

103 to 105 Cheetham Hill Road, Manchester - conversion from commercial to hotel premises:

Noise Assessment

M F Khan

Echo Acoustics 6 November 2019

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EXECUTIVE SUMMARY

The results of a noise measurement survey and desk-based assessment are presented, with respect to the change of use of commercial premises for use as a hotel, at 103 – 105 Cheetham Hill Road, Manchester M8 8PY.

The assessment shows that the premises are predominantly affected by a wide range of vehicle noise from traffic using Cheetham Hill Road.

The assessment provides recommendations for suitable noise mitigation measures for bedrooms on facades facing Cheetham Hill Road, sufficient to satisfy the Local Planning Authority's requirements that "*prospective occupiers will not be unduly affected by the surrounding environment*".

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1 INTRODUCTION AND SITE DESCRIPTION

- 1.1 Echo Acoustics was commissioned by Mr M F Khan to undertake an assessment of noise affecting the proposed change of use of premises at 103 to 105 Cheetham Hill Road, Manchester M8 8PY, from commercial use to a hotel.
- 1.2 The site is in a relatively central location close to Manchester City Centre; Cheetham Hill Road is a major road between the city centre and the northern outskirts of the city. The surrounding uses are predominantly commercial at ground floor with a number of residential premises at first floor level. The ambient noise situation is dominated, day and night, by traffic noise including buses, large and small diesel-engine delivery vehicles, numerous taxis, emergency vehicles and private vehicles with modified exhausts/in-car audio systems.
- 1.3 The application premises currently comprise a restaurant at ground floor level (Alif) and a clothes shop (Brezza) with vacant/storage uses at first floor level.
- 1.4 The premises location and street-view are shown in Figures 1 and 2.

Figure 1: Premises location

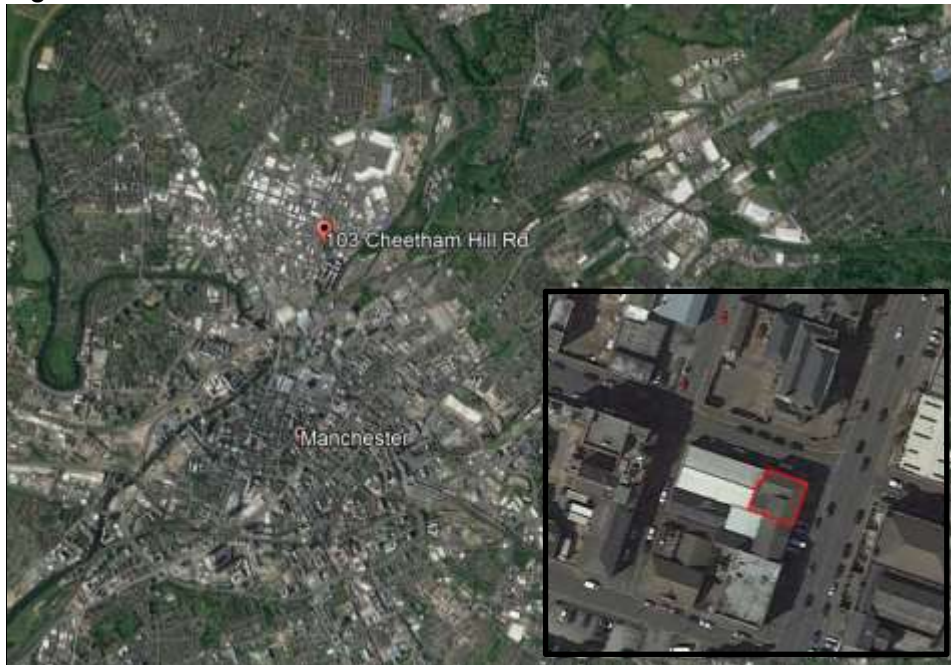


Figure 2: Street-view of application premises



- 1.5 The current plans indicate that the Alif restaurant will remain whilst the ground floor area currently occupied by Brezza, will become the entrance, along with communal seating and dining areas. At first, second and third storey, habitable rooms will only be bedrooms but will extend across the full area of the premises. The layout is presented in Figure 3.

Figure 3: Current and proposed layout



- 1.6 A planning application has been submitted to the Local Planning Authority (reference: 122590/FO/2019) who has requested additional information, including the preparation of a noise assessment report: *“Details of acoustic insulation are required to demonstrate prospective occupiers will not be unduly affected by the surrounding environment”*.

- 1.7 In order to calculate the acoustic insulation requirements, it was necessary to measure the ambient noise affecting the premises.
- 1.8 This report presents the results of a noise measurement survey at the premise's front façade facing Cheetham Hill Road, a desk-based assessment of noise affecting the site and its significance with respect to the proposed residential use and, where appropriate, a discussion of suitable noise mitigation requirements for the site sufficient to satisfy the Local Planning Authority's requirements.
- 1.9 A glossary of acoustic terminology is presented at Appendix A.

2 GUIDANCE

- 2.1 Planning policies are set at both a national and local level. With respect to national policy, assessment of the suitability of a site for residential development is guided by the National Planning Policy Framework (NPPF), issued in March 2012.
- 2.2 With regard to noise, the NPPF (“the Framework”) does not provide specific policies or defined noise limits, but rather is intended to enable the planning system to support the Government’s aims and objectives with respect to sustainable development, and provides a general framework within which planning applications for development “*must be determined in accordance with the [local] development plan*”.
- 2.3 None of the current local or national planning policies preclude residential development of the site.
- 2.4 The National Planning Policy Framework does state that “*the planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability*”.
- 2.5 Additional national planning guidance is provided in the Government’s Noise Policy Statement for England¹ (NPSE – “the Noise Policy”), to which the Framework makes specific reference as the main source of national guidance specifically on planning and noise.
- 2.6 The Noise Policy has a long term vision to “*Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development*”. The vision is supported by three key aims intended to promote sustainable development with respect to noise so that “*Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*
- *avoid significant adverse impacts on health and quality of life;*
 - *mitigate and minimise adverse impacts on health and quality of life; and*
 - *where possible, contribute to the improvement of health and quality of life*”.
- 2.7 Health is defined by the World Health Organisation as “*a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, and recognises the enjoyment of the highest attainable standard of health as one of the fundamental rights of every human being*” and the Noise Policy makes “*a distinction between ‘quality of life’ which is a subjective measure that refers to people’s emotional, social and physical well being and ‘health’ which refers to physical and mental well being*”.
- 2.8 However, the Noise Policy recognises that it is not currently possible to define a single objective noise level having specific effects on people, hence the emphasis on “promoting” improvements to health and quality of life through effective management of noise, considered in the context of the wider environment and factors other than noise.

¹ Dept. for Environment, Food and Rural Affairs (DEFRA), [2010] “Noise Policy Statement for England” <http://www.defra.gov.uk/environment/quality/noise/npse/> (accessed 28 March 2012)

- 2.9 Additional guidance is given in the Planning Practice Guidance Note (PPG) on noise, issued in March 2014 alongside the NPPF. This “*advises on how planning can manage potential noise impacts in new development*”. The PPG suggests the following noise exposure hierarchy, based on average responses to noise.

Table 1: PPG noise exposure and response hierarchy

Perception	Examples of outcomes	Increasing effect level	Action
<i>No Observed Effect Level (NOEL)</i>			
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
<i>Lowest Observed Adverse Effect Level (LOAEL)</i>			
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; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported 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
<i>Significant Observed Adverse Effect Level (SOAEL)</i>			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. 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	Significant Observed Adverse Effect	Avoid

	area.		
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 Adverse Effect	Prevent

- 2.10 Beyond this, however, the guidance is relatively generic. It avoids specifying ‘acceptable’ environmental noise levels as the acceptability of a source of is both subjective and context-dependant.
- 2.11 With respect to detailed assessment and calculation of noise, BS 8233: 2014 *Guidance on sound insulation and noise reduction for buildings* gives recommendations for external and internal noise levels for residential dwellings in order to protect residential amenity in dwellings, based on health-based research, as follows:
- Living rooms during the day 35 dB $L_{Aeq,16hour}$
 - Dining rooms during the day 40 dB $L_{Aeq,16hour}$
 - Bedrooms during the day 35 dB $L_{Aeq,16hour}$
 - Bedrooms during the night 30 dB $L_{Aeq,8hour}$
- 2.12 These values can be taken to be broadly equivalent with the LOAEL in the PPG. Note that these are not specific criteria or ‘target’ noise levels, merely indicative recommendations which will be context-dependant. However, most Local Authorities tend to apply the recommended noise levels as strict criteria.
- 2.13 The standard suggests that “*recommendations for ambient noise in hotel bedrooms are similar to those for living accommodation*”.
- 2.14 In most standard modern properties, the walls and roof provide relatively high levels of sound insulation of greater than 40 dB; the weakest part of a building facade, with respect to noise, is generally the windows. Modern construction methods for new residential properties incorporate standard thermal double-glazing which, the standard suggests, will provide approximately 30 dB R_w of sound attenuation when closed. The standard does not specifically give sound attenuation values for partially open windows, although the worked example (G.1) at Annex G of the Standard indicates that a partially open window would provide 15 dB of sound attenuation.
- 2.15 The World Health Organisation (WHO) 1999 *Guidelines for community noise* provides guideline values for avoidance of particular negative health effects e.g. annoyance and sleep disturbance.
- 2.16 The guideline values applicable to residential developments, which reflect those presented in BS 8233, are reproduced in Table 2.

Table 2: WHO guideline values for community noise in specific environments

Specific environment	Critical health effect	dB L_{Aeq}	Time base (hours)	dB L_{AFmax}
Outdoor living area	Serious annoyance, daytime and evening	55	16	---
	Moderate annoyance, daytime and evening	50	16	---
Dwelling, indoors	Speech intelligibility & moderate annoyance, daytime & evening	35	16	---
Inside bedrooms	Sleep disturbance, night-time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

3 METHODOLOGY AND ASSUMPTIONS

- 3.1 The assessment comprised a noise measurement survey between 11:00pm and midnight on Wednesday 30th October and during the day time, between 10:30am and 11:30am on Thursday 31st October 2019.
- 3.2 The sound level meter was placed at the front façade of the premises looking onto Cheetham Hill Road; traffic on the road provides the dominant affecting the premises with occasional vehicle movements on the side road (Knowsley Street) providing no significant noise contribution.
- 3.3 The meter in position is presented in Figure 4.

Figure 4: Meter in position



- 3.4 The sound level meter used was a Casella CEL 633C Class 1 integrating, averaging meter, which was placed in a locked, weather-proof case attached via extension cable to the microphone which was mounted on a tripod at a height of 2.1 metres above ground level; conventionally, measurements are recorded at a height of between 1.3m and 1.5m but, in this instance, a greater height was used to provide the microphone with an unobstructed line-of-sight with the road, in view of the presence of parked cars in front of the premises. The microphone was protected by a proprietary wind-shield and was field-calibrated before and after the survey; no significant variation in calibration tone was observed.
- 3.5 The noise data gathered included continuous, consecutive 15-minute time-averaged noise samples, along with 1-second measurement data to aid in identifying significant noise events.
- 3.6 The weather during the survey was cool and dry with low or negligible westerly and south-westerly air movement.

4 RESULTS, ASSESSMENT AND DISCUSSION

Measurement data

- 4.1 The noise measurement data directly relevant to the assessment are summarised in Table 3, rounded to the nearest whole integer. The 1-second data are too numerous to include in this report in tabulated form, but are available on request.

Table 3: Measured noise data

Start time	Duration (mm:ss)	Measured noise (dB)	
		L _{Aeq}	L _{AFmax}
23:02:39	13:21	62.6	79.2
23:15:00	15:00	63.1	79.1
23:30:00	15:00	62.5	79.4
23:45:00	15:00	62.9	77.8
Overall:		62.8	79.4
10:30:00	15:00	66.4	-
10:45:00	15:00	65.6	-
11:00:00	15:00	65.6	-
11:15:00	15:00	65.8	-
Overall:		65.9	-

Assessment

- 4.2 The data indicate relatively little variation between day and (early) night time noise levels; the night time period between 11:00pm and midnight was specifically selected as this the period when people will be settling to sleep but traffic (and noise) level will still be relatively elevated.
- 4.3 Table 4 presents the calculated internal noise levels in habitable rooms of the proposed hotel facing the road, based on the data in Table 3 and assuming 30 dB R_w of attenuation through an open window and 15 dB through a partially open window.

Table 4: Calculated internal noise levels

Period	Calculated noise (dB)	
	L _{Aeq}	L _{AFmax}
Windows closed		
Day	35.9	-
Night	32.8	49.4
Windows open		
Day	50.9	-
Night	47.8	64.4

- 4.4 The data indicate that, with windows closed, ambient (L_{Aeq}) noise levels in all habitable rooms will be suitable for the preservation of residential amenity and sleep during both the day and night time, in accordance with the guideline levels recommended in BS 8233 and the WHO guidance. However, night time maximum noise levels affecting bedrooms will be up to 5 dB greater than the WHO guideline levels. In view of this and due to the frequent passage of buses, diesel-engine delivery vehicles, emergency vehicles and noisy private vehicles, it is recommended that the glazing specification be slightly upgraded to protect residents from the incidence of low-frequency noise, which is generally not adequately mitigated by standard double-glazing.

- 4.5 The data indicate that the opening of windows for ventilation in bedrooms would result in ambient (L_{Aeq}) noise levels in excess of the night time BS 8233 guideline values for bedrooms, by up to 16 dB during the day time and up to 18 dB at night with night time maximum noise levels up to 20 dB greater than the WHO guideline levels.
- 4.6 Consequently, windows in habitable rooms facing Cheetham Hill Road, Liverpool Road will need to remain closed in order to achieve the guideline values and to prevent sleep disturbance, in which case alternative means of providing background ventilation, as a minimum, would be required.

5 MITIGATION MEASURES

- 5.1 The following recommendations apply only to bedrooms on facades facing Cheetham Hill Road, including those on Knowsley Street facing Cheetham Hill Road; those to the rear of the premises will be suitably protected with standard thermal double-glazing units and through-window trickle ventilation.
- 5.2 The assessment has shown that, in order to minimise the likelihood due to low frequency noise associated with diesel engines on large vehicles, a glazing specification of $35 \text{ dB } R_W + C_{tr}$ will be required in bedrooms facing Cheetham Hill Road; C_{tr} is an acoustic charter correction that accounts for the additional low frequency noise associated with the diesel-engines of large vehicles and/or buses.
- 5.3 It will also be necessary to provide alternative means of background ventilation for these rooms.
- 5.4 Current standard construction practice is to install through-window trickle ventilation units but, this instance, these would not be; it is recommended that bedrooms on the front and side façade of the building be provided with acoustically-attenuating, mechanical ventilation.
- 5.5 Alternatively, whole-house passive input ventilation (PIV) system (with boost function) or mechanical ventilation and heat recovery (MVHR) systems may be installed providing fresh-air to all rooms; the practicality and costs of these systems will need to be determined by the Applicant although cost of these systems has reduced considerably in recent years making their use more viable. They also provide greater capability for rapid ventilation and cooling in hot weather, a higher-specification of residential amenity through improved air quality and energy efficiency, alongside noise considerations.
- 5.6 However, in all cases, irrespective of ventilation options, windows should remain capable of being opened, for occupant choice.
- 5.7 The assessment concludes that the recommended noise mitigation measures are sufficient to satisfy the Local Planning Authority's requirements that "*prospective occupiers will not be unduly affected by the surrounding environment*".

6 SUMMARY & CONCLUSION

- 6.1 The assessment showed that the site is affected principally by traffic noise from Cheetham Hill Road.
- 6.2 The assessment recommends that, on facades facing Cheetham Hill Road, including those on Knowsley Street, bedroom windows will require glazing achieving a sound insulation performance of 35 dB $R_w + C_{tr}$ will be required, alongside alternative means of providing background ventilation; the latter may be through the use of acoustically-attenuating mechanical ventilation units or through the provision of whole-house passive input ventilation (PIV) systems or mechanical ventilation and heat recovery systems.
- 6.3 In all cases, however, where alternative means of ventilation are provided, windows should remain capable of being opened.
- 6.4 The assessment concludes that the recommended noise mitigation measures will satisfy the Local Planning Authority's requirements that "*prospective occupiers will not be unduly affected by the surrounding environment*".

7 APPENDICES

Appendix A: Glossary of acoustic terms

Ambient noise: the noise from all sources, both near and far, at any given time. Conventionally defined using the A-weighted equivalent continuous noise level (L_{Aeq}) [see below].

Background noise level (dB L_{A90}): In the UK, the 90th percentile noise level (L_{A90}) is generally used to define 'background' noise. This is a statistical parameter describing the noise level that is exceeded for 90% of the measurement or assessment time. Its value lies in the fact that it is a statistical value, towards the lower end of a measured range of data, and which is relatively 'stable' i.e. not adversely affected by occasional high-energy noise events.

Decibel (dB): a unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 micro-Pascals (μPa), the threshold of normal hearing is in the region of 0 dB, and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.

dB(A) / A-weighting: decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change (in steady noise) of 3 dB(A) is the minimum perceptible under normal conditions and a change of 10 dB(A) corresponds roughly to halving or doubling the *loudness* of a sound. The background noise level in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).

$L_{Aeq,T}$: the equivalent continuous sound level - the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). L_{Aeq} is used to describe many types of noise and can be measured directly with an integrating sound level meter.

L_{Amax} : the maximum single-event noise level attained during a measurement period.

Noise: any audible sound. Often defined as unwanted sound. Can be damaging to hearing if it is too loud or can be just annoying if it interferes with the normal enjoyment of others.

Sound / sound pressure: a fluctuation in air pressure over the static ambient pressure.

Sound pressure level: the sound pressure relative to a standard reference pressure of 20 μPa (20×10^{-6}) on the decibel scale.