Environmental Noise Assessment Report

In Support of a Planning Application to Retain External Plant Serving the Royal Oak Public House, Langstone High Street, Havant, Hampshire.

April 2011

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NOISE SURVEY REPORT/GKPC/April 2011.
ROYAL OAK PUBLIC HOUSE, LANGSTONE HIGH STREET, HAVANT, HANTS
GREENE KING PUB COMPANY LTD
NOISE CONTROL REPORT TO SUPPORT A RETROSPECTIVE PLANNING APPLICATION TO RETAIN THE EXTERNAL KITCHEN EXTRACT SYSTEM AND ANCILLIARY PLANT.

1.0 INTRODUCTION

1.1	Instruction:		To provide a noise assessment and evaluation with regard to external air conditioning and kitchen extract plant to serve the Royal Oak Public House, Langstone.
1.2	Client:		Greene King Pub Company Ltd.
1.3	Survey Location:		The Royal Oak Public House, 19 Langstone High Street, Havant PO9 1RY.
1.4	Survey Dates	i)	22 September 2010 - daytime environmental background and specific noise monitoring.
		ii)	22 September 2010 – evening and early morning background noise monitoring.
1.5	Survey Times:	i)	22 September 2010 - 1100 hrs to - 1500 hrs
		ii)	22 September 2010 – 2100 hrs to 0100 hrs
1.6	Weather Conditions:		22 September 2010 – clear skies, no wind and dry.
1.7	Instrumentation:		CEL 593 C1R Precision Sound Analyser Type 1 CEL 284/2 Acoustic Calibrator Type 1 (Calibration Status: Current Certification from Nov 2009)
1.8	Report Date:		15 April 2011.
1.9	Consultant:		R B Parker, MIOA, MCIEH

2.0 SUMMARY/CONCLUSIONS

2.1 Greene King Pub Company Ltd recently undertook external works to the Kitchen Extract System, other mechanical extract and plant. In order to support retention of this equipment an evaluation has been undertaken at the site and assessments for compliance of noise from existing external plant has been included in this report.

2.2 In summary, noise measurements taken at the back of the building confirm existing background noise levels in later part of the evening are in the region of LA90 35dB. Due to this fact and the proximity of the nearest residential property there is a requirement for the Company to ensure their air conditioning and kitchen extract plant have acoustic controls in place.

2.3 In conclusion, the assessments indicate that retaining the Kitchen Extract system and ancillary plant with noise controls in place will ensure compliance with noise related planning conditions in terms of environmental noise.

2.4 The plant, with its attenuation in place will achieve the local authority noise criteria which is believed to be -5dBA below existing background levels at the nearest noise sensitive facade. It is concluded that the nearest noise sensitive property is No 17 Langstone High Street which lies immediately to the west of the application site, about 5 metres from the Kitchen Extract plant.

3.0 LOCATION DETAILS

3.1 The public house is a listed 2 storey part single storey 15th Century Inn situated on the north quayside of Langstone Harbour, within the Borough of Havant. It is located in a picturesque setting overlooking the Harbour, Hayling Island road bridge and the northern shores of Hayling Island.

3.2 The main 2 storey element of the building is brick built under a tiled roof with a rear flat roof single storey extension, which partly houses the Kitchen Extract and fresh air supply equipment. There is a rear single storey pitched roof building attached to the north elevation of the flat roof extension, housing the main stores and refrigeration cabinets. There are several beer chillers and refrigeration condensers attached to this part of the premises.

3.3 The premises fronts on to Langstone Quay, which is a walkway to leisure walks and other residential properties. The nearest residential property is located immediately to the west and is No 17 Langstone High Street. The licensed premises currently has the permitted licensed hours 1000 hours to Midnight Monday to Saturday and Sundays 1100 hours to 2230 hours.

4.0 ENVIRONMENTAL NOISE MEASUREMENT CONSIDERATIONS.

4.1 In order to provide a background noise level from which to base assessments can be made, background noise readings were carried out at the rear of the Public House, partly at the rea boundary and partly in the north east area of the garden of the public house. These positions were selected to ensure extraneous noise from the various items of plant did not influence the measurements. These readings are in the table below and are used in the upcoming assessment tables.

4.2 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 at the proposed monitoring positions as in para 4.1 above.

4.3 Measurements made have been assessed and rated under the guidance in the 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.

4.4 Measurement periods of 5 to 15 minutes are used during the survey to ensure these periods are considered an adequate range of measurements to be taken. Calibration of instrumentation was carried out at the beginning and end of each monitoring period, in accordance with good practice.

5.0 ENVIRONMENTAL NOISE MONITORING RESULTS

5.1 Table 1 - Specific Noise Monitoring of Equipment – 22 September 2010

Monitoring Position – 1m from each unit	**Octave Frequencies in Hertz ref 2 x 10^{-5} Pascalls**							
	'A'	**63**	**125**	**250**	**500**	**1K**	**2K**	**4K**
Flat Roof Mounted Equipment								
Kitchen Extract (1)	74	73	76	76	70	67	68	64
Kitchen Fresh Air In (2)	Inaudible above Kitchen Extract							
Kitchen AC unit (3)	Inaudible above Kitchen Extract							
Mounted Vertically on Storage Building Walls								
Beer Master (4)	73	65	72	73	72	68	64	58
Hermetique (5)	68	63	68	68	66	63	59	59
Hermetique (6)	63	67	65	62	61	57	56	51

Notes

(1) Fully operational Kitchen Extract system.
(2) Fully operational Kitchen Fresh Air Intake system.
(3) Mitsubishi Electric Mr Slim PUHZ RP71UHAZ Air Conditioner.
(4) Beer master Chiller Unit, situated on the east side of the Storage Building.
(5) Hermetique Refrigeration Condensing Unit serving the food freezers located on NW side of storage building at high level.
(6) Hermetique Refrigeration Condensing Unit serving the food freezers located on NE side of storage building at low level.

5.2 Table 2 - Environmental Background Noise Monitoring – 22 September 2010

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 – Northern boundary of Public House.	1100-1200	48	46	59	44	50
	1200-1300	47	45	62	44	52
	2130-2200	43	40	52	39	44
	2200-2230	44	40	57	39	47
Position 2 – Northern eastern end of pub garden.	2130-2200	44	41	58	40	46
	2200-2300	41	39	54	37	43
	2300-0000	41	38	57	36	43
Estimated Lowest BNL	2300-0700	--	35	--	--	--

5.3 Table 3 - Environmental Background Octave Frequency Data – 22 September 2010

Monitoring Position – 1m from each unit	**Octave Frequencies in Hertz ref 2 x 10^{-5} Pascalls**							
	'A'	**63**	**125**	**250**	**500**	**1K**	**2K**	**4K**
BNL - 2200-2300 hours	46	54	56	44	42	43	37	28
BNL - 2300-0000 hours	42	52	46	38	36	39	33	23

5.4 Comments

5.5 This is a relatively low noise area with the only influence being traffic using the Hayling Island Bridge and the A3024 highway, which is about 150metres to the west of the public house. Background noise levels at the rear of the site were slightly lower due to the partial screening afforded by the buildings themselves, which are close together, but not all terraced.

5.6 Background remained steady for most of the daytime readings and throughout the early evening, dropping off during the latter part of the evening. Typically background L_{A90} levels range from 44dB to 46dB during the period 0700 hours to 2100 hours. Through the late evening time (ie 2100 hours to 0000 hours) the range for the L_{A90} was noted to be 38dB through to 42dB. The estimated lowest night time L_{A90} is likely to be in the order of 35dB.

6.0 NOISE ASSESSMENT.

6.1 External Plant Associated with the Existing Public House Operation

6.2 The following plant and equipment is located externally in the rear areas:

i) Kitchen Extract system – on the rear flat roof discharging at roof level, directly over the Kitchen Hood.
ii) Kitchen Fresh Air Intake on the rear flat roof intaking air at roof level, directly over the Kitchen.
iii) 1 No Mitsubishi Electric Mr Slim PUHZ RP71UHAZ Air Conditioner located on the rear flat roof over the Kitchen adjacent to the Kitchen Extract plant.
iv) 2 No External Hermetique Condensing Units – located on the north side of the Storage Building.
v) 1 No Beer Master Chiller Unit located on the east side of the Storage Building.

6.3 Observations confirmed that none of the above plant has acoustic controls in place. The nearest residential facade is about 5 metres from the Kitchen Extract discharge and noise emissions from the operation of the equipment is likely to be audible at present.

6.4 For the most part the Kitchen Extract, Kitchen Fresh Air Intake and the Mitsubishi Electric Mr Slim will operate during the restaurant serving times. This is up to 2100 hours each evening, although the equipment above would be switched off at about 2130 hours. The 2 No External Hermetique Condensing Units and the 1 No Beer Master Chiller Unit operate 24 hours per day upon temperature controlled demand.

6.5 Sound Data

6.6 The sound data for most of the external plant is set out in the results tables. Sound emission levels provided by Mitsubishi, the manufacturer of the 1 No AC Heat Pump units indicates for the PUHZ RP71UHAZ Air Conditioner sound pressure level at 1 metre are LAeq 58dB.

6.7 Calculations to assess noise emissions from the kit as operating at the venue are set out below. The calculations are made allowing for the acoustic controls and

enclosures needed to ensure compliance with planning conditions and ensure no adverse impact on local resients by way of noise.

6.8 Assessments

6.9 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.

6.10 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 (0700 hours to 2300 hours) and 5 minutes during the night (2300 hours to 0700 hours), of the specific noise to which are applied certain corrections which take into account any tone, impulsive or irregular character of the noise.

6.11 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 with the intrusive noise ceased, can be compared with the rating level.

6.12 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.

6.13 In summary, the following acoustic changes are proposed:

i) Provide attenuation to the Kitchen Extract and Fresh Air Intake.

ii) Relocate the roof mounted Mitsubishi Electric Mr Slim to the ground floor yard area.

The assessments below reflect these changes and the introduction of an odour filtration unit to the Kitchen Extract system.

6.14 Assessment Table 1 - Kitchen Extract and Fresh Air Intake Systems – Post Acoustic Treatment – during operating hours

Assessment Criteria	Levels
1. Measured sound pressure level 1 m from KE fan and Fresh Air Intake systems	73dB
2. Attenuation TL	-22dB
3. Screening	-8dB
4. Distance Correction to residential windows 5 metres	-14dB
5. Angle of Incidence	-4dB
6. Acoustic Feature Correction	0dB
7. Façade Reflection of incident building	+3dB
8. $L_{Aeq(5mins)}$ Rating Level	28dB
9. Lowest Background Noise Level (1100 - 2200 hrs)	39dB
10. Assessment Level (Line 8-9)	-11dB

6.15 The assessment indicates that there is unlikely to be any intrusion from kitchen fan noise during the operating period, providing the recommended acoustic measures are maintained. The table sets out the calculations showing compliance.

6.16 Assessment Table 2 - for other units (with acoustic treatment) – During Period 2200 hours to 0700 hours to nearest residential window.

Assessment Criteria (A-weighted)	Levels
1. Measured sound pressure level at 1 metre for 1 No Hermetique Cond Unit (NW)	68dB
2. Measured sound pressure level at 1 metre for 1 No Hermetique Cond Unit (NE)	63dB
3. Result for 2 Units	69dB
4. Transmission loss (sound reduction) for acoustic enclosure	-25dB
5. Measured sound pressure level at 1 metre for 1 No Beer Master Chiller Unit	73dB
6. Transmission loss (sound reduction) for acoustic enclosure	-25dB
7. 1 No Mitsubishi Electric Mr Slim	58dB
8. Enclosure attenuation	-25dB
9. Overall Resultant	50dB
10. Distance Correction - to nearest residential window 10 metres	-20dB
11. Façade Reflection of incident building	+3dB
12. Angle of Incidence/Barrier effect	-8dB
13. Acoustic Feature Correction for the AC units	0dB
14. $L_{Aeq(5mins)}$ Rating Level	25dB
15. Lowest Background Noise Level (2200 - 0700 hrs)	35dB
16. Assessment Level (Line 14-15)	-10dB

6.17 The above calculations are for A-weighted criteria only. No frequency data was provided by the Manufacturer. In consideration of the projected period of operation of the air conditioning units, their distance and position relative to potential noise sensitive properties, in practical terms, calculations indicate they are likely to be inaudible over existing background noise at the nearest residential properties.

6.18 British Standard 8233:1999.

6.19 The guidance in BS 8233:1999 in relation to acceptable noise levels within buildings has been considered also and does not raise any issues in relation to the operation of the units whne acoustical controls are applied.

6.20 In BS8233:1999 the criteria which needs to be considered is that noise levels within the dwellings should not exceed LAeqT 30dB, where T = 5 minutes (ref BS4142:1997). The internal criteria of LAeq 30dB is unlikely to be exceeded in any nearby resident property by the operations of the plant due to the noise control measures proposed.

6.21 Odour Control

6.22 Provision has been made in the revised system layout to accommodate a bag filter odour control system. This will be specific by the Mechanical and Ventilation Installers, but should be designed to required environmental standards.

6.23 Local Authority Environmental Noise Requirements

6.24 There has been no specific information provided by the council, however, in general terms all new equipment of this type should be -5dBA below BNL as measured at any nearby residential property. In this case, that criteria is met.

6.25 Planning Position

6.26 A recent retrospective planning application for the retention of the Kitchen Extract, Fresh Air Intake and ancillary plant serving the public house was refused on the grounds that the installation was not acceptable to the Conservation Officer and in respect of noise issues. The Council have states they require a full detailed technical scheme including full technical and noise data.

7.0 CONCLUSIONS

7.1 It is concluded that the technical detail provided in this report supports the retention of the plant and equipment. With the implementation of the recommended acoustical controls, the retention of the Kitchen Extract, Fresh Air Intake and ancilliary plant serving the public house noise from the plant should not cause nuisance to nearby residential occupiers.

7.2 The recommended level of attenuation should ensure that during the hours of operation set out above does not cause disturbance and is unlikely to have a adverse impact on nearby residential occupiers.

8.0 RECOMMENDATIONS

8.1 Kitchen Extract System

8.2 At the present time the Kitchen Extract System outlet is directed at the tiled roof of the public house. This is adding to the issue of noise emissions The following

noise control treatment is recommended to maintain sound levels in this area in accordance with the assessments above:

1. Remove the existing termination duct..
2. Ductwork from the kitchen extract should be isolated from the building structure, where is passes through building elements. This can be in conjunction with acoustic lagging.
3. Reposition the first section of ductwork and the fan to face north.
4. Connect round ductwork to the atmospheric side of the fan provide a 600mm long round to square transition piece.
5. Connect as per manufacturer requirements, a suitably sized and specified in-duct bag odour filter.
6. Connect a further 600mm straight length of duct to the exit of the bag filtration system.
7. To the transition piece attach a suitably dimensioned 1500 long galvanized mild steel rectangular attenuator having 100mm sideliners and 200 mm centre splitter elements. Airways should ideally be 100mm wide. The attenuator should provide the following minimum insertion loss:

Octave Frequency in Hertz (dB ref 2 x 10^{-5} Pascals)							
63	125	250	500	1K	2K	4K	8K
9	17	30	47	55	55	49	36

8. After the attenuator provide a 600mm long square transition piece with an angled termination piece to complete..
9. Enclose the entire arrangement externally provide a suitable support framework, timber or equivalent around the fan ‘housing’ and splitter attenuator to include the section of duct as it leaves the roof, the fan and transition pieces and for 1 metre after the attenuator. The framework can be fitted fairly close to the ductwork to save space and ensure reasonable aesthetics to the construction.
10. Clad framework with a solid construction such as 2 layers of 19mmGyproc Plank material, at staggered joints. Acoustically seal to roof surface. The internal side of this structure should have 50mm 45kg/m3 Rocksil absorbent material inserted.
11. If using the solid construction complete by over cladding with marine ply and weatherproofing.
12. All the above should be suitably supported.
13. The fan system should be fitted with a tamper proof speed controller on the system.

8.3 Fresh Air Intake System

. 12. Connect square ductwork to provide a 600mm long square to round transition piece.

13. To the transition piece attach a suitably dimensioned 1200 long galvanized mild steel rectangular attenuator having 100mm sideliners and 200 mm centre splitter elements. Airways should ideally be 100mm wide. The attenuator should provide the following minimum insertion loss:

Octave Frequency in Hertz (dB ref 2 x 10^{-5} Pascals)							
63	125	250	500	1K	2K	4K	8K
6	12	23	40	49	48	48	48

14. After the attenuator provide a 600mm long square transition piece with an angled termination piece to complete.
15. Enclose the entire arrangement externally provide a suitable support framework, timber or equivalent around the fan 'housing' and splitter attenuator to include the section of duct as it leaves the roof and for 1 metre after the attenuator. The framework can be fitted fairly close to the ductwork to save space and ensure reasonable aesthetics to the construction.
16. Clad framework with either Muftilag acoustic lagging material or a solid construction such as 2 layers of 19mmGyproc Plank material, at staggered joints. Acoustically seal to roof surface. The internal side of this structure should have 50mm 45kg/m3 Rocksil absorbent material inserted.
17. If using the solid construction complete by over cladding with marine ply and weatherproofing.
18. All the above should be suitably supported.
19. The fan system should be fitted with a tamper proof speed controller on the system.

8.4 Acoustic Timber Screening

8.5 In addition to the above primarily due to the relatively low background noise levels in this area it is recommended that screen is erected between the systems and the nearest residential property. This screen should be a 1 metre high close boarded tongue and groove 25mm thick timber screening is constructed to the western edge and partly returning by 2 metres on the northern edge of the flat roof.

8.6 This screen needs to be correctly supported by a framework to be specified by the Company's Structural Engineer.

8.7 Other External Air Conditioning and Condensing Plant

8.8 This plant is to be re-located to the ground floor yard area. The recommendations comprise of the following:
The Mitsubishi Electric Mr Slim Air Conditioner.
The location for this plant has been retained to the rear areas.
The Hermetique refrigeration unit (located in the NW rear area)
The Beer Master Chiller unit
should be enclosed in proprietary acoustic enclosures which provide suitable ventilation provision and with minimum insertion loss set out below.

Octave Frequency in Hertz (dB ref 2 x 10^{-5} Pascals)							
63	125	250	500	1K	2K	4K	8K
12	13	20	29	36	37	39	39

This requirement is specialised and a list of manufacturers of this equipment can be supplied as appropriate.

8.9 The above recommendations are for acoustic purposes only, to support to retention of the equipment as part of a planning application. All matters associated with Health & Safety, Structural Stability, Structural support and Conservation issues should be dealt with by others.

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