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NOISE IMPACT ASSESSMENT FOR PROPOSED DEVELOPMENT: 527A Wilmslow Road, Manchester M20 4BA

Prepared for:

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1.00 INTRODUCTION

1.1

Acoustic Solutions has been commissioned by Mr Raja Riaz Investments Limited to undertake a noise impact assessment for a proposed development at 527A Wilmslow Road, Manchester. The development (planning reference 127981/FO/2020) is for a change of use of the first floor to form 2x self-contained residential apartments.

1.2

The objectives for the noise impact assessment were as follows:

- Establish the daytime, evening and night time ambient and background sound levels at the application site and its surrounding environs;

- Establish the specific sound level within the property's proposed first storey dwelling rooms, associated with existing noise sources, specifically a kitchen extraction system associated with Aladdin Restaurant, 529 Wilmslow Road, Road Traffic on Wilmslow Road and noise associated with the Red Lion Public House and the Shakedown Bar, both on Wilmslow Road.

- With specific reference to the planning application, Manchester City Council (MCC) has requested that a noise impact assessment be carried out to determine the likely noise impact of the above noise sources upon the future occupiers of the first storey dwellings. MCC has not specified a criteria against which measured noise levels are to be assessed. This being the case, the report was assess noise levels against nationally recognised criteria: the National Planning Policy Framework Planning Practice Guidelines on Noise, World Health Organisation 1999 and BS8233: 2014.

- If appropriate, provide recommendations with respect to management and/or structural controls to mitigate and control the potential noise impact upon future occupiers of the proposed development.

1.3

This report details the methodology and results of the assessment. It has been prepared to accompany an application for planning permission that is to be submitted to MCC for the proposed development of the application site.

1.4

This report has been prepared for the sole purpose described above and no extended duty of care to any third party is implied or offered.

Third parties referring to the report should consult Mr Riaz and Acoustic Solutions as to the extent to which the findings may be appropriate for their use.

1.05

A glossary of acoustic terms used in the main body of the text is contained in Appendix 1.

2.0 SITE SETTING AND PROPOSED DEVELOPMENT

2.1

The application site is 527A Wilmslow Road, Manchester (Appendix 2). The premises is located in the suburb of Withington. Wilmslow Road is a busy highway running north-south. 527A, a two-storey building is located on the eastern side of the road, it being located within a row of commercial/domestic premises. The Aladdin restaurant is next door to the 527A. The Aladdin restaurant has an advertised closing time of 23:00 hours. The Shakedown Bar (number 533) is part of the same row; and is approximately 20 metres from 527A. The Shakedown has an advertised closing time of 23:30 hours. The Red Lion Public House is located on the western side of Wilmslow Road, and is located approximately 32 metres north west of 527A. The Red Lion has an advertised closing time of 00:30 hours, but like all bars and restaurants cited in this report, its actual closing time was 22:00 hours, in line with current Covid-19 restrictions.

3.00 NOISE IMPACT ASSESSMENT CRITERIA

3.1

In terms of noise impact assessment criteria, Paragraph 170e of the National Planning Policy Framework (NPPF) 2018 states that planning policies and decisions should contribute to and enhance the natural local environment by '*preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.'*

3.2

Planning Practice Guidance specifically dealing with noise was uploaded to the Government's Planning Portal in March 2014 as an accompaniment to the National Planning Policy Framework. This guidance is summarised herein.

3.3

The guidance states that noise needs to be considered when new developments may create additional noise. Whilst noise can override other planning concerns, neither the Noise Policy Statement for England nor the National Planning Policy Framework (which reflects the Noise Policy Statement for England) expects noise to be considered in isolation, separately from the economic, social and other environmental dimensions of proposed development.

3.4

In order to determine noise impact, local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur, and;
- Whether or not a good standard of amenity can be achieved.

3.5

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.

3.6

In terms of Observed Effect Levels:

- No Observed Adverse Effect Level (NOAEL) – This is the level of noise exposure below which no effect at all on health or quality of life can be detected;

- Lowest Observed Adverse Effect Level (LOAEL) – This is the level of noise exposure above which adverse effects on health and quality of life can be detected, and;

- Significant Observed Adverse Effect Level (SOAEL) – This is the level of noise exposure above which significant adverse effects on health and quality of life occur.

3.7

At the lowest extreme, when noise is not noticeable, there is by definition no effect. As the noise exposure increases, it will cross the 'no observed' effect level as it becomes noticeable. However, the noise has no adverse effect so long as the exposure is such that it does not cause any change in behaviour or attitude. The noise can slightly affect the acoustic character of an area but not to the extent there is a perceived change in quality of life. If the noise exposure is at this level no specific measures are required to manage the acoustic environment.

3.8

As the exposure increases further, it crosses the lowest observed adverse effect level boundary above which the noise starts to cause small changes in behaviour and attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard. The noise therefore starts to have an adverse effect and consideration needs to be given to mitigating and minimising those effects (taking account of the economic and social benefits being derived from the activity causing the noise).

3.9

Increasing noise exposure will at some point cause the significant observed adverse effect level boundary to be crossed. Above this level the noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is above this level the planning process should be used to avoid this effect occurring, by use of appropriate mitigation such as
by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused.

3.10

At the highest extreme, noise exposure would cause extensive and sustained changes in behaviour without an ability to mitigate the effect of noise. The impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise, this situation should be prevented from occurring.

3.11

The following table summarises noise exposure hierarchy, based on likely average response.

Table 3.1 Guideline "Absolute" Sound Level[1]

Absolute Sound Level							
	Absolute Level:	**≤40Db**	**41 - 45dB**	**46 - 50dB**	**51 - 55dB**	**56 - 60dB**	**≥60dB**
	Daytime Effect:[2]	**NOAEL**	**NOAEL**	**NOAEL**	**LOAEL**	**SOAEL**	**SOAEL+**
	Evening Effect:[3]	**NOAEL**	**NOAEL**	**LOAEL**	**SOAEL**	**SOAEL**	**SOAEL+**
	Night-time Effect:[4]	**NOAEL**	**LOAEL**	**SOAEL**	**SOAEL**	**SOAEL**	**SOAEL+**
	Effect / Impact Description:	No observed effect on health or quality of life.	Sleep disturbance in bedrooms with window open.	Speech intelligibility within living areas with windows open resulting in moderate annoyance. Greater potential for sleep disturbance and adverse health impact.	Increased potential for sleep disturbance, including significant adverse health effects. Gardens and amenity spaces affected.	Significant adverse health effects likely to all habitable rooms. Occupants unable to open windows due to noise ingress and unable to enjoy garden / amenity areas.	High risk of significant adverse health impact. Unable to use garden and amenity space or have windows open for ventilation.
	Mitigation Considerations:	**A1** Use design, layout and landscaping (DLL) to create and preserve areas of amenity and tranquillity to enhance the noise environment.	**A2** Protect bedroom facades from noise through DLL. Provide minimum double-glazing with trickle vents to bedrooms.	**A3** Protect habitable room facades from noise through DLL with greater protection for bedrooms. Provide higher spec double-glazing with trickle-vents to all habitable rooms.	**A4** Bedroom facades to be protected through DLL to bring below LOAEL. Provide higher spec double-glazing with trickle vents to all habitable rooms. Protection of gardens and amenity space through DLL and acoustic fencing.	**A5** Bespoke assessment of noise mitigation needs, including consideration of alternative to open window ventilation provision to protect internal noise environment and protection of garden / amenity areas through DLL to bring below LOAEL.	**A6** Bespoke assessment of noise impact and mitigation, including DLL, protection of building envelope and provision of alternative amenity space.
	Planning Consideration:	No objection	No objection subject to Approved Plans and/or conditions to include satisfactory window specification to bedrooms with facades exposed to LOAEL noise.	No objection subject to Approved Plans and/or conditions to include satisfactory window specification to all habitable rooms with facades exposed to LOAEL noise.	Details of noise mitigation to be supplied as part of planning approval process. Conditions required to implement control measures within the noise report. Refusal if noise report is inadequate.	Details of noise mitigation to be supplied as part of planning approval process. Conditions required to implement control measures within the noise report. Refusal if noise report is inadequate.	Presumption against planning permission being granted, unless detailed noise impact assessment and approved mitigation measures implemented through conditions. Post completion verification of mitigation measures required.

[1] Free-field, outdoor noise level expressed as dB LAeq(T), where T is the reference time period for the relevant Day, Evening or Night-time period.
[2] Day is from 07:00 to 19:00 and the reference time period (T) is 8 hours.
[3] Evening is from 19:00 to 23:00 and the reference time period (T) is 4 hours.
[4] Night is from 23:00 to 07:00 and the reference time period (T) is 8 hours.

3.12

The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation. These factors include:

- The source and absolute level of the noise together with the time of day it occurs;

- For non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise;

- The spectral content of the noise (i.e. whether or not the noise contains particular high or low frequency content) and the general character of the noise (i.e. whether or not the noise contains particular tonal characteristics or other particular features);

- The local acoustic character of the area.

3.13

In addition, further useful contextual guidance is provided in:

- British Standard 4142:2014 'Methods for Rating and Assessing Industrial and Commercial Sound' (BS 4142);

- British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' (BS 8233);

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

3.14

BS 4142 states:

The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs'. Typically, the greater this difference, the greater the magnitude of the impact. For example:

- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*

- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;*

- *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*
- *Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact. Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the absolute level of sound. For a given*
- *difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low. Where background sound levels and rating levels are low, absolute levels might be as, or*

more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

3.15

British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' sets indoor ambient noise levels from residential dwellings (see table below).

Table 3.2 – Indoor Ambient Noise Levels in Dwellings (BS 8233): 2014

Activity	Location	Good Indoor Ambient Noise Levels	
Resting	Living Room	35 dB $L_{Aeq\ (0700–2300)}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq\ (0700–2300)}$	30 dB $L_{Aeq\ (2300–0700)}$

3.16

With regard to sound attenuation through the building envelope, the 'weak points' in the building façade are generally considered to be the windows. The worked example (G.1) at Annex G of BS 8233 suggests that a partially opened window would provide sound attenuation of approximately 15 dB R_w. The Standard also suggests that *"..standard insulating glass units have an insulation value of approximately 30 dB R_w"* when closed.

3.17

With respect to noise affecting external areas, i.e. gardens, BS 8233 states that *".. it is desirable that the steady noise level does not exceed 50 dB L_{Aeq}, and 55 dB L_{Aeq} should be regarded as the upper limit".*

3.18

The World Health Organisation's Guidelines for Community Noise (1999) sets indoor ambient noise levels from residential dwellings (see table below).

Table 3.3 – Indoor Ambient Noise Levels in Dwellings (WHO 1999)

Activity	Location	Good Indoor Ambient Noise Levels	
Resting	Living Room	35 dB $L_{Aeq\ (0700–2300)}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq\ (0700–2300)}$	30 dB $L_{Aeq\ (2300–0700)}$

4.0 BASELINE NOISE SURVEY

4.1

In order to establish the evening/night time background noise levels at the application site and its surrounding environs, a baseline noise survey was undertaken on 2 & 3 October 2020 between 07:00 and 23:00 hours (daytime) and 23:00-01:00 hours (night time).

4.2

For the purpose of the assessment, two noise monitoring positions, MP1 and MP2 were adopted in free field environments at over 1.5 metres above ground and over 3 metres from any vertical reflective surface (see Appendix 2):

- MP1. 527A, Rear. Microphone positioned outside the premises' rear east-facing façade at a distance of 4 metres from a large circular flue serving Aladdin Restaurant. The monitoring position was selected to assess noise from the flue; it being identified as the dominant noise noise at this location (Appendix 2);

- MP2 527A, Front. Microphone positioned outside the premises' west-facing façade. The monitoring position was selected to assess noise from all other noise sources cited by this report. (Appendix 2);

4.3

A series of hourly 15-minute noise measurements were undertaken using a Type 1 integrating sound level meter (Appendix 3). The measurement system calibration was verified immediately before the commencement of the measurement sessions and again at the end. Weather conditions throughout the survey were dry but overcast with a maximum south-westerly wind speed of 3 metres per second: appropriate for monitoring. Measurements consisted of A–weighted parameters: L_{Aeq}, L_{A90} and L_{Amax}.

4.4 MP1

Day The principle existing daytime noise source in the vicinity of MP1 was birdsong and the wind blowing through nearby (approx. 25 metres) trees. At 4m away, the kitchen extraction flue was barely audible. The flue is located 4 metres from the rear-facing windows of 527A. The row of buildings provided an acoustic barrier against noise from road traffic on Wilmslow Road, however traffic was audible throughout the assessment from approximately 08:00 hours onwards.

Evening. The principle existing evening noise source in the vicinity of MP1 was the wind blowing through nearby (approx. 25 metres) trees. The kitchen extraction flue was barely audible until 21:40 hours when it was switched off. Traffic was audible throughout the assessment, however by 00:00 hours it was very intermittent. Table 4.1 contains a summary of the daytime and evening noise measurement data at MP1.

Table 4.2 – MP1: Baseline Noise Measurement Data, Day & Evening

Start Time	Measured Noise Level, dB, $L_{Aeq, 15 min}$	Measured Noise Level, dB $L_{A90, 15 min}$
07:00	47.1	45.2
08:00	51	48.1
09:00	51.2	48
10:00	51.7	47.8
11:00	50	47.5
12:00	52.4	48.4
13:00	49.3	46.9
14:00	49	47.2
15:00	49.8	48
16:00	47.9	46
17:00	50.1	47.2
18:00	49	47.2
19:00	50.4	47.4
20:00	48.6	44.7
21:00	48.5	44.6
22:00	48.4	44.5
Average	**50**	**47**

Night Time. The overall night time sound environment could be described as quiet. Little of no road traffic was audible. Table 4.2 contains a summary of the night time noise data.

Table 4.2 – MP1: Baseline Noise Measurement Data, Night Time

Start Time	Measured Noise Level, dB, $L_{Aeq, 15 min}$	Measured Noise Level, dB $L_{A90, 15 min}$
23:00	46.3	42.5
00:00	45.4	42.1
01:00	43.5	40.1
Average	**45**	**42**

4.5 MP2

Day. The principle existing day time noise source in the vicinity of MP2 was road traffic travelling along Wilmslow Road.

Evening. The principle existing evening noise source in the vicinity of MP2 was road traffic travelling along Wilmslow Road. Other noise sources included pedestrians and customers sitting outside the Shakedown Bar. At 22:00 (closing time) significant numbers of customers from the Shakedown left the premises *en-masse*. No noise emanating from the Red Lion was audible. No amplified music was audible at any bar or restaurant. It is recognised that the new Covid-19 restrictions on bars (introduced on 22 September) prohibiting post-22:00 hours opening will have been a material factor in this; however given the presence of domestic dwellings in the near vicinity it is assumed that MCC will have imposed licencing conditions prohibiting noise from amplified music from being audible at the nearest dwelling. This being the case, noise from amplified music has not be considered as a noise source. Similarly, although some very intermittent aircraft noise was audible, its overall noise impact was insignificant. Given the proximity of Manchester Airport (6 miles), it is thought likely that that daytime and evening noise levels from aircraft would be elevated were Covid-19-related flight timetables not in place. Table 4.3 contains a summary of daytime and evening noise data at MP2.

Table 4.3 – MP2: Baseline Noise Measurement Data, Daytime & Evening

Start Time	Measured Noise Level, dB, $L_{Aeq, 15 min}$	Measured Noise Level, dB $L_{A90, 15 min}$
07:00	55.4	53
08:00	58.7	56.2
09:00	60	58.1
10:00	59.8	56.7
11:00	62.4	60
12:00	64.2	61.5
13:00	63.5	61.3
14:00	65.9	62
15:00	63.7	62.2
16:00	63.4	60.9
17:00	61.9	57.2
18:00	61.9	52
19:00	60.4	49.9
20:00	61.4	50.3
21:00	58.3	49.5
22:00	58.5	51.2
Average	**62**	**57**

Night Time. The principle existing night noise source in the vicinity of MP2 was intermittent road traffic travelling along Wilmslow Road. Between 23:00 and 00:00, noise from Shakedown staff leaving was audible. Table 4.4 contains a summary of the night time noise data.

Table 4.4 – MP2: Baseline Noise Measurement Data, Night Time

Start Time	Measured Noise Level, dB, $L_{Aeq, 15 min}$	Measured Noise Level, dB $L_{A90, 15 min}$
23:00	60.1	45.5
00:00	55.6	45
01:00	53	43.6
Average	**56**	**45**

Table 4.5 summaries average L_{Aeq} and L_{A90} measured values at MP1 & MP2.

Table 4.5 – Average LAeq & L_{A90} Values

Time	MP1	MP2
Ave Day L_{Aeq}	50	62
Ave Eve L_{Aeq}	49	60
Ave Night L_{Aeq}	45	56
Average Day L_{A90}	47	58
Average Evening L_{A90}	45	50
Average Night L_{A90}	42	45

6.0 Assessment of Potential Noise Impact Arising from the Proposed Ground Floor Coffee Shop

Although it is difficult to predict an internal noise level within the proposed coffee shop, for the purpose of this report, a sound insulation assessment of the ceiling separating the ground and first storey of 527A Wilmslow Road was undertaken as part of the overall noise impact assessment.

The measured sound insulation results have been compared with the standards for similar constructions given in Approved Document E (ADEL) 2003 edition: guidance to the Building Regulations 2000.

Details of the brief are given below:

(A) Conduct measurements of the airborne and impact sound insulation between the ceiling;

(B) The tests will be carried out in accordance with BS EN 16283-2:2015. The results will be analysed in accordance with BS EN ISO 16283-1:2014 and BS EN ISO 16283-2:2014;

(C) The obtained results will be compared with the requirements of the Building Regulations 2000, Approved Document E “Resistance to the Passage of Sound” 2003 edition.

The equipment used during the tests is as listed in Appendix 3 of this report. The sound level meter (SLM) was calibrated before, after and during the tests as appropriate. No significant calibration deviation was observed. The SLM, acoustic calibrator and microphone are all covered by current manufacturers’ calibration certificates and/or certificates of compliance. Additionally, all procedures in Annex B of the Approved Document E, guidance to the Building Regulations, have been followed.

6.1 Basic Procedures

The field testing of structures for airborne sound insulation involves generating a controlled level of noise in one room (the source room) and measuring the

resulting noise in the other room (the receiving room) which is separated from the source room by the element being tested. Spatial and temporal averaging of the noise level in both rooms is carried out by manually repositioning the microphone in the receiving room.

Two separate measurements were completed. Corrections are applied to the measured levels for the effects of background noise and acoustic absorption; the latter being characterised by reverberation time measurements.

The corrected, measured source and receiving room levels are used to derive the Standardised Level Difference. The data, which is analysed in third octave bands, is compared with reference values using a defined matching criteria to determine the single figure Weighted Standardised Level Difference.

From this data, a Spectrum Adaptation term is calculated. This gives an indication of the performance of the element under test when it is exposed to particular types of noise. This term is additive to the Weighted Standardised Level Difference, and is quoted when referring to the element's sound insulation performance.

Reverberation times in the receiving rooms must also be recorded. This involves generating a controlled level of noise in a minimum of one source position for a pre-determined period of time, and measuring the decay time of the sound energy over a range of not less than 20 dB.

6.2 Ceiling Construction

22mm tongue and groove floorboards, existing timber joists, 15mm gypsum plank soundboard, 12.5mm plasterboard, 100mm Isowool APR 1200, 5mm skim.

6.3 Insulation Criterion

Approved Document E "Resistance to the Passage of Sound" 2003 edition provides guidance to meeting the requirements of the Building Regulations 2000. The document provides specific values of sound insulation that are required in a number of situations including purpose-built dwelling houses and rooms, and dwelling houses and rooms formed by material change of use. In the case of airborne sound insulation of both separating walls and floors, the

required sound insulation performance standards are quoted in terms of the DnT,w. The airborne noise criteria published by Approved Document E "Resistance to the Passage of Sound" 2003 for dwellings formed by change of use is 43 dB, DnT,w+Ctr however for the purpose of this report a two-fold increase in this criteria, 49 dB, DnT,w is felt to be sufficient : the ceiling will be judged to have met the criteria where the result obtained from the site measurements is at or above this value. Ctr describes a low frequency noise correction incurred to account for loud amplified music typically played at clubs and public houses. Given that the assessment relates to the ceiling between a restaurant and a residential dwelling, the Ctr correction will not be used.

6.4 Background Noise Levels

Measurements of typical noise levels were made within the receiving rooms during the tests.

Background noise comprised noise from road traffic. It should be remembered that low background noise levels are not taken into account by Approved Document E. Consequently, even if a wall or floor is performing satisfactorily, it may still be the case that sound will be heard passing between adjacent spaces; this being a result of a lack of masking sound provided by background noise.

6.5 Airborne Sound Results

The airborne noise measurements obtained on site have been processed to produce the standardised level difference, DnT, between the source and receiver rooms. The DnT is detailed with the weighted Standardised Level Difference, DnT,w.

6.6 Airborne Sound Insulation Analysis

The obtained results for the separating partitions have met the minimum value of sound insulation required by West Yorkshire Planning Consultation Guidance (2016), and as such may be regarded as having "passed" the test. The subjective impression was that the sound insulation was good, with adequate containment of sound energy within the separating partition structure. Airborne Insulation values are described in Table and Appendix 5.

7.0 DISCUSSION

7.1 External Sound Levels

With reference to the National Planning Policy Framework Planning Practice Guidance on Noise, Table 7.1 summarises daytime, evening and night time noise levels at MP1 & MP2, and presents their relative Observed Effect Levels.

Table 7.1 Observed Effect Levels at MP1 & MP2

Location	Predicted Daytime Observed Effect Level	Predicted Evening Observed Effect Level	Predicted Night Time Observed Effect Level
MP1	NOAEL	LOAEL	LOAEL
MP2	SOAEL	SOAEL	SOAEL

At MP1 the subjective assessment found that sound levels at the rear of 527A were reduced; it being somewhat shielded from Wilmslow Road by the buildings themselves. L_{Aeq} and L_{A90} values were relatively close to one another throughout the assessment, suggesting that the sound levels at MP1 were caused predominantly by road traffic.

At MP2 the subjective assessment found that the close vicinity of the busy Wilmslow Road to the development has resulted in elevated sound levels throughout the day, evening and night time. All average external daytime, evening and night time sound levels meet the Significant Observed Adverse Effect Level (SOAEL). The high external noise values are significant insomuch that they will have a negative impact upon the dwelling's internal daytime, evening and night time sound levels.

7.2 Internal Sound Levels

With reference to internal noise levels, given open windows affording 15 dB attenuation,

Table 7.2 indicates that WHO & BS8233 criteria will be exceeded at the front facade of development during the daytime and evening.

Table 7.2 Predicted Daytime and Evening Internal Noise Levels at 527A Wilmslow Road

Location	External SPL, dB	Open Window Attenuation, dB	Predicted Internal SPL, dB	WHO & BS8233 35 dB Criteria met?
MP1 East Facade	50	15	35	Yes
MP2 West Façade	62	15	47	No

For west-facing rooms, a noise reduction of at least -12 dB is required to meet these internal noise criteria.

For east-facing rooms, the internal noise criteria is met.

Table 7.3 summarises predicted Night Time levels in south and north-facing dwellings rooms at 78 Wilmslow Road, assuming open windows providing 15 dB noise attenuation.

Table 7.3 Predicted Night Time Internal Noise Levels at 78 Wilmslow Road

Location	External SPL, dB	Open Window Attenuation, dB	Predicted Internal SPL, dB	WHO & BS8233 30 dB Criteria met?
MP1 East Facade	45	15	30	Yes
MP2 West Façade	56	15	41	No

For west-facing rooms, a noise reduction of at least 11 dB is required to meet these internal noise criteria.
For east-facing rooms, a noise the internal noise criteria are met.

7.3 Noise Associated with Proposed Ground Floor Coffee Shop

The derived DnT,w value for the airborne sound insulation performance is 64 dB. This is above the criteria value, 49 dB, and such it is not anticipated that

noise associated with kitchen work/patrons' dining will adversely impact upon the occupiers of the first storey dwelling.

8.0 RECOMMENDATIONS

8.1 Ambient External Noise

All habitable first storey front, west facing rooms should have glazing of 6.4mm laminated glass, 12mm air-filled cavity, 8.8mm toughened glass. Optional acoustic vents. The Pilkington datasheet (Pilkington, 2019, see Appendix 5) cites an insulation value of 32 dB, Rw (window closed) for this approximate specification. Open-window ventilation will result in excessive internal sound levels during daytime hours; therefore closed-window mechanical ventilation should be available.

The glazing must incorporate sufficient ventilation so to prevent overheating. ProPG calls for glazing with 'good ventilation'. In terms of temperature, this report interprets this as ventilation sufficient to provide a range of between 15-210C. It is thought that this can only be provided by means of mechanical ventilation. Given the windows' west-facing aspect, the risk of overheating should be prevented by means of controllable mechanical ventilation, with a control range extending from background/trickle through to purge, see Appendix 5 for ventilation details.

Where mechanical ventilation is required, it is recommended that ventilation be provided by 1x Solace Decentralised Mechanical Ventilation Unit (dMEV) per room (Titon, 2019).

Table 5.1.b of Approved Document F, 'Approved means of ventilation' (2010) prescribes a whole dwelling ventilation rate of 13 l/s per bedroom. The dMEV meets this criteria. Additionally, its sound rating at 13 l/s is 23 dB @ 3 metres. Assuming an existing night time internal sound level of 30 dB, an additional 23 dB would increase the SPL to 31 dB: an imperceptible increase.

Appendix 1
Glossary of Acoustic Terms

Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 µPa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$L_p = 20 \log_{10}(p/p_0)$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p0 = reference sound pressure (20 µPa).

A-weighting Network

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

The A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified period of time. In other words, L_{Aeq} is the level if a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. L_{Aeq} is increasing being used as the preferred parameter for all forms of environmental noise.

$L_{A90, T}$

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T. L_{A90} is typically taken as representative of background noise.

$L_{A\ max}$

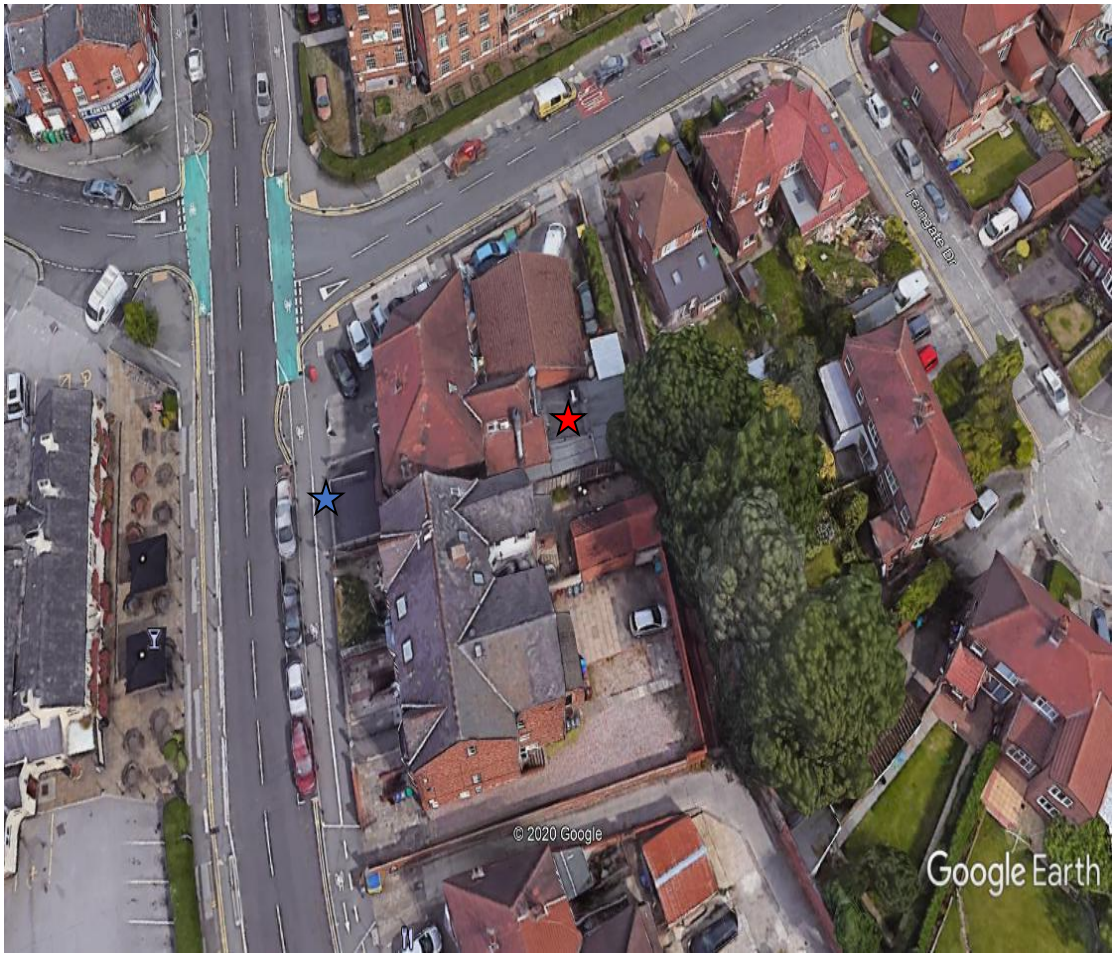
The maximum A-weighted noise level recorded during the measurement period.

Hz

The unit of frequency. The number of cycles (in the context of acoustics, the number of complete sound waves generated) per second.

Appendix 2

Location Plan and Noise Monitoring Positions



MP1: East of 527A Wilmslow Road
MP2: West of 527A Wilmslow Road

Appendix 3

Equipment Used

B & K 2260 Model integrating sound level meter, Serial Number 172181
Certificate Number 12308
Last Laboratory Calibrated 13/2/20

B & K Microphone 4189 Model, Serial Number 1783702

B & K 4230 Model calibrator, Serial Number 724157
Last Laboratory Calibrated 13/2/20

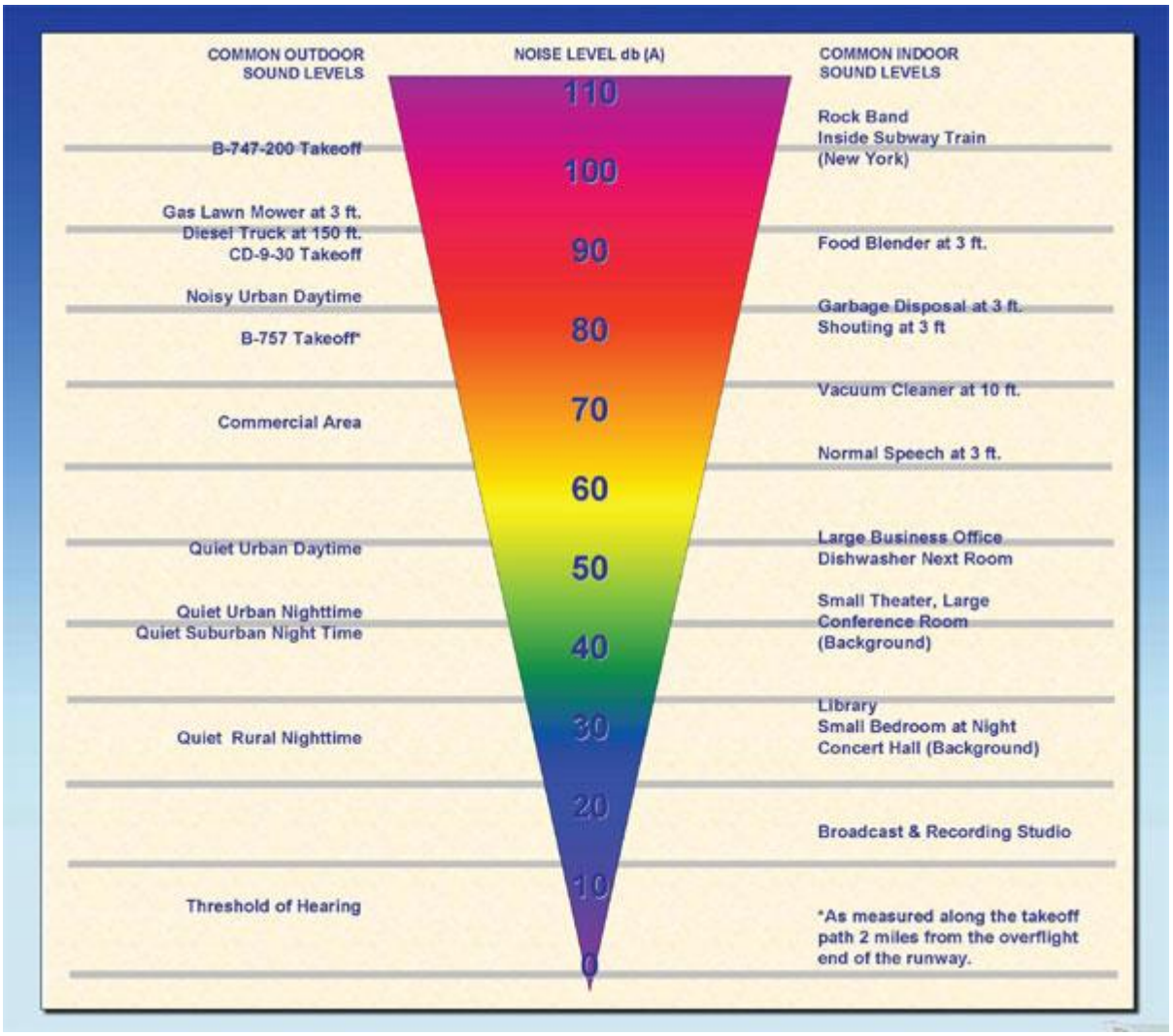
Microphone windshield
Tripod
Anemometer/Thermometer, Serial Number EA931486

The Sound Level Meter was calibrated before and after all measurement periods, with no significant change in calibration. All calibrations took place on site.

The SLM met the requirements of BS EN 60651: 1994 and BS EN 60804: 2001 IEC 60804: 2000. It was capable of simultaneously measuring L_{eq} and L_n values. Batteries for the SLM and calibrator were checked prior to all measurements.

Appendix 4

Sound Level Comparison Chart



Appendix 5
Airborne sound Insulation between Ground Floor Restaurant and First Storey Residential

ACOUSTIC SOLUTIONS

Consultant in Noise and Vibration

20 Netherhall Road, Baildon, West Yorkshire, BD17 6QD. Telephone: 01274 580796/07786 028451

Email: acousticsolutions@email.com

Calculation of Standardised Level Difference

Field Measurements of airborne Insulation between Rooms

Test Report Number: 1965-75-20/T1

Client: Mr Raja Riaz **Test Date:** 26 November 2020

Address: 15 Laurel Mount, Heckmondwike, West Yorkshire WF16 9EF

Details: Party ceiling at 527A Wilmslow Road, Manchester M20 4BA between:

Source Room: Ground floor commercial kitchen

Receiver Room: First floor commercial dining area

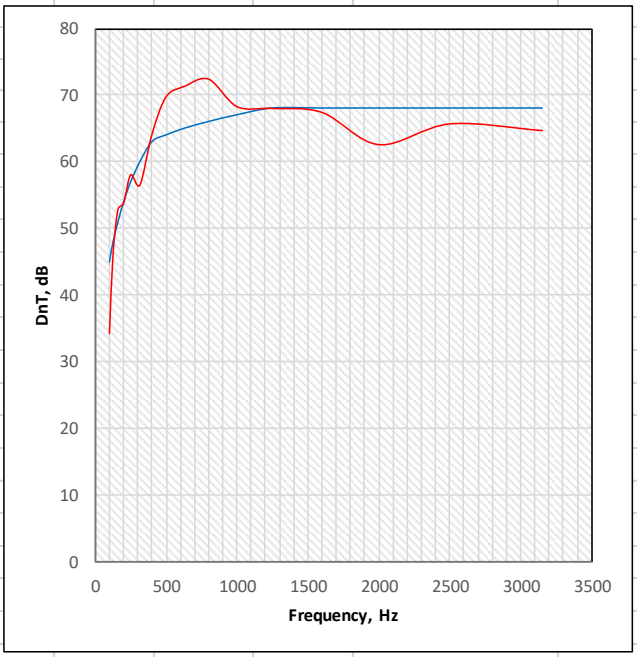
Ceiling Construction (nominal)

22mm tongue and groove floorboards, existing timber joists, 15mm gypsum plank soundboard, 12.5mm plasterboard, 100mm Isowool APR 1200, 5mm skim.

Source Vol: 37.5

Rec Vol: 135

Hz	DnT (dB)
50	
63	
80	
100	34.17125768
125	45.85736305
160	52.74177912
200	53.68150293
250	57.95480371
315	56.43384149
400	64.05043687
500	69.6665606
630	71.21513939
800	72.27575578
1000	68.15861422
1250	67.89689626
1600	67.28266912
2000	62.47108252
2500	65.58434659
3150	64.5846512
4000	
5000	



Rating According to ISO 717-1

DnT,w + Ctr = **48.86056648** **(DnT,w: C, Ctr) =** **64** **-18.1497** **-15.13943352**

Evaluation based on field measurement results obtained by an engineering method

Test Report Number: 1965-75-20/T1 **Test Institute:** Acoustic Solutions

Report Date: 26 November 2020 **Signature:** ..

LS, SOURCE ROOM			LR, RECEIVING ROOM			L, BACKGROUND	
Hz	dB		Hz	dB		Hz	dB
100	90		100	57		100	32
125	99		125	55		125	30
160	102		160	52		160	25
200	102		200	52		200	27
250	101		250	48		250	26
315	101		315	50		315	24
400	102		400	44		400	24
500	100		500	37		500	21
630	96		630	31		630	19
800	95		800	29		800	21
1000	96		1000	33		1000	19
1250	97		1250	34		1250	24
1600	97		1600	34		1600	24
2000	95		2000	36		2000	21
2500	94		2500	32		2500	24
3150	95		3150	33		3150	19
							32
							19

T, REVERBERATION TIME

residential

Hz	T
100	0.65271
125	0.7644178
160	0.9381678
200	1.1634421
250	1.5548965
315	1.7428575
400	1.9936499
500	2.2624434
630	1.9596529
800	1.7848644
1000	1.5746654
1250	1.3896395
1600	1.2063669
2000	1.0767697
2500	0.9604269
3150	0.8705465

D, LEVEL DIFFERENCE D = LR - L

Hz	LR	L	D
100	57	32	56.986245
125	55	30	54.986245
160	52	25	51.991326
200	52	27	51.986245
250	48	26	47.972511
315	50	24	49.989077
400	44	24	43.956352
500	37	21	36.889517
630	31	19	30.716952
800	29	21	28.250596
1000	33	19	32.823569
1250	34	24	33.542425
1600	34	24	33.542425
2000	36	21	35.860446
2500	32	24	31.250596
3150	33	19	32.823569

DnT, STANDARDISED LEVEL DIFFERENCE DnT = LS - LR + 10 LOG (T/TO) where TO = 0.5

Hz	LS	D	T	TO	T/TO	10 LOG	LS - D	DnT
100	90	56.98624464	0.65271	0.5	1.3054199	1.1575023	33.01375536	**34.171258**
125	99	54.98624464	0.7644178	0.5	1.5288355	1.8436077	44.01375536	**45.857363**
160	102	51.99132603	0.9381678	0.5	1.8763356	2.7331052	50.00867397	**52.741779**
200	102	51.98624464	1.1634421	0.5	2.3268841	3.6677476	50.01375536	**53.681503**
250	101	47.97251106	1.5548965	0.5	3.109793	4.9273148	53.02748894	**57.954804**
315	101	49.98907729	1.7428575	0.5	3.485715	5.4229188	51.01092271	**56.433841**
400	102	43.95635195	1.9936499	0.5	3.9872997	6.0067888	58.04364805	**64.050437**
500	100	36.88951667	2.2624434	0.5	4.5248869	6.5560773	63.11048333	**69.666561**
630	96	30.71695216	1.9596529	0.5	3.9193058	5.9320916	65.28304784	**71.215139**
800	95	28.25059633	1.7848644	0.5	3.5697287	5.5263521	66.74940367	**72.275756**
1000	96	32.82356854	1.5746654	0.5	3.1493308	4.9821828	63.17643146	**68.158614**
1250	97	33.54242509	1.3896395	0.5	2.7792789	4.4393214	63.45757491	**67.896896**
1600	97	33.54242509	1.2063669	0.5	2.4127339	3.8250942	63.45757491	**67.282669**
2000	95	35.86044566	1.0767697	0.5	2.1535394	3.3315282	59.13955434	**62.471083**
2500	94	31.25059633	0.9604269	0.5	1.9208537	2.8349429	62.74940367	**65.584347**
3150	95	32.82356854	0.8705465	0.5	1.741093	2.4082197	62.17643146	**64.584651**

DnT,w, WEIGHTED STANDARDISED LEVEL DIFFERENCE

Hz	IRV	DnT	UD	12	AUD	**If<0, 0**
100	33	34.17125768	-1.1712577	45	10.828742	10.828742
125	36	45.85736305	-9.857363	48	2.142637	2.142637
160	39	52.74177912	-13.741779	51	-1.7417791	0
200	42	53.68150293	-11.681503	54	0.3184971	0.3184971
250	45	57.95480371	-12.954804	57	-0.9548037	0
315	48	56.43384149	-8.4338415	60	3.5661585	3.5661585
400	51	64.05043687	-13.050437	63	-1.0504369	0
500	**52**	**69.6665606**	**-17.666561**	64	**-5.6665606**	**0**
630	53	71.21513939	-18.215139	65	-6.2151394	0
800	54	72.27575578	-18.275756	66	-6.2757558	0
1000	55	68.15861422	-13.158614	67	-1.1586142	0
1250	56	67.89689626	-11.896896	68	0.1031037	0.1031037
1600	56	67.28266912	-11.282669	68	0.7173309	0.7173309
2000	56	62.47108252	-6.4710825	68	5.5289175	5.5289175
2500	56	65.58434659	-9.5843466	68	2.4156534	2.4156534
3150	56	64.5846512	-8.5846512	68	3.4153488	3.4153488
			-186.0267		5.9732995	**29.036389**

IRV	Initial Reference Value
UD	Unfavourable Deviation
ARV	Amended Reference Value
AUD	Amended Unfavourable Deviation

Appendix 6
References

HM Government (2010) *'Approved Document F, 'Approved means of ventilation'* [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/468871/ADF_LOCKED.pdf [Accessed 3 October 2020];

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