Pollution Control Consultancy and Design
ABN 71 776 800 318
Air, Noise and Water Pollution
Assessment and Engineering Control

Level 57, 19-29 Martin Place
Sydney - New South Wales 2000 - Australia

ALEX JOCHELSON
MEMech MIEAust CPEng (Reg)

Telephone: **(02) 9238 2053**
Facsimile: **(02) 9238 7633**

E -mail: **principal@pccd.com.au**
Web site: **www.pccd.com.au**

REPORT No EN-OAC-301011AJ

Parramatta Stadium

11-13 O'Connell Street
PARRAMATTA

Measurements of noise emanating from
Deepavali Fair 2011 held at Parramatta Stadium on 30 October 2011.

November 2011

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This report has been checked and endorsed by
Principal Consultant of Pollution Control Consultancy and Design (PCCD)

Registered Professional Engineer **371231**
Mr M. Alexander Jochelson
MIEAust CPEng (Reg)
NPER - 3
Signature .....
Registered on the NPER-3 in the Category of
Environmental and Mechanical
National Professional Engineers Register Section Three

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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] : $L_P = 10 \log_{10} (p/p_o)^2$,
where:
p - is the sound pressure; and
p_o - is the reference sound pressure of 20μPa.

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 ($L_{AMax, T}$ and $L_{CMax, T}$):
the maximum A- and C-weighted sound pressure level during the measurement time **T**, [dB(A) and dB(C)].

Equivalent Sound Pressure Level ($L_{eq, T}$):
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_{AMax} and L_{CMax}), and linear peak sound pressure level (L_{ZPeak})] that were carried out by Pollution Control Consultancy and Design (PCCD) during Deepavali Fair 2011 (an open air concert) held at Parramatta Stadium in 11-13 O'Connell Street, Parramatta (Appendix 1), on Sunday, 30 October 2011, between 2 pm and 9 pm.

The measurements were carried out:

(1) along residential boundaries marked with red lines in Appendix 1; and

(2) at Old Government House, including Lachlan's 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_{AMax} and L_{CMax} emanating from the sound amplification system used during the event were well below the limits from *Noise Management Plan* of Parramatta Stadium; and
- L_{ZPeak} emanating from the pyrotechnic display at the conclusion of the event exceeded the limit from the plan by up to 30 dB(L) and lasted seven minutes longer than provided by this plan.

1. LIMITS ON NOISE DURING OPEN AIR CONCERTS

In this report, the level of noise emanating from Deepavali Fair 2011 (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 to 1.3 below:

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

The A-weighted and C-weighted maximum sound pressure levels (L_{AMax} and L_{CMax}) 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(C), respectively, when measured at boundaries of any other residential premises.

1.2. Limit on noise from pyrotechnics - residential premises

The linear peak sound pressure level (L_{LPeak}) emanating from pyrotechnic displays during open air concerts held at Parramatta Stadium should not exceed 100 dB(L), when measured at any residential premises.

A display should not occur for more than 5 minutes and should be completed prior to 10 pm.

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

The A-weighted maximum sound pressure level (L_{AMax}) 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 Lachlan's 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 Sunday, 30 October 2011, between 2 pm and 9 pm.

3. INSTRUMENTATION AND CALIBRATION

For the purpose of this report, the measurements of the A- and C-weighted maximum sound pressure level (L_{AMax} and L_{CMax}), and the linear peak sound pressure level (L_{LPeak}) were carried out with NATA-calibrated, class 1, Brüel and Kjær (B&K) modular, precision, real-time sound analyzer type 2250, serial number: 2506294, with a ½" prepolarized, condenser, free-field microphone type 4189, serial number: 1931341.

The instrument was calibrated acoustically with a NATA-calibrated, B&K sound level calibrator type 4231, serial number: 2699433, 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 instrument 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_{CMax}) emanating from the sound amplification system (music/announcements) used during Deepavali Fair 2010.

Table 1

No	Location	L_{AMax}	L_{CMax}
	RESIDENTIAL PREMISES		
1	**Fennell Street** (between Fleet Street and Northcott Lane)	Music just audible; too low to measure	
2	**Northcott Lane**	Music essentially inaudible	
3	**Ross Street** (between O'Connell Street and Trott Street)	62	69
4	**6 Victoria Street** (top floor of Convent of Sisters of Mercy)	No access to convent on 30.10.11	
5	**1 Macquarie Street** (Central Park Apartments)	Music just audible; too low to measure	
6	**Campbell Street** (between O'Connell Street and Pitt Street)	Music inaudible	
7	**Parkside Lane/Lichen Place**	55	63
8	**Park Avenue** (between Hainsworth Street and Railway Parade)	55	66
	COMMERCIAL PREMISES		
1	**Lachlan's Restaurant** [1)] (Old Government House)	64	-
2	**Kiosk** [2)] (Parramatta Park Café / Conference Centre)	66	-

The results show that L_{AMax} and L_{CMax} emanating from the sound amplification system (music/announcements) were well below the limits from Sections 1.1 and 1.3 above.

4.2. Noise from pyrotechnics display (fireworks)

The linear peak sound pressure level (L_{ZPeak}) emanating from the pyrotechnics display at the conclusion of Deepavali Fair 2010 ranged between 96.8 dB(L) and 129.7 dB(L), i.e. it exceeded the limit from Section 1.2 above by up to 30 dB(L).

Appendix 2 shows the linear, peak, one-second sound pressure level ($L_{ZPeak, 1sec}$) logged during the entire duration of the pyrotechnics display.

The pyrotechnics display was running for twelve minutes, between 8.45 pm and 8.57 pm, i.e. seven minutes longer than in Section 1.2 above.

In our opinion, the approval conditions relating to the pyrotechnics display, as in Section 1.2, are impractical and, as such, should be changed to the:

1. limit on the L_{ZPeak} emanating from the display to a realistic/achievable value of 120 dB(L) - 125 dB(L);
2. allowable duration of the display to reasonable 10 minutes - 15 minutes.

5. NOISE COMPLAINTS

During Deepavali Fair 2011 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 any areas of concern.

No noise complaints were lodged through the hot lines and/or other means either during Deepavali Fair 2011 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)].

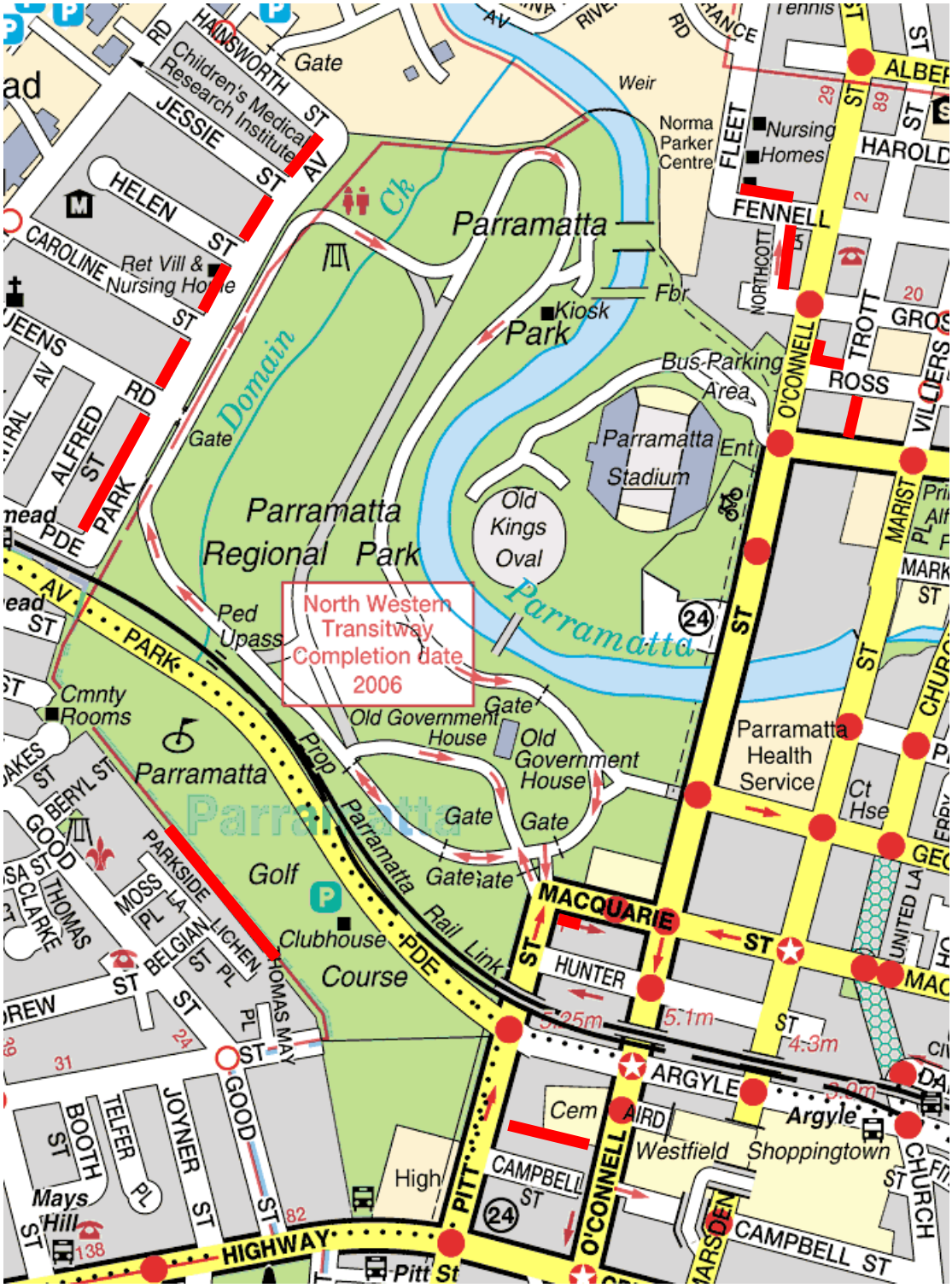
Alex's well balanced, extensive, multi-disciplinary experience in environmental engineering includes:-

(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).

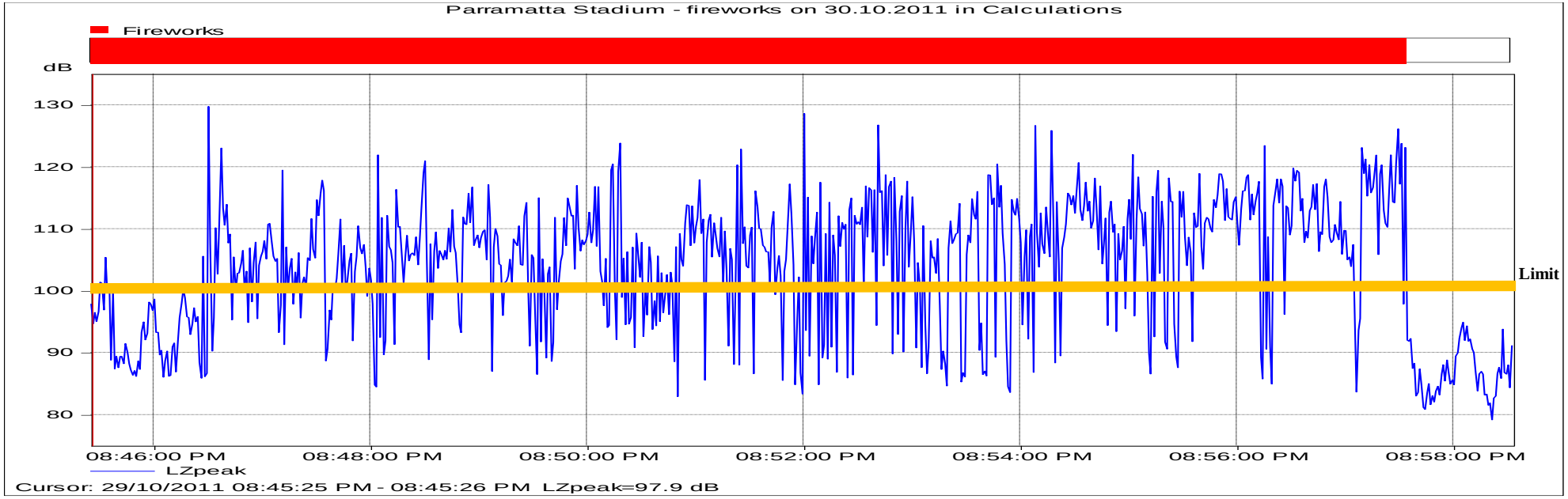
Services provided by
Pollution Control Consultancy and Design

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 ( ).



Results of logging of linear peak sound pressure level in one-second periods ($L_{ZPeak,\ 1s}$) during fireworks.

NOTES