

Bassett Consulting Engineers

Level 11, 44 Market Street, Sydney NSW 2060, PO Box Q410, QVB Post Office NSW 1230, Australia
T +61 2 8295 7555 F +61 2 8295 7500 E sydney@bassett.com.au www.bassett.com.au

ABN 22 004 873 634

Ref: 60047996

Owen Martin
APP Corporation Pty Ltd
53 Berry Street
NORTH SYDNEY NSW 2060

3 December 2008

Dear Owen,

Project Star Outdoor Gaming Areas - Response to DoP Comments**Executive Summary**

Bassett Acoustics has undertaken acoustic analysis of the likely noise emission from the use of the 'outdoor' areas proposed for Project Star. Noise emission criteria have been determined on the basis of existing ambient noise levels at the receivers most likely to be adversely affected and the requirements of the NSW Office of Liquor, Gaming and Racing.

Typical busy operational scenarios have been assessed and the analysis has indicated that use of the 'outdoor' areas on Pirrama Road will meet the daytime (7.00 am – 12 midnight) criteria and also the night-time (12 midnight – 7.00 am) criteria with the exception of one mid-frequency. This exceedance is likely to be imperceptible at residential receivers and is very unlikely to cause annoyance. The use of the Union Street 'outdoor' gaming area may result in an overall daytime period (7 am to 12 midnight) exceedance of 3 dB(A) with an exceedance of up to 7 dB at 500 Hz. This noise is principally due to people talking and will have a mid-frequency character. The implementation of a 'Noise Management Plan' with close supervision will minimise these exceedances.

It should be noted that Star City is located within an entertainment precinct. These assessments are based upon busy operating scenarios and typically noise emissions would be less than the levels predicted above. The assessments have been completed at the closest residential receivers and noise levels would be less than shown above at receivers further away or subject to shielding. The noise likely to be generated within the 'outdoor' gaming areas and other 'outdoor' entertainment areas will be of a mid-frequency nature, given that the sources include voices and electronic gaming machines. This type of noise is generally considered to be less intrusive and annoying than low frequency entertainment noise generated within places of entertainment such as bars and nightclubs.

Introduction

Bassett Acoustics has reviewed comments dated 17 November 2008 from the Department of Planning ('the Department'), in relation to noise emission from the 'outdoor' gaming and entertainment areas at the proposed Project Star development at Pyrmont.

This advice is presented for incorporation into the Preferred Project Report, required by the Department in response to the following queries:

'Outdoor' Gaming Areas

- The proposed 'outdoor' gaming and entertainment areas may produce high noise impacts, particularly on the Union Street frontage.
- The Department requires additional acoustic analysis to indicate the impact of the two proposed 'outdoor' entertainment areas on noise levels in the local neighbourhood. Specifically noise levels in residences and the public domain on Union Street, Pyrmont Street, Pirrama Road and the waterfront developments around Jones Bay are to be assessed at peak use periods for the 'outdoor' entertainment areas.
- Measures proposed to mitigate any potential impacts of these areas on neighbourhood amenity are to be included in the Preferred Project Report.

Additional Acoustic Analysis

Bassett has previously undertaken 'additional acoustic analysis' as follows:

- Unattended noise logging at three (3) locations to quantify the existing noise environment, including at potentially noise-affected receivers surrounding the proposed development site;
- Establishment of entertainment noise criteria based in accordance with *City of Sydney* Standard Conditions of Development Consent relating to 'use of the premises' which are based upon (and perform the same function as) the *Liquor Administration Board 'Standard Condition'* which has been adopted by the NSW Office of Liquor, Gaming and Racing;
- Derivation of numerical, octave band and overall dB(A) limiting noise criteria using the above; and
- Preparation of an Acoustic Specification for Tender (for the Casino and Hotel components of the proposed development) incorporating a review of the existing noise environment, presentation of all noise criteria for the development and a section relating to Operational Noise Requirements, including patron noise emission.

Bassett's acoustical analysis has focussed upon assessment of noise emission from the Pirrama Road 'outdoor' gaming and entertainment areas and roof top open deck area; and also the Union Street 'outdoor' gaming area.

The analysis has particularly considered the nearest residential receivers at Jones Bay Wharf for noise emission from the Pirrama Road 'outdoor' areas; and the mixed use/residential receiver at 33 Union Street for noise emission from the Union Street 'outdoor' area.

It is important to note that any acoustical strategy developed to achieve compliance at these potentially most-affected receivers can also be used for less potentially-impacted receivers so that compliance is also achieved at those locations.

Patron Noise Emission Criteria

For reference, the patron noise emission criteria derived from the results of unattended noise logging and *City of Sydney* Standard Conditions of development consent (i.e.: the permissible contribution of noise from patron and entertainment activities) that have been established for the project are as follows:

Table 1 - Receivers to the north and east of the development site (Jones Bay Wharf Area)

Criterion	L ₁₀ Sound Level, dB at Octave Band Centre Frequency, Hz									L _{A10} Overall, dB(A)
	32	63	125	250	500	1k	2k	4k	8k	
Daytime (7.00 am–12 midnight)	70	68	66	60	56	56	51	50	34	60
Night-time ¹ (12 midnight-7.00 am)	62	60	58	52	48	48	43	42	26	52

Note 1: Notwithstanding compliance with the values tabulated above, when assessed 'at the boundary' 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 7.00 am.

Table 2 - Receivers in Union Street:

Criterion	L ₁₀ Sound Level, dB at Octave Band Centre Frequency, Hz								L _{A10} Overall, dB(A)	
	32	63	125	250	500	1k	2k	4k		8k
Daytime (7.00 am–12 midnight)	67	65	62	58	55	55	53	48	41	60
Night-time ¹ (12 midnight-7.00 am)	57	56	53	50	47	47	45	40	33	52

Note 1: Notwithstanding compliance with the values tabulated above, when assessed 'at the boundary' 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 7.00 am.

Table 3 – Receivers in Pyrmont Street

Criterion	L ₁₀ Sound Level, dB at Octave Band Centre Frequency, Hz									L _{A10} Overall, dB(A)
	32	63	125	250	500	1k	2k	4k	8k	
Daytime (7.00 am–12 midnight)	66	64	66	56	53	53	49	41	37	58
Night-time ¹ (12 midnight-7.00 am)	57	55	57	47	44	44	40	32	28	49

Note 1: Notwithstanding compliance with the values tabulated above, when assessed 'at the boundary' 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 7.00 am.

As noted, these criteria have been based on *City of Sydney* Standard Conditions of Development Consent. These 'use of the premises' criteria are, in turn, based upon (and perform the same function as) the *Liquor Administration Board 'Standard Condition'* which has been adopted by the NSW Office of Liquor, Gaming and Racing. Further, this Condition is presented in the Noise Guide for Local Government published by the NSW Department of Environment and Conservation (DECC) dated June 2004.

The City of Sydney Condition is presented below for reference:

(46) Noise - Use

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 5 dB above the background (L₉₀) noise level in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) between the hours of 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 any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) between the hours of 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 (a) and (b) 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.

(Note that compliance with (b) infers compliance with (a)).

Pirrama Road Gaming and Open Areas

A review of the 'outdoor' areas adjacent to Pirrama Road has been conducted by Bassett for a typical operational scenario based on the following calculation inputs:

- During the daytime (7.00 am–12 midnight) up to 200 patrons may occupy each of the 'outdoor' areas on level 1, up to 200 patrons may occupy each of the restaurant and food and beverage balconies, with the open deck being occupied by up to 1000 patrons. It is assumed that up to 67 patrons may be talking on each of the 'outdoor' areas on level 1, up to 67 patrons may be talking on each of the restaurant and food and beverage balconies and 334 patrons may be talking on the open deck;
- During the night-time (12 midnight-7.00 am) up to 600 patrons may occupy the 'outdoor' areas including the open deck. It is assumed that up to 200 patrons may be talking on the 'outdoor' areas including the open deck;
- The patrons are assumed to be using a 'normal' vocal effort;
- It is assumed that speech and the operation of electronic gaming machines (EGM) will control noise levels in the space. Note that the modelled noise spectrum in the space is mid-frequency dominant. It is NOT low-frequency-range dominant, which is typical of venues that play dance music;
- 100 electronic gaming machines will be installed on one of the 'outdoor' areas on level 1, of which, it is assumed, 75% may be in use at any one time and 25% of these machines may be producing noise at any one time. The assumed sound power (L_w) of one EGM is 80 dB(A);
- The covered 'outdoor' gaming area with standard absorptive finishes, will have a mid-frequency reverberation time of approximately 0.6 seconds and are acoustically, open to the external environment on the north-eastern facade.
- The 'outdoor' areas are approximately 210 m from the most potentially affected residential receivers at Wharves 8 and 9 (Jones Bay Wharf); and
- The 'night venue' is fully enclosed.

Based upon the above inputs, the operation of the 'outdoor' gaming and open areas adjacent to Pirrama Road would result in daytime period (7 am to 12 midnight) compliance and in overall dB(A) level compliance during the night-time period (12 midnight to 7 am) with a minor exceedance of up to 1 dB at 500 Hz. This exceedance is likely to be imperceptible and given the mid-frequency nature of the noise is unlikely to cause annoyance. It should be noted that these assessments are based upon busy operating scenarios and typically noise emissions would be less than the levels predicted above.

Union Street Gaming Area

A review of the 'outdoor' gaming area adjacent to Union Street has previously been conducted by Bassett for a typical operational scenario based on the following calculation inputs:

- Up to 150 patrons may occupy the space, of which it is assumed that 50 patrons may be talking;
- The patrons are assumed to be using a 'normal' vocal effort;
- This scenario is based on a reverberant sound pressure level of 78 dB(A) in the entertainment area, which is consistent with overall noise levels under a typical 'busy' scenario in the existing

Sports Bar. It is assumed that speech and the operation of electronic gaming machines will control noise levels in the space. Note that the modelled noise spectrum in the space is mid-frequency dominant. It is NOT low-frequency-range dominant, which is typical of venues that play dance music;

- 130 electronic gaming machines (EGM) will be installed in the space, of which it is assumed that 75% of the machines may be in use at any one time and 25% of these machines may be producing noise at any one time. The assumed sound power (L_w) of one EGM is 80 dB(A);
- The 'outdoor' gaming area, with standard acoustically-absorptive finishes, will have a mid-frequency reverberation time of 0.5 seconds and is acoustically, open to the street on the southern façade;
- The 'outdoor' gaming area will not be used after 12 midnight; and
- The 'outdoor' gaming area is approximately 20 m from the nearest receiver.

Based upon the above inputs, the operation of the 'outdoor' gaming area adjacent to Union Street would result in a daytime period (7 am to 12 midnight) exceedance of 3 dB(A) with an exceedance of up to 7 dB at 500 Hz. This is principally due to people talking and will have a mid-frequency character. It should be noted that this assessment is based upon busy operating scenarios and typically noise emissions would be less than the levels predicted above.

Possible Mitigation Measures

The predicted exceedances will require mitigation measures in the form of:

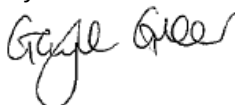
- Further design refinement of architectural measures including acoustically-absorptive finishes and development of alternative perimeter treatments such as glass balustrades, etc.
- Development of a *Noise Management Plan* for the operation of all gaming and entertainment areas, to include measures including:
 - Limit patron numbers;
 - Do not permit high noise level automated music playback when a 'linked jackpot' is won;
 - Operate coin-less type electronic gaming machines;
 - Request patrons to respect the acoustic amenity of nearby residents and strictly enforce compliance;
 - All 'outdoor' gaming or entertainment areas should be subject to close supervision by staff; and
 - Provide a volume-limiting system on any background music systems.

It is recommended that these measures (both architectural and management practices) are included in the Preferred Project Report.

It should be noted that Star City is located within an entertainment precinct. These assessments are based upon busy operating scenarios and typically noise emissions would be less than the levels predicted above. The assessments have been completed at the closest residential receivers and noise levels would be less than shown above at receivers further away or subject to shielding. The noise likely to be generated within the 'outdoor' gaming areas and other 'outdoor' entertainment areas will be of a mid-frequency nature, given that the sources include voices and electronic gaming machines. This type of noise is generally considered to be less intrusive and annoying than low frequency entertainment noise generated within places of entertainment such as bars and nightclubs.

Yours faithfully

Gayle Greer



Manager Acoustics NSW
g.greer@bassett.com.au

cc: Tim Barnett, Greig Chandler and Martin Ferguson