

ACOUSTICS

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Palatine Road & Brett Street,
Northenden, Manchester

Noise Impact Assessment

221105

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EXECUTIVE SUMMARY

BWB Consulting was instructed by Express Solicitors to undertake a Noise Impact Assessment to support an outline application for a proposed mixed-use residential development at Palatine Road and Brett Street, Northenden in Manchester M22 4HH.

The proposed development is understood to comprise of a cluster of single aspect mews houses, three additional single aspect mews houses presenting a residential edge onto Allanson Road, and a four-storey new-build mixed-use development fronting Palatine Road comprising a retail/commercial base at ground floor level, with a mix of one- and two-bedroom apartments on the upper floor levels.

A baseline noise survey was undertaken at the Site in March 2023. The survey, and subsequent assessment work, have been undertaken in accordance with current standards and guidance.

It is considered that noise levels can be suitably controlled to within recommended acoustic design standards, subject to a commensurate level of protection being included in the design of the building façade, so that an appropriate acoustic environment can be provided to all future occupants, and that impacts associated with the operation of the Development can be controlled.

CONTENTS

EXECUTIVE SUMMARY	iii
1. INTRODUCTION.....	1
Appointment & Background.....	1
Site Setting	1
Proposed Development	2
2. STANDARDS AND GUIDANCE	4
BS 8233:2014: Guidance on Sound Insulation and Noise Reduction for Buildings.....	4
World Health Organisation (WHO) 1999: Guidelines for Community Noise	5
BS 4142:2014+A1:2019; 'Methods for rating and assessing industrial and commercial sound'	5
Manchester City Council: Planning and Noise Technical Guidance document	7
Consultation with Manchester City Council.....	7
3. BASELINE NOISE CONDITIONS	8
Measurement Equipment.....	9
Meteorological Conditions.....	9
Measurement Results	10
4. ASSESSMENT	11
Internal Noise Levels	11
External Daytime Noise Levels.....	13
Noise Break-out from Commercial Use	13
Building Services Plant Noise	14
5. CONCLUSION	16
Noise.....	19
Acoustic Terminology	20

FIGURES

Figure 1.1: Site Location

Figure 1.2: Proposed Site Plan

Figure 3.1: Baseline Noise Measurement Locations

APPENDICES

APPENDIX A: Glossary of Terms

APPENDIX B: Full Baseline Monitoring Results

1. INTRODUCTION

Appointment & Background

- 1.1 This noise impact assessment has been prepared by BWB Consulting Ltd (hereafter 'BWB') on behalf of Express Solicitors (hereafter '*the Applicant*') as part of their application to obtain outline planning consent for the proposed mixed-use residential development at Palatine Road and Brett Street, Northenden in Manchester M22 4HH (hereafter referred to as '*the Site*'), which comprises of a cluster of single aspect mews houses, three additional single aspect mews houses presenting a residential edge onto Allanson Road, and a four-storey new-build mixed-use development fronting Palatine Road comprising a retail/commercial base at ground floor level, with a mix of one- and two-bedroom apartments on the upper floor levels (hereafter referred to as '*the Development*').
- 1.2 This report considers the Site's suitability for the nature of its intended uses and to determine the potential impacts of the proposed Development upon nearby existing sensitive receptors. The following works have been undertaken;
- Preliminary façade sound insulation assessment to provide early indication of the necessary façade airborne sound insulation required to achieve appropriate internal noise levels, whilst protecting against noise break-out from the commercial units, and
 - The setting of appropriate noise emission limits for new fixed building services plant associated with the Development.
- 1.3 This report is necessarily technical in nature, so to assist the reader, a glossary of acoustic terminology can be found in **Appendix A**.

Site Setting

- 1.4 The Site measures 0.32 hectares and is situated in Northenden and is located within the administrative area of the Manchester City Council (MCC). The Site is centred on national grid reference 383066, 390295.
- 1.5 The proposed development Site(s) are made up of two separate sites. The main larger site of the two sites borders Palatine Road to the west, which is a busy commercial high-street, and Allanson Road to the east beyond which are existing residential dwellings. This site currently has two existing buildings (Resolution building, and Annex building) and car parking spaces, which is all currently actively occupied by the client '*Express Solicitors*'.
- 1.6 The second site parcel is located on the corner of Allanson Road and Brett Street, which is largely residential in nature. **Figure 1.1** presents the Site locations.

Figure 1.1: Site Location



Proposed Development

- 1.7 The proposed development is understood to comprise of a cluster of single aspect mews houses, three additional single aspect mews houses presenting a residential edge onto Allanson Road, and a four-storey new-build mixed-use development fronting Palatine Road comprising a retail/commercial base at ground floor level, with a mix of one- and two-bedroom apartments on the upper floor levels. An indicative drawing of the proposed Site Plan is presented in **Figure 1.2**.

Figure 1.2: Proposed Site Plan



Figure 1.3: Proposed Ground Floor Level Plan



2. STANDARDS AND GUIDANCE

- 2.1 When selecting appropriate criteria for assessment, consideration has been given to relevant planning policy and regulations concerning the Development. Consideration has been given to advice contained within the National Planning Policy Framework (NPPF)¹, the Noise Policy Statement for England (NPSE)² and Noise Planning Practice Guidance³, although direct noise and vibration assessment criteria has not been drawn from these documents.
- 2.2 With regard to acoustic design and noise control, the NPPF provides a set of overarching aims, broadly reflecting those already contained in the NPSE. They are directed towards the avoidance of significant adverse impacts and reduction of other adverse impacts on health and quality of life; set within the context of the Government's policy on sustainable development.

BS 8233:2014: Guidance on Sound Insulation and Noise Reduction for Buildings

- 2.3 This standard provides guidance for the control of noise in and around buildings. The guidance provided within the document is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.
- 2.4 The guidance provided includes appropriate internal and external noise level criteria which are applicable to dwellings for steady external noise sources. It is stated that it is desirable that the internal ambient noise level does not exceed the following criteria set out in **Table 2.1**:

Table 2.1: Summary of Internal Ambient Noise Levels to be Achieved in Habitable Rooms when Assessed in Accordance with BS 8233

Activity	Location	Period	
		07:00 to 23:00 Hours, i.e. Daytime	23:00 to 07:00 Hours, i.e. Night-time
Resting	Living Room	35 dB LAeq, 16 Hour	-
Dining	Dining Room/area	40 dB LAeq, 16 Hour	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq, 16 Hour	30 dB LAeq, 8 Hour

- 2.5 Whilst BS 8233:2014 recognises that a guideline value may be set in terms of SEL or LA_{Fmax} for the assessment of regular individual noise events that can cause sleep disturbance during the night-time, a specific criterion is not stipulated. Accordingly, reference has been made in this assessment to the World Health Organisation (WHO) 1999: *Guidelines for Community Noise* below.

¹ Department for Communities and Local Government (DCLG) (2012); 'The National Planning Policy Framework', TSO.

² Department for Environment, Food and Rural Affairs (DEFRA) (2010); 'Noise Policy Statement for England', DEFRA.

³ DCLG (2014); 'Planning Practice Guidance website', DCLG. (<http://planningguidance.planningportal.gov.uk/>)

- 2.6 With respect to external amenity space such as gardens and patios it is stated that it is desirable that the noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. It is then confirmed that higher external noise criteria may be appropriate under certain circumstances such as within city centres urban areas, and locations adjoining the strategic transportation network, where it may be necessary to compromise between elevated noise levels and other factors such as convenience of living, and efficient use of land resource.

World Health Organisation (WHO) 1999: Guidelines for Community Noise

- 2.7 The World Health Organisation (WHO) guidance: 1999: Guidelines for community noise includes guidance for individual maximum noise events during the night-time. This document draws upon guidance from Vallet and Vernay, which states:

"For good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night"

BS 4142:2014+A1:2019; 'Methods for rating and assessing industrial and commercial sound'

- 2.8 The effect of industrial noise on the nearest noise sensitive residences will be assessed in accordance with BS4142:2014+A1:2019⁴.
- 2.9 The standard describes a method of determining the level of sound of a commercial nature, together with procedures for assessing the impact of such a sound outside nearby noise sensitive areas.
- 2.10 The standard may be thought of as a procedure for comparing the sound from commercial sources with background sound levels in the absence of the commercial sound and determining the likely impact of the sound on noise sensitive residences.
- 2.11 In accordance with BS 4142 the background sound level is the typical A-weighted sound pressure level at the assessment position that is exceeded for 90% of a given time interval (L_{A90}). The specific sound level is the equivalent continuous (L_{Aeq}) sound pressure level at the assessment position produced by the commercial source over a given time interval.
- 2.12 Certain acoustic features can increase the impact over that expected from a simple comparison between the specific sound level and the background level. Where such features are present, these are taken into account by adding corrections to the specific sound level.
- 2.13 This correction is applied based on whether the following features occur or are expected to be present. The correction values can either be determined subjectively, or by various objective measurement procedures.

⁴ British Standard (BS) 2014, BS 4142:2014 'Methods for rating and assessing industrial and commercial sound', British Standards Institution (BSI).

- The sound contains a distinguishable, discrete, continuous tone (whine, hiss, screech, hum, etc.). 0 – 6 dB penalty
- The sound contains distinct impulses (bangs, clicks, clatters, or thumps). 0 – 9 dB penalty.
- The sound is irregular enough to attract attention. 0 – 3 dB penalty.
- Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

2.14 From the addition of the above penalties where appropriate the rating level is established, this being the value that is compared with the background noise. Note that corrections for impulsivity and tonality may be added arithmetically where both are present and likely to affect perception within the same reference period. However, if any single feature is dominant to the exclusion of the others, then it might be appropriate to apply a reduced or even zero correction for the minor characteristics.

2.15 According to BS 4142, an initial estimate of the impact is given based on the rating level value as follows:

- a rating level 10 dB(A) or more above the background is an indication of significant adverse impact, depending on the context.
- a rating level 5 dB(A) above the background is an indication of an adverse impact, depending on the context.
- where the rating level does not exceed the background level, this is an indication of the specific sound source having a low impact, depending on the context.

2.16 BS4142 indicates that the noise source should be evaluated over the appropriate time interval which is as follows:

- 1-h during the day (07:00 – 23:00)
- 15-min during the night (23:00 – 07:00)

2.17 The above initial assessment may then be modified depending on the context, to take into account.

- The absolute level of the sound.
- The character and level of the residual sound compared to the character and level of the specific sound.
- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:
 1. Façade insulation treatment;
 2. Ventilation and / or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
 3. Acoustic screening.

Manchester City Council: Planning and Noise Technical Guidance document

- 2.18 Manchester City Council's (MCC) Planning and Noise Technical Guidance document (Dec 2015) states the following regarding noise and vibration from fixed plant:

'Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location'.

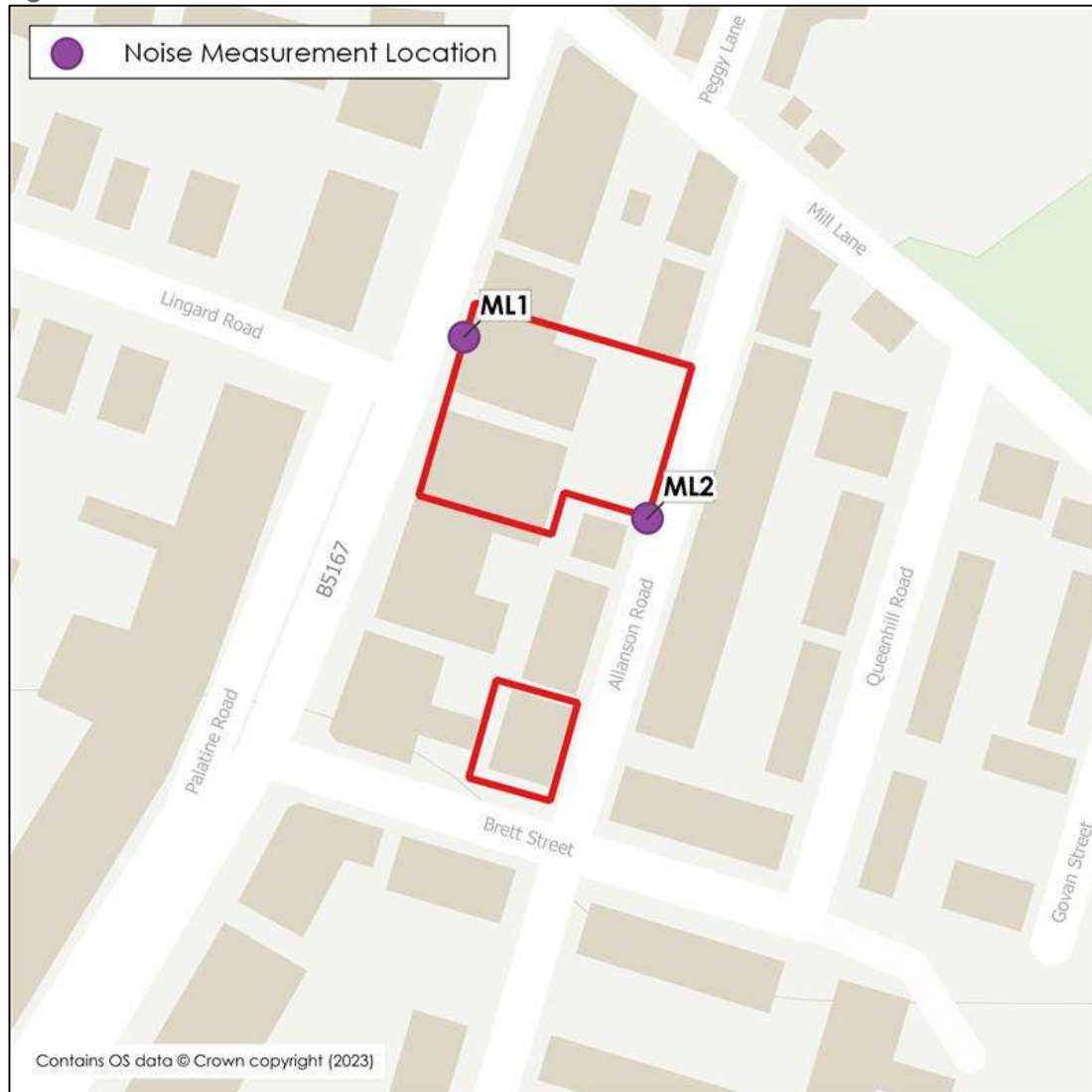
Consultation with Manchester City Council

- 2.19 Consultation was undertaken with the Environmental Health Officer (EHO) at MCC by email on 17th March 2023, seeking opinion on the specific requirement of a noise impact assessment and agreement on monitoring strategy.
- 2.20 A formal response was not received from MCC; therefore, the industry standards and guidance's stipulated in this section of the report has been considered appropriate for this assessment.

3. BASELINE NOISE CONDITIONS

- 3.1 An environmental baseline noise survey was undertaken to establish and quantify the existing noise climate on, and within the vicinity of, the Site.
- 3.2 Unattended noise measurements were undertaken at two monitoring locations (ML). The noise MLs are presented below in **Figure 3.1**.

Figure 3.1: Baseline Noise Measurement Locations



- 3.3 Details of the noise measurements are given below in **Table 3.1**

Table 3.1: Summary of Monitoring Observations

Monitoring Location	Description	Observations and Predominant Noise Sources
ML1	Facade measurement taken at the western aspect of the site directly overlooking Palatine Road. Meter was installed at the second floor level of the existing building, approximately 9m above ground Level (AGL).	The noise climate was dominated by local road traffic noise, namely Palatine Road, as well as low-level pedestrian pass-bys having an influence in the recordings, to some extent. This is typical of the busy town centre location.
ML2	Free-field measurement taken at the eastern site boundary, overlooking Allanson Road. and within the carparking area of the site. Meter approximately 1.5m AGL., and 3m away from nearby facades.	The noise climate was dominated by local wider road traffic noise, local pedestrian pass-bys, and intermittent noise of vehicular activities associated with the use of the carparking area.

Measurement Equipment

- 3.4 The noise measurements were undertaken using Class 1, integrating sound level meters, details of which are presented in **Table 3.2**. The sound level meters were calibrated to a reference level of 94dB at 1kHz both before, and on completion of the noise survey. No drift in the calibration was noted during the survey.

Table 3.2: Noise monitoring equipment

Survey Location	Equipment	Make & Model	Serial Number	Calibration Due Date
ML1	Sound Level Meter	Svantek 971	72616	June 2024
	Microphone	ACO 7052E	69463	
	Calibrator	Svantek SV33A	73421	June 2023
ML2	Sound Level Meter	01dB Fusion	14147	Oct 2023
	Microphone	Gras 40CD	466821	
	Calibrator	01dB CR515	98098	Dec 2023

- 3.5 The sound level meters, pre-amplifiers and microphones were calibrated to traceable standards within the 24-months prior to the measurements. The portable calibrators were calibrated within the 12-months preceding the date of the survey. Calibration certificates can be provided upon request.

Meteorological Conditions

- 3.6 The weather conditions remained conducive to environmental noise measurement, it being largely dry with negligible winds (<5ms⁻¹) between 15^h and 16^h March 2023. On 16th March 2023, winds increased to approximately 7 m/s⁻¹ at noon with slight rainfall noted towards 1300 hours. However, this data has not been utilised within the following assessment.

Measurement Results

- 3.7 A summary of measured sound pressure levels is presented in **Tables 3.3 – 3.8**. Full results are provided in **Appendix B**.

Table 3.3: Summary of measured sound pressure levels at ML1

Start Date and Time	Period	dB L _{Aeq,T}	dB L _{A90,T}	dB L _{Afmax}
15/03/2023 13:00	Daytime (07:00 – 23:00) ¹	73	64 ²	-
16/03/2023 23:00	Night-time (23:00 – 07:00)	68	50 ²	83
¹ Includes periods between 13:00 and 23:00 on the 15 th March and between 07:00 and 13:00 on the 16 th March 2023. ² Mean of measured L _{A90,15min} values during period. ³ 10 th Highest of measured L _{Afmax,15min} values during the night-time.				

Table 3.4: Summary of measured octave band sound pressure levels at ML1

Period	Octave Band Sound Pressure Levels (L _{eq} dB)								dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz	
Daytime	69	63	62	57	66	62	57	49	73
Night-time	64	58	56	52	61	57	52	46	68

Table 3.5: Summary of measured sound pressure levels at ML2

Start Date and Time	Period	dB L _{Aeq,T}	dB L _{A90,T}	dB L _{Afmax}
15/03/2023 13:00	Daytime (07:00 – 23:00) ¹	58	54 ²	-
16/03/2023 23:00	Night-time (23:00 – 07:00)	51	46 ²	65
¹ Includes periods between 13:00 and 23:00 on the 15 th March and between 07:00 and 13:00 on the 16 th March 2023. ² Mean of measured L _{A90,15min} values during period. ³ 10 th Highest of measured L _{Afmax,15min} values during the night-time.				

Table 3.6: Summary of measured octave band sound pressure levels at ML2

Period	Octave Band Sound Pressure Levels (L _{eq} dB)								dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz	
Daytime	62	57	54	53	55	50	45	40	58
Night-time	55	50	48	47	49	43	37	32	51

4. ASSESSMENT

- 4.1 The results of the baseline noise survey have been used as a basis for the noise assessment.

Internal Noise Levels

- 4.2 The degree of external environmental noise intrusion into internal areas depends on the acoustic performance of all elements of the façade, but it is generally determined by the components providing the least airborne sound resistance, notably the glazed elements and any façade ventilation.
- 4.3 To predict the future internal noise levels inside the habitable rooms of the Proposed Development, the detailed methodology set out in BS 8233:2014 and BS EN 12354-3:2000⁵ has been used, and are based on the frequency spectra measured on-site and on the following assumptions considered to present an accurate if not slightly cautionary scenario:
- Bedroom/living room dimensions (W3m x L4m x H2.7m) and window sizes (40% window, 60% wall);
 - A reverberation time of 0.5 seconds;
 - Mechanical ventilation negating the need for openings in the facade; and
 - The external walls forming a part of the Development achieve an acoustic performance of not less than 43dB R_w .
- 4.4 The calculated noise levels are based on a 40% glazed area for different user elements of the Development. Should glazed areas change by more than +/-10% of the façade area then the performance of the proposed glazing units would need to be reviewed accordingly.
- 4.5 The assessment results are presented in **Table 4.1** in terms of the Weighted Sound Reduction Index (R_w), a single number quantity used to characterise the airborne sound insulation performance of a system or material, with C_{tr} adjustment factor (*a negative number*) used to take account of the low frequency noise and workmanship.
- 4.6 It should be noted however that the result demonstrated within **Table 4.1** only references the worst affected residential facades which are orientated, and closest towards the main noise source (*i.e., road traffic*). All other aspects of the facades oriented away from the main noise sources (*i.e., road traffic noise*) would require a less stringent glazing package to achieve the design criteria.

⁵ BS EN 12354-3:2000; Building acoustics. Estimation of acoustic performance in buildings from the performance of elements. Airborne sound insulation against outdoor sound, BSI

Table 4.1: Indicative Noise Control Measures (Glazing performances)

Façade Aspect / Floor Levels	Sound Reduction Index (dB) in Octave Band Centre Frequency (Hz)							Minimum Sound Insulation of Glazing dB (Rw+Ctr) ¹	Example Glazing Configuration (or equal and approved)
	63	125	250	500	1k	2k	4k		
Western Façades (overlooking Palatine Road)	17	21	20	26	38	37	39	35	Double-Glazed Package comprising; 8 mm panel / (6-16mm) air gap / 6 mm panel
Eastern Façade (overlooking Allanson Road)	17	21	17	25	35	37	31	27	Standard Thermal Double-Glazed Package comprising; 6 mm panel / (6-16mm) air gap / 4 mm panel

Notes;

* Assessment has been based on determined LAeq,16hr daytime and LAeq,8hr and LAFmax night-time values with the highest representative LAFmax value.

¹ The sound insulation performance of the window is for the glazing system as a whole (including framing, seals, opening lights etc.) as opposed to the glass panels alone.

- 4.7 On the basis of the measured external noise climate and preliminary break-in calculations, providing the glazing system as a whole (*including framing, seals openable lights etc.*) meets or exceeds the stipulated performance specified in **Table 4.1** then a sufficient level of sound insulation against external environmental noise should be provided to achieve the target internal design criteria levels with windows closed.
- 4.8 With regards to ventilation, should windows be partially opened for ventilation (assuming 10-15dB typical noise attenuation) then the internal design criteria levels within habitable room spaces would not be achieved.
- 4.9 The Building Regulations on ventilation (Approved Document F; ADF)⁶ require that habitable rooms have background ventilation by natural or mechanical means. As such, an alternative source of passive (e.g., trickle vent) or mechanical ventilation will need to be made available that meets the minimum requirements for background ventilation in habitable rooms as set out in ADF. It is important to ensure that the alternative source of ventilation, as highlighted, but not limited to the specifications detailed in **Table 4.1**, does not compromise the overall performance of the façade

⁶ Department for Communities and Local Government (DCLG) (2010); 'The Building Regulations Approved Document F – Means of Ventilation', HM Government.

system or the internal ambient noise level criteria to be met within habitable room spaces.

- 4.10 At this stage, we have assumed that the ventilation strategy for the building would be an active solution comprising a whole building mechanical ventilation system. This would allow windows to remain closed for much of the time, safeguarding internal target criteria levels, with occupants and tenants free to open windows for purge ventilation and summer cooling as required at their own discretion accepting the related increase in noise.

External Daytime Noise Levels

- 4.11 Should the Development provide communal amenity space and/or balconies on the most exposed façade facing the surrounding transportation noise sources along Palatine Road, which was measured to be exposed to noise levels of up to 73 dBL_{Aeq,T}, which is in excess of the upper WHO / BS 8233 external limit of 55 dBL_{Aeq,T} shown to protect the majority of people from being seriously annoyed during the daytime.
- 4.12 However, BS8233 states that these guideline values may not always be achievable in higher noise environments, such as city centres or urban areas adjoining the strategic transport networks, such as in this area. Therefore, 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. Where this is the case and there is an exceedance, development should be designed to achieve the lowest practicable levels in these external amenity spaces.
- 4.13 To reduce noise levels to the lowest practicable levels on any proposed balconies facing Palatine Road, a solid, imperforate barrier could be placed around any balcony area to partially screen the occupant from noise on the surrounding road network when sitting down. This would reduce the noise levels from road traffic to provide some amenity outdoor space for future occupants. This would need to extend to a height of 1.6m high, and be solid i.e., imperforate with a minimum mass per unit area of 15kg/m².
- 4.14 It is though worth noting that any proposed balconies facing within the eastern façade overlooking Allanson Road are anticipated to be within the guideline limits due to noise levels in these areas benefiting from maximise screening from surrounding buildings.

Noise Break-out from Commercial Use

- 4.15 The significance of noise impacts associated with the proposed new commercial facility on the lower floors depends upon the type of tenant and the nature of noise sources as this will dictate the sound insulation performance of the primary building fabric in controlling noise break-out. Particular regard will need to be given to tenants whose use may be unusually noisy or noise sensitive to minimise conflict of use between adjacent occupants and wider off-site receptors. This is to ensure that tenanted activities are controlled to an unobtrusive level to safeguard the acoustic acceptability of the Development.
- 4.16 To not comprise public areas outside of the proposed Development, it is recommended that break-out noise is controlled to below NR 40 (~48dBA) 3.0m from the façade, which

will ensure that noise levels at the nearest noise sensitive receptors fall to an unobtrusive (unnoticeable) level.

- 4.17 Based upon a representative sample internal ambient noise level of 71 dB $L_{Aeq,T}$ and maximum noise level of 90 dB L_{AFmax} (90th %tile) taken within a busy retail unit, provided that the façade system can achieve a performance equal to or greater than that presented in **Table 4.1** then break-out noise levels associated with the operation of the premises would be controlled to a sufficient level to protect nearby sensitive receptors.
- 4.18 It should also be noted that as the building is a mixed-use development, consideration to internal sound transference between commercial and residential uses and appropriate mitigation in excess of Building Regulations Approved Document Part E (ADE) should be undertaken at the detailed design stage.

Building Services Plant Noise

- 4.19 At this stage in the design of the Development, specific details of the type, number and configuration of building services plant are not developed. Consequently, suitable limits to which fixed building services plant should adhere should be recommended.
- 4.20 The plant noise limits apply to the total contribution of noise from all new plant items associated with the proposed Development that may run during any particular period. It should be noted that the limits are to be met 1m from the nearest habitable windows of existing sensitive receptors that may be affected by the proposed Development.
- 4.21 In accordance with BS 4142, assessments of plant noise emissions should include appropriate rating corrections for tonal, irregular, or intermittent plant where applicable, before comparison with the limits.
- 4.22 As mentioned in **Section 2** of the report, BS 4142 indicates that the noise rating level should not exceed the background level, which would indicate the specific sound source having a 'low impact'.
- 4.23 With the application of MCC's policy on plant noise, requiring that plant should achieve a rating level of 5dB ($L_{Ar,T}$) below the typical background (L_{A90}) level at the nearest noise sensitive location, it follows that the maximum plant emission levels ($L_{Aeq,T}$) for fixed mechanical plant presented in **Table 4.2** must be met 1m from the façade of the closest noise sensitive properties.

Table 4.2: Plant Noise Limits at Nearest Noise Sensitive Premises

Location	Period	Typical Measured $L_{A90,T}$	Plant Noise Emission Limit ($L_{Ar,T}$) ¹
All NSRs	Daytime	54	49
	Night-time	46	41

- 4.24 It should be noted that the plant specification should be flexible to ensure that suitably quiet, non-tonal plant can be procured and / or practical, cost-effective mitigation options incorporated into the design to ensure that guideline noise criteria are met.

-
- 4.25 During the detailed design of the Development efforts should focus on optimising the layout of plant and procuring the quietest yet most efficient plant for the job before considering applying individual noise control measures (e.g., *silencers*, *louvres*), where assessed, as necessary.

5. CONCLUSION

- 5.1 Express Solicitors are seeking outline planning consent for a proposed mixed-use residential development at Palatine Road and Brett Street, Northenden in Manchester M22 4HH.
- 5.2 A baseline noise survey was undertaken at the Site in March 2023. The survey, and subsequent assessment work, have been undertaken in accordance with current standards and guidance.
- 5.3 This study has shown that to achieve the internal noise level design criteria within residential spaces on the most noise exposed façade it will be necessary to provide a glazed unit that provide a sound reduction in the region of between 27 - 35dB R_w+C_{tr} in conjunction with what is proposed to be an active solution comprising a whole building mechanical ventilation system.
- 5.4 With regards to building services plant, suitable plant noise emission limits have been specified in accordance with BS4142: 2014 plant noise policy to which all fixed plant will need to be designed (collectively) to achieve. Providing careful attention is paid to plant selection, installation, and noise attenuation and that the design aim is achieved then there can be high confidence that noise from the operation of plant associated with the proposed Development will have negligible impact upon the existing noise climate and amenity of nearby sensitive receptors or future occupants of the Development.
- 5.5 Based on assessment findings, it is considered that noise levels can be satisfactorily controlled to within recommended acoustic design standards so that a commensurate level of protection can be afforded to future residential occupants and that impacts associated with the operation of the Development can be controlled.

APPENDICES

APPENDIX A: Glossary of Terms

Noise

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq} , L_{A90} etc., according to the parameter being measured.

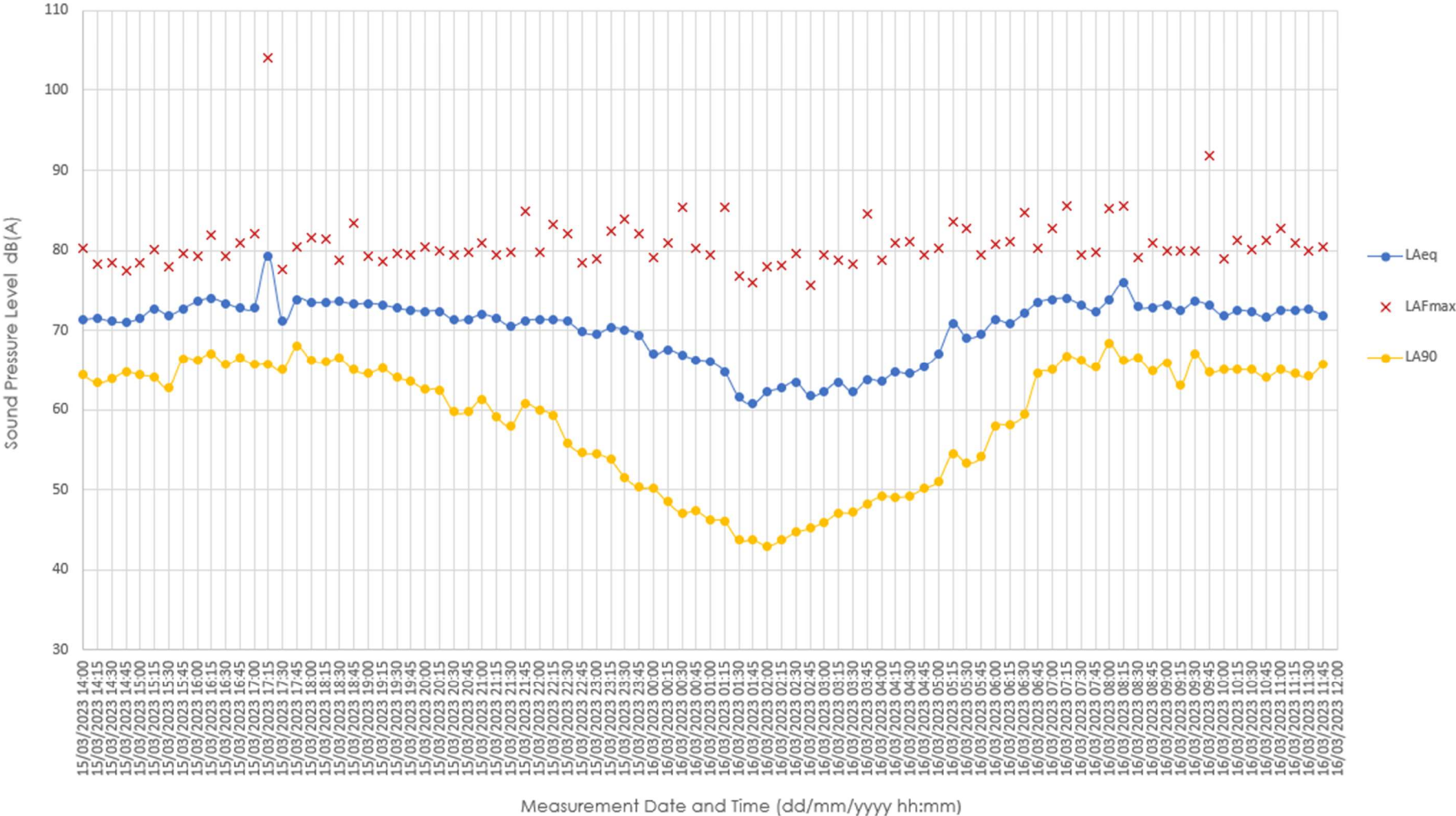
The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

Acoustic Terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. Sound pressure level is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2×10^{-5} Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} and L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time, and the L_{90} is the level exceeded for 90% of the time.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Façade Level	A sound field determined at a distance of 1 m in front of a large sound reflecting object such as a building façade.

APPENDIX B: Full Baseline Monitoring Results

Noise Level Time History Graph at Northenden, Manchester - ML1
Wednesday 15th March to Thursday 16th March 2023



Noise Level Time History Graph at Northenden, Manchester - ML2

Wednesday 15th March to Thursday 16th March 2023

