



Sydney Cricket Ground Trust

**NOISE MONITORING, A LEAGUE:
SYDNEY FC V BRISBANE ROAR**

30 JANUARY 2016

February 2016

Report Prepared by:

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Executive Summary

Monitoring of noise levels at sensitive receptors in the area surrounding Allianz Stadium was undertaken during the A League Sydney FC v Brisbane Roar Football match held on 30 January 2016 to determine compliance with the following noise criteria defined in the site's Noise Management Plan (NMP):

'When measured at the specified monitoring locations, the L_{Amax} of noise emanating from any sound amplification equipment must not exceed 60 dB (A) during any sporting events.

This noise limit applies to wind speeds up to 5m/s, above which wind generated noise on the microphone limits measurement accuracy. During periods of wind greater than 5m/s this noise limit does not apply.

Noise levels measured when wind speed exceed 5m/s (at microphone height) should not be used to measure compliance with noise limits, as wind generated noise may influence measurement accuracy. During periods of wind greater than 5 m/s the Trust must continue to take all reasonable and feasible actions to minimise noise.'

Noise levels were measured for the duration of the amplified activities associated with the event 6:30 pm to 9:30pm at the two positions required by the Noise Management Plan. During the monitoring, notes were also made regarding the sources of noise in the area and the source of any potential exceedences of the noise criteria.

Throughout the monitoring, noise levels were measured continuously and the maximum levels were recorded at each location every two minutes. During each two minute period notes were also made regarding the sources of noise in the area and the source of any potential exceedences of the noise criteria. The noise levels recorded represent the highest RMS noise level recorded during the two minute period.

During the A-League Football match at Allianz Stadium, it was identified that noise levels from the event were less than the criteria defined in the site's NMP. Due to heavy rain for the first half of the event it was difficult to distinguish PA noise levels from the background levels. Short term noise levels were perceived to be up to 4 dB over the 60 L_{Amax} criteria for a short period during the rain storm. The PA operator was advised to reduce the levels and these were reduced immediately. It is possible that the ambient thunderstorm noise was influencing the readings at this time. Once the PA operator was contacted by Event Noise Management staff they responded promptly by reducing the levels. No subsequent exceedances were measured.

At Position 1 the match was audible at times, however generally noise from the match was masked by thunderstorm activity for the first half of the event and traffic and other ambient noise during the second half of the event. At Position 2 the match was audible at times, however noise levels were well below the criteria and noise from the match was usually masked by thunderstorm activity, traffic and other ambient noise.

No complaints were forwarded to Event Noise Management staff for investigation.

During the event, L_{Amax} noise levels were higher than the 60 dB(A) criteria for the majority of the time due to traffic noise and patrons external to the venue. These sources of noise are not directly attributable to the sound amplification system and therefore do not represent an exceedance of the criteria.

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1 INTRODUCTION

1.1 SCOPE OF ASSESSMENT

Sydney Cricket Ground Trust (SCGT) commissioned Event Noise Management to conduct event noise monitoring during the A League Sydney FC v Brisbane Roar Football match held on 30 January 2016 as part of the requirements under the Noise Management Plan (NMP) for the facility¹.

This report presents a summary of the results of the monitoring and a comparison with the noise criteria for the event as defined in the NMP.

1.2 EVENT DETAILS

The sporting event was held at Allianz Stadium on Saturday 30 January 2016. The gates opened at 5:30 pm and the game concluded at approximately 9:30 pm, with amplified music, announcements and advertising continuing at a low level until approximately 9:36 pm.

1.3 EVENT NOISE CRITERIA

Noise limits for sporting events held at Allianz Stadium are provided in the site's NMP as follows:

'When measured at the specified monitoring locations, the L_{Amax} of noise emanating from any sound amplification equipment must not exceed 60 dB (A) during any sporting events.'

This noise limit applies to wind speeds up to 5m/s, above which wind generated noise on the microphone limits measurement accuracy. During periods of wind greater than 5m/s this noise limit does not apply.

Noise levels measured when wind speed exceed 5m/s (at microphone height) should not be used to measure compliance with noise limits, as wind generated noise may influence measurement accuracy. During periods of wind greater than 5 m/s the Trust must continue to take all reasonable and feasible actions to minimise noise.'

Section 6.2.1 of the NMP details the monitoring positions that must be considered as follows:

'Monitoring Locations

For both sporting events and concerts attended monitoring locations will be as set out below.

For activities taking place at Allianz Stadium:

- *At a point within one (1) metre of the boundary nearest to Allianz Stadium at 234 Moore Park Road, Paddington*
- *At a point within one (1) metre of the boundary nearest to Allianz Stadium of 10 Alexander Street, Paddington.*

¹ Sydney Cricket Ground and Allianz Stadium, Noise Management Plan (NMP), prepared by ERM for Sydney Cricket and Sports Ground Trust (SCGT), April 2015

2 MONITORING METHODOLOGY

2.1 MONITORING POSITIONS

Monitoring during the match was undertaken at two fixed monitoring positions as required by the NMP. Table 2.1 presents a summary of the monitoring locations assessed during the event, with the monitoring positions identified on Figure 1.

TABLE 2.1: SUMMARY OF MONITORING POSITIONS

Position	Description
1	Fixed monitoring position located within 1 m of the front boundary of 234 Moore Park Road
2	Fixed monitoring position located within 1 m of the front boundary of 10 Alexander Street



Figure 1: Noise Monitoring Positions (External Fixed Locations)

2.2 OPERATORS

During the monitoring undertaken on 30 January 2016, Event Noise Monitoring personnel were located at each position identified in Figure 1. The monitoring exercise was undertaken by the following personnel:

- Position 1: Gary Hall: Bsc (Hons) Env Sci..
- Position 2: Roger Treagus: BA, MA Env. Stud, MAAS.

2.3 MONITORING EQUIPMENT

Table 2.2 presents a summary of the equipment used to complete the monitoring. The monitoring instruments utilised conform to Australian Standard 1259 "Acoustics - Sound Level Meters", (1990) as Type 1 precision sound level meters and have an accuracy suitable for both field and laboratory use.

The sound level meters and calibrator used for the monitoring have been checked, adjusted and aligned to conform to the Type 1 specifications within the last 24 months and issued with a conformance certificate (NATA).

TABLE 2.2: SUMMARY OF MONITORING EQUIPMENT

Position	Instrument Model	Instrument Serial	Instrument Calibration Due Date	Calibrator Model	Calibrator Serial	Calibrator Calibration Due Date
1	B&K 2250L	1405306	22/01/17	Rion NC-73	11127965	3/11/16
2	B&K 2250L	2741104	23/01/17	Rion NC-73	11127965	3/11/16

Field calibrations of each of the instruments were also undertaken prior to and immediately after the monitoring was completed. Less than 0.5 dB drift occurred over the measurement periods. All instruments were fitted with a windshield and monitoring was completed at a height of 1.5 m above ground level.

2.4 WEATHER CONDITIONS DURING THE EVENT

During the monitoring period wind speeds on the site were generally gusty and a thunderstorm dominated the weather for the first half of the event. The second half of the event weather tended toward moderate north-easterly winds. The temperature was generally cool.

2.5 METEOROLOGICAL INFLUENCES ON MONITORING

The winds during the event were strong and gusty during the thunderstorm followed by moderate winds from all directions. The gusty variable winds would have caused variations in the noise carrying towards and away from the nearby residents during the event.

3 RESULTS OF MONITORING

3.1 METHODOLOGY

Noise monitoring was completed at each location throughout the monitoring period with the maximum noise levels recorded for every two minute period. During the monitoring, notes were also made regarding the sources of noise in the area and the source of any potential exceedances of the noise criteria. The noise levels represent the highest RMS noise level recorded during the two minute period. Hence, even where exceedances are identified, it is possible that for the majority of the two minute period receptor noise levels (from amplified activities within the Allianz Stadium) were compliant with the NMP criteria.

3.2 MONITORING RESULTS

Noise monitoring during the A League Sydney FC v Brisbane Roar Football match held on 30 January 2016 at Allianz Stadium was conducted between 6:30 pm and 9:40 pm at monitoring positions 1 and 2. The measured noise levels and associated notes that were recorded during this period are presented in Appendix B. Only 1 short period was noted to exceed the criteria but this was during the thunderstorm activity and the rain could have influenced the readings.

The noise monitoring identified a few periods with noise levels approaching the noise criteria at Position 1 during the monitoring period. Due to heavy rain for the first half of the event it was difficult to distinguish PA noise levels from the background levels. Noise levels were perceived to be up to 4 dB over the 60 L_{Amax} criteria for a short period during the rain storm. These levels were influenced by the gusty storm activity. The PA operator was advised to reduce the levels and these were reduced immediately. It is possible that the ambient rain noise was influencing the readings at this time. Once the PA operator was contacted by Event Noise Management staff they responded by reducing the levels and a greater margin of compliance was achieved.

Typically during periods where noise levels approached the criteria, measured L_{Amax} noise levels from traffic noise and rain were significantly greater than that of the amplified noise from Allianz Stadium during the same 2-minute period.

At Position 1 the match was audible at times, however generally noise from the match was masked by thunderstorm traffic and other ambient noise. At Position 2 the match was audible at times, however well below the criteria and generally noise from the match was masked by traffic and other ambient noise.

All recorded L_{Amax} noise levels were greater than the noise criteria set in the NMP for noise emanating from sound amplification equipment. However, these noise levels do not represent non-compliance with the NMP as the L_{Amax} levels recorded were attributable to extraneous ambient noise sources and not the Allianz Stadium PA system. These sources included passing vehicles, aircraft overhead, pedestrians, and event patrons outside the venue.

3.3 CONCERT HOTLINE

During the event no noise complaint related calls were received on the concert hotline established by the Sydney Cricket Ground Trust and no complaints were received by Event Noise Management staff for investigation.

4 CONCLUSIONS

Monitoring of amplified noise from Allianz Stadium during the A League Sydney FC v Brisbane Roar Football match held on 30 January 2016 was completed at two positions as required by the site's Noise Management Plan (NMP).

Noise levels were measured for the duration of the amplified activities associated with the event from 6:30 pm to 9:40 pm. Throughout the monitoring, noise levels were measured continuously, with the maximum levels for every two minute period recorded. During each two minute period notes were also made regarding the sources of noise in the area and the source of any potential exceedences of the noise criteria. The noise levels recorded represent the highest RMS noise level during the two minute period.

During the Soccer match it was identified that noise levels from the event were less than the criteria defined in the site's NMP for the durations.

Due to heavy rain for the first half of the event it was difficult to distinguish PA noise levels from the background levels. Short term noise levels were perceived to be up to 4 dB over the 60 L_{Amax} criteria for a short period during the rain storm. The PA operator was advised to reduce the levels and these were reduced immediately. It is possible that the ambient thunderstorm noise was influencing the readings at this time. Once the PA operator was contacted by Event Noise Management staff they responded promptly by reducing the levels. No subsequent exceedances were measured.

At Position 1 the match was audible at times, however generally noise from the match was masked by traffic and other ambient noise especially during the rainstorm. At Position 2 the match was audible at times, however noise levels were well below the criteria and generally noise from the match was masked by traffic, rain and other ambient noise.

No complaints were forwarded to Event Noise Management staff for investigation.

During the event, L_{Amax} noise levels were higher than the 60 dB(A) criteria for the majority of the time due to traffic noise and patrons external to the venue. These sources of noise are not directly attributable to the sound amplification system and therefore do not represent an exceedance of the criteria.

APPENDIX A

ACOUSTIC GLOSSARY

APPENDIX A: GLOSSARY OF ACOUSTIC TERMINOLOGY

A-Weighting	A response provided by an electronic circuit which modifies sound in such a way that the resulting level is similar to that perceived by the human ear.
dB (decibel)	This is the scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and the reference pressure (0.00002N/m ²).
dB(A)	This is a measure of the overall noise level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
dB(C)	This is a standard weighting of the audible frequencies, commonly used for the measurement of Peak Sound Pressure level.
Facade Noise Level	Refers to a sound pressure level determined at a point close to an acoustically reflective surface (in addition to the ground). Typically a distance of 1 metre is used.
Free Field	Refers to a sound pressure level determined at a point away from reflective surfaces other than the ground with no significant contribution due to sound from other reflective surfaces; generally as measured outside and away from buildings.
Hertz (Hz)	A measure of the frequency of sound. It measures the number of pressure peaks per second passing a point when a pure tone is present.
L_{Aeq} Equivalent Continuous Sound Level	This is the equivalent steady sound level in dB(A) containing the same acoustic energy as the actual fluctuating sound level over the given period. For a steady sound with small fluctuations, its value is close to the average sound pressure level.
L_{A90,T}	This is the dB(A) level exceeded 90% of the time, T.
L_{A10,T}	This is the dB(A) level exceeded 10% of the time, T.
L_{Amax}	is the maximum A-weighted sound pressure level recorded over the period stated.
L_{Cmax}	is the maximum C-weighted sound pressure level recorded over the period stated.

APPENDIX B

DETAILED MONITORING DATA (FIXED POSITIONS)



EVENT NOISE MANAGEMENT

Project Number:	4464	Date:	30/1/16
Project Description:	A-League: Sydney FC vs Brisbane Roar		
Monitoring Location:	234 Moore Park Road		
Operator:	Gary Hall		
Weather Description:	Storms, rain		
Instrument:	B&K 2250L	Calibrator Model:	Rion NC73
Instrument Serial:	2741105	Calibrator Serial:	11127965
Instrument NATA Calibration Date:	22/1/17	Calibrator NATA Calibration Date:	3/11/16
Pre-calibration:	93.6	Post calibration:	93.6

Time	L _{Amax} dB(A)	Description of Noise and/or Changes to Weather
17:30 - 18:38	-	Rain, observations only from nearby sheltered position. Rain dominant noise source throughout.
18:40:00	80.2	Traffic Dominant (music 56-58 dB(A))
18:42:00	74.4	Traffic Dominant
18:44:00	84.4	Traffic Dominant
18:46:00	76.1	Traffic Dominant
18:48:00	80.6	Traffic Dominant (music 55-56 max 59 dB(A))
18:50:00	76.6	Rain - wet road noise
18:52:00	86.3	Rain - wet road noise
18:54:00	78.2	Rain - wet road noise
18:56:00	90.1	Rain and sirens
18:58:00	75.6	Rain and traffic, PA 56-58 dB(A)
19:00:00	79.5	Rain, traffic, people talking
19:02:00	78.3	Rain, traffic dominant

Time	L _{Amax} dB(A)	<u>Description of Noise and/or Changes to Weather</u>
19:04:00	78.1	Traffic dominant, music during announcement 62-64 dB(A) – advised to reduce 80-100Hz (4dB). Measured value may be confounded by extraneous noise, however reduced as a precaution. PA operators compliant in reducing levels.
19:06:00	81.5	Rain dominant
19:08:00	76.7	Rain dominant
19:10:00	82.5	Rain, traffic dominant
19:12:00	77.8	Rain, traffic dominant
19:14:00	80.0	Rain dominant, music 58-59 dB(A)
19:16:00	84.8	Rain dominant, people talking
19:18:00	80.7	Rain dominant, music 56-59 dB(A)
19:20:00	81.1	Rain dominant
19:22:00	83.1	Rain dominant, Thunder 87.7 dB(A)
19:24:00	77.6	Rain and thunder, local traffic
19:26:00	87.7	Rain and thunder, local traffic
19:28:00	80.7	Rain heavy, local traffic
19:30:00	90.1	Rain heavy, local traffic
19:32:00	84.0	Rain heavy, crowd singing 64-67 dB(A)
19:34:00	79.5	Rain heavy, local traffic
19:36:00	82.3	Rain, local traffic 87dB, crowd 70 dB(A)
19:38:00	82.2	Rain heavy
19:40:00	86.3	Rain and local traffic, crowd 64-71 dB(A)
19:42:00	79.8	Rain and local traffic
19:44:00	80.4	Car horn, local traffic
19:46:00	80.8	Car, traffic, rain

Time	L _{Amax} dB(A)	<u>Description of Noise and/or Changes to Weather</u>
19:48:00	87.6	Rain and local traffic
19:50:00	81.3	Rain and local traffic
19:52:00	81.8	Rain and local traffic
19:54:00	81.0	Rain and local traffic
19:56:00	81.8	Rain and local traffic
19:58:00	81.1	Rain and local traffic
20:00:00	83.1	Rain and local traffic
20:02:00	80.1	Rain and local traffic, bus
20:04:00	81.4	Rain and local traffic
20:06:00	92.4	Rain and local traffic
20:08:00	81.9	Rain and local traffic
20:10:00	82.7	Rain and local traffic
20:12:00	79.5	Rain and local traffic, crowd 68 dB(A)
20:14:00	79.1	Rain and local traffic, thunder
20:16:00	80.4	Rain and local traffic
20:18:00	81.7	Stopped raining, local traffic
20:20:00	83.2	Traffic – wet roads
20:22:00	78.1	Bus 80dB
20:24:00	80.0	Local traffic – pedestrian 83 dB(A)
20:26:00	85.7	Traffic – motorbike, PA system 58-59 dB(A)
20:28:00	77.6	Traffic, PA System 58-59 dB(A)
20:30:00	80.7	Traffic, PA music 56-59 dB(A)
20:32:00	81.0	Traffic, loud car
20:34:00	75.6	Traffic

Time	L _{Amax} dB(A)	Description of Noise and/or Changes to Weather
20:36:00	76.1	Traffic, bus
20:38:00	76.8	Traffic
20:40:00	81.3	Traffic, local car idling
20:42:00	77.0	Traffic
20:44:00	79.1	Traffic, crowd 64-68 dB(A)
20:46:00	79.5	Traffic, bus, crowd singing
20:48:00	74.9	Traffic, crowd roar
20:50:00	84.0	Traffic, car horn, crowd singing 78 dB(A)
20:52:00	75.1	Traffic, crowd singing
20:54:00	84.7	Traffic, crowd singing
20:56:00	77.2	Traffic, motorbike, crowd singing
20:58:00	78.8	Local traffic (roads still wet)
21:00:00	78.2	Local Traffic, crowd singing 63-65 dB(A)
21:02:00	76.7	Local traffic
21:04:00	75.0	Traffic
21:06:00	74.6	Traffic, crowd singing 64 dB(A)
21:08:00	73.6	Traffic, Lamborghini 86 dB(A)
21:10:00	74.3	Traffic
21:12:00	86.1	Traffic, loud car 80.5 dB(A), crowd drums 64 dB(A)
21:14:00	74.7	Traffic dominant, crowd singing
21:16:00	80.5	Traffic dominant, crowd singing
21:18:00	75.0	Traffic dominant, wet roads, crowd singing
21:20:00	73.4	Traffic and pedestrian noise
21:22:00	74.8	Traffic, crowd starting to leave



Time	L_{Amax} dB(A)	<u>Description of Noise and/or Changes to Weather</u>
21:24:00	79.9	Traffic
21:26:00	74.9	Traffic - police sirens
21:28:00	76.9	Traffic, bus
21:30:00	91.2	Traffic, crowd leaving - game over
21:32:00	82.0	Traffic , crowd leaving - PA 59 dB(A)
21:34:00	76.2	Traffic, crowd noise (65 dB(A)), PA 56 dB(A)
21:36:00	75.9	Traffic, crowds, PA stopped
21:38:00	78.5	Traffic and crowds



EVENT NOISE MANAGEMENT

Project Number:	4464	Date:	30/1/16
Project Description:	A-League:		
Monitoring Location:	10 Alexander Street Paddington		
Operator:	Roger Treagus		
Weather Description:	Thunderstorms Adjacent		
Instrument:	B&K 2250L	Calibrator Model:	Rion NC-73
Instrument Serial:	2741104	Calibrator Serial:	11127965
Instrument NATA Calibration Date:	23/10/17	Calibrator NATA Calibration Date:	3/11/16
Pre-calibration:	93.4	Post calibration:	93.4

Time	L_{Amax} dB(A)	Description of Noise and/or Changes to Weather
18:36:00	-	Started monitoring
18:38:00	70.73	Local traffic
18:42:00	59.72	Local traffic
18:46:00	89.55	During rain SLM moved to shelter of 12 Alexander St, 1m away
18:50:00	78.06	Rain, dominant noise is local traffic, dogs and thunder
18:52:00	-	Rain, dominant noise is local traffic, dogs and thunder
18:54:00	-	Rain, dominant noise is local traffic, dogs and thunder, PA Audible 48.8 dB(A)
18:56:00	-	Rain, dominant noise is local traffic, dogs and thunder
18:58:00	-	Rain, dominant noise is local traffic, dogs and thunder
19:00:00	-	Rain, dominant noise is local traffic, dogs and thunder
19:02:00	-	Rain, thunder
19:04:00	-	Rain, thunder
19:06:00	74.98	Rain, thunder, PA 51 dB(A)
19:08:00	77.67	Rain, thunder

Time	L _{Amax} dB(A)	<u>Description of Noise and/or Changes to Weather</u>
19:10:00	73.65	Rain, thunder, PA <50 dB(A)
19:12:00	78.25	Rain, thunder, PA <50 dB(A)
19:14:00	73.64	Rain, thunder, PA <50 dB(A)
19:16:00	82.4	Rain, thunder, PA <50 dB(A)
19:20:00	69.47	Rain, thunder, PA <50 dB(A)
19:22:00	88.18	Rain, thunder, PA <50 dB(A)
19:28:00	75.72	Thunder and rain dominant, PA inaudible due to rain and thunder
19:30:00	77.76	
19:32:00	76.33	
19:36:00	77.12	
19:38:00	76.97	
19:40:00	77.44	
19:42:00	81.45	
19:44:00	68.95	
19:48:00	77.78	
19:50:00	78.37	
19:52:00	76.87	
19:54:00	74.51	
19:58:00	77.19	
20:00:00	75.91	
20:02:00	77.44	
20:04:00	73.29	
20:06:00	76.29	
20:08:00	74.27	

Time	L _{Amax} dB(A)	<u>Description of Noise and/or Changes to Weather</u>
20:12:00	73.68	Thunder and rain dominant, PA inaudible due to rain and thunder
20:14:00	65.98	Thunder and rain dominant, PA inaudible due to rain and thunder
20:16:00	79.83	Thunder and rain dominant, PA inaudible due to rain and thunder
20:18:00	66.9	Thunderstorm finished, no PA noise, crowd noise
20:20:00	62.54	Traffic and local music dominant
20:22:00	62.11	Traffic and local music dominant, PA <50 dB(A)
20:24:00	65.58	
20:26:00	62.31	
20:28:00	64.69	
20:32:00	63.86	
20:34:00	66.24	
20:40:00	56.69	Traffic and local music dominant, no PA
20:42:00	61.88	Traffic and local music dominant, no PA
20:44:00	55.8	Traffic and local music dominant, no PA
20:46:00	62.32	Traffic and local music dominant
20:48:00	67.28	Traffic and local music dominant, crowd noise 62 dB(A)
20:50:00	63.28	Traffic and local music dominant, crowd noise <55 dB(A)
20:52:00	51.22	
20:54:00	60.93	
20:56:00	60.93	
20:58:00	70.25	
21:00:00	61.42	
21:02:00	54.51	
21:04:00	58.64	

Time	L _{Amax} dB(A)	<u>Description of Noise and/or Changes to Weather</u>
21:06:00	60.7	Traffic and local music dominant, crowd noise <55 dB(A)
21:08:00	65.15	Traffic and local music dominant, crowd noise <55 dB(A)
21:10:00	50.69	Traffic and local music dominant, crowd noise <55 dB(A)
21:14:00	55.39	Local sources dominant, crowd noise
21:16:00	59.74	
21:18:00	55.19	
21:20:00	52.39	
21:22:00	63.27	
21:24:00	73.51	
21:28:00	64.71	
21:30:00	62.97	Local sources dominant, PA <46dB dB(A)
21:32:00	68.87	Local sources dominant, PA <46dB dB(A)
21:38:00	59.54	Local sources dominant, noise sounds from SFS
21:40:00	63.52	Local sources dominant, noise sounds from SFS
21:42:00	60.2	Local sources dominant, noise sounds from SFS