Update to the Initial Post Installation Environmental Noise Impact Assessment Report

Including Sound Measurements taken at Gnarley Cottage Following Completion of Alterations and New External Cold Room at the Gate Inn Public House, Ashby Road, Osbaston nr Nuneaton Warwicks CV13 0HS

Report Date: June 2011

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NOISE SURVEY REPORT/MIT/June 2011.
GATE INN, ASHBY ROAD, OSBASTON NR NUNEATON, WARWICKS.

1.0 INTRODUCTION

1.1 Instruction: To provide consultancy services including noise monitoring, advise and evaluation with reference to post installation noise tests following completion of alterations and a new external cold room for the above venue.

1.2 Client: Mr D Taylor, Project Manager, Marston's Inns and Taverns Ltd

1.3 Survey Location: The Gate Inn Public House, Ashby Road, Osbaston nr Nuneaton, Warwicks CV13 0HS

1.4 Survey Date:
i) 17 May 2011 – environmental noise tests.
ii) 15 June 2011 – environmental noise tests at Gnarley Cottage.

1.5 Weather Conditions: No wind, warm and dry.

1.6 Instrumentation: CEL 593 C1R Precision Sound Analyser Type 1
CEL 284/2 Acoustic Calibrator Type 1
(Calibration Status: Current Cert from March 2011)

1.7 Report Date: 18 June 2011 (updated from 18 May 2011)

1.8 Consultant: R B Parker, MIOA, MCIEH, DMS.

2.0 LOCATION AND OPERATIONAL DETAILS

2.1 The Gate Inn is a detached 2 storey public house with large rear and side car park. It is located on the west side of HinckleyRoad/Ashby Road (A447), between the Villages of Osbaston and Nailstone. The area is predominantly rural with the closest noise sensitive property situated directly to the north of the venue building. This property is residential (Gnarley Cottage), being 2 metres from the north gable of the venue building.

2.2 There are a number of items of external plant associated with the public house operations, have been updated as part of a planning approval. The units updated are the external Fresh Air Intake and Kitchen Extract systems, to be located on the existing single central roof of the main building, directly over the Kitchen area and the condensing unit to serve the new refrigeration cold rooms. These units are to be located behind a garden wall on the north west boundary of the Gate Inn.

3.0 ENVIRONMENTAL NOISE MEASUREMENT CONSIDERATIONS.

3.1 Hinckley and Bosworth Borough Council have approved the initial survey and assessment of the operation of the plant involved under the guidance in BS4142:1997. The information in this report confirms the acceptability of the acoustic works associated with the installation of new systems.

3.2 In this case environmental measurements were made in accordance with BS7445:1991 Parts 1-3. The microphone was positioned 1.2 metres above ground level adjacent to the plant area, within the rear access area and adjacent to the boundary fence.

3.3 Measurements made have been assessed and rated under procedures in British Standard 4142:1997 - Method for rating industrial noise affecting mixed residential and industrial areas. This standard is extensively used to assess the impact of noise from commercial/industrial activity upon residential properties.

3.4 Measurement periods of 5 minutes were used during the survey to ensure as these periods are considered an adequate range of measurements to be taken. Calibration of instrumentation must carried out at the beginning and end of each monitoring period, in accordance with good practice.

3.5 Environmental noise measurements have been taken of:
a) Noise from new kitchen extract systems
b) Noise from new refrigeration installation..

3.6 The noise level descriptors to be used for the survey:
i) L_{AeqT}dB - Time weighted equivalent continuous A-weighted sound pressure level in decibels. This index is used to describe events over the period of the event.
ii) Real time analysis.

4.0 MONITORING RESULTS

4.1 Environmental Noise Monitoring – Readings Taken Within Curtilage of the Gate Inn.

Monitoring Positions	Period(hrs) of readings	SPL dB ref 2 x 10^{-5} Pascals				
		L_{Aeq}	L_{A90}	L_{AMAX}	L_{AMIN}	L_{A10}
Tuesday 17 May 2011						
Pos 1 – 1 m from Refrig Units	2000-2100	46	--	50	--	--
	2100-2200	46	--	51	--	--
Pos 2 – 1 m from Kitchen Ext	2100-2200	49	--	66	--	--
nearest to Gnarley Cottage	2200-2230	48	--	58	--	

4.2 Typical Noise Level Octave Band Frequencies

Monitoring Position	Octave Frequencies in Hertz ref 2 x 10-5 Pascalls							
	'A'	63	125	250	500	1K	2K	4K
Position 1	47	57	63	49	42	38	36	31
Position 2	48	61	57	50	45	37	36	34

4.3 Environmental Noise Monitoring – Readings Taken Within Curtilage of Gnarley Cottage - Wednesday 15 June 2011

Monitoring Positions	Period(hrs) of readings	SPL dB ref 2 x 10^{-5} Pascals				
		L_{Aeq}	L_{A90}	L_{AMAX}	L_{AMIN}	L_{A10}
Position 1 - 3m from Conservatory in central garden area						
Kitchen Extract	2000-2100	Inaudible				
Condensing Units		Inaudible				
Freezer Box		Audible low frequency tone				
Background Noise Levels –	2100-2200	46	34	73	32	49
Beer Chiller off		47	35	71	33	50

4.4 Typical Noise Level Third Octave Band Frequencies – To Identify Drone Emitted by the Freezer Unit

Monitoring Position	Third Octave Frequencies in Hertz ref 2 x 10-5 Pascalls							
	'A'	63	80	100	125	160	200	250
Pos 1- centre of garden	45	44	37	**46**	39	27	29	29
Pos 2 – Boundary wall	54	49	53	**70**	55	47	50	45

4.5 Further Environmental Third Octave Band Frequencies – Readings Taken Within Curtilage of the Gate Inn - Wednesday 15 June 2011

Monitoring Position	Third Octave Frequencies in Hertz ref 2 x 10-5 Pascalls							
	'A'	63	80	100	125	160	200	250
1 m from Heat Dump (1)	63	53	47	47	48	48	51	55
Inside Freezer Cabinet	69	50	59	**80**	64	55	65	64
Inside Chiller Cabinet	67	52	56	**67**	55	54	64	62

Notes: (1) Although noise from this unit and the Beer Cellar Condensing Unit are elevating overall background noise levels within the cartilage of Gnarley Cottage they are not subject of the current planning conditions. They are being dealt with as a separate item.

5.0 POST INSTALLATION CONFIRMATION OF NOISE ASSESSMENT – TAKEN IN BOTH THE GATE PREMISES AND WITHIN THE CURTLAGE OF GNARLEY COTTAGE.

5.1 Local Authority Environmental Noise Requirements

5.2 Hinckley and Bosworth Borough Council require that all new equipment of this type shall operate at 10dBA below background at the nearest noise sensitive property, in accordance with BS4142:1997. The calculations below show that the criteria is being met in terms of the 'A'-weighted scale, but a residual tonal noise from the operation of the Freezer/Chiller systems remains.

5.3 Assessment of External Plant

5.4 The British Standard 4142:1997 - 'rating of industrial noise affecting mixed residential and industrial areas' - offers guidance and calculation procedures for the assessment of noise that is likely to give rise to complaint. Although the title indicates that any such assessment is restricted to industrial noise, in the absence of any other suitable environmental noise standard, is used extensively by acoustic professionals, local authorities and academics for the assessment purpose.

5.5 The measurement technique is a system which utilises the measures equivalent continuous A-weighted sound pressure level over a given reference time period, being 1 hour during the day and 5 minutes during the night, of the specific noise to which are applied certain corrections which take into account any tone, impulsive or irregular character of the noise.

5.6 In Section 8 reference is made to the corrected noise level, called the 'rating level'. The background noise level ("BNL" BS4142:1997 Section 7.0), which is measured at the same position without the intrusive noise, to be compared with the rating level.

5.7 In Section 9 reference is made to the assessment method. This section describes a methodology by which the simple arithmetic difference between the rating level and the BNL can be evaluated. It is stated that a difference of +5dB (ie Rating Level - BNL) is of marginal significance. A difference of +10dB or more (ie Rating Level - BNL) indicates that complaints are likely.

5.8 In addition to the above detailed real time analysis of noise emissions were carried out to establish the profile/source of the tonal noise remaining from the operation of the plant serving the Public House.

5.9 Kitchen Extract System and Refrigeration Systems

5.10 The above systems are now installed and provided with the acoustic works as specified in the report dated 30 April 2011. The updated assessment is set out below

5.11 Proposed Assessment for Kitchen Extract/Fresh Air Intake Systems and Refrigeration Condensing Unit - During Period 1000 hours to 2300 hours at rear elevation windows of Gnarley Cottage – after the implementation of the Noise Control Scheme.

Assessment Criteria – Kitchen Extract Fan	Levels
1. Measured sound pressure level 1 m from Kitchen Extract fan system	48dB
2. Distance Correction to residential windows 15 metres	-24dB
3. Angle of Incidence	-4dB
4. Acoustic Feature Correction	0dB
5. Resultant	20dB
6. 2 No Refrigeration Condensing Units (1)	48dB
7. Distance Correction to residential windows 25 metres	-28dB
8. Barrier Effect of Boundary Wall	-10dB
9. Acoustic Feature Correction	0dB
10. Resultant	10dB
11. Overall Resultant ie 7+14 $L_{Aeq(5mins)}$ Rating Level	20dB
12. Lowest Background Noise Level (1000 - 2300 hrs)	38dB
13. Assessment Level (Line 5-10)	-18dB

5.12 The assessment undertaken for this plant after installation confirms that there is no exceedance existing background levels at Gnarl Cottage and compliance with the Council's noise criteria. Measurements undertaken within the cartilage of Gnarley Cottage on 15 June 2011 confirm this assessment is being achieved.

5.13 Proposed Assessment for Refrigeration Condensing Unit - During Period 2300 hours to 1000 hours at rear elevation windows of Gnarley Cottage – after the implementation of the Noise Control Scheme.

Assessment Criteria	Levels
1. 2 No Refrigeration Condensing Unit	48dB
2. Distance Correction to residential windows 25 metres	-28dB
3. Barrier Effect of Boundary Wall	-10dB
4. Acoustic Feature Correction	0dB
5. Resultant	10dB
6. Lowest Background Noise Level (2300 - 1000 hrs)	34dB
7. Assessment Level (Line 5-6)	-24dB

5.14 The assessment undertaken for this plant after installation confirms there is no exceedance existing background levels at Gnarl Cottage from the operation of the refrigeration system and compliance with the Council's noise criteria. Measurements undertaken within the cartilage of Gnarley Cottage on 15 June 2011 confirm this assessment is being achieved.

5.15 Measurements Taken Within the Curtilage of Gnarley Cottage.

5.16 Detailed third octave centre band frequency test were carried out within the cartilage of Gnarley cottage to establish the source of the tonal emissions. These measurements confirmed the presence of an elevated tone at 100Hz and this was tracked to the Freezer/Chiller Units.

5.17 This was further confirmed by readings being carried out within the Freezer and Chiller units. The primary cause of the emission problem rest with the operation of the internal fans and the pipework serving the Frezer and Chiller from the remote condensing units.

5.18 Observations and measurements confirm the likely cause is inadequate transmission loss (sound reduction) of the Freezer/Chiller Boxes themselves. This is added to by resonance in the connecting pipework. Upgrading the transmission loss (sound reduction) of the Freezer/Chiller Boxes and enclosing the pipes more effectively should resolve this problem to a degree that the tonality will be acceptable.

6.0 CONCLUSIONS

6.1 It is concluded that the operation of the externally mounted Kitchen Extract system, in conjunction with updated acoustic treatment, is such that the systems are not causing adverse impact to occupiers of Gnarley Cottage. The assessments above confirm the installations meet with the Hinckley and Bosworth Borough Council environmental noise criteria in terms of the overall levels.

6.2 Further assessments undertaken within the curtilage of Gnarley Cottage indicate that although the overall 'A' weighted requirement in the planning conditions is being met there is a residual tonal issue remaining. It is concluded that further acoustic works will control these emissions to within acceptable levels.

7.0 RECOMMENDATIONS

7.1 The following acoustic works are recommended:

i) Freezer/Chiller Cabinets

The present cabinet construction has inadequate acoustic performance to contain the tonality from the fans within the cabinets. Upgrading of the external envelope is required to improve this situation.

a) Provide an external timber frame independent of the existing construction. This framework is to cover the rear wall, return halfway along the side walls and entire roof of the units. Nothing is required to the front of the units.

b) Insert 50mm of acoustic absorption material (ST30 or equivalent) between the frame and the unit, but not touching the units.

c) Overclad the construction with 2 layers of 19mm Gyproc Plank at staggered joints. The construction should cover tightly to ground level.

d) All joints to be seals

ii) Refrigeration Pipework

Upgrade the existing insulation covering to the refrigeration pipe wok with Muftilag acoustic insulation or equivalent for the entire length of the pipework from the Condensing unit exit to the access point into the Freezer/Chiller boxes. The pipes access point should be organized such that the pipes themselves do not touch the Freezer/Chiller units. The pipes should be acoustically sealed as they enter the boxes.

APPENDIX 1 - GLOSSARY OF ACOUSTIC TERMS

1. **A-weighted decibels - dB(A)** - Approximately equivalent to the human ear frequency response. A simulated measure of the loudness level of the noise as heard by the listener. Specific corrections are made to simulate this response.
2. **Ambient noise** - Totally encompassing sound in a given situation at a given time.
3. **Attenuation** - the amount by which a noise is reduced.
4. **Corrected Noise Level or Rating level L_{ArT}** - the specific noise level plus any adjustment for the character of the noise.
5. **Decibels** - a unit of sound level using a logarithmic scale. It is the ratio of the measured sound pressure and the reference level ie $10 \log_{10}(P^2_1/P^2_{ref})$ where 1 = rms pressure and ref = 2×10^{-5} N/m^2.
6. **Frequency in Hertz** - sound is propagated in wave form. Sound frequency is expressed in cycles per second or Hertz. Most noises comprise many frequencies. One Hertz equals one cycle per second.
7. **L_{AeqT} - Equivalent Continuous A-weighted sound pressure level** - the value of the A-weighted sound pressure level in decibels of the continuous steady sound that within a specified time interval has the same mean square sound pressure as a sound that varies with time.
8. **L_{A90T} - Background Noise Level (BNL)** - the A-weighted level of the residual noise in decibels exceeded for 90% of a given time interval. The level of noise underlying all fluctuating noise s reaching a given location. This tends to be dominated by the more distant, non-local sources and events.
9. **$L_{A10(1hour)}$ dBA - Road Traffic Noise** - the value of $L_{A10(1hour)}$ dBA is the noise exceeded for 10% of a period of one hour.
10. **Noise** - A complex sound often defined as unwanted sound.
11. **Precision Grade Instrumentation** - There are 2 basic grades of instrumentation guaranteeing different grades of accuracy of which precision grade instrumentation is the most accurate.
12. **Sound Pressure Level** - the sound pressure level in decibels is given by:

    $20 \log_{10} (P_1/P_2)$.