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REPORT No EN-OAC-171009AJ

Parramatta Stadium

11-13 O'Connell Street
PARRAMATTA



**Measurements of noise emanating from
Spring Break 2009 held at Parramatta Stadium on 17 October 2009**

November 2009



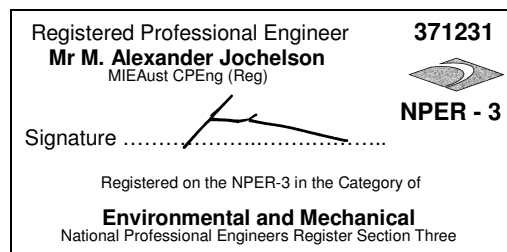
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is an independent, accredited acoustical and environmental engineering consultancy :
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and Association of Australian Acoustical Consultants (AAAC).



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**This report has been checked and endorsed by
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Appendix 1: Locations of noise measurements along residential boundaries.



GLOSSARY

Sound Frequency:

a number of fluctuations in the air pressure, which are detected by the human ear, per second, [Hz].

Sound Pressure:

fluctuations in the air pressure that are detected by the human ear, [Pa].

Sound Pressure Level (L_p):

a sound pressure measured on a decibel scale, [dB] : $L_p = 10 \log_{10} (p/p_0)^2$,

where:

p - is the sound pressure; and

p_0 - is the reference sound pressure of $20\mu\text{Pa}$.

A-weighted sound pressure level (L_A):

in A-weighted decibels [dB(A)], the sound pressure level, which is corrected to correlate with the human subjective response to different frequencies at low ranges of sound pressure levels (about 40 dB).

C-weighted sound pressure level (L_C):

in C-weighted decibels [dB(C)], the sound pressure level, which is corrected to correlate with the human subjective response to different frequencies at high ranges of sound pressure levels (about 80 dB).

A- and C-weighted Maximum Sound Pressure Level ($L_{A\text{Max}, T}$ and $L_{C\text{Max}, T}$):

the maximum A- and C-weighted sound pressure level during the measurement time T , [dB(A) and dB(C)].

Equivalent Sound Pressure Level ($L_{\text{eq}, T}$):

the sound pressure level of a steady sound that has the same energy during the measurement time T as a sound under consideration whose level varies with time, (dB).



EXECUTIVE SUMMARY

This report presents results of noise measurements [A- and C-weighted maximum sound pressure levels ($L_{A\text{Max}}$ and $L_{C\text{Max}}$)] that were carried out by Pollution Control Consultancy and Design (PCCD) during Spring Break 2009 (an open air concert) held at Parramatta Stadium in 11-13 O'Connell Street, Parramatta (Appendix 1), on Saturday, 17 October 2009, between 11 am and 8 pm.

The measurements were carried out:

- (1) along residential boundaries marked with red lines in Appendix 1; and
- (2) at Old Government House, including Lachlans Restaurant, south of Parramatta Stadium, and Parramatta Park Café (Kiosk) / Events Centre (Conference Facilities) north-west of Parramatta Stadium;

and their results show that the $L_{A\text{Max}}$ and $L_{C\text{Max}}$ emanating from the sound amplification system used during the event were below the limits from *Noise Management Plan* of Parramatta Stadium.

Notwithstanding the compliance with these limits, during the concert PCCD asked several times for reduction of the level of noise at the mixing desk, when the $L_{A\text{Max}}$ and $L_{C\text{Max}}$ contained considerable tonal components and when the $L_{A\text{Max}}$ and $L_{C\text{Max}}$ were approaching the limits.



1. LIMITS ON NOISE DURING OPEN AIR CONCERTS

In this report, the level of noise emanating from Spring Break 2009 (an open air concert) is assessed in terms of limits proposed in Report No EN-OAC-030809AJ of 14 September 2009: *Parramatta Stadium - 11-13 O'Connell Street, PARRAMATTA - NOISE MANAGEMENT PLAN for open air concerts and Australian Supercross Championship*. The limits are provided in Sections 1.1 and 1.2, below:

1.1. Limits on noise from sound amplification system - residential premises

The A-weighted and C-weighted maximum sound pressure levels ($L_{A_{Max}}$ and $L_{C_{Max}}$) emanating from open air concerts held at Parramatta Stadium should not exceed:

- 75 dB(A) and 90 dB(C), respectively, when measured:
 - (a) at boundaries of the residential premises at the corner of O'Connell and Ross Streets;
 - (b) at boundaries of the residential premises in Ross Street between O'Connell and Trott Streets;
 - (c) on the balcony on the top floor the Convent of Sisters of Mercy in 6 Victoria Street; and
- 65 dB(A) and 80 dB(L), respectively, when measured at boundaries of any other residential premises.

1.2. Limit on noise from sound amplification system - commercial premises

The A-weighted maximum sound pressure level ($L_{A_{Max}}$) emanating from open air concerts held at Parramatta Stadium should not exceed 80 dB(A), when measured at any commercial premises.

2. LOCATION AND TIME OF NOISE MEASUREMENTS

2.1. Location of noise measurements at residential premises

For the purpose of this report, the noise measurements at residential premises were carried along the:

1. southern boundary of residential premises in Fennell Street between Fleet Street and Northcott Lane;
2. western boundary of residential premises in O'Connell Street between Fennell and Gross Streets (boundary off Northcott Lane);
3. western and southern boundary of residential premises at the corner of O'Connell and Ross Streets;
4. southern boundary of residential premises in Ross Street between O'Connell and Trott Streets;
5. balcony on the top floor on the western aspect of the Convent of Sisters of Mercy in Victoria Street (subject to a consent from the Convent);
6. northern boundary of residential premises in Campbell Street between O'Connell and Pitt Streets;
7. north-eastern boundary of residential premises in Parkside Lane and Lichen Place; and
8. south-eastern boundary of the residential premises in Park Avenue between Hainsworth Street and Railway Parade;

as marked with red lines in Appendix 1.

2.2. Location of noise measurements at commercial premises

For the purpose of this report, the noise measurements were carried at the following commercial premises:

1. Old Government House, including Lachlans Restaurant, south of Parramatta Stadium; and
2. Parramatta Park Café (Kiosk) and Events Centre (Conference Facilities) north-west of Parramatta Stadium; shown on the map in Appendix 1.



2.3. Time of noise measurements

The noise measurements at the residential and commercial premises were carried out on Saturday, 17 October 2009, between 11 am and 8 pm.

3. INSTRUMENTATION AND CALIBRATION

For the purpose of this report, the measurements of the A- and C-weighted maximum sound pressure level ($L_{A_{Max}}$ and $L_{C_{Max}}$), and the linear peak sound pressure level ($L_{L_{Peak}}$) were carried out with NATA-calibrated, class 1, Brüel and Kjær (B&K) modular, precision, real-time sound analyzers type 2260 Investigator, serial numbers: 1823768 and 2001750, with ½" prepolarized, condenser, free-field microphones type 4189, serial numbers: 1783817 and 2385971, respectively.

The instruments were calibrated acoustically with a NATA-calibrated, B&K sound level calibrator type 4231, serial number: 1821262, before and after the measurements, when the calibration drifts were lesser than 1 dB and thus, according to Australian Standard: Acoustics - Description and measurement of environmental noise (AS 1055.1-3 - 1997), the results from the instruments are valid.



4. RESULTS OF NOISE MEASUREMENTS

4.1. Noise from sound amplification system

Table 1 below provides results of measurements of the A- and C-weighted maximum sound pressure levels (L_{AMax} and L_{CMMax}) emanating from the sound amplification system (music/announcements) used during Spring Break 2009.

Table 1

No	Location	L_{AMax}	L_{CMMax}
RESIDENTIAL PREMISES			
1	Fennell Street (between Fleet Street and Northcott Lane)	56.9	77.1
2	Northcott Lane	Music just audible; too low to measure	
3A	Ross Street - SOUND TEST (between O'Connell Street and Trott Street)	69.0	95.6
3B	Ross Street - CONCERT (between O'Connell Street and Trott Street)	63.9	88.5
4	6 Victoria Street (top floor of Convent of Sisters of Mercy)	Location inaccessible on 14.11.2009	
5	1 Macquarie Street (Central Park Apartments)	Music audible; too low to measure	
6	Campbell Street (between O'Connell Street and Pitt Street)	Music audible; too low to measure	
7	Parkside Lane/Lichen Place	64.5	78.8
8	Park Avenue (between Hainsworth Street and Railway Parade)	Music just audible occasionally	
COMMERCIAL PREMISES			
1	Lachlans Restaurant (Old Government House)	70.0	-
2	Kiosk (Parramatta Park Café / Conference Centre)	72.0	-

The results show that:

- (1) During the sound test, prior to the concert, the L_{CMMax} exceeded the limit from Section 1.2 above at the nearest residential premises in Ross Street.

As a result, PCCD asked the mixing desk to reduce the L_{AMax} at:

- 50 Hz by 5 dB, at 63 Hz by 3 dB and at 125 Hz by 3 dB;

and then asked again to reduce the L_{AMax} at:

- 160 Hz by 2 dB, at 100 Hz by 1 dB and at 1000 Hz by 3 dB.

Such reductions dropped the L_{CMMax} to below 90 dB(C) at this location for the remaining time.

- (2) During the concert the L_{AMax} and L_{CMMax} emanating from the sound amplification system music/announcements) were well below the limits from Sections 1.1 and 1.2 above at all locations except the residential premises in Parkside Lane/Lichen Place, where the L_{AMax} and L_{CMMax} were close to the limits.



5. NOISE COMPLAINTS

During Spring Break 2009 both Parramatta Stadium and Pollution Control Consultancy and Design (PCCD) maintained “hot lines” to allow any persons affected by noise from the event lodging noise complaints that could be followed by immediate noise measurements in areas of concern.

No noise complaints were lodged through the hot lines and/or other means either during Spring Break 2009 or afterwards.





Pollution Control Consultancy and Design

is a member of The Association of Consulting Engineers, Australia (ACEA)
and Association of Australian Acoustical Consultants (AAAC),

and its principal consultant is a Corporate Member of
The Institution of Engineers, Australia (MIEAust)
and Australian Acoustical Society (M.A.A.S.).

Pollution Control Consultancy and Design (PCCD) is an independent, accredited, acoustical and environmental engineering practice that was established and is managed by **Alex Jochelson**.

Alex has a Master's Degree in Mechanical Engineering (MEMech) and he is a Corporate Member, Chartered Professional Engineer of The Institution of Engineers, Australia, registered on National Professional Engineers Register under No 371231, in the categories of Environmental and Mechanical Engineering [MIEAust CPEng (Reg)].

Alex's well balanced, extensive, multi-disciplinary experience in environmental engineering includes:-

- (1) four-year industrial experience (environment protection specialist at ferro-chromium smelting plant);
- (2) four-year research and design experience (research engineer at university);
- (3) nine-year operational, industrial pollution control experience at the Environment Protection Authority of New South Wales - EPA (engineer); and
- (4) the current, since January 1995, engineering consulting experience as the principal consultant of Pollution Control Consultancy and Design (PCCD).

Services provided by Pollution Control Consultancy and Design

Pollution Control Consultancy and Design (PCCD) provides a comprehensive range of services covering all major aspects of the environment protection: air, noise and water pollution control. These services include:-

- a) air, noise and water pollution measurement, assessment and engineering control;
- b) environmental reviews and audits;
- c) environmental management programs (EMPs);
- d) pollution reduction programmes (PRPs);
- e) environment protection policy and strategy;
- f) submissions to and negotiations with the Environment Protection Authority, Department of Planning, Department of Mineral Resources, Sydney Water, Liquor Administration Board and Local Councils;
- g) "environment impact statements" and "statements on environmental effects" for development consents;
- h) applications for pollution control approvals and licences;
- i) compliance audits for environment protection approvals and licences, and development consents;
- j) interpretation of technical requirements of environment protection legislation;
- k) expert witness services for Land and Environment Court and local courts;
- l) proposals of environmentally acceptable and safe operational conditions and procedures;
- m) development of operational manuals for pollution control systems;
- n) process and functional design of air, noise and water pollution control systems;
- o) selection of optimal pollution control technology, equipment and systems;
- p) supervision of construction, commissioning, operation and maintenance of pollution control systems; and
- q) troubleshooting existing air, noise and water pollution control systems.



Locations of noise measurements along residential boundaries, as marked with red lines (—).

NOTES