



597 Cheetham Hill Road

Noise Impact Assessment

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Client: Mr S. Kehinde

Date: 01/03/2022

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REVISION HISTORY

Revision	Date	Revision Details	Author	Checked
R01	01/03/2022	Original Issue	<i>Joseph Tony</i> Joseph Tony (Mar 1, 2022 11:19 GMT) Joseph Tony BTech MIOA	<i>Ben Tomlin</i> Ben Tomlin (Mar 1, 2022 11:35 GMT) Ben Tomlin BSc MIOA

1 INTRODUCTION

- 1.1 dBx Acoustics Ltd has been appointed by Architek Design, on behalf of Mr S. Kehinde, to discharge a planning condition associated with planning application reference 131144/P3MPA/2021 for “Prior Approval for change of use of first floor retail (Class E) to 2 residential flats (Class C3)” at 597 Cheetham Hill Road, Manchester M8 5EJ.
- 1.2 The planning condition related to the development states:

“Before the development commences a scheme for acoustically insulating the proposed residential accommodation against noise from Cheetham Hill Road and surrounding streets shall be submitted to and approved in writing by the City Council as local planning authority. There may be other actual or potential sources of noise, including noise transfer from ground floor retail and adjoining retail and takeaways along with external plant and kitchen extraction which require consideration on or near the site, including any local commercial/industrial premises. The approved noise insulation and ventilation scheme shall be completed before any of the dwelling units are occupied.

Noise survey data must include measurements taken during a rush-hour period and night time to determine the appropriate sound insulation measures necessary. The following noise criteria will be required to be achieved:

Bedrooms (night time - 23.00 - 07.00) 30 dB L_{Aeq} (individual noise events shall not exceed 45 dB $L_{Amax,F}$ by more than 15 times)

Living Rooms (daytime - 07.00 - 23.00) 35 dB L_{Aeq}

Gardens and terraces (daytime) 55 dB L_{Aeq}

(entertainment/music): Additionally, where entertainment noise is a factor in the noise climate the sound insulation scheme shall be designed to achieve internal noise levels in the 63Hz and 125Hz octave centre frequency bands so as not to exceed (in habitable rooms) 47dB and 41dB, respectively.

b) Prior to first occupation of the residential units, 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 the internal noise criteria have 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 internal noise criteria.”
- 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 The planning condition (see Paragraph 1.2) sets out the required internal noise criteria. Whilst these noise levels are typically associated with sound without character, Manchester City Council (MCC) does not make this distinction, therefore it is considered that the noise levels include sound from all sources referenced within the condition (i.e. road traffic noise from Cheetham Hill Road; noise transfer from ground floor retail and adjoining retail and take ways; and external plant and kitchen extraction).

Target Noise Levels

External Noise Levels

- 2.2 There are no proposed gardens or terraces, therefore the external noise criteria are not relevant.

Internal Noise Levels

Daytime

- 2.3 Living Rooms (daytime - 07.00 - 23.00h): 35 dB $L_{Aeq,16h}$.

Night-Time

- 2.4 Bedrooms (night-time - 23.00 - 07.00h): 30 dB $L_{Aeq,8h}$ and 45 dB $L_{AF,max}$ not exceeded more than 15 times per night from individual noise events.

Entertainment/Music

- 2.5 There are not understood to be any sources of entertainment or music noise likely to affect the proposed dwellings, therefore the entertainment/music noise criteria are not relevant.

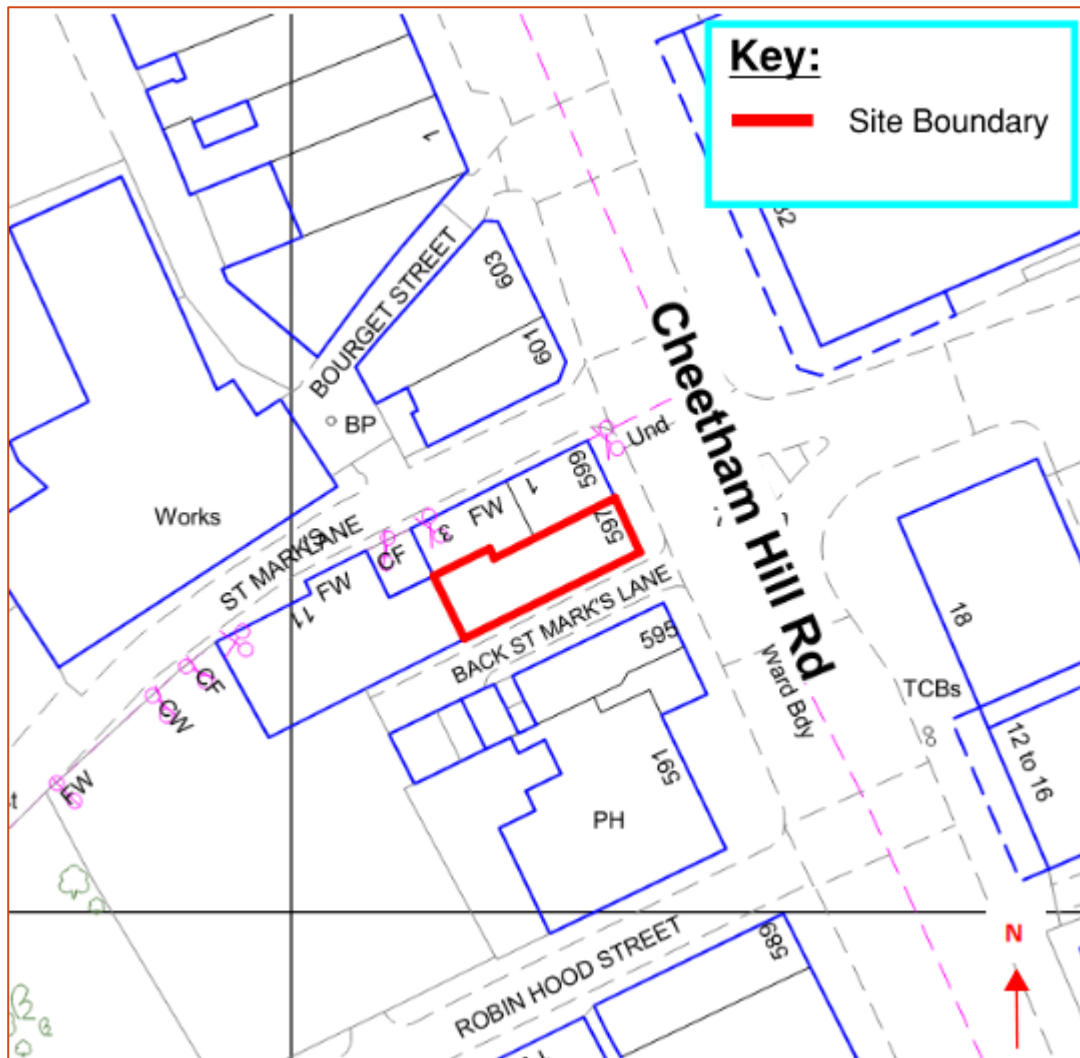
Plant Noise Egress

- 2.6 Based on MCC's 'Draft Noise Technical Guidance Note (September 2020) Planning & Noise Technical Guidance' (December 2015)', 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.

SITE DESCRIPTION

- 2.7 The proposed site is located at 597 Cheetham Hill Road, Manchester. A site location plan is provided as Figure 1, below, which illustrates the location of the site, and the surrounding area. The site is located in an area dominated by commercial uses on the ground floor with dwellings above.
- 2.8 The ground floor of 597 Cheetham Hill is currently retail use, and this is not proposed to be changed.

Figure 1: Site Location Plan



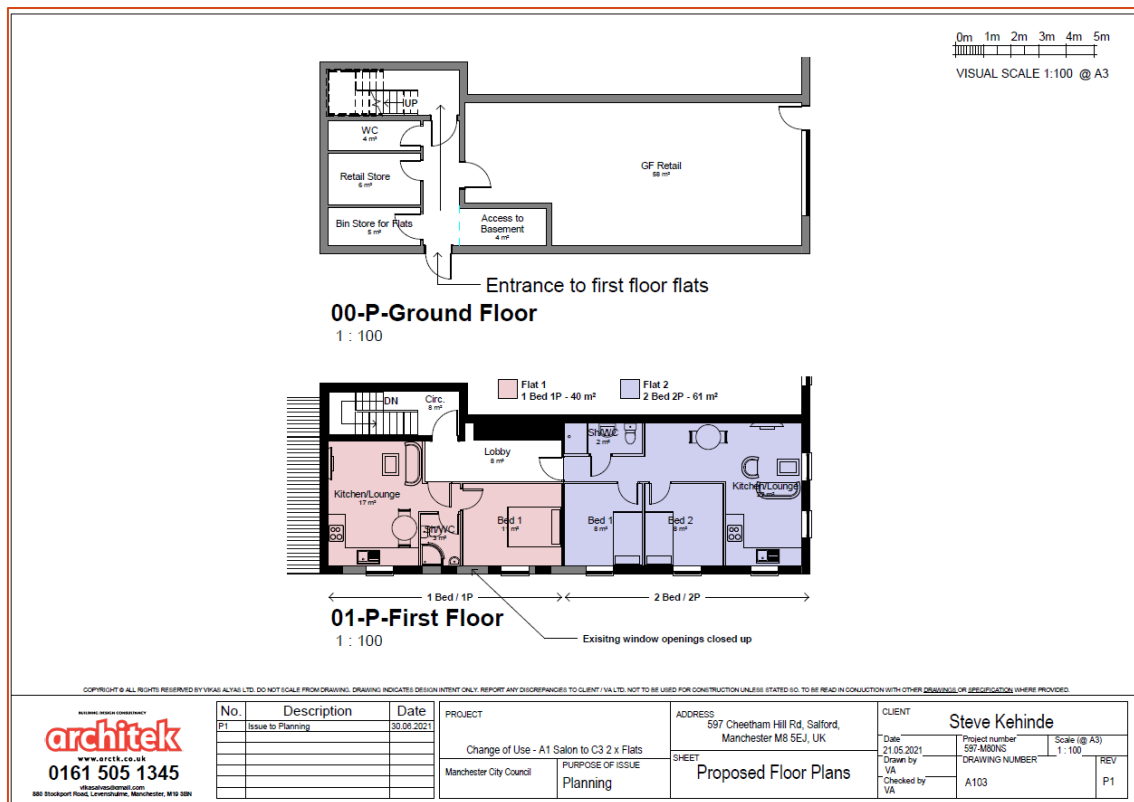
Noise Sources

- 2.9 The dominant noise source at this site is road traffic on Cheetham Hill Road, with contributions from traffic on the surrounding road network.
- 2.10 With regards to any proposed new external plant, the nearest noise sensitive receptors can be considered as the neighbouring properties along Back St Mark's Lane.

Proposed Development

- 2.11 The proposed development comprises conversion of the first floor of the property from retail to residential (two flats), as illustrated in Figure 2.

Figure 2: Proposed Floor Plan



3 ENVIRONMENTAL NOISE SURVEY

Methodology

- 3.1 dBx Acoustics has undertaken noise measurements at the site to establish the typical existing ambient, background and maximum sound levels at the site.
- 3.2 An unattended environmental noise survey was undertaken between Thursday 10th February 2022 and Monday 14th February 2022, at Location A indicated on Figure 3, below. Additional short term attended measurements were undertaken at two locations on Monday 14th February 2022, indicated as Locations B-C on Figure 3, below.
- 3.3 Figure 3 illustrates the approximate noise measurement locations.

Figure 3: Noise Measurement Locations



- 3.4 Measurements were undertaken in accordance with BS 7445-1:2003 '*Description and Measurement of Environmental Noise*', with microphones located at approximately 5 m above the local ground level and around 1 m away from the façade.

Equipment

- 3.5 The equipment used during the environmental noise survey is detailed in Table 1.

Table 1: Equipment Used in the Environmental Noise Survey

Measurement Locations (Figure 3)	Equipment	(Manufacturer & Part No./ Serial Number)	Serial Number
Location A	Sound Level Meter	CR:171C	G300656
	Microphone	MK:224	211733D
	Calibrator	Cirrus CR:515	87921
Locations B, and C	Sound Level Meter	Norsonic Nor140	1405619
	Microphone	Norsonic 1225	168247
	Calibrator	Norsonic 1251	33827

- 3.6 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

- 3.7 Weather conditions during the short-term noise monitoring were generally cool and cloudy, with scattered clouds.
- 3.8 At long-term noise monitoring Location A, based on the historical weather data, it is understood that it rained between 12:00-20:00 hours on Saturday 12th February 2022. However, on analysis with rest of the noise survey period, rain did not significantly affect the survey data. At the beginning and end of the survey, there was noted to be no rainfall, with a minimally cloudy sky.
- 3.9 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 surveys.

Environmental Noise Survey Results

Unattended Noise Levels

- 3.10 A summary of the day and night-time noise levels measured at the long-term noise monitoring Location A is presented below.
- 3.11 All measurements at these locations were façade measurements and hence are corrected by 3 dB to obtain the free-field noise levels incident upon the proposed development.
- 3.12 Appendix B of this report presents a time history graph showing the ambient, background and maximum noise levels measured at the unattended measurement Location A, throughout the noise survey.

Table 2: Summary of Measured Noise Levels at Long Term Noise Monitoring - Location A

Day/Date	Period (hh:mm)	Ambient Noise Level (dB L _{Aeq,T}) ²	Maximum Noise Level (dB L _{AFmax}) ³	Typical Background Noise Level (dB L _{A90, 15mins}) ⁴
Thursday 10th February	Daytime ¹ (16:00-23:00)	72	n/a	64
	Night-Time (23:00-07:00)	71	86	42
Friday 11th February	Daytime (07:00-23:00)	73	n/a	64
	Night-Time (23:00-07:00)	71	88	46
Saturday 12th February	Daytime (07:00-23:00)	73	n/a	65
	Night-Time (23:00-07:00)	72	87	47 ⁵
Sunday 13th February	Daytime (07:00-23:00)	73	n/a	64
	Night-Time (23:00-07:00)	71	88	42
Monday 14th February	Daytime ¹ (07:00-16:00)	74	n/a	66

Notes - ¹ Partial period measured; ² Logarithmic averages 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); ⁴ Modal values presented and considered representative over the day / night survey periods; ⁵ Excludes atypical noise levels between a brief period of time at night(23:00-00:30). All figures rounded to the nearest whole decibel.

Rush Hour Measurements

- 3.13 The planning condition requires that noise survey data to include measurements taken during a rush-hour period. The noise measurements undertaken at Location A (Figure 3) include rush hour period.
- 3.14 Table 3 below presents a comparison of ambient noise level measurements taken during a rush-hour period (1600-17:00h) and over the daytime(07:00-23:00h) survey period.

Table 3: Comparison of Ambient Noise Levels (Daytime)

Location (Figure 3)	Average Ambient Noise Level, dBL _{Aeq,16hour} (dB)	Rush-hour Ambient Noise Level, dBL _{Aeq,T} (dB)
A	73	72

- 3.15 It can be seen from Table 3 above, the 16 hour ambient noise level measured over the daytime (07:00-23:00h) survey period was marginally (up to 1dB) louder than the rush hour period (17:00-16:00h). This value was therefore used in the assessment.

Attended Noise Survey

- 3.16 In order to determine the variation in noise levels around the site, spot check measurements were also undertaken around the site on Monday 14th February 2022, synchronised to the long-term monitor such that comparisons can be made to the long term measured noise levels.
- 3.17 A summary of the daytime noise levels measured at the short-term noise monitoring positions is presented in Table 4, below.

Table 4: Summary of Measured Noise Levels at Short Term Noise Monitoring - Location B & Location C

Locations (Figure 3)	Start Date and Time (hh:mm)	Duration (hh:mm)	L _{Aeq} (dB)	L _{A10} (dB)	L _{A90} (dB)
B	14/02/2022 15:40	00:15	66	69	59
	14/02/2022 16:17	00:15	66	70	58
C	14/02/2022 15:59	00:15	69	70	60
	14/02/2022 16:34	00:15	66	68	59

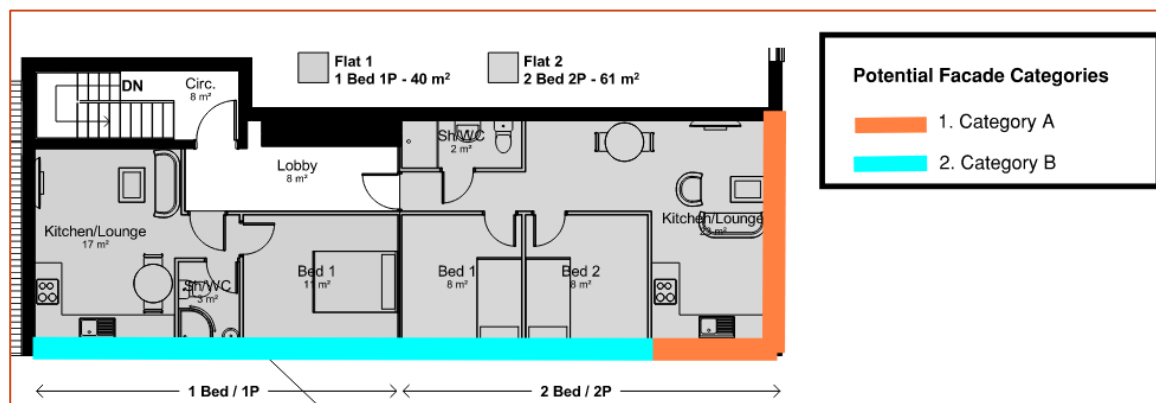
- 3.18 As can be seen from Table 4 above, the ambient noise levels (dB L_{Aeq,T}) at the southern elevation (Location B) are typically around 6dB lower than those measured at the eastern elevation (Location A).
- 3.19 The background noise levels (dB L_{A90,T}) at the southern elevation (Location B) are typically around 5dB lower than those measured typical background noise levels (dB L_{A90,T}) at the eastern elevation (Location A).
- 3.20 The data presented above has been used to establish the typical daytime and night- time noise levels impacting on the façades of the 597 Cheetham Hill, as presented in
- 3.21 Table 5, below.

Table 5: Noise Levels per Façade

Façade	Day, $dBL_{Aeq,16hour}$	Night $dBL_{Aeq,8hour}$	Night, $dBL_{Amax,F}$
Category A - Cheetham Hill Road ¹	73	-	-
Category B- Back St Mark's Lane	67	65	81

Note : ¹ There are no bedrooms overlooking the Cheetham Hill road (eastern elevation).

Figure 4: Indicative Façade Categories



4 BUILDING ENVELOPE SOUND INSULATION

Internal Ambient Noise Criteria

- 4.1 The internal noise criteria which have been adopted for the proposed development based on Planning condition are outlined below.

Daytime

- 4.2 Living Rooms (daytime - 07.00 - 23.00h):

- 35 dB $L_{Aeq,16h}$

Night-Time

- 4.3 Bedrooms (night time - 23.00 - 07.00h):

- 30 dB $L_{Aeq,8h}$
- 45 dB L_{AFmax} not exceeded by more than 15 times per night from individual noise events.

External Noise Break-In Assessment

- 4.4 Based on a reduction in external noise levels to internal noise levels of 15 dB for a partially opened window (based WHO 1999), allowable external noise levels are therefore 50dB $L_{Aeq,T}$ outside living rooms in the day, and 45 dB $L_{Aeq,T}$ and 60 dB $L_{Amax,F}$ outside bedrooms at night.
- 4.5 It can be seen from Table 5 that the required internal ambient noise levels cannot be achieved using open windows for natural ventilation.
- 4.6 The required internal ambient noise levels can therefore only be achieved with closed windows, and ventilation will need to be provided via alternative means.
- 4.7 Based on the predicted noise levels on each elevation with windows, the sound insulation requirements for the glazing and ventilators required to achieve the internal ambient and maximum noise level limits have been calculated and are presented in Table 5, below.

Table 6— Glazing and Ventilator Sound Insulation Requirements

Façade	Room	Glazing Sound Insulation Performance, dB R_w (+ C_{tr})	Example Glazing Construction, mm	Ventilator Sound Insulation Performance, dB $D_{n,e,w}$ (+ C_{tr})
Category A - Cheetham Hill Road	Living Rooms	42 (-7)	10mm/Thermal Cavity/8.8mm	44 (-4)
Category B - Back St Mark's Lane	Living Rooms	31 (-6)	4mm/12mm Thermal Cavity /4mm	36 (-1)
	Bedrooms	42 (-7)	10mm/Thermal Cavity/8.8mm	47(-6)

- 4.8 Sound insulation performance must be achieved by the glazing unit as a whole, including frames, seals, opening lights etc, as opposed to the glass panels alone
- 4.9 The glazing configurations shown above is a suggestion only, and alternative configurations may be acoustically suitable.
- 4.10 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 existing cavity masonry and tiled roof construction with plasterboard ceiling.
- 4.11 There are condensers located to the southern elevation of the development. The exact details of these condensers are not available, and were not operating at the time of the noise survey.
- 4.12 However, based on a typical condenser of similar size(e.g. Daikin RXF-C), the sound pressure level would not typically exceed 45-55 dB $L_{Aeq,T}$. This is at least 10 dB lower than the external noise levels (65-67 dB $L_{Aeq,T}$) at all times and therefore it is anticipated that these units would have no impact on residential amenity.

5 NEW BUILDING SERVICES NOISE EMISSIONS

- 5.1 Any items of fixed plant associated with the operation of the proposed development would have the potential to generate noise.
- 5.2 Manchester City Council's '*Planning & Noise Technical Guidance*' (December 2015) states that the rated plant noise levels are controlled to 5dB below the background noise level during the periods in which the plant operates. Consequently, suitable limits to which the cumulative noise level plant should adhere have been determined and are presented in Table 7.

Table 7—Proposed Building Service External Noise Limits

Noise Sensitive Receptors	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)
Neighbouring properties along Back St Mark's Lane	54 dB	32 dB

6 CONCLUSION

- 6.1 dBx Acoustics Ltd has been appointed by Architek Design, on behalf of Mr S. Kehinde, to discharge a planning condition associated with planning application reference 131144/P3MPA/2021 for “Prior Approval for change of use of first floor retail (Class E) to 2 residential flats (Class C3)” at 597 Cheetham Hill Road, Manchester M8 5EJT.
- 6.2 To establish the existing noise climate at the site, an unattended environmental noise survey was undertaken between Thursday 10th February 2022 and Monday 14th February 2022. Additional short term attended measurements were undertaken on Monday 14th February 2022.
- 6.3 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 planning condition.
- 6.4 It has been determined that natural ventilation by means of openable windows will not be appropriate for this site and ventilation via trickle vents is suggested. Minimum sound insulation requirements for glazing and ventilators have been provided.
- 6.5 The plant noise limits have been set such that plant noise at the nearest noise sensitive properties would not be expected to affect residential amenity.
- 6.6 On this basis, noise should not therefore 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.

	Standardised Level Difference, a frequency-dependent measurement of airborne sound insulation, calculated using the following formula: $D_{nT} = L_1 - L_2 + 10\log(T/T_0) \text{ dB}$ 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, 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. Standardised Impact Sound Pressure Level, a frequency dependent measurement of impact sound insulation, calculated using the following formula: $L_{nT} = L_1 + 10\log(T/T_0) \text{ dB}$ 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 (LOCATION A)

