



Final Environmental Noise Report

**Knottfest
Brazilian Field, Centennial Park
March 25th, 2023**

Prepared for
**The Centennial Parklands & Moore Park Trust
Centennial Park
Sydney NSW. 2021**

Prepared by
The P.A. People Pty Ltd
A.C.N. 000 919 255

9 – 11 Leeds Street
Rhodes NSW 2138
Phone (02) 8755 8700
Fax (02) 8755 8599

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A. Introduction

The P.A. People were engaged by The Centennial Parklands & Moore Park Trust to provide Environmental Noise Management and Monitoring Services for Knotfest.

This document is the final report outlining the process and procedures employed by our Company to assist the venue and the event organiser to manage the environmental impact of this event on the surrounding residential areas of Centennial Park. The document is intended to fulfil the requirements of the sound monitoring report as required by The Centennial Parklands & Moore Park Trust to comply with Centennial Park EPA Notice details - Clause 17 (a) through (h) of the Trusts Prevention Notice No 1002139, file No SR125 dated 26-Feb-2001. And Variations of Prevention Notice No 1521549 File No EF13/8821 dated 18-Feb-2015

To proactively prevent perimeter sound pressure levels exceeding the levels set by the regulator, The PA People provided *SPLnet* - a networked, real time sound pressure level monitoring system.

Sound pressure levels from five (5) fixed SPL data collectors located at key perimeter locations along with one (1) fixed SPL data logger at the FOH audio control mix position were centrally monitored in real time. During the event two mobile sound pressure level monitoring engineers supplemented the *SPLnet* system. These mobile monitors were used to patrol the perimeter, verify *SPLnet* measurements and to conduct location specific measurements in response to any received complaints.

This report comprises:

- An introduction
- Event Details
- Environmental Noise management approach
- Monitoring Details
- Results
- Appendices

The P.A. People prepared the report for this event, under the guidance of Chris Dodds M.A.A.S (Managing Director).

The report also draws extensively on our experience in other similar venues and our understanding of event operational requirements, coupled with our strong understanding of environmental noise issues as they relate to outdoor venues and live entertainment.

Please do not hesitate to contact us should you require clarification of any part of this report.

B. Compliance with the Prevention Notice

Knotfest has not complied with the noise monitoring conditions of the Trusts Prevention Notice No 1002139, file number SR125, dated 26 February 2001. And Variations of Prevention Notice No 1521549 File No EF13/8821 dated 18-Feb-2015.

This is due to exceedances as detailed below. All exceedances were responded to however.

The location of perimeter noise loggers is based on historical data as directed by the Centennial Parklands and Moore Park Trust. In addition, guidelines on the position of stages and the type and direction of sound amplification are designed to minimise noise spill to residential areas, and noise loggers are generally positioned at the most sensitive perimeter areas. This provides consistency in approach to noise management and is reviewed for continuous improvement.

An independent review of sound management for events on Centennial Parklands and Moore Park Trust land provided further investigation of the most sensitive perimeter areas and provided recommendations that have been implemented for the 2018/19 season onwards to concentrate noise loggers on sensitive areas that provide data that corresponds to the event levels.

The above procedures are implemented for each event in consultation between the Centennial Parklands and Moore Park Trust representatives, The P.A. People. This consultation is complemented further with the review of each event Noise Management Plan, providing feedback and recommendations to further mitigate noise impact.

B.1 Exceedances

The PA People have collected a substantial amount of data pertaining to the noise levels at the perimeter during this event.

B.1.1 Rehearsals and Sound Tests

Zero (0) exceedance of the 65dB(A) limit was identified at the perimeter monitoring locations.
Zero (0) exceedance of the 85dB(C) limit was identified at the perimeter monitoring locations.

B.1.2 Main Event

Nine (9) exceedances of the 65dB(A) limit were identified at the perimeter monitoring locations attributable to the event sound system.
Nine (9) exceedances of the 85dB(C) limit were identified at the perimeter monitoring locations attributable to the event sound system.

The preliminary report stated seven (7) exceedances attributable to the event sound system. After detailed analysis of the data collected two (2) additional noise limit exceedances are noted in this report.

The data showed two exceedances, 1-minute apart, at 1343 & 1344.
A third exceedance, not noted in the preliminary report, occurred at 2015. This replaces, in the final count, the exceedance at 2004 that was noted in the preliminary report, which after investigation was not due to the amplified sound from the event.

These are shown with an Asterix (*) in the table below.

In response to condition 17(f) of the Prevention Notice a list of all limit breaches as measured on the perimeter of the Centennial Parklands while the event sound system was in use is shown below.

It is noted that where the data logger was located on Oxford Street, it was particularly noisy prior to the event commencing, for the duration of the event and after the event had concluded. SPL measurements in this area were consistently higher than the limits set out in the prevention notice. SPL measurements in this area were confirmed by mobile monitoring engineers as being the result of local heavy traffic. Because of this, the limit breaches in this location are not noted individually here. Similar circumstances were present at all other fixed monitoring locations on the perimeter of Centennial Park except Martin Rd.

A list of the sound system attributable exceedances noted by the *SPLnet* engineer on the day of the sound tests and the event day are shown below.

1221	Lang Rd	76.0dBA / 86.6dBC	31 seconds	Condition 15 exemption.
1302	Lang Rd	69.2dBA / 88.7dBC	3 seconds	
1320	Lang Rd	70.4dBA / 88.5dBC	7 seconds	Condition 15 exemption
1323	Lang Rd	71.5dBA / 85.3dBC	8 seconds	Condition 15 exemption
1324	Lang Rd	71.3dBA / 86.9dBC	37 seconds	Condition 15 exemption
1326	Lang Rd	74.1dBA / 88.1dBC	14 seconds	Condition 15 exemption
1327	Lang Rd	74.0dBA / 85.3dBC	4 seconds	Condition 15 exemption
1330	Lang Rd	73.8dBA / 89.5dBC	15 seconds	Condition 15 exemption
1332	Lang Rd	70.7dBA / 91.5dBC	44 seconds	Condition 15 exemption
*1343	Lang Rd	71.9dBA / 87.8dBC	8 seconds	
*1344	Lang Rd	69.5dBA / 86.3dBC	11 seconds	
1348	Lang Rd	71.3dBA / 87.3dBC	32 seconds	
1641	Lang Rd	73.1dBA / 85.8dBC	29 seconds	Condition 15 exemption
1643	Lang Rd	72.6dBA / 86.7dBC	72 seconds	Condition 15 exemption
1700	Lang Rd	74.6dBA / 86.9dBC	9 seconds	
2000	Lang Rd	70.8dBA / 89.9dBC	13 seconds	
*2015	Lang Rd	72.9dBA / 86.6dBC	7 seconds	
2058	Lang Rd	70.3dBA / 86.5dBC	13 seconds	
2107	Lang Rd	68.7dBA / 86.0dBC	7 seconds	

On each occasion an exceedance was noted to have occurred, and it was deemed to have been caused by the event's sound system the event production manager, and the representative of the Centennial Parklands and the sound system operators were informed.

When appropriate requests were made to reduce levels of the sound system. In addition to the requests for level decreases, frequency information was also provided so spectrum adjustments could be made.

When practical a mobile monitoring engineer was sent to logger locations to verify the noise sources and corroborate levels.

B.2 Complaints

As confirmed by the Trust, there were five (5) sound-related complaints to the telephone hotline during the sound tests and day of the event and four (4) sound-related complaints received by email after the event.

Shown here is a list of the complaint locations and the times each complaint was received.

Saturday March 25th

1226 57 Cook Road.

1721 No location given.

2028 No location given.

2045 58 Lang Rd

2058 4 Lang Rd

Mobile monitors were available on both the sound test and show day of this event days to respond to all telephone hotline complaints.

B.3 Hours of Operation

Knotfest took place within the nominated hours as detailed for this event.

C. Event Details

C.1 Dates and Times

The event, rehearsals and sound tests were all held within the licensed hours nominated and contained in the venue licence and the event plan.

Knotfest was a single stage music concert held at The Brazilian Field, Centennial Park, Sydney from 1030 – 2151 on Saturday March 25th, 2023. Sound system checks and rehearsals were held on Friday March 24th, 2023, between 1600-1800.

The Trust reports that 28,528 people attended this event.

The Trust confirms that music concluded before 2200 as scheduled.

C.2 Schedule of Acts

A complete schedule of acts can be seen below. In general, all acts conformed to this schedule.

CENTENNIAL PARK SATURDAY 25 MARCH

STAGE 1		STAGE 2
SLIPKNOT	8:20 - 9:50	[REDACTED]
[REDACTED]	7:05 - 8:20	PARKWAY DRIVE
MEGADETH	6:05 - 7:05	[REDACTED]
[REDACTED]	5:20 - 6:05	TRIVIUM
NORTHLANE	4:35 - 5:20	[REDACTED]
[REDACTED]	3:50 - 4:35	AMON AMARTH
IN FLAMES	3:10 - 3:50	[REDACTED]
[REDACTED]	2:30 - 3:10	STORY OF THE YEAR
SPIRITBOX	1:50 - 2:30	[REDACTED]
[REDACTED]	1:20 - 1.50	KNOCKED LOOSE
ALPHA WOLF	12:50 - 1:20	[REDACTED]
[REDACTED]	12:20 - 12:50	VOID OF VISION
BAD OMENS	11:50 - 12:20	[REDACTED]
[REDACTED]	11:20 - 11.50	MALEVOLENCE
		[REDACTED]

C.3 Weather Conditions

During the times when noise monitoring was carried out for this event information pertaining to weather conditions around the event site were obtained from the Sydney Airport Weather Station, as it appears on the Bureau of Meteorology website,

Conditions could be described as mild. Temperatures on the event day ranged from 20°C late in the evening up to 27°C in the early to mid-afternoon. Winds was moderate to high from a predominantly easterly direction at speeds between 17-26km/h. Humidity was low throughout the day but reached 88% late in the afternoon. There was light rain late in the afternoon and 4mm of rainfall was recorded.

On March 24th prior to, and during the sound testing period temperatures were stable at 23-24°C. Humidity was moderate between 64-78% and winds were moderate to high between 17-28km/h and mostly form the south-east and south, south-east.

D. Environmental Noise Management Approach

D.1 Mitigation before the Event

Audio system design has historically been carried out by the sound system contractors with the dual goal of reducing emissions, whilst maintaining acceptable performance for the artist's requirements. On this occasion we are satisfied that the systems provided for event was of an appropriate professional standard and level of performance.

The P.A. People also reviewed the site layout plan prior to the event.

Our client's Noise Management Plan forms the basis for sound monitoring for this event.

D.2 Mitigation during the Event

The *SPLnet* system was used to continuously monitor and log noise levels at the event site.

The *SPLnet* engineer at event control was able to use this data, in combination with the subjective analysis of the information received from the mobile monitoring engineers, to identify the source of any sound pressure level exceedances at the event perimeter. Any perimeter exceedances detected by *SPLnet* or the mobile monitoring engineers caused by external factors were identified. Any potential exceedances caused by the Knotfest sound reinforcement systems were identified and immediately actioned by event control.

The *SPLnet* engineer set dynamic SPL thresholds and exceedance indicators for the FOH positions. These thresholds were based on the stage's effect on perimeter SPL conditions. Therefore, the sound engineer was able to proactively adjust the sound pressure level produced by the stage based on its' effect on perimeter conditions at any given time.

D.3 Mitigation after the Event

The Trust, the P.A. People regard the management of environmental noise for this event to be appropriate and in compliance with the venue License and the EPA Prevention Notice. It is proposed that this level of sound management and monitoring is implemented for future events of this nature in Centennial Park.

E. Monitoring Details

E.1 Details of Measurement System

To monitor perimeter sound pressure levels for Knotfest, The PA People provided a networked, real time sound pressure level monitoring system based on *SPLnet*.

Key features of this system include:

- The centralised logging of SPL data includes information as to when stages are notified of exceedances or, to the best of our knowledge, impending exceedances, to ensure immediate action from the stages otherwise penalties are implemented from the sound bond.
- When notified of a complaint, sound control can immediately identify readings at the perimeter so there is an immediate measurement in the vicinity at the time of the complaint before the roving sound monitor arrives at the complaint location. This allows more accurate and immediate response to the complainant, and if there is an exceedance this can be immediately rectified centrally while the mobile sound monitor is being dispatched to the residence.
- The communication lines between identifying an exceedance and notifying the offending stage are more streamlined.
- All logging meters work in all weather conditions. Most logging meters currently employed for event monitoring in Australia are affected by wet weather or cannot be used at all.

As noted previously, the *SPLnet* system is focused on proactively preventing perimeter sound pressure level exceedance.

Sound pressure levels for the Knotfest were centrally monitored and recorded from fixed SPL meters located at five (5) key perimeter locations, as determined by the Centennial Parklands and Moore Park Trust, and from one (1) FOH mixing position in real time. During the event two (2) additional mobile sound pressure level monitoring engineers supplemented the *SPLnet* system. The mobile monitors were used to patrol the perimeter and verify the *SPLnet* measurements and to conduct location specific measurements in response to any received complaints.

The *SPLnet* system was used to continuously monitor and log noise levels at the event site. The *SPLnet* system continuously recorded data from each of the five (5) *SPLnet* perimeter monitors for the duration of the event.

The *SPLnet* engineer at event control was able to use this data, in combination with the subjective analysis of the mobile monitoring engineers, to identify the source of sound pressure level exceedances at the event perimeter. Any perimeter exceedances detected by the *SPLnet* system or the mobile monitoring engineers caused by external factors (i.e. not due to sound emanating from the event) were identified. Similarly, exceedances caused by the event sound reinforcement system could be identified and immediately actioned by event control.

Fast dB(A) and dB(C) SPL measurements for all *SPLnet* meters were simultaneously monitored by the engineer at event control.

Fast dB(A) and dB(C) SPL results at the FOH mixing position were also monitored centrally and available to the sound engineers. Dynamic SPL thresholds and exceedance indicators were set for the FOH position by event control. These thresholds were based on the effect of event's sound system on perimeter SPL conditions. Therefore, the sound engineer was able to proactively adjust the sound system outputs to maintain predetermined sound pressure levels based on their effect on perimeter conditions at any given time.

E.2 Site Plan and Measurement Locations

The P.A. People reviewed The Centennial Parklands & Moore Park Trust prevention notice and noise management plan. This information assisted us in formulating the event monitoring strategy that was implemented for this event.

E.2.1 Perimeter Monitoring

As per the requirements outlined in The Centennial Parklands & Moore Park Trust prevention notice for this category of event. Five (5) perimeter locations were used for the installation of a fixed sound pressure level monitoring instruments. At these locations the instrument was attached to a light pole at a height of approximately three (3) metres.

The instrument cabinet comprises the following items:

- SPLnet M100 analyser complete with third octave analysis software
- SPLnet M121 Type 1 measurement microphone fitted in a weatherproof enclosure
- Battery
- 4G mobile broadband modem

The five (5) fixed locations were near the following locations.

- 12 Martin Road, Moore Park
- 30 Lang Road, Centennial Park
- Corner of Oxford Street and Lang Road, Centennial Park
- 85 Darley Road, Centennial Park
- 60 York Road, Queens Park

To proactively manage levels at the perimeter of the event site, the engineer uses the fixed location data collection units. If the engineer detects any exceedance of the limits set out in the prevention notice a roving monitor is dispatched to the location to conduct location specific measurements and determine if the exceedance is a result of the amplified sound from the event.

These measurements are conducted using a class one portable analyser mounted on a tripod stand at a height between 1.2m-1.6m above ground, this meter when practical would be placed within 1m of the boundary of the nearest affected premises in relation to the fixed monitoring location.

E.2.2 Stage Monitoring

One (1) system were also located within the event boundary, at the FOH mixing location. At this location an instrument was attached to the supporting structure of the platform.

The instrument cabinet comprises the following items:

- SPLnet M100 analyser complete with third octave analysis software
- SPLnet M121 Type 1 measurement microphone fitted in a weatherproof enclosure

E.2.3 Mobile Monitor

Two mobile monitoring personnel were also available to patrol the perimeter, corroborate the SPLnet measurements and to conduct location specific measurements in response to any received complaints or exceedances noted by the engineer.

The remote monitoring engineers were provided with a Type1 sound analyser and the appropriate calibrator.

E.2.4 Site Plan

Below is a plan showing the relative position of the monitoring locations used for this event. It also shows the event site location.



E.2.5 Calibration

Each instrument was calibrated using either Bruel and Kjaer 4230 calibrator or a BWSA Type CA111 calibrator prior to and after use.

No significant variations were noted between pre and post use measurements.

E.3 Use of Third Octave information

A feature of the SPLnet system is the capability for third octave analysis at all measurement locations, again in real time.

This capability is significant in that it allows the audio operators of each system to tailor the response of their system to maximise the perceived level of their system by adjusting spectral content of the music, rather than relying on level only.

This also reduces the annoyance factor of the noise by reducing dominant frequencies and smoothing the resultant frequency response.

E.4 Complaints Management

The Centennial Parklands & Moore Park Trust has adopted a comprehensive sound management program, which includes a detailed complaints management procedure.

The focus of The P.A. People and The Centennial Parklands & Moore Park Trust for this event was to proactively minimise complaints by monitoring perimeter sound pressure levels continuously in real time. In addition to continuous static perimeter monitoring two (2) mobile monitoring engineers were available to attend complainant locations personally.

F. Results

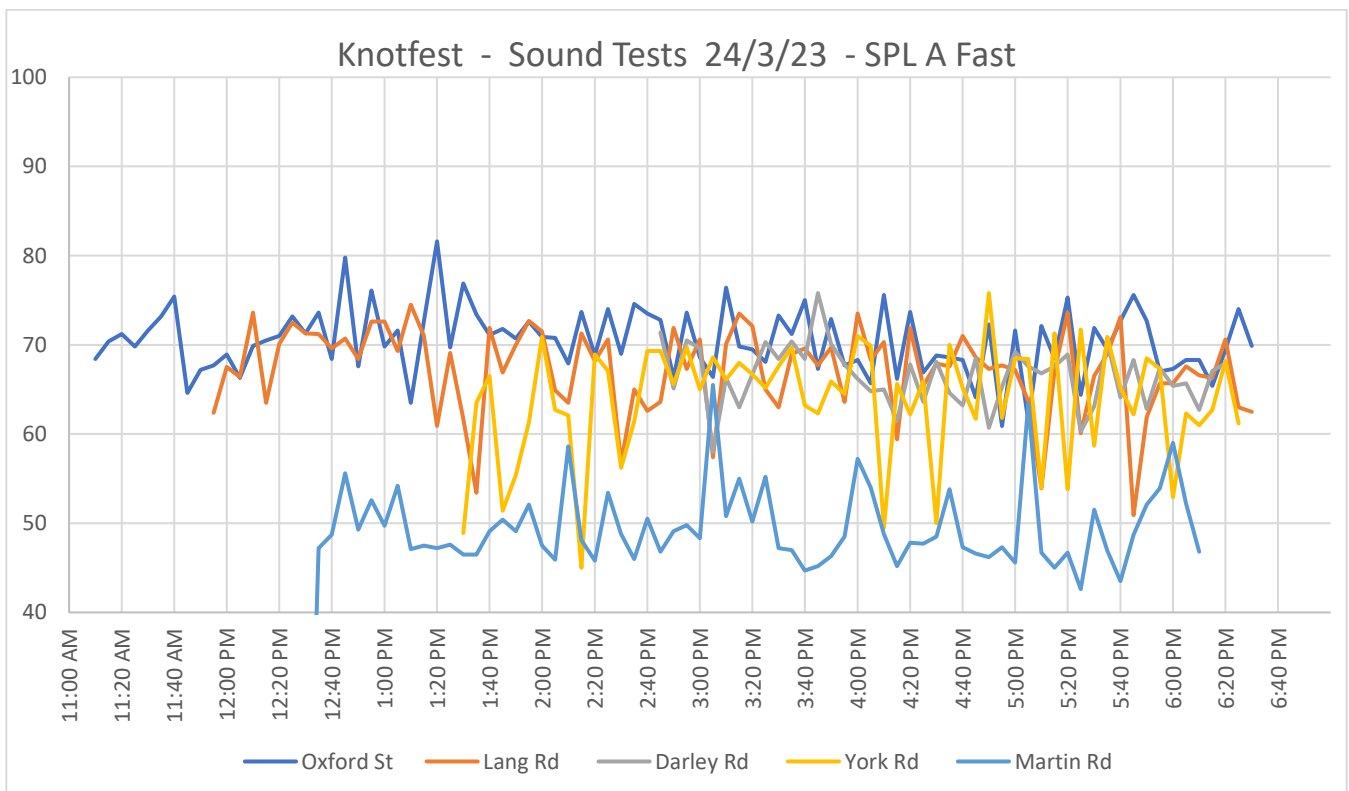
F.1 Perimeter Results

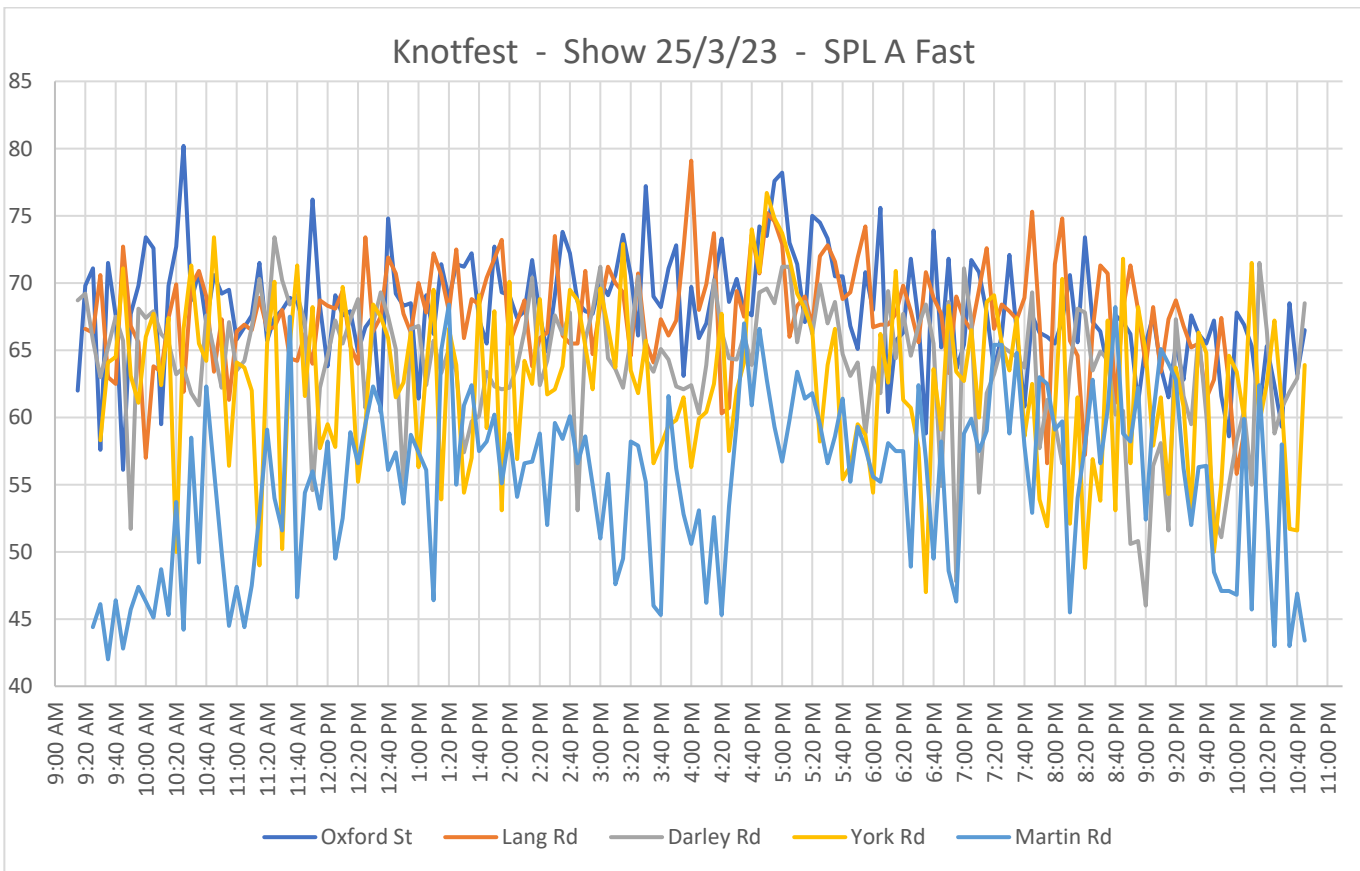
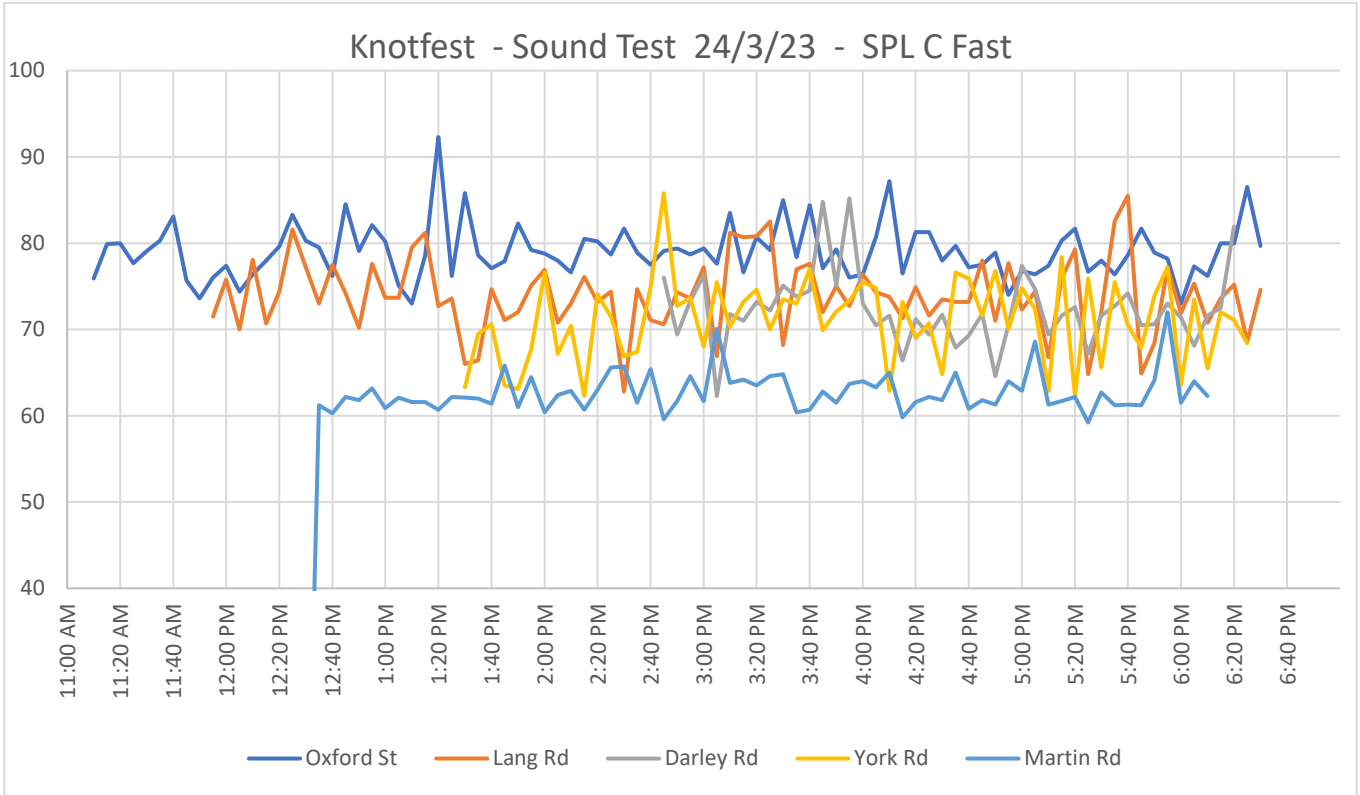
The SPLnet system employed for this event provided a significant amount of data.

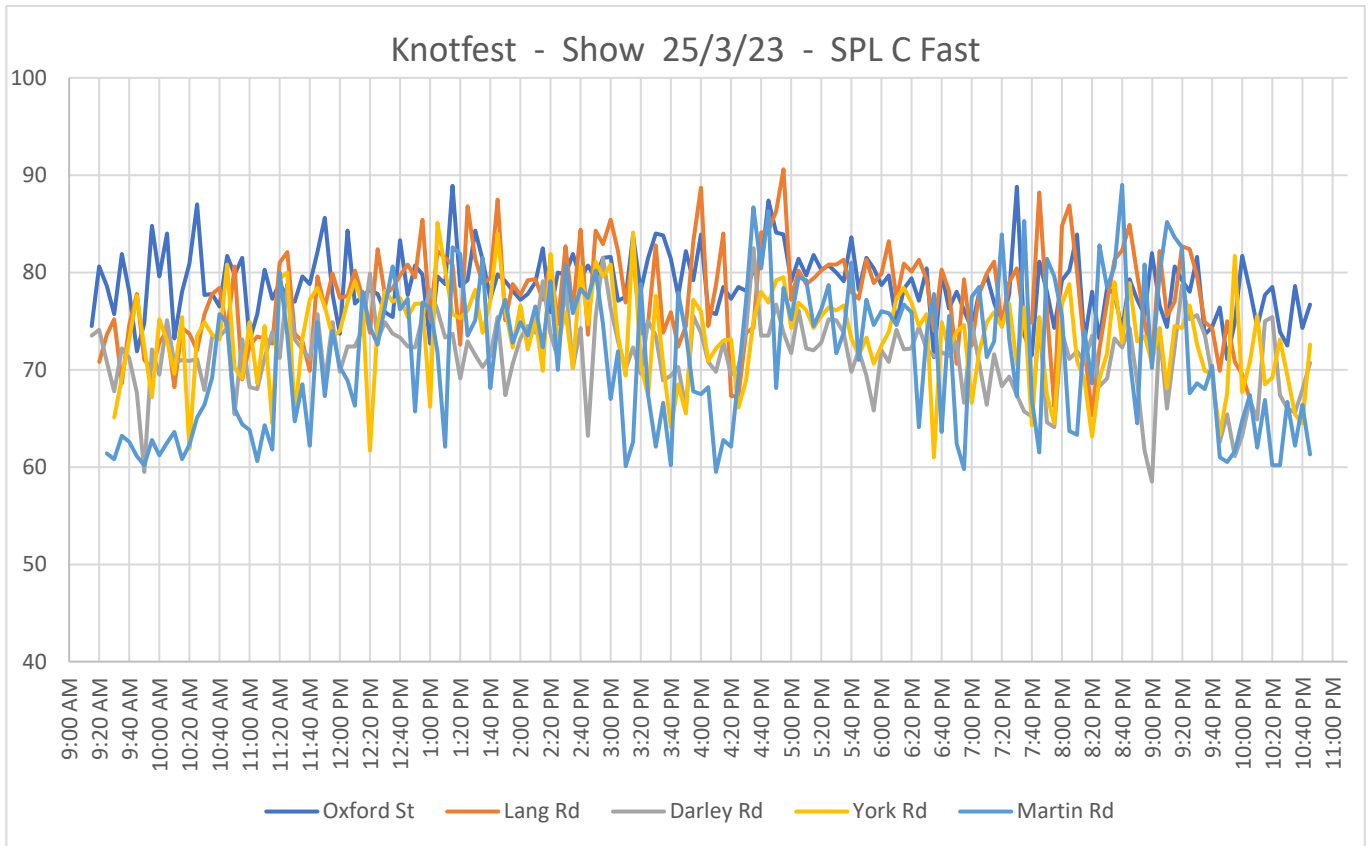
One would expect that continuous monitoring of all perimeter sensors might reveal a significant increase in the number of exceedances identified. This has not proven to be the case, due mostly to the proactive approach of using this same information to adjust the exceedance thresholds provided to each stage.

Below are four (4) graphs outlining the levels at each perimeter location over the duration of the event, please note that these graphs are of limited use in and of themselves as they record absolute levels due to all environmental factors, not only levels that are associated with the sound generated by the Knotfest sound system.

Each plot represents samples taken at 5-minute intervals of a total some 3600 points per hour at each measurement location.







F.2 Management Process for Exceedances

With the *SPLnet* system SPL levels at all perimeter points were centrally monitored in real time from our control location. The system is designed so that upon the detection of a perimeter exceedance deemed to be the result of the Knotfest reinforcement systems, event control would immediately contact the front of house sound control position and, or the event organiser to request a level decrease.

In general, communications between event control and the stage were prompt and effective in preventing and correcting any perimeter exceedances.

G. Summary

Overall, we believe that the implementation of the *SPLnet* system as part of the environmental noise management plan for Knotfest has improved the quality of noise management for the event and helped ensure general compliance with the EPA notice of Preventative Action governing events in this venue.