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HSH Engineering Services
428 Cheetham Hill Road
Cheetham
Manchester
M8 9LE

For the Attention of Mr T Zeria

Dear Sirs

Reference : 432 Cheetham Hill Road Manchester – amended February 2020 (in blue at end of report)

With reference to the above development and a request by the LPA in a letter dated 10 December 2019 which is detailed below :

3) A noise assessment is required to assess the impact upon neighbouring upper floor occupiers.

The following is a desk based study that aims to satisfy the above.

Inevitably, the constructions used in build work cannot always comply exactly with the Regulation guidance since existing materials and structures often need to be used in order to be economically viable. Therefore, there is a provision in the current Building Regulations for the Local Authority Building Control Officer to require a Pre-Completion Test (PCT) to ensure compliance with the Regulations.

Technical Background

A major revision of the Building Regulations Approved Document E on Sound Insulation came into force on 1st July 2003. The previous 1992 Regulations have been extended to include rooms for residential purposes, the insulation of internal walls, reverberation in multiple occupancy dwellings and a new section on schools. Levels of sound insulation between domestic dwellings were stated which were deemed to be "reasonable" and methods of achieving these were suggested. Acceptable

Before detailing the work required it is worth repeating the following requirements :

When this kind of work is undertaken, there is a duty on the developer to specify methods and materials of construction to ensure compliance with the Noise Insulation aspects of the current Building Regulations (Approved Document E). The Approved Document E provides guidance on “typical” constructions that should provide the required noise insulation but does not specify exact materials.

I levels were specified for both New Build and for Conversions. Most importantly, a new requirement for Pre-Completion Testing **(PCT)** has been added.

For **Airborne Noise**, the actual performance levels chosen were expressed in terms of a new parameter, DnTw + Ctr, the Weighted Standardised Level Difference corrected for low frequency noise. The parameters DnTw and Ctr are defined in BSEN ISO 717. The basic parameter DnTw is the value of the Rating Curve at 500Hz. The Rating Curve is arrived at by taking the difference between the level of a Standard Source noise in one room and the residual level in a corresponding Receiving Room and correcting for Reverberation Time and Background Noise. This is then compared with a Standard Reference curve using the methods of BS EN ISO 717. The DnTw value is then corrected for low frequency using a calculation for the Ctr term. The previous 1992 regulations used only the DnTw parameter.

The minimum airborne insulation level required for floors is:- **45dB DnTw + Ctr** for New Build and **43dB DnTw + Ctr** for Conversions. These values are numerically smaller than the value for DnTw in the previous Regulations since the Ctr term is a negative value. A higher value suggests better noise insulation.

AS the residential apartment is above commercial premises there is no requirement in Part E of the current Building Regulations for Impact Testing.

Methods for carrying out the tests are defined in BS EN ISO 140. For field tests, the tests should be carried out on unfurnished rooms .

In addition there is a requirement that Internal Walls should achieve an Rw = 40 dB. A higher figure suggesting better noise insulation.

There can be confusion between the attenuation figures quoted in literature :

DnTw + Ctr : this denotes a FIELD measurement – this figure is ALWAYS lower than the Rw attenuation quoted because it is a field measurement on partitions built on site.

The Ctr term is a correction for low frequency performance of the partition, this has become more important will the advent of high-powered music systems.

It is important to note that the 'Building Regulations' denote this term the *apparent sound insulation* between rooms – this not only takes into account the attenuation (or lack of it) of the party wall but also any acoustic leakage paths (flanking transmission) between the two properties – ***this is why it is very important to correctly seal the wall to the floor, ceiling and outer walls.***

Rw – this figure is quoted by manufactures of building elements (and is the only one they can quote as they are not responsible for the building of the various elements into the final structure) and is obtained by LABORATORY measurements – it will ALWAYS be greater that the DnTw + Ctr figure because in the lab. measurements there is no flanking transmission – and the building elements are always correctly fitted in the aperture.

It is understood that there have been no complaints from the occupiers of the residential premises regarding noise.

The opening hours of the Restaurant are 11.00 to 23.00 seven days a week.

Noise Assessment Criteria

The likelihood of complaints about noise from industrial plant can be assessed where the standard is appropriate using BS 4142 – 2014 – this has replaced the earlier standard BS 4142 : 1997

This standard describes methods for rating and assessing sound of an industrial / commercial nature. The methods described use outdoor sound levels to assess the likely effects of sound on people who might be inside / outside residential premises.

The significance of sound of an industrial / commercial nature depends upon the margin by which the rating level of the source exceeds the background sound level and the context in which the sound occurs.

The Standard is intended to be used for :

Investigating complaints regarding noise.

Assessing sound from proposed / new / modified or additional noise sources of an industrial / commercial nature.

Assessing sound at proposed new dwellings or premises used for residential purposes.

The sound level from a source when determined as a discrete entity distinct and free of other influences contributing to the ambient sound is referred to as the 'specific sound level'.

The specific sound level is evaluated at an identified location over the appropriate reference time interval which are : 1 hours during the daytime – 07.00 to 23.00 hrs and 15 minutes during the night time – 23.00 to 07.00 hrs.

The specific noise may be subject to acoustic feature correction if the noise level at the measurement location is subjectively considered to contain certain acoustic features that may increase the significance of the impact of the noise over the background level.

If these features are present at the measurement location then the character correction is added to the specific sound level to arrive at the rating level.

The Standard requires the assessor to consider the subjective prominence of the character of the specific noise source at the measurement location / noise sensitive receptors and the extent to which the character of the noise will attract attention to it – such features are taken into account by applying the following corrections :

	Tonality	Impulsivity	Other Characteristics
Just Perceptible	+ 2 dB	+ 3dB	-
Clearly Perceptible	+ 4dB	+ 6 dB	-
Highly Perceptible	+ 6dB	+9 dB	-
Readily Distinctive against Residual Environment			+ 3 dB

If both tonal and impulsive characteristics are both present then two corrections can be made – however if only one is dominant then only one correction need be applied.

If no corrections are deemed appropriate then the Rating Level equals the Specific Noise Level.

An initial estimate of the impact of the specific sound is obtained by subtracting the measured background level from the rating level and considering the following :

A) Typically the greater the difference the greater the impact.

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

C) A difference of around + 5 dB or more is likely to be an indication of a significant adverse impact – depending on context.

1.0 The lower the rating level is to the measured background level the less likely it is that the sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the measured background level this is an indication that the sound source will have a low impact depending upon context.

Where the initial estimate of the impact needs to be modified due to the context then all pertinent factors need to be taken into consideration – these include the following :

- The absolute level of the sound.

- The character and level of the residual sound compared to the character and level of the specific sound.

- The sensitivity of the receptor and whether residential dwellings already incorporate design measures that secure good internal and outdoor conditions eg facade insulation – ventilation / cooling that reduces the need to open windows – acoustic screening.

The standard recognises that the response to sound can be subjective as well as to the local attitudes to the source of the sound and the character of the neighbourhood.

Also relevant are the World Health Organisation (WHO) Guidelines for Community Noise – these identify that sleep may be disturbed by short term noise events and the level associated with this is 45 dB LAmax inside the bedroom – this relates to 60 dB LAmax external to the bedroom.

In brief an ‘Outdoor Living Area’ should be subject to a noise level less than 55 dBA in order to prevent serious annoyance during the daytime and evening - a level less than 50 dBA is desirable to prevent moderate annoyance : reference World Health Organisation.

Discussion



Site

As can be seen from the above plan of the site the Restaurant has only one party wall to neighbouring property.

It is understood that the equipment in the kitchen will not be changed therefore the noise from this equipment has not been considered as this does not effect the change of use and therefore its effect on the neighbouring property.

However as can be seen there are 24 seats within the First Floor Restaurant and 20 in the Ground Floor Restaurant which could all be occupied in the 'worst case situation'.

However as the Ground Floor is adjacent to other commercial property the noise from the use of the Ground Floor has been ignored – in addition the proposed it will be similar to the present usage of the Ground Floor.

If all the tables are occupied on the First Floor and the distance between the talker and listener is 1.0m then for a 'normal' voice the noise level will be 57 dBA – as there is the possibility of 12 conversations (24 people) taking place then the level is increased by 57 + 10 log 12 = **68 dBA**.

If the above conversations are taking place with a 'raised' voice – which would result in a level in the kitchen of 62 + 10 log 12 = **73 dBA**

The construction of the party wall between the proposed First Floor Restaurant and the adjacent property is unknown but from experience is likely to be a solid double masonry wall – this wall is plastered on both sides.

From previous Pre Completion tests on walls of this type the attenuation offered by them can vary between a measured level of Dn,Tw + Ctr = 42 dB up to 53 dB depending upon the integratey of the wall.

Therefore the possible range of noise level in the adjacent property could be 73 – 42 or 53 = 31 to 20 dBA.

The possible attenuation offered by the party wall could therefore be below that required by LPA's as it is usual that the attenuation offered should be equal to that of 'New Build' ie. DnTw + Ctr = 45 dB – also the resultant noise level in the adjacent property is just in excess of the requirements of BS 8233 : 2014.

Therefore the attenuation offered by the party wall between the two properties needs to be increased – we would recommend the following solution :

The condition of the party wall in the proposed Restaurant be visually examined and any defects repaired to at least the standard of the existing wall.

Adjacent to this wall should be constructed an independent timber / metal studded framework – the cavity created in filled with mineral fibre sound insulation material having a thickness of 50mm and a minimum density of 10 kg / cu ,.

The whole of the studding is then covered with a double layer of 12.5mm plasterboard – with staggered joints and fully sealed around its perimeter the whole is then skim plastered to 3mm.

No holes must be cut into this wall for electrical sockets / switches etc. as the holes will very effectively reduce the attenuation offered by the independent studded wall.

From previous Pre Completion measurements of this type of construction the attenuation achieved has been in excess of DnTw + Ctr = 50 dB – in excess of rthe New Build requirement.

If this is the case then the noise level in the adjacent property could be of the order of 73 – 50 = **23 dBA**

This level is within the daytime (and night time) requirements for the internal noise level within residential property detailed in BS 8233 : 2014

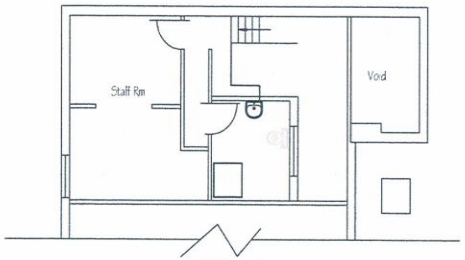
Conclusion and Recommendations

- The present internal construction of the party walls and floor / ceiling may not be satisfactory with respect to the requirements of BS 8233 : 2014 for the internal noise levels generated in the adjacent properties.

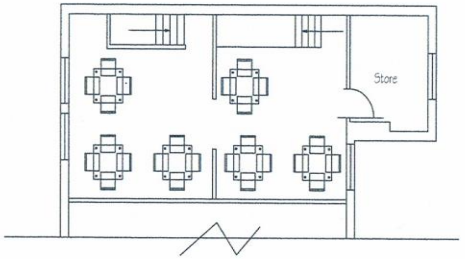
- Therefore the construction of an independent studded wall adjacent to the existing party wall should be constructed (as detailed above).

Roger Leach AMIOA

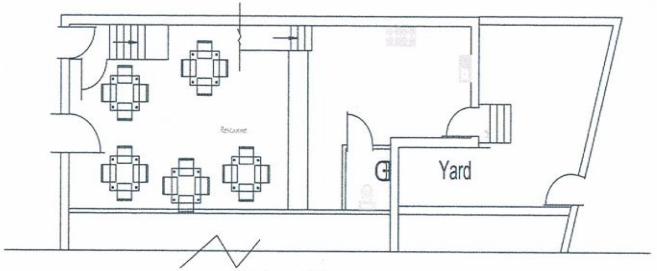
The builder must check the site and the approved drawings before commencing the works and must take any working measurements as neccessary.Any discrepancy in the drawing must be reported to the client .



2nd Floor Plan



1st Floor Plan



Site Layout Plan

H S H
Engineering Design Services
428 Cheetham hill Road Cheetham Manchester
M8 9LE. UK. 0161795636,07940197 333

project title	Proposed change of the 1st Floor to a Restaurant.
client	Mr Danish Ashraf
dwg title	Proposed Plans

dwg no.	client no.	scale.	job no.
02		1:100 @ A3	

432 Cheetham Hill Road Manchester M8 9LE

drawn by.	checked by.	approved by.	date.
TZ			Sept 2019

Amendment – February 2020

With reference to the above development an e mail has been received from the LPA which is copied below :

Reviewed the AB acoustic desk based memo submitted with the application and it is not sufficient. Require a report based on the above guidance to demonstrate that noise from the proposed kitchen extract flue will not exceed the above criteria. The neighbouring commercial premises should be considered as receptors also.

Below is the guidance that is referred to in the above note from the LPA.

NSE6
Noise – external equipment insulation

Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location.

The scheme shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the site. The approved scheme shall be completed before the premises is occupied.

Upon completion of the development 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 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 agreed noise criteria

The following hopes to answer the above query.

As can be seen the proposed site is located in a busy existing residential / commercial area – the property fronting onto Cheetham Hill Road – however there is vacant land to the side.

Noise Assessment Criteria

The likelihood of complaints about noise from industrial plant can be assessed where the standard is appropriate using BS 4142 – 2014 – this has replaced the earlier standard BS 4142 : 1997

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2.0 The lower the rating level is to the measured background level the less likely it is that the sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the measured background level this is an indication that the sound source will have a low impact depending upon context.

Where the initial estimate of the impact needs to be modified due to the context then all pertinent factors need to be taken into consideration – these include the following :

The absolute level of the sound.

The character and level of the residual sound compared to the character and level of the specific sound.

The sensitivity of the receptor and whether residential dwellings already incorporate design measures that secure good internal and outdoor conditions eg facade insulation – ventilation / cooling that reduces the need to open windows – acoustic screening.

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In brief an 'Outdoor Living Area' should be subject to a noise level less than 55 dBA in order to prevent serious annoyance during the daytime and evening - a level less than 50 dBA is desirable to prevent moderate annoyance : reference World Health Organisation.

BS 4142 : 2014

Regarding the residential properties the survey was undertaken – as stated above - with respect to BS 4142 : 2014 .

It is now a requirement of BS 4142 to consider the potential uncertainty of the assessment – the steps taken to reduce uncertainty as far as practical included :

All the measurements were made with a Type 1 sound level meter with certificates of calibration and field calibration checks were undertaken after each series of measurements with a minimal drift (0.1 dB) recorded.

The weather conditions were considered ideal for environmental noise measurements with no rain – dry / damp surfaces - low wind speeds (< 5.0 m /sec).

Variations in ground cover between the proposed site and the receivers could affect the ground absorption and therefore the calculated levels at the various receivers – in order to reduce this problem it has been assumed that there is acoustically reflective ground cover over the various distances.

Inaccuracies that could result from estimates of the intervening ground cover – meteorological conditions etc. will not be significant.

The measurements were undertaken over a number of days / times in order to obtain – what is considered to be – a representative measurement of the existing noise climate at this location.

Therefore taking the above into account it is considered that the uncertainty has been controlled as far as practically possible with the results being over predicted rather than under predicted and therefore the above represents a robust assessment.

Equipment Used and Procedure

The noise levels were measured using a :

The measurements were made with a Bruel & Kjaer Type 2238 Sound Level Meter (Type 1 instrument) – at a height of 1.5m and at least 1.5m away from any reflecting surfaces.

The system was calibrated prior to the series of measurements and checked afterwards using a B & K Type 4231 Calibrator – no deviation was found.

The measurements were undertaken at the times stated in the results.



Approximate Measurement Location

Site

Results

Weather

Date	Wind Speed M/sec	Wind Direction	Temperature C	Rain	Cloud Cover %	Road Conditions
17.02.2020 21.00-21.38	4.7	W	6	No at start Ended due to rain.	100	Damp
20.02.2020	4.9	SW	4	No	?	Damp

Measurement Period	LA eq	LA 90	LA 10
21.00 – 21.38	53.1	45.4	54.6
20.02.2020 20.00 – 21.00	54.8	44.2	56.9
22.00 – 23.00	52.1	42.6	53.6

Rear of Building

The extract fan used for the kitchen has been fitted with two 1D straight through silencers – one on the input to the fan and one on the exhaust. work comes through the external wall.

As the fan is mounted externally then the fan itself must be enclosed in a suitable acoustic enclosure in order to attenuate the fan breakout noise.

The ductwork must be connect to the fan by using a flexible connector in order to reduce the vibration that could be transmitted to the ductwork and radiated as noise.

In the following the fan that it is proposed to us is a Flakt Woods long case axialflow extract fan – 31 JM / 16 /4 / 5 /40 / 1PH (details enclosed at the end of the report) which will be fitted with a CDAP 2D silencer (details enclosed at the end of the report).

The noise level generated by this fan exhaust at the rear window of the adjacent property can be calculated from SPL = Lw – 20 log R (in this case scaled at 11.0m) – 11.

The output of the fan is fitted with a 1D silencer (see enclosed data sheet) – it is important that the silencer is fitted as close to the fan output as is practically possible in order to reduce noise breakout from the ductwork between the fan output and the silencer.

If this is not possible then any ductwork should be treated with a 5 kg / sq m sound barrier mat (www.soundservice,co.uk) in order to reduce this breakout.

Project Name : jm single phase pdf
Quotation Number :
Customer : nfs

Date:
Fan Code
Item Reference:

Fan Code	31JM/16/4/5/40
Fan Diameter / Size	315mm
Blades	5
Fan Speed	1420 rpm
Velocity	5.5 m/s
Blade Angle	40°
Form of Running	B
Fan Casing	Long
Requested Duty	0.43m³/s @ 81Pa (static)
Outlet Dynamic Pressure	18 Pa
Duty Shaft Power	0.083kW
Max Shaft Power	0.085kW
Total Efficiency	51 %
Motor Frame	BT4
Motor Rating	0.095kW
Full Load Current	0.8A
Starting Current	1.3A
Motor Mounting	Pad
Electrical Supply	220-240 Volts 50 Hz 1 Phase
Start Type	DOL
Motor Winding	Standard
Enclosure	Standard All
Air Density	1.2 kg/m³ / 20 °C / 0 m / 50% RH
Smoke Venting	Non Smoke Venting
Product Number	DX321460

Performance data has been derived from tests carried out in a Flakt Woods laboratory, in accordance with ISO 5801 and is specifically applicable for Ducted installations. When an electronic controller is incorporated, enhanced motor noise can occur - particularly when the operating speed is well below maximum. FWL therefore recommend using an auto transformer speed controller for noise sensitive applications.

Acoustic data has been derived from tests carried out in a Flakt Woods laboratory, in accordance with BS 848 Pt 2, 1985 under Ducted conditions. The single figure provided is the overall Inlet sound pressure level at the specified distance, under spherical, free field conditions. Breakout levels stated are estimated from induct sound power levels and are provided for guidance.

Terms and Conditions: This offer is made subject to the terms and conditions detailed on the accompanying letter.

	Sound Spectrum (Hz)								Overall	
	63	125	250	500	1k	2k	4k	8k	Lw*	LpA @ 3 m**
Inlet*	70	67	64	62	57	53	48	44	73	43
Outlet*	71	69	64	62	58	55	50	46	74	43
Breakout*	61	55	44	42	34	26	24	22	62	23

* Lw dB re 10^{-12} W
** dBA re $2x10^{-5}$ Pa

Silencer Insertion Loss

Octave Band Centre Frequencies Hz

	63	125	250	500	1000	2000	4000	8000
Attenuation 1D	-3	-4	-9	-15	-15	-8	-7	-6

Octave Band Centre Frequencies Hz

	63	125	250	500	1000	2000	4000	8000
Lw	71	69	64	62	58	55	50	46
Attenuation 1D	-3	-4	-9	-15	-15	-8	-7	-6
Resultant	68	65	55	47	43	47	43	40
20log3.6	-11	-11	-11	-11	-11	-11	-11	-11
-11	-11	-11	-11	-11	-11	-11	-11	-11
Resultant	46	43	33	25	21	25	21	18
'A' weighting	-26.3	-16.1	-8.6	-3.2	0	+1,2	1	-1.1
Resultant	**19.7**	**26.9**	**24.4**	**21.8**	**21**	**26.2**	**22**	**16.9**
Measured Background								
Difference								

The above results in an overall SPL of 32 (32.4) dBA .

Fan Case Breakout

Octave Band Centre Frequencies Hz

	63	125	250	500	1000	2000	4000	8000
Lw	61	55	41	42	34	26	24	22
20log3.6	-11	-11	-11	-11	-11	-11	-11	-11
-8	- 8	- 8	- 8	- 8	- 8	- 8	- 8	- 8
Resultant	42	36	22	23	25	17	15	3
'A' weighting	-26.3	-16.1	-8.6	-3.2	0	+1,2	1	-1.1
Resultant	**15.8**	**19.1**	**13.4**	**19.8**	**25**	**18.2**	**16**	**1.9**
Measured Background								
Difference								

The above results in an overall SPL of 28 (28.1) dBA – the adjacent property is partially screened from the fan case by the building itself which will result in an attenuation.

This however has been ignored in order to achieve a more robust assessment.

The above two calculated noise levels are summed resulting in an overall Specific Noise level of 28 + 32 = 33 (33.4) dBA – as the noise from the fan is tonal then a correction is added with respect to BS 4142 : 2014 of +2 dB resulting in a Rating Level of **35 dBA.**

Assessment with respect to BS 4142 : 2014

Results		Clause	Comment
Measured ambient sound level	LA eq (15 mins.) = 33 dB	7.1 7.3.1	Specific sound sources active and generally unaffected by other sound sources
Residual Sound Level	LA eq (15 mins.) = 52 dBA	07/03/03	Specific sound sources not active
Background Sound Level	LA 90 (20 mins.) = 42.6	8.1.3 8.3	Measured at time of no activity
Assessment made during night time – reference time interval 15 minutes			
Specific Sound Level	LA eq(60 minutes) = 33	7.3.4 7.3.5	
Acoustic feature correction	2 dB	9.2	Tonal character 'Just Perceptible'
Rating Level	33 + 2 = 35 dBA	9.2	
Background Sound Level	LA 90 (1 hr) = 42.6 dBA	8	Sound Level steady
Excess of Rating Level over Background	35 – 42.6 = - 7.6 dBA	-24.7	
Assessment indicates no adverse impact		11	
Uncertainty of the assessment	Not Significant	11	

As can be seen the calculated Rating Level is 24.7 dBA below the measured background level which is an indication that the extract system will have no adverse impact on the rear of the adjacent residential properties on Boundary Street.

The National Planning Guidance 2014 states that noise exposure defined by the response of people to the noise – briefly it states that :

Perception	Examples of Outcome	Increasing Effect Level	Action
Not Noticeable	No effect	No observed Effect	No Specific Measures required
Noticeable and not Intrusive	Noise can be heard – does not cause any change in behaviour or attitude	No Observed Adverse Impact	No Specific Measures required
Noticeable and Intrusive	Noise can be heard and causes small changes in behaviour and / or attitude – affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Impact	Mitigate and reduce to a minimum.

The Perception at the nearest property is highlighted.

Conclusions

The above assessment indicates that the equipment fitted complies with the requirements of the LPA in that the calculated Rating Level for the system is 5 dBA below the lowest measured background level as measured adjacent to the site.

Roger Leach AMIOA

Dated : February 2020