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Ms Carter
Lee Carter House
Clitheroe

Environmental Assessment
Tom's Table
Saddlers Mews
Clitheroe
BB7 2BX

AB acoustics
4 Cumbrian Close
High Crompton
Shaw
Oldham

August 2020

Introduction

AB acoustics were commissioned by Judith Douglas Town Planning Ltd on behalf of Ms V Carter to undertake an environmental assessment for the change of use of the Ground Floor at Lee Carter House from A1 to A3 (Restaurant)..

The existing First Floor already has A3 permission as an ancillary cafe.

The survey was undertaken in order to accompany a planning application for the proposed development.

In the same building there is an existing business unit and residential accommodation.

The following report is divided into two sections to cover the requirements of the application : these are the internal noise from the use of the proposed Restaurant upon the attached residential accommodation and the external noise from the Restaurant on the residential accommodation across Lowergate.

It is understood that the maximum number of covers in the Ground Floor seating area will be 25 – on the First Floor (existing A3 usage) there will be a maximum of 10 covers.

However as the First Floor has existing permission for A3 then this is not considered in the following report though it is commented on.

The proposed hours of operation are from 10.00 to 22.30 on Tuesday to Saturday – the Restaurant being closed on Sunday and Monday.

It is envisaged that the last people will leave the premises by 22.45 as the access gate to the Adjacent public car park will be locked (by the Restaurant owners at 23.00 hrs) on Friday and Saturdays

As can be seen from the photograph below the Restaurant is situated in a mixed commercial /residential area in central Clitheroe.

Immediately adjacent to the proposed Restaurant is a public car park – with access off Lowergate

Immediately opposite the Car Park exit is a Public House – Keystreet Pub – which it is understood can operate until 04.30 hrs on certain days and in fact one of the residential properties that face the proposed Restaurant has windows that overlook the Car Park and Lowergate.

The kitchen – which is adjacent to another residential property (see plans at end of report) has a party wall that is adjacent to solid ground.

It is to be noted that the fume extract system fitted into the kitchen has no external air inlet or exhaust – the system working by re circulating the air therefore there is no extract noise to consider as this source does not exist.

On the Ground Floor there is an access door and emergency fire exit – the approximate size being 2m x 2m each – in addition two windows with an approximate size of 09. x 09. = 1.8 sq m each that could radiate noise towards the adjacent residential property.

On the Ground Floor the seating is spread out due to the shape of the Restaurant.

All the windows / doors are single glazed – with it is assumed 4mm glass (though this may not be the case with the doors) due to safety concerns.

Internal Noise

Technical Background

A major revision of the Building Regulations Approved Document E on Sound Insulation came into force on 1st July 2003. The previous 1992 Regulations have been extended to include rooms for residential purposes, the insulation of internal walls, reverberation in multiple occupancy dwellings and a new section on schools. Levels of sound insulation between domestic dwellings were stated which were deemed to be "reasonable" and methods of achieving these were suggested. Acceptable levels were specified for both New Build and for Conversions. Most importantly, a new requirement for Pre-Completion Testing **(PCT)** has been added.

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

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

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

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

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

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

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

It is important to realise that LPA's require that the attenuation between residential and commercial units achieve at least the New Build standard.

It is also important to realise that the internal noise level in any residential apartments adjacent to the proposed change of use are also governed by the requirements of BS 8233 : 2014 which basically states that the internal noise level in Living areas should not exceed 35 dBA between the hours 07.00 to 23.00 and 30 dBA between the hours 23.00 to 07.00.

A visit was made to the site on Tuesday 28 July 2020 in order to visually examine the internal structure of the building and to set up the external noise measuring equipment.

From the visit it was established that the party wall between the First Floor dining area (the existing A3 ancillary cafe) is understood to have a thickness of between 600 / 700mm and is constructed from stone / block with a cavity in fill and then either plastered both sides or fitted with dot and dab plasterboard.

The ceiling / floor between the Ground Floor Restaurant and the First Floor Maisonette was examined as far as was practically possible and we understand consists of the following :

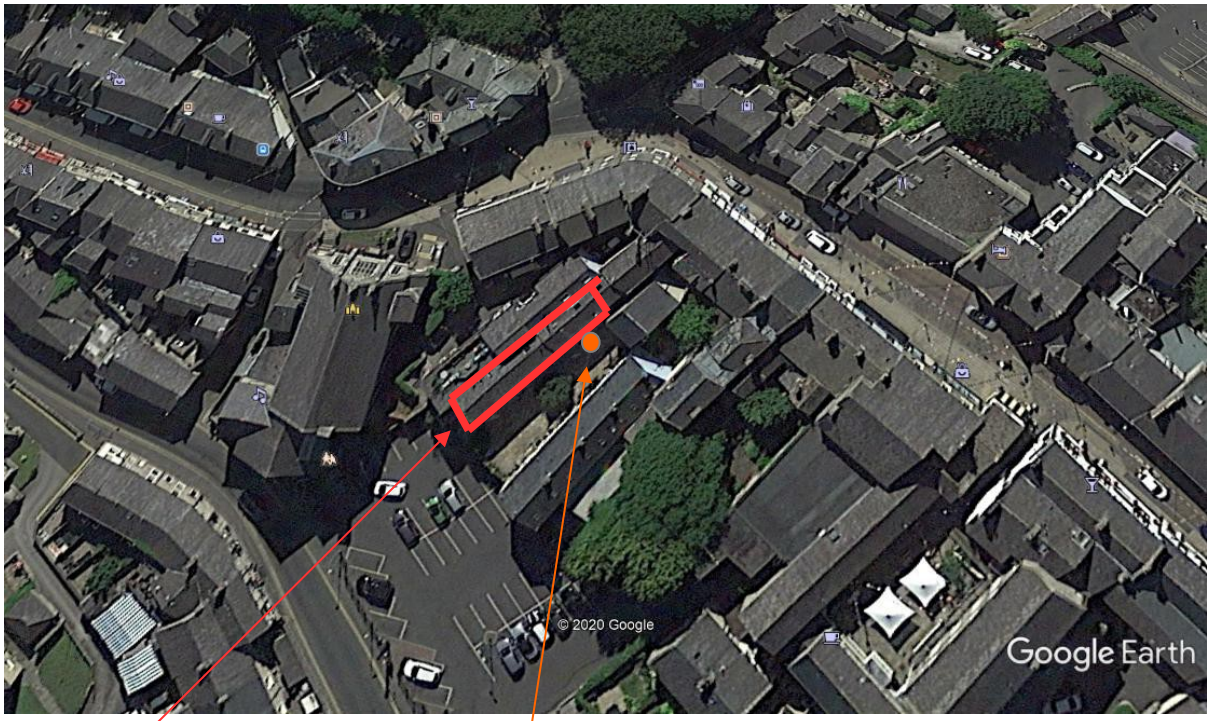
Between the Ground Floor dining area and the Maisonette there appears to be a suspended ceiling of plasterboard fitted to the original plasterboard ceiling – with a cavity of approximately 200mm – it is unknown whether this is fitted with sound absorption material or not.

The floor to the Maisonette is understood to have had in the past some form of acoustic treatment.

As far as can be determined this consists of a double layer of Fireliner mounted to the underside of the existing wooden beams – on top of the beams the existing floor boards were removed and the floor area treated with a Gypfloor Silent (or similar) - the flooring replaced and then an additional layer of flooring fitted to this.

Whilst it was difficult to determine the exact build up of the floor / ceiling if the above description is correct then according to the 'White Book' a ceiling / floor of this type could achieve an attenuation of the order of Rw = 54 dB

Below is a photograph of the area adjacent to the proposed Restaurant with the measurement location marked.



Proposed Site

Measurement Location

Internal Levels.

The number of covers on the Ground Floor would be a maximum of 25 – if this is the case then the noise level generated by the people in the Restaurant can be calculated from :

The noise level generated by people talking varies – according to BS 8233 the noise levels for various speech is :

Distance between Talker and listener - m	Noise Level dBA	
	Normal Voice	Raised Voice
1	57	62

The actual noise level of people in the proposed area will also depend upon the number of people there at any one time – this is determined from $L_1 = L_2 + 10 \log N$

Where :
L_1 = Resultant Level – dBA
L_2 = Assumed Level – dBA
N = number of people.
.

Number of People Talking	Normal Voice	Raised Voice
1 (2)	57	62
2 (4)	60	65
4 (8)	63	68
8 (16)	66	71
12 (24)	68	73

Therefore the highest calculated level in the Ground Floor could be **73 dBA** .

However it is proposed that there will be low level background music played through various speakers situated at various location on the Ground Floor.

The above graph shows the measured noise level in The Foresters Arms over a similar time frame as is proposed for Tom's Table – the microphone was located adjacent to the bar area and there was low level background music being played the whole of the time.

The number of people in the pub varied throughout the evening from 7 at 17.00 hrs up to 48 at 22.00 hrs.

The Octave Band levels recorded for the above were :

Octave Band Centre Frequencies Hz

'A'	63	125	250	500	1000	2000	4000	8000
66.9	65.3	59.3	60.8	61.4	59.6	58.4	55.8	51.1

If the 'worst case situation' is assumed – that the internal level within the Restaurant could be 73 dBA and the attenuation of the existing party wall is of the order of 55 / 60 dBA (which would comply with Part E of the current Building Regulations) which from previous measurements has been achieved with solid walls of this thickness then the noise level within the Maisonette could be order the order of 73 – 55 = **18 dBA.**

This is well within the requirements of BS 8233 : 2014.

With respect to the ceiling between the Ground Floor and the Maisonette then if the ceiling / floor construction detailed above is correct then the calculated noise level within the Maisonette could be of the order of 73 – 54 = 19 dB due to the noise from the proposed Ground Floor Restaurant.

Again this is well within the requirements of BS 8233.

External Noise

The measurement location is detailed on the above plan.

The measurements were undertaken at the time stated in the results (Tuesday evening)

Noise Assessment Criteria

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

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

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

The Standard is intended to be used for :

Investigating complaints regarding noise.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The absolute level of the sound.

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

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

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

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

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

BS 4142 : 2014

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

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

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

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

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

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

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

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

Equipment Used and Procedure

The noise levels were measured using a :

The measurements were made with a Bruel & Kjaer Type 2260 Sound Level Meter (Type 1 instrument) - the microphone was place externally through a First Floor window.

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

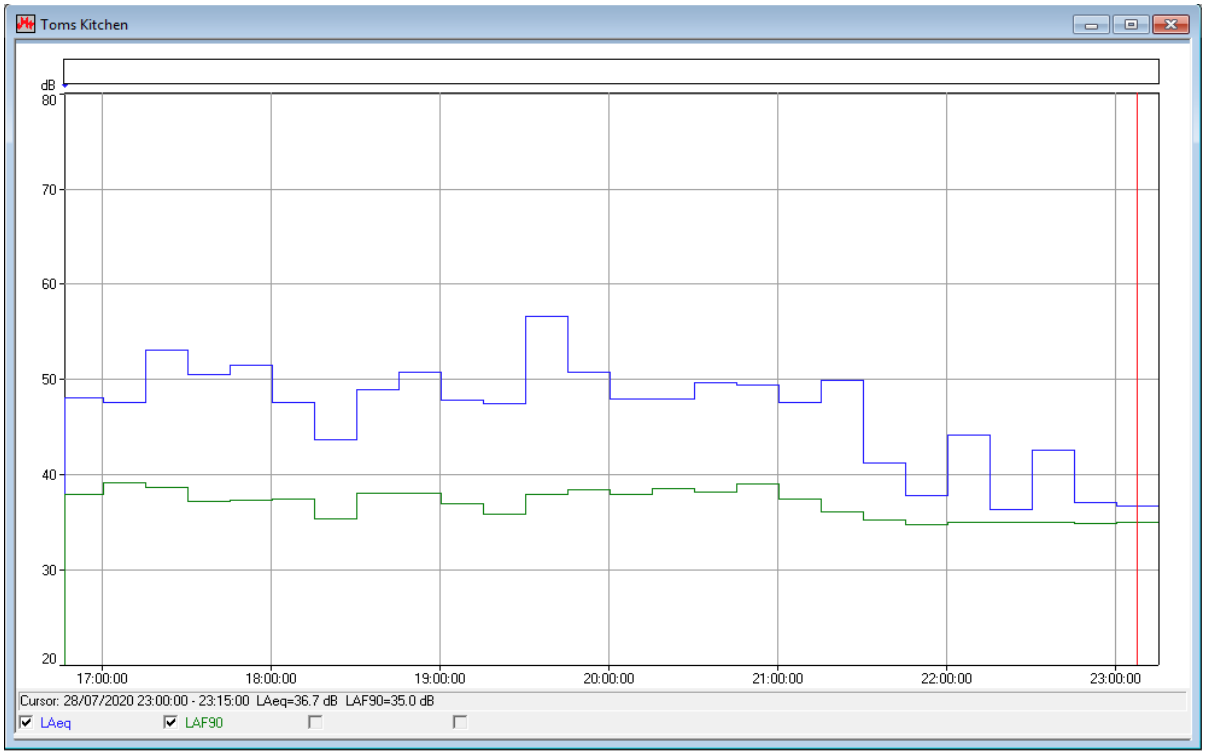
The measurements were undertaken at the times stated in the results.

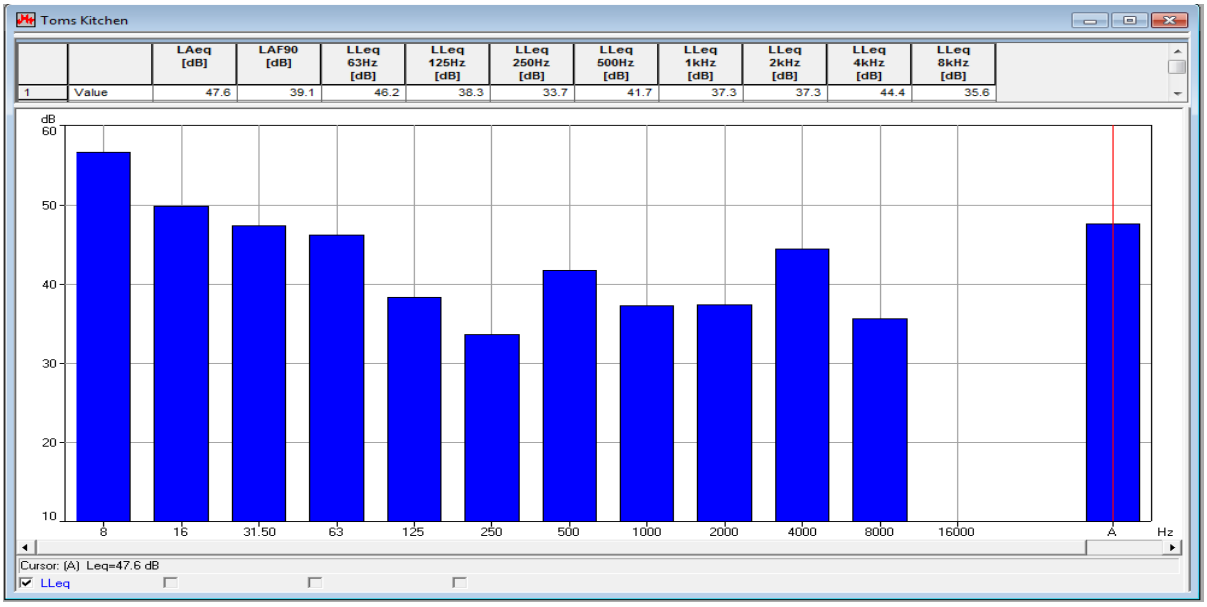
Results

Tuesday 28 July 2020

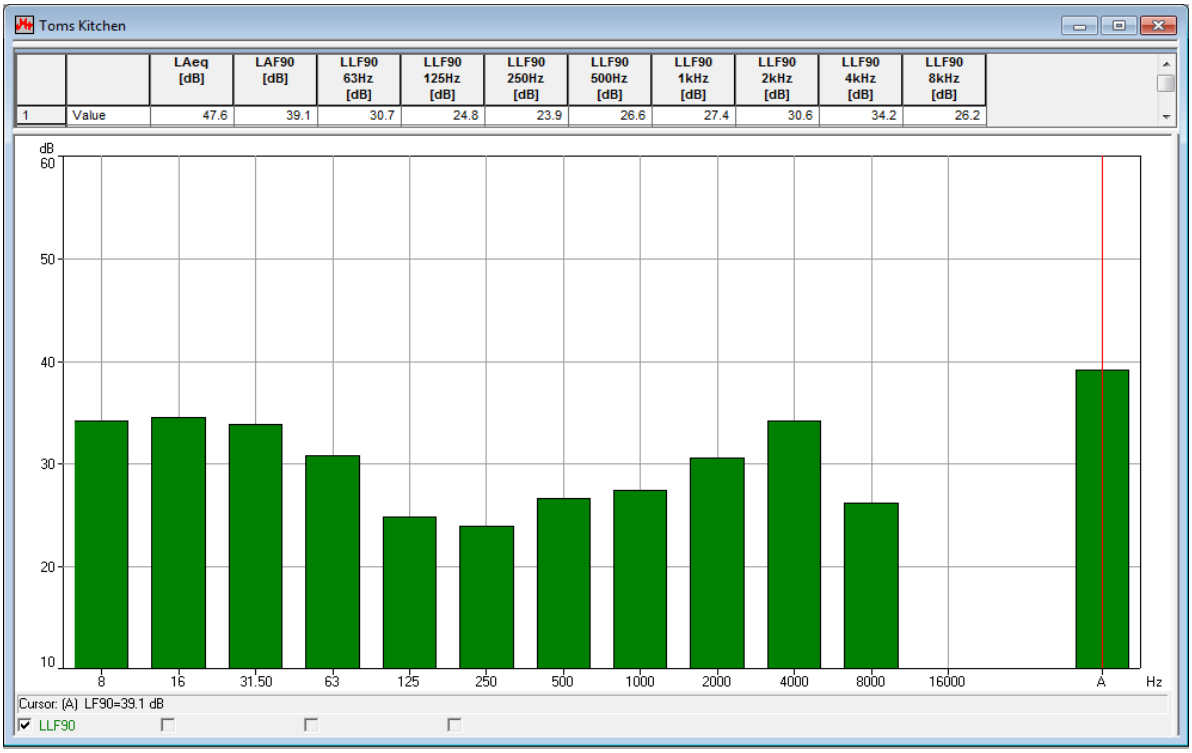
Weather

Date	Wind Speed M/sec	Wind Direction	Temperature C	Rain	Cloud Cover %	Road Conditions
28/07/2020 Start	3.6	SW	16	No	70	Dry





As can be seen the measured LA eq between the hours 17.00 and 23.00 was **47.6 dBA**



The resultant LA 90 was recorded at **39.1 dBA** – it should be remembered that these measurements were undertaken at what could be regarded as a quiet time – Tuesday evening – from experience it is likely that the LA 90 level will rise at week ends when there is increased activity – therefore the above measurements can be regarded as a ' worst case situation'

The residential properties opposite the proposed Restaurant are scale at 8m (Reference Google Earth) .

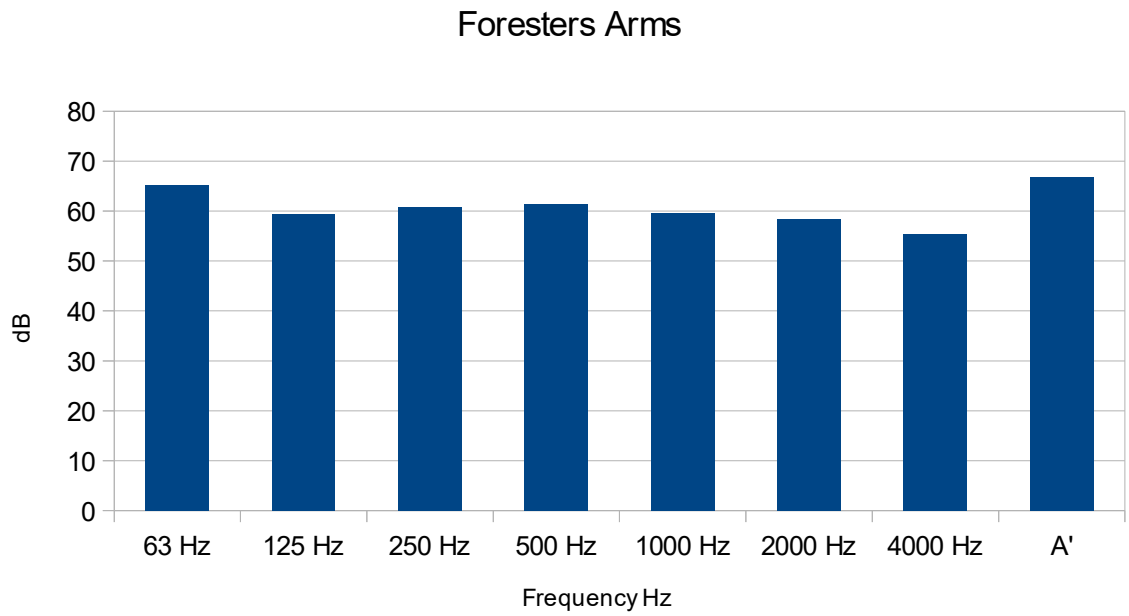
The following is an assessment of the above site reference to the properties on the opposite side of Saddlers Mews.

As stated above the likely noise level within the proposed Restaurant could be of the order of 73 dB – this is the noise level that will be radiated by the windows on the facade towards the residential accommodation over the funeral directors opposite the proposed site.

With the following Octave Band levels - no Octave Band data is available for the calculated 73 dBA noise level – the following represent the internal noise level with approximately 8 people on the Ground Floor.

Octave Band Centre Frequencies Hz

'A'	63	125	250	500	1000	2000	4000
66.9	65.3	59.3	60.8	61.4	59.6	58.4	55.8



.The noise level at the residential property can be calculated from :

$L_2 = L_1 – 6 – R + 10 \log S –11 – 20 \log r + DI$

L_2 = Calculated level at distance r metres

L_1 = Estimated Level Level – **73 dBA**

R = the sound reduction index of the building element –single glazed units of **Rw = 29 dB –** it was not possible to determine the actual thickness of the glazing but this quoted attenuation is for 4mm glass (it is likely to be thicker due the the size of the pane).

S = surface Area of facade facade – 2 x 0.9 x 0.9 + 1 x 2 x 2 = = **4.81 sq m**

.r= distance to houses = **8 m** (scaled off Google Earth)

DI= Directivity Index = **3**

Therefore $L_2 = 74 – 6 – 29 + 10\log 4.81 – 11 – 20\log 8 + 3$

L2 = 20 (19.7) dBdBA .

As can be seen this level is 28 dBA below the lowest measured LA eq at the site and also 19 dBA below the measured background level – therefore the noise from the Restaurant is very likely to be inaudible at the residential property.

If the noise level is calculated for the octave bands of interest the following results:

Octave Band Centre Frequency Hz

	125	250	500	1000	2000	4000
Measured LA eq	59.3	60.8	61.4	59.6	58.4	55.8
Attenuation due to distance	18	18	18	18	18	18
Attenuation due to glazing	17	20	26	32	33	26
Resultant	24.3	22.8	17.4	9.6	7.7	11.8
'A' weighting	-16.1	-8.6	-3.2	0	+1.2	+1
Resultant	8.2	14.2	14.2	9.6	8.9	12.8
Background Level L90	24.8	23.9	26.6	27.4	30.6	34.2
Level difference to L90	***-16.6***	***-9.7***	***-12.4***	***-17.8***	***-21.7***	***-21.4***

From the above the calculated LA eq of the noise from the proposed Restaurant is **20 (19.8) dBA**

Below is an assessment with respect to BS 4142 : 2014

Results		Clause	Comment
Calculated ambient sound level	LA eq (1 hr) = 20 dBA	7.1 7.3.1	Specific sound source active and generally unaffected by other sound sources
Residual Sound Level	LA eq (1 hr) = 47.6 dBA	07/03/03	Specific sound source not active
Background Sound Level	LA 90 (1 hr) = 39.1 dBA	8.1.3 8.3	Deemed to be representative of existing level
Assessment made during day time – reference time interval 1 hr.			
Specific Sound Level	LA eq(60 minutes) = 20 dBA	7.3.4 7.3.5	
Acoustic feature correction	0	9.2	Noise inaudible
Rating Level	20 + 0 = 20 dBA dBA	9.2	Sound
Background Sound Level	LA 90 (1 hr) = 39.1 dBA	8	Lowest level measured
Excess of Rating Level over Background	20 – 39.1 = -19.1 dBA	11	
Assessment indicates no adverse impact		11	
Uncertainty of the assessment	Not Significant	11	Particularly due to the high level of traffic noise at the residential property

In the above the noise radiated by the stone facade wall has been ignored : however if it is assumed that the area of the wall facing the residential property is of the order of 22 x 3 = 66 – 4.81 = 61.19 sq m and the attenuation of the external wall is of the order of 55 dB then from the above the calculated noise level at the residential property could be **4 (3.8) dBA**

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

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

The Perception at the residential property being highlighted .

Conclusions

The change of use of the Ground Floor at Lee Carter House from A1 To a Restaurant (A3) will not have a detrimental effect on either the existing residential property in Lee Carter House or on the existing residential property opposite the proposed Restaurant on Lowergate Clitheroe.

Therefore from a noise viewpoint Planning Permission could be granted for the change of use.

Roger Leach AMIOA


south west elevation
Fire Exit
south east elevation
'Toms Table' is within the broken line at Grd+1st Floor Levels
Terrace
north east elevation
Emergency fire exit
Main entrance + exit
To Castle Street
To Towergate car park
Toms Table
Lee Carter House
Off Castle St Clitheroe
Elevations
Scale 1:100 at A3

Pilkington **Optiphon**™

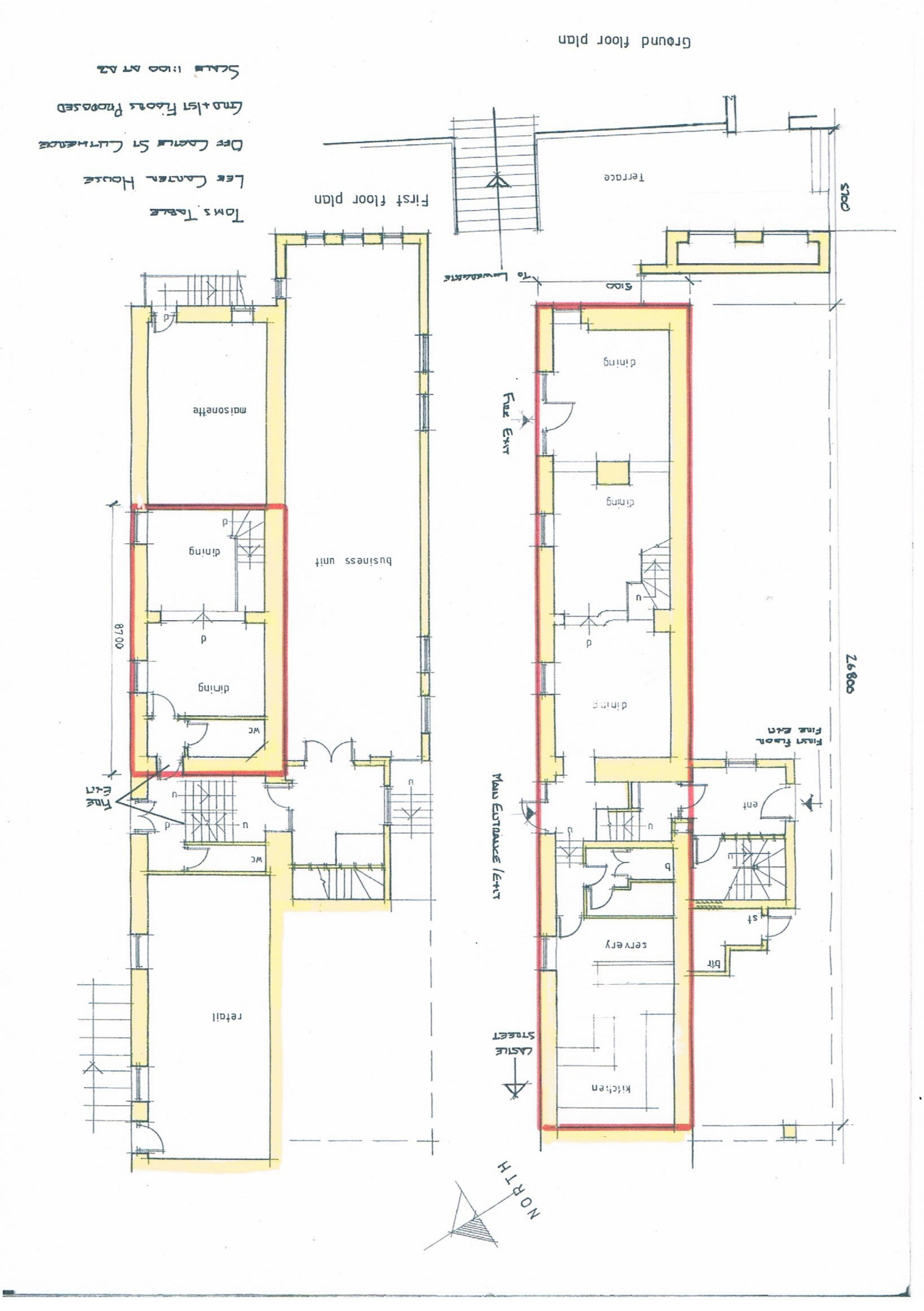
	dB sound reduction index by octave band – Hz						$R_w(C;C_{tr})$	R_w	R_w+C	R_w+C_{tr}
	125	250	500	1000	2000	4000				
Configuration single glazing										
6.8 mm Pilkington **Optiphon**™	21	26	31	35	37	38	35(-1;-3)	35	34	32
8.8 mm Pilkington **Optiphon**™	24	28	34	38	37	43	37(-1;-4)	37	36	33
10.8 mm Pilkington **Optiphon**™	28	31	36	38	39	47	38(-1;-2)	38	37	36
12.8 mm Pilkington **Optiphon**™	30	32	37	39	41	51	39(-0;-2)	39	39	37
16.8 mm Pilkington **Optiphon**™	29	34	37	39	46	55	40(-0;-2)	40	40	38
Configuration Insulating Glass Unit (IGU), thickness in mm										
6 / 6 to 20 mm / 6.8 Pilkington **Optiphon**™	23	24	34	42	43	52	38(-2;-5)	38	36	33
6 / 6 to 20 mm / 8.8 Pilkington **Optiphon**™	24	26	40	48	46	54	41(-3;-7)	41	38	34
6 / 6 to 20 mm / 10.8 Pilkington **Optiphon**™	23	28	41	47	45	55	42(-3;-7)	42	39	35
6 / 6 to 20 mm / 12.8 Pilkington **Optiphon**™	20	29	43	47	46	49	42(-3;-8)	42	39	34
8.8 Pilkington **Optiphon**™ / 6 to 20 mm / 12.8 Pilkington **Optiphon**™	26	36	46	50	52	63	47(-2;-7)	47	45	40
16.8 Pilkington **Optiphon**™ / 6 to 20 mm / 16.8 Pilkington **Optiphon**™	29	40	45	47	54	68	48(-2;-6)	48	46	42

The above IGUs with Pilkington **K Glass**™ on one pane and a 16 mm 90 % Argon-filled cavity achieve a U value of 1.5 W/m² K
Further information on solar and thermal performance is available on the Pilkington website using the Spectrum program: www.pilkington.com/spectrum
Impact classification EN12600 Class 1(B)1 for all above Pilkington **Optiphon**™ products
$R_w(C;C_{tr})$ are in accordance with EN717-1

Non Pilkington Optiphon™ glass products. Figures from BS EN 12354

	dB sound reduction index by octave band – Hz						$R_w(C;C_{tr})$	R_w	R_w+C	R_w+C_{tr}
	125	250	500	1000	2000	4000				
Configuration single glazing										
4 mm Float Glass	17	20	26	32	33	26	29(-2;-3)	29	27	26
6 mm Float Glass	18	23	30	35	27	32	31(-2;-3)	31	29	28
8 mm Float Glass	20	24	29	34	29	37	32(-2;-3)	32	30	29
10 mm Float Glass	23	26	32	31	32	39	33(-2;-3)	33	31	30
12 mm Float Glass	27	29	31	32	38	47	34(-0;-2)	34	34	32
Configuration Insulating Glass Unit (IGU), Float glass, thickness in mm										
4 / 6 to 20 mm / 4	21	17	25	35	37	31	29(-1;-4)	29	28	25
6 / 6 to 20 mm / 6	20	18	28	38	34	38	31(-1;-4)	31	30	27
6 / 6 to 20 mm / 4	21	20	26	38	37	39	32(-2;-4)	32	30	28
10 / 6 to 20 mm / 4	24	21	32	37	42	43	35(-2;-5)	35	33	30
10 / 6 to 20 mm / 6	24	24	32	37	37	44	35(-1;-3)	35	34	32

Note that these are conservative figures and cover all products by European glass manufacturers.
R_w = Weighted sound reduction. This scale allows for the response of the human ear and could be used for determining a suitable product to reduce noise such as voices.
C = An adjustment to the R_w scale that could be used for selecting a product to reduce noise from music, radio, tv, high speed traffic and other medium to high frequencies.
C_{tr} = An adjustment to the R_w scale that could be used for selecting a product to reduce noise from urban road traffic, disco music and other noises with a large component of low frequencies.
Note that a 3 dB difference is barely discernable, 5 dB is clearly discernable and 10 dB is a doubling or halving of the noise.


Tom's Table
Lee Carter House
Off Castle St Clitheroe
Gnd + 1st Floors Proposed
Scale 1:100 at A3
Ground floor plan
First floor plan
NORTH
kitchen
servery
Castle Street
Main Entrance / Exit
dining
dining
dining
Fire Exit
ent
st
b/r
b
First Floor Fire Exit
26800
5100
To Lowergate
5300
Terrace
retail
wc
wc
Fire Exit
business unit
dining
dining
8700
maisonette

dfhj