AIRTIGHT & NOISECHECK LIMITED

F8 Fareham Heights, Standard Way, Fareham, PO16 8XT

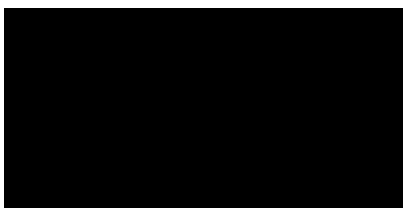
Phone: 034 5066 6966 email: info@airtightnoisecheck.co.uk

NOISE BREAKOUT ACOUSTIC TESTING REPORT FOR

SOUTH PARADE PIER LTD
10 CLARENDON ROAD
SOUTHSEA
HAMPSHIRE
PO5 2EE

SITE ADDRESS:

SOUTH PARADE PIER
SOUTH PARADE
SOUTHSEA
PORTSMOUTH
PO4 0SP



Acoustic Engineer: Date: 25-26th April 2017

Michael Vine

AIRTIGHT & NOISECHECK BUILDING ACOUSTIC TESTING

Contents

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

Customer Name: Date: 25-26th April 2017

South Parade Pier Ltd
10 Clarendon Road
Southsea
Hampshire
PO5 2EE

Site Address:

South Parade Pier
South Parade
Southsea
Hampshire
PO4 0SP

Acoustic Engineer:

Mr. Michael Vine

Equipment used:

Nor121 Environmental Analyser – Serial No 29809, Calibration due July 2017.

Analyser complies with the following standards:
IEC 60651 type 1
IEC 60804 type 1
IEC 61260 class 1
IEC 225
ANSI S1.4 – 1985 type 1
ANSI S1.43 – 1997 type 1
ANSI S1.11 – 1986 order 3 type 1D
Norsonic production standard set for the Nor121

Measurement Microphone (Gras 40AF) – Serial No 51465, Cal due January 2018

Acoustic Calibrator (Nor 1251) - Serial No 31652, Cal due September 2017

Measurement Procedure:

The external ambient noise levels were measured for a period of 24hours between Friday 19th & Saturday 20th May 2017 in one microphone location at the nearest noise sensitive window in relation to the pier and function room. This was performed to establish the current background noise levels associated with the immediate area. The background noise levels will be compared to the calculated noise levels associated with the pier's proposal to play live and amplified music.

The proposal is to play live music until 2300hrs and amplified music until 0200hrs.

AIRTIGHT & NOISECHECK ACOUSTIC TESTING

Executive Summary:

Airtight & Noisecheck Ltd were instructed by South Parade Pier Ltd to undertake a noise assessment at South Parade Pier, South Parade, Southsea, PO4 0SP to assess if the playing of live and amplified music in the function room of the pier will have an adverse impact on the residential dwellings located on St. Helens Parade, which is circa 75m North of the function room.

South Parade Pier was built in 1879 and has been a long standing part of Southsea's tradition until it closed in 2012 due to the unsafe condition of the building. Prior to its closure it was operating numerous functions throughout the year and had been doing so for a number of years previously. The pier has recently undergone a huge transformation, with extensive measures being implemented to the building fabric and has recently reopened, the proposal to reopen the function room on a regular basis and have live and amplified music played.

The purpose of this report it to establish if the operation of music from the function room will have an adverse impact on the nearest residential dwellings located circa 75m to the North of the function room on St. Helen's Parade, Southsea.

A 24hour assessment was undertaken at the façade of 3 St. Helens Parade to establish the current acoustic criteria at the façade and all calculated noise levels will be compared to these values.

Portsmouth City Council have requested a noise assessment to be prepared and assess *'the breakout of airborne noise from the premises due to the performance of regulated entertainment as applied for'* as part of the license application. In similar scenarios they have also requested that the L_{eq} values at 63Hz & 125Hz are not audible within the nearest noise sensitive rooms.

The assessment undertaken has measured the background noise (BGN) at the nearest residential façade, used generic data for the music noise levels as the function is not yet operational and assessed the sound reduction properties of the façade elements, which are the weakest part of the structure to determine a rating level at the façade. A number of methods have been applied to establish the level at the façade due to there not being one direct method for rating the music noise level (MNL).

All of the methods incorporated indicate that based on a MNL level within the building of 95dBA then the criteria of the local authority should be met. It may be prudent to undertake a further assessment once the venue is in operation to ensure that the criteria is met and to see if any further frequency control is required.

The building fabric will offer sound reduction for the MNL. The noise will be propagated (reduced) over distance between the source and receiver. The pier is a detached building located on Southsea sea front so there will be no issue with structure borne noise.

This report includes a number of calculations and predictions based on generic music data and all indicate that with implementation of certain measures and careful control of the MNL then the current acoustic criteria should not be affected.

It is my opinion that each façade should be treated as an individual element, this is due to the orientation of the building. The Eastern façade faces the dwellings located to the North East of the pier and the Western façade faces the dwellings to the North West. The building itself will screen a lot of the noise for a lot of the buildings as stated above.

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

1 **Introduction:**

1.1 South parade pier is a large detached pier located on the sea front in Southsea. There are a variety of areas apparent within the venue including:

1. Arcade machines
2. Function room
3. Restaurant

1.2 South Parade Pier was in operation for many years until it closed for safety reasons in 2012, it has since undergone huge improvement works and the arcade section reopened in 2016. The internal works are still commencing to the function rooms and restaurant area.

3 **Site Layout & Microphone Position:**

3.1 The large detached building is located to the South of South Parade, on the beach at Southsea. The immediate area is predominantly residential with existing and new dwellings, along with a hotel located immediately to the North of St Helens Parade.

3.2 There are numerous areas apparent within the building. There is an arcade area located at the North of the venue, with commercial kitchens immediately behind this area. The function room is located further South with a proposed restaurant located at the Southern end of the Pier. The arcade and kitchens act as a buffer for the function room so the likelihood of noise resonating through there is low. The function room is accessed via a large lobby area, so this also acts as a buffer for the noise as it will get dissipated in this area. All doors will remain closed during all functions.

3.2 The main function room is located circa 75m from the noise sensitive facades to the North. It is a large open plan area with an internal area of approximately 400m^2. The Eastern façade is completely made up of 75m2 of 10mm laminated glazing, and the Western façade is comprised of 75m^2 of 10mm laminated glass and 20m^2 of a façade construction (concrete blocks, timber battens and acoustic plasterboard) dwarf wall. These façades are believed to be the weakest elements of the building façade so they have been incorporated into the calculations.

3.3 It is not anticipated that the same level of noise will break out through the ceiling section of the building as this is made up of an independent acoustic ceiling, large void, then a composite metal profile flat roof system. A detailed facade and ceiling construction list is shown later in the report.

4 **Microphone Location (nearest noise sensitive facade):**

4.1 The microphone was positioned at 2nd floor level on St Helen's Parade, in direct line of sight of the function room facade. It was approximately 3.5m from ground level and 1.5m from the building façade.

4.2 The existing noise climate was monitored for a 24hour period over a weekend as this is the time when the venue will be in operation and at its busiest.

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

5 Design Criteria:

5.1 Music Noise Breakout:

5.1.1 Numerous guidance and criteria documents have been incorporated, along with the requested criteria of the local authority on similar projects. The following document was used to establish good practice for the client:

Institute of acoustics – Good Practice Guide on the Control of Noise from Pubs & Clubs, March 2003

5.1.2 This document includes many provisions for the client to undertake to ensure that the noise can be controlled and mitigated where necessary. This guidance suggests that for premises where entertainment takes place on a regular basis, music and associated sources should not be audible inside noise-sensitive property at any time. 'Inaudibility' remains a matter of considerable debate and disagreement within the acoustic community.

5.1.3 A code of practice (CP&C) has been issued by the Noise Council of the Institute of Acoustics (IOA) in 2003. This document is not a code of practice approved by the secretary of state, conferred by sections 71 and 104(1) of the Control of Pollution act 1974. It has also not been submitted for consideration as such. This guidance suggests the use of inaudibility as a criterion to be used during the night.

5.1.4 There are a number of possible objective definitions for 'inaudibility' but no single one has been established as a standard. However the subjective definition set out in the code is noise of:

'a sufficiently low level such that it is not recognizable as emanating from the source in question and it does not alter the perception of the ambient noise environment that would prevail in the absence of the source in question'.

The use of inaudibility remains an unresolved debate, which if applied, may results in an unnecessarily onerous target.

5.2 DEFRA produced a noise report 'Noise from Pubs & Clubs (phase II) in May 2006, section 5.59 of this document states that '*It is clear in many cases, subjects who were able to hear the entertainment noise nonetheless considered it to be acceptable*'. Based on this evidence inaudibility may not be a reasonable or necessary criterion.

5.3 Low frequency noise is also a potential issue and it is anticipated that the background noise levels at 63Hz & 125Hz should not be increased by the entertainment noise at the nearest noise sensitive façade. Some L_{max} levels have also been used as part of this assessment to take into account the linear low frequency noise for direct comparison with the background noise levels at the façade (after distance propagation and sound reduction offered by the building).

5.3.1 Due to the absence of reliable third octave sound insulation performance data for the building constructions, comparison of rating levels to background noise at octave band frequencies 63Hz & 125Hz is considered to be suitable.

6 Hours of Operation:

6.1 It is proposed that the venue will be open until 0200hrs, with live music played until 2300hrs and amplified between 2300-0200 therefore the calculations have been compared to the background noise levels at the appropriate times.

7 Background Noise Levels:

Time period	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz	LAeq	LAmax	LA90
0155 - 1hour	49.4	45.9	40.5	42.5	45.2	41.7	33.6	23.6	48	68	39
0155 - 15mins	50.2	47.3	40.2	42.6	45.5	41.9	33.8	23.2	49	62	40
2155-2255	63.8	60.5	52.9	52.1	54.2	50.1	40.6	31	57.4	75.8	45

The above table shows the background noise levels at the residential facade at various times of the evening

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

Time Period	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz	LAeq	LAmax	
Inside - Lmax	105	105	95	90	93	93	87			99	
Inside – Leq	95	92	90	90	90	90	86	79	95		

The above table shows the libraray data used for the internal reverberant noise levels, including the Leq and Lmax linear frequency values.

8 **Various Calculations:**

8.1 For all of the following calculations the following criteria has been used:

Frequency values (Hz)	125	250	500	1K	2K	4K	SRI Rw
Façade – concrete blocks, timber battens, insulation & acoustic plasterboard	28	34	45	53	55	52	46dB
Glazing – 10mm laminated glass	26	27	34	35	36	44	35dB

Ceiling/Roof Construction	*Anticipated Sound Reduction*
1- Acoustic plasterboard 2- MF suspended ceiling with acoustic mineral wool 3- Large void (1m) 4- Metal profile flat roof system 5- Associated insulation 6- Outer roof skin	> 55dBA

Western façade	Composite SRI
75m2 glazing (2.5x30)	35dB
20m2 façade construction	46dB

Eastern Facade façade	Composite SRI
75m2 glazing (2.5x30)	35dB

Distance to dwellings	Ground type
75metres	Hard ground

8.2 One way of measuring the single figure sound reduction apparent of a building façade is to use the criteria set out in BS EN ISO 12354-4: 2000 which uses the following formula:

$$L_{w\ façade} = L_{pinside} - R + 10_{logS} - 6.$$

Where R is the sound reduction index and S is the surface area of the façade or element in question.

8.2.1 Based on the $L_{p,in}$ being 95dB, SRI of glazing 35dB and the surface area being 75m^2 this calculation gives an L_w of 73dBA at the façade. The following sound propagation method is then used to determine the noise level at distance:

$L_p = L_w - 20\log r - 8$ = dB(A) at the residential façade
$L_p = 73 - 20\log 75 - 8 = 27$dB(A) at the residential façade

8.2.2 This is assuming hard ground and a distance of 75m, this single figure equation indicates no adverse impact at the residential façade.

8.2.3 Using the other methods for calculations within this document also gives similar results at the façade, including the simplified method in Annex E.

8.3 Listed below are further calculations indicating the same/similar values as shown above. The table also include some frequency details at distance.

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

Frequency (Hz)	63	125	250	500	1K	2K	4K	8K	LAeq
Linear Values	95	92	90	90	90	90	86	79	100
A Weighted	-26	-16	-9	-3	0	1	1	-1	
A weighted values	69	76	81	87	90	91	87	78	95
SRI Glazing reduction	-26	-26	-27	-34	-35	-36	-44	-44	
Calculated external value at source (linear levels)	69	66	63	56	55	54	42	35	68
Reduction for point source	-38	-38	-38	-38	-38	-38	-38	-38	
Calculated values at residential façade	31.5	28.5	25.5	18.5	17.5	16.5	4.5	-2.5	36

BGN Values										
Leq - 0155 - 1hour	49.4	45.9	40.5	42.5	45.2	41.7	33.6	23.6	48	39
Leq - 0155 - 15mins	50.2	47.3	40.2	42.6	45.5	41.9	33.8	23.2	49	40
Leq - 2155-2255	63.8	60.5	52.9	52.1	54.2	50.1	40.6	31	57.4	45
Criteria Met										

8.3.1 Please note that the corrections for the glazing have been applied to the linear frequency values and not the A weighted values. This has been done to give a direct comparison between the values rather than applying a correction to the values. The above table indicates that there is a rating level of 36dBA at the residential façade, which is below all of the background noise levels at various times throughout the night. The table to the right is the L_{A90} values for the background noise levels, the calculated level is also below all of these too.

8.3.2 Once the SRI for the acoustic curtains has been included to the above the L_{Aeq} of the entertainment noise should not exceed the LA90 BGN. Even with the curtains being omitted the L_{Aeq} level is below the LA90 value. This should satisfy the criteria listed in the Draft version of Control of Noise from Pubs and Clubs.

8.4 The same table listed above can be used for the L_{max} noise levels. These levels can also be compared to the L_{eq} values for a more onerous calculation (calculation table on next page).

8.4.1 This table has been included to show the calculated frequency values at distance once the noise has broken out of the building. The glazing will offer sound reduction and then the noise will be propagated over distance.

8.4.2 The sound propagation equation used for this calculation is shown below as the units are SPL

$$L2 = L1 - 20\log(r2/r1)$$

8.4.3 The same equation can be applied to the Western façade. It is the opinion of the author that the façade reductions shouldn't be combined (East and West), as the building will offer significant screening and reduction for the facades on the other side of the building. For example, the dwellings located to the North East of the pier will be screened from the Western façade of the pier by the large pier building.

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

Frequency (Hz)	**63**	**125**	**250**	**500**	**1K**	**2K**	**4K**	**8K**	**Lmax**	
Lmax values	105	105	95	90	93	93	87	87	109	
A Weighted	-26	-16	-9	-3	0	1	1	-1		
A weighted values	79	89	86	87	93	94	88	86	99	
Glazing reduction SRI	-26	-26	-27	-34	-35	-36	-44	-44		
Calculated external values at source (linear levels)	79	79	68	56	58	57	43	43	79	
Reduction for point source	-38	-38	-38	-38	-38	-38	-38	-38		
Calculated values at residential façade	41	41	30	18	20	19	5	5	43dB	
BGN values below										
Leq -0155 - 1hour	49	46	41	43	45	42	34	24	48	39
Leq - 0155 - 15mins	50	47	40	43	46	42	34	23	49	40
Leq - 2155-2255	64	61	53	52	54	50	41	31	57	45
Criteria Met										

This table includes the entire façade being comprised of a single element (glazing), there are no other façade elements apparent so a simple equation was used based on this single façade element only.

8.4.4 The L_{Amax} value at the facade indicates a rating level of 43dBA at the façade. This L_{Amax} value is below all of the L_{Aeq} values. Having an external L_{Amax} of 43dB would indicate an internal L_{Amax} value of 28dBA, which is acceptable for internal noise levels and should not cause sleep disturbance WHO guidelines states that an internal value of above 45dB L_{Amax} would cause sleep disturbance.

8.4.5 Further to the above, another criteria listed in Control of Noise from Pubs and Clubs is that the L_{10} of the entertainment noise should not exceed the representative background noise level L_{90} (without entertainment noise) in the 63Hz & 125Hz octave bands 2 metres from the façade of any noise sensitive façade. No measured data has been collated based on the proposed internal levels as the venue is not open, but a detailed inspection of the L_{max} and L_{10} values from another entertainment venue indicates that the L_{10} value is generally -5dB below the L_{max} value in the 63Hz octave band and -10dB below in the 125Hz octave band (although it would appear to be higher than this). The table below shows a calculation based on this principle and also takes into account the sound reduction offered by the acoustic curtains. It indicates that based on these predictions and calculations the above criteria should be met.

Frequency Hz	*63*	*125*
Lmax	105	105
dB corr (-5 for 63Hz & -10for 125Hz)	100	95
SRI of glazing	-26	-26
Calculated external value	74	69
Reduction for distance	-38	-38
	36	31
SRI of curtains	-3.6	-2.8
Overall level	32.4	28.2
L90 BGN (taken from BGN data) 0155hrs 15min	37.1	34.1
Difference	-4.7	-5.9

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

8.5 **Detailed Noise break out equation – Composite SRI:**

8.5.1 The following tables have been used to show the calculated values of the music noise at the façade, using all of the façade elements for each façade. This takes into account the surface area of each façade element, the distance to the receptor and free field conditions to establish a rating level. This formula has been taken from 'The little red book of acoustics' for noise break out calculations, pages 267-268.

	125Hz	250Hz	500Hz	1KHz	2KHz
Internal SPL	92	90	90	90	90
SRI of Glazing	26	27	34	35	36
	0.002511886	0.001995262	0.000398107	0.000316228	0.000251189
	0.002511886	0.001995262	0.000398107	0.000316228	0.00025119
	26	27	34	35	36
10log for 1st plane	-10	-10	-10	-10	-10
20log for 2nd plane	-18	-18	-18	-18	-18
Linear levels	32	29	22	27	26
	1585	794	158	501.1872336	398
Calculated value at facade					35dB

8.5.2 The above table assumes a façade construction area of 75m^2 of glazing (height 2.5m and length of 30m) and a distance of 75m to the receptor.

	125Hz	250Hz	50Hz	1KHz	2KHz
Internal SPL	92	90	90	90	90
SRI of Glazing	26	27	34	35	36
SRI of façade	28	34	35	53	55
	0.002511886	0.001995262	0.000398107	0.000316228	0.000251189
	0.001584893	0.000398107	0.000316228	5.01187E-06	3.16228E-06
	0.00231673	0.001659019	0.000380869	0.000250709	0.000198973
	26	28	34	36	37
10log for 1st plane	-10	-10	-10	-10	-10
20log for 2nd plane	-18	-18	-18	-18	-18
Linear levels	32	28	22	20	9
	1462	660	152	100	8
Calculated Value at facade					34dB

8.5.3 The above table assumes a façade area of 20m^2 (height of 0.67m and length of 30m), a glazing façade area of 75m^2 of glazing (height of 2.5m x length of 30m) and a distance of 75m to the receptor. The facades are curved, hence the measurements above.

8.5.4 The above tables have followed the principles in the noise break out tables for composite SRI method in "The little red book of Acoustics', 2nd edition. These detailed calculations show a similar value to the tables on the previous page, they also take into account the various sound propagation for a plane source.

8.5.5 The linear calculated values are below the measure L_{90} BGN values at the receptor location; these are similar levels to the other calculations performed at lower frequencies.

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

9 **Results Conclusion:**

9.1 A variety of detailed and simple calculations have been performed to try and establish the rating levels at the façade of the noise sensitive dwellings and thus calculate the impact the music venue will have on the current standard of living. Whilst all results vary slightly, they are well within a satisfactory level to indicate that the calculations are accurate and the rating levels should fall somewhere between 34-36dBA for the L_{Aeq} noise levels of each façade. These include single figure calculations and full frequency range calculations.

9.2 All data used for the music has been taken from other literature but an internal level of 95dBA is a fair assumption to be made as that is a level that can be enjoyed by the patrons using the venue and not too intrusive for them.

9.2.1 The building itself will offer high levels of screening for the dwellings as the function room will be located towards the middle of the venue with the arcade and kitchens in front of it. The client has undertaken and implemented extensive works to the venue, both in relation to the building fabric but also to the various elements apparent on site, these include:

- Upgrading all glazing to laminated glazing and installed new glazing
- Formed new lobby areas to the function room, which will increase sound insulation
- Installed a new ceiling to the function room
- New flooring to the function room

In addition to the above, the client will also implement a management plan/offer suitable management and control of:

- Smoking area, to be near side entrance of function room, 75m away from dwellings
- Calming measures for when patrons leave the venue
- On going frequency control of music – regular checks to ensure no noise creep
- Offer appropriate training to employees
- Consideration to location and number of speakers to ensure best possible criteria

9.3 Due to the entire Eastern façade (and 95% of the Western façade) comprising of glazing only, then calculations used within this report seem to be a fair example of calculating the sound reduction of the façade. The façade is only comprised of one material and not a combination of many. Also, it is unlikely that the noise will penetrate through the ceiling/roof void due to the comprehensive make up of this element, this element will offer a far greater level of sound reduction than the facades will. The glazing will be the weakest aspect of the building so a calculation based on the glazing alone will be the worst-case scenario.

9.3.1 Due to there being no direct standard to assess the noise to, all of the above calculations have been included. The results are very similar in each method, both for single figure and frequency analysis. The results indicate that if the internal noise levels are maintained to similar to those listed within this report then the music break out noise should achieve the criteria set by the local authority. It may be prudent to perform a post installation assessment to ensure that the music break out is within the acceptable limits as library data has been used for this assessment.

9.3.2 The detailed calculations may be the more accurate calculations, but as the entire Eastern facade is made up of one element only, the simple calculations are also accurate. They offer very similar results indicating they are offen an accurate reflection of the assumed sound reduction offered by the glazing apparent on the façade. Please note that they do not include the sound reduction values for the acoustic curtains, so the level should reduce further once these are implemented to the building façade.

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

10 **Recommendations:**

10.1 Although this assessment would indicate that the music associated with the proposed venue with its new mitigation measures should not have an adverse impact on the residential dwellings located nearby, further recommendations are stated below:

- ***Install kilo wool serge acoustic curtains to all glazing and doors in the function room and lobby areas, these must remain closed whilst any function is in operation. They are very dense and offer a mass in excess of 800g/m^2. These can be opened as required during the day and when there is not a function in operation***

- ***Post sound system install and regular frequency checks for the music level, as over time these levels may increase. This will also ensure the criteria requested by the LA can be met.***

- ***Careful management of internal MNL, ensuring the levels do not increase. The values listed within this report could be implemented; if these levels are increased then it could have a negative impact on the neighbourhood.***

- ***Careful management of the venue as a whole, there are many aspects of noise related to this venue so the management must implemented careful measures to ensure a satisfactory and efficient venue that can be enjoyed by all patrons.***

10.2 It must be noted that the pier was in operation for many years before its closure in 2012. The client has gone to great lengths to improve the building fabric to ensure a suitable venue can be in operation, they have vastly improved the building as a whole and therefore improved the integrity of the façade and other elements. All of these measures will help to reduce the impact on the neighbouring dwellings located 75m to the North.

10.3 The installation of acoustic curtains will be effective mitigation methods to further reduce the impact of the music on the residential dwellings. They will also help to absorb the internal noise, which will further add to the sound insulation of the building. By installing these curtains, the calculated values within this report should be reduced to take into account the further sound reduction offered by the Acoustic Curtains.

11 **Noise Rating Curves:**

11.1 Noise rating curves are an internal guidance to measure and specify noise in buildings and occupied spaces. The single figure rating also takes into account the frequency content of the noise.

11.2 The table below shows the calculated NR curve for both the L_{Aeq} & L_{Amax} **external** values at the façade. These have just been included to show the calculated value in relation to the existing criteria at 0200hrs.

Noise	*63Hz*	*125Hz*	*250Hz*	*500Hz*	*1KHz*	*2KHz*	*4KHz*	*8KHz*	*NR*
BGN	50	47	40	43	46	42	34	24	NR46
Leq	32	29	26	19	18	17	5	-3	NR20
Lmax	41	41	30	18	20	19	5	5	NR22

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

11 **Google Earth Image:**

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

APPENDIX

Continuous equivalent noise level, LAeq — The steady noise level (usually in dBA) which, over the period of time under consideration, contains the same amount of sound energy as the time varying noise.

LAmax - The maximum value that the A-weighted sound pressure level reaches during a measurement period.

dB (A) — The A-weighted sound pressure level.

Decibel (dB) — A unit used for many acoustic qualities to indicate the level of sound with respect to a reference level.

A-weighting — A frequency weighting that relates to the response of the human ear.

Background noise level — Prevailing noise level in a specified environment measured in the absence of the noise being studied.

Habitable Room – A room used for sleeping or recreation/relaxation

LA90 - The A-weighted noise level exceeded for 90% of the measurement duration.

L_w – The sound power level of a substitute point sound source

L_p – Sound pressure level at a specified receptor point outside the building – usually A weighted

$L_{p,in}$ – The sound pressure level inside the building

C_d – The level difference between the sound pressure level at 1m to 2m from the inside face of the relevant building element and the intensity level of the incident sound perpendicular to the element.

British Standards & associated documents:

BS EN ISO 12354-2: 2000 – Building Acoustics – Estimation o acoustic performance of buildins from the performance of elements. PART 4 – Transmission of indoor sound to the outside

WHO Guidelines for community noise, 2000

IOA – Good practice guide on the control of noise from pubs & clubs, 2003

DEFRA – Noise from pubs & clubs (Phase II), 2006

AIRTIGHT & NOISECHECK LIMITED ACOUSTICS TESTING

BS8233: Table 5 – Indoor Ambient noise levels in spaces when they are unoccupied.

Activity	Location	0700-2300	2300-0700
Resting	Living Rooms	35dB LAeq,16hour	-
Dining	Dining Room/Area	40dB LAeq,16hour	-
Sleeping (daytime resting)	Bedroom	35dB LAeq,16hour	30dB LAeq,8hour

Acoustic Curtain SRI

Frequency	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz
SRI	3.6	2.8	3.7	6.2	7.4	8.2	8.1	8.7

Calibration:

The measurement microphone was calibrated both before and after the testing procedure and no drift was recorded.

References:

Acoustics & Noise Control, 2nd Edition, B J Smith etal

The little red book of acoustics, 2nd edition – R. Watson etal pages 79-80 & 265-268,

www.acoustic-curtains.co.uk

Data used to show comparison between Lmax and L10 figures Taken from another entertainment venue

L_{MAX} 63HZ	L10 63HZ	DIFF		L_{MAX} 125HZ	L10 125HZ	DIFF
105.3	92.3	-13		105.3	80.1	-25.2
101.5	95.6	-5.9		101.5	80.2	-21.3
101.6	95.3	-6.3		101.6	80.9	-20.7
102.1	94	-8.1		102.1	80.7	-21.4
101.3	96.4	-4.9		101.3	81.6	-19.7
97.2	91.9	-5.3		97.2	77.7	-19.5
99.6	94.8	-4.8		99.6	78.7	-20.9
95.5	90.5	-5		95.5	78.1	-17.4
94	86.7	-7.3		94	78	-16
103.8	91.2	-12.6		103.8	76.6	-27.2
102.6	93.1	-9.5		102.6	83.5	-19.1
101.8	95	-6.8		101.8	81.8	-20
101.5	96.2	-5.3		101.5	75.9	-25.6

Distance attenuation - Plane source – used for detailed composite SRI calculations

Smallest dimension of sound source (height or width) = a (2.5)
Other dimension of sound source (height or width) = b (30)
Find $a/\pi = 0.79$
Find $b/\pi = 9.5$
Distance to receptor = r = 75m

No attenuation will occur from 1m to a/π

Line source attenuation will occur between a/π to b/π (=-10)
Point source attenuation will occuer from b/π to r (= -18)