



Final Environmental Noise Report

**Electric Gardens
Centennial Parklands, Sydney
28th January 2017**

Prepared for
Botanic Gardens & Centennial Parklands

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 Botanic Gardens & Centennial Parklands to provide Environmental Noise Management and Monitoring Services for Electric Gardens.

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 the Centennial Parklands precinct. The document is intended to fulfil the requirements of the sound monitoring report as required by The Trust to comply with Clause 17 (a) through (h) of the Trusts Prevention Notice Number 1002139 dated 26 Feb 2001 and Variation notice number 1521549 dated 18th Feb 2015.

In order 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 at five fixed SPL meters located at key perimeter locations along with two fixed monitors at the FOH mix positions were centrally monitored in real time. During the event two additional mobile sound pressure level monitor personnel supplemented the *SPLnet* system. These mobile monitors were used to patrol the perimeter, verify the *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

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. Event Details

B.1 Dates and Times

Electric Gardens was a multi stage music concert held in the Brazilian Fields precinct of Centennial Park Sydney from 12pm – 10pm on Saturday 28th January 2017, with sound system checks and rehearsals from 10am - 12pm on Saturday 28th January 2016.

The Trust confirms that music concluded at 10:00pm.

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

B.2 Weather Conditions

It was noted that the winds were from the North for most of the day at speeds 30-34kph. As per clause 14(c) The wind speed was in excess of 5m/s for the duration of the event. Humidity was between 55-65% throughout the day.

C. Environmental Noise Management Approach

C.1 Mitigation before the Event

Audio system design was 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.

The P.A. People reviewed data and other information from previous events held in Centennial Parklands over previous years. This information assisted us in formulating the event monitoring strategy that was implemented for this event.

The Trust's Noise Management Plan forms the basis for sound monitoring for Electric Gardens.

C.1.2 Pre-event planning:

As part of pre-event planning, the following was carried out for the event:

- Early provision of site plans to the Trust's acoustic consultants for feedback on noise impact and implementation of recommendations received by the consultants. This included study of the site layout, and positioning and direction of stages. Details include:
- Facing stages away from direct lines to residential areas.
 - Particularly directing sound sub frequency energy to dense tree area between the Brazilian Fields and the Parade Grounds.
- Sound briefings prior to the event with the event organiser, representatives of The Trust and the Sound System Contractor establishing clear understanding of how requests for noise reduction will be communicated and actioned, and a clear action plan should any stage fail to comply with instructions received for noise reduction.
- Notification to residents as outlined in community consultation above, including provision of a hotline for residents to register complaints and comments, operating throughout all sound checks, rehearsals and during the event.
- Scheduling of sound checks just prior to the event start time to ensure noise impacts are reduced to just the one day.
- Scheduling of event to finish at 10.00pm, instead of the 10.30pm finish time permitted under EPA guidelines.

C.2 Mitigation during the Event

The SPLnet system was used to continuously monitor and log environmental conditions at the event site. The SPLnet system continuously recorded audio from each of the five perimeter SPLnet monitors for the duration of the event.

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

Event control set dynamic SPL thresholds and exceedance indicators for the stage/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.

Sound engineers responded to requests for adjustment in a timely manner, and exceedances outside the exemptions offered by Clause 15 of the license were contained.

C.3 Post Event Summary

Overall, The Trust, The P.A. People and the organisers of Electric Gardens 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 monitoring and management is implemented for future events of this nature at the Parklands.

D. Monitoring Details

D.1 Details of Measurement System

To monitor perimeter sound pressure levels for Electric Gardens, 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 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 residence. 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 is 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 Electric Gardens event were centrally monitored and recorded from two (2) fixed SPL meters located at the main stages and at five (5) key perimeter positions in real time. During the event two (2) additional mobile sound pressure level monitors 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 environmental conditions at the event site. The *SPLnet* system continuously recorded data from each of the five perimeter *SPLnet* monitors for the duration of the event.

The engineer at event control was able to use this data, in combination with the subjective analysis of the mobile monitors, to identify the source of any sound pressure level exceedances at the event perimeter. Any perimeter exceedances detected by the *SPLnet* system or the mobile monitors 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 were 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 for the stages were also monitored at the FOH mixing positions by the sound engineers. Dynamic SPL thresholds and exceedance indicators were set for the stage/FOH positions by event control. 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.2 Site Plan and Measurement Locations

The P.A. People reviewed data and other information from previous events held in Centennial Parklands over previous years. This information assisted us in formulating the event monitoring strategy that was implemented for this event.

D.2.1 Perimeter Monitoring

Five perimeter locations were selected for the installation of fixed sound pressure level monitoring instruments. At each location an instrument was attached to a roadside pole at a height of three metres. Within the height range noted in the Variation notice condition 15 of 1.5-3.5m off the ground.

Each instrument cabinet comprised the following items:

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

These five fixed locations were in the vicinity of:

- Lang Road
- Martin Road
- Oxford Street
- Darley Road
- York Road

To proactively manage levels at the perimeter of the event site, the engineer uses the fixed location monitors. 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 over 1.5m 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.

Stage Monitoring

Two systems were also located within the event boundary, at the Front of House mixing locations for the stages. At these locations an instrument was attached to the supporting structure of the platform.

The instruments comprised the following items:

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

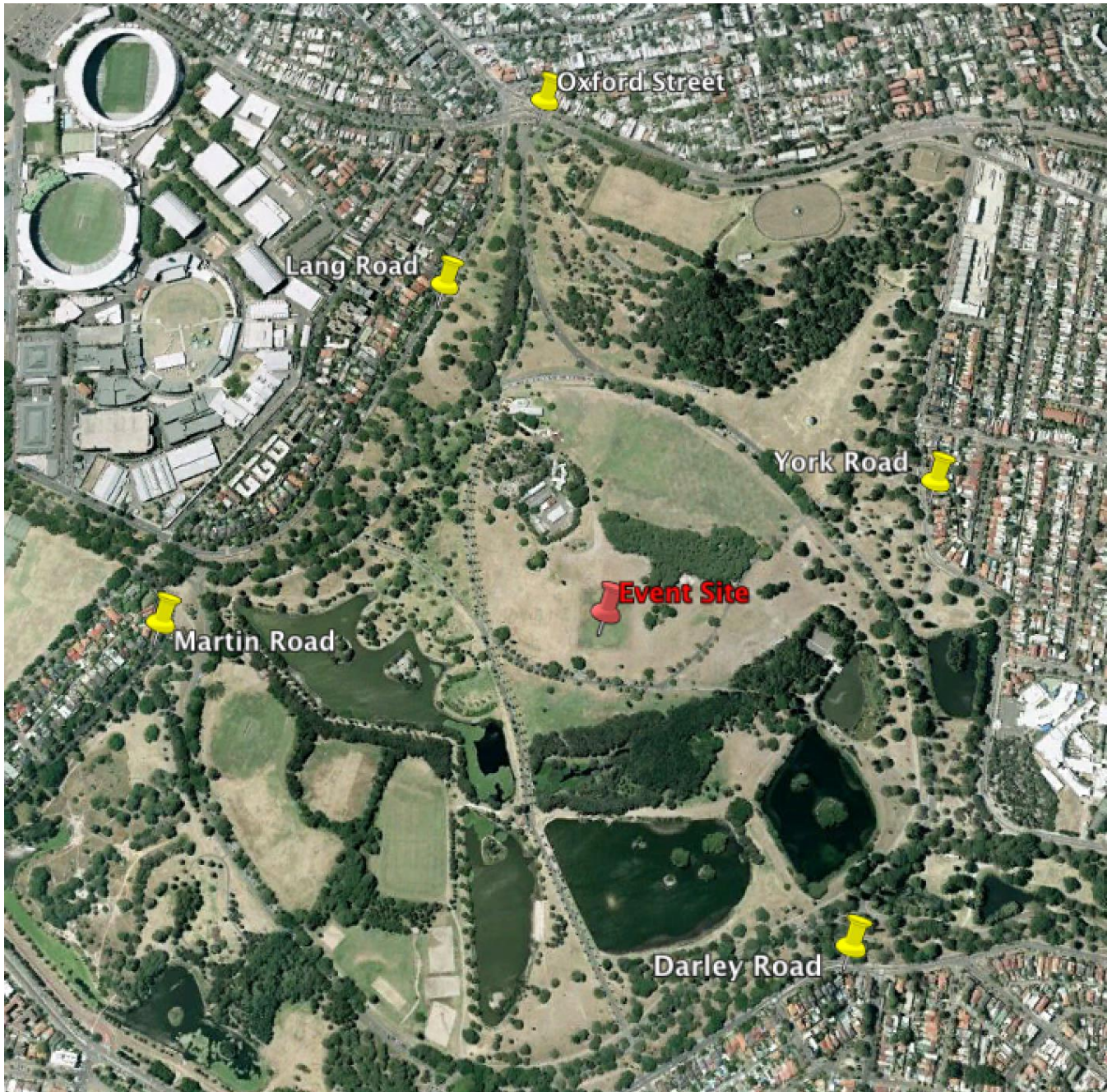
D.2.2 Mobile Monitor

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.

Remote monitoring staff was provided with a Type1 sound analyser complete with calibrator.

D.2.3 Site Plan

Below is a site plan showing relative positions of the five major monitoring locations used for this event.



D.2.4 Calibration

All instruments used for the monitoring of sound pressure levels for this event carry current calibration certificates.

Each instrument was field calibrated using either Bruel and Kjaer 4230 calibrator or a BWSA Type 660 calibrator prior to and after use.

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

D.3 Use of Third Octave information

A feature of the SPL_{net} 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.

D.4 Complaints Management

The Botanic Gardens & Centennial Parklands have adopted a comprehensive sound management program, which includes a detailed complaints management procedure.

The focus of The P.A. People and The Trust for this event has been to proactively minimise complaints by monitoring perimeter sound pressure levels continuously in real time. In addition to continuous perimeter monitoring two mobile monitor personnel were available to attend to complainants locations personally.

E. Results

E.1 Perimeter Results

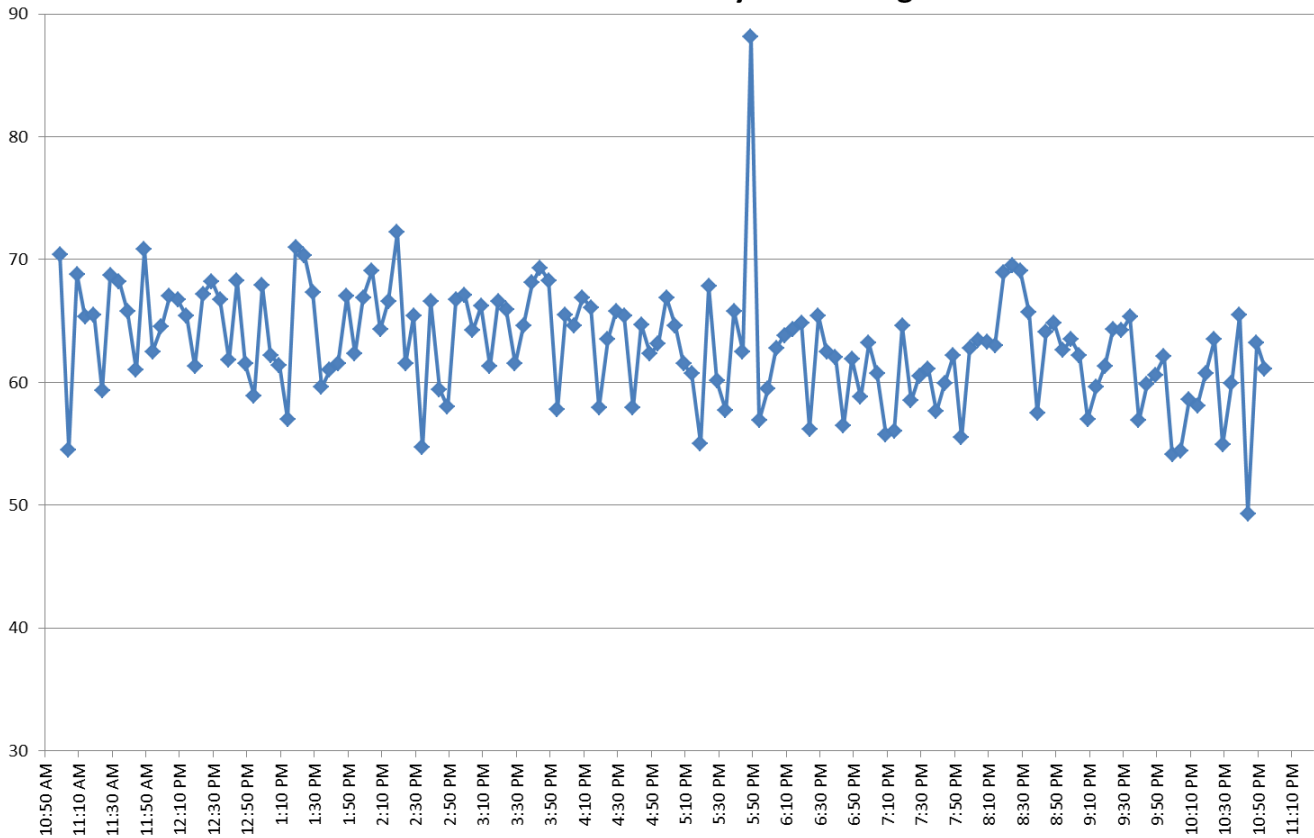
The SPL_{net} system employed for this event provides a significant amount of data particularly compared to the data collected from previous events.

In particular 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.

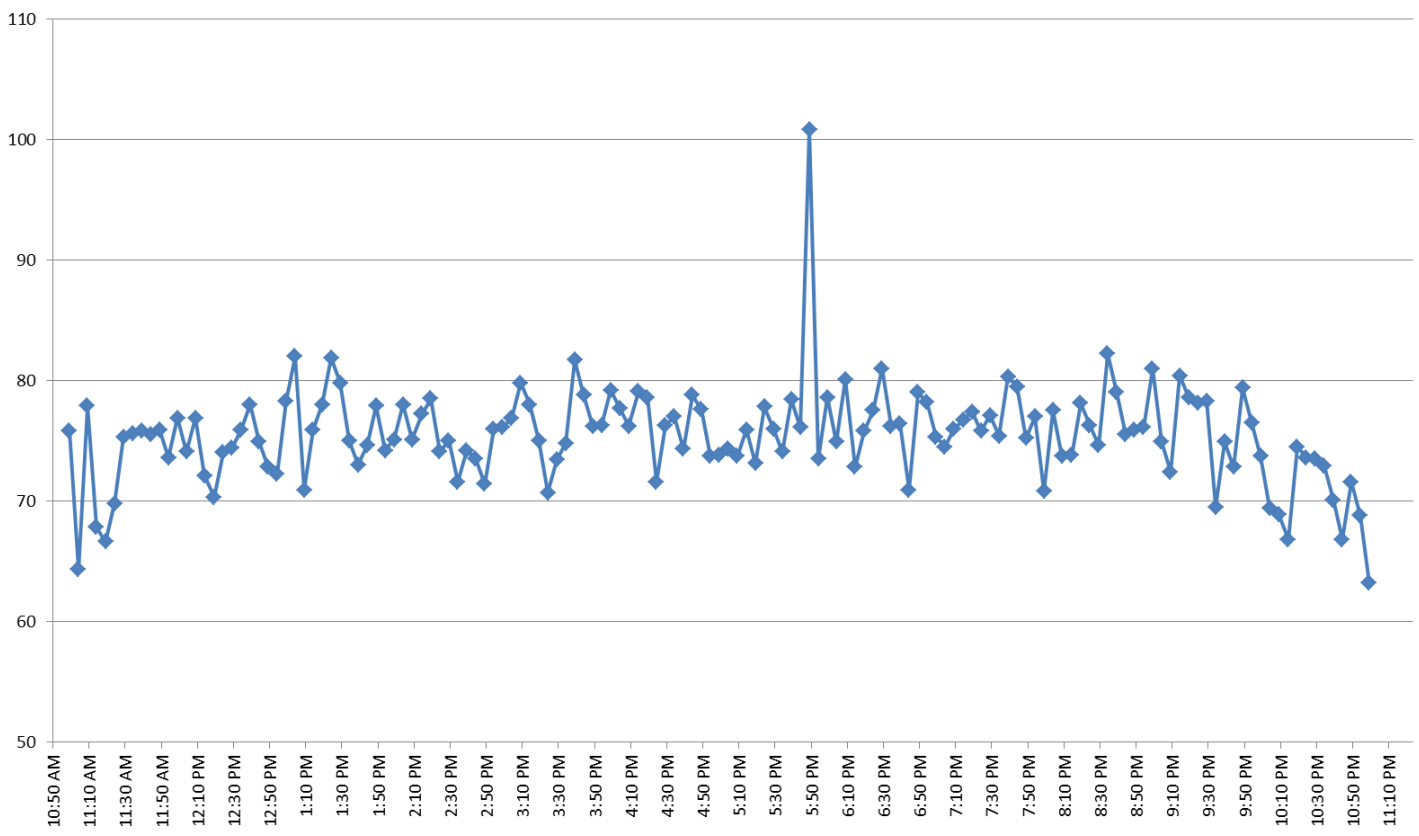
Below are two graphs outlining the levels at each of the five perimeter locations over the duration of the event day. Please note that these graphs are of limited use in and of themselves as they record absolute levels due to all environmental factors, not only levels that are associated with the sound generated by the Electric Gardens stages. In particular the A weighed plot shows significant interference from local traffic.

Each plot represents samples taken at 5-minute intervals of a total some 36,000 data points per measurement location.

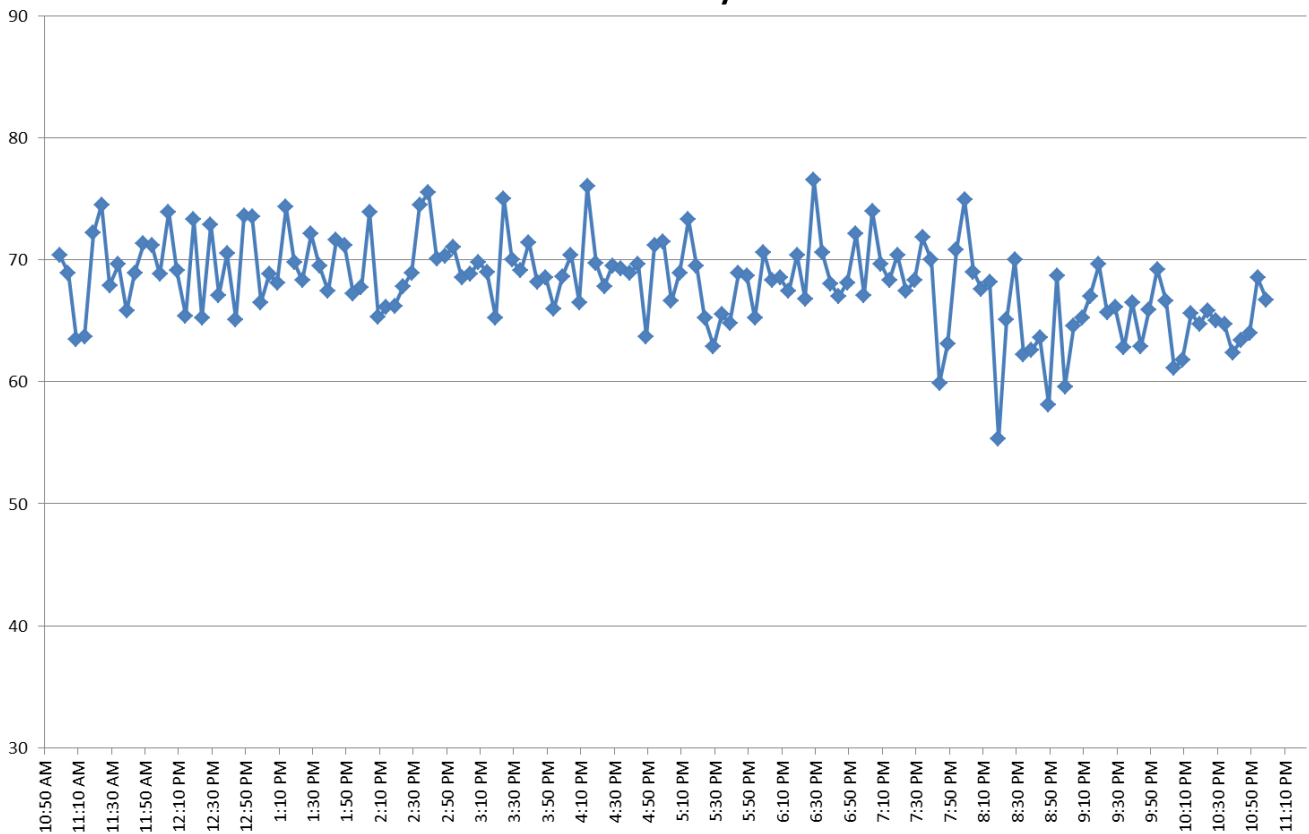
SPL A Fast - 28th January 2017 - Lang Rd



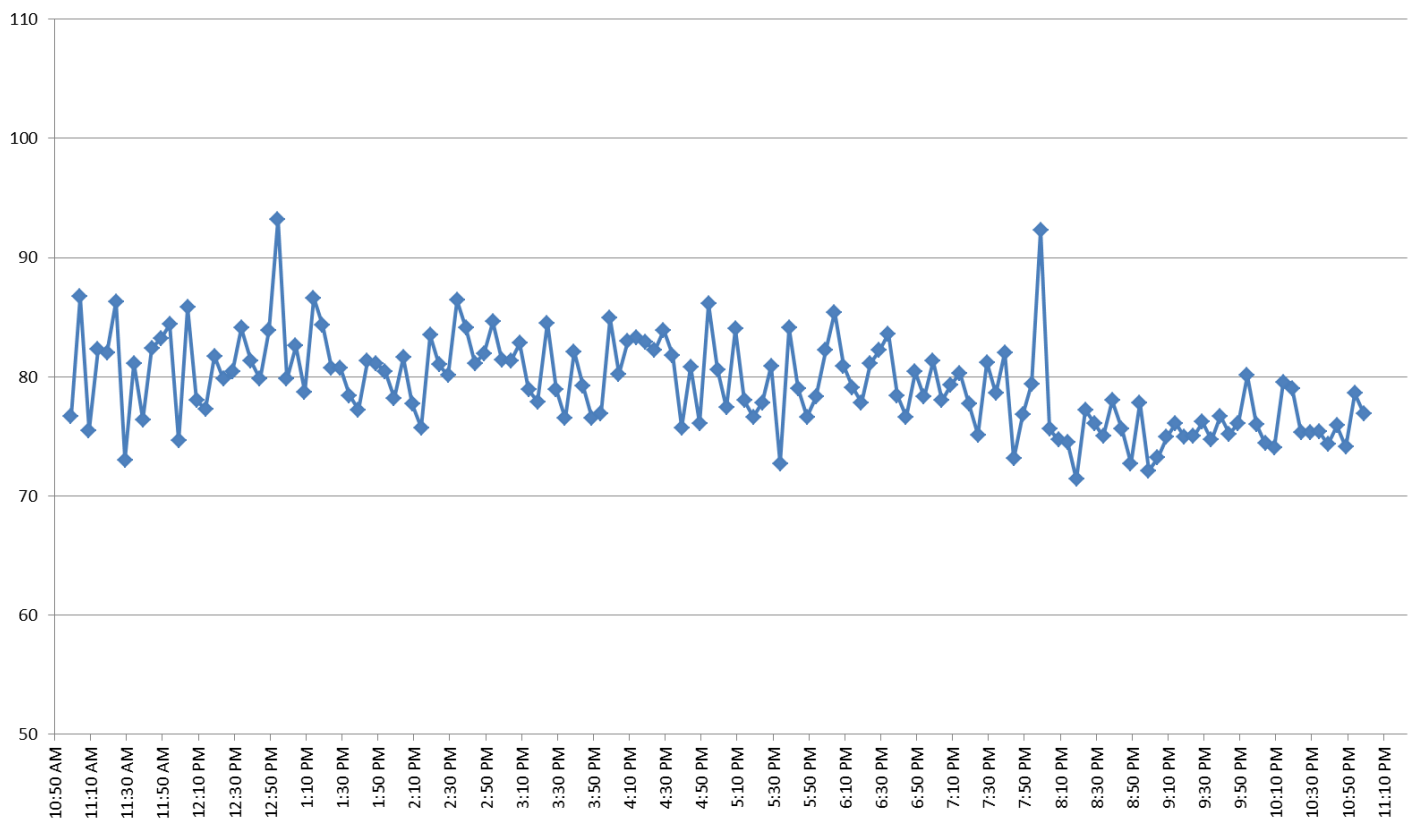
SPL C Fast - 28th January 2017 - Lang Rd



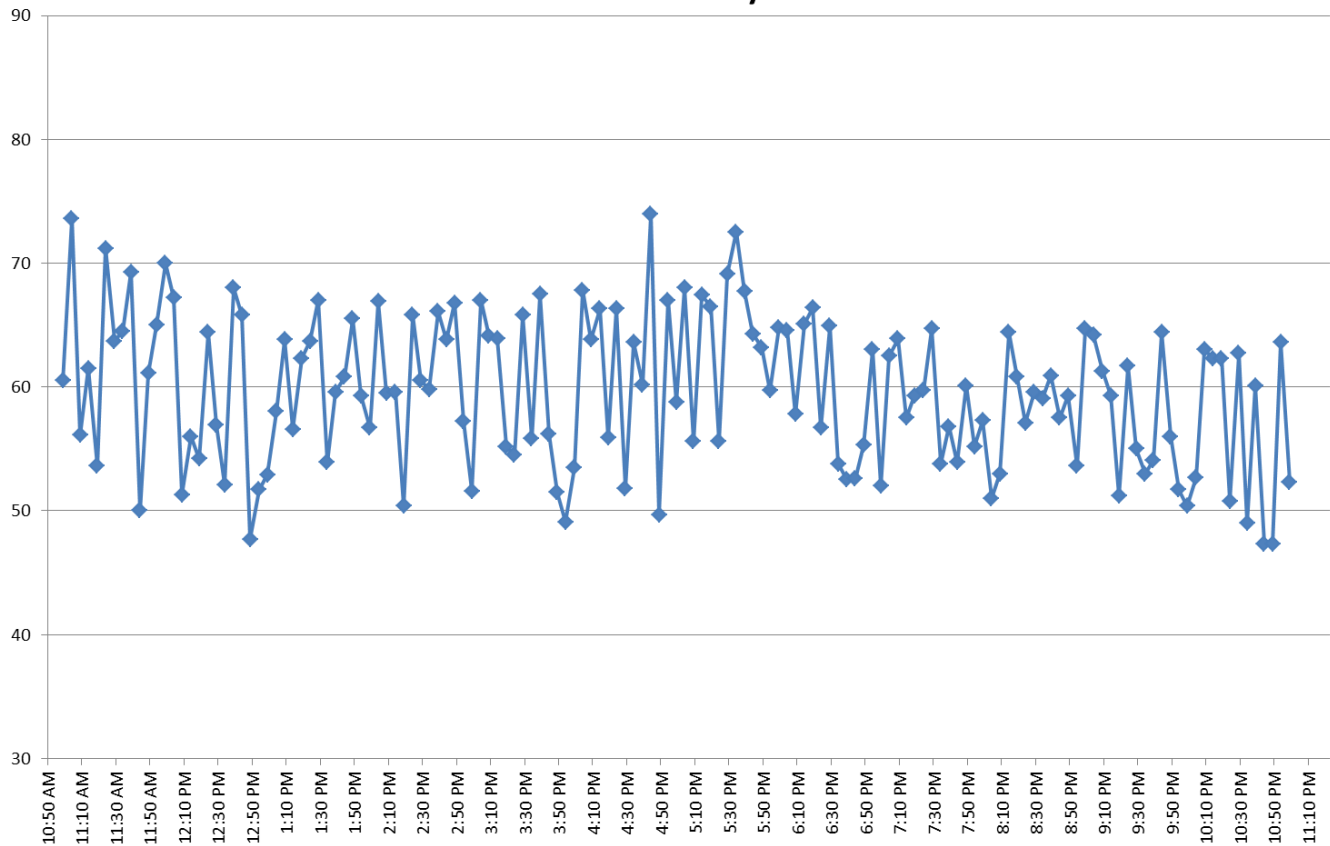
SPL A Fast - 28th January 2017 - Oxford St



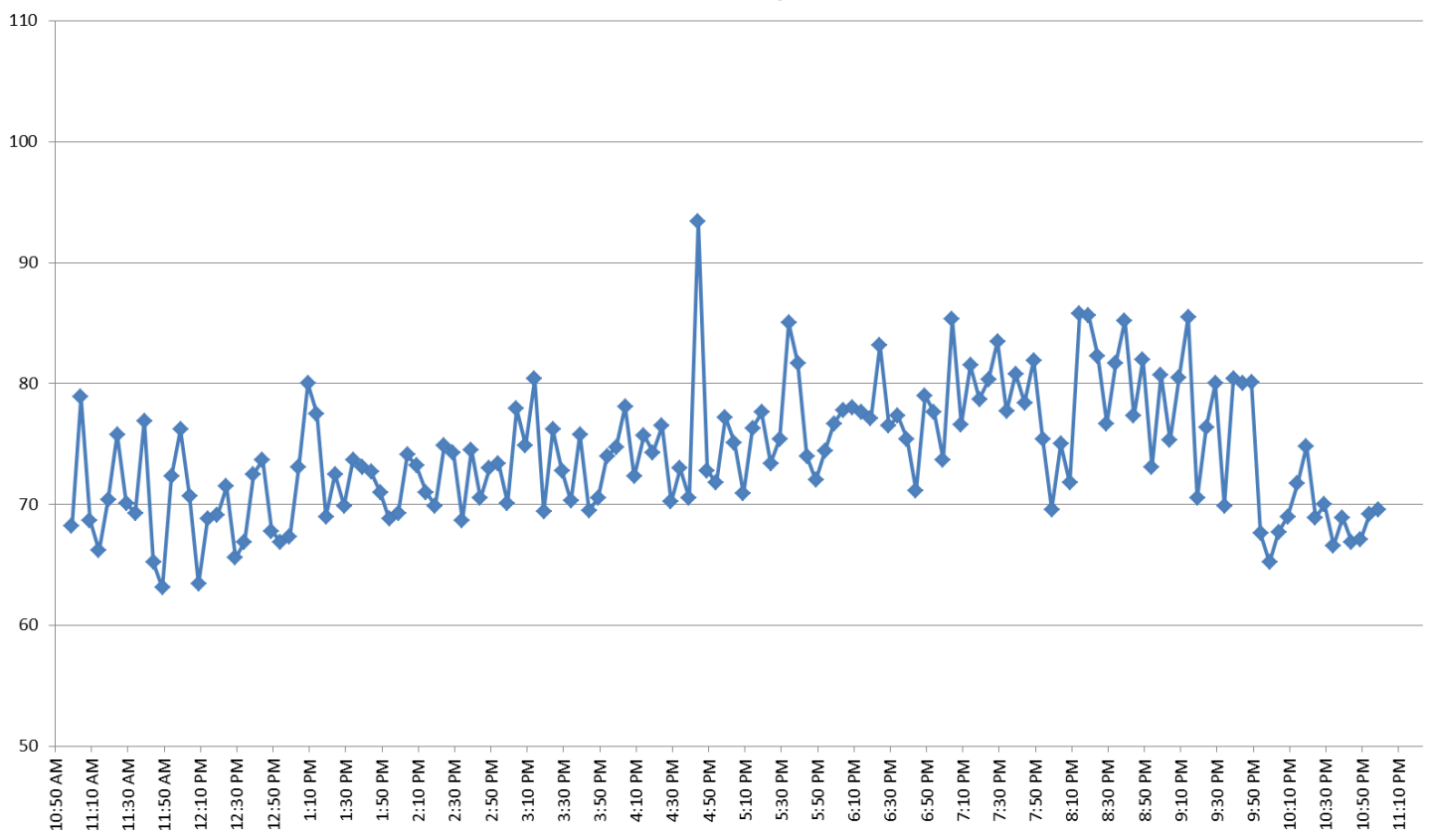
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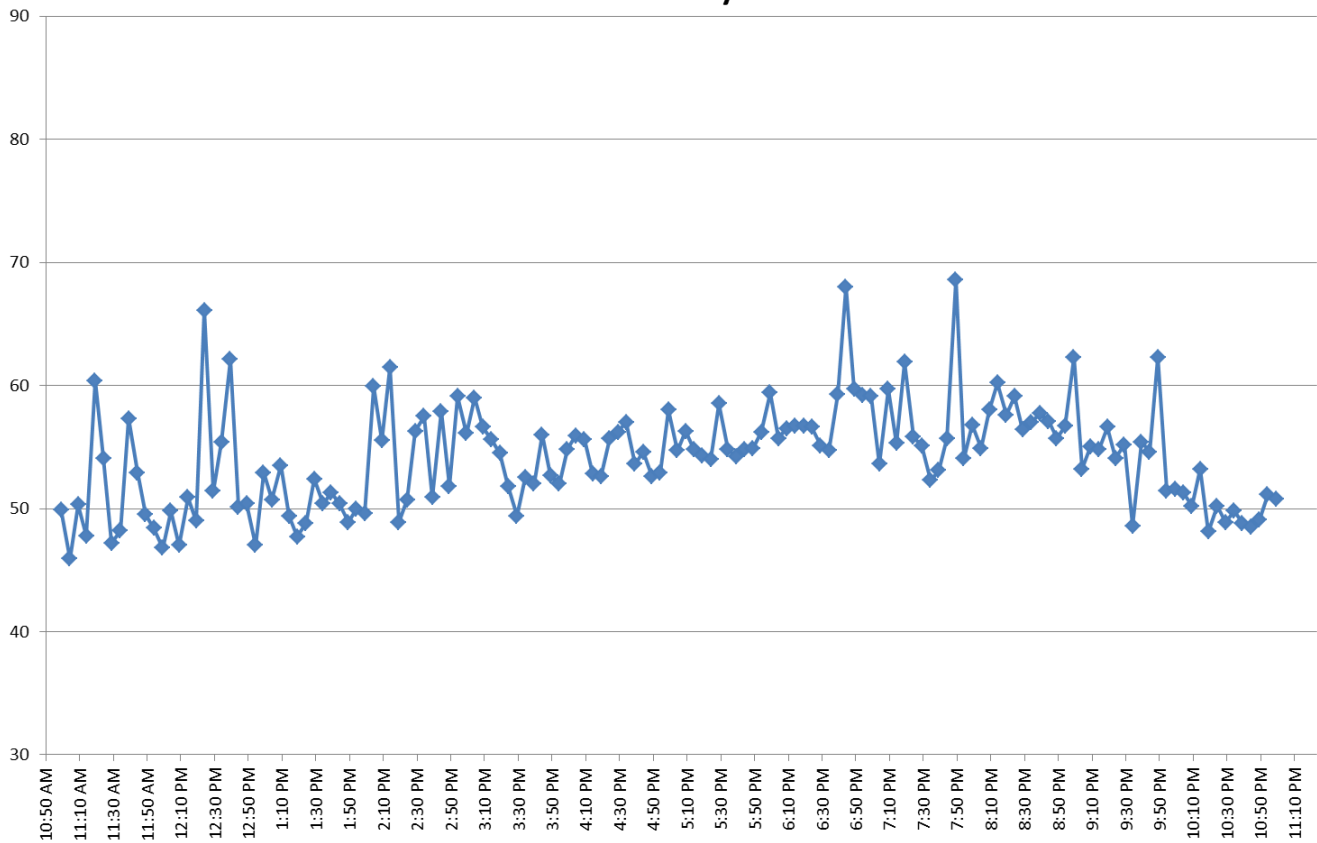
SPL A Fast - 28th January 2017 - York Rd



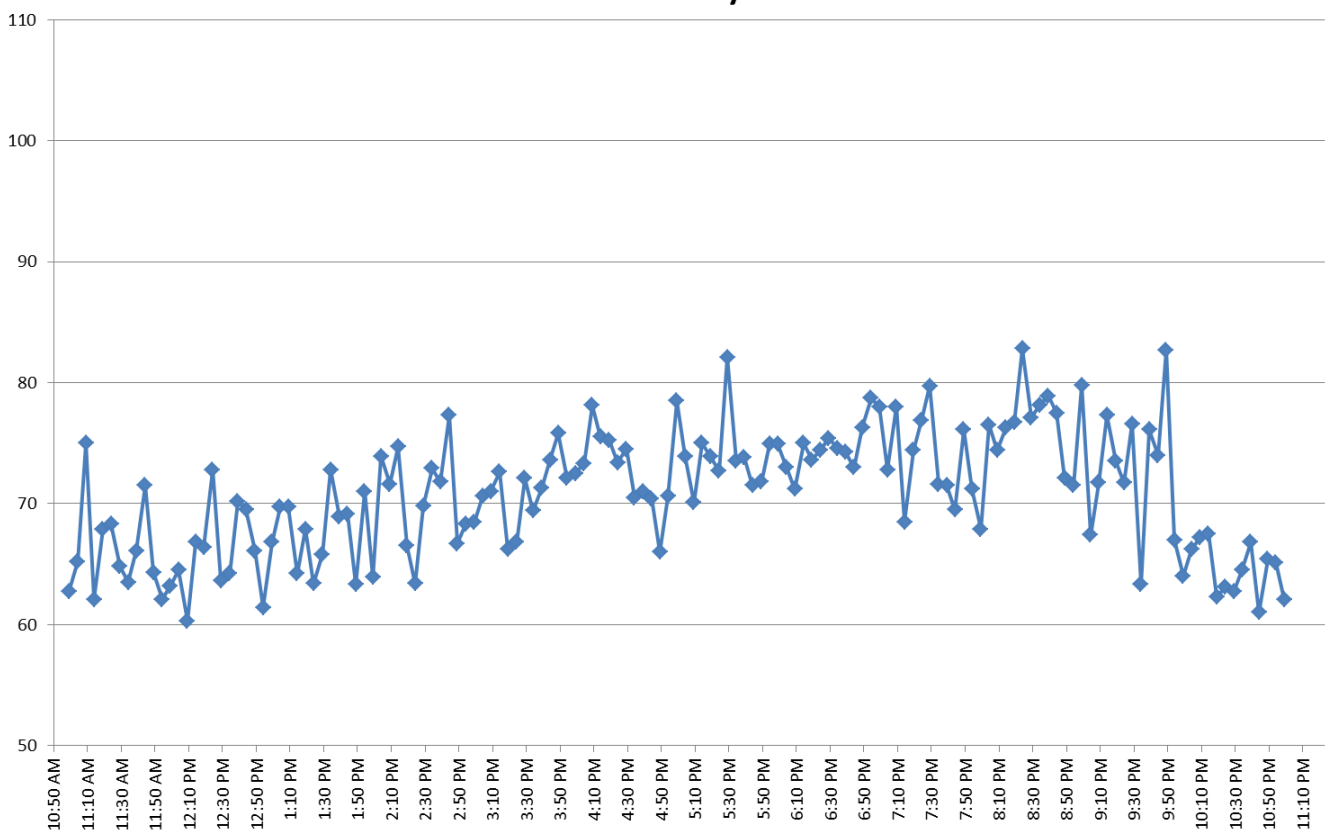
SPL C Fast - 28th January 2017 - York Rd



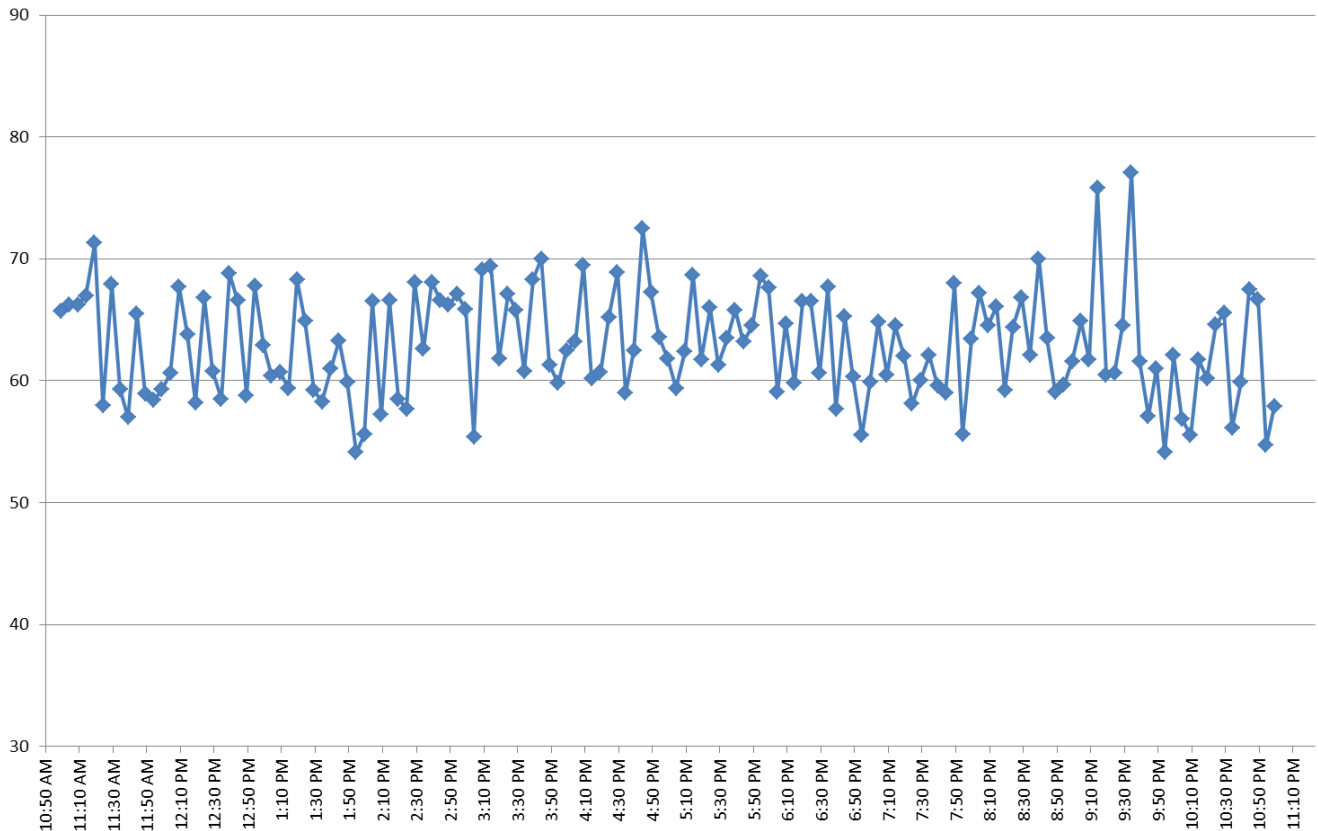
SPL A Fast - 28th January 2017 - Martin Rd



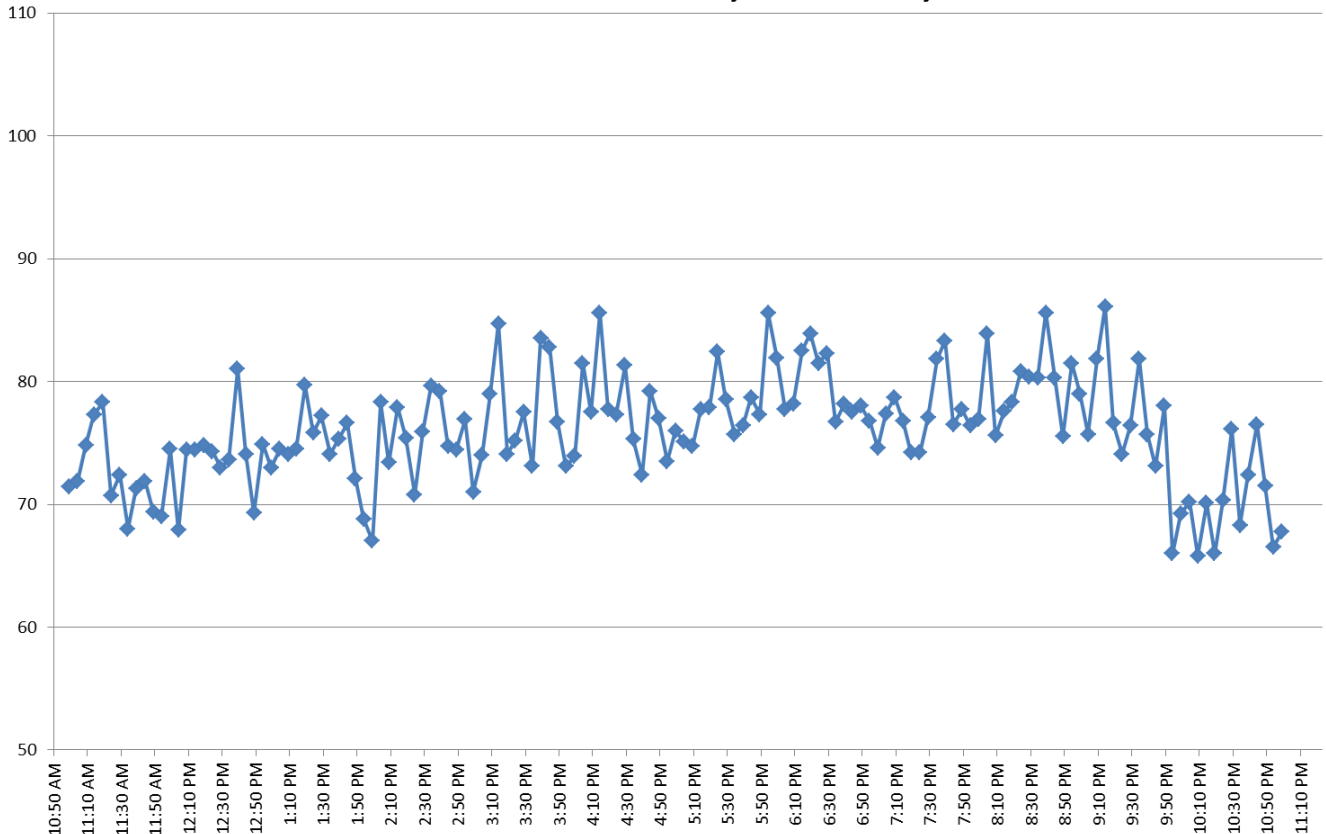
SPL C Fast - 28th January 2017 - Martin Rd



SPL A Fast - 28th January 2017 - Darley Rd



SPL C Fast - 28th January 2017 - Darley Rd



E.2 Exceedances

As noted previously we have collected a substantial amount of data pertaining to the noise levels at the perimeter of Centennial Park during this event. Below is a summary of any exceedances that occurred.

E.2.1 Rehearsals and Sound Tests

Zero (0) exceedance of the 85dB(C) limit were identified at the perimeter.

Zero (0) exceedance of the 65dB(A) limit were identified at the perimeter.

E.3 Main Event

Main Event (not exempted by Clause 14&15):

Zero (0) exceedances of the 85dB(C) limit was identified at the perimeter.

Zero (0) exceedances of the 65dB(A) limit were identified at the perimeter.

Main Event (exempted by Clause 14&15):

Zero (0) exceedances of the 85dB(C) limit was identified at the perimeter.

Zero (0) exceedances of the 65dB(A) limit were identified at the perimeter.

E.4 Sound Related Complaints

There were five (5) sound-related complaints fielded by the hotline during the event day of Electric Gardens. A roving monitor was despatched to the first two addresses, and noise levels were found to be within limits.

The next two complaints were not able to be attended as the event finished before a roving monitor could be despatched. Spot measurements from nearby at a similar time indicate that noise levels were within limits.

The fifth complainant chose not to leave their details so a roving monitor was not despatched.

E.5 Management Process for Exceedances

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

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

The dynamic sound pressure level thresholds set for the stage were effective in preventing perimeter exceedances.

F. Summary

Overall we believe that the implementation of the *SPLnet* system as part of the environmental noise management plan for Electric Gardens has improved the quality of noise management for the event and ensured overall compliance with the EPA Prevention Notice and variations.