



BRAIDEN ACOUSTICS LTD

Innovation Forum // 51 Frederick Road // Salford // Manchester // M6 6FP

NOISE IMPACT ASSESSMENT

Prepared For : Intelligent Design Centre

Date : 8 Jun 2022

Site : Former Southern Hotel, Mauldeth Road West,
Chorlton

Report No. : 10995revA

1 INTRODUCTION

Braidén Acoustics has been commissioned by Intelligent Design Centre to undertake an acoustic survey at the site of the Former Southern Hotel, Mauldeth Road West, Chorlton in order to support a planning permission to convert the upper floors to residential flats.

1.1 AIM

This report assesses potential noise impact on the proposed residential dwellings, focussing on noise transmission from the ground floor restaurant, external plant noise and environmental noise ingress.

2 DESCRIPTION OF SITE

The site is the former Southern Hotel, which is a large purpose-built public house and hotel.



Figure 1
Proposed site street view

John Braidén BSc MSc MIOA
Acoustic Consultant

0161 743 3621
john@braidénacoustics.co.uk



2.1 SITE LOCATION AND SURROUNDING AREA

The site is bounded by Mauldeth Road West to the north west, residential dwellings to the east and Nell Lane to the south west. There are some small commercial uses on the other side of Nell Lane.

Both Mauldeth Road West and Nell Lane are busy roads in Chorlton with Mauldeth Road West also accommodating tram lines.

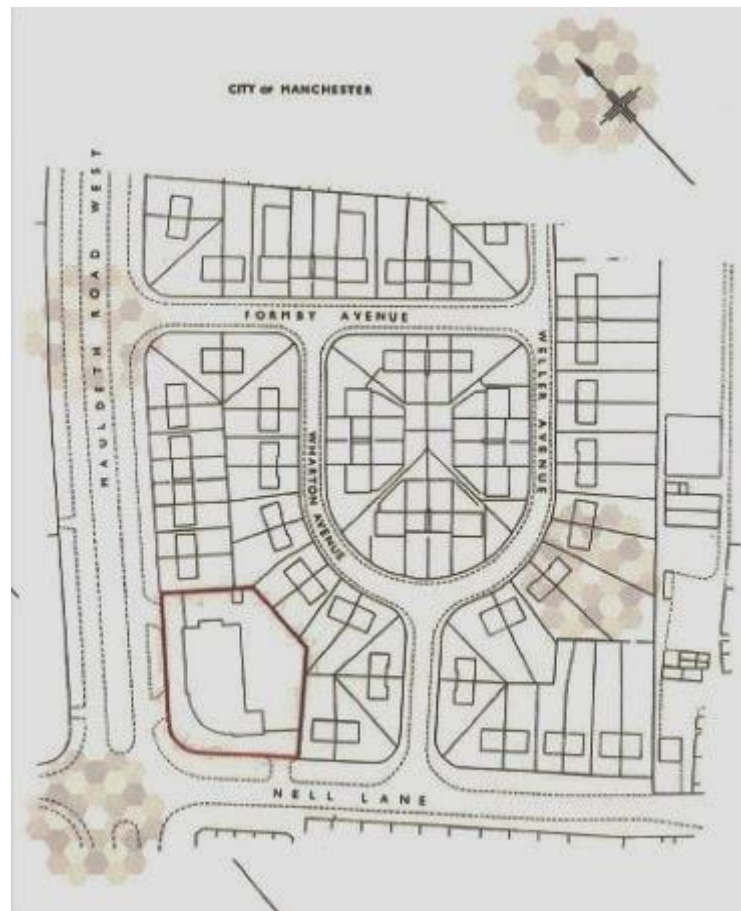


Figure 2
Site location showing neighbours and surrounding uses

2.1.1 Nearest sensitive receptor

The nearest sensitive receivers (NSR) are the proposed residential apartments on the upper floors.

2.1.2 Existing ground floor

There is an existing restaurant on the ground floor called Sai Spice.

2.1.2.1 Restaurant opening hours

Monday	Closed
Tuesday - Thursday	5–10pm
Friday -	5–11pm
Saturday	4–11pm
Sunday	5–10pm



2.1.2.2 Restaurant external plant

There seems to be a kitchen extract and intake systems with some external condenser units, possibly for air conditioning and refrigeration. However, the external plant will be upgraded as part of the proposed works.

2.2 PROPOSED USE

The proposed layout of the first (and second) floor is shown below.

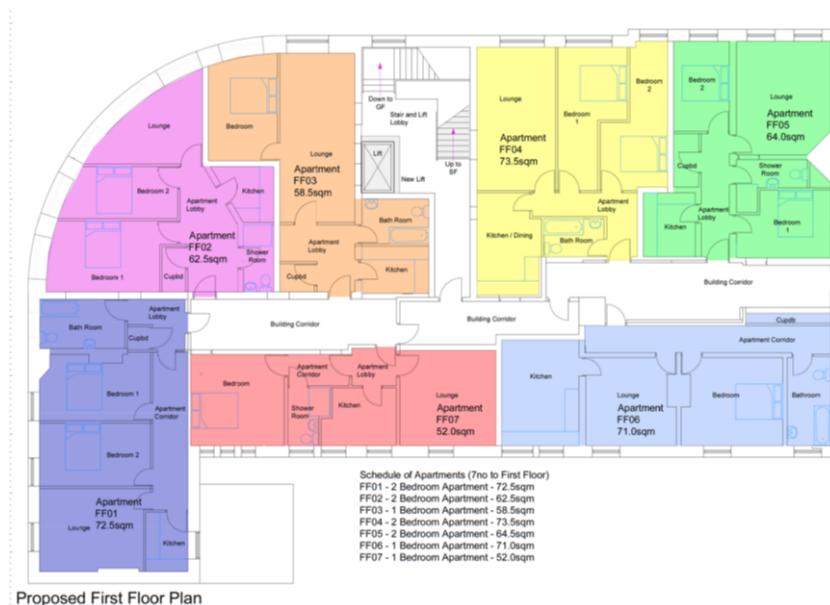


Figure 3
Proposed first floor layout

2.2.1 Building services

The external plant for the restaurant will be upgraded but the exact system is not yet known.

2.2.1.1 Kitchen extract

To be confirmed (TBC).

2.2.1.2 kitchen supply

TBC

2.2.1.3 Condenser units

TBC

2.2.2 Sound system

Only background music, if any, will be within the take away.

3 ACOUSTIC CRITERIA AND METHODOLOGY

Potential mitigation measures are determined by recommended indoor noise levels from BS 8233 “Sound insulation and noise reduction for buildings” [i] which, in turn, takes guidance from the research-based World Health Organisation “Guidelines for Community Noise”.

Noise level thresholds are usually given for the night-time – 2300-0700 hrs and daytime – 0700-2300 hrs.



3.1 NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

The National Planning Policy Framework is the current document for planning guidance. Paragraph 180 of the revised NPPF states:

180. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) mitigate and reduce to a minimum, potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

Paragraph 180 refers to the Noise Policy Statement for England which shall be briefly discussed in the next Section.

3.2 NOISE POLICY STATEMENT FOR ENGLAND

The main aim of the Noise Policy Statement is 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.

Therefore, the NPSE is mainly concerned with environmental noise.

The document sets out categories in order to help distinguish if there is an adverse effect due to noise and if there is, how significant it is.

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur

It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.

3.3 BS 4142

BS 4142:1999 “Method for rating industrial noise affecting mixed residential and industrial areas” [ii] assesses industrial noise with regards to nearby residential dwellings. The guidance is commonly used to compare the equivalent noise from an industrial source only (specific noise level), L_{Aeq} , to the background noise level, L_{A90} , at the nearest sensitive receptor (NSR).

This Standard has been recently updated, BS 4142:2014 “Methods for rating and assessing industrial and commercial sound” [iii]. Whereas the old standard added 5dB ‘penalty’ to the Specific Noise Level (SNL) if the noise source has a ‘character’ that can draw attention that may be described as tonal, intermittent or



impulsive, the new standard gives clearer guidance on noise 'character'. Furthermore, the previous Standard gave only one 5 dB penalty whereas the new Standard may not. When added to the specific noise level it forms the rating level. The new Standard gives the guidance for the following types of noise character:

Where appropriate, establish a rating penalty for sound based on a subjective assessment of its characteristics. This would also be appropriate where a new source cannot be measured because it is only proposed at that time, but the characteristics of similar sources can subjectively be assessed.

Correct the specific sound level if a tone, impulse or other characteristic occurs, or is expected to be present, for new or modified sound sources.

NOTE 1 The prominence of tonal or impulsive sound from a source can be masked by residual sound. In many cases the amount of masking varies as the residual sound changes in level and possibly character. The source's tonal and/or impulsive characteristics could also vary with time.

Consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention.

Tonality

For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible.

Impulsivity

A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible and 9 dB where it is highly perceptible.

Other sound characteristics

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.

NOTE 2 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.

Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

Once a penalty for noise character is added to the Specific Noise Level then this is termed the Rating Level.

The background level is then compared to the rating level. It is usual that the rating level due to the source should be below the background noise level at the nearest sensitive receptor; indeed BS 4142 states:

"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."



3.4 BS 8233: 2014

The British Standard BS 8233:2014 “Guidance on sound insulation and noise reduction for buildings” gives guidance on recommended indoor ambient noise levels for residential dwellings.

Room	Criterion	$L_{Aeq,T}$	
		night	day
Bedroom	Sleeping	30	35
Dining Room/Area	Dining	--	40
Living Room	Resting	--	35

Table 1

Recommending indoor ambient noise level thresholds from anonymous noise (taken from Table 4, BS 8233:2014)

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.

3.4.1 Noise levels in external living areas

For external living areas such as gardens and balconies, BS 8233:2014 § 7.7.3.2 recommends an upper limit of 55dB $L_{Aeq,day}$ although there is a caveat:

However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

3.4.2 Maximum noise levels

In the 2014 edition of the Standard, the criterion of 45dB L_{AFmax} inside bedrooms has been removed although there is Note 4:

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 $L_{Amax,P}$ depending on the character and number of events per night. Sporadic noise events could require separate values.

3.5 COUNCIL CRITERIA

3.5.1 Residential noise levels

The noise criteria from condition 4 are as follows:

- 35dB L_{Aeq} (16hr) from 0700 to 2300 within living rooms
- 30dB L_{Aeq} (8hr) from 2300 to 0700 within bedrooms
- 45dB L_{AFmax} from 1900 to 0700 for single sound events within bedrooms
- 50dB L_{Aeq} (16hr) from 0700 to 2300 for outdoor living areas

The evening standard L_{AFmax} will only apply where the evening L_{AFmax} significantly exceeds the L_{Aeq} and the maximum levels reached are regular in occurrence, for example several times per hour. Industrial noise



3.5.2 Industrial noise levels

It is usual for Councils to adhere to a BS4142:2014 for industrial noise.

Section 11 d) of BS 4142:2014 says

“Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact”

Therefore, the Rating Level should not exceed the Background Level to ensure any potential noise has a low or no impact.

4 MONITORING DETAILS

4.1 SITE VISIT 1 – FRONT

4.1.1 Monitoring details

Personnel: John Braiden, BSc & MSc Acoustics, MIOA.

Weather: 6-13°C temperature; ~5ms⁻¹ wind; ~20-40% cloud;

Equipment: NTi XL2 integrated real time analyser & B&K 4231 calibrator.

Date: Wednesday 12th January 2022.

The sound level meter was calibrated before after the measurements with no significant drift reported.

Monitoring was unmanned with audio recorded.

4.1.2 Monitoring locations

There was one monitoring location:

Location 1 one metre from a front first floor window.

4.1.3 Results

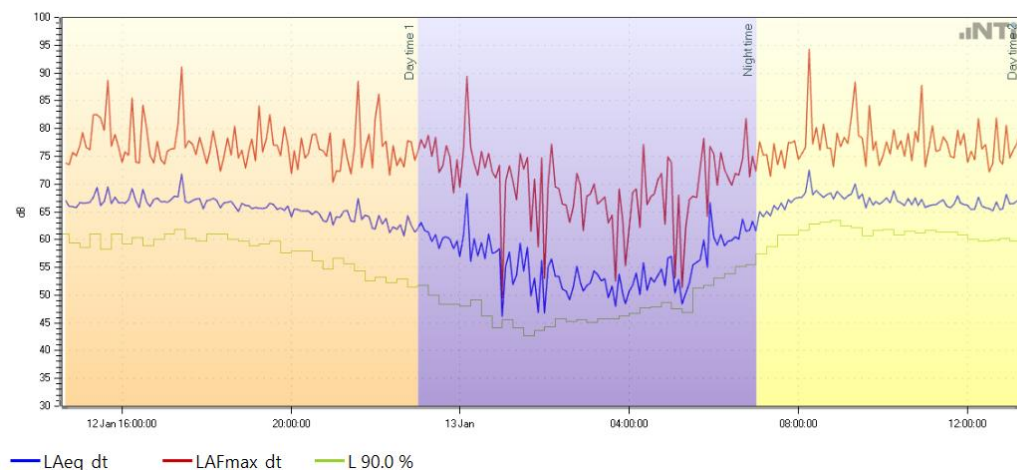


Figure 4
Time history at location 1



Day	Time		Duration	Time Period	L_{A90} dB	L_{Aeq} dB	L_{Amax} dB
	Start	Finish					
Wed 12/01/22	14:39	23:00	08:20:48	day	57	66.1	91.1
1	23:00	07:00	08:00	night	46	58.2	89.4
	13:14	17:00	06:14:47	day	60.8	67.1	94.3

Table 2
Summary of noise monitoring results –FRONT

The noise levels were relatively modest, even with the building's prominent corner plot with busy roads and trams adjacent.

The overall free field¹ noise levels are as follows:

L_{Aeq} (night) 58 – 3 = 55 dB(A)

L_{Aeq} (day) 67 – 3 = 64 dB(A)

4.2 SITE VISIT 2 –REAR

4.2.1 Monitoring details

Personnel: John Braiden, BSc & MSc Acoustics, MIOA.

Weather: 12-16-°C temperature; <5ms⁻¹ wind; ~20-40% cloud;

Equipment: NTi XL2 integrated real time analyser & B&K 4231 calibrator.

Date: Wed 20/04/2022 10:18

The sound level meter was calibrated before after the measurements with no significant drift reported.

Monitoring was unmanned with audio recorded.

4.2.2 Monitoring locations

There was one monitoring location:

Location 2 one metre from a side first floor window.

¹ a 3 dB correction was made for façade monitoring.



4.2.3 Results

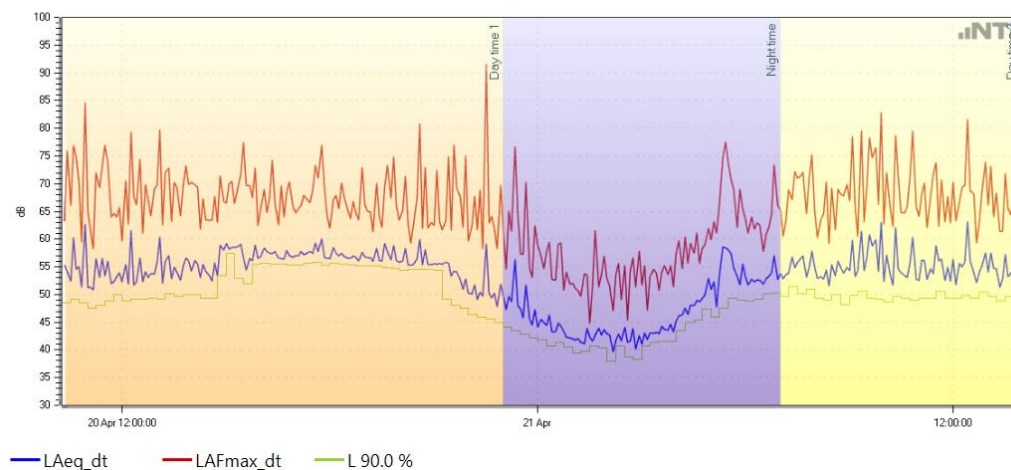


Figure 5
Time history at location 1

Day	Time		Duration	Time Period	L_{A90} dB	L_{Aeq} dB	L_{Amax} dB
	Start	Finish					
Wed 20/04/22	10:18:12	23:00	12:41:48	day	49	56.3	91.5
1	23:00	07:00	08:00	night	40.8	50.1	77.5
	07:00	13:53	06:53:16	day	49.5	56.2	82.8

Table 3
Summary of noise monitoring results –SIDE

The noise levels were lower at the side / rear due to the building shielding noise from the surrounding road network.

The overall free field² noise levels are as follows:

L_{Aeq} (night) $50 - 3 = 47$ dB(A)

L_{Aeq} (day) $56 - 3 = 53$ dB(A)

5 ACOUSTIC ASSESSMENT

5.1 BS4142 ASSESSMENT

Currently, the external plant cannot be assessed as the final scheme is not yet know.

² a 3 dB correction was made for façade monitoring.



5.2 INTERNAL NOISE TRANSFER

5.2.1 Ground to First Floor

The main noise source from the ground floor will be from the kitchen. Noise levels have been taken at a similar kitchen.

The highest 5-minute noise level from a kitchen has been measured at 78.2 dB $L_{Aeq,5min}$. Therefore, it is safe to assume that the upper noise level within the kitchen will be 80 dB(A).

The kitchen will only be open during daytime hours (07:00 – 23:00) therefore the internal noise level within the residential accommodation should not exceed 35 dB(A) (from BS 8233). Hence the ceiling / floor should achieve a minimum sound insulation value of 45 dB $D_{nT,w} + C_{tr}$. This is just slightly above the standard for Building Regulations Part E, which is 43 dB $D_{nT,w} + C_{tr}$.

As the ground floor is in use then it is not viable to install a new ceiling.

However, the integrity of the existing ceiling (not suspended) should be checked for holes / gaps etc. and appropriately filled where necessary.

In addition, it is recommended to install on the first floor:

- **Exton TNF 70 firebatt slabs friction fitted between the joists (floorboards will need to be lifted)**
- **30mm Karma Masspanel (18mm sanded cement bonded particle board with 12 mm wood fibre integral resilient layer)**
- **12mm cement board laid on top of the Masspanel.**

5.2.2 First to Second Floor

Remove any existing ceiling grid(s) to expose the original ceiling.

****NB Prior to installing the acoustic ceiling upgrade, the existing ceiling must be made good using equivalent materials and building methods; for example, removing all loose plaster and replaster with a minimum of 10mm of plaster.**

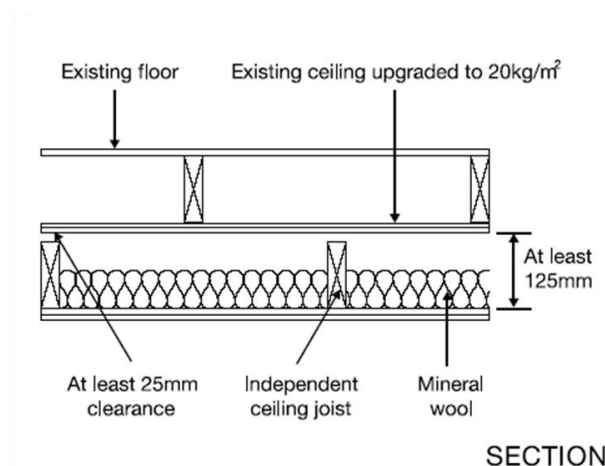


Figure 6
Proposed separating floor build up

The acoustic construction is as follows:

- upgrade existing ceiling to 2 layers of plasterboard with staggered joints, minimum mass per unit area 20kg/m²



- the acoustic ceiling shall be supported by independent joists fixed only to the surrounding walls. A clearance of at least 25mm should be left between the top of the independent ceiling joists and the underside of the existing ceiling
- an absorbent layer of mineral wool laid on the acoustic ceiling , minimum thickness 100mm, minimum density of 10 kg/m³;
- 2 x 15mm acoustic (SoundBloc) plasterboards.

This design, if properly constructed (see Section 5.2.2.1), should give an in-situ sound insulation value of approximately 50 dB $D_{nT,w} + C_{tr}$. This is in excess of the 43 dB required for Building Regulations Part E.

NB** *an on-site inspection of the current ceiling / joists to the attic space will be required to confirm appropriate solution.*

5.2.2.1 Acoustic ceiling construction advice

The following construction recommendations should be strictly followed to ensure the acoustic integrity of the separating floor.

The following points should be strictly adhered to:

- fill (with acoustic sealant) all joints between the acoustic plasterboard.
- when double-boarding, joints should be staggered.
- leave 2-3mm around the perimeter to allow for movement and fully seal with acoustic sealant in line with British Gypsum guidance on MF ceilings.
- there should be NO penetrations in the acoustic plasterboard apart from the screws attaching the boards to the joists and cables for lights / alarms etc.
- downlighters should not be installed.

5.3 ENVIRONMENT NOISE BREAK IN

Given the external noise levels, the initial glazing scheme can be suggested. However, it should be noted that this assumes windows closed in order to achieve the internal noise levels based on BS 8223:1999.

The amount of attenuation from the building façades were readily computed using the simple method in Appendix G of BS 8233:2014 whereby the sound insulation index (SRI) of the glazing (the weakest element of the building façade, acoustically) is determined by simply deducting the required internal noise level from the external free field noise level.

5.3.1 Façade effect

A -3dB façade correction was necessary as the noise monitoring was not free-field.

5.3.2 Distance correction

There was no distance correction applied as the monitoring locations were representative of the location proposed residential dwellings.

5.3.3 Barrier effect

There is no barrier correction due to direct line of sight to the noise sources.



5.3.4 BS 8233 assessment

The weakest structural element is the glazing. The required glazing was calculated using recommended internal values. The Table below shows the required Sound Reduction Indices (SRI) for the bedrooms (night) and living areas (day) on each relevant elevation.

Façade	period	room	External Levels measured / calc'd		Internal Levels recommended		Required glazing	
			L_{Aeq} (dB)	L_{Amax} (dB)	L_{Aeq} (dB)	L_{Amax} (dB)	SRI ($R_w + C_{tr}$)	Example Spec ³
FRONT	night	bedroom	55		30		25	4 (6-16) 4
	day	lounge	64		35		29	8 (6-16) 4
REAR	night	bedroom	47		30		17	4 (6-16) 4
	day	lounge	53		35		18	8 (6-16) 4

Table 4
Calculated SRI values and recommended glazing

The lounge / day time living areas will require a slight upgrade in glazing for the front elevation. All other habitable rooms will achieve adequate internal noise levels with standard 4mm double glazing.

6 CONCLUSION

An acoustic survey has taken place at the Former Southern Hotel, Mauldeth Road West, Chorlton to support a planning application for the conversion of the upper floors to residential flats.

This is an initial survey, as the details of the proposed external plant of the ground floor restaurant is not yet known.

A summary of the acoustic mitigation (so far) is as follows:

- existing ceilings to be made-good and airtight
 - first floor acoustic upgrade.
 - new independent ceiling installed for the second floor, as detailed in this report.
- upgraded windows for the daytime living rooms on the front elevation
 - standard 4mm double glazing for the rest of the habitable rooms.

A description and assessment of the proposed external plant to be completed at a later date, once the full system is known.

7 REFERENCES

- [i] BS8233: 2014
Sound Insulation and noise reduction for buildings – Code of Practice,
British Standards Institute, 2014.

³ Example glazing build up and performance from BS 12354-3 – table in Appendix. Other glazing build-ups available.



[ii] BS 4142: 1997

Method for Rating industrial noise affecting mixed residential and industrial areas

British Standards Institute, 1997.

[iii] BS 4142: 2014

Methods for rating and assessing industrial and commercial sound

British Standards Institute, 2014.



Appendix

A1 BS12354-3 – Glazing spec

Table B.1 - Examples of the sound reduction index of glazing

Glazing type	Sound reduction index (dB)						
	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	R_w (C; C_{tr}) dB
Single panes (mm)							
3	14	19	25	29	33	25	28 (-1; -4)
4	17	20	26	32	33	26	29 (-2; -3)
5	19	22	29	33	29	31	30 (-1; -2)
6	18	23	30	35	27	32	31 (-2; -3)
8	20	24	29	34	29	37	32 (-2; -3)
10	23	26	32	31	32	39	33 (-2; -3)
12	27	29	31	32	38	47	34 (0; -2)
Laminated panes (mm) + plastic laminate (0,5 to 1) mm							
6+	20	23	29	34	32	38	32 (-1; -3)
8+	20	25	32	35	34	42	33 (-1; -3)
10+	24	26	33	33	35	44	34 (-1; -3)
Double pane units with single or laminated panes (mm); air filled cavity from (6 to 16) mm							
4-(6-16)-4	21	17	25	35	37	31	29 (-1; -4)
6-(6-16)-4	21	20	26	38	37	39	32 (-2; -4)
6-(6-16)-6	20	18	28	38	34	38	31 (-1; -4)
8-(6-16)-4	22	21	28	38	40	47	33 (-1; -4)
8-(6-16)-6	20	21	33	40	36	48	35 (-2; -6)
10-(6-16)-4	24	21	32	37	42	43	35 (-2; -5)
10-(6-16)-6	24	24	32	37	37	44	35 (-1; -3)
6-(6-16)-6+	20	19	30	39	37	46	33 (-2; -5)
6-(6-16)-10+	24	25	33	39	40	49	37 (-1; -5)
NOTE 1 This selection and the values are in accordance with prEN 12758-1. The single number ratings are deduced from results in 1/3-octave bands and therefore single number ratings deduced from the given octave band data might result in values which differ 1 dB at the most.							
NOTE 2 Though it is known that for a given double pane unit the sound reduction increases with increasing cavity width, this effect has been found to be too small to take into account here for air filled cavities in the light of the inherent spread in results for nominally identical units.							

