Fraser House
36 Charlotte Street

NOISE IMPACT ASSESSMENT
REPORT 19508/NIA2

For :
Chan Hong Properties Ltd
26 Charlotte Street
Manchester
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CONTENTS

Page

1.0	INTRODUCTION	1
2.0	OBJECTIVES	1
3.0	SITE DESCRIPTION	1
4.0	ACOUSTIC TERMINOLOGY	2
5.0	STANDARDS & DOCUMENTATION	2
6.0	ENVIRONMENTAL NOISE SURVEY	3
7.0	PROPOSALS	3
8.0	NOISE IMPACT ASSESSMENT	4

ATTACHMENTS

APPENDIX A – ACOUSTIC TERMINOLOGY

DOCUMENT CONTROL

Issue	Date	Comment	Prepared by	Authorised by
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1.0 INTRODUCTION

It is proposed to convert Fraser House into a mixed use property containing a restaurant/bar and office space.

Hann Tucker Associates have been appointed to undertake a noise impact assessment of the proposals based on a previously undertaken baseline noise survey.

2.0 OBJECTIVES

Based on the results of a previously undertaken noise survey, to provide sound reduction performance specifications for the external building fabric in order to control airborne noise intrusion in line with proposed internal acoustic design criteria.

To assess potential noise break-out from noisy areas and comment upon the acceptability of the proposals.

3.0 SITE DESCRIPTION

3.1 Location

The existing building at 36 Charlotte Street, Manchester is to be refurbished to form a combined restaurant and office development. The location of the site is indicated below.

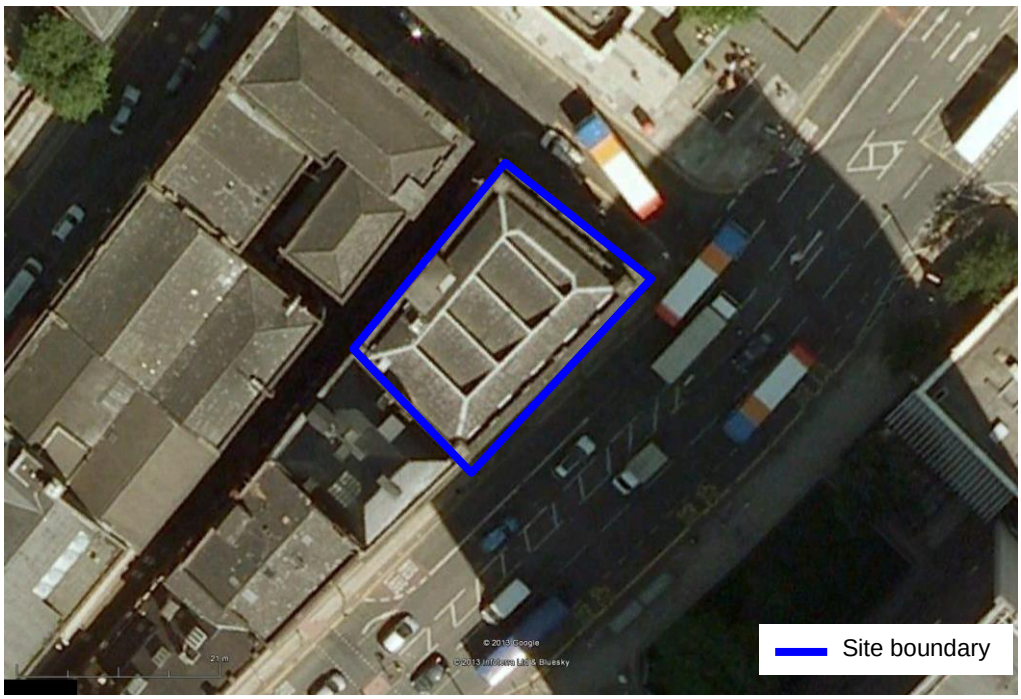


Location map (maps.google.co.uk)

The site is surrounded predominantly by commercial properties including restaurants and office buildings.

3.2 Description

The lower and upper ground floors and the first floor are to be restaurant/bar areas and the upper floor are to be office spaces. The site itself is bounded by Portland Street to the south east, Charlotte Street to the north east and Reynar Street to the north west. An overview of the site location is indicated below.



Site Plan (maps.google.co.uk)

4.0 ACOUSTIC TERMINOLOGY

For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.

5.0 STANDARDS & DOCUMENTATION

5.1 Local Authority Guidance

The National Planning Policy Framework (NPPF) states that Local Authorities should ensure that new developments should not be put at unacceptable levels of risk from or be adversely affected by unacceptable levels of noise.

Manchester City Council's document GD 03 *'Public Protection Information for Developers Version: 1.01 February 2014'* recommends BS8233 'Guidance on Sound Insulation and Noise Reduction for Buildings' as a suitable document on which to base noise assessments.

5.2 BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

BS8233: 2014 provides recommended criteria for indoor ambient noise levels in spaces when they are unoccupied. Fraser House is proposed to contain restaurant and open-plan office areas. Section 7.3 of the document states the following:

'Normally, only the maximum desirable noise level needs to be decided. In some cases, such as open-plan offices and restaurants, a moderate noise level might provide masking for acoustic privacy in shared spaces without causing disturbance, so upper and lower noise levels should be considered.'

Table 2 provides target indoor ambient noise level design ranges:

Objective	Typical Situations	Design Range $L_{Aeq, T}$ dB
Typical noise levels for acoustic privacy in shared spaces	Restaurant	40 – 55
	Open plan office	45 – 50

6.0 ENVIRONMENTAL NOISE SURVEY

An environmental noise survey was undertaken by Hann Tucker Associates in September 2013. The details of this survey can be found in the accompanying report 19508/NIA dated 25 September 2013. The results of the survey indicate the following typical daytime and night time incident noise levels at the façade of the building.

Façade	Time Period	L_{eq} Sound Pressure Level (dB) at Octave Band Centre Frequency (Hz)						dBA
		125	250	500	1k	2k	4k	
Portland St & Charlotte St	Daytime (07:00 – 23:00 hours)	68	69	66	67	64	59	71
	Night-time (23:00 – 07:00 hours	67	66	67	68	65	59	71
Reynar St	Daytime (07:00 – 23:00 hours)	67	66	65	61	57	51	68
	Night-time (23:00 – 07:00 hours)	74	72	71	70	68	61	75

7.0 PROPOSALS

We understand that due to the listed nature of the building the use of in-wall or in frame trickle ventilation is prohibited and that the existing window frames are to be retained with any glazing replaced on a like-for-like basis.

As such we understand the refurbishment of the existing glazing is proposed with the addition of secondary glazing to form the following configuration:

- operable, refurbished existing sash windows (4mm glass);
- 75-100mm cavity;
- operable secondary glazing (6mm glass).

It is also understood that the building will be naturally ventilated via openable windows when required.

8.0 NOISE IMPACT ASSESSMENT

8.1 Road Traffic Noise Ingress to Office Areas

We have undertaken calculations of predicted noise intrusion based on the spaces used as an open plan office with carpet and absorbent suspended ceilings.

The following table presents our predictions for internal noise levels within office areas under various conditions.

Condition	Predicted Approximate Internal Ambient Noise Level $L_{Aeq,\,T}$ dB	Acceptable?
A - Windows fully closed	30 – 35	✓
B - Windows open (aligned air path)	55 – 60	Boarderline
C - Windows open with staggered air path (non – aligned)	50 - 55	✓

With reference to Section 5.2 the predicted internal ambient noise level with the windows fully closed (condition A) may be too low to provide adequate acoustic privacy within a shared office space. This is not normally a cause for concern as conditions can be improved retrospectively by such means as the introduction of a sound masking system to suit the tenant.

The predicted internal ambient noise levels with windows open are above the design range as recommended in BS 8233. Should, however, the openings between primary and secondary glazing be staggered (Condition C) the exceedance of this range would only be around 5dB, which is not unreasonable considering windows would only ever be fully opened for purge (e.g. to avoid summertime overheating). There are no recommended purge/summertime noise limits in BS 8233, but a 5 dB increase would general fall in line with other acoustic industry standards that do present summertime limits.

8.2 Noise Breakout from Operational Activities

Noise generated by the operation of the restaurant unit should not unduly impact on the locality and occupants of neighbouring buildings. To this end, we would suggest L_{eq} operational noise levels should not exceed the a level 5dB below the lowest daytime L_{eq} noise levels (per octave band) at 1 metre from the windows of the office spaces on the upper floors. This will ensure any potential increase in noise has a negligible subjective impact in accordance with Institute of Acoustics' guidelines on change in noise levels.

The following table presents the lowest octave band L_{eq} noise levels recorded at Position 1 during our automated survey.

Location	Lowest Measured Noise Level (dB $L_{eq,15min}$) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Position 1	71	65	66	64	66	63	55	46	66

Noise level measurements have previously been undertaken in the table areas of a bustling modern restaurant within Manchester City Centre. The following table presents the results of our measurements which shall be used to inform our assessment of operational noise breakout.

Location	Reverberant Noise Level (dB $L_{eq,1hr}$) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Within Restaurant	61	64	68	72	69	65	60	53	73

NB Measurements undertaken during very busy Saturday evening service (worst case).

Based on the above data, and a typical spectral shape for the sound reduction of a double (secondary glazed) window with a cavity of approximately 100mm, our calculations indicates compliance with the proposed criteria, as outlined below.

Location	Noise Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Source Level	61	64	68	72	69	65	60	53	73
Window Sound Reduction	*-22*	*-26*	*-35*	*-41*	*-46*	*-49*	*-50*	*-51*	-
+10log(S/r2), 1m	*-3*	*-3*	*-3*	*-3*	*-3*	*-3*	*-3*	*-3*	-
-14	*-14*	*-14*	*-14*	*-14*	*-14*	*-14*	*-14*	*-14*	-
Noise at Receptor	22	21	16	14	6	-1	-7	-15	14
Limit	66	60	61	59	61	58	50	41	61
Exceedance	-	-	-	-	-	-	-	-	-

The calculations indicate operational noise output from the restaurant should be well below the prevailing ambient noise climate in the locality.

Entrance doors to the restaurant should be lobbied with one of the door sets having acoustic seals to achieve an overall sound reduction of 30 dB R_w.

There should no need for the inclusion of sound limiters within the restaurant, unless the tenant intends to have live music or loud amplified DJs. In which case, we would suggest an additional assessment to inform noise limits for inclusion in the tenant's handbook. We would be pleased to undertake this exercise if required and upon request.

8.3 Restaurant-to-Office Noise Transfer

It should be ensured that the operation of the ground and first floor units as restaurants will not impact on the second floor office accommodation. It is understood that the existing separating floor structure to be retained comprises 70mm timber planks with screed (30mm approx.) on timber joists.

Our calculations indicate a suspended plasterboard ceiling will be required to restaurant areas to obtain sufficient acoustic separation to prevent adverse impact on office occupants for 'typical' restaurant operators.

This ceiling should be applied to the restaurant areas, including kitchen, toilets, restaurant-office and storage space. It should comprise a single layer of 15mm dense plasterboard on a lightweight metal frame grid providing a cavity depth of not less than 100mm and containing a minimum 25mm insulation (10-30kg/m3). This system can be installed between beam (leaving beams exposed) if required/desired.

At second floor level, the restaurant will be separated from office areas by a wall. The existing construction of this wall is not known. However, in order to achieve sufficient acoustic privacy between the two areas, this wall should a minimum on-site airborne sound insulation performance of DnT,w 47 dB. We would be pleased to advise on plasterboard lining specifications to achieve this upon receipt of information on the existing wall construction. If the wall is to be rebuild, we would advise any replacement wall is rated at not less than Rw 55 dB, which could be achieved with 2 layers of 15mm dense plasterboard, 70mm stud with 50mm insulation.

The above recommendations should control noise transfer from the restaurant to suit the vast majority of restaurant types and office uses. However, should the restaurant operator run a 'noisy' or 'bustling' operation or if any loud (more than background) music is proposed, we would advise that noise limits and suitable wording is included in the tenant's handbook to clarify responsibilities. Hann Tucker Associates would be pleased to advise further on this upon request.



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Appendix A

The acoustic terms used in this report are explained below:

dB : Decibel - Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.

dBA : The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dBA level.

Because of being a logarithmic scale noise levels in dBA do not have a linear relationship to each other. For similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.

L_{10} & L_{90}: If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time, hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the average minimum level and is often used to describe the background noise.

It is common practice to use the L_{10} index to describe traffic noise, as being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic noise.

L_{eq} : The concept of L_{eq} (equivalent continuous sound level) has up to recently been primarily used in assessing noise in industry but seems now to be finding use in defining many other types of noise, such as aircraft noise, environmental noise and construction noise.

L_{eq} is defined as a notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 1 hour).

The use of digital technology in sound level meters now makes the measurement of L_{eq} very straightforward.

L_{max} : L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.