

9 December 2011

Graham Brown
Property Services
The Star
80 Pyrmont Street
Pyrmont NSW 2009

Dear Graham,

Darling Hotel Pool Terrace Noise Emission Assessment - Section 75W Application - Modification 11 to MP08-0098

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) has been commissioned by Echo Entertainment to undertake a desktop assessment of the likely noise impact from the proposed use of the external Darling Hotel Pool Terrace (Darling Pool Terrace) at The Star development, Pyrmont, New South Wales.

This desktop assessment addresses the likely noise impact under various scenarios. The scenarios include the following:

- 1) Playback of background music using the proposed pool terrace sound system;
- 2) DJ/live band/amplified music events using the proposed pool terrace sound system; and
- 3) DJ/live band/amplified music events using an Extended Level Integrated Active System (ELIAS).

The impacts of the above scenarios, including noise from patrons, have been assessed on nearby affected receivers. The scenarios have been assessed during the daytime and night-time periods, where applicable.

The Darling Pool Terrace is located at the new hotel, The Darling Hotel, at The Star on the corner of Union Street and Pyrmont Street. The Darling Pool Terrace is shielded by the surrounding buildings of The Star including the new hotel development to the south, the existing hotel and apartment towers to the north-west and by the Lyric Theatre to the north. The Darling Pool Terrace is approximately three to four storeys above Pyrmont Street ground level. As the pool terrace is mostly shielded by the surrounding buildings of The Star, the nearest potentially affected sensitive receivers to the Darling Pool Terrace are the residential receivers at 91 and 93 Pyrmont Street, Pyrmont, NSW. Appendix A to this letter shows the location of the Pool Terrace and nearby sensitive receivers. A roof plan of the casino development can be found in Appendix B.

The Darling Pool Terrace comprises of a 25 m long pool, a steel framed pergola structure, and a triangular shaped open terrace area of approximately 500 m². The Darling Pool Terrace accommodates 300 patrons. A sound system for the Darling Pool Terrace is proposed with twelve independently controlled speakers all mounted at approximately 3 m from the floor level. The proposed sound system for the Darling Pool Terrace comprises of twelve Meyer Sound Miniature speakers (MM-4XP) with two subwoofers under the pergola structure. An Extended Level Integrated Active System (ELIAS) – standard set up consisting of two speakers, is proposed for use during some DJ/live band/amplified music events. The proposed locations for the speakers and DJ are presented in the Pool Terrace layout plan in Appendix C.

2.0 Noise emission criteria

The noise emission criteria for Pyrmont Street noise sensitive receivers derived from the results of AECOM's previous unattended noise logging and Condition F5 Noise of NSW Department of Planning Major Project Approval dated 27 January 2009 (i.e. the permissible contribution of noise from patron and entertainment activities) are as follows:

Table 1 – Noise emission criteria applicable to receivers in Pyrmont Street

Period	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, 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 Condition *F5 Noise* in the Major Project Approval dated 27 January 2009. The criteria have identical requirements to the *Liquor Administration Board 'Standard Condition'* which has been adopted by the NSW Office of Liquor, Gaming and Racing. This Condition is presented in the Noise Guide for Local Government published by the NSW Office of Environment and Heritage (OEH) dated October 2010.

Condition *F5 Noise* is reproduced below for reference:

F5 Noise

Noise caused by the approved use including music and other activities must comply with the following criteria:

- 1) 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.
- 2) The L₁₀ noise level emitted from the use must not exceed 5dB above the background (L₉₀) noise level in any Octave Band Centre Frequency (31.5 Hz to 8kHz 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.
- 3) 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 8kHz 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.
- 4) Notwithstanding compliance with (1) and (2) 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.
- 5) The L₁₀ noise level emitted from the use must not exceed the background noise level (L₉₀) in any Octave Band Centre Frequency (31.5 Hz to 8kHz inclusive) by more than 3dB when assessed indoors at any affected commercial premises.”

(Note that compliance with (2) infers compliance with (1)).

In order for noise from the use of the Pool Terrace to be inaudible at a noise sensitive receiver it should be 15 dB less than the existing noise level in every octave band at that noise sensitive receiver.

It is noted that Condition F5 Noise subsection 5 is applicable indoors at any affected commercial receiver. Given that the residential receiver criteria are applicable outdoors, the distance between the Pool Terrace and both residential and commercial receivers are comparable and the nearest commercial receivers have fully closed facades, the residential receiver criteria will be the most stringent.

Compliance with the residential receiver criteria will ensure compliance with the commercial receiver criteria also. Therefore the remainder of this letter addresses the most affected receivers, the residential receivers on Pyrmont Street.

3.0 Assessment

The assessment of the three proposed operational scenarios for the Pool Terrace have been completed with the following assumptions:

- The Terrace has a capacity to accommodate 300 patrons. It has been assumed that at any one time one third of the patrons will be speaking. The average male and female sound spectrum with a ‘loud’ or a

'conversational' vocal effort has been applied to each of the patrons speaking. It is also assumed that maximum patronage will not occur for some events and therefore 200 patrons have been assumed for these events. The total sound power and octave band spectrum of the patrons speaking used in the calculations are presented in Table 2 below;

Table 2 Sound power and octave band spectrum of patrons

No. of Patrons	Vocal Effort	Octave band sound power level, dB								Total dB(A)
		63	125	250	500	1000	2000	4000	8000	
100	Loud	80	84	93	100	100	95	89	81	103
	Conversational	68	72	81	88	88	83	77	69	91
67	Loud	78	82	92	98	98	94	88	79	101
	Conversational	66	70	80	86	86	82	76	67	89

3.1 Scenario 1a - Background music – Daytime – Up to 300 patrons

The noise sources in this scenario include 100 patrons speaking with 'conversational' vocal effort and equal output level from the twelve speakers playing background music only.

The calculations indicate that in order to comply with the nearby sensitive receivers criteria, the proposed sound system level output measured at 1 m from each speaker shall be limited to levels presented in Table 3 below.

Table 3 Daytime criteria, maximum allowable speaker output, and predicted noise levels at receivers

Location	SPL, dB at octave band Hz									Total SPL dB(A)
	32	63	125	250	500	1000	2000	4000	8000	
Maximum allowable speaker output – Pool Terrace sound system										
Measured at 1 m	-	79	84	83	78	77	75	71	69	82
Pyrmont Street										
Daytime criteria	66	64	66	56	53	53	49	41	37	58
Noise level	-	44	47	44	35	30	22	12	-	39

AECOM advises that the above maximum allowable speaker output of 82 dB(A) is likely to be more than adequate for background music playback. This playback level results in an approximate noise level of 70 dB(A) in the middle of the terrace area which is approximately 17 dB above the typical daytime background noise on the Pool Terrace. The noise emission resulting from this scenario is predicted to comply with the established noise criteria during the daytime period.

3.2 Scenario 1b - Background music scenario – Night time – Up to 200 patrons

The noise sources in this scenario include 67 patrons speaking with 'conversational' vocal effort and equal output level from the twelve speakers playing background music only.

The calculations indicate that in order to comply with the nearby sensitive receivers criteria, the proposed sound system level output measured at 1 m from each speaker shall be limited to levels presented in Table 4 below.

Table 4 Night-time criteria, maximum allowable speaker output, and predicted noise levels at receivers

Location	SPL, dB at octave band Hz									Total SPL dB(A)
	32	63	125	250	500	1000	2000	4000	8000	
Maximum allowable speaker output – Pool Terrace sound system										
Measured at 1 m	-	74	79	72	73	72	70	66	-	77
Pyrmont Street										
Night-time criteria	57	55	57	47	44	44	40	32	28	49
Inaudibility criteria	42	40	42	32	29	29	25	17	13	34
Noise level	-	38	41	32	29	24	16	6	-	31

AECOM advises that the above maximum allowable speaker output of 77 dB(A) is likely to be adequate for background music playback. This playback level results in an approximate noise level of 64 dB(A) in the middle of the terrace area which is approximately 15 dB above the typical night time background noise on the Pool Terrace. The operations of this scenario are predicted to comply with the established noise criteria during the night time period.

3.3 Scenario 2 - DJ/live band/amplified music events – Daytime – Up to 300 patrons

The noise sources in this scenario include 100 patrons speaking with 'loud' vocal effort and equal output level from the twelve speakers playing background music only. It is assumed that there will be no additional sound amplification equipment in use.

The calculations indicate that in order to comply with the nearby sensitive receivers criteria, the proposed sound system level output measured at 1 m from each speaker shall be limited to levels presented in Table 5 below.

Table 5 Daytime criteria, maximum allowable speaker output, and predicted noise levels at receivers

Location	SPL, dB at octave band Hz									Total SPL dB(A)
	32	63	125	250	500	1000	2000	4000	8000	
Maximum allowable speaker output – Pool Terrace sound system										
Measured at 1 m	107	98	102	94	94	99	101	99	84	106
Pyrmont Street										
Daytime criteria	66	64	66	56	53	53	49	41	37	58
Noise level	64	63	65	55	52	52	48	40	-	56

AECOM advises that the daytime maximum allowable speaker output provided in Table 5 above is likely to result in an approximate noise level of 93 dB(A) in the middle of the terrace area. AECOM advises that by adhering to the recommended maximum allowable loudspeaker outputs, compliance will be achieved at the nearest sensitive receivers during the daytime period.

3.4 Scenario 3 - DJ/live band/amplified music events using ELIAS speaker system – Daytime – Up to 300 patrons

The noise sources in this scenario include 100 patrons speaking with 'loud' vocal effort and equal output level from the ELIAS speaker system. It has also been assumed that announcements of no longer than 1 minute in any 15 minute period will be made through the proposed pool terrace sound system.

The calculations indicate that in order to comply with the nearby sensitive receivers criteria, the proposed sound system level output measured at 1 m from each speaker shall be limited to levels presented in Table 6 below.

Table 6 Daytime criteria, maximum allowable loudspeaker output, and predicted noise levels at receivers

Location	SPL, dB at octave band Hz									Total SPL dB(A)
	32	63	125	250	500	1000	2000	4000	8000	
Maximum allowable speaker output – Pool Terrace sound system										
Measured at 1 m	92	102	106	99	99	99	100	96	63	105
Maximum allowable speaker output – ELIAS										
Measured at 1 m	110	110	114	107	109	115	117	115	81	121
Pyrmont Street										
Daytime criteria	66	64	66	56	53	53	49	41	37	58
Noise level	66	64	66	56	53	53	49	41	37	58

AECOM advises that the daytime maximum allowable loudspeaker output provided in Table 6 above is likely to result in an approximate noise level of 96 dB(A) in the middle of the terrace area. AECOM advises that by adhering to the recommended maximum allowable loudspeaker outputs, compliance will be achieved at the nearest sensitive receivers during the daytime period.

4.0 Conclusions

It is noted that the likely noise emission associated with Scenario 1 will comply with the daytime and night-time criteria at the nearest noise sensitive receivers. The likely noise emission associated with Scenario 2 will comply with the daytime criteria at the nearest noise sensitive receivers. The likely noise emission associated with Scenario 3 will comply with the daytime criteria.

AECOM has conducted a desktop assessment of the likely noise impact from the proposed use of the external Darling Hotel Pool Terrace at The Star development, Pyrmont, New South Wales. Based on achieving compliance with applicable noise criteria at nearby noise sensitive receivers, AECOM has provided the maximum allowable sound system output levels for the various proposed operation scenarios of the pool terrace.

Please feel free to contact us should you have any queries regarding this letter.

Kind regards



Sean Holmes
Graduate Engineer
sean.holmes@aecom.com

Direct Dial: +61 2 89340355

Appendix A

Location of pool terrace and nearby noise sensitive receivers



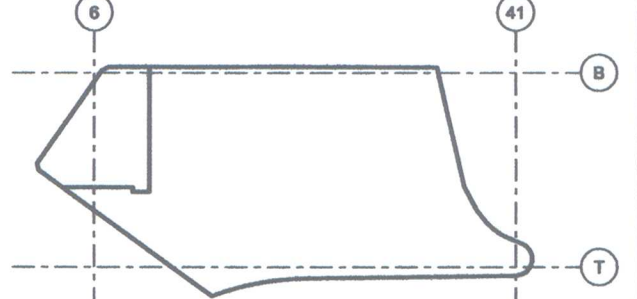
Project Consultant Team	
Prefix Consultant	Discipline

AC	The Buchanan Group	Architect
AD	AH The Cox Group	Architect (Casino)
AE	A Arup	Acoustic Consult.
BS	Philipp Chun & Associates	Building Surveyor
C	Hard & Forrester	Land Surveyor
CL	Taibcorp Holdings Limited	Client (Star City & Taibcorp)
DD		Civil - Drainage
	Bassett	Disability Consultant
E	Arup	Electrical Services
FG	Steve Paul & Partners	Fire Services
F		Fire - Sprinkler
GS	Steve Paul & Partners	Security & Surveillance
H		Hydraulic Services
ID		Interior Design
J		Telephone & Data Ser.
K	Norman Disney Young	Lifts & Escalators
L	Tract Consultants	Landscape Consulting
M	Bassett	Mechanical Services
N	Cundall (St Leonards)	Non Consultant
PL	Urbs	Planning Consultant
PM	APP Corporation	Project Management
QS	WT Partnership	Casino - QS Reports
	Davis Langdon	Hotel - QS Reports
R	CB Richard Ellis	Retail Consultant
ST	Thomas Thomson Whittingly Pty Ltd	Structural Consultant
T	Arup	Traffic Consultant
U	Hyder Consulting (Aust) Pty Ltd	Facade Consultant

-  No work to this area
 New parking
 Pedestrian circulation
 Retail
 Food & beverage
 Casino
 Outdoor casino area
 Conference
 Landscaped deck
 New roof terrace
 Residential Hotel
 Vehicular circulation
 Vertical access
 Gold suite
 New Plant / Store

Revisions - ISSUES			
No.	Description - Issued for	By	Date
00	DA SUBMISSION	MK	01/07/08
01	DA RE-SUBMISSION	SM	09/09/08
02	PPR ISSUE	MK	02/12/08

Key Plan



Consultant

THE **BUCHAN** GROUP

Buchan Lohd & Bowden (Vic) Pty Ltd
A.C.N. 007 272 826
Architects Planners & Interior Designers
133 Rosslyn Street West Melbourne
Victoria 3003, AUSTRALIA
Tel : +613 **9329 1077** Fax : +613 9329 0481
Email: thg@melbourne.buchan.com.au

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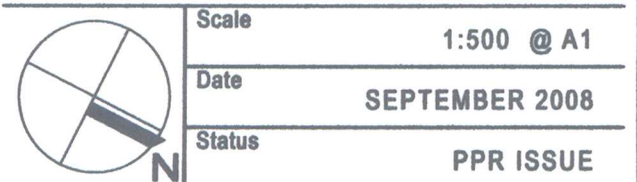
Project _____

PROJECT STAR

PYRMONT, SYDNEY

Drawing Title

**LEVEL 04
COVERED DECK &
ROOF PLAN**



Project Number	Drawing Number	Revision
308024	DA-AC.209	02
Checked By	Approved By	Drawn

Major Project Number: 08_0098 approved on 27 January 2009
by the Minister, in accordance with the Environmental Planning &
Assessment Act 1979, subject to conditions of approval.
Signed: 

Appendix C Proposed Pool Terrace Layout

