



Noise assessment for proposed change of use to Restaurant (A3) use: Ground Floor of Hilton House Hilton Street, Manchester

Report ref.

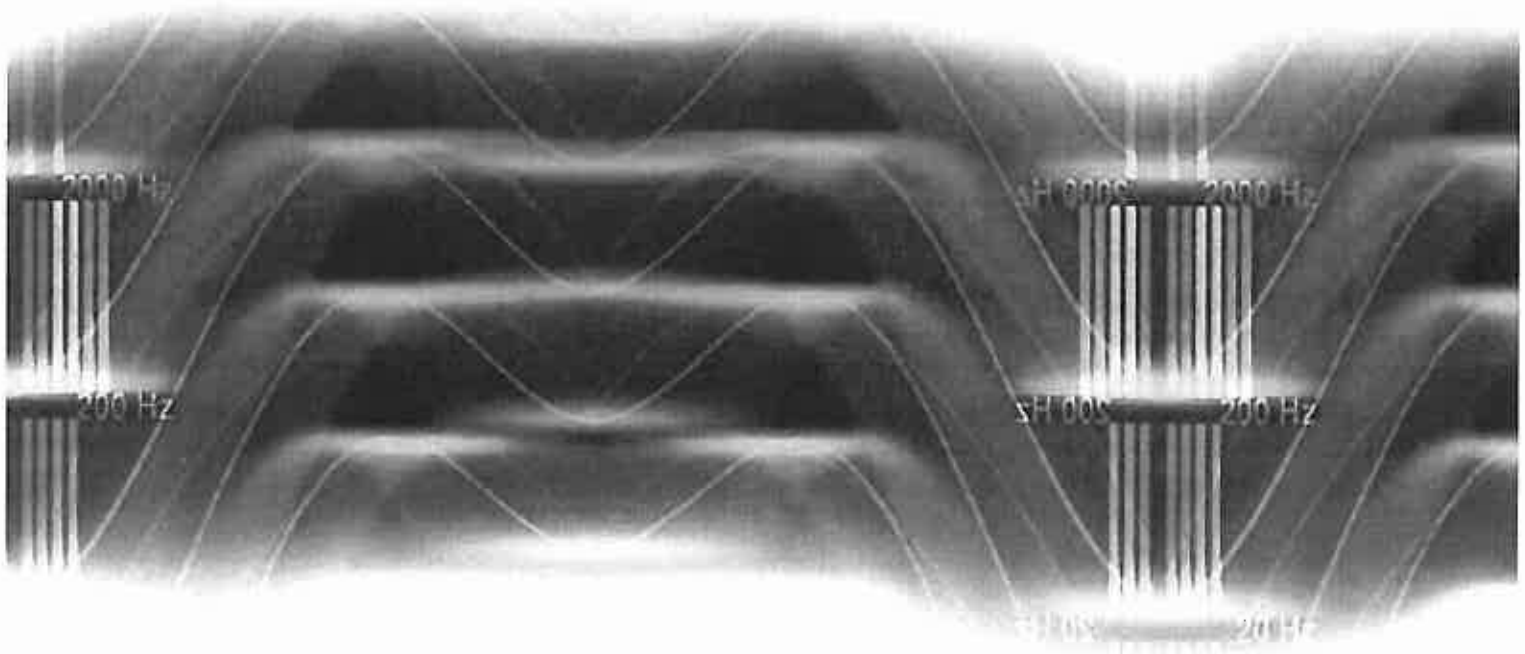
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Issued by

Peter Jackson MSc MIOA
Principal Consultant



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1. INTRODUCTION

Adam Geoffrey Management Limited has commissioned Spectrum Acoustic Consultants to complete a noise assessment at Hilton House, situated at Hilton Street, Manchester.

The noise assessment is required for the purpose of discharging the requirements detailed in the pre-application advice note, issued by Manchester City Council (the Planning Authority).

The acoustic requirements are included in item 9 of the pre-application advice note and are summarised as follows:

An acoustic study is required identifying ambient noise levels during daytime, night time and weekends along with an indication of noise levels which are proposed to be achieved within the accommodation, together with details of any acoustic glazing and acoustically treated ventilation proposed. The acoustic study should identify acoustic treatment and measures that will limit breakout of noise in accordance with a noise study of the premises. The scheme shall include any required mitigation measures (such as access door lobbies, building sound insulation, sound limiters), together with specified maximum internal noise levels.

Accordingly, this noise assessment report provides the following information:-

- The results of an ambient noise survey completed for the purpose of establishing existing ambient noise levels on the different aspects of the development building, situated on the corner of Hilton Street and Port Street.
- A prediction of the noise breakout from the restaurant premises, under normal trading conditions.
- Noise limit requirements, for external mechanical services equipment.
- Details of noise mitigating measures to be considered, together with proposed maximum noise limits associated with the operation of the premises, trading as a restaurant.

The area around the development building consists of a mix of commercial and residential use buildings. By definition, an A3 restaurant use should provide no adverse noise impact on other commercial uses in the area and consequently this noise assessment focuses on the assessment of noise impact on the adjacent residential use buildings, which have the greater sensitivity, particularly to a later evening restaurant use.

2. DEVELOPMENT PROPOSALS AND DESCRIPTION OF DEVELOPMENT LOCATION

The proposals involve change of use of the ground floor of Hilton House, located on the corner of Hilton Street and Port Street, Manchester, to an A3 restaurant use.

The premises are situated in the northern sector of central Manchester, which contains a mix of commercial and residential use buildings. The upper floors of Hilton House are currently used for education and office use.

The nearest noise sensitive (residential) premises is 'The Vaults' apartment building, which is located on the west side of Hilton House and separated by a car ramp, which accesses the basement car part of Hilton House. There is also a hostel building (Halters Hostel) on the opposite side of Port Street, which although providing temporary budget accommodation provides some degree of residential sensitivity.

3. AMBIENT NOISE SURVEY

3.1 SURVEY DETAILS

In order to cover weekday and weekend daytime and night time periods, noise measurements were recorded continuously over a 10-day period from Tuesday 31st August to Thursday 9th September 2010.

To provide information from the aspects of the development building, which overlook the adjacent residential use buildings, noise measurements were recorded at the following two locations:

- Position 1** At 1m outside the ground floor west façade of Hilton House, overlooking the car park ramp and 'The Vaults' apartment building.
- Position 2** At 1m outside the second floor window of the north façade of Hilton House, overlooking Port Street and the rear of Halters Hostel.

The above positions are applicable for the purpose of establishing the current ambient noise levels at the nearest residential buildings to the development site.

At each position, continuous noise samples of 15-minute duration were recorded with a microphone positioned on an extension pole at 1 metre outside of Hilton House, overlooking the residential buildings opposite.

Measurements were recorded in terms of the following parameters.

- LAeq, the equivalent continuous noise level
- LA90 percentile level
- LAFmax

Briefly, LAeq the equivalent continuous noise level is used as the measure of total ambient noise or noise from a specific source. LA90 represents the noise level exceeded for 90% of the time and is defined in BS4142, as the measure of background noise, when it is applied to the residual noise level (the noise in the absence of the specific noise being assessed). LAFmax represents the maximum sound pressure level recorded over the sample period.

Instrumentation used to measure noise levels included the following items. All equipment is calibrated annually, using equipment referenced to the British Calibration Service, and the National Physical Laboratory: -

- Bruel & Kjaer Integrating Sound level meter, Type 2238
- Bruel & Kjaer ½" Microphone, Type 4188
- Bruel & Kjaer UA 1404 Outdoor microphone Kit
- Bruel & Kjaer Acoustic Calibrator, Type 4231

3.2 MEASUREMENT RESULTS

All the bulk 15-minute noise sample data is included in tables A1 and A2 of Appendix A. This data is also presented in graphical format, in Charts 1 and 2 below so that the short and long period trends to the ambient noise levels may be analysed.

Table 1 below provides the summary of the measured LAeq, LA90 and LAFmax data, taken over the complete 16-hour daytime, and 8-hour night-time measurement periods at each measurement position.

Period	Sample Period	Night time (2300 – 0700)			Sample Period	Daytime (0700 – 2300)		
		LAeq	LA90	LAmx		LAeq	LA90	LAmx
1 Car ramp (The Vaults)								
Tuesday 31:08:10					9-hours	53.9	44.1	84.6
Wednesday 01:09:10	8-hours	45.9	40.7	69.9	16-hours	54.7	44.8	89.8
Thursday 02:09:10	8-hours	45.4	40.5	72.2	16-hours	55.4	45.4	91.2
Friday 03:09:10	8-hours	46.1	40.7	75.3	16-hours	55.7	45.9	87.0
Saturday 04:09:10	8-hours	48.3	43.1	74.8	16-hours	51.2	44.8	81.1
Sunday 05:09:10	8-hours	52.3	45.4	84.3	16-hours	49.4	45.0	77.7
Monday 06:09:10	8-hours	47.4	43.5	66.4	8-hours	57.8	48.8	92.3
Mean		48	42	74		54	46	86
2 Port Street (Hatters)								
Monday 06:09:10	8-hours				8-hours	64.1	57.5	78.0
Tuesday 07:09:10	8-hours	58.6	47.5	83.1	16-hours	62.7	54.4	94.3
Wednesday 08:09:10	8-hours	60.1	45.4	93.3	16-hours	63.5	54.8	94.4
Thursday 09:09:10	8-hours	58.8	44.5	90.1	6-hours	64.2	55.9	94.3
Mean		59	46	89		64	56	90

Table 1: Measured noise levels over daytime and night time periods 31 August to 9 September 2010

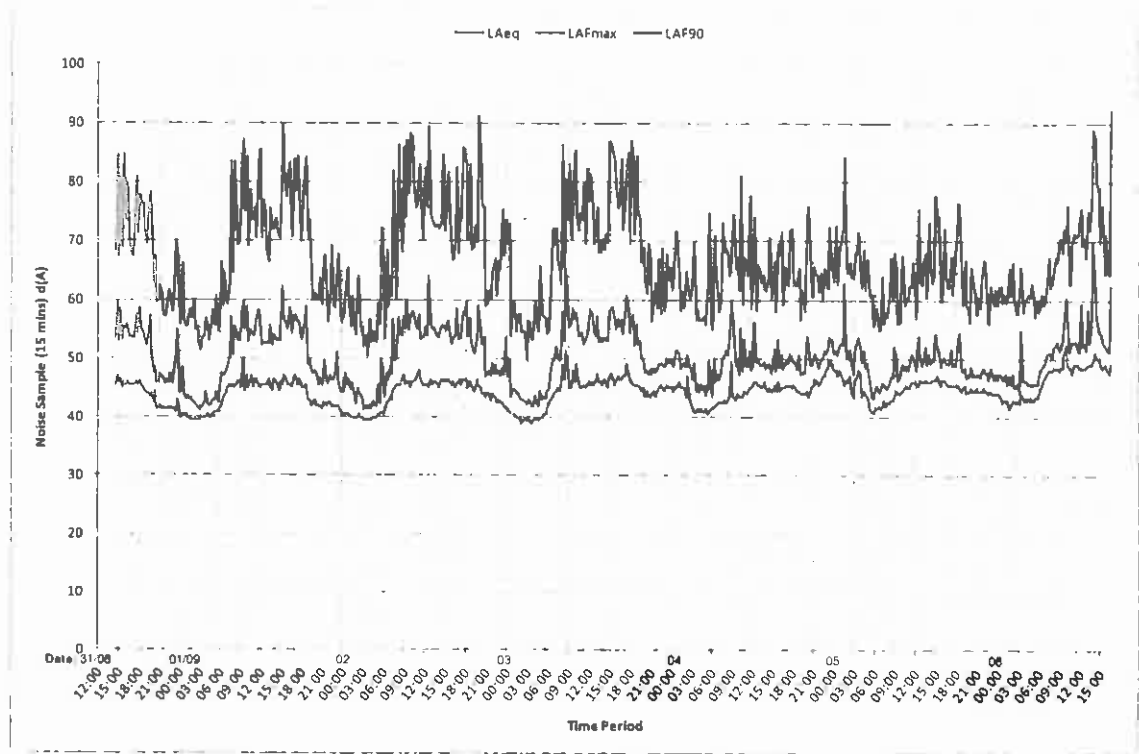


Chart 1: Measured noise profile Position 1: Car Ramp (The Vaults apartments)

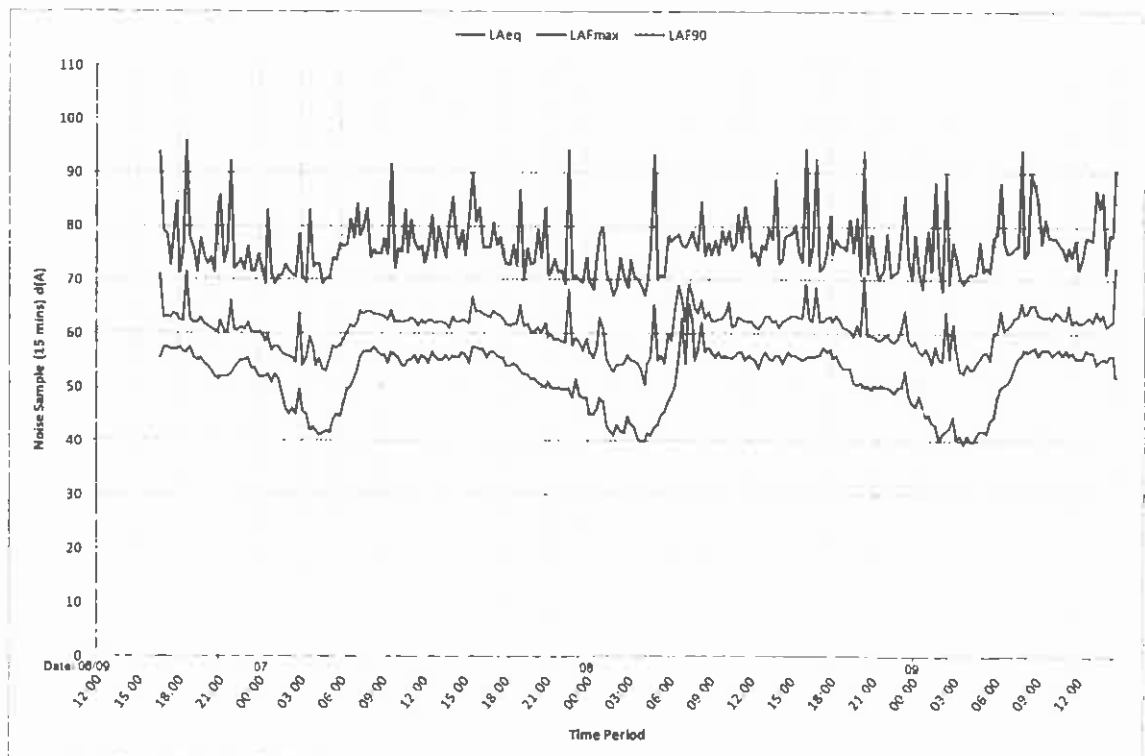


Chart 2: Measured noise profile Position 2: Port Street (Halter's Hostel)

Both daytime and night time noise levels in this location of Manchester are largely controlled by road traffic noise from local and more distant main roads, together with street noise from the general public.

The tabulated data, together with chart 1, illustrates that outside the west elevation of Hilton House, looking onto the car ramp and The Vaults' apartment building daytime $L_{Aeq}(16\text{-hour})$ levels are in the range 50-58dB(A), with the lower levels in the range occurring at the week-end. Daytime LA_{90} background noise levels were found to be very steady from day to day, in the range 44-49dB(A), with an average level of 46dB(A).

As expected, and reflecting the reduced traffic noise, night time ambient L_{Aeq} levels were measured in a lower range 46-52dB(A), with background LA_{90} level also being lower at 40-45dB(A).

Outside the north elevation of Hilton House, looking onto Port Street and Hatters Hostel daytime $L_{Aeq}(16\text{-hour})$ levels were found to be very steady, in the range 63-64dB(A), with the higher levels reflecting this location, which overlooks a main street and has higher levels of traffic noise. Daytime LA_{90} background noise levels were also found to be very steady from day to day, in the range 54-58dB(A), with an average level of 56dB(A).

As expected, and again reflecting the reduced traffic noise, night time ambient L_{Aeq} levels on Port Street were measured in a lower range 58 - 60dB(A), with background LA_{90} level being significantly lower at 45 - 47dB(A).

For an A3 restaurant use, the most sensitive trading time, from the aspect of noise emission, is the evening period, typically up to midnight, when background noise levels in city centre areas tend to start falling to the night time average level.

Looking at the ambient and background noise data, the mean night time levels of L_{Aeq} 48dB(A) and LA_{90} 42dB(A) at 'The Vaults' and L_{Aeq} 59dB(A) and LA_{90} 46dB(A) at Port Street (Hatters Hostel) are also representative of the noise levels present at around midnight at these locations.

For the purpose of assessing noise impact from the restaurant development, these ambient and background noise levels will therefore be referenced.

4. NOISE LEVEL PRODUCED BY RESTAURANT DEVELOPMENT

4.1 NOISE BREAKOUT FROM RESTAURANT TRADING AND ANCILLARY ROOM AREAS

Noise emitted onto the outside streets, from the proposed restaurant, will be dependent on the noise level produced inside the restaurant rooms, together with the sound insulation performance of the façade elements of each aspect of the development building.

4.1.1 Internal noise levels

Noise levels inside a restaurant main trading room / dining room can vary significantly, depending on the type of restaurant operated, together with the level of music played as part of any entertainment for supplementing the dining.

Spectrum has recorded noise levels inside a variety of restaurant premises, as part of noise assessment studies. Table 2 includes some typical room noise values associated with restaurant use.

Restaurant noise level	dB(A)	Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Typical restaurant: speech and background music	70	75	72	70	69	65	60	50	48
Lively / busy contemporary restaurant: raised speech and higher level music	80	80	78	76	79	75	70	60	52
Beer Cellar	70	67	69	69	67	64	63	59	56
Kitchen	70	67	77	67	67	65	62	56	50

Table 2: Measured noise level examples, applicable to inside restaurant premises

For typical restaurant uses, where diners expect to conduct reasonable conversation, within a moderate level of background of music, the typical dining room noise level, due to speech and background music is 70dB(A). For more contemporary restaurants, where the house music system is set at a higher level to produce a livelier atmosphere the average room noise level would be significantly higher at around 80dB(A).

Higher noise levels, associated with disco, or live, music entertainment would be more associated with public house or night club A4 uses and consequently, for the purpose of this assessment, a noise level of 80dB(A), as associated with a lively restaurant use, will be assumed for the Hilton House premises.

4.1.2 Sound insulation specification

The following design features are to be incorporated into the specification for the windows and doors:

- The existing single glazed windows to be upgraded to provide a secondary sliding sash window, resulting in a window glazing specification of 6mm glass / 150mm air-gap / 4mm glass
- Both entrance door openings to comprise a lobby with two sets of glass doors (minimum 8mm safety glass), set in a rebated (with compression seal) metal or timber frame, to allow for one set of doors being kept closed at any time.
- The lobbied entrance doors to be fitted with self closing devices.
- Entrance doors to the main trading area to be kept closed at all times except when customers are entering and exiting the premises (i.e. the doors should not be pinned open).
- There will be no 'straight through' type ventilation openings from the main trading area direct to outside streets.

4.1.3 Noise breakout to Port Street (Hatters Hostel)

As shown in figures 2 to 4, included in Appendix B, the external façade of the ground floor premises to Hilton Street and Port Street, comprises a wall of windows with main entrance doors (glass) onto Hilton Street and secondary entrance doors (glass) on the corner of Hilton Street and Port Street.

Noise breakout from the main restaurant dining and bar area, on to the street will therefore be controlled by sound insulation offered by the window glazing and the door openings (as detailed in section 4.1.2).

A prediction of noise breakout to Hatters Hostel, the nearest residential accommodation on Port Street (opposite the restaurant main dining room) is included in table 3.



The predictions are based on the noted maximum internal noise level inside the restaurant, the expected sound insulation offered by the various façade elements and the radiating surface areas (m²) of these elements. Predictions are provided assuming one set of entrance doors across each lobby area will be in a closed position.

Details	dB(A)	Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Restaurant maximum internal noise level Leq	80	80	78	76	79	75	70	60	52
Element sound insulation									
Window glazing (openable secondary glazing) 6/150/4		-23	-25	-28	-48	-51	-48	-45	-45
Hilton St glass (door insulation (SRI) dB Rw 30 dB		-15	-20	-24	-28	-29	-26	-30	-30
Port St glass (door insulation (SRI) dB Rw 30 dB		-15	-20	-24	-28	-29	-26	-30	-30
Indoor (reverberant) to free field (outside)		-6	-6	-6	-6	-6	-6	-6	-6
Radiated sound pressure level (Lp dB)									
Lp radiated by Port Street Windows	36	51	47	42	25	18	16	9	1
Lp radiated by Hilton Street Windows	36	51	47	42	25	18	16	9	1
Lp radiated by Port Street Doors	47	59	52	46	45	40	38	24	16
Lp radiated by Hilton Street Main Doors	47	59	52	46	45	40	38	24	16
Radiated sound power level (Lw dB)									
Lw Port Street windows = Lp + 10 x log (S)	51	66	62	57	40	33	31	24	16
Lw Hilton Street windows = Lp + 10 x log (S)	52	67	63	58	41	34	32	25	17
Lw Port Street Doors = Lp + 10 x log (S)	50	63	56	50	49	44	42	28	20
Lw Hilton Street Main Doors = Lp + 10 x log (S)	52	65	58	52	51	46	44	30	22
Distance / directivity correction									
Port St windows -29dB dist. (11m) / +3dB directivity		-26	-26	-26	-26	-26	-26	-26	-26
Hilton St windows -34dB dist. (20m) / -5dB directivity		-39	-39	-39	-39	-39	-39	-39	-39
Port St Doors -29dB dist. (11m) / +3dB directivity		-26	-26	-26	-26	-26	-26	-26	-26
Hilton St Doors -38dB dist. (32m) / -5dB directivity		-43	-43	-43	-43	-43	-43	-43	-43
Sound level contribution to Hatters Hostel windows									
Port Street Windows	25	40	36	31	14	7	5	-	-
Hilton Street Windows	14	28	24	19	2	-	-	-	-
Port Street Doors	24	37	30	24	23	18	16	2	-
Hilton Street Main Doors	10	22	15	9	8	3	1	-	-
Total Contribution (lobby entrance door closed)	28	42	37	32	23	18	16	2	-

Table 3: Prediction of noise levels to outside of Hatters Hostel windows

Note: In the sound power level section of the calculation table S = surface area of façade element

The calculations shown in table 3 demonstrate that noise produced from inside the restaurant and breaking out of the building façade will produce a noise level of 28dB(A) outside the windows of Hatters Hostel, located on the opposite side of Port Street. These levels are applicable when one set of doors across the lobbied entrance doors remains closed.



4.1.4 Noise breakout to Car Ramp (The Vaults apartments)

As shown in figures 2 to 4, included in Appendix B, the external (west) façade of the ground floor premises looking onto the car ramp and 'The Vaults' apartments, comprises several rooms, including office, kitchen, food store, beer cellar, and disabled toilet. There are also three sections of window, about 6m in total length, located behind the wine/food bar of the main trading area.

Again, noise breakout from these rooms to the car ramp area will be controlled by sound insulation offered by the window glazing (as detailed in section 4.1.2).

A prediction of noise breakout to 'The Vaults' apartments, the nearest residential accommodation on the west aspect of Hilton House is included in table 4. The predictions are based on the typical internal noise levels for the room uses, as noted in table 1.

Details	dB(A)	Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Room noise levels									
Dining Area internal noise level Lp	80	80	78	76	79	75	70	60	52
Kitchen internal noise level	70	67	69	69	67	64	63	59	56
Cellar room internal noise level	70	67	77	67	67	65	62	56	50
Element sound insulation									
Window glazing (secondary glazing) 6/150/4		-23	-25	-28	-48	-51	-48	-45	-45
Indoor (reverberant) to free field (outside)		-6	-6	-6	-6	-6	-6	-6	-6
Radiated sound pressure level (Lp dB)									
Lp radiated by Kitchen Window	28	38	38	35	13	7	9	8	5
Lp radiated by Wine Bar windows	36	51	47	42	25	18	16	9	1
Lp radiated by Cellar windows	31	38	46	33	13	8	8	5	-
Radiated sound power level (Lw dB)									
Lw Kitchen window = $L_p + 10 \times \log(S)$	32	42	42	39	18	12	13	13	9
Lw Wine Bar windows = $L_p + 10 \times \log(S)$	46	61	57	52	35	28	26	19	11
Lw Cellar windows = $L_p + 10 \times \log(S)$	39	46	54	41	21	16	16	14	8
Distance / directivity correction									
Kitchen windows -20dB dist.(4m) / +3dB directivity		-17	-17	-17	-17	-17	-17	-17	-17
Wine Bar windows -20dB dist. (4m) / +3dB directivity		-17	-17	-17	-17	-17	-17	-17	-17
Cellar windows -20dB dist. (4m) / +3dB directivity		-17	-17	-17	-17	-17	-17	-17	-17
Sound level contribution 'The Vaults' windows									
Lp radiated by Kitchen Window	15	25	25	22	1	-	-	-	-
Lp radiated by Wine Bar windows	29	44	40	35	18	11	9	2	-
Lp radiated by Cellar windows	22	29	37	24	4	-	-	-	-
Total Contribution	30	45	42	36	19	11	9	2	-

Table 4: Prediction of noise levels to outside of 'The Vaults' apartments

Note: In the sound power level section of the calculation table S = surface area of façade element

4.1.5 Assessment of noise from trading and ancillary room areas and additional mitigation

The predicted noise level breakout from the trading and ancillary room areas of the restaurant premises is compared with the measured late evening ambient and background noise levels in table 5.

Receptor Position	Predicted noise level dB(A)	Ambient noise level dB		Level difference dB.	
		LAeq	LA90	LAeq	LA90
1. Car Ramp : The Vaults	30	48	42	-18	-12
2. Port St : Hatters Hostel	28	59	46	-31	-18

Table 5 Predicted noise levels produced by restaurant use compared with measured ambient and background noise levels.

Note Level difference is difference between ambient/background noise level and predicted noise level from restaurant operation. Negative value means restaurant noise is below ambient noise

The table shows that, providing the sound insulation specification and measures outlined in section 4.1.2 are implemented, noise from operation of the proposed Hilton House Restaurant will be significantly below both measured late evening ambient LAeq and background LA90 noise levels, at the nearest residential accommodation to the development.

The noise assessment has therefore demonstrated that the ground floor area of Hilton House can be operated as an A3 restaurant use, with associated house system for background music, without causing adverse impact from the aspect of noise.

Existing ambient noise levels, as measured on Port Street (Hatters Hostel) and the car ramp (The Vaults apartments), will not be increased providing the following control measures are observed:

- Noise levels in the trading area of the restaurant are controlled to a level of around 80dB(A), with the predictions showing that a tolerance of at least +5dB(A) could be accepted. This noise level is commensurate with providing background style music, within a busy contemporary restaurant venue. Management control of the level of music in the trading area of the restaurant will be required for the purpose of controlling the level of amplified music played inside the restaurant.
- No amplified music to be provided by loudspeakers fitted to the outside of the building, or music piped to the outside of the building.

No additional mitigating measures are required to provide any further reduction to noise levels.

4.2 NOISE FROM MECHANICAL SERVICES EQUIPMENT

The design for the building services has not yet been completed for the project.

At this stage it is understood that the kitchen fume extraction will be completed by use of a fan-assisted fume-filtration hood connected to the existing duct, which runs up the west elevation of the building, discharging at roof level. The cold room chiller plant will presumably be located on the outside wall of the cellar located in the Car Ramp area facing the 'The Vaults' apartments.

As specific plant items have yet to be confirmed it is therefore necessary to provide the following noise control design limits and design advice for building services equipment in order to protect residential amenity at the nearest dwellings located at The Vaults and Hatters Hostel.

- Building services equipment must be designed such that the combined noise rating level from all plant, including any air-conditioning, room ventilation, kitchen extraction equipment, together with cellar and cold room chiller plant, does not exceed $L_{Aeq} 40dB(A)$ outside the windows of the nearest dwelling.
- Ventilation equipment not required outside trading hours, for example, kitchen extract and trading area ventilation should be fitted with timer switches to prevent over-running thought the night time hours.

Compliance with the specified building services noise limit may necessitate noise control measures such as specifying low noise units, provision of local plant screening, installation of in-line duct silencers, acoustic louvers, etc. It is recommended that the building services contractor consults with an acoustic specialist in order to develop a correct specification of design requirements, to meet the noise limit objectives.

~~4.3 NOISE FROM EXTERNAL SEATING AREA (PORT STREET)~~

~~Whilst noise levels produced in external eating and drinking areas will clearly vary, depending on customer numbers and level of voices, a good indication of the likely range of produced noise outside the nearby residential buildings is provided in the detailed calculation included in Appendix C of the report.~~

~~The calculation provides noise level predictions under two scenarios, the first for normal levels of trading with 50% occupancy of external seating area, with relaxed conversation, perhaps most associated with a restaurant dining use. The second scenario covers peak trading, with full occupancy and raised voices, perhaps more associated with outdoor seating areas of a public house.~~

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~~The predictions show that customer noise levels produced from use of the external seating area would be $46dB(A)$ for normal trading / relaxed conversation (typical of restaurant use) and $59dB(A)$ for peak trading / lively conversation (more typical of lively public house use).~~

~~With reference to the results of the ambient noise survey, the noise levels produced by customers in the external seating area of a restaurant should be no higher than the later evening ambient/background levels of $L_{Aeq} 59dB(A)$ / $L_{A90} 46dB(A)$, respectively, as measured outside the nearest residential premises in Port Street.~~

4.4 NOISE FROM ACTIVITY IN REFUSE AREA

Noise produced inside refuse areas of restaurants is commonly associated with disposal of bottles, movement of bottle bins, together with activities associated with visits by delivery and disposal vehicles.

Noise from these activities cannot be accurately assessed, as this is highly dependent on how refuse (and particularly bottles) are handled and deliveries made.

Noise levels produced in refuse areas are largely controlled by operating good practices, which include:

- Restricting delivery and waste pick up visits to normal daytime working hours 0700-1900.
- Eliminating the need to dispose of glass bottles and move bottle bins around the refuse area during evening trading hours

To further reduce noise levels from activities conducted in the refuse area, design proposals include for the provision of a new external wall, with substantial heavy wooden doors, to replace the existing roller shutter access door to the refuse area. This will improve the sound insulation offered by the current access doors and reduce noise breakout from the refuse area.

5. SUMMARY AND CONCLUSIONS

An assessment of the potential noise impact of the proposed A3 restaurant use of the ground floor of Hilton House, in Hilton Street, Manchester has been undertaken. The noise assessment has been based on measurements of existing daytime and night time ambient and background noise levels in the location of the nearest dwellings to the premises.

The Hilton House development building is situated in a busy area, in the northern sector of Manchester City centre. There are residential dwellings in the vicinity, namely, 'The Vaults' adjacent to the west of Hilton House and Hatters Hostel across from the Port Street façade of Hilton House.

The noise climate of the area is representative of a busy commercial area of a city centre, however, background noise levels fall to reasonably low levels (LA90 42-46dB(A) at The Vaults and Hatters Hostel respectively), during the later evening trading period for a restaurant.

A scheme of sound insulation measures, together with operating controls, has been recommended, to limit noise break-out from the trading and ancillary room areas of the restaurant, and an appropriate design noise limit has been specified for building services equipment.



APPENDIX A

Tables A1 – A2

Ambient noise measurement data at positions 1 and 2
31 August to 9 September 2010 survey



Time	15 minute Noise Level Samples dB(A)			Time	15 minute Noise Level Samples dB(A)		
	LAeq	LA90	LAFmax		LAeq	LA90	LAFmax
Daytime				19:15	53.6	44	75.3
7:00				19:30	57.3	43.5	78.3
7:15				19:45	50.6	44	73.3
7:30				20:00	47.7	42.5	62.7
7:45				20:15	48.5	44.5	67.3
8:00				20:30	45.9	41.5	59.7
8:15				20:45	46.2	41.5	60.1
8:30				21:00	47.2	42	62.4
8:45				21:15	46.9	41.5	61
9:00				21:30	46.7	41.5	57.5
9:15				21:45	45.6	41.5	57.2
9:30				22:00	46.3	41.5	58.6
9:45				22:15	45.8	41.5	61.6
10:00				22:30	47.4	41.5	60.5
10:15				22:45	45.7	41.5	58.1
10:30				Mean	53.9	44.1	84.6
10:45							
11:00				Night			
11:15				23:00	47.4	41.5	60.4
11:30				23:15	50.7	41	69.9
11:45				23:30	54.9	43	67.8
12:00				23:45	44.3	40.5	57.8
12:15				0:00	44	40	55.8
12:30				0:15	48.4	40.5	66.1
12:45				0:30	43.9	40.5	56.6
13:00				0:45	43.2	40.5	55.5
13:15				1:00	43.8	40	55.7
13:30				1:15	43.1	40	57.1
13:45				1:30	43.4	39.5	58.4
14:00	53.5	45.5	68.4	1:45	42.7	39.5	56.8
14:15	59.8	47	84.5	2:00	42.5	39.5	60.1
14:30	53.1	46	67.4	2:15	42.2	39.5	54.8
14:45	58.4	46.5	80.6	2:30	41.7	39.5	55.4
15:00	53.3	45	68.9	2:45	41.3	39.5	52.2
15:15	55.5	46	84.6	3:00	41.5	40	51.5
15:30	55.3	45.5	73.6	3:15	41.8	40	53.4
15:45	55.8	46	79.7	3:30	42.5	40	53.8
16:00	53.7	45.5	69.7	3:45	44.2	40	56.8
16:15	53.7	45.5	68.2	4:00	42.1	40.5	55.6
16:30	53.7	45.5	67.3	4:15	41.9	40	53.1
16:45	53.5	45.5	70.3	4:30	42.2	40	55.8
17:00	57.4	46	80.8	4:45	42.9	40.5	58.2
17:15	54.5	45.5	71.4	5:00	42.9	41	55.7
17:30	58.7	46	77.7	5:15	44.3	41	60.6
17:45	55.2	45.5	76.6	5:30	42.6	41	54.7
18:00	54.4	45	76.3	5:45	44.4	41.5	56.1
18:15	53.5	44.5	71.9	6:00	47.4	42	66.3
18:30	52.2	44	69.6	6:15	47	43	59
18:45	53.5	45.5	68.4	6:30	47	43.5	64.8
19:00	59.8	47	84.5	6:45	47.8	44	59.9
				Mean	45.9	40.7	69.9

Table A1: Ambient noise measurements, 31 August to 1 September 2010. Position 1



Time	15 minute Noise Level Samples dB(A)			Time	15 minute Noise Level Samples dB(A)		
	LAeq	LA90	LAFmax		LAeq	LA90	LAFmax
Daytime				19:15	47.8	42	64.2
7:00	48.4	45	59.2	19:30	47.5	42.5	59.8
7:15	50.3	45.5	62.9	19:45	47.8	43	61.1
7:30	57.1	45	83.5	20:00	47.4	42	60.5
7:45	50.6	45.5	64.6	20:15	45.4	42	59.8
8:00	55.5	45	83.5	20:30	46.6	42	63.5
8:15	54.7	45.5	75.3	20:45	45.5	41.5	59.2
8:30	53	46	69.3	21:00	46.1	42	65.4
8:45	53.5	46	71.9	21:15	49.7	42.5	67.6
9:00	55.2	45	75.9	21:30	46	42	61
9:15	59.6	50	87.3	21:45	45.7	42.5	56.3
9:30	55.1	44.5	75.1	22:00	47.1	42.5	61.1
9:45	58.9	47	84.2	22:15	46.4	42	69.1
10:00	52.8	45	69.2	22:30	46.2	42	59
10:15	54.9	46	78.7	22:45	47.2	42	58.7
10:30	54.5	47	73.5	Mean	54.7	44.8	89.8
10:45	53.8	45	73.7				
11:00	54.5	46.5	75.7	Night			
11:15	56.8	46.5	70.5	23:00	51.1	42	65.5
11:30	58.2	45.5	83.4	23:15	46.3	42	67.7
11:45	56.9	45	85.4	23:30	44.3	41	57
12:00	52.5	45.5	70.6	23:45	44.5	40.5	56.3
12:15	52.4	45.5	76.9	0:00	44.3	40.5	57.7
12:30	52.6	45.5	74.8	0:15	47.4	40.5	61.1
12:45	52.6	45.5	68.1	0:30	45.4	40.5	65.4
13:00	52.5	46.5	66.4	0:45	46.4	40.5	59.9
13:15	55.6	45	75.5	1:00	44.6	40	55.4
13:30	52.3	44.5	71.9	1:15	45.9	40	60.7
13:45	54.1	46.5	72.2	1:30	43.8	40	55.3
14:00	53.3	46	73.7	1:45	42.3	40	54
14:15	53.1	45.5	71.8	2:00	44.9	40	63.9
14:30	53.1	44.5	70.6	2:15	44.1	40.5	60.6
14:45	55.9	46	72	2:30	43.9	40	55.6
15:00	62.2	45.5	89.8	2:45	42.9	40	54
15:15	56.6	47	81.5	3:00	41.3	39.5	52.2
15:30	55.8	46.5	77.6	3:15	41.9	39.5	53.9
15:45	55	45.5	81	3:30	41.6	39.5	50.5
16:00	58.7	45.5	83.3	3:45	42.1	39.5	56.7
16:15	57.7	45.5	74.5	4:00	41.5	39.5	52.8
16:30	54.2	45	70.8	4:15	42.8	40	54.6
16:45	57.3	47	83.9	4:30	42.1	40	52.8
17:00	57.4	47	78.6	4:45	41.9	40	52.9
17:15	56.3	45.5	84.3	5:00	45.4	40.5	59.5
17:30	56.2	46.5	77.4	5:15	42.4	40.5	55.9
17:45	53.4	45.5	70	5:30	49.6	41	72.2
18:00	53.5	45	74.8	5:45	46.2	40.5	65.6
18:15	56.3	45	82.7	6:00	43.5	41	53.5
18:30	58.9	45.5	84.3	6:15	47.6	42.5	68.4
18:45	48.9	43	70.3	6:30	46.2	42.5	58.9
19:00	49.9	43	73.5	6:45	48.6	43.5	64
				Mean	45.4	40.5	72.2

Table A1: Ambient noise measurements, 1 - 2 September 2010. Position 1



Time	15 minute Noise Level Samples dB(A)			Time	15 minute Noise Level Samples dB(A)		
	LAeq	LA90	LAFmax		LAeq	LA90	LAFmax
Daytime				19:15	50.8	44.5	72.6
7:00	47.3	43	60.7	19:30	53.7	46.5	69.7
7:15	56.6	44.5	81.9	19:45	59.1	45.5	91.2
7:30	49.7	45	67.2	20:00	55.3	45	84.7
7:45	50.1	45.5	59.8	20:15	52.5	44	76.2
8:00	57.1	45.5	86.3	20:30	53.6	44	75.7
8:15	54.3	45.5	74.4	20:45	47.1	43.5	59.1
8:30	53.8	46.5	68.2	21:00	47.2	44	59.5
8:45	57.2	47	85.8	21:15	47.8	44	61.6
9:00	55.1	45.5	74.2	21:30	47.1	43	60.1
9:15	59.9	46	87.1	21:45	49.3	44	64.8
9:30	54.9	46	78.1	22:00	47.4	43.5	66.1
9:45	56.9	45	88.3	22:15	48.9	43.5	67
10:00	58	46	87.5	22:30	47.5	42.5	60.7
10:15	57.9	46	79.6	22:45	47.9	43	66.6
10:30	55.6	46.5	75.7	Mean	55.4	45.4	91.2
10:45	55	47	76.4				
11:00	57.4	48	82.8	Night			
11:15	53.2	46.5	78.3	23:00	47.1	42.5	65.2
11:30	53.7	45.5	70.2	23:15	48.4	42.5	75.3
11:45	53.9	45.5	79.6	23:30	47.2	42	67.5
12:00	55.4	45.5	82.5	23:45	53.7	41.5	73.6
12:15	53.9	45.5	75.8	0:00	47	41.5	69.7
12:30	64	45	89.4	0:15	49.9	41	72.9
12:45	56.3	46.5	74.1	0:30	43.6	40.5	53.9
13:00	55	45.5	73.5	0:45	44.9	40.5	59.9
13:15	55.2	46	72.5	1:00	44.9	40.5	59
13:30	54.4	46	72.5	1:15	44.1	40	54.7
13:45	53.7	45.5	72.7	1:30	44.2	40	57.3
14:00	53.6	45	72.1	1:45	43.3	40	57.6
14:15	55.5	46.5	72.9	2:00	43.1	39	54.7
14:30	55.7	46	84.7	2:15	42.9	39.5	54.6
14:45	55.3	46.5	71.8	2:30	42.8	39.5	54.4
15:00	54.9	46	74.5	2:45	42.3	40	49.8
15:15	56.4	46.5	81.6	3:00	42.8	39.5	56.5
15:30	55	46	75.5	3:15	43	39.5	56.3
15:45	52.4	45.5	68.2	3:30	42	39	53.2
16:00	53.2	46	66.7	3:45	41.9	39.5	53.5
16:15	53.9	45	69.5	4:00	43.8	40	59.8
16:30	58.6	45.5	82.5	4:15	42.8	39.5	56.7
16:45	53.2	46	68	4:30	41.9	39.5	54.6
17:00	53.9	46.5	75.3	4:45	44.5	40	65.7
17:15	53.4	45.5	73.6	5:00	43.1	40	57.7
17:30	58.1	46.5	85.9	5:15	43.6	40.5	57.3
17:45	57.5	46.5	84.9	5:30	43.4	40.5	56.9
18:00	59.7	46.5	82.8	5:45	44.5	41.5	54.2
18:15	53.8	45	70.4	6:00	44.8	42.5	55.1
18:30	56.9	46	83	6:15	47.5	43	59.8
18:45	52.7	45.5	68.5	6:30	49.9	43.5	72.1
19:00	51.3	44.5	69	6:45	49.6	44	69.6
				Mean	46.1	40.7	75.3

Table A1: Ambient noise measurements, 2 - 3 September 2010. Position 1



Time	15 minute Noise Level Samples dB(A)			Time	15 minute Noise Level Samples dB(A)		
	LAeq	LA90	LAFmax		LAeq	LA90	LAFmax
Daytime				19:15	53	45	73.8
7:00	52	44.5	72.2	19:30	50.5	44.5	66.4
7:15	50.4	45	66.8	19:45	49.7	45	68.9
7:30	49.6	44.5	65	20:00	47.6	43.5	63.2
7:45	51	45.5	62.7	20:15	47.8	44.5	61.3
8:00	58	49	86.3	20:30	47.2	43.5	69.8
8:15	53	46.5	65.3	20:45	48.2	43.5	65.9
8:30	65.2	51.5	80.5	21:00	47.5	44	56.5
8:45	58.1	48	73.8	21:15	48.4	44.5	60
9:00	55.4	45	82.9	21:30	47.6	43.5	62.8
9:15	56.1	45	70.3	21:45	48.1	44.5	58.6
9:30	58.7	48	78.3	22:00	49.1	45	67
9:45	56.8	46	85.5	22:15	49.3	45.5	57.6
10:00	57.9	49	74.5	22:30	49	45	68.8
10:15	53.8	46	71.7	22:45	48.7	44.5	58.3
10:30	54.1	45	74.7	Mean	55.7	45.9	87.0
10:45	54.4	45	73.7				
11:00	52.5	45.5	79.7	Night			
11:15	53.3	45	69.6	23:00	48.9	45	59.7
11:30	53.9	45.5	82.3	23:15	50	45.5	67.8
11:45	56.6	46	77	23:30	49.3	45	63.4
12:00	58.2	45.5	81.2	23:45	50	45	65.3
12:15	57.6	46	76.1	0:00	49.1	45	61.7
12:30	54.7	45.5	69.5	0:15	48.6	44.5	63.9
12:45	53.8	46.5	72.6	0:30	51.3	45.5	71.7
13:00	57.3	47.5	75.7	0:45	51.5	45	70.2
13:15	52.8	46	68.2	1:00	50.8	46	64.1
13:30	53.7	46	68.2	1:15	48.2	45	58.3
13:45	52.9	45.5	70.3	1:30	49	45	61.4
14:00	53.5	46.5	68.5	1:45	49.2	45	58.6
14:15	53.4	46	71.1	2:00	48.7	43.5	64.7
14:30	53	45	69.8	2:15	50.6	47	63.3
14:45	58	47	86.9	2:30	48.5	43	60.3
15:00	58.7	47.5	86.5	2:45	48.4	42.5	60.7
15:15	58.9	47	85.4	3:00	46.4	41.5	63.3
15:30	56.9	45.5	83.7	3:15	49.2	41	70
15:45	55	46	78.9	3:30	44.4	41	56.7
16:00	56.8	47	75.7	3:45	45.7	41.5	58.4
16:15	55.7	46.5	76.3	4:00	44.2	41	56.7
16:30	56.7	46.5	83.8	4:15	45.6	41.5	56.4
16:45	54.3	47	71.9	4:30	44.7	41	56.9
17:00	57.7	47	77.4	4:45	45.5	41	57.3
17:15	60.8	49	82.8	5:00	43.8	41.5	55.8
17:30	58.4	47.5	85	5:15	44.9	40.5	61.5
17:45	54.5	46	69.8	5:30	49.7	41	74.8
18:00	56.7	46.5	87	5:45	44.8	41.5	56.2
18:15	57.4	45.5	83.9	6:00	43.8	41.5	55.1
18:30	52.3	45.5	71.2	6:15	50	42	70.9
18:45	55.9	45.5	84.4	6:30	46.1	42	65
19:00	52.5	45.5	75	6:45	47.3	42.5	60.5
				Mean	48.3	43.1	74.8

Table A1: Ambient noise measurements, 3 - 4 September 2010. Position 1



Time	15 minute Noise Level Samples dB(A)			Time	15 minute Noise Level Samples dB(A)		
	LAeq	LA90	LAFmax		LAeq	LA90	LAFmax
Daytime				19:15	47.2	44	61.8
7:00	46.4	42.5	58	19:30	47.6	44	60.3
7:15	47.6	42.5	59.9	19:45	47.6	44	58.1
7:30	50.2	42.5	73.1	20:00	53.8	44.5	74.5
7:45	50.4	43	68.2	20:15	52.9	43.5	75.9
8:00	51.5	42.5	68.8	20:30	48.9	44.5	66.1
8:15	50.7	43	67.6	20:45	49.2	45.5	60.7
8:30	53	43.5	64.2	21:00	50.6	45.5	65.5
8:45	60	49.5	68.7	21:15	50.8	46.5	64.5
9:00	57.7	43.5	73.8	21:30	49	46	64.2
9:15	56.3	43.5	74.5	21:45	48.4	45.5	61.4
9:30	48.8	43	65.3	22:00	49.8	46	64.6
9:45	49.5	44	67.1	22:15	49.9	47	60.2
10:00	47.3	43.5	61.6	22:30	51.4	47	65.4
10:15	55.3	43.5	81.1	22:45	50.8	48	63
10:30	47.8	43.5	59.3	Mean	51.2	44.8	81.1
10:45	53.3	44.5	67.2				
11:00	48.9	44	66	Night			
11:15	48.7	44	64.1	23:00	51.6	48.5	61.9
11:30	51.2	45	77.7	23:15	53.7	50	72.4
11:45	48.3	45	58.9	23:30	53.3	49.5	65.3
12:00	48.6	45.5	63.8	23:45	52.2	48.5	65.2
12:15	56.3	46	74.2	0:00	50.8	48	63.2
12:30	49.5	46	58.2	0:15	51.4	48	72.6
12:45	50.1	45.5	65.9	0:30	50.7	47	62.8
13:00	48.8	45.5	65	0:45	52.2	48	68.9
13:15	48.9	45	62.9	1:00	52.7	47.5	69.8
13:30	49.1	45.5	64.2	1:15	52.5	46.5	72.7
13:45	49.5	46	62	1:30	62.7	45.5	84.3
14:00	48.3	45	61.6	1:45	50.5	46.5	65.5
14:15	49.1	44.5	63.3	2:00	50	46	64.5
14:30	49.1	45	70.6	2:15	51.6	47	66.3
14:45	47.6	44.5	60.2	2:30	49.4	44.5	63.9
15:00	48.3	44.5	61.7	2:45	47.5	43.5	63.7
15:15	51.6	45.5	66.6	3:00	51	46	66.9
15:30	47.9	44.5	58.1	3:15	53	47	68.8
15:45	53.3	46	69.6	3:30	53.7	48	71.5
16:00	48.4	44.5	67.8	3:45	52.1	47.5	64.2
16:15	50.7	45	71.5	4:00	49.4	43.5	62.2
16:30	48.3	45	59.2	4:15	51.5	44.5	68.6
16:45	49	45	65.5	4:30	48.5	44	61.8
17:00	49.8	45.5	63.2	4:45	49.3	43.5	67
17:15	49.2	45.5	62.4	5:00	47.4	43	63.8
17:30	50.8	45.5	71.8	5:15	46.5	41.5	60.7
17:45	49.7	45	72.1	5:30	43.4	41	61.1
18:00	49.6	45.5	63.3	5:45	43.6	41	55.7
18:15	49.2	45	62.3	6:00	44.9	41.5	57.5
18:30	48.2	44.5	62.5	6:15	45.3	41.5	58.6
18:45	50.6	44.5	65.4	6:30	44.3	42	54.8
19:00	47.6	44	56.6	6:45	44.4	41.5	55.1
				Mean	52.3	45.4	84.3

Table A1: Ambient noise measurements, 4 - 5 September 2010, Position 1



Time	15 minute Noise Level Samples dB(A)			Time	15 minute Noise Level Samples dB(A)		
	L _{Aeq}	L _{A90}	L _{AFmax}		L _{Aeq}	L _{A90}	L _{AFmax}
Daytime				19:15	46.7	44	59.1
7:00	45.9	42	63.9	19:30	47.3	44.5	58.7
7:15	45.6	43	56.1	19:45	47.1	44.5	56.3
7:30	45.1	42	57.9	20:00	48.6	45	65.5
7:45	44.8	42.5	57.2	20:15	47.1	44.5	62.4
8:00	45.6	42.5	60.9	20:30	47.2	44.5	61.6
8:15	46.9	43	67.1	20:45	47.1	45	57.6
8:30	46.8	43	60.1	21:00	47.5	44.5	60.5
8:45	52.1	43.5	68	21:15	46.9	44.5	58.9
9:00	50.5	44.5	65.2	21:30	47.8	44.5	63.6
9:15	46.3	44	56.1	21:45	48.5	45	66.8
9:30	46.9	44	56.3	22:00	47.6	44.5	66.6
9:45	48.1	44.5	64.4	22:15	47.6	44.5	59
10:00	49.1	44.5	67.6	22:30	46.4	44	56.1
10:15	48.1	45	59.2	22:45	48.5	44.5	62.4
10:30	48.8	45.5	60.4	Mean	49.4	45.0	77.7
10:45	48	45	60				
11:00	48.8	45	62.4	Night			
11:15	50.9	46	62.3	23:00	47.6	44	61.1
11:30	50.5	46	66.4	23:15	46.4	44	59.2
11:45	49.1	46	61.1	23:30	47.4	44	61.7
12:00	48	45.5	57.1	23:45	46.6	44	59.2
12:15	53.8	45.5	75.6	0:00	47.5	44	61.9
12:30	50.5	46.5	63.2	0:15	47.3	43.5	62.4
12:45	48.8	46	62.5	0:30	46.6	42.5	59.7
13:00	49.7	46	66.4	0:45	46.5	43	61
13:15	52.1	46.5	68	1:00	47.5	43	59.6
13:30	49.1	46	60.5	1:15	45.6	43	60.2
13:45	50.9	46	73.2	1:30	47.1	41.5	65.6
14:00	49.2	46	65.5	1:45	45.7	42	60.9
14:15	50.1	46.5	62.9	2:00	47.5	43	66.4
14:30	49.7	46.5	64.4	2:15	45.3	43	60.4
14:45	54.3	46.5	77.7	2:30	45.2	42.5	57.8
15:00	51.8	47	73.7	2:45	45.8	43	57.9
15:15	51.9	46.5	74.4	3:00	44.2	42.5	62
15:30	48.7	45.5	59.8	3:15	54.8	44	65.6
15:45	49.6	46.5	60.3	3:30	46.2	43.5	58.1
16:00	50.3	46.5	72.1	3:45	46.3	43	59.9
16:15	49.5	46	64.4	4:00	46.3	43.5	60.5
16:30	49.1	45.5	62.2	4:15	45.6	43	61.1
16:45	49.2	45.5	62.1	4:30	45.8	43.5	60.5
17:00	51.7	45.5	67.3	4:45	45.5	43	62.7
17:15	48.9	45.5	61	5:00	45.9	43	60.9
17:30	49.1	45.5	68.4	5:15	45.7	43.5	57.3
17:45	49.4	45.5	68.8	5:30	45.7	43.5	60.1
18:00	53.1	45.5	76.5	5:45	46.6	44	58.2
18:15	54.4	45	74	6:00	47.6	44.5	58.6
18:30	48.1	44.5	62.7	6:15	48.7	45.5	61.1
18:45	47.8	45	59.3	6:30	48.9	46.5	59.3
19:00	48.5	45.5	66.8	6:45	49.6	47	60.3
				Mean	47.4	43.5	66.4

Table A1: Ambient noise measurements, 5 - 6 September 2010. Position 1



Time	15 minute Noise Level Samples dB(A)			Time	15 minute Noise Level Samples dB(A)		
	LAeq	LA90	LAFmax		LAeq	LA90	LAFmax
Daytime				19:15			
7:00	50.9	47.5	62.6	19:30			
7:15	51.1	48	67.4	19:45			
7:30	51	48	62.1	20:00			
7:45	50	48	63	20:15			
8:00	52	48.5	64.5	20:30			
8:15	52.5	48.5	67.4	20:45			
8:30	52.9	48.5	66.5	21:00			
8:45	51.7	48	70.4	21:15			
9:00	51.7	48.5	70.6	21:30			
9:15	53	48.5	68.1	21:45			
9:30	56	51	72.2	22:00			
9:45	60.4	52.5	70.4	22:15			
10:00	58.1	49	76.1	22:30			
10:15	51.2	48.5	62.7	22:45			
10:30	52.1	48.5	62.8	Mean	57.8	48.8	92.3
10:45	52.9	47.5	69.9				
11:00	52.8	49	71.4	Night			
11:15	53.1	49	70.8	23:00			
11:30	51.6	49	71	23:15			
11:45	51.3	48.5	73	23:30			
12:00	59.5	48.5	75.6	23:45			
12:15	52.3	48.5	69.4	0:00			
12:30	52.5	48.5	70.6	0:15			
12:45	51.5	48.5	67.1	0:30			
13:00	58.5	49	75.1	0:45			
13:15	52.6	49	71.9	1:00			
13:30	55	49	75.7	1:15			
13:45	69.9	49.5	88.9	1:30			
14:00	63.4	51	87.6	1:45			
14:15	57.9	50	79.9	2:00			
14:30	54.7	50	78.6	2:15			
14:45	54.6	49.5	70	2:30			
15:00	54	48.5	76.1	2:45			
15:15	52.6	48.5	72.5	3:00			
15:30	52.2	49	64.3	3:15			
15:45	51.8	48.5	71.1	3:30			
16:00	51.4	48	64.7	3:45			
16:15	51.3	47.5	64.4	4:00			
16:30	62.3	49	92.3	4:15			
16:45				4:30			
17:00				4:45			
17:15				5:00			
17:30				5:15			
17:45				5:30			
18:00				5:45			
18:15				6:00			
18:30				6:15			
18:45				6:30			
19:00				6:45			
				Mean			

Table A1: Ambient noise measurements, 6 September 2010. Position 1



Time	15 minute Noise Level Samples dB(A)			Time	15 minute Noise Level Samples dB(A)		
	LAeq	LA90	LAFmax		LAeq	LA90	LAFmax
Daytime				19:15	62.1	55	71.4
7:00				19:30	63	55.5	77.9
7:15				19:45	61.8	54.5	74.6
7:30				20:00	61.5	54	73.1
7:45				20:15	60.9	53	74
8:00				20:30	60.5	52	71.5
8:15				20:45	60.4	51.5	83.9
8:30				21:00	62.4	52	85.8
8:45				21:15	60.6	52	73.3
9:00				21:30	60.2	52	75.7
9:15				21:45	66.3	52.5	92.3
9:30				22:00	60.8	53.5	72.2
9:45				22:15	60.6	54.5	72.7
10:00				22:30	61.2	55	73.8
10:15				22:45	60.8	55	72
10:30				Mean	64.1	57.5	78.0
10:45							
11:00				Night			
11:15				23:00	62.1	55.5	76.3
11:30				23:15	60.4	53.5	71.8
11:45				23:30	60.3	53.5	71.8
12:00				23:45	60.3	52	74.7
12:15				0:00	60	52	72.4
12:30				0:15	58.3	52	69.3
12:45				0:30	59.8	52.5	83.1
13:00				0:45	56.8	51	71.3
13:15				1:00	57.8	52.5	69.3
13:30				1:15	57.4	51.5	70.8
13:45				1:30	56.4	49	70.8
14:00				1:45	56	46	72.8
14:15				2:00	55.7	45	71.8
14:30				2:15	55.6	46	71.1
14:45				2:30	54.7	45	70.6
15:00				2:45	63.9	49.5	78.4
15:15				3:00	54.3	45.5	70.7
15:30				3:15	55.3	45	69.6
15:45				3:30	59.4	42	83
16:00				3:45	57.5	42.5	72.4
16:15				4:00	53.9	42	73.1
16:30	71.1	55.5	93.9	4:15	55.4	41	72.9
16:45	63	57.5	79.1	4:30	53.4	41.5	69.4
17:00	63.2	57.5	78.8	4:45	53.1	42	70.3
17:15	63	57	72.9	5:00	55.4	41.5	70.3
17:30	63.8	57	77.5	5:15	57.7	44	74
17:45	63.3	57	84.6	5:30	57.2	45	73.7
18:00	62.5	57.5	71.5	5:45	57.6	44.5	76.8
18:15	62.2	56.5	75.5	6:00	58.7	47	76.3
18:30	71.4	56.5	96	6:15	60.1	49.5	76.5
18:45	62.8	57.5	77.5	6:30	61.7	50	81.4
19:00	62	55.5	75.8	6:45	61.1	51.5	77.9
				Mean	58.6	47.5	83.1

Table A2: Ambient noise measurements, 6-7 September 2010. Position 2

Time	15 minute Noise Level Samples dB(A)			Time	15 minute Noise Level Samples dB(A)		
	LAeq	LA90	LAFmax		LAeq	LA90	LAFmax
Daytime				19:15	61.4	52.5	70
7:00	62.1	53.5	84.1	19:30	61.9	52.5	75.9
7:15	64.2	55.5	78.2	19:45	60.4	51.5	72.9
7:30	63.7	56.5	79.8	20:00	60.3	51.5	73.3
7:45	64.1	56.5	83.2	20:15	61.1	51	79.3
8:00	64	56.5	74.2	20:30	60	50.5	74
8:15	63.5	57.5	75.7	20:45	61.9	50	83.3
8:30	63.5	56.5	74.8	21:00	59.5	51	70.8
8:45	63.4	56	74.9	21:15	59.9	50	71.4
9:00	63.1	56	77.6	21:30	58.8	49.5	73.9
9:15	62.6	54.5	74.7	21:45	59.1	50	71.5
9:30	64.3	56.5	91.7	22:00	58.5	49.5	71.7
9:45	62.1	56	72.2	22:15	58.4	49.5	69.2
10:00	62.2	55.5	75.9	22:30	68.3	49.5	94.3
10:15	62.1	54	75.3	22:45	57.7	48	70.1
10:30	62.3	54	83	Mean	62.7	54.4	94.3
10:45	62.4	55	74.9				
11:00	62.9	55	81	Night			
11:15	62.5	56	77	23:00	59.3	51.5	70.9
11:30	61.5	54.5	75.7	23:15	58.3	48.5	69.9
11:45	62.6	56	76.2	23:30	56.8	48	69.5
12:00	61.8	55.5	73.3	23:45	59.1	48	74.1
12:15	62.5	54.5	76.6	0:00	56.7	45	69.6
12:30	62.6	56.5	81.9	0:15	55.6	45	68.3
12:45	61.9	55.5	74	0:30	57.7	46	74.5
13:00	62.4	55	79.6	0:45	62.9	48	78.6
13:15	62.1	55	76.8	1:00	61.1	47.5	79.7
13:30	61.8	56	74.1	1:15	55.3	43	71
13:45	61	55	81	1:30	54	42	69.7
14:00	63.1	56	85.4	1:45	52.8	41	67.2
14:15	62.3	55.5	79.1	2:00	54.1	43	68.6
14:30	62	55.5	75.9	2:15	54.1	42	74
14:45	62.5	56.5	79.4	2:30	54.4	41.5	70.6
15:00	62.2	56	74.6	2:45	56	44.5	68.7
15:15	61.9	54.5	81.6	3:00	55.1	43	73.6
15:30	66.8	57.5	89.9	3:15	54.9	42.5	70.5
15:45	64	57.5	80.8	3:30	54.4	40.5	70.1
16:00	64.3	57	83.6	3:45	53	40	68.8
16:15	63.5	57	76	4:00	50.5	40	67
16:30	63.4	55.5	76.1	4:15	54.4	41.5	69.2
16:45	62.9	56.5	76.1	4:30	55.7	41	75.8
17:00	64.2	56.5	80.7	4:45	65.4	42.5	93.3
17:15	63.5	56	76.5	5:00	55	43	70.3
17:30	63.3	55.5	78	5:15	55.9	45	70.8
17:45	62.8	55.5	74.8	5:30	54.5	45.5	70.6
18:00	61.8	54	73	5:45	59.8	47.5	78
18:15	61.4	54	72.8	6:00	58.7	48.5	77.1
18:30	61.9	54.5	76.5	6:15	64.5	50.5	78
18:45	61.8	54	72.5	6:30	69.1	55.5	78.4
19:00	65.4	53	86.8	6:45	66.5	63	76.5
				Mean	60.1	45.4	93.3

Table A2: Ambient noise measurements, 7 - 8 September 2010. Position 2



Time	15 minute Noise Level Samples dB(A)			Time	15 minute Noise Level Samples dB(A)		
	L _{Aeq}	L _{A90}	L _{AFmax}		L _{Aeq}	L _{A90}	L _{AFmax}
Daytime				19:15	60.5	53.5	81.3
7:00	62.4	54.5	76	19:30	59.4	51	75.3
7:15	69.8	65.5	77.3	19:45	61.6	50.5	81.5
7:30	67	62.5	79.2	20:00	59.6	51	71.1
7:45	64.9	55	77.1	20:15	70.6	50	94.1
8:00	63.9	57	75.6	20:30	59.6	50.5	71.3
8:15	66.3	62	84.5	20:45	59.6	49.5	78.5
8:30	62.9	56.5	74.6	21:00	59.4	50.5	74.9
8:45	64	57.5	76.9	21:15	58.7	50	70.2
9:00	62.6	56.5	74.7	21:30	58.9	50.5	70.9
9:15	62.2	55.5	77.3	21:45	59.4	50	72
9:30	62.8	56.5	74.7	22:00	59.7	50	78.8
9:45	62.7	55.5	79.1	22:15	58.9	49.5	70.7
10:00	63.9	56	76.7	22:30	58.4	49	71.2
10:15	65.8	55.5	79.1	22:45	59.3	50	71.8
10:30	61.2	55.5	75.7	Mean	63.5	54.8	94.4
10:45	61.6	56	76.6				
11:00	63.1	56.5	82.2	Night			
11:15	62.7	56.5	77.2	23:00	60.9	50	78.7
11:30	62.3	55	83.7	23:15	64.3	53	85.7
11:45	62.4	56	80.1	23:30	58.8	48.5	73.6
12:00	62.2	55.5	74.4	23:45	57.9	47	70.4
12:15	61.5	55	75.2	0:00	58.5	46.5	78.3
12:30	61	53.5	72.7	0:15	56.8	48.5	71.4
12:45	61.9	55.5	76.6	0:30	56.1	46.5	68.4
13:00	63.1	56.5	75.6	0:45	57.3	44.5	74.7
13:15	63.4	55.5	79.5	1:00	56.4	45	79.2
13:30	62.2	55	77.5	1:15	54.4	43.5	71.6
13:45	62.5	56	88.8	1:30	57.8	43	88.1
14:00	61.2	56	73.1	1:45	55.4	40	72.5
14:15	62.2	54.5	73.9	2:00	54.8	41.5	68
14:30	62.6	55.5	78	2:15	64	42	90.1
14:45	63	56.5	78.4	2:30	55.2	42.5	69.2
15:00	63.3	56	78.8	2:45	61.8	44.5	76.9
15:15	63.4	56	80.3	3:00	57	40.5	74.5
15:30	62.9	55.5	75.1	3:15	53	41	70.7
15:45	62.9	55	73.4	3:30	52.7	39.5	69.4
16:00	69.3	55.5	94.4	3:45	54.5	41	70.5
16:15	62.8	56	72.8	4:00	53.3	40	71.3
16:30	62.3	55.5	76.4	4:15	53.6	40	70.9
16:45	68.7	56	92.4	4:30	54.5	41	71.2
17:00	62.4	56	71.8	4:45	55.4	42	77.2
17:15	62.4	57.5	72.3	5:00	56.3	42	71.6
17:30	63	56.5	75.3	5:15	56.5	41.5	72.4
17:45	63.2	57	82	5:30	55.1	44	71.5
18:00	62.3	55.5	75	5:45	60.3	44.5	78
18:15	63.3	56	77.7	6:00	60.2	48	78.4
18:30	62.6	54.5	76.3	6:15	64.3	50	88.1
18:45	61.3	53.5	76.2	6:30	60.6	50.5	77
19:00	60.9	53.5	75.6	6:45	61.1	51	75
				Mean	58.8	44.5	90.1

Table A2: Ambient noise measurements, 8 - 9 September 2010. Position 2



Time	15 minute Noise Level Samples dB(A)			Time	15 minute Noise Level Samples dB(A)		
	L _{Aeq}	L _{A90}	L _{AFmax}		L _{Aeq}	L _{A90}	L _{AFmax}
Daytime				19:15			
7:00	61.9	52	75.1	19:30			
7:15	62.9	54	76.1	19:45			
7:30	63.1	55.5	76.2	20:00			
7:45	65.7	56	94.3	20:15			
8:00	63.7	57	74.4	20:30			
8:15	63.8	56.5	75.1	20:45			
8:30	65.3	57	89.9	21:00			
8:45	65.4	57.5	87.7	21:15			
9:00	63.6	56	84.5	21:30			
9:15	63.1	57	76.7	21:45			
9:30	63	57	81.3	22:00			
9:45	63.3	57	78	22:15			
10:00	62.7	56	77.8	22:30			
10:15	64	56.5	77.8	22:45			
10:30	63.7	57	76.8	Mean	64.2	55.9	94.3
10:45	62.7	56	75.9	Night			
11:00	62.8	57	73.8	23:00			
11:15	65.3	56	76.1	23:15			
11:30	61.9	56.5	74.3	23:30			
11:45	62.8	55.5	77.4	23:45			
12:00	62	55.5	72	0:00			
12:15	62.1	55.5	74.2	0:15			
12:30	62.7	57	77.9	0:30			
12:45	63.1	56.5	77.8	0:45			
13:00	62.3	56.5	77.4	1:00			
13:15	64.3	54.5	86.7	1:15			
13:30	62.7	55	83.5	1:30			
13:45	63.5	55.5	86.3	1:45			
14:00	61.4	55	71.3	2:00			
14:15	61.9	56	78.4	2:15			
14:30	62.3	56	78.2	2:30			
14:45	72.4	52	90.5	2:45			
15:00				3:00			
15:15				3:15			
15:30				3:30			
15:45				3:45			
16:00				4:00			
16:15				4:15			
16:30				4:30			
16:45				4:45			
17:00				5:00			
17:15				5:15			
17:30				5:30			
17:45				5:45			
18:00				6:00			
18:15				6:15			
18:30				6:30			
18:45				6:45			
19:00				Mean			

Table A2: Ambient noise measurements, 9 September 2010. Position 2

APPENDIX B

Figures 1 to 3 showing site plan and noise measurement positions, proposed ground floor layout and rear elevation

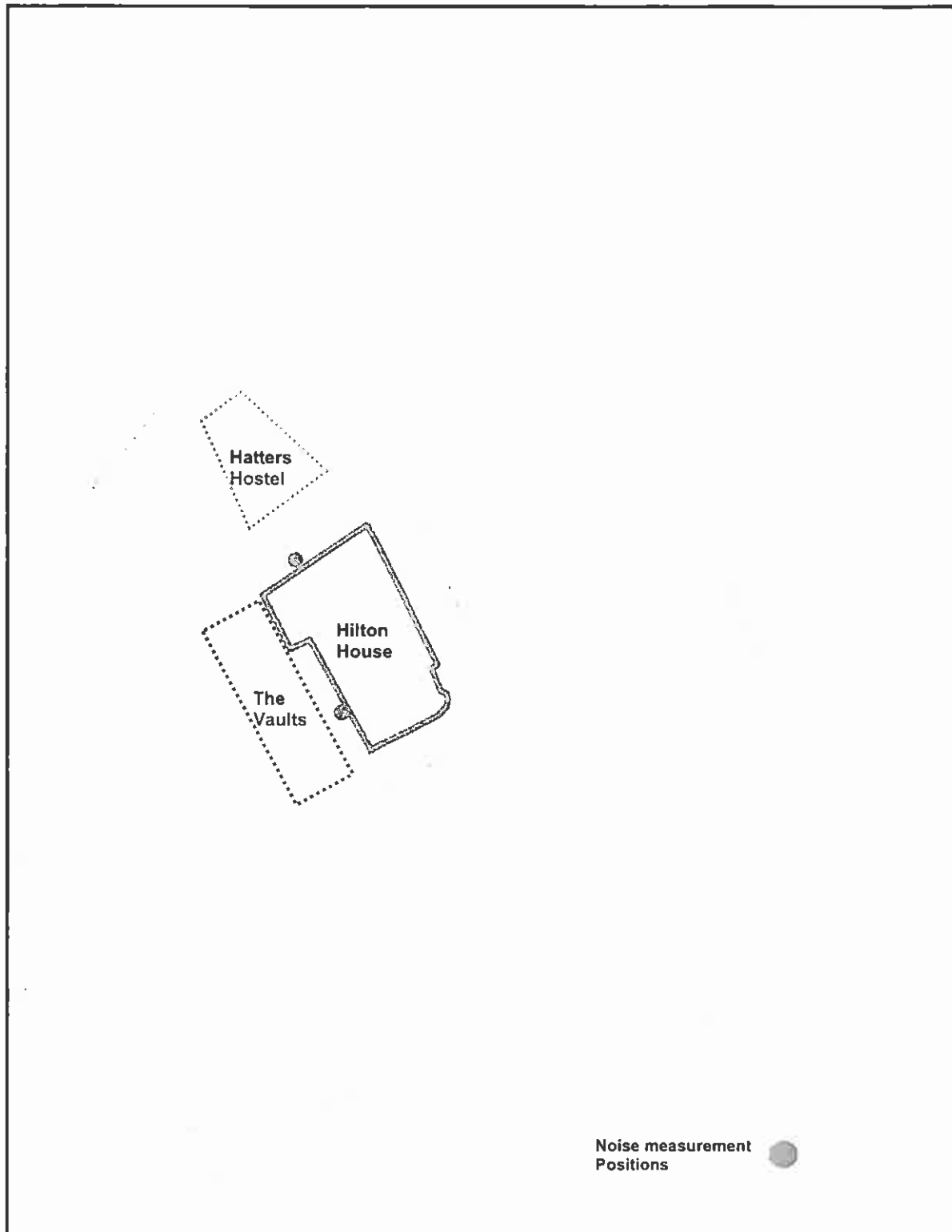


Figure 1 Plan showing development building, noise measurement positions and surrounding area





APPENDIX C

Calculation for Customer Noise produced in rear Yard Area.

CLIENT	Adam Geoffrey management
PROJECT	Hilton House Restaurant

SOURCE LOCATION
RECEIVER LOCATION

External seating area
Adjacent Residential: Hatters Hotel / The Vaults

GARDEN DETAILS

Pub external area capacity	48	patrons
Distance from source to receiver	11	metres

BARRIER DETAILS

source height (m)	1.2	metres
receiver height (m)	4	metres
barrier height (m)	0	metres Enter 0 if no barrier
distance from source to barrier (m)	5	metres
distance from barrier to receiver (m)	15	metres

SCENARIO 1 - normal trading

% Occupancy of external area	50%
% of patrons assumed to talk simultaneously	50%

Frequency (Hz)	dBA	63	125	250	500	1000	2000	4000	8000
Relaxed Conversation SPL @ 1m	56.0	14	27	38	51	52	49	41	29
Correction for simultaneous speakers		11	11	11	11	11	11	11	11
Correction for distance		-21	-21	-21	-21	-21	-21	-21	-21
Barrier Attenuation		0	0	0	0	0	0	0	0
Reduction to barrier IL due to reflections									
Resultant SPL	48.0	4	17	28	41	42	39	31	19

SCENARIO 2 - peak trading

% Occupancy of external area	100%
% of patrons assumed to talk simultaneously	50%

Frequency (Hz)	dBA	63	125	250	500	1000	2000	4000	8000
Raised Voices SPL @ 1m	66.0	24	37	48	61	62	59	51	39
Correction for simultaneous speakers		14	14	14	14	14	14	14	14
Correction for distance		-21	-21	-21	-21	-21	-21	-21	-21
Barrier Attenuation		0	0	0	0	0	0	0	0
Reduction to barrier IL due to reflections									
Resultant SPL	59.0	17	30	41	54	55	52	44	32

APPENDIX D

Photos showing Hilton House and noise measurement positions



Photo 1: Looking to entrance doors on corner of Port Street and Hilton Street



Photo 2: Looking to Port Street façade of Hilton House, showing noise monitoring position



Photo 3: Looking down Tariff Street to car park ramp and 'The Vaults' apartments



Photo 4: Looking from Hilton House ground floor west façade window across to The Vaults apartments.



Photo 5: Looking down Port Street. Hatters Hostel opposite Hilton House



Photo 6: Looking down Port Street. Hilton House and The Vaults

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TELEPHONE HEAD OFFICE +44 (0)1767 212871 BRIGAN +44 (0)1257 473242