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24 April 2008

Mr D G Jones
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RECD 29 MAY 2008

By post & email

Dear Graham

The Samaritans, 72-74 Oxford Street, Manchester

Further to ambient noise levels measurements taken on 11 March 2008, on-site testing of the sound insulation performance between floors and details provided on the TADW drawing *dwg(2-) 01,* our report on the proposed change of use of the upper ground floor at The Samaritans is presented below.

1.0 INTRODUCTION

1.1 Acoustic and Engineering Consultants Ltd (AEC) have been appointed to prepare a noise assessment report on the implications of the proposed change of use of the upper ground floor of The Samaritans, from several offices and a reception area to an A5 'hot food takeaway' unit. The report is necessary to support a planning application relating to the change of use.

1.2 The issues associated with noise with the change of use will be:

- noise to the duty room (call centre) located above the proposed A5 unit, to the training room located below, and to the adjacent reception area;
- noise break out externally from the A5 unit to The Samaritans and nearby noise sensitive premises.
- mechanical services noise to the nearest noise sensitive premises.

2.0 SITE DESCRIPTION

2.1 The Samaritans is located between The Grand Central (public house) and the Cornerhouse (bar/cinema). Oxford Street is situated to the northwest of the site (front) and James Leigh Street is situated to the southwest (rear), as identified on Figure 1.

2.2 The noise climate is dominated by road traffic on Oxford Street, which includes a very frequent number of buses.

2.3 A rail line is located to the south of the site, where trains travel over Oxford Street via a bridge

2.4 The Salisbury is a public house to the rear of The Samaritans on James Leigh Street. There is also The Attic night club under the railway bridge on Wakefield Street.

2.5 During measurements on 11 March 2007, it was observed that the nearest residential accommodation was W3 on Whitworth Street West and the Palace Hotel opposite The Samaritans. It is not known whether any residents live above The Grand Central or the Salisbury public house, situated on James Leigh Street.

3.0 EXTERNAL NOISE LEVELS

3.1 External noise levels were measured at The Samaritans on 11 March 2008 during the daytime. It was found that free-field noise levels affecting the northwest elevation (front) were in the order of 73dBL_{Aeq}, due to road traffic on Oxford Street, with maximum free-field noise levels in the order of 91dBL_{Amax}. In addition, a measurement was taken at the rear of the development to establish the existing background level, which was found to be in the order of 59dBL_{A90}. Measured noise levels are presented in Table A1, with typical spectra presented in Table A2.

3.2 Based on AEC's experience of city centre measurements the night-time background noise levels would typically be in the order of 50dBL_{A90} in this type of city centre location. Given that any ventilation plant serving the A5 unit or The Samaritans would be operating during part of the night-time, it would seem appropriate to design the plant to achieve a noise limit of 45dBL_{Aeq} at 5m from any plant or atmospheric opening. This would be 5dB below the typical background noise levels in the city centre and would ensure that the existing relatively high noise levels are not increased.

3.3 In addition, a night-time noise measurement was taken at the rear of The Samaritans on 23 April 2008, where it was noted that the noise climate was dominated by clientele and music from the nearby Salisbury public house. The ambient noise level was 65dBL_{Aeq} and the background noise level was measured at 61dBL_{A90}. Although not confirmed, AEC were informed by a customer that the public house is usually open until 0300h.

4.0 INTERNAL NOISE LEVELS

4.1 Noise levels were measured inside The Samaritans building to determine the current internal baseline noise levels and establish the sound insulation performance of the glazing of the rooms on the first floor which face Oxford Street.

4.2 The existing unoccupied noise levels were found to be 40dBL_{Aeq} in the first floor duty room, 41dBL_{Aeq} in the first floor office and 34dBL_{Aeq} in the lower ground training room, which was shielded from traffic on Oxford Street, Measured noise levels are presented in Table A3.

4.3 In addition, the airborne sound insulation performances of the existing floor constructions were obtained via on-site measurements. This measured data is presented in Table A4.

5.0 ASSESSMENT

Glazing

5.1 Based on on-site observations, the windows of the front elevation facing Oxford Street consists of double glazed windows, a 10-20mm void and a secondary, single glazed window.

5.2 The existing baseline noise levels in the duty room and office area are 40dBL_{Aeq} and 41dBL_{Aeq} respectively. Comparing these levels to the desirable internal noise levels stated in *BS8233:1999 "Sound insulation and noise reduction for buildings – Code of Practice"*, as in Table 1, the current internal noise levels would seem acceptable and generally inline with the appropriate guidance for office spaces.

Table 1 - Desirable Internal Office Noise Levels as Proposed in BS8233:1999

Type of Office	Design Range, $dBL_{Aeq,T}$	
	Good	Reasonable
Cellular office	40	50
Executive office, Meeting Room, Classroom	35	40

5.3 Although a lower internal noise level of $35dBL_{Aeq}$ could be desirable, it is understood that the existing noise climate in the duty room is acceptable and does not affect telephone communication with callers. Therefore, it would seem that the existing internal noise levels are appropriate.

5.4 Based on the internal levels due to road traffic noise on Oxford Street, the glazing is achieving a performance of $36dBR_w$ or greater. This performance will also control noise levels due to road traffic during the night to similar or lower levels. Due to the volume and frequency of traffic on Oxford Street, this would be the most onerous noise issue to control. Therefore, other noise sources, such as noise from passing pedestrians would also be adequately controlled.

5.5 As discussed earlier, the existing noise levels are understood to be acceptable, therefore the existing glazing would also be considered acceptable. It should be noted that if an upgrade to the existing glazing specification should be considered in the future, current activities of adjacent call takers, or surrounding activities could become or appear more intrusive due to less masking from traffic on Oxford Road.

5.6 It is understood that mechanical ventilation is to be installed throughout the Samaritans building. Any mechanical ventilation system should be designed to maintain the existing internal noise levels.

Floors

5.7 During the visit to site, brief sound insulation measurements were undertaken between an upper ground floor office (interview room) to the training room below and to the duty room above. The results were similar and the sound level difference achieved by the floor structure is presented in Table 2 below.

Table 2 – Measured Sound Insulation Performances of Floors at The Samaritans

Floor	Overall dBD_w	Level Difference, dBD, At Octave Band Centre Frequency, Hz							
		63	125	250	500	1k	2k	4k	8k
Office to Training Room	47	- -	25	34	44	55	64	- -	- -
Office to Duty Room	45	- -	25	33	43	52	61	- -	- -

5.8 Table 3 below demonstrates 'typical' maximum noise levels in an A3 unit (restaurant). Noise levels in an A5 'hot food' takeaway would not be expected to be greater than those stated.

Table 3 –Typical Maximum Noise Levels an A3 Unit Restaurant

Location	Overall A-weighted	Maximum Noise Level, dB, At Octave Band Centre Frequency, Hz							
		63	125	250	500	1k	2k	4k	8k
Restaurant	Approx 85	75	75	75	77	79	77	75	75

5.9 Based on the typical maximum noise levels presented in Table 3, and the measured floor sound insulation values stated in Table 2, the resultant in the duty or training rooms has been computed to be NR32L_{max}. Therefore, in order to provide adequate sound insulation between the A5 unit and the spaces above and below, an upgrade to the floor construction is proposed. It is suggested that the following would need to be applied below the existing ceiling areas:

- Provide a new ceiling below the existing ceiling, consisting of at least one layer of 12.5mm thick British Gypsum SoundBloc plasterboard, or equivalent sound resistant plasterboard, suspended on a lightweight metal grid (mf) fixed using strap hangers (not metal angles), forming a cavity of at least 150mm deep with the underside of the existing ceiling (a larger cavity would be preferable if possible) with a layer of 100mm thick mineral wool roll in the cavity.

Any gaps around the perimeter would need to be sealed using dense non-setting mastic.

5.10 As identified earlier, in the duty room and training room it would appear that the ambient noise levels could be in the order of 40dBL_{Aeq} and provide reasonable acoustic conditions. This would be equivalent to NR35L_{eq} and, therefore, to provide full privacy to the duty room and training room it seems appropriate to design to NR25-30L_{max}.

5.11 The above ceiling upgrade should provide an appropriate level of sound insulation between the A5 unit to the offices above, and training room below. The upgrade with one layer of plasterboard should meet NR25L_{max}, which is a design range suitable for a residential dwelling above a retail unit. In addition, the upgrade has been designed so that noise breaking out from the A5 to above or below would generally not be greater than the background level (L_{90}) measured in the spaces on-site. If further privacy is considered necessary two layers of plasterboard should be considered.

5.12 It should be noted that upgrading the ceiling as specified above does not take into account any flanking paths (e.g. via walls), which may downgrade the overall performance.

5.13 During on-site measurements it was noted that there was a weakness in the areas highlighted on Figure 2 between the floor and walls, which led to flanking noise transmission. After discussions with TADW, it is understood that the services are located behind these areas. Therefore, it is suggested that these areas are inspected during the installation of the ceiling and the following system installed:

- The plasterboard areas concealing the services should be independently lined using two layers of 12.5mm thick sound resistant plasterboard on an independent timber or metal frame, with a cavity of at least 35mm deep and 25mm thick mineral wool inside the cavity. In addition, there should also be a gap of 10mm between the frame and existing wall area.

5.14 If the tenant wishes to operate at noise levels greater than those anticipated in Table 3, they must demonstrate how they would control noise to NR25L_{max} in the adjacent spaces, using their fit-out.

Party Wall

5.15 The party wall separating the A5 unit from the proposed new reception/waiting area of The Samaritans should achieve a minimum of 55dBR_w in the laboratory to adequately control typical noise break out. A typical construction would consist of:

- Two layers of 12.5mm thick sound resistant plasterboard on each side of 146mm deep metal 'C' studs at 600mm centres, with a 25mm thick mineral wool in the cavity.

5.16 Based on the spectra presented in Table 3 above, noise levels should meet the design range of NR30L_{max}, however, the performance of the entrance door and new window will be critical in achieving suitable internal levels.

Entrance Door and New Window

5.17 The entrance door is situated immediately next to the expected 'interview' area of the reception. Therefore the door and seals must maintain a high level of performance to ensure internal noise levels in this area are maintained. The entrance door should be a solid core type door, which achieves a minimum value of 35dBR_w in the laboratory. In addition, the door should be effectively sealed around its perimeter when closed, with a substantial frame. Acoustic seals would be required around the perimeter of the door, as well as the threshold.

5.18 To afford adequate control of noise break in via the new window, the glazing should achieve a minimum sound insulation rating of 35dBR_w. In theory this would control ambient noise levels the same standard as in the offices on the first floor, which face Oxford Street. However, the overall internal noise level will be determined by the amount of noise break-in via the entrance door. As stated previously, the glazing value indicated refers to the glazing, frame and seals of the window, which must maintain the required sound insulation performance.

Curtain Walling

5.19 A typical curtain walling system would be expected to provide a sound insulation performance of about 35dBR'_w. Based on the data presented in Table 3, the external envelope to the A5 units would control potential noise breakout to about below 30dBL_{Amax} at 10m. This would control the noise breakout to well below the existing daytime ambient noise levels of 73dBL_{Aeq} and would be controlled to below the night-time ambient noise levels, as anticipated background levels in the area would be at least 45dBL_{A90}. Therefore, noise breakout would be controlled to well below the daytime and night-time ambient levels and it would seem that the overall rating of the curtain walling may be reduced to 30dBR'_w.

5.20 The Palace Hotel is situated opposite to the proposed A5 unit, where hotel rooms have a clear line of site. Based on the anticipated break-out noise via the curtain walling, the occupants of these rooms would not be affected. Due to the volume of traffic during the day, and night buses during the early hours of the morning, it is anticipated that noise break-out from the A5 unit would be masked by road traffic noise.

5.21 If the doors of the retail unit were left fully open the anticipated break-out noise from the A5 unit would be in the order of 51dBL_{Amax} at the Palace Hotel. This would not present a problem during the daytime or night-time, where maximum noise levels would be greater due to traffic on Oxford Street. Therefore, the entrance door of the A5 unit should maintain the overall performance of the curtain walling system but a lobby would not be required.

5.22 Should the existing window frames be preserved, then any glazing associated should achieve the same performance as the curtain walling stated in 5.19. The performance refers to the glazing, frame and seals of the window, which must maintain the required sound insulation performance.

Mechanical Services and Electrical Plant

5.23 Unless informed otherwise, AEC have assumed the nearest noise sensitive property is above The Grand Central. Therefore, based on this, external noise levels from all future mechanical and electrical plant serving the proposed development should therefore not exceed 45dB$L_{Aeq,}$ at 5m at night, and 54dBL_{Aeq} at 5m during the daytime, with no distinguishing characteristics e.g. tone or intermittency.

6.0 CONCLUSIONS

6.1 It is proposed to change the use of the upper ground floor of The Samaritans, Oxford Street, to an A5 'hot food' take away, which will operate until the early hours of the morning.

6.2 The sound insulation performances of the upper ground and first floors have been measured to demonstrate their existing sound insulation values. Based on these values it has been found that anticipated noise levels in the proposed A5 unit can be controlled to provide suitable noise levels in the adjacent spaces by upgrading the floor construction.

6.3 Based on typical noise levels in a hot food takeaway, breakout noise from the A5 unit would be below the existing ambient and background noise levels in the area.

6.4 Potential noise levels from mechanical services and electrical plant for the A5 unit can be adequately controlled to meet the local authority noise limits.

6.5 Based on the above, suitable conditions can be applied to any planning permission granted, to adequately control the noise break-out from the A5 unit, to activities in The Samaritans and the nearest residential premises.

Ryan McNulty
24 April 2008

FIGURE 1 – Site Layout Showing Monitoring Locations

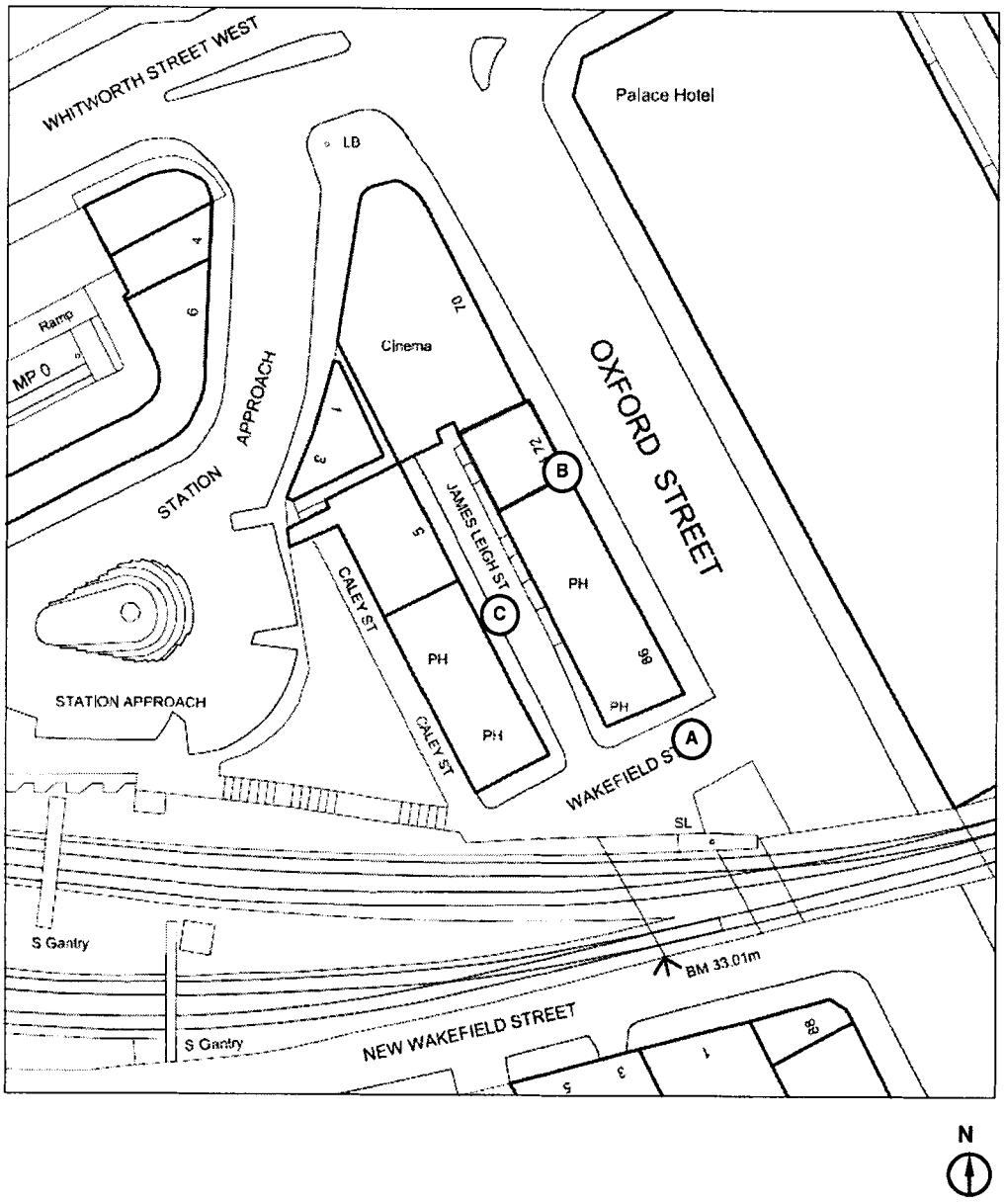
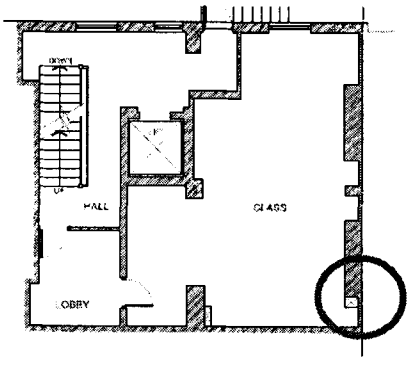
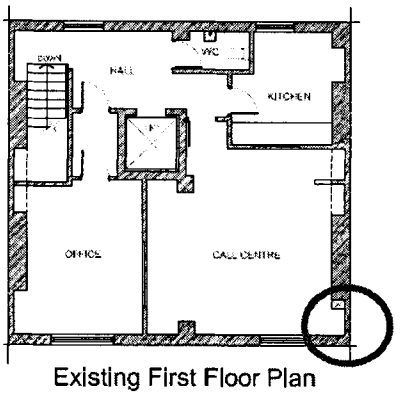


FIGURE 2 – Areas of Potential Weakness as Identified on Site



Existing Lower Ground Floor Plan



Existing First Floor Plan

APPENDIX A – Measurement Procedure

Date & Time of Survey:	Tuesday 11 March 2008, 1420 to 1635h Wednesday 23 April 2008, 0055 to 0110h
Personnel Present:	Ryan McNulty (AEC) Paul Knowles (AEC)
Equipment Used:	B&K 2250 Real Time Analyser (AEC Kit 2)
Weather Conditions:	*Daytime:* 12°C, cloud, dry road, no significant wind *Nigh-time: 12*°C, cloud, dry road, no significant wind
Measurement Procedure:	Noise levels were measured at three locations, identified as A, B and C on Figure 1 and described below. A – Free-field measurement at 4m from Oxford Road. B – 1m from the façade The Samaritans building on Oxford Road. C – Free-field at the rear of The Samaritans building, on James Leigh Street. Locations were selected to measure road traffic and general ambient noise levels, which were measured in terms of L_{Aeq}, L_{A10}, L_{A90} and L_{Amax} (fast response) typically between 5 to 15 minute periods. All the measurements were taken at a height of 1.5m above ground. The sound level analyser, which conforms 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 Bruel & Kjaer type 4230 (94dB) calibrator. There was no significant drift of calibration. A windshield was fitted at all times.
Measured Data:	A summary of the results are presented in Table A1 to A3.

TABLE A1 – Noise Levels Measured at the Proposed Site

Location	Period	Noise Level, dB				Comments
		L_{Aeq}	L_{A10}	L_{A90}	L_{Amax}	
A	1422 to 1438	73	77	62	87	Noise climate dominated by road traffic on Oxford Road. Noise levels not affected by trains on the nearby bridge.
	1459 to 1503	73	76	63	91	
B	1439 to 1445	76	79	65	92	
	1445 to 1451	76	79	69	94	
	1627 to 1632	77	79	68	90	
C	1452 to 1457	63	65	59	75	
	0055 to 0111	65	66	61	73	Noise climate dominated by the Salisbury and the Thirsty Scholar cliental and music.

TABLE A2 – Typical L_{Aeq} and L_{Amax} Spectra Due to traffic on Oxford Road

	Octave Band Centre Frequency, Hz							
	63	125	250	500	1k	2k	4k	8k
73dBL_{Aeq}	80	73	69	69	68	65	62	53
91dBL_{Amax}	94	89	83	85	79	78	90	75

TABLE A3 – Noise Levels Measured Inside The Samaritans Building Over 30 Seconds(approx)

Location	Noise Level, dB				Comments
	L_{Aeq}	L_{A10}	L_{A90}	L_{Amax}	
1st Floor Duty Room	40	42	37	47	Traffic on Oxford Road
1st Floor Office	41	45	35	48	Traffic on Oxford Road
Lower Ground Floor Training Room	34	37	32	44	No comment

TABLE A4 – Measured Sound Insulation Performances of Floors at The Samaritans

Floor	Overall dBD_w	Level Difference, dBD, At Octave Band Centre Frequency, Hz							
		63	125	250	500	1k	2k	4k	8k
Office to Training Room	47	- -	25	34	44	55	64	- -	- -
Office to Duty Room	45	- -	25	33	43	52	61	- -	- -

APPENDIX B - Acoustic Terminology in Brief

$L_{Aeq,T}$	The equivalent continuous (A-weighted) sound level. May be thought of as the "average" sound level over a given time, T. It 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_{A10}	The (A-weighted) sound level exceeded for 10% of a measurement period. It is the value used in the past to describe traffic noise.
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 quoted.
Free-field Level	This refers to the sound level measured outside, far away from reflecting surfaces
R_w	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.
R_{tra}	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, using a traffic noise spectrum as the source.
$D_{n,e,w}$	Weighted element-normalised level difference. Single number rating used to describe the performance of a ventilation unit.