NOISE ASSESSMENT

481-485 WILMSLOW ROAD, WITHINGTON, MANCHESTER, M20 4AN

Report by
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Site Visited by: S.B. Mellor
Signed:

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1.0 INTRODUCTION

At the request of Hive Architects Studio, on behalf of their client (owners of the property), SBM Safety Solutions Ltd undertook a noise assessment in connection with the proposed development of an existing building at 481-485, Wilmslow Road, Withington, Manchester, M20 4AN. The ground floor is currently in use as a retail space. It is proposed to retain this space for retail use and refurbish the remainder of the building for domestic use. It is clear from the historic decoration that the upper floors have been in domestic use previously.

Transportation (Wilmslow Road) and other sources of noise (where applicable) would be examined where they could affect future residents of this development.

This report considers measurements made on site, the requirements of NPPF and current standards such as BS8233:2014, plus other appropriate criteria; and makes recommendations as necessary.

Acoustic terminology is explained in Appendix 1 of this report; The author's qualifications and experience are described in Appendix 2; and views of the site in Appendix 3.

2.0 SITE DESCRIPTION

The building, part of a row of terraced properties, lies parallel to Wilmslow Road. The area is typical for a location on the edge of city centre with a mixture of domestic use, retail, restaurants, a betting shop and take-aways etc.

The ground floor retail space is close to Wilmslow Road at approximately 3m. There is a flat roof above this space and the windows of the first floor are located to the rear of the roof at approximately 10m from the road.

It was observed that there was an extraction system to the rear and AC units on the flat roof. See observations. (see figure 1 below – source Google Earth).

Figure 1

Source – Google Earth

To the observer, Wilmslow Road appeared relatively busy at all times, with regular passing vehicles of all types including HGV's, buses etc.

Figure 2

3.0 ASSESSMENT CRITERIA

The proposed method was discussed with Sharon McAndrew Neighbourhood Officer with Manchester City Council and it was agreed that road noise and any external plant should be considered:

"Before the development commences a scheme for acoustically insulating the proposed residential accommodation against noise from [Main Street] and [Busy Road] 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 which require consideration on or near the site, including any local commercial/industrial premises. The approved noise insulation 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}*

Upon completion of the development and before 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 has been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the internal noise criteria.

Reason: To secure a reduction in noise from traffic or other sources in order to protect future residents from noise disturbance."

3.1 NPPF (National Planning Policy Framework)

When considering applications for new residential development adjacent to existing noise sources, the relevant document is the "National Planning Policy Framework" or NPPF (2019). This replaces an earlier version from 2012.

The national Planning Practice Guidance (PPG) web-based resource was launched by the Department for Communities and Local Government (DCLG) on 6 March 2014 to support the original National Planning Policy Framework and make it more accessible. The overall aim of the guidance, tying in with the principles of the NPPF and the Explanatory Note of the Noise Policy Statement for England, is to identify whether the overall effect of 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.

A summary of the effects of noise exposure associated with both noise generating developments and noise sensitive developments is presented within the PPG:

Table 1

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No Specific Measures Required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect (NOEL)	No Specific Measures Required
Lowest Observed Adverse Effect Level (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Observed Adverse Effect	Prevent

The NPPF, NSPE and PPG:Noise do not, however, present absolute noise level criteria which define SOAEL, LOAEL and NOEL which is applicable to all sources of noise in all situations. Therefore, within the context of the proposed development, national planning policy and appropriate guidance documents including the 'World Health Organisation Community Noise Guidelines' (1999) and 'BS

8233 – Guidance on Sound Insulation and Noise Reduction for Buildings (2014), which presents the noise level criteria used as a basis for this assessment.

The PPG:Noise also states that neither the NPSE nor the NPPF (which reflects the Noise Policy Statement) expects noise to be considered in isolation, separately from the economic, social and other environmental dimensions of the proposed development.

3.2 ProPG Professional Practice Guidance on Planning & Noise (May 2017) – excerpts are reproduced below

The Professional Practice Guidance on Planning and Noise (ProPG) has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England.

The scope of ProPG is restricted to the consideration of new residential development that will be exposed predominantly to airborne noise from transport sources.

New apartments, flats and houses are the most common type of new residential development; however, the guidance can also be applied to other types of residential developments such as residential institutions, care homes etc.

The two sequential stages of the overall approach are:

Stage 1 – an initial noise risk assessment of the proposed development site; and

Stage 2 – a systematic consideration of four key elements.

The overall Stage 1 approach is considered to support wider Government planning and noise policy and guidance at the date of publication of this document, including the NPPF, NPSE and PPG-Noise.

The noise risk assessment may be based on measurement or prediction (or a combination) as appropriate and should aim to describe noise levels over a "typical worst case" 24-hour day either now or in the foreseeable future.
The four key elements to be undertaken in parallel during Stage 2 of the recommended approach are:

- **Element 1 – demonstrating a "Good Acoustic Design Process";**
- **Element 2 – observing internal "Noise Level Guidelines";**
- **Element 3 – undertaking an "External Amenity Area Noise Assessment"; and**
- **Element 4 – consideration of "Other Relevant Issues".**

The approach is underpinned by the preparation and delivery of an "Acoustic Design Statement" (ADS). An ADS for a site assessed as high risk should be more detailed than for a site assessed as low risk. An ADS should not be necessary for a site assessed as negligible risk. The choice of recommendation is as follows: "grant without conditions", "grant with conditions", "avoid" or "prevent".

The recommended ProPG internal noise level guidelines are described in Figure 2. These guidelines reflect and extend current practice contained in BS8233:2014.

Figure 3

ACTIVITY	LOCATION	07:00 – 23:00 HRS	23:00 – 07:00 HRS
Resting	Living room	35 dB $L_{Aeq,16\,hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16\,hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16\,hr}$	30 dB $L_{Aeq,8\,hr}$ 45 dB $L_{Amax,F}$ (Note 4)

NOTE 1 The Table provides recommended internal L_{Aeq} target levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Ground-borne noise is assessed separately and is not included as part of these targets, as human response to ground-borne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.

NOTE 2 The internal L_{Aeq} target levels shown in the Table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the internal L_{Aeq} target levels recommended in the Table.

NOTE 3 These internal L_{Aeq} target levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.

NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events (see Appendix A).

NOTE 5 Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7.

NOTE 6 Attention is drawn to the requirements of the Building Regulations.

NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form **(see Section 3.D)**.

It should be noted that the acoustic performance of the building envelope will be reduced in the event windows are opened for ventilation or cooling purposes, typically reducing the insulation to no more than 10 to 15 dB(A). Most residents value the ability to open windows at will, for a variety of reasons. *"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB LAeq,16hr."*

ProPG Stage 1

For an initial assessment the following table can be referred for indications of suitability:

Table 2

Level Day	Level Night	Risk	Conclusion
Below 50 dB(A) day	Below 40 dB(A) at night	Negligible Risk	Site is likely to be acceptable
Between 50 and 60-65 dB(A) day	Between 40 and 50-55 dB(A) night	Low Risk	Likely to be acceptable provided that Good Acoustic Design (GAD) is followed
Between 60-65 and 70 dB(A) day	Between 50-55 and 60 dB(A) night	Medium Risk	Likely to be less suitable and application may be refused unless ADS demonstrates GAD, how adverse effects will be mitigated, and significant adverse effects avoided
Above 70 dB(A) day	Above 60 dB(A) night	High Risk	Increased risk of refusal, which may be reduced by demonstrating GAD in a detailed ADS, expert advice recommended

3.3 British Standard 8233:2014 (Guidance on Sound Insulation and Noise Reduction for Buildings)

The latest version of BS.8233 "Guidance on Sound Insulation and Noise Reduction for Buildings", was published in February 2014. BS 8233:2014 adopts guideline external noise values provided in WHO for external amenity areas such as gardens and patios. The Standard states that it is "desirable" that the external

noise does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,\ T.}$ Where design standards cannot be achieved for traditional amenity spaces (e.g. gardens and patios) then the '*lowest practical levels*' should be achieved.

An extract of the "Design Range" of BS.8233's Table 4 for indoor noise levels (with Notes 4 & 7) appears below and it should also be noted that the assessment period is for the whole of the day (16 hours) or night (8 hours).

Table 4 **Indoor ambient noise levels for dwellings**

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	—
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	—
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

NOTE 4 regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or LAmax,P depending on the character and number of events per night. Sporadic noise events could require separate values.

NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB LAeq,T , with an upper guideline value of 55 dB LAeq,T. which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable."

3.4 WHO "Guidelines for Community Noise"

These guidelines entitled "Guidance for Community Noise"; were approved by the World Health Organisation and consider guideline values for annoyance in the community. These have been set at 50 or 55 dBA, representing daytime levels below which a majority of the adult population will be protected from becoming moderately or seriously annoyed, respectively. An extract of "*Table 4.1 from Section 4.4"* appears below:

Table 4.1: Guideline values for community noise in specific environments (Extract).

Specific environment	Critical health effect(s)	LAeq [dB]	Time base [hours]	LAmax, fast [dB]
Outdoor living area	Serious annoyance, daytime and evening Moderate annoyance, daytime and evening	55 50	16 16	- -
Dwelling, indoors Inside bedrooms	Speech intelligibility and moderate annoyance, daytime and evening Sleep disturbance, night-time	35 30	16 8	 45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

The guidelines also suggest that; "*At night, sound*

pressure levels at the outside façades of the living spaces should not exceed 45 dB LAeq and 60 dB LAmax, so that people may sleep with bedroom windows open. These values have been obtained by assuming that the noise reduction from outside to inside with the window partly open is 15 dB." LAeq for daytime is for 16 h and for nighttime 8h. BS8223 is based on the WHO Guidelines and as can be seen has similar values.

3.5 BS4142:2014 – Rating Industrial Noise Affecting Mixed Residential and Industrial Areas

BS4142:2014 states, *"Response to sound can be subjective and is affected by many factors, both acoustic and non-acoustic. The significance of its impact, for example, can depend on such factors as the margin by which a sound exceeds the background sound level, its absolute level, time of day and change in the acoustic environment, as well as local attitudes to the source of the sound and the character of the neighbourhood…This British Standard describes methods for rating and assessing sound of an industrial and/or commercial nature".*

This British Standard describes a method for assessing whether a specific sound may have an adverse impact.

The Standard requires that the ambient noise ***(totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far)*** including the "specific" sound from the source in question is measured in terms of the equivalent continuous sound level LAeq [see Appendix 1 for acoustic terms], which is then corrected for the residual sound (total LAeq excluding the "specific" sound).

A correction for character is made if ***"a tone, impulse or other characteristic occurs".*** For tonality a correction of between +2dB and 6dB is considered acceptable and for impulsivity between 3 and 9dB. See table below.

Table 3

Character	**Just Perceptible**	**Clearly Perceptible**	**Highly Perceptible**
Tonality	+2dB	+4dB	+6dB
Impulsivity	+3dB	+6dB	+9dB

Where the specific sound features characteristics that are

neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant, then it might be appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion.

The final figure, including any character correction is known as the Rating level.

This Rating Level is then compared with the measured background [LA90] level. The greater this difference the greater the likelihood of "adverse impact" (See Notes 1 & 2 from BS4142:2014 below).

NOTE 1

a) Typically, the greater this difference, the greater the magnitude of the impact.

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

c) A difference of around +5 dB is likely to be an indication of an adverse impact,

depending on the context.
d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

NOTE 2
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.

It can be seen above that the conclusions to a BS4142 assessment also depend on the context and Section 11 of the British Standard states:

"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following...

3) 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:

i. facade insulation treatment;
ii. ventilation and/or cooling that will reduce the need

to have windows open so as to provide rapid or purge ventilation; and

iii. acoustic screening."

4.0 NOISE LEVEL INFORMATION

4.1 Existing Noise Climate

Methodology

The site was visited on Thursday 23rd January 2020 and Friday 24th January 2020 and SBM Safety Solutions installed noise monitoring instrumentation at two positions.

Firstly, at the front of the property from a first-floor window at 1m from the façade for 24 hours and also at the rear of the property for a shortened period as a comparison (to establish the difference when screened from Wilmslow Road) also at 1m from the façade.

Figure 4

As both monitoring positions were situated at 1m from the façade a correction would be necessary (-3dBA).

The weather was dry with some brief spells of light rain over the 24-hours. There was a wind speed forecast between 1-2m/s (SW) although levels measured on an electronic anemometer were less often <0.5m/s. The temperature ranged between 7-8 degrees Celsius.

It is not considered that the weather conditions would have influenced the results.

The sound level meters used (with "outdoor kit") plus on-site calibrator can be found in Table 4 below. The meters calibrated correctly before and after the measurements;

all instrumentation had been laboratory calibrated within the preceding 2 years.

Table 4

Instrument	Type	Serial No.	Calibration Cert. No.	Date of Due Calibration
Svan 977A	Sound Level Meter	69280	New - test date 23/02/2018	23/02/2020
ACO 7052E	Microphone	70160	New - test date 23/02/2018	23/02/2020
Svan SV12L	Preamp	71675	New - test date 23/02/2018	23/02/2020
Cirrus 511E	Calibrator	39816	Cirrus 248531	24/04/2021
Svan 977	Sound Level Meter	36870	1400 7353-1	09/09/2021
ACO 7052E	Microphone	61121	1400 7353-1	09/09/2021
Svan SV12L	Preamp	47576	1400 7353-1	09/09/2021

4.2 Results and Calculations

Period measurements are shown below in Tables 5-8.

Table 5 - Monitoring Position 1 (Front) dBA

Start date & time	Duration	LAeq	LAmax	LAmin	L01	L10	L50	L90	L95
23/01/2020 11:00:00	01:00:00.000	64.3	80.7	52.3	71.2	66.9	62.7	57.9	56.7
23/01/2020 12:00:00	01:00:00.000	63.8	80.4	52.4	70.1	66.6	62.5	58.6	57.7
23/01/2020 13:00:00	01:00:00.000	63.7	84.6	50.9	70.3	66.5	61.9	57.4	56.2
23/01/2020 14:00:00	01:00:00.000	64.0	87.6	52.6	71.2	66.2	62.0	58.5	57.6
23/01/2020 15:00:00	01:00:00.000	63.5	80.1	53.5	70.2	66.2	62.1	58.2	57.3
23/01/2020 16:00:00	01:00:00.000	64.0	77.7	54.3	71.4	66.7	62.4	58.7	57.7
23/01/2020 17:00:00	01:00:00.000	62.9	79.5	52.7	69.9	65.7	61.3	58.0	57.1
23/01/2020 18:00:00	01:00:00.000	63.3	81.2	51.8	70.6	65.8	61.7	57.6	56.7
23/01/2020 19:00:00	01:00:00.000	66.6	95.3	51.3	73.3	66.0	61.5	56.8	55.8
23/01/2020 20:00:00	01:00:00.000	65.6	97.8	48.9	70.9	66.3	61.7	56.9	55.2
23/01/2020 21:00:00	01:00:00.000	66.4	95.4	47.3	71.6	65.7	60.8	55.4	53.8
23/01/2020 22:00:00	01:00:00.000	62.1	79.2	45.4	69.1	65.2	60.5	54.2	52.5
23/01/2020 23:00:00	01:00:00.000	61.3	79.6	45.4	68.6	64.7	59.4	52.8	51.3
24/01/2020 00:00:00	01:00:00.000	60.5	81.3	44.8	68.1	63.7	58.1	52.2	50.8
24/01/2020 01:00:00	01:00:00.000	59.8	79.0	43.8	67.8	63.3	56.8	51.2	50.0
24/01/2020 02:00:00	01:00:00.000	58.6	76.9	36.0	68.1	62.5	54.4	45.2	42.2
24/01/2020 03:00:00	01:00:00.000	56.8	72.4	34.2	66.7	61.5	49.1	39.4	37.9
24/01/2020 04:00:00	01:00:00.000	56.1	73.5	34.2	67.6	60.2	44.7	37.9	37.1
24/01/2020 05:00:00	01:00:00.000	57.6	73.5	36.4	67.3	62.3	50.4	41.3	40.1
24/01/2020 06:00:00	01:00:00.000	61.6	76.8	43.3	68.9	65.2	59.5	51.9	49.7
24/01/2020 07:00:00	01:00:00.000	64.4	79.9	52.1	70.2	67.4	63.3	57.9	56.6
24/01/2020 08:00:00	01:00:00.000	65.3	77.6	54.6	71.9	68.1	64.0	59.5	58.5
24/01/2020 09:00:00	01:00:00.000	64.7	77.5	52.3	71.2	67.7	63.3	59.2	58.0
24/01/2020 10:00:00	01:00:00.000	64.4	74.7	54.1	70.5	67.2	63.3	59.1	58.1

	LAeq	Time
Day	64.5	16 hours
Night	59.4	8 hours

Table 6 - Octave Band Levels (Position 1 - Total Monitoring Period)

1/1 Octave	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Day	63.5	61.0	59.2	60.5	57.4	51.4
Night	56.0	53.3	53.3	56.0	52.0	45.6

Table 7 - Monitoring Position 2 (Rear) dBA

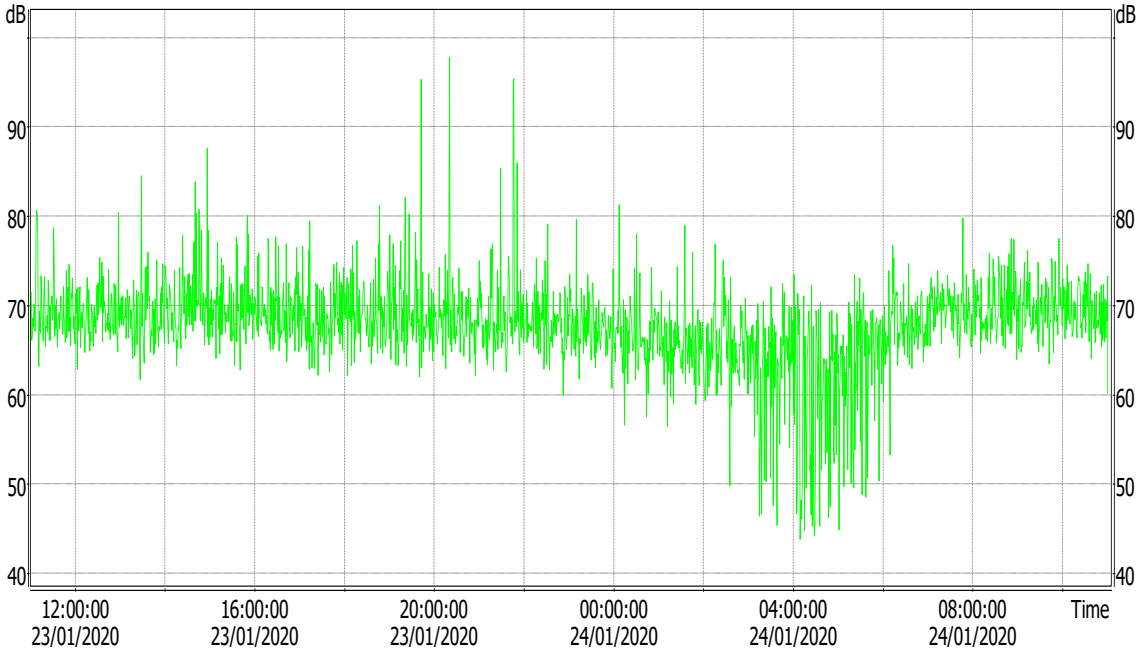
Start date & time	Duration	LAeq	LAmax	LAmin	L01	L10	L50	L90	L95
24/01/2020 11:04:28.200	00:15:02.000	49.6	65.5	41.0	58.8	51.8	47.1	43.7	43.1

Table 8 - Octave Band Levels (Position 2 - Total Monitoring Period)

1/1 Octave	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
LAeq, 15 mins	52.9	51.4	46.9	44.3	40.1	36.7

In addition to the above, the maximum readings were recorded and the typical highest LAmax readings were noted to be around 75-79dB (or 72-76dB after adjusting for the façade) for the monitoring period, at position 1 (front) at night.

Figure 5 – Position 1 (Front)



When considering maximum noise levels generated by road traffic, it is generally found that these levels are not governed by the volume of traffic, but by specific single events such as a car or motorbike passing by at high speed, an empty lorry passing over bumps or potholes in a section of road, a car horn, emergency siren or a vehicle skidding (see impression below).

4.3 Subjective Impressions

Noise sources associated with an area close to a town centre were present on attendance such as shoppers, passing cars, cars using the car parks opposite and to the rear.

External extraction plant associated with a nearby restaurant, at the rear, was not audible even very close to when the site was visited during the night. AC plant at the front associated with the betting shop was also not audible but may only be used in the Summer. There was also a flue close to the first-floor window, again no sounds were audible to the observer. It is likely that because the AC plant is associated with the betting shop that it will

only be used during the daytime and road traffic noise will be dominant at the front and mask any sound from the plant.

4.4 BS4142 - Night-time Noise

BS4142:2014 recognises that at night residents will be inside their properties [BS4142 A.6.1 and A.6.3] and that consequently "*Other guidance, such as BS 8233, might be applicable in this instance."* Also, BS4142 is directed primarily to the circumstances of a proposed or existing noise source affecting existing property, i.e. circumstances where insulating the property is impracticable. Therefore, BS4142 can't take into account circumstances where the properties have not yet been built and where noise control, such as acoustic glazing and ventilation, can be incorporated such to alleviate "*...the primary concern is the potential for disturbance of residents who could be sleeping with open bedroom windows.*"

The provision of acoustic glazing, ventilation and screening can all change the impact of external noise.

Consequently, where noise control can be incorporated into the properties [as here] SBM Safety Solutions uses BS 8233:2014.

5.0 ASSESSMENT AND DISCUSSION

5.1 Position 1 (Front) Daytime (07:00 to 23:00)

LAeq,16hr = **64.5dB**

Position 2 Nighttime Levels (23:00 to 07:00)

LAeq,8hr = **59.5dB**

5.3 ProPG

ProPG is aimed principally at transport noise and new builds but if we apply the guidance regarding risk to this building then with the present levels of noise, this would place the site in the **medium risk category** (day / night) as shown below (marginally over the night time range at the front). Therefore, good acoustic design is essential to

avoid adverse impact.

Table 9 - ProPg

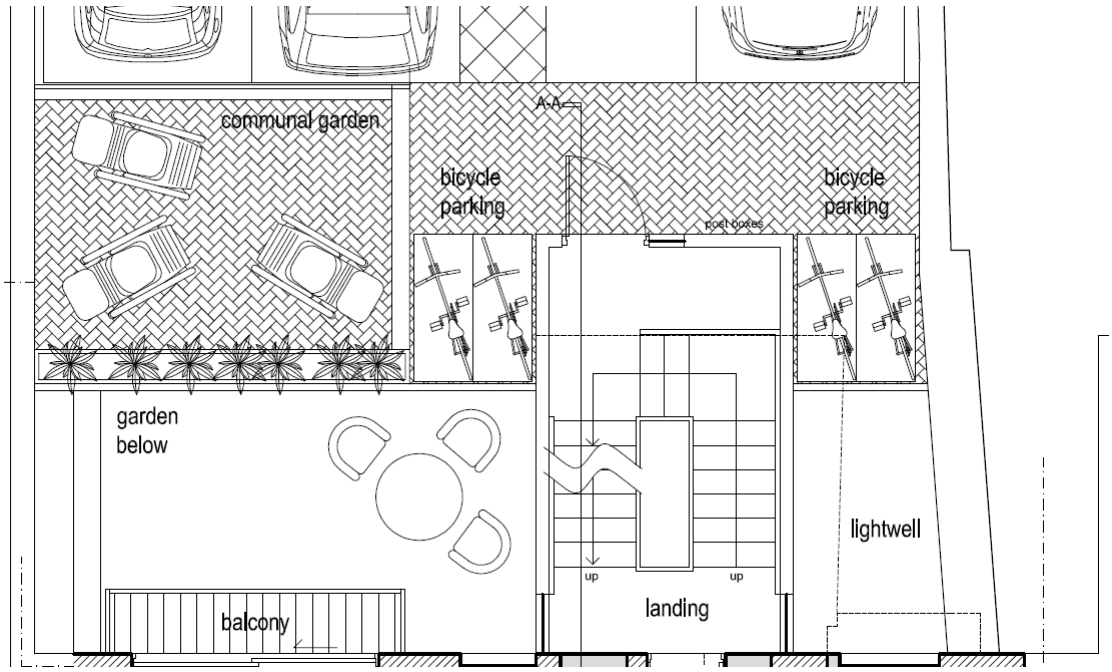
Between 60-65 and 70 dB(A) day	**Between 50-55 and 60 dB(A) night**	**Medium Risk**	Likely to be less suitable and application may be refused unless ADS demonstrates GAD, how adverse effects will be mitigated, and significant adverse effects avoided

5.4 External Noise Levels

A small shared space is planned for the rear of the building as shown below. The indicative measurement LAeq, 15 minutes, made at a busy time of the day, was 49.6dBA. This suggests that for a 16-hour period (07.00-23.00) that the lower desirable level from BS8233 will be met as noise levels naturally diminish from late evening into the night, i.e. 50dBA which easily achieves the target by Manchester City Council of 55dBA.

This building and others screen the rear from Wilmslow Road, restaurant extraction and also the relatively quiet Parson's Road which runs to the south of the site.

Figure 6 – small external communal space



5.5 Internal Noise Levels

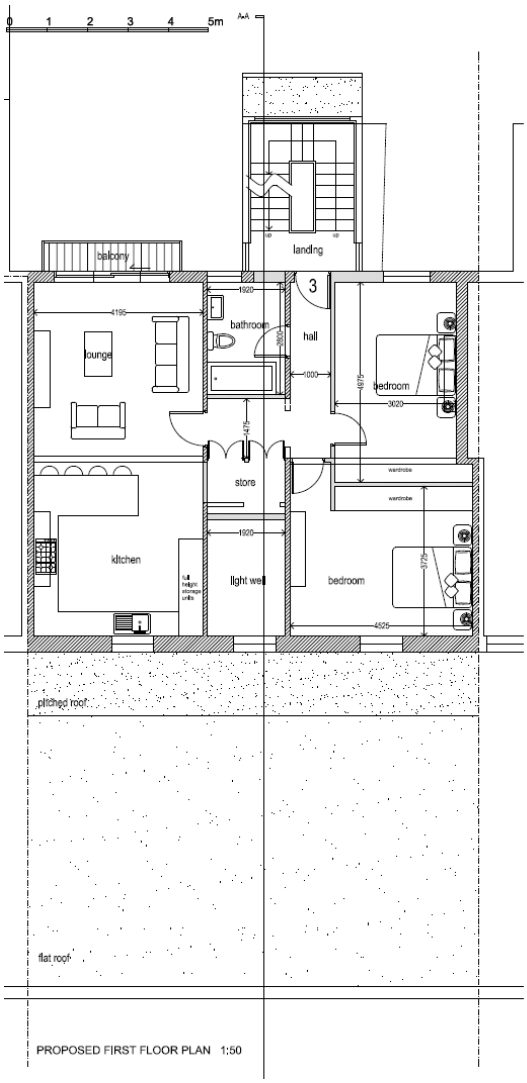
Detailed internal levels have been calculated using the typical octave band levels (see above) and an example construction using the methodology described in BS EN 12354-3:2000 [6].

For the purposes of prediction, the following have been assumed for first floor rooms facing the front and rear from available plans:

- Reverberation time is 0.5s for kitchen areas

- Reverberation is 0.3s for bedrooms.
- The volume for the first-floor bedroom facing Wilmslow Road = $40m^3$
- The volume for the kitchen facing Wilmslow Road = $40m^3$
- Window areas approximate = $2m^2$
- Brick / block cavity construction
- Tiled/slated roof, plasterboard ceiling, absorbing layer above the ceiling (e.g. mineral wool loft insulation)

Figure 7 – Internal Layout



5.6 Example Construction and Glazing

With (daytime) external levels of 65dB LAeq, 16 hours, desirable internal levels should be achievable where the existing structure is of solid brickwork, brick/block cavity or timber frame with lightweight cladding, tiled/slated roof, 9kg/m^3 plasterboard ceiling, 100mm sound absorbing layer above the ceiling (e.g. mineral wool) and window and ventilation specification as described below.

The suggested glazing and ventilation are based on the overall external octave band levels established during the monitoring period – this should achieve target internal levels.

5.7 Bedroom (facing Wilmslow Road)

For the studio on the first floor facing the front, it can be seen (Table 10) that the predicted internal daytime noise level of **25.7dB LAeq,16hr** using double glazing (10/12/6) as shown with Passivent window frame ventilation, or similar alternatives would meet the daytime

criteria of 35dB LAeq, 16hr from BS8223:2014 for bedrooms.

Table 10 (Front Facing Bedroom)

BS EN 12354-Calcs		**Use**	Volume		Volume	40		LAeq Ext	**64.5**
Version 4.3		**length**						LAeq Int	**25.7**
© 2014 Martec Environmental Consultants Ltd		**width**			RT	0.3		**dBA Diff**	**39**
& Acute Acoustics Ltd		**height**		**Octave Band Centre Frequency [Hz]**					**dBA**
				125	**250**	**500**	**1k**	**2k**	**4k**
	External Spectrum Leq (Free Field & Linear)			63.5	61.0	59.2	60.5	57.4	51.4	**64.2**
	Adjustment to Given Level if required									64.5
	External Spectrum Adjusted for Level			**63.8**	**61.3**	**59.5**	**60.8**	**57.7**	**51.7**	**64.5**
			Area m2	**Element Sound Reduction Index [SRI]**						**Contrib**
Wall	Brick/block/cavity		10.0	**41**	**45**	**45**	**54**	**58**	**58**	**14.5**
Window	10/12/6_double_glazing		2.0	**26**	**27**	**34**	**40**	**38**	**38**	**22.5**
Window	None		0.0	**0**	**0**	**0**	**0**	**0**	**0**	**0.0**
Door	None		0.0	**0**	**0**	**0**	**0**	**0**	**0**	**0.0**
Roof	None		0.0	**0**	**0**	**0**	**0**	**0**	**0**	**0.0**
			# Vents							
Vent Dn,e	Passivent TVALdB 800 Window Frame vent		1.0	**46**	**44**	**38**	**43**	**43**	**50**	**22.1**
										dBA
		Internal SPL/dBLin		**31.3**	**27.7**	**23.5**	**19.2**	**16.6**	**7.7**	**25.7**

Given the -5.0dBA difference between daytime and nighttime noise levels [64.5-59.5=5.0] then this specification for glazing and ventilation would also achieve the desirable internal nighttime levels for bedrooms at **20.7dB LAeq, 8hr** [25.-5.0=20.7dB].

The higher LAmax levels at night are typically around 72-76dB after adjusting for the façade reflection (see figure 5). Given the predicted difference between external and internal levels of 39dB this would equate to internal levels

of **33-37dB LAmax** which meets the LAmax criteria of 45dB LAmax (ProPG).

5.9 Kitchen Facing Wilmslow Road

For the kitchen on the first floor facing the front, it can be seen (Table 10) that the predicted internal daytime noise level of **27.9dB LAeq,16hr** using double glazing (10/12/6) with the same ventilation as the bedroom as noted above, or similar alternatives would meet the daytime criteria of 35dB LAeq, 16hr from BS8223:2014 for living areas.

Table 11 Front Facing Kitchen

BS EN 12354-Calcs		Use	Volume		Volume	40		LAeq Ext	64.5
Version	4.3	length						LAeq Int	27.9
© 2014 Martec Environmental Consultants Ltd		width			RT	0.5		dBA Diff	37
& Acute Acoustics Ltd		height		Octave Band Centre Frequency [Hz]					dBA
				125	250	500	1k	2k	4k	
	External Spectrum Leq (Free Field & Linear)			63.5	61.0	59.2	60.5	57.4	51.4	64.2
	Adjustment to Given Level if required									64.5
	External Spectrum Adjusted for Level			63.8	61.3	59.5	60.8	57.7	51.7	64.5
			Area m2	Element Sound Reduction Index [SRI]						Contrib
Wall	Brick/block/cavity		10.0	41	45	45	54	58	58	16.7
Window	10/12/6_double_glazing		2.0	26	27	34	40	38	38	24.7
Window	None		0.0	0	0	0	0	0	0	0.0
Door	None		0.0	0	0	0	0	0	0	0.0
Roof	None		0.0	0	0	0	0	0	0	0.0
			# Vents							
Vent Dn,e	Passivent TVALdB 800 Window Frame vent		1.0	46	44	38	43	43	50	24.4
										dBA
			Internal SPL/dBLin	33.5	29.9	25.7	21.4	18.8	9.9	27.9

6.0 CONCLUSIONS AND RECOMMENDATIONS

Measured levels overall were higher at the front due to the dominance of road traffic. Levels were also relatively high at night which reflects how busy this road is.

AC fans at the betting office were not audible, but the recommended specification is robust enough to mitigate for this if the units are operated at night (unlikely).

The above demonstrates that with considered specification appropriate noise levels can be met with reference to BS8233: 2014 and ProPG, and sources of noise mitigated.

The following noise control measures are recommended:

- For all habitable rooms with a view of Wilmslow Road, windows should be fitted with double glazing 10/12/6, or better and Passivent window frame ventilation TVAL dB 800 or an alternative (see table 12 below).

Table 12: Required Element Performance or similar / better and approved for the front [dB]

Element	Unit	Octave Band Centre Frequency [Hz]				
		125	250	500	1k	2k
Glazing	SRI	26	27	34	40	38
Ventilation	SRI	46	44	38	43	43

- For the rear, standard double glazing with standard window ventilation should suffice.

APPENDIX 1

EXPLANATION OF ACOUSTIC TERMS

The dB or the decibel, is the unit of noise. The number of decibels or the level, is measured using a sound level meter. It is common for the sound level meter to filter or 'weight' the incoming sound so as to mimic the frequency response of the human ear. Such measurements are designated **dB(A)**.
A doubling of the sound is perceived, by most people, when the level has increased by 10 dB(A). The least discernible difference is 2 dB(A). Thus, most people cannot distinguish between, say 30 and 31 dB(A).
If a noise varies over time then the **equivalent continuous level, or LAeq**, is the notional constant level of noise which would contain the same amount of acoustic energy as the time varying noise.
The following table gives an indication of the comparative loudness of various noises expressed in terms of the A weighted scale:

Source of noise	**dB(A)**	**Nature of Noise**
Inside Quiet bedroom at night	30	Very Quiet
Quiet office	40	
Rural background noise	45	
Normal conversational level	60	
Busy restaurant	65	
Typewriter @ 1m	73	
Inside suburban electric train	76	
Alarm clock ringing @ .5m	80	
Hand clap @ 1m	80	
HGV accelerating @ 6m	92	Very Loud

APPENDIX 2

QUALIFICATIONS AND EXPERIENCE OF S.B. MELLOR

My full name is Steven Brian Mellor. I am the principal of the firm of SBM Safety Solutions Ltd, a consultancy company that specialises in health, safety and environmental services including noise assessment and control.

I hold a Masters degree in Health, Safety and Environmental Law, British Occupational Health Society (BOHS) M104 certificate in Noise and Vibration and Institute of Acoustics Certificate of Competence in Environmental Noise Measurement (Derby University) and Diploma in Acoustics and Noise Control (Bristol University). I am a member of the professional body for noise and vibration specialists, the Institute of Acoustics - MIOA.

I have some 18 years of experience dealing with problems caused by noise and vibration, both regarding noise and vibration in the environment, the workplace and the home. The firm of SBM Safety Solutions Ltd. was formed 16 years ago. During that time, we have advised many groups including employers, residents and developers about the problems of noise and vibration in the workplace and environment.

APPENDIX 3

Views of the Site and Location

View of rear (screened on both sides)

Rear view

Extraction stack screened

AC plant above betting shop