



168-170 Bury Old Road, Manchester

Noise Impact Assessment

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22109-R01-JT-168-170 Bury Old Road, Manchester

Client: Mayfair Estates

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Revision History

Revision	Date	Revision Details	Author	Checked
R01	19/12/2022	Original Issue	<i>Susan Witterick</i> Joseph Tony BTech MIOA	Susan Witterick BSc MIOA

1 INTRODUCTION

- 1.1 dBx Acoustics Ltd has been appointed by Mayfair Estates, to discharge a planning condition associated with planning application reference 127106/FO/2020 for the erection of 12 dwellinghouses (Class C3) to front both Bury Old Road and Catherine Road, Manchester M7 4QY.

- 1.2 Condition 8 states:

“The dwellinghouses hereby approved shall be acoustically insulated and treated to limit the break out of noise in accordance with a noise study and a scheme of acoustic treatment that has been submitted to and approved in writing by the City Council as Local Planning Authority. The scheme shall be implemented in full before the dwellinghouses are occupied.

Upon completion of the development and within 3 months of first occupation, a Verification Report will be required to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic consultant's report. The report shall also undertake post completion testing to confirm that acceptable criteria has been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.

Reason - To safeguard the amenities of the occupiers of the buildings and occupiers of nearby properties, pursuant to saved policy DC26 of the Unitary Development Plan for the City of Manchester and policies SP1 and DM1 of the Core Strategy.”

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

2 CRITERIA

Local Authority Criteria

- 2.1 Condition 8 (see Paragraph **Error! Reference source not found.**) requires that a scheme of sound insulation to control noise intrusion to the proposed development should be provided.
- 2.2 Manchester City Council's *Planning & Noise Technical Guidance (October 2022)* sets out Manchester City Council's (MCC) 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.
- 2.3 MCC has adopted the following internal noise limits for residential properties:
 - Bedrooms (night time 23:00-07:00h) 30 dB $L_{Aeq, 8h}$ (individual noise events should not normally exceed 45 dB $L_{Amax,F}$ more than 15 times);
 - Living Rooms (daytime – 07:00-23:00h) 35 dB $L_{Aeq, 16h}$.
- 2.4 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)

- 2.5 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.
- 2.6 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 impact 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 tranquility which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.
- 2.7 With specific reference to noise impact, the NPPF document refers to the Noise Policy Statement for England (NPSE).

Noise Policy Statement for England (NPSE)

- 2.8 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:

- 2.9 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

- 2.10 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

- 2.11 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.
- 2.12 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.
- 2.13 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.

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 reported 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'

Indoor Noise Level Limits

- 2.14 BS 8233:2014 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: Indoor 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 $L_{Aeq,8h}$

- 2.15 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 (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.
- 2.16 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.
- 2.17 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 45 $dB L_{Amax,F}$ more than 10-15 times a night.

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

- 2.18 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.
- 2.19 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 $L_{Ar,Tr}$ below the typical background L_{A90} level at the nearest noise sensitive location.
- 2.20 The Rating Level ($dB_{L_{Ar,Tr}}$) 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.
- 2.21 BS 4142:2014 seeks to determine a “representative” Background Sound Level, stating that
- 2.22 “...the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods”.
- 2.23 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.

3 SITE DESCRIPTION

Site Description

- 3.1 The proposed site is located between Bury Old Road and Catherine Road, Manchester. A site location plan is provided as Figure 1, below, which illustrates the location of the site, and the surrounding area.
- 3.2 The area surrounding the site is predominantly residential.
- 3.3 Figure 1 illustrates the location of the building, and the nearest noise sensitive receptors (NSRs).

Figure 1: Site Boundary and Nearby Noise Sensitive Properties



Nearby Noise Sensitive Receptors (NSR)

- 3.4 The nearest noise sensitive receptors are the residential receptors overlooking Bury Old Road and Catherine Road, approximately 4m to the east and west.

Noise Sources

- 3.5 The dominant noise source at this site is road traffic on Bury Old Road, with contributions from traffic on the surrounding road network. The maximum noise events were caused by bus movements on Bury Old Road, in particular from buses stopping at and pulling away from the bus stop adjacent to the site boundary.

Proposed Development

- 3.6 The proposed development consists of 12 houses, 6 accessed off Bury Old Road and 6 from Catherine Road as presented in Figure 2 below.

Figure 2: Site Plan



4 NOISE SURVEY

Methodology

- 4.1 dBx Acoustics has undertaken noise measurements at the site to establish the existing ambient, background and maximum noise levels affecting the site and its surroundings.
- 4.2 Unattended noise measurements were undertaken between Thursday 1st December 2022 and Monday 5th December 2022. The measurement locations are shown in Figure 3, below.

Figure 3 : Noise Monitoring Locations



- 4.3 The microphones were mounted on a pole above the site hoarding, in free-field conditions.
- 4.4 Noise levels were measured continuously over the survey period, which therefore included daytime, evening and night-time periods (including rush hour periods).
- 4.5 Measurements were undertaken in accordance with BS 7445-1:2003 '*Description and Measurement of Environmental Noise*', with microphones located at approximately 1.5 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.

Equipment

- 4.6 The equipment used during the environmental noise survey is detailed in Table 3.

Table 3: Equipment Used in the Environmental Noise Survey

Measurement Locations (Figure 3)	Equipment	Manufacturer & Part No	Serial Number
A	Sound Level Meter	Norsonic Nor140	1403443
	Microphone	Norsonic Nor1225	18437
	Calibrator	B&K 4231	1821323
B	Sound Level Meter	Cirrus 171C	G300656
	Microphone	MK:224	215619A
	Calibrator	Cirrus 515	87921

- 4.7 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.

Weather Conditions

- 4.8 Weather conditions throughout the survey period were suitable for environmental measurements with wind speeds of less than 5 m/s. No precipitation was recorded during the noise survey. Temperatures varied between 2°C and 7°C.

5 ENVIRONMENTAL NOISE SURVEY RESULTS

- 5.1 A summary of the day and night-time noise levels measured at the long-term noise monitoring Locations A and B are presented in Tables 4 and 5, below.

Table 4: Summary of Measured Noise Levels at Location A (Catherine Road)

Day/Date	Period (hh:mm)	Ambient Noise Level (dB L _{Aeq,T})	Maximum Noise Level (dB L _A F _{max})	Typical Background Noise Level (dB L _{A90, 15mins})
Thursday 1st December 2022	Daytime (14:45-23:00)	59	n/a	51
	Night-Time (23:00-07:00)	51	73	28
Friday 2nd December 2022	Daytime (07:00-23:00)	58	n/a	50
	Night-Time (23:00-07:00)	49	69	40
Saturday 3rd December 2022	Daytime (07:00-23:00)	56	n/a	49
	Night-Time (23:00-07:00)	51	69	39
Sunday 4th December 2022	Daytime (07:00-23:00)	58	n/a	51
	Night-Time (23:00-07:00)	51	71	37

Table 5: Summary of Measured Noise Levels at Location B (Bury Old Road)

Day/Date	Period (hh:mm)	Ambient Noise Level (dB L _{Aeq,T})	Maximum Noise Level (dB L _{AFmax})	Typical Background Noise Level (dB L _{A90, 15mins})
Thursday 1st December 2022	Daytime (15:00-23:00)	74	n/a	63
	Night-Time (23:00-07:00)	69	87	30
Friday 2nd December 2022	Daytime (07:00-23:00)	75	n/a	65
	Night-Time (23:00-07:00)	69	87	39
Saturday 3rd December 2022	Daytime (07:00-23:00)	74	n/a	62
	Night-Time (23:00-07:00)	69	87	42
Sunday 4th December 2022	Daytime (07:00-23:00)	76	n/a	68
	Night-Time (23:00-07:00)	70	86	40

- 5.2 The maximum noise levels (L_{Fmax}) shown represent typical occurrences; these are not exceeded more than 15 times per night, in accordance with the WHO guidance.
- 5.3 Appendix B of this report presents a time history graph for each location showing the ambient, background and maximum noise levels measured.

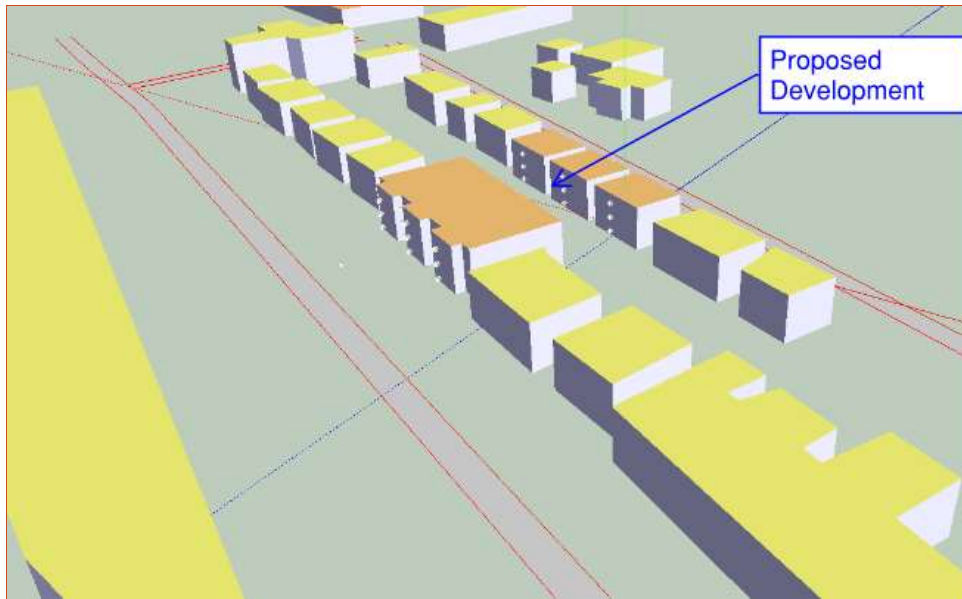
6 NOISE MODEL

Acoustic Modelling Exercise

- 6.1 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 Google Maps to ensure that the location and height of surrounding buildings, is accurately represented within the model.
- 6.2 The model of the undeveloped site has been calibrated against the noise data captured during the noise survey and summarised in Table 4 and Table 5, above.
- 6.3 The model has then been populated with the proposed buildings 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.
- 6.4 The following figures, Figure 4 and 5, present screenshots extracted from the acoustic modelling software.

Figure 4: Site Boundary and Nearby Noise Sensitive Properties



Figure 5 – Acoustic Model (3D)

Noise Modelling Results

- 6.5 The noise maps presented below in Figures 6 and 7 are derived from the results of the environmental noise survey, illustrating how noise propagates in the local area and affects the proposed development site.
- 6.6 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 (1.5m above ground).

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

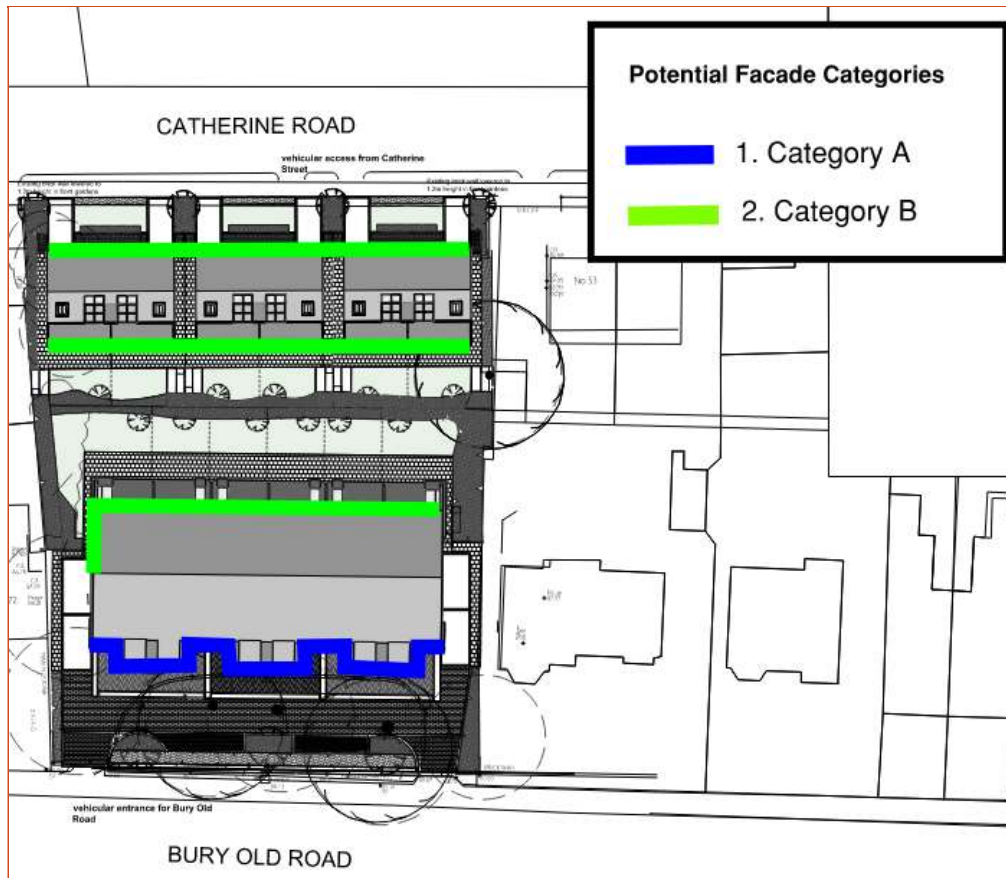


Figure 7 : Night-time Ambient Noise Map (1.5m above ground) -Site and Surroundings



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

Figure 8: Indicative Façade Categories



- 6.8 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 difference to affect the envelope requirements, and hence the worst-case noise level has been used for the assessment of each façade.
- 6.9 Table 6 below presents the predicted typical worst-case daytime and night-time noise levels used for the noise ingress assessments.

Table 6: Predicted Typical Worst-case External Noise Levels at Façades (Figure 8)

Façade (Figure 8)	Predicted Daytime Ambient Noise Level (dB LAeq,16 hours)	Predicted Night-time Ambient Noise Level (dB LAeq,8 hours)	Predicted Night-time Maximum Noise Level (dB LAfMax,8 hours)
Category A	72	66	83
Category B	50	44	60

7 BUILDING ENVELOPE SOUND INSULATION

Indoor Ambient Noise Criteria

- 7.1 The indoor noise criteria which have been adopted for the proposed development using BS 8233:2014 and WHO guidelines are outlined in Table 7, below. Achieving these limits will also ensure compliance with Manchester City Council's requirements.

Table 7: Indoor 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

- 7.2 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.
- 7.3 With reference to the predicted levels at the building facades presented in Table 6, and the allowable external noise levels detailed above, it can be seen that the required internal ambient noise levels can be achieved using open windows for natural ventilation for all facades other than those overlooking Bury Old Road, for which background ventilation will need to be provided via alternative means.
- 7.4 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:
- Drawing Number: 0303, P-00 dated 22.05.20 (Proposed site plan)
 - Drawing Number: 19567-0304, P-00 dated 21.05.20 (Proposed elevations)
 - Drawing Number: 19567-0308, P-00 dated 20.05.20 (Proposed floor plans)
 - Drawing Number: 19567-0310, P-00 dated 20.05.20 (Proposed elevations)
 - Drawing Number: 19567-0311, P-00 dated 21.05.20 (Proposed sections)
 - Drawing Number: 19567-0312, P-00 dated 21.05.20 (Proposed floor plans)
 - Drawing Number: 19567-0313, P-00 dated 22.05.20 (Proposed floor plans)
 - Drawing Number: 19567-0314, P-00 dated 21.05.20 (Proposed sections)
- 7.5 Based on the predicted noise levels on each elevation, the requirements for the glazing and ventilation required to facades facing Bury Old Road to achieve the internal ambient and maximum noise level limits have been calculated, as detailed in Table 8, below.

Table 8– Glazing Sound Insulation Requirements

Façade	Room	Glazing Sound Insulation Performance, dB R_w (+ C_{tr})	Example Glazing Construction, mm	Ventilator Sound Insulation Performance, dB $D_{n,e,w}$
Category A	Living Rooms	42 (-7)	10mm/TC/8.8mm (A)	44
	Bedrooms	46 (-7)	6.5mm(A)/ 14mm (TC) /13mm (A)	46

Note: A- Acoustic Laminated glass; TC = Thermal Cavity;

- 7.6 **NB:** ¹ The acoustic performance of ventilators required to bedrooms overlooking Bury Old Road is onerous and may require the use of mechanical ventilation. Should a natural ventilation system be pursued, e.g. in-wall vents, it should be noted that if multiple ventilators are required the sound insulation performance of each would be increased by $10 \log n$ dB where n is the number of ventilators.
- 7.7 The stated sound insulation performance must be achieved by the window as a whole, including frames, seals, opening lights etc., as opposed to the glass panels alone.
- 7.8 The glazing configurations shown above are suggestions only, and alternative configurations may be acoustically suitable.
- 7.9 The external wall and roof should achieve a sound insulation performance at least 10dB greater than the glazing. This is not an onerous requirement and would be achieved with the cavity masonry construction, and a tiled roof with plasterboard ceiling.

Overheating

- 7.10 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.
- 7.11 MCC require that an assessment is made based on guidance in the Association of Noise Consultants' document '*Acoustics, Ventilation and Overheating Guide*' (2020) (AVO). This guidance is not definitive.
- 7.12 Primarily, a Stage 1 assessment is undertaken by considering the external noise levels. External daytime noise levels of $50\text{dBL}_{\text{Aeq,T}}$ are considered 'negligible risk', while a noise level of $65\text{dBL}_{\text{Aeq,T}}$ is considered 'high risk'. At night, these limits are reduced to $45\text{--}55\text{dBL}_{\text{Aeq,T}}$.
- 7.13 As can be seen from Table 6, Category A façades would be considered to be within the 'high risk' criteria during daytime and night-time and Category B façades would be considered to be within the 'medium' risk criteria during the daytime and 'high' risk at night.
- 7.14 On this basis, a Level 2 assessment should be undertaken.
- 7.15 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'.
- 7.16 However, indoor noise level limits of $50\text{dBL}_{\text{Aeq,16hour}}$ in the day, and $42\text{dBL}_{\text{Aeq,8hour}}$ and $65\text{dBL}_{\text{Amax,F}}$ at night are the limits at which '*Noise causes a material change in behaviour 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.*'
- 7.17 These limits would therefore appear to be a worst-case upper limit.
- 7.18 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) with which the overheating condition occurs.
- 7.19 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 $63\text{dBL}_{\text{Aeq,16hour}}$ in the day, and $55\text{dBL}_{\text{Aeq,8hour}}$ and $78\text{dBL}_{\text{Amax,F}}$ at night.
- 7.20 With reference to Table 6, above, therefore, it can be seen that these noise levels are exceeded in rooms in Category A at all times. These facades are therefore likely to require some form of attenuated ventilation, or mechanical ventilation, to control noise ingress during the overheating condition.
- 7.21 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 ventilation strategy are known.

8 EXTERNAL AMENITY AREAS

- 8.1 Based on MCC's requirements and BS8233:2014 guidance, daytime noise levels of no more than 55 dB_{L_{Aeq} (16 hour)} are to be targeted in the proposed outdoor amenity areas.
- 8.2 The predicted external daytime noise levels at the external amenity areas to the rear of the houses is predicted to be in the order of 50dB _{L_{Aeq},16hour}. This is compliant with MCC requirements.
- 8.3 The daytime _{L_{Aeq},16 hour} noise levels on balconies overlooking Bury Old Road would be in the order of 74 dB _{L_{Aeq} 16 hour} and balconies overlooking Catherine Road would be in the order of 58 dB _{L_{Aeq},16 hour}.
- 8.4 British Standard 8233 gives the following guidance in relation to 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."*
- 8.5 In the case of the proposed development, access to peaceful amenity space for all residents is provided at the rear of the properties.

9 BUILDING SERVICES NOISE EMISSIONS

- 9.1 Manchester City Council's '*Planning & Noise Technical Guidance*' (October 2022) states that the rated plant noise level should be controlled to 5dB below the background noise level during the periods in which the plant operates.
- 9.2 Consequently, suitable limits to which the cumulative plant noise should adhere have been determined, and are presented in Table 9.

Table 9: Proposed Building Service External Noise Limits

Noise Sensitive Receptors (Figure 1)	External Building Services Plant Noise Limit ($L_{A,T}$) dB	
	Daytime 07:00 – 23:00 hours (T = 1 hour)	Night-time 23:00 – 07:00 hours (T = 15 minutes)
NSRs overlooking Bury Old Road	57 dB	25 dB
NSRs overlooking Catherine Road	44 dB	23 dB

10 SUMMARY AND CONCLUSION

- 10.1 dBx Acoustics Ltd has been appointed by Mayfair Estates, to discharge planning condition 8 associated with planning application reference 127106/FO/2020 for “Erection of 12 dwellinghouses (Class C3) to front both Bury Old Road and Catherine Road, together with associated parking, landscaping and boundary treatment” at 168-170 Bury Old Road, Manchester M7 4QY.
- 10.2 A noise survey was undertaken around the site to determine existing noise levels affecting the site and nearby noise sensitive receptors.
- 10.3 Using these noise levels, calculations have been undertaken to determine the sound insulation requirements for glazing and the ventilators to achieve internal noise level limits in compliance with MCC’s requirements.
- 10.4 Plant noise limits have been set such Manchester City Council’s plant noise limit is achieved.
- 10.5 External amenity areas to the rear of the premises will be compliant with MCC’s daytime noise level.
- 10.6 Taking the above into account, noise should not be a limiting factor in any planning application.

APPENDIX A – GLOSSARY OF ACOUSTIC TERMINOLOGY

Decibel, dB	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (L_p) the reference quantity is 2×10^{-5} N/m ² . The sound pressure level existing when microphone measured pressure is 2×10^{-5} 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_{Fmax}	The instantaneous maximum sound pressure level which occurred during the measurement. F indicates that the fast time-weighting is used.
L_{AFmax}	The instantaneous maximum A weighted sound pressure level which occurred during the measurement. F indicates that the fast time-weighting is used.
$L_{Ar,Tr}$	The rating level: the equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise.
Reverberation Time, T	The time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped. The descriptor T, often includes other nomenclature to describe the type of reverberation time measurement or if the reverberation time is an average taken for specific frequencies. For example, a T_{mf} is the mid-frequency reverberation time.
Absorption Coefficient, α	The fraction of reverberant sound energy absorbed by a material. It is expressed as a value between 1.0 which equates to perfect absorption and 0 which equates to zero absorption.
Acoustic Class, A - E	Classification of sound absorbers into Sound Absorption Classes A-E, according to BS EN ISO 11654, including frequencies 200-5000 Hz
NRC	A single-number rating system used to compare the sound-absorbing characteristics of building materials. A measurement of the acoustical absorption performance of a material, calculated by averaging its Sound Absorption Coefficients at 250, 500, 1000 and 2000 Hz
STI	Speech Transmission Index , Metric ranging between 0 and 1 representing the transmission quality of speech with respect to intelligibility by a speech transmission channel
R	Sound Reduction Index , the laboratory measured sound insulation properties of a material or building element in octave or third octave bands.
R_w	Weighted Sound Reduction Index , a single number which represents the sound reduction of a material. It is derived by plotting the sound reduction index against a set of reference curves. The curves are shifted until a best-fit is established and the curve which best fits the sound reduction spectrum is used to represent the single figure value.
D_w	Weighted Level Difference , the weighted level difference between a pair of rooms, stated as a single figure.

D_{nT}	Standardised Level Difference, a frequency-dependent measurement of airborne sound insulation, calculated using the following formula: $D_{nT} = L_1 - L_2 + 10\log(T/T_0)$ dB Where: L_1 is the energy-averaged sound pressure level due to the pink noise source measured in the source room using a sweep technique. L_2 is the energy-averaged sound pressure level measured in the receiving room using a sweep technique. T is the mean receiving room reverberation time (derived from T_{30} measured in seconds). T_0 is the reference reverberation time (= 0.5s for dwellings).
$D_{nT,w}$	Weighted Standardised Level Difference, a single-figure value of airborne sound insulation performance, derived according to procedures in BS EN ISO 717-1, based on the D_{nT} values at different frequencies (100-3150 Hz third octave bands).
D_{nFw}	Weighted, Normalised Flanking Level Difference, the normalised, weighted difference in sound level between a pair of rooms via a flanking element, such as mullion or ceiling detail. The level difference in octave bands is first normalized to a reference amount of absorption and then plotted against a set of reference curves to establish a single figure value.
D_{ne}	Normalised Element Level Difference, The normalised difference in sound level between a pair of rooms via a small element such as a trickle ventilator. The level difference in octave bands is normalized to a reference amount of absorption.
D_{new}	Weighted, Normalised Element Level Difference, The normalised, weighted difference in sound level between a pair of rooms via a small element such as a trickle ventilator, stated as a single figure. The level difference in octave bands is normalized to a reference amount of absorption and then plotted against a set of reference curves to establish a single figure value.
C_{tr}	Spectrum Adaptation Term, a correction term applied to the sound insulation single-number values (R_w, $D_{w,w}$, and $D_{nT,w}$) in accordance with BS EN ISO 717-1. Applying the C_{tr} penalises a construction's performance if its low frequency performance is poor in relation its performance at higher frequencies.
Impact Sound	The noise generated by an impact on a structure. This is normally used to describe the noise created by people walking or moving furniture on a floor structure.
L_{nT}	Standardised Impact Sound Pressure Level, a frequency dependent measurement of impact sound insulation, calculated using the following formula: $L_{nT} = L_1 + 10\log(T/T_0)$ dB Where: L_1 is the mean sound pressure level due to the tapping machine measured in the receiving room using a sweep technique. T is the mean receiving room reverberation time (derived from T_{30} measured in seconds). T_0 is the reference reverberation time (0.5s for dwellings)
$L'_{nT,w}$	Weighted Standardised Impact Sound Pressure Level, a single-figure value (@ 500 Hz) of impact sound insulation, performance, derived according to BS EN ISO 717-2, based on the L_{nT} values at different frequencies (100Hz- 3150 Hz third octave bands).
Insertion Loss, IL	The reduction of noise level due to the presence of a noise control device such as an attenuator, excluding any regeneration noise created by its presence.
NR	The Noise Rating level. This is a single figure value derived by plotting a noise spectrum against a set of curves. The curve under which the spectrum fits is the resulting NR level.

APPENDIX B – TIME HISTORY GRAPH

Figure 9: Time History Graph of Measured Noise Levels - Position A Catherine Road

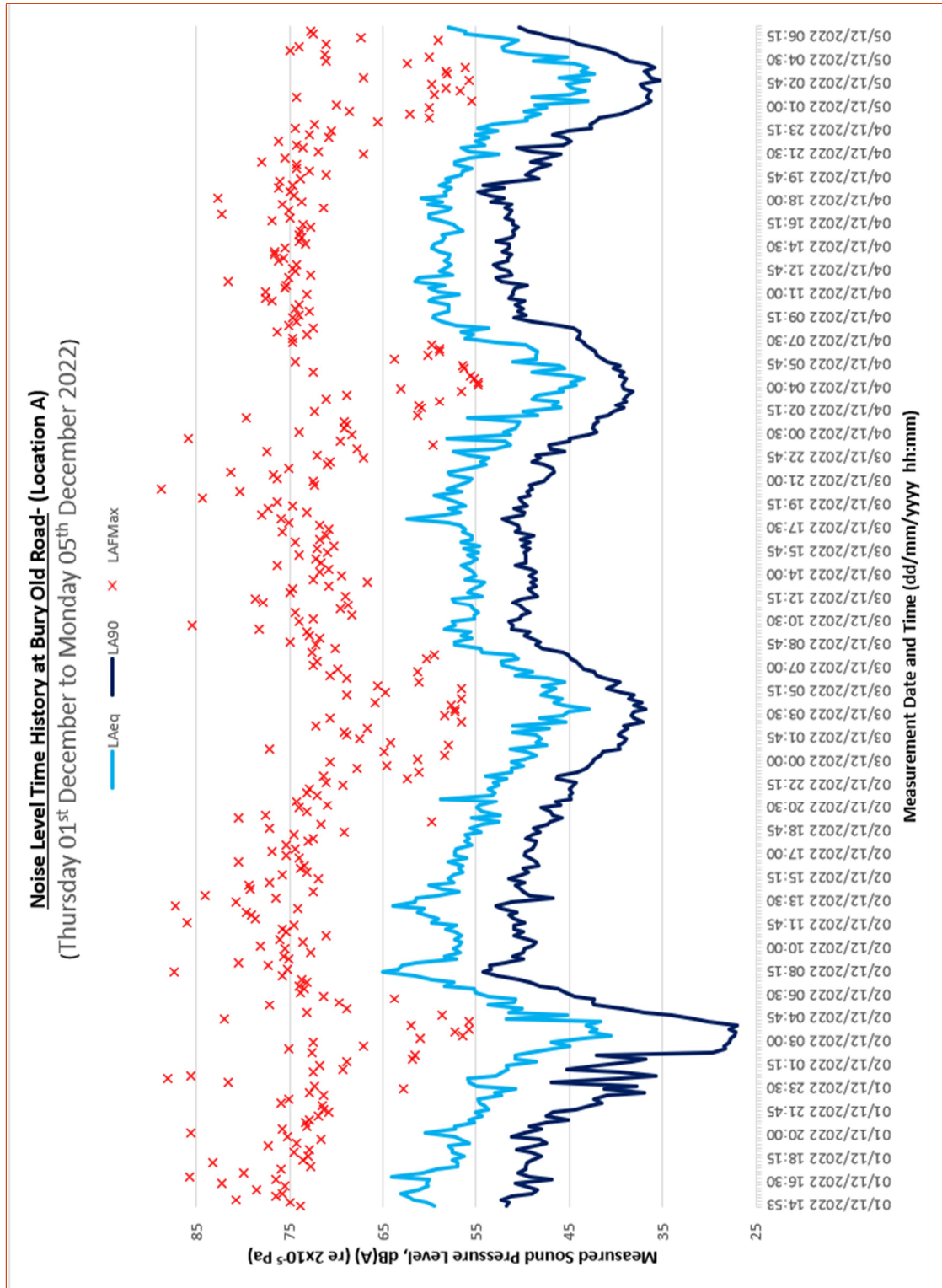


Figure 10: Time History Graph of Measured Noise Levels - Position B Bury Old Road

