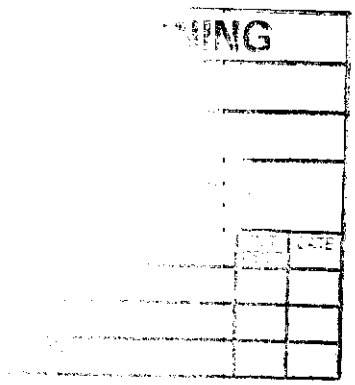

OMBLER IWANOWSKI ARCHITECTS

SOUND INSULATION ASSESSMENT

14 ALBERT SQUARE (MEMORIAL HALL), MANCHESTER

AEC REPORT: P1568-R1A/PNG

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1.0 INTRODUCTION

1.0 Acoustic & Engineering Consultants Limited (AEC) has been appointed by Ombler Iwanowski Architects (OI), on behalf of Stampscreen Limited, c/o Wrather & Co, (SL) to assess the acoustic performance of the premises on the ground floor of 14 Albert Square/1 & 3 Southmill Street, Manchester. The assessment is in respect of a planning application for a proposed conversion of a former ground floor bar to a restaurant and the subsequent requirement of Manchester City Council's (MCC) Planning Department for an acoustic study and to give advice regarding noise breakout from the premises and any associated plant. In addition, guidance is given regarding possible noise break out into the floor above the premises.

1.1 This report details the results of the study, and provides an assessment of the measured ambient and background noise levels in the vicinity of the site, and discusses the implications on the building fabric to achieve acceptable internal levels and meet appropriate planning guidance. It further assesses the sound insulation properties of the existing party floor and walls, together with internal treatment necessary to satisfy both MCC's requirements and those of the other building occupants.

2.0 DEVELOPMENT PROPOSALS

2.1 A scheme to develop the existing ground floor at Memorial Hall has been prepared by OI, on behalf of SL. The building is sited at the junction of Albert Square and Southmill Street, Manchester and adjoins existing office buildings to the east and south. To the rear of the property lies a small delivery yard utilised by various occupants for loading. The immediate neighbour to the east is Taylor Maxwell (TM), whilst to the south is the reception entrance for Search Recruitment (SR). Figure 1, at the end of this report, shows the relative locations.

2.2 The proposed scheme comprises the conversion of the ground floor former public bar to a restaurant. This report is issued on the basis that the currently unoccupied floors above are to be utilised as offices in the future and not for residential purposes. It is understood that the windows on the building are listed and that the client will wish to have openable windows to the ground floor, if practical.

2.3 To support part of the planning permission being sought external ambient noise level data was acquired and the sound insulation performances of the existing floor construction above the proposed restaurant and adjacent party walls, where appropriate, was determined.

3.0 NOISE MEASUREMENTS

External Noise Environment

3.1 The ambient noise level was measured during the afternoon of 12 June 2006 at the junction of Jackson's Row and Southmill Street. This location is close to the proposed site in terms of ambient and traffic noise. Measurements included typical daytime traffic noise, the procedure for which is given in the Appendix. During the day, noise levels in the area were dominated by road traffic.

3.2 The external noise level during the daytime was measure as typically 61dBL_{Aeq} and 57dBL_{A90}.

3.3 Since offices are unlikely to be occupied outside the working day, and with no residential uses locally, night-time noise levels are not considered in this report.

Sound Insulation of Party Walls and Floors

3.4 To quantify the sound insulation provided between the proposed restaurant and the adjacent occupants, this report also details the measured sound level differences between:

a) Proposed restaurant (ground floor), and the floor above (first floor), and,

b) Proposed restaurant (ground floor), and existing reception/entrance to SR (ground floor).

Adjacent Commercial

3.5 It was not considered necessary to carry out any tests in the TM demise, owing to the current site layout, having a wide stairwell between the proposed restaurant and the external wall.

3.6 A subjective assessment of possible noise breakout was conducted in the Reception area of SR whilst accompanied by Ms Yvonne Taylor of SR, who assisted with access. No discernible breakthrough was noted either by the author, the receptionist or Ms Taylor. It was concluded that a full test was, therefore, unnecessary.

Offices Above

3.7 There were no internal fittings or partitions in place from the former bar usage, the area having been stripped out. The ceiling was mostly exposed to the underside of the floor above.

3.8 It was noted that a significant sound leakage path exists via the vertical rain services pipe to the office space above. There were also a number of weaknesses in the floor construction where exploratory structural investigations had been made. Both these factors would result in a poorer acoustic performance than might be expected from an intact floor build up.

3.9 Results of the airborne sound insulation measurements in terms of level difference, D, in octave bands are presented in TABLE 1 below.

TABLE 1: Measurement Results- Airborne Sound Insulation

Location		Overall D_w	Level Difference D_w (dB) at Octave Band Centre Frequencies (Hz)						
Source (Bar)	Receiver		63	125	250	500	1k	2k	4k
Ground Floor	First floor	34	21	24	27	29	34	40	44

4.0 ASSESSMENT OF PROPOSED DEVELOPMENT

External Envelope

4.1 Based on the measured data summarised in Section 3, external free-field noise levels at the façade of the proposed development would be about 61dBL_{Aeq} during the daytime, with a background noise level of 57dBL_{A90}.

4.2 AEC are not aware of any dwellings nearby. Therefore, in this case, the adjacent office accommodation is regarded as the nearest noise sensitive property. The building is listed and as such needs to retain the existing style of windows. Hence, the windows will be single glazed and effectively sealed at the perimeter with the frames, but could be openable.

4.3 In the offices above, a desirable criterion of NR40L_{max} due to activities in adjacent spaces, should be achieved. For noise breaking in from outside, via windows open for ventilation, this would

equate to an external level of NR50-55L_{max}, approximately equivalent to 60dBL_{Amax}. As identified above, the existing noise climate was generally 61dBL_{Aeq}, therefore, if noise breakout from the restaurant was controlled to NR50-55L_{max} external to the office windows, this should be acceptable

4.4 To achieve NR50-55L_{max} with the windows in the restaurant open, then noise levels in the restaurant would need to be controlled to about 80dBL_{Amax}. A typical noise level frequency spectrum for café/restaurants with low background music is presented in Table 2 below, which would be acceptable.

TABLE 2 – Typical Maximum Noise Level for Café/Restaurant Playing Low Level Background Music

Noise Unit	Noise Level (dB) @ Octave Band Centre Frequency, Hz							Overall Level (dBA)
	63	125	250	500	1k	2k	4k	
L_{max}	79	76	75	74	72	71	80	82

4.5 If the restaurant windows were closed then the internal noise levels in the restaurant could be increased, but would need to be controlled to 85dBL_{max} at each octave frequency band, i.e. equivalent to about 92dBL_{Amax}. This would be typical for a relatively noisy public house with background music and, hence, noisier than a restaurant. The control of the level of music may be effected electronically by a limiting device, incorporating a graphic equaliser, if considered necessary.

4.6 If the noise levels are limited to those in Table 2, then no specific control measures would be required to the external envelope.

Internal Sound Insulation

Offices Above

4.7 Calculations have shown that the existing floor build up achieves an airborne sound insulation value in the order of only some 34dBD_w, which includes the various leakage paths described above. We are given to understand that it is proposed to install a 'Danskin'-type floor of some 100mm overall to the floor above in order to control airborne noise breakout in this direction.

4.8 Calculations further show that such an installation may be expected to produce an overall sound insulation predicted level of 49dBR_w to achieve around 45dBD_w on site providing all leakage paths are controlled. Noise levels of around 80dBL_{max} per octave frequency within the proposed restaurant area would give internal levels in the floor above to be controlled to NR40L_{max}.

4.9 It is important to note that whilst such levels are deemed acceptable, they may not be inaudible. As such, it may be considered prudent to ensure that the proposed raised floor is constructed on resilient battens and contains a minimum 50mm mineral-wool fibre infill. The flooring must be installed in accordance with the manufacturer's instructions.

Adjacent Commercial

4.10 The existing party wall between the proposed development and the reception of SR was subjectively appraised at the time of the testing described above. No discernible breakthrough was noted either by the author, the receptionist or Ms Yvonne Taylor of SR, who assisted with access.

4.11 With regard to TM, AEC did not conduct testing, since there is a significant buffer formed by a wide stairwell and double external wall feature between TM and the proposed restaurant.

4.12 Thus, AEC are of the opinion that with the noise levels described in 4.8 above in the restaurant, breakout to the two areas will be within acceptable limits.

4.13 It is perhaps worthy of note that, generally, the restrictions on generated noise need only apply when offices are occupied, i.e. during the working day, plus occasions when occupants may be working late.

Plant Noise

4.14 MCC usually request that noise associated with mechanical plant from any new development must not exceed a level of L_{A90} – 5dB across the frequency spectrum at the nearest noise sensitive property. Therefore, any plant associated with the development should be designed to achieve a noise limit of 52dBL_{Aeq} at the nearest noise sensitive premises.

5.0 CONCLUSIONS

5.1 Noise levels have been measured at the proposed restaurant development at Memorial Hall, Manchester.

5.2 To achieve acceptable environmental breakout noise levels, it will be necessary to control internal noise levels in the restaurant. If music is to be provided then an internal noise level of 80dBL_{max} per octave frequency must be complied with, however, the windows would need to be closed and a sound limiting device installed in the music system.

5.3 Adequate sound insulation would be provided by the floor upgraded with a 'Danskin'-type floor of some 100mm overall depth above the existing floor. The wall structures between the adjacent commercial and office uses would be adequate to control potential noise impact if levels are controlled to 80dBL_{max} per octave frequency.

5.5 Appropriate conditions can be applied to any planning permission to ensure all of the above are achieved.

Peter N Greenhalgh

APPENDIX A – Measurement Procedure

Date & Time of Survey:	Internal; 1000-1130 Friday 9 June 2006; attended External; 1515-1545 Monday 12 June; attended
Personnel Present:	Internal; Peter Greenhalgh (AEC) External: Chris Hooper (AEC)`
Equipment Used:	Brüel & Kjær type 2250 Real Time Analyser (AEC Kit 3)
Weather Conditions:	Fine and dry throughout, daytime c18°C
Measurement Procedure:	Noise levels were measured within the demise and, externally, at the junction of Southmill Street and Jackson's Row in respect of road traffic activity. The sound level analyser, conforming to BS EN 60651:1994 "Specification for sound level meters" and BS EN 60804:2001 "Integrating-averaging sound level meters", was in calibration and check calibrated before and after the measurement periods using a Brüel & Kjær type 4231 (94dB) calibrator. There was no significant drift of calibration. All measurements were carried out in accordance with: • ISO 140-4: 1996 *'Acoustics - Measurement of sound insulation in buildings and of building elements - Part 4: Field measurements of airborne sound insulation between rooms';* • ISO 717-1: 1997 *'Acoustics - Rating of sound insulation in buildings and of building elements. Part 1: Airborne sound insulation;*
Measured data:	All measured data is held on file by AEC.

Equipment Used:

Manufacturer	Type	Description	Serial Number
Fostex	SPA11	Powered Loudspeaker	0700664
Brüel & Kjær	2250	Modular Precision Sound Analyser	2456390
Brüel & Kjær	4189	½" Falcon Range Pre-polarised Free Field Microphone	2453430
Brüel & Kjær	4230	Sound Level Calibrator	1441331

APPENDIX B - Acoustic Terminology in Brief

$L_{Aeq,T}$	The equivalent continuous (A-weighted) sound level. It may be thought of as the "average" sound level over a given time, T, and is used for assessing noise from various sources: industrial and commercial premises, construction sites, railways and other intermittent noises and can be considered as the "ambient" noise level.
L_{A90}	The (A-weighted) sound level exceeded for 90% of a measurement period. It is the value used to describe background noise.
L_{Amax}	The maximum (A-weighted) sound level during a given time. "Fast" or "Slow" response should be cited.
Free-field Level	This refers to the sound level measured outside, far away from reflecting surfaces
Façade Level	This refers to the sound level measured within one metre of a building façade, and hence includes the reflected sound energy off that facade
R_w	Laboratory measured weighted single number rating used to describe the airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz.
D_w	Weighted single number rating used to describe the airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz but not adjusted to reference conditions.

FIGURE 1 - Location Plan

