8 May 2014
TG004-13F06 (r2) L1 UGAs Condition F3

Graham Brown
Echo Entertainment (The Star)
80 Pyrmont Street
Pyrmont NSW 2009

Dear Sir

The Star - Pirrama Rd Level 1 Unenclosed Gaming Areas - Condition F3 - Hours of Operation

Introduction

Renzo Tonin & Associates was engaged to provide acoustic services to support the application to amend the existing consent conditions relating to the hours of operation in the Unenclosed Gaming Areas (UGA) located on Level 1 along the Pirrama Road frontage at The Star, Pyrmont.

This letter relates specifically to the S75W application to be lodged to the Department of Planning and Environment relating to the existing conditions set out in the Major Project Approval MP08_0098. Condition F3 of the approval approved use of the UGAs operation from 7am to midnight under a 24 hour trial period for 12 months from the date of the Occupation Certificate. The condition enabled a modification request to be lodged to seek an extension of the period of occupation. This modification is now being sought.

The application seeks to amend Condition F3, 2 c) in order to enable the 24 hour use of the Level 1 UGAs on a permanent basis.

Condition F3 2 c)

The conditions for the approved hours of operation of the Pirrama Rd UGA at The Star are stipulated in Condition F3 of Major Project Approval MP08-0098 as follows:

> *F3 Hours of Operation Outdoor Casino Areas / Outdoor Terraces*
>
> *(2) The hours of operation of the Level 1 outdoor casino areas / unenclosed gaming areas fronting Pirrama Road are regulated as follows:*
>
> *a. The hours of operation must be restricted to between 7am and 12 midnight*

b. Notwithstanding 2(a) above, the use of these outdoor casino areas / unenclosed gaming areas may operate for 24 hours for a trial period of 12 months from the date of Occupation Certificate for these areas

c. A further application may be lodged to continue the trading hours outlined in (2)(b) above before the end of the trial period. The Department's consideration of a proposed continuation and/or extension of the hours permitted by the trial will include the performance of the operator in relation to the compliance with these conditions of approval, acoustic monitoring at nearby sensitive receptors, compliance with condition F5, any substantiated complaints received and any views expressed by the NSW Police.

(3) The trial period for extended hours of operation set out in this Condition should only proceed if the Director General is satisfied that implementation of the noise management plan will achieve compliance with the limits set for those extended hours.

Acoustic review

The Level 1 UGAs opened in November 2010, and in accordance with Condition F6 of MP08_0098 an acoustic review was carried out within the first 3 months of operation. The review included the undertaking of attended noise surveys on three separate occasions in order to assess compliance of the use against the criteria set out in Condition F5 at the nearest most potentially affected receivers, identified to be Sydney Wharf 9.

The surveys included noise measurements during both the pre and post-midnight periods and the results were presented in the following RT&A reports (included in Appendix A):

1. TF146-01F02 (rev 2) Survey 1 2010-12-03, MP08-0098 Condition F6
2. TF146-01F03 (rev 1) Survey 2 2011-02-05, MP08-0098 Condition F6
3. TF146-01F04 (rev 1) Survey 3 2011-02-17, MP08-0098 Condition F6

All surveys revealed compliance, with noise from patrons and gaming machines found to be inaudible at the Sydney Wharf 9 receiver location.

It is understood that the continued operation of the UGAs has not been subject of complaints or objections.

Conclusion

It is concluded that the Level 1 UGAs at The Star do not produce audible or nuisance noise at the closest residential receiver. On this basis there is no technical reason to prevent the continued 24 hour per day use of the UGAs on Level 1 Pirrama Road.

We trust this satisfies the requirements of the Department.

Regards,

Glenn Wheatley
GWheatley@renzotonin.com.au

APPENDIX A Condition F6 compliance reports

RENZO TONIN & ASSOCIATES
inspired to achieve

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STAR CITY - UNENCLOSED GAMING AREAS (UGAS)

CONDITION F6 ACOUSTIC REPORT 1

TF146-01F02 (REV 1) SURVEY 1 2010-12-03.DOC

13 JANUARY 2011

Prepared for:

APP Corporation Pty Ltd

Level 6, 53 Berry Street

North Sydney NSW 2060

Attention: Ms Katie Redpath

Association of Australian Acoustical Consultants

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DOCUMENT CONTROL

Date	Revision History	Non-Issued Revision	Issued Revision	Prepared By (initials)	Instructed By (initials)	Reviewed & Authorised by (initials)
09.12.2010	Initial Preparation	Rev 0	Rev 1	GW	-	GW
13.01.2011	Add Diagram		Rev 2	GW	-	GW

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1 Introduction

NSW Department of Planning Major Project 08-0098 related to the construction of unenclosed gaming areas (UGA's) for Star City Casino, Sydney. The project proposal included three UGAs, including two on the Pirrama Road frontage and one on Union Street.

Condition F6 'Acoustic Review' of the Determination requires demonstration of compliance with the Conditions under Part F of the Determination. The noise criteria are specified in conditions F4 and F5 and relate to both mechanical services equipment and noise from activities respectively.

Condition F6 states;

> *Within 3 months of operation of the approved development an acoustic review, demonstrating compliance with the above conditions is to be submitted to the Department. The review is to include specific monitoring and testing at relevant times.*

The two Pirrama Road UGAs opened on Friday 26th November 2010. Construction of the Union St UGA is yet to commence. The approved operating hours of the Pirrama Rd UGA's are 7am to 12 midnight with a one year trial period extending operations to 24 hours.

Specific methodology for the acoustic review is not set out within the Determination. Renzo Tonin & Associates have therefore based the acoustic review on the acoustic testing requirements required of the City of Sydney Council for licensed premises. The City of Sydney require three tests to be undertaken, at relevant times, during which the noise emission from the use is measured and assessed against the relevant criteria.

It is noted that short-term attended monitoring is required for compliance measurement purposes, as it is required to identify the source of any noise measured. This is particularly required when the ambient noise level may not be dominated by noise from the area under investigation.

This report presents the findings from the first of three measurement surveys. Measurements were undertaken on a Friday night continuing into the Saturday morning. Friday and Saturday nights are typically the busiest periods of trade for the casino. As a more stringent noise criterion applies during the 12 midnight to 7am period, weekend nights are considered to represent the worst case scenario for potential noise impact from the use.

2 Site Address

Star City, 80 Pyrmont Street, Pyrmont - Situated between Pyrmont Street to the west, Jones Bay Road to the north, Pirrama Road to the east and Edward Street to the south.

3	**Noise Sources**	The noise sources being assessed were; • Patron and Gaming machine noise emission from unenclosed gaming areas located on Level 1 of Star City, fronting Pirrama Road. • Potential noise breakout from internal areas of Star City via access doors to the unenclosed gaming areas.	
4	**Measurement Locations**	Location 1 -	Wharf 9, Sydney Wharf Southern facade of the residential building, 1.5m above the ground level. The residential building is located approximately 210m to the northeast of the Star City Pirrama Road facade.
		Location 2 -	Wharf 9, Sydney Wharf Southwestern corner of the residential building, 1.5m above the ground level.
		Location 3 -	14 Wharf Crescent 1.5m above the ground level to the south of the Wharf Crescent residential building. The residential building is located approximately 210m to the north-northeast of the Star City Pirrama Road facade.
		Location 4 -	Pirrama Road 1.5m above the street level, opposite and approximately 30m from the northern UGA. This location was used for reference purposes only and not considered as an assessment location.
		Location 5 -	Southern UGA - General Public Between the general public and members gaming area, 1.5m above the floor level.
		Location 6 -	Southern UGA - Members Area At the Pirrama Road frontage, 1.5m above the floor level.
		Location 7 -	Northern UGA - General Public Location 1.5m above the floor level, in proximity to Sports Bar access door and below void.

		Location 8 - Northern UGA - General Public At the Pirrama Road frontage, 1.5m above the floor level. Locations 1 to 4 are shown in Appendix B and Locations 5 to 8 are shown in Appendix C.
5	**Measurement Date**	Friday 3rd December 2010.
6	**Survey Period**	Start: 10:45pm Finish: 2:45am
7	**Weather Conditions**	Temperature during the survey was 21°C, intermittent wind gusts from the ENE and NE between 3 - 5m/s, and partial cloud cover (1/8). The weather conditions on the day would not have adversely affected the results and were conducive for measuring noise under typical conditions. It is noted that winds from the northeast would tend to reduce noise propagation towards the nearest residential receiver locations.
8	**Applicable Criteria**	**Condition F5** Noise caused by the approved use including music and other activities must comply with the following criteria: The use must not result in the transmission of "offensive noise" as defined in the Protection of the Environment Operations Act 1997 to any place of different occupancy. The L10 noise level emitted from the use must not exceed 5dB above the background (L90) noise level in an Octave Band Centre Frequency (31.5Hz – 8kHz inclusive) between the hours 7:00am and 12:00 midnight when assessed at the boundary of the nearest affected property. The background noise level must be measured in the absence of noise emitted from the use. The L10 noise level emitted from the use must not exceed the background (L90) noise level in an Octave Band Centre Frequency (31.5Hz – 8kHz inclusive) between the hours 12:00 midnight and 7:00am when assessed at the boundary of the nearest affected property. The background noise level must be measured in the absence of noise emitted from the use. Notwithstanding compliance with the above, the noise from the use must not be audible within any habitable room in any residential property between the hours of 12:00 midnight and 7:00am.

The L10 noise level emitted from the use must not exceed the background noise level (L90) in any Octave Band Centre Frequency (31.5Hz to 8kHz inclusive) by more than 3dB when assessed indoors at any affected commercial premises.

No mechanical plant serves the area and as such Condition F4 was not assessed.

9 Survey Methodology

External noise measurements were carried out generally in accordance with Australian Standard AS1055-1997. The following procedure was used:

Measurements of the L90 background noise level at each assessment location were undertaken in the absence of the noise source.

Where noise from the premise was identified the average maximum deflection on a sound level meter deflection on the sound level meter was recorded in order to establish the L10 noise level.

10 Instrumentation

The equipment used for the noise measurements was a Brüel & Kjær Type 2250 precision sound level analyser. Statistical noise levels were acquired in both overall and octave band frequencies. This instrument complies with AS IEC 61672.1 2004 "Electroacoustics - Sound Level Meters" and is designated as Type 1 instrument having an accuracy suitable for field and laboratory use.

11 Field Calibration Checks

The calibration of the meter was checked in the field immediately before and after the noise measurements using a Brüel & Kjær Type 4231 calibrator and no drift in calibration was observed.

12 Measurement Results

The results of the measurements made at each monitoring location are given below. It is noted that the L10 measurement results are ambient noise levels and do not relate to the noise level resulting from the subject premise.

Location Time	Desc	Overall dB(A)	Octave Band Centre Frequency (Hz) – dB(lin)								
			31.5	63	125	250	500	1k	2k	4k	8k
Location 1 23:04 - 23:19	L_{10}	60	63	66	70	64	59	53	47	39	29
	L_{90}	55	58	62	60	57	52	49	43	35	25
Location 1 23:21 - 23:36	L_{10}	55	66	67	63	57	53	50	46	39	29
	L_{90}	53	62	62	59	52	50	48	43	36	26
Location 6 00:11 - 00:14	L_{10}	68	71	66	62	65	65	65	60	50	48
	L_{90}	59	61	58	56	55	56	55	51	44	35
Location 5 00:15 - 00:17	L_{10}	66	62	64	65	66	64	62	59	55	47
	L_{90}	62	58	57	58	61	59	56	53	47	38
Location 7	L_{10}	76	67	65	71	71	74	71	68	61	52

00:21 - 00:23	L_{90}	70	63	60	64	67	67	65	62	54	44
Location 8	L_{10}	74	68	73	68	69	71	70	66	59	48
00:26 - 00:28	L_{90}	66	60	59	60	62	63	61	57	50	40
Location 1	L_{10}	54	62	64	65	53	51	49	45	38	28
00:43 - 00:58	L_{90}	51	58	59	58	49	47	46	41	34	26
Location 3	L_{10}	51	60	64	59	52	47	45	43	38	30
01:06 - 01:21	L_{90}	47	54	57	53	47	44	42	37	27	18
Location 4	L_{10}	63	60	62	60	57	57	60	55	47	39
01:27 - 01:32	L_{90}	52	55	56	54	50	49	47	42	35	27
Location 4	L_{10}	64	61	63	61	58	59	60	56	48	38
01:40 - 01:55	L_{90}	51	55	57	55	50	48	47	41	33	24
Location 2	L_{10}	49	57	58	54	49	46	44	40	34	27
01:57 - 02:12	L_{90}	44	52	52	49	45	41	38	34	26	17
Location 7	L_{10}	63	63	60	62	60	60	59	57	53	45
02:18 - 02:20	L_{90}	60	59	56	56	56	56	54	52	47	37
Location 8	L_{10}	66	58	58	58	60	65	62	57	50	45
02:21 - 02:24	L_{90}	59	54	54	54	55	57	53	48	42	33
Location 5	L_{10}	66	60	62	59	64	65	61	57	51	46
02:26 - 02:28	L_{90}	59	56	55	54	56	57	53	50	44	36

13 Discussion of Results

The ambient noise level at the residential receiver locations was dominated by distant urban hum, road traffic and intermittent noise from wharf activities. In the case of Location 1, noise from King Street Wharf was audible at the receiver location, along with mechanical plant serving the Wharf 9 residential development. Measurements at Location 2 were shielded from the mechanical plant noise, hence the lower background noise levels.

No noise from either UGA was detected at any of the residential monitoring locations and therefore operations complied with the noise conditions.

Reference noise level measurements and observations were made inside the UGAs on two occasions during the noise survey. Attendance between 00:00 and 00:30 identified approximately 120 patrons in the public southern UGA, 15 patrons in the southern UGA member's area, and 120 patrons in the northern UGA. Attendance between 02:15 and 02:30 identified approximately 100 patrons in the southern UGA public area, 10 patrons in the southern UGA member's area, and 60 patrons in the northern UGA. The lower patron number is reflected in the lower noise levels recorded between the two measurement periods.

With regard to measurements at Location 4, patron and gaming machine noise from the northern UGA was audible at the measurement location. It is noted that the L10 noise levels were determined by local road traffic rather than from the gaming areas. Only 1-2dB measureable differences in the

background were recorded as a result of the UGA. Whilst the location is not considered an assessment location it has been used to correlate the findings at the residential locations.

For the purpose of estimating contributions at the residential locations, the L10 contribution from UGA has been taken to equal the background L90 noise levels measured at Location 4. Based on distance attenuation only, a reduction in the order of 15dB is expected between the Pirrama Rd location and the residential receivers. On this basis, the noise contribution from the UGAs would be well below the measured background noise levels at the residential receiver locations, which correlates with the observed inaudibility.

14 Conclusion

Noise emission levels from the Level 1 Star City UGA's were assessed as complying with the Major Project 08-0098 Determination Condition F5. The noise testing was part of the proposed methodology for certifying operations in accordance with Condition F6 of the Determination. It is proposed to undertake two more noise surveys within the first three months of the operation. Ti is recommended that this report be forward to the Department of Planning for review prior to the undertaking of the second noise survey.

APPENDIX A - GLOSSARY OF ACOUSTIC TERMS

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse Weather — Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).

Ambient Noise — The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.

Assessment Period — The period in a day over which assessments are made.

Assessment Point — A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.

Background Noise — Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the $\mathbf{L_{90}}$ noise level (see below).

Decibel [dB] — The units that sound is measured in. The following are examples of the decibel readings of every day sounds:

0dB The faintest sound we can hear

30dB A quiet library or in a quiet location in the country

45dB Typical office space. Ambience in the city at night

60dB Martin Place at lunch time

70dB The sound of a car passing on the street

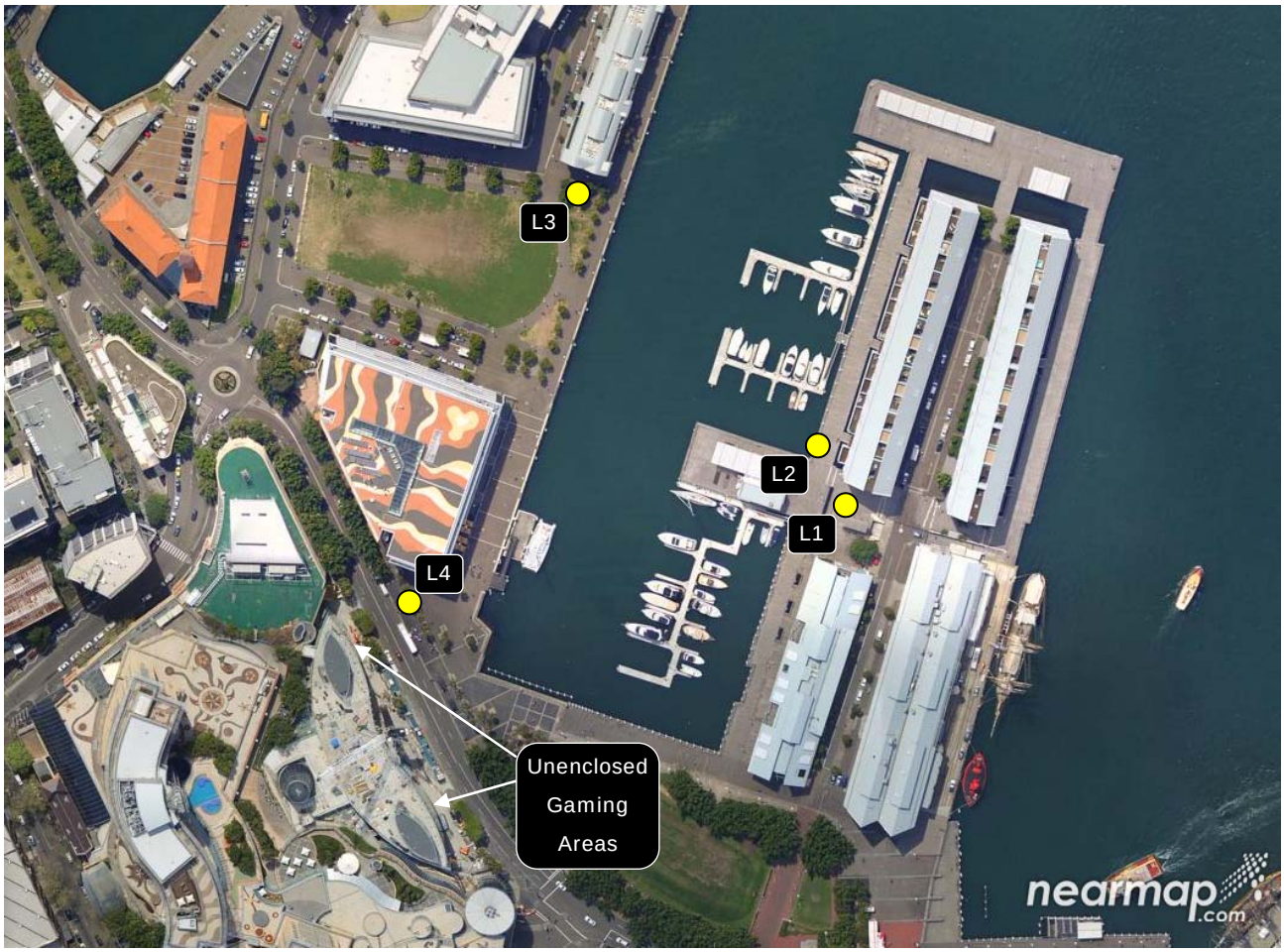
80dB Loud music played at home

90dB The sound of a truck passing on the street

	100dB The sound of a rock band
	115dB Limit of sound permitted in industry
	120dB Deafening
dB(A):	A-weighted decibels The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L_{max}	The maximum sound pressure level measured over a given period.
L_{min}	The minimum sound pressure level measured over a given period.
L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L_{90} noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and

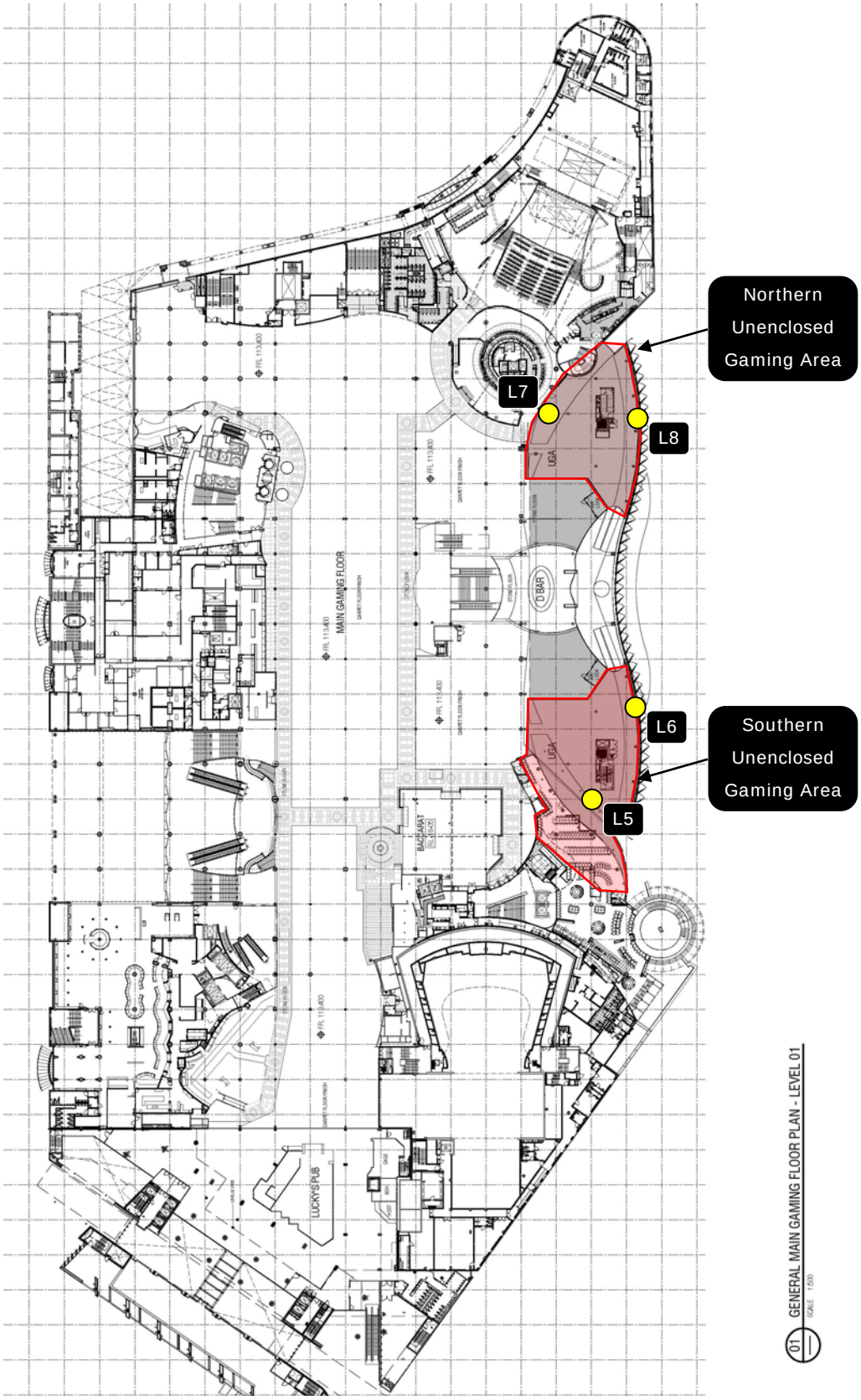
	integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound Absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound Level Meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound Pressure Level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound Power Level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B - SITE AND EXTERNAL MEASUREMENT LOCATIONS



- Measurement Location

APPENDIX C - UNENCLOSED GAMING AREAS AND MEASUREMENT LOCATIONS



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STAR CITY - UNENCLOSED GAMING AREAS (UGAS)

CONDITION F6 ACOUSTIC REPORT 2

TF146-01F03 (REV 1) SURVEY 2 2011-02-05.DOC

8 FEBRUARY 2011

Prepared for:

APP Corporation Pty Ltd

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07.02.2011	Initial Preparation	Rev 0	Rev 1	DS	GW	GW

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It is noted that short-term attended noise monitoring is required for compliance measurement purposes, as it is required to identify the source of any noise measured. This is particularly required when the ambient noise level may not be dominated by noise from the area under investigation.

This report presents the findings from the second of three measurement surveys. Measurements were undertaken on a Saturday night continuing into the Sunday morning. Friday and Saturday nights are typically the busiest periods of trade for the casino. As a more stringent noise criterion applies during the 12 midnight to 7am period, weekend nights are considered to represent the worst case scenario for potential noise impact from the use.

2 Site Address

Star City, 80 Pyrmont Street, Pyrmont – Situated between Pyrmont Street to the west, Jones Bay Road to the north, Pirrama Road to the east and Edward Street to the south.

3	**Noise Sources**	The noise sources being assessed were; • Patron and Gaming machine noise emission from unenclosed gaming areas located on Level 1 of Star City, fronting Pirrama Road. • Potential noise breakout from internal areas of Star City via access doors to the unenclosed gaming areas.	
4	**Measurement Locations**	Location 1 –	Utilised for Survey 1, no measurement undertaken during Survey 2
		Location 2 –	Wharf 9, Sydney Wharf South-western corner of the residential building, 1.5m above the ground level. The residential building is located approximately 210m to the north-east of the Star City Pirrama Road facade.
		Location 3 –	14 Wharf Crescent 1.5m above the ground level to the south of the Wharf Crescent residential building. The residential building is located approximately 210m to the north of the Star City Pirrama Road facade.
		Location 4 –	Pirrama Road 1.5m above the street level, opposite and approximately 30m from the northern UGA. This location was used for reference purposes only and not considered as an assessment location.
		Location 5 –	Southern UGA Location 1.5m above the floor level, near the high tables & chairs area and in proximity to the access door to the Casino floor and below void.
		Location 6 –	Southern UGA At the Pirrama Road frontage, 1.5m above the floor level.
		Location 7 –	Northern UGA Location 1.5m above the floor level, in proximity to Sports Bar access door and below void.

		Location 8a & Northern UGA Location 8b – At the Pirrama Road frontage, 1.5m above the floor level. Location 8a is slightly to the north and only expose to a small number of patrons and gaming machines. Location 8b is to the south towards the open area with a large number of patrons and gaming machines. Locations 1 to 4 are shown in Appendix B and Locations 5 to 8 are shown in Appendix C. Measurements were not undertaken at Location 1 (as set out in Survey 1 2010-12-03) as it was affected by mechanical plant serving the Wharf 9 residential development.
5	**Measurement Date**	Saturday 5th to Sunday 6th February 2011.
6	**Survey Period**	Start: 10:30pm Finish: 2:55am
7	**Weather Conditions**	Temperature at the beginning of the survey was 33°C with clear sky and rare wind gusts. The wind picked up throughout the survey with intermittent wind gusts from the SW between 2 – 3m/s and partial cloud cover (1/8). The weather conditions during the survey would not have adversely affected the results and were conducive for measuring noise under typical conditions. It is noted that winds from the south-west would tend to increase noise propagation towards the nearest residential receiver locations.
8	**Applicable Criteria**	**Condition F5** Noise caused by the approved use including music and other activities must comply with the following criteria: The use must not result in the transmission of "offensive noise" as defined in the Protection of the Environment Operations Act 1997 to any place of different occupancy. The L10 noise level emitted from the use must not exceed 5dB above the background (L90) noise level in an Octave Band Centre Frequency (31.5Hz – 8kHz inclusive) between the hours 7:00am and 12:00 midnight when assessed at the boundary of the nearest affected property. The background noise level must be measured in the absence of noise emitted from the use. The L10 noise level emitted from the use must not exceed the background (L90) noise level in an Octave Band Centre Frequency (31.5Hz – 8kHz inclusive) between the hours 12:00 midnight and

7:00am when assessed at the boundary of the nearest affected property. The background noise level must be measured in the absence of noise emitted from the use.

Notwithstanding compliance with the above, the noise from the use must not be audible within any habitable room in any residential property between the hours of 12:00 midnight and 7:00am.

The L10 noise level emitted from the use must not exceed the background noise level (L90) in any Octave Band Centre Frequency (31.5Hz to 8kHz inclusive) by more than 3dB when assessed indoors at any affected commercial premises.

No mechanical plant serves the area and as such Condition F4 was not assessed.

9	**Survey Methodology**	External noise measurements were carried out generally in accordance with Australian Standard AS1055-1997. The following procedure was used: Measurements of the L_{10} and L_{90} background noise levels were undertaken at each assessment location whilst the premise under investigation was in operation. Where noise from the premise was identified the average maximum deflection on a sound level meter was recorded in order to establish the L_{10} noise level contribution.
10	**Instrumentation**	Brüel & Kjær Type 2250 precision sound level meter was used to measure statistical noise levels. The meter complies with AS IEC 61672.1 2004 “Electroacoustics – Sound Level Meters” and is designated as a Type 1 instrument having accuracy suitable for field and laboratory use.
11	**Field Calibration Checks**	The calibration of the meter was checked in the field immediately before and after the noise measurements using a Brüel & Kjær Type 4231 calibrator and no drift in calibration was observed.
12	**Measurement Results**	The results of the measurements made at each monitoring location are given below. It is noted that the L_{10} measurement results were ambient noise levels and do not relate to the noise level resulting from the subject premise.

Location Time	Desc	Overall dB(A)	Octave Band Centre Frequency (Hz) – dB(lin)								
			31.5	63	125	250	500	1k	2k	4k	8k
Location 4 22:31 – 22:46	L_{10}	68	79	75	68	64	63	65	60	53	44
	L_{90}	58	65	66	61	56	55	53	49	43	34
Location 3 22:52 – 23:00	L_{10}	58	70	75	69	61	56	52	47	43	30
	L_{90}	52	61	66	62	53	48	45	40	33	20
Location 3 23:00 – 23:15	L_{10}	57	69	71	66	62	51	48	44	38	28
	L_{90}	51	64	65	61	52	46	44	39	31	20
Location 2 23:26 – 23:31	L_{10}	53	63	65	59	54	50	47	45	40	30
	L_{90}	50	59	60	55	51	47	43	40	36	29
Location 2 23:35 – 23:50	L_{10}	53	63	64	60	54	49	47	44	38	26
	L_{90}	49	58	58	54	51	46	43	39	31	20
Location 7 00:07 – 00:12	L_{10}	76	68	67	70	70	75	73	68	62	51
	L_{90}	71	63	60	64	66	69	66	62	55	45
Location 8 00:14 – 00:19	L_{10}	70	75	69	67	66	69	66	62	55	47
	L_{90}	65	70	64	60	60	63	60	56	48	39
Location 6 00:30 – 00:35	L_{10}	69	67	68	68	64	66	65	61	55	48
	L_{90}	62	61	60	60	59	60	57	53	47	38
Location 5 00:37 – 00:42	L_{10}	76	64	68	67	67	73	72	67	61	53
	L_{90}	67	60	58	60	62	64	61	58	51	43
Location 4 00:53 – 00:58	L_{10}	67	65	67	64	62	63	65	60	51	42
	L_{90}	53	59	60	56	52	51	49	43	36	27
Location 3 01:05 – 01:20	L_{10}	52	62	66	64	54	46	44	40	34	24
	L_{90}	47	58	61	56	48	43	40	35	26	16
Location 3 01:21 – 01:36	L_{10}	51	61	67	62	53	46	44	40	35	25
	L_{90}	47	57	61	55	48	43	40	34	25	15
Location 2 01:42 – 01:52	L_{10}	50	64	62	57	53	47	44	39	32	22
	L_{90}	47	57	56	53	50	44	40	36	28	18
Location 7 02:10 – 02:13	L_{10}	76	65	63	67	69	74	73	68	62	51
	L_{90}	70	60	58	60	64	68	65	61	55	43
Location 8 02:14 – 02:17	L_{10}	75	62	61	64	68	74	71	66	58	49
	L_{90}	67	57	55	59	61	65	62	58	50	41
Location 6 02:21 – 02:24	L_{10}	66	62	68	63	63	64	63	57	50	42
	L_{90}	57	56	57	55	55	54	52	48	41	33
Location 5 02:25 – 02:28	L_{10}	67	61	67	68	64	65	63	59	52	45
	L_{90}	61	57	59	58	59	58	55	53	46	37
Location 3 02:45 – 02:55	L_{10}	49	60	63	58	51	45	43	39	33	21
	L_{90}	46	57	59	55	47	42	39	33	24	14

13 Discussion of Results

The ambient noise level at the residential receiver Location 3 was dominated by distant urban hum, road traffic and intermittent noise from wharf activities.

The ambient noise level at the residential receiver Location 2 was dominated by distant urban hum, road traffic, intermittent noise from wharf activities and mechanical plant (refrigeration system) from 'Ripples'. Two measurements before midnight were undertaken at Location 2. The first measurement was undertaken with the sliding door leading to the pool deck open and revealed higher noise levels in the 4kHz and 8kHz octave bands.

No noise from either UGA was detected at any of the residential monitoring locations and therefore operations complied with the noise conditions.

Reference noise level measurements and observations were made inside the UGAs on two occasions during the noise survey. It is also noted that the public and member's area have been recently merged together. Attendance between 00:05 and 00:45 identified approximately 130 patrons in the northern UGA and 180 patrons in the southern UGA. Attendance between 02:10 and 02:30 identified approximately 130 patrons in the northern UGA and 100 patrons in the southern UGA.

Measurements at Location 5 and 6 varied in accordance with the patron capacities. Both measurements at Location 7 revealed similar noise levels. Noise levels for Locations 8a and 8b varied as a result of exposure to patrons and gaming machines.

With regard to measurements at Location 4, patron and gaming machine noise from the northern UGA was audible at the measurement location. It is noted that the L_{10} noise levels were determined by local road traffic rather than from the gaming areas. Only 1-3dB measureable differences in the background were recorded as a result of the UGA. Whilst the location is not considered an assessment location it has been used to correlate the findings at the residential locations.

For the purpose of estimating contributions at the residential locations, the L_{10} contribution from the UGA has been taken to equal the background L_{90} noise levels measured at Location 4. Based on distance attenuation only, a reduction in the order of 15dB is expected between the Pirrama Rd location and the residential receivers. On this basis, the noise contribution from the UGAs would be well below the measured background noise levels at the residential receiver locations, which correlates with the observed inaudibility.

14 Conclusion

Noise emission levels from the Level 1 Star City UGAs were assessed as complying with the Major Project 08-0098 Determination Condition F5. The noise testing was part of the proposed methodology for certifying operations in accordance with Condition F6 of the Determination.

It is proposed to undertake one more noise survey (on a Thursday night) within the first three months of the operation.

APPENDIX A - GLOSSARY OF ACOUSTIC TERMS

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse Weather — Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).

Ambient Noise — The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.

Assessment Period — The period in a day over which assessments are made.

Assessment Point — A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.

Background Noise — Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the $\mathbf{L_{90}}$ noise level (see below).

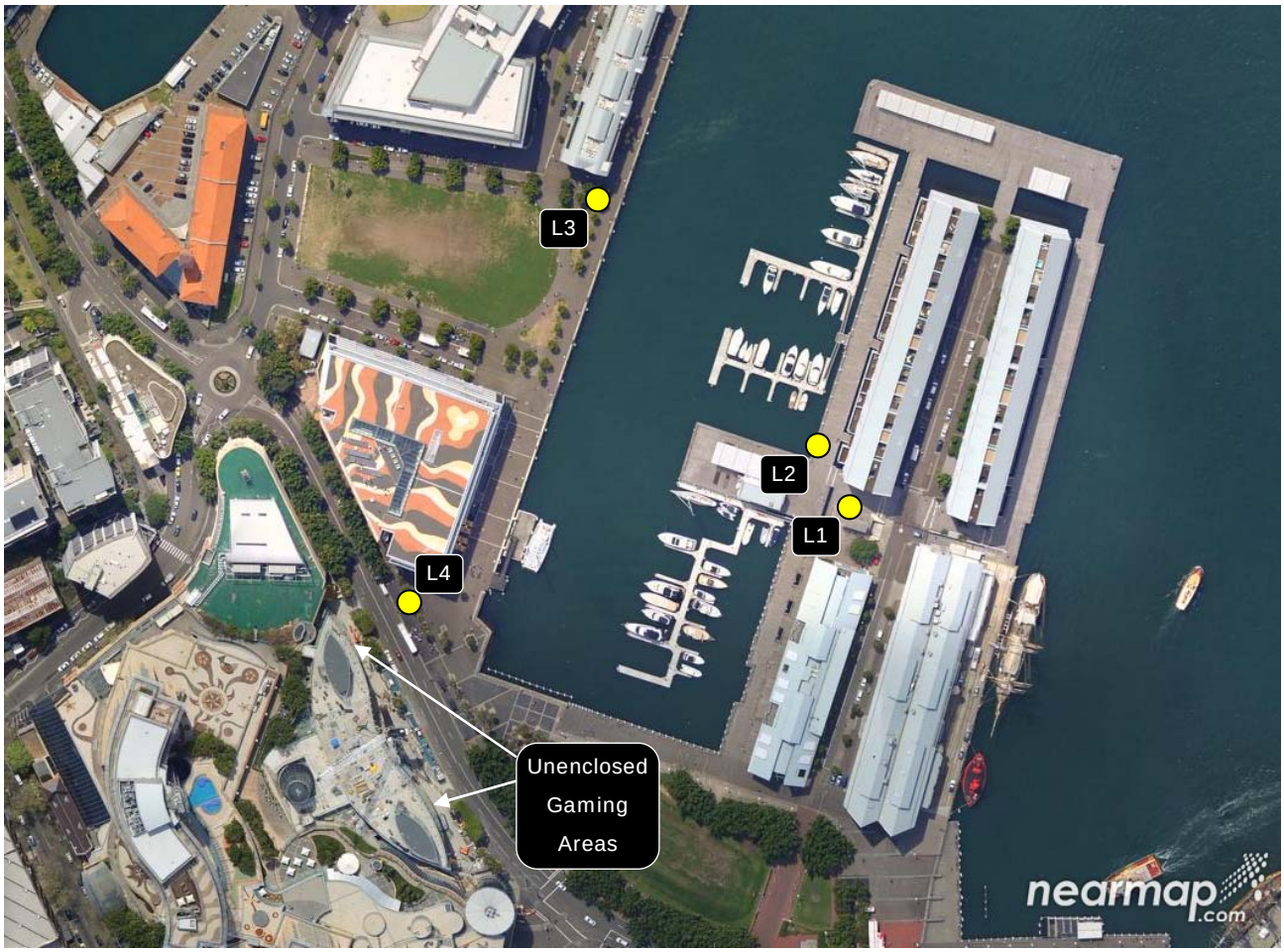
Decibel [dB] — The units that sound is measured in. The following are examples of the decibel readings of every day sounds:

0dB	The faintest sound we can hear
30dB	A quiet library or in a quiet location in the country
45dB	Typical office space. Ambience in the city at night
60dB	Martin Place at lunch time
70dB	The sound of a car passing on the street
80dB	Loud music played at home
90dB	The sound of a truck passing on the street
100dB	The sound of a rock band
115dB	Limit of sound permitted in industry
120dB	Deafening

dB(A)	A-weighted decibels. The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L_{max}	The maximum sound pressure level measured over a given period.
L_{min}	The minimum sound pressure level measured over a given period.
L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L_{90} noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain L_{eq} sound levels over any period of time and can be used for predicting noise at various locations.

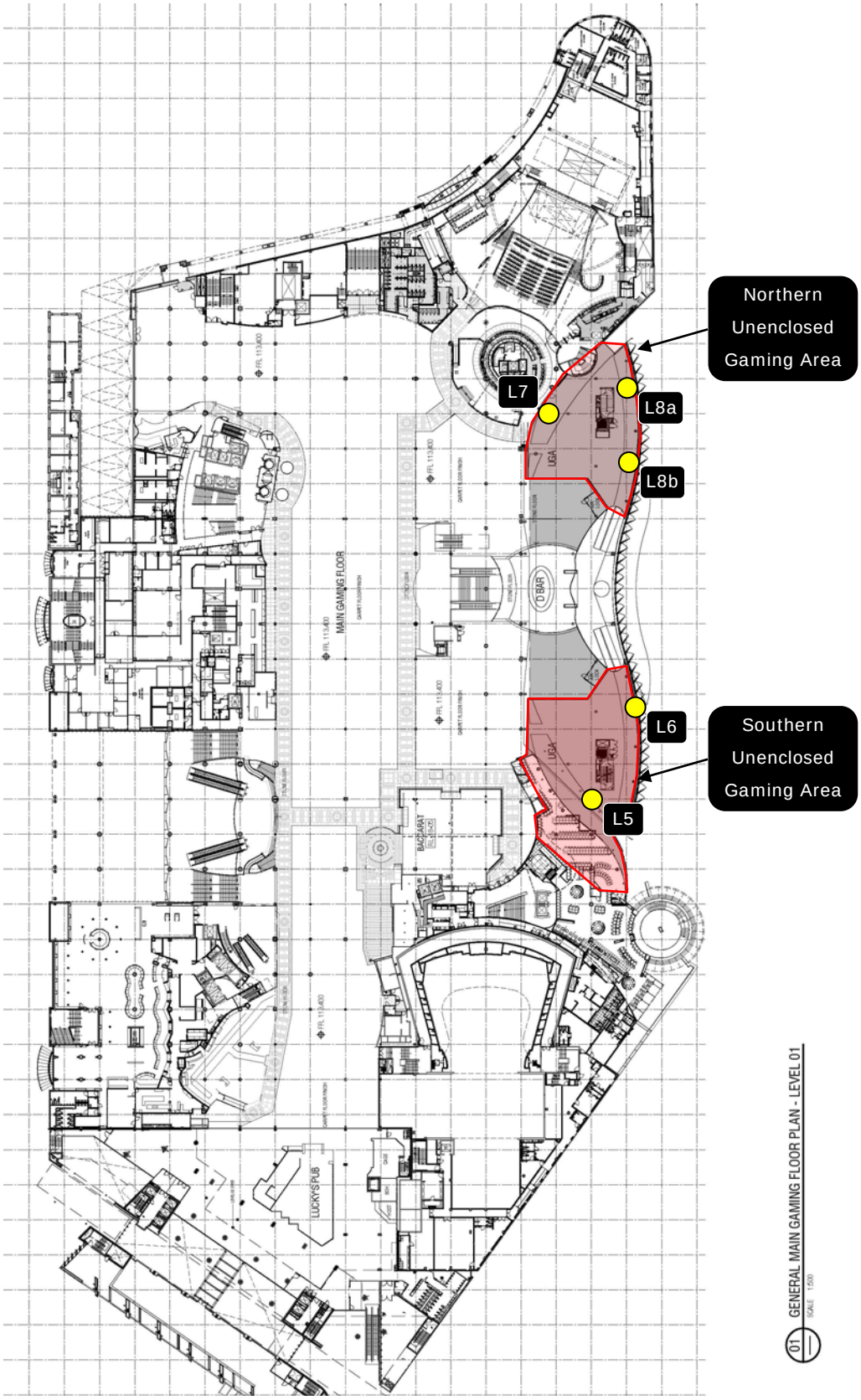
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound Absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound Level Meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound Pressure Level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound Power Level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B - SITE AND EXTERNAL MEASUREMENT LOCATIONS



– Measurement Locations

APPENDIX C - UNENCLOSED GAMING AREAS AND MEASUREMENT LOCATIONS



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STAR CITY - UNENCLOSED GAMING AREAS (UGAS)

CONDITION F6 ACOUSTIC REPORT 3

TF146-01F04 (REV 1) SURVEY 3 2011-02-17.DOC

22 FEBRUARY 2011

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DOCUMENT CONTROL

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22.02.2011	Reviewed Issue		Rev 1	DS	GW	GW

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1 Introduction

NSW Department of Planning Major Project 08-0098 related to the construction of unenclosed gaming areas (UGAs) for Star City Casino, Sydney. The project proposal included three UGAs, including two on the Pirrama Road frontage and one on Union Street.

Condition F6 'Acoustic Review' of the Determination requires demonstration of compliance with the Conditions under Part F of the Determination. The noise criteria are specified in conditions F4 and F5 and relate to both mechanical services equipment and noise from activities respectively.

Condition F6 states;

> *Within 3 months of operation of the approved development an acoustic review, demonstrating compliance with the above conditions is to be submitted to the Department. The review is to include specific monitoring and testing at relevant times.*

The two Pirrama Road UGAs opened on Friday 26th November 2010. Construction of the Union St UGA is yet to commence. The approved operating hours of the Pirrama Rd UGAs are 7am to 12 midnight with a one year trial period extending operations to 24 hours.

Specific methodology for the acoustic review is not set out within the Determination. Renzo Tonin & Associates have therefore based the acoustic review on the acoustic testing requirements required by the City of Sydney Council for licensed premises. The City of Sydney requires three tests to be undertaken, at relevant times, during which the noise emission from the use is measured and assessed against the relevant criteria.

It is noted that short-term attended noise monitoring is required for compliance measurement purposes, as it is required to identify the source of any noise measured. This is particularly required when the ambient noise level may not be dominated by noise from the area under investigation.

This report presents the findings from the third (last) of three measurement surveys. Measurements were undertaken on a Thursday night continuing into the Friday morning. Previous surveys assessed impacts during the typically busier Friday and Saturday night operations.

2 Site Address

Star City, 80 Pyrmont Street, Pyrmont – Situated between Pyrmont Street to the west, Jones Bay Road to the north, Pirrama Road to the east and Edward Street to the south.

3	**Noise Sources**	The noise sources being assessed were; • Patron and Gaming machine noise emission from unenclosed gaming areas located on Level 1 of Star City, fronting Pirrama Road. • Potential noise breakout from internal areas of Star City via access doors to the unenclosed gaming areas.	
4	**Measurement Locations**	Location 1 –	Utilised for Survey 1, no measurement undertaken during Survey 3
		Location 2 –	Wharf 9, Sydney Wharf South-western corner of the residential building, 1.5m above the ground level. The residential building is located approximately 210m to the north-east of the Star City Pirrama Road facade.
		Location 3 –	14 Wharf Crescent 1.5m above the ground level to the south of the Wharf Crescent residential building. The residential building is located approximately 210m to the north of the Star City Pirrama Road facade.
		Location 4 –	Utilised for Surveys 1 & 2, no measurement undertaken during Survey 3.
		Location 5 –	Southern UGA Location 1.5m above the floor level, near the high tables & chairs area and in proximity to the access door to the Casino floor and below void.
		Location 6 –	Southern UGA At the Pirrama Road frontage, 1.5m above the floor level.
		Location 7 –	Northern UGA Location 1.5m above the floor level, in proximity to Sports Bar access door and below void.
		Location 8 –	Northern UGA At the Pirrama Road frontage, 1.5m above the floor level.

		Locations 1 to 4 are shown in Appendix B and Locations 5 to 8 are shown in Appendix C. Measurement was not undertaken at Location 1 (as set out in Survey 1 2010-12-03) as it was affected by mechanical plant serving the Wharf 9 residential development. Measurement was not undertaken at Location 4 (as set out in Survey 1 2010-12-03 and Survey 2 2011-02-05) as it was used for reference purposes only and not considered as an assessment location.
5	**Measurement Date**	Thursday 17th to Friday 18th February 2011.
6	**Survey Period**	Start: 11:00pm Finish: 3:10am
7	**Weather Conditions**	Temperature at the beginning of the survey was 25°C with intermittent wind gusts from the southeast up to 0.6m/s and heavy cloud cover (7/8). The wind picked up throughout the survey with intermittent wind gusts from the SSW up to 3m/s and temperature dropping to 24°C. The weather conditions during the survey would not have adversely affected the results and were conducive for measuring noise under typical conditions. It is noted however that wind gusts up to 6m/s were recorded on the last measurement at Location 3.
8	**Applicable Criteria**	**Condition F5** Noise caused by the approved use including music and other activities must comply with the following criteria: The use must not result in the transmission of "offensive noise" as defined in the Protection of the Environment Operations Act 1997 to any place of different occupancy. The L10 noise level emitted from the use must not exceed 5dB above the background (L90) noise level in an Octave Band Centre Frequency (31.5Hz – 8kHz inclusive) between the hours 7:00am and 12:00 midnight when assessed at the boundary of the nearest affected property. The background noise level must be measured in the absence of noise emitted from the use. The L10 noise level emitted from the use must not exceed the background (L90) noise level in an Octave Band Centre Frequency (31.5Hz – 8kHz inclusive) between the hours 12:00 midnight and 7:00am when assessed at the boundary of the nearest affected property. The background noise level must be measured in the absence of noise emitted from the use.

Notwithstanding compliance with the above, the noise from the use must not be audible within any habitable room in any residential property between the hours of 12:00 midnight and 7:00am.

The L10 noise level emitted from the use must not exceed the background noise level (L90) in any Octave Band Centre Frequency (31.5Hz to 8kHz inclusive) by more than 3dB when assessed indoors at any affected commercial premises.

No mechanical plant serves the area and as such Condition F4 was not assessed.

9 Survey Methodology

External noise measurements were carried out generally in accordance with Australian Standard AS1055-1997.

The following procedure was used:

Measurements of the L_{10} and L_{90} background noise levels were undertaken at each assessment location whilst the premise under investigation was in operation.

Where noise from the premise was identified the average maximum deflection on a sound level meter was recorded in order to establish the L_{10} noise level contribution.

10 Instrumentation

Brüel & Kjær Type 2250 precision sound level meter was used to measure statistical noise levels. The meter complies with AS IEC 61672.1 2004 "Electroacoustics – Sound Level Meters" and is designated as a Type 1 instrument having accuracy suitable for field and laboratory use.

11 Field Calibration Checks

The calibration of the meter was checked in the field immediately before and after the noise measurements using a Brüel & Kjær Type 4231 calibrator and no drift in calibration was observed.

12 Measurement Results

The results of the measurements made at each monitoring location are given below. It is noted that the L_{10} measurement results were ambient noise levels and do not relate to the noise level resulting from the subject premise.

Location Time	Desc	Overall dB(A)	Octave Band Centre Frequency (Hz) – dB(lin)								
			31.5	63	125	250	500	1k	2k	4k	8k
Location 3 23:02 – 23:12	L_{10}	50	63	65	60	52	46	44	40	35	26
	L_{90}	46	58	59	54	48	43	41	35	28	20
Location 2 23:43 – 23:58	L_{10}	49	60	58	52	50	46	43	42	35	27
	L_{90}	47	55	53	49	48	44	41	40	33	24

Location 5 00:19 – 00:21	L_{10}	64	60	60	62	61	62	61	57	50	45
	L_{90}	59	56	54	56	56	55	54	51	44	37
Location 6 00:27 – 00:29	L_{10}	63	59	58	60	57	61	59	53	47	39
	L_{90}	54	54	52	53	52	52	49	45	39	31
Location 8 00:33 – 00:35	L_{10}	63	61	65	60	59	61	59	54	47	40
	L_{90}	56	57	61	54	54	54	51	47	41	33
Location 7 00:36 – 00:38	L_{10}	68	63	61	65	66	67	62	59	54	46
	L_{90}	60	59	55	59	60	57	54	51	45	37
Location 3 00:46 – 01:01	L_{10}	49	60	60	55	49	43	42	44	38	29
	L_{90}	44	56	55	52	45	40	38	33	26	25
Location 3 01:08 – 01:23	L_{10}	47	61	59	55	49	44	42	37	32	26
	L_{90}	44	55	54	51	46	41	38	33	25	23
Location 2 01:33 – 01:48	L_{10}	48	57	56	52	50	45	43	42	35	26
	L_{90}	47	53	52	49	47	43	40	39	32	24
Location 2 01:48 – 02:03	L_{10}	49	64	56	52	50	46	44	44	35	26
	L_{90}	47	53	52	49	48	44	41	39	32	24
Location 2 02:13 – 02:28	L_{10}	49	59	57	53	50	45	43	42	35	26
	L_{90}	47	53	52	49	48	43	40	39	32	24
Location 3 02:33 – 02:48	L_{10}	52	63	59	55	51	46	44	48	42	33
	L_{90}	46	55	54	52	47	43	40	34	26	20
Location 7 02:57 – 02:59	L_{10}	63	64	61	64	61	61	59	57	50	45
	L_{90}	56	59	54	54	55	53	51	47	41	34
Location 8 03:00 – 03:01	L_{10}	64	58	62	58	61	63	61	55	48	42
	L_{90}	58	54	54	53	55	56	52	48	41	33
Location 5 03:04 – 03:06	L_{10}	63	59	56	57	60	62	58	55	51	47
	L_{90}	56	55	52	53	55	53	50	48	42	36
Location 6 03:07 – 03:09	L_{10}	59	57	55	55	56	56	55	50	43	38
	L_{90}	52	52	50	51	51	50	47	44	37	32

13 Discussion of Results

The ambient noise level at the residential receiver Location 3 was dominated by distant urban hum, road traffic. The ambient noise level at the residential receiver Location 2 was dominated by distant urban hum, road traffic and mechanical plant.

No noise from either UGA was detected at any of the residential monitoring locations and therefore operations complied with the noise conditions.

Reference noise level measurements and observations were made inside the UGAs on two occasions during the noise survey. Attendance between 00:20 and 00:40 identified approximately 80 patrons in the northern UGA and 50 patrons in the southern UGA. Attendance between 02:55 and 03:10 identified approximately 55 patrons in the northern UGA and 30 patrons in the southern UGA.

14 Conclusion

Noise emission levels from the Level 1 Star City UGAs were assessed as complying with the Major Project 08-0098 Determination Condition F5. The noise testing was part of the proposed methodology for certifying operations in accordance with Condition F6 of the Determination.

Three noise surveys have been undertaken on three different nights (Survey 1 on a Friday night, Survey 2 on a Saturday night and Survey 3 on a Thursday night) within the first three months of the operation and all three surveys confirmed that the operations of the UGAs complied with the noise conditions as no noise from either UGA was detected at any of the residential monitoring locations.

APPENDIX A - GLOSSARY OF ACOUSTIC TERMS

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse Weather — Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).

Ambient Noise — The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.

Assessment Period — The period in a day over which assessments are made.

Assessment Point — A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.

Background Noise — Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the $\mathbf{L_{90}}$ noise level (see below).

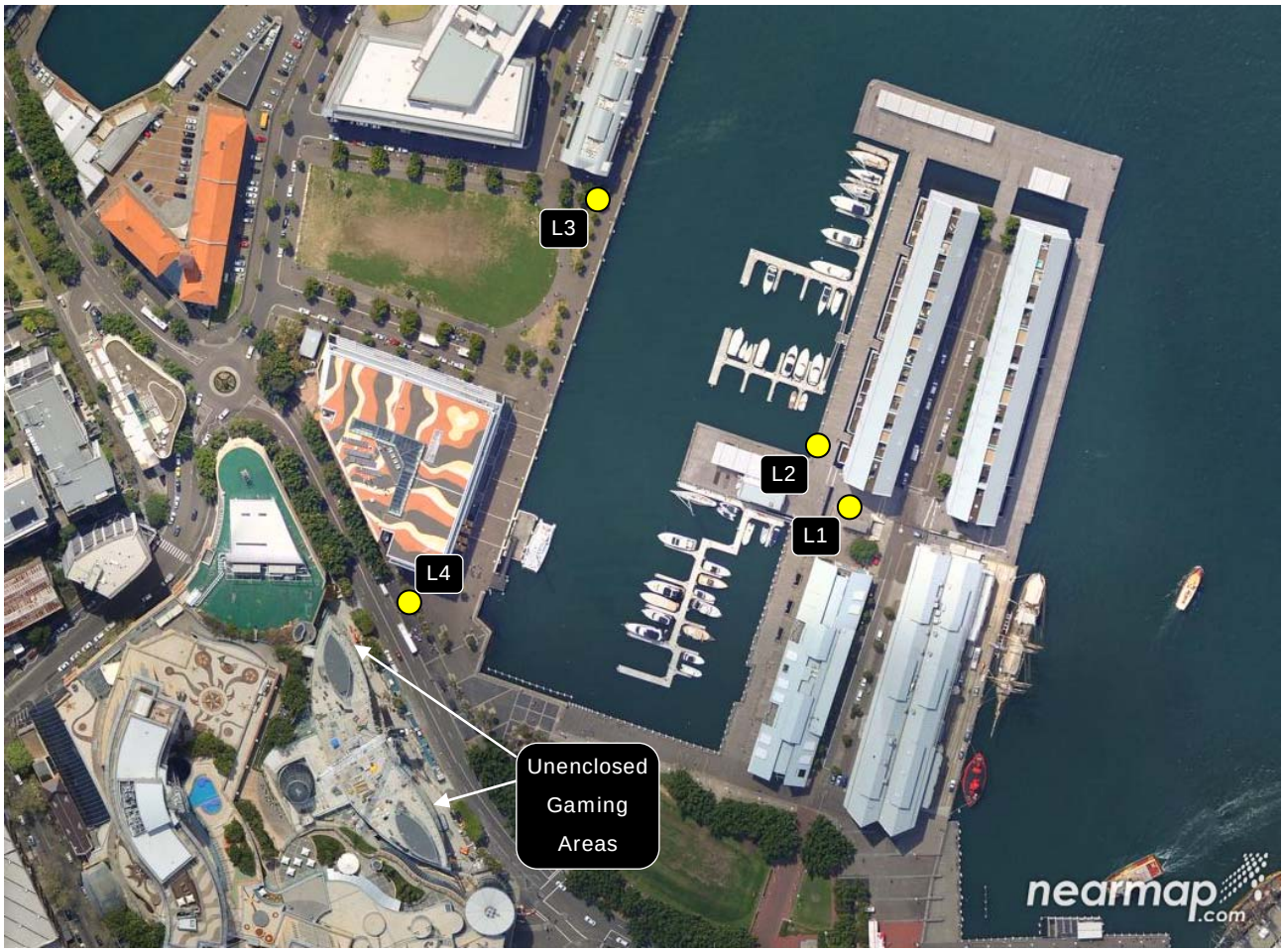
Decibel [dB] — The units that sound is measured in. The following are examples of the decibel readings of every day sounds:

0dB	The faintest sound we can hear
30dB	A quiet library or in a quiet location in the country
45dB	Typical office space. Ambience in the city at night
60dB	Martin Place at lunch time
70dB	The sound of a car passing on the street
80dB	Loud music played at home
90dB	The sound of a truck passing on the street
100dB	The sound of a rock band
115dB	Limit of sound permitted in industry
120dB	Deafening

dB(A)	A-weighted decibels. The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L_{max}	The maximum sound pressure level measured over a given period.
L_{min}	The minimum sound pressure level measured over a given period.
L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L_{90} noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain L_{eq} sound levels over any period of time and can be used for predicting noise at various locations.

Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound Absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound Level Meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound Pressure Level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound Power Level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B - SITE AND EXTERNAL MEASUREMENT LOCATIONS



– Measurement Locations

APPENDIX C - UNENCLOSED GAMING AREAS AND MEASUREMENT LOCATIONS