



# Operational Noise Emission Assessment

KIKOFF Harbord Bowling Club  
33 Bennett St, Curl Curl, NSW



Client:  
KIKOFF Harbord Bowling Club  
C/o Rapid Plans

1 July 2021



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## GLOSSARY

### NOISE

Noise is produced through rapid variations in air pressure at audible frequencies (20 Hz – 20 kHz). Most noise sources vary with time. The measurement of a variable noise source requires the ability to describe the sound over a particular duration of time. A series of industry standard statistical descriptors have been developed to describe variable noise, as outlined in Section 2 below.

### NOISE DESCRIPTORS

**dB** – Decibels. The fundamental unit of sound, a Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell. Probably the most common usage of the Decibel in reference to sound loudness is dB sound pressure level (SPL), referenced to the nominal threshold of human hearing. For sound in air and other gases, dB(SPL) is relative to 20 micropascals ( $\mu\text{Pa}$ ) =  $2 \times 10^{-5}$  Pa, the quietest sound a human can hear.

**$L_{Aeq}$**  – The A-weighted sound pressure level averaged over the measurement period. It can be considered as the equivalent continuous steady-state sound pressure level, which would have the same total acoustic energy as the real fluctuating noise over the same time period. Measured in dB.

**$L_{Amax}$**  – The maximum or peak A-weighted noise level that occurs over the measurement period. Measured in dB.

**Indoor Design Level** – The recommended maximum level in dB(A) inside a building from external noise sources.

### A-WEIGHTING

"A-weighting" refers to a prescribed amplitude versus frequency curve used to "weight" noise measurements in order to represent the frequency response of the human ear. Simply, the human ear is less sensitive to noise at some frequencies and more sensitive to noise at other frequencies. The A-weighting is a method to present a measurement or calculation result with a number representing how humans subjectively hear different frequencies at different levels.

### NOISE CHARACTER, NOISE LEVEL AND ANNOYANCE

The perception of a given sound to be deemed annoying or acceptable is greatly influenced by the character of the sound and how it contrasts with the character of the background noise. A noise source may be measured to have only a marginal difference to the background noise level, but may be perceived as annoying due to the character of the noise.

Acoustic Dynamics' analysis of noise considers both the noise level and sound character in the assessment of annoyance and impact on amenity.

## 1 INTRODUCTION

### 1.1 SUMMARY

Acoustic Dynamics is engaged by **Rapid Plans** on behalf of **KIKOFF Harbord Bowling Club** to assess noise emission resulting from operation of the modified KIKOFF facility, to be located at Harbord Bowling Club, 33 Bennett St, Curl Curl, NSW.

This document provides an assessment of noise emission levels at nearby receivers resulting from various noise sources associated with the proposed facility. This assessment is prepared in accordance with the various acoustic assessment requirements of Northern Beaches Council, the NSW Environmental Protection Authority (EPA) and relevant Australian Standards.

### 1.2 LOCATION & DESCRIPTION OF SUBJECT SITE

The DA proposes modifications to the KIKOFF football facility at Harbord Bowling Club, located at 33 Bennett St, Curl Curl, NSW. The modifications include the replacement of the playing surface of the existing fields, and the construction of a new amenity building. The site is zoned *RE2 Private Recreation*, while the nearest receivers are zoned *R2 Low Density Residential*.

Acoustic Dynamics notes that the proposal involves no change to the current operation of the facility, and therefore no increase in noise emission. The primary noise sources resulting from the operation of the facility involve individuals engaged in sport and physical activity. It is understood that no music or PA system will be provided within the areas of the facility. Additionally, no mechanical plant is to be installed as part of the new amenity building. There is existing parking available at the bowling club for patrons, and access to the KIKOFF facility will be through the entrance on Bennett Street.

Acoustic Dynamics understands that Council has requested an acoustic assessment be undertaken of the proposed operation of the upgraded KIKOFF facility, to confirm that nearby sensitive receivers will not be adversely affected by its operation.

The facility is intended to be used for both training and competition purposes. The proposed hours of operation are as follows:

- Monday to Friday: 8:00am to 10:00pm; and
- Saturday & Sunday: 9:00am to 10:00pm.

With regard to acoustical assessment, the nearest sensitive receivers are as follows:

- Residential receiver located at 31 Bennett Street;
- Residential receiver located at 50 Stirgess Avenue; and
- Commercial receiver located at Harbord Bowling Club.

The subject building and the surrounding area is shown in the Location map, aerial image and acoustic mark-up presented within **Appendix A**.

### 1.3 SCOPE

Acoustic Dynamics has been engaged to provide an acoustic assessment suitable for submission to the Northern Beaches Council.

The scope of the assessment is to include the following:

- Review of legislation, Council criteria and Australian Standards relevant to the internal noise emission at the subject site;
- Travel to site to conduct inspections and testing;
- Conduct noise monitoring to establish background noise levels at a location representative of the most affected sensitive receiver;
- Examination of architectural drawings; and
- Prediction of likely noise emission associated with the subject site.

## 2 ASSESSMENT CRITERIA AND STANDARDS

Acoustic Dynamics has conducted a review of the local council, state government and federal legislation that is applicable to noise assessment for the subject site. The relevant sections of the legislation are presented below. The most stringent criteria which have been used in the assessment of the subject site are summarised below.

### 2.1 NORTHERN BEACHES COUNCIL

#### 2.1.1 LOCAL ENVIRONMENT PLAN

A review of the Warringah Local Environment Plan (LEP) 2011 was conducted. No relevant acoustic requirements or noise criteria were presented within the LEP.

#### 2.1.2 DEVELOPMENT CONTROL PLANS

A review of the Warringah Development Control Plan (DCP) 2011 was conducted. No relevant acoustic requirements or noise criteria were presented within the LEP.

### 2.2 NSW EPA'S ENVIRONMENTAL NOISE CRITERIA

Acoustic Dynamics has conducted a review of relevant EPA documents and found no specific criteria for the assessment of noise from sporting facilities within its current documents. The following sections discuss guidelines which may be applied to the subject site.

## 2.2.1 NOISE POLICY FOR INDUSTRY (NPFI)

The EPA, in its Noise Policy for Industry (NPFI) document published in October 2017, outlines and establishes noise criteria for industrial other noise sources, or those listed in *Schedule One of the POEO Act*, in various zoning areas.

Acoustic Dynamics advises that the following criteria have been applied for the assessment of the operational noise associated with the subject site, under the guidance of the NPFI. However, it is also noted that the NPFI may not an applicable guideline for the development, as sporting fields are not contained within *Schedule One of the POEO Act*.

### ***Project Intrusiveness Noise Level***

The intrusiveness noise level is determined as follows:

<b><math>L_{Aeq, 15min} = \text{rating background noise level} + 5 \text{ dB}</math></b>	
where:	
<b><math>L_{Aeq, 15min}</math></b>	represents the equivalent continuous (energy average) A-weighted sound pressure level of the source over 15 minutes.
and	
<b>Rating background noise level</b>	represents the background level to be used for assessment purposes, as determined by the method outlined in Fact Sheets A and B.

### ***Project Amenity Noise Level***

The recommended amenity noise levels represent the objective for **total** industrial noise at a receiver location, whereas the **project amenity noise level** represents the objective for a noise from a **single** industrial development at a receiver location.

To ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a project amenity noise level applies for each new source of industrial noise as follows:

<b>Project amenity noise level for industrial developments = recommended amenity noise level (Table 2.2) minus 5 dB(A)</b>
--

The NPFI provides exceptions to the above method to derive the project amenity noise level. Exception 4 states:

*“Where cumulative industrial noise is not a necessary consideration because no other industries are present in the areas, or likely to be introduced into the area in the future. In*

*such cases the relevant amenity noise level is assigned as the project amenity noise level for the development.”*

The **Project Noise Trigger Level** is the lowest value of Project Intrusiveness Noise Level or Project Amenity Noise Level after conversion to  $L_{Aeq}$  equivalent value.

To establish the acoustic environment at the subject site in accordance with the guidelines of the NSW EPA’s NPfI, unattended noise logging was conducted near the subject site. Acoustic Dynamics advises the measurement location was representative of the existing noise environment of the nearest sensitive receivers. The prevailing weather conditions during the unattended noise monitoring were generally calm and did not influence the noise measurements taken. Operator-attended background noise measurements were undertaken on site to supplement the unattended background noise monitoring data collected.

The results of the unattended noise monitoring are presented graphically in **Appendix B**. Following the general procedures outlined in the EPA’s NPfI, a summary of the established noise environment, and relevant environmental noise criteria is presented in **Table 2.1**.

Acoustic Dynamics advises that the assessment of the KIKOFF facility has been based on the **lowest** background noise levels in the area during typical **maximum** use and operation of the site. Acoustic Dynamics advises that such an assessment is conservative and will ensure no loss of amenity to the nearby residential receivers.

**Table 2.1 Summary of External Measured Noise Levels & Most Stringent Criteria**

Location	Time of Day	Measured RBL ( $L_{A90}$ ) [dB]	Measured $L_{Aeq}$ Noise Level [dB]	Project Intrusive Noise Level $L_{Aeq,15min}$ [dB]	Project Amenity Noise Level $L_{Aeq,15min}$ [dB] <sup>3</sup>	Project Noise Trigger Level $L_{Aeq,15min}$ [dB]
Nearest residential receiver(s)	Daytime <sup>1</sup> (7am to 6pm)	47	59	52	53	<b>52</b>
	Evening (6pm to 10pm)	43	56	48	43	<b>43</b>

Note: 1) Acoustic Dynamics has been advised that the KIKOFF facility will be operational during daytime and evening hours only.  
 2) 8am to 6pm on Sundays and Public Holidays.  
 3) Amenity adjustment based on “Suburban” receiver type (Table 2.3 of the NPfI). The noise emission objective has been modified in accordance with the recommendations detailed within the NPfI Section 2.2, for time period standardising of the intrusiveness and amenity noise levels ( $L_{Aeq,15min}$  will be taken to be equal to the  $L_{Aeq, period} + 3$  decibels (dB)).

For premises to which it applies, the NPfI noise criteria for the assessment of noise emission from commercial noise sources at the boundaries of nearby commercial premises are reproduced from Table 2.1 of the NPfI and presented as **Table 2.2**.

**Table 2.2 Recommended  $L_{Aeq}$  Noise Levels – Commercial**

Type of Receiver	Noise Amenity Area	Time of Day	Recommended Amenity Noise Level $L_{Aeq,15min}$ [dB] <sup>1</sup>
Commercial premises	All	When in use	65

Note 1) Amenity adjustment based on “Commercial premises” receiver type (Table 2.3 of the NPfI). The noise emission objective has been modified in accordance with the recommendations detailed within the NPfI Section 2.2, for time period standardising of the intrusiveness and amenity noise levels

The EPA’s NPfI specifies additional noise emission level corrections that should be applied when a noise source is determined to include “modifying factors” that can vary the perceived intrusiveness of a noise source. Such modifying factors include tonal, low frequency, impulsive, or intermittent noise.

Although the NPfI does not apply for the assessment of noise emission from the subject site, Acoustic Dynamics advises that achieving compliance with the NPfI intrusive noise emission objectives applicable at the boundaries of the nearest non-residential premises will adequately protect the acoustic amenity of these receivers.

## 2.2.2 EPA ENVIRONMENTAL NOISE CRITERIA FOR PUBLIC PLACES & SPORTING ACTIVITIES

The EPA’s Environmental Noise Control Manual (ENCM), which has now been superseded, provides the following noise criteria regarding noise from public places and sporting activities. The method of assessing noise from public places and sporting activities is described on page 53-2 of the Environmental Noise Control Manual (ENCM) as follows:

*“... the condition usually adopted is that the intrusive noise ( $L_{A10}$  measured for a period of not less than 15 minutes when the noise is being emitted), at the nearest affected residence, should not exceed the background ( $L_{A90}$ ) by more than 5 dB(A).*

### Note

- *Some greater tolerance might be considered, and intrusive noise up to 10 dB(A) above background might be allowed where the activity has social merit and is of unique or infrequent occurrence, but in all cases the figures should be used for guidance and varied according to local conditions where necessary.”*

Although superseded and not strictly applicable, in lieu of a suitable alternative, Acoustic Dynamics advises that use of background noise level plus 5 dB criterion, as detailed in the EPA ENCM, may provide guidance for determination of suitable noise emission criteria for the subject site.

### 2.2.3 THE EPA'S SLEEP DISTURBANCE CRITERION

Acoustic Dynamics understands that the operation hours of the sporting fields are not to extend beyond 10pm on weekdays and weekends. Hence, the sleep disturbance criterion does not apply for this project.

### 2.2.4 APPROPRIATE CRITERIA

Following consideration of the various criteria contained in the above EPA guidelines, we provide the following criteria most relevant to assessment of sporting fields. Acoustic Dynamics once again notes that the proposed works will have no effect on the existing noise levels. The criteria given below in **Table 2.3** is based off the background noise level obtained as discussed above.

**Table 2.3 Appropriate Noise Emission Criteria**

Location	Time of Day	Method of Calculation of Criteria	Applicable Noise Emission Criteria Value
Boundary of Nearest Residential Receivers	Evening <sup>1</sup> (6pm to 10pm)	ENCM: $L_{A10} \leq L_{A90} + 5 \text{ dB}$	$L_{A90} + 5 = 48 \text{ dB}$
Boundary of Nearest Commercial Receivers	When in use	NPfI Amenity Level	65 dB

Note: 1) Acoustic Dynamics advises that by achieving compliance with the more stringent evening criteria, compliance will also be achieved with the less stringent daytime criteria.

## 2.3 THE EPA'S ROAD NOISE POLICY

The NSW Environmental Protection Authority (EPA) presents guidelines for assessment of road traffic noise in its Road Noise Policy (RNP). The document provides road traffic noise criteria for proposed developments with the potential to have an impact in relation to traffic noise generation. **Table 2.3** presents the relevant RNP noise criteria for the subject site.

**Table 2.4 Road Traffic Noise Assessment Criteria for Residential Land Uses**

Road category	Type of project / land use	Assessment Criteria [dB]	
		Day (7am – 10pm)	Night (10pm – 7am)
Local Roads	6. Existing residences affected by <b>additional traffic</b> on existing local roads generated by land use developments	$L_{Aeq, (1 \text{ hour})} 55$ (external)	$L_{Aeq, (1 \text{ hour})} 50$ (external)

### 3 INSTRUMENTATION & MEASUREMENT STANDARDS

All measurements were conducted in general accordance with Australian Standard 1055.1-1997, “Acoustics – Description and Measurement of Environmental Noise Part 1: General Procedures”. Acoustic Dynamics’ sound measurements were carried out using precision sound level meters conforming to the requirements of IEC 61672-2002 “Electroacoustics: Sound Level Meters – Part 1: Specifications”. The survey instrumentation used during the survey is set out in **Table 3.1**.

**Table 3.1 Noise Survey Instrumentation**

Type	Serial Number	Instrument Description
2270	2664115	Brüel & Kjaer Modular Precision Sound Level Meter
4189	2385698	Brüel & Kjaer 12.5 mm Prepolarised Condenser Microphone
4230	1234136	Brüel & Kjaer Acoustic Calibrator
Ngara	878069	ARL Ngara Type 1 Environmental Noise Logger

The reference sound pressure level was checked prior to and after the measurements using the acoustic calibrator and remained within acceptable limits.

### 4 ASSESSMENT

The following subsections provide an assessment of the modified KIKOFF facility against the various noise emission criteria and objectives outlined in **Section 2** above.

#### 4.1 OPERATIONAL NOISE EMISSION TO RECEIVERS (EXTERNAL)

Acoustic Dynamics once again notes that the proposed works at the subject site will have no impact on the current noise levels, and as such the following sections are inherently assessing the current operation.

Based on the site visit, previous experience and the drawings and information provided by the proponent, Acoustic Dynamics has conservatively undertaken modelling and calculations to predict the likely **maximum**  $L_{Aeq,15min}$  external noise levels at the nearest residential and commercial receivers resulting from the following **assumed** noise sources and activities:

- Patrons engaged in social sport, including the use of whistles;
- The arrival and departure of patron vehicles to car spaces located on-site and along surrounding local roads (a maximum of 60 vehicle movements within a 1-hour period is conservatively assumed during the operation of the facility); and
- The ingress and egress of patrons, between the sport fields and the carpark;

Noise emission due to patrons engaged in sport has been calculated based off previously conducted short-term operator-attended noise measurements of sporting activities. The noise

sources captured by these measurements includes raised speech, laughter, crowd noise, ball impacts, blown whistles and players during a competition.

The following table presents a summary of the various measured noise levels of representative activities associated with the use of similar sporting facilities.

**Table 4.1 Measured Noise Levels of Various Sporting Activities**

Description of Noise Sources	Distance from Noise Source [m]	Measured $L_{Aeq(15min)}$ [dB]	Measured $L_{A10}$ [dB]
Netball training session on 3 adjacent courts – coaches' raised voices dominant, occasional ball bounce (no blowing of whistles)	10	61	64
Netball competition games on 3 adjacent courts – frequent whistle blowing along perimeter of courts	10	72	72

The calculated maximum noise emission levels at the nearest external receiver locations and the relevant noise emission criteria are presented in **Table 4.2** below. It is advised that by achieving compliance with the nearest residential and commercial receiver locations, compliance will also be achieved at all other receiver locations further away.

**Table 4.2 Maximum External Noise Emission Levels & Relevant Criteria – Nearest External Receivers**

Receiver Location	Assessment Description & Period	Noise Source	Noise Emission Criteria	Maximum Noise Emission Level <sup>2</sup> [dB]	Complies with Criteria?
Residential Receiver at 31 Bennett St	Evening <sup>1</sup> (6pm to 10pm)	Training activities + ingress/egress	$L_{A10} \leq 48$ dB	$L_{A10} = 48$	<b>Yes</b>
		Competitive activities + ingress/egress		$L_{A10} = 56$	<b>No</b>
Residential Receiver at 50 Stirgess Ave		Training activities + ingress/egress		$L_{A10} = 43$	<b>Yes</b>
		Competitive activities + ingress/egress		$L_{A10} = 51$	<b>No</b>
Commercial Receiver at Harbord Bowling Club	When in use	Training activities + ingress/egress	$L_{Aeq} \leq 65$ dB	59	<b>Yes</b>
		Competitive activities + ingress/egress		51	<b>Yes</b>

Note: 1) Acoustic Dynamics advises that by achieving compliance with the more stringent evening criteria, compliance will also be achieved with the less stringent daytime criteria.  
2) Cumulative noise emission from the use and operation of the facility and ingress/egress of patrons, based on worst-case noise emission.

The predicted noise emission levels presented above in **Table 4.1** include allowances for relevant distance, direction and shielding losses. Acoustic Dynamics advises that the above

calculated noise emission levels are conservatively based on the maximum source noise levels and capacity operations (i.e. worst-case scenario) at the subject site. Acoustic Dynamics advises that such a scenario is unlikely to occur for the majority of the time.

Based on the results of Acoustic Dynamics' noise modelling and calculations, we advise the following:

- The predicted maximum  $L_{Aeq(15min)}$  associated with both training and competitive activities **complies** with the most relevant guidelines at the commercial receiver;
- The predicted maximum  $L_{A10(15min)}$  associated with training activities **complies** with the most relevant guidelines at the nearest residential receivers; and
- The predicted maximum  $L_{A10(15min)}$  associated with competitive activities **fails to comply** with the most relevant guidelines at the nearest residential receivers.

## 4.2 ROAD TRAFFIC NOISE EMISSION

Acoustic Dynamics has conducted an analysis of road traffic noise due to off-site car movements resulting from the operation of the site. The results are attached below in **Table 4.3**.

**Table 4.3 Maximum Road Traffic Noise Emission Levels & Criteria for Residential Receivers**

Receiver Location	Noise Source	Quietest Period Source Operates	Calculated Maximum $L_{Aeq(1 \text{ hour})}$ Noise Level [dB]	Relevant Criterion $L_{Aeq(1 \text{ hour})}$ [dB]	Complies With Criteria?
Residential Receiver at 31 Bennett St	Off-site car movements	Evening <sup>1</sup> (6pm to 10pm)	35	55	Yes

Note: 1) Acoustic Dynamics advises that by achieving compliance with the more stringent evening criteria, compliance will also be achieved with the less stringent daytime criteria.

Based on the results of Acoustic Dynamics' noise modelling and calculations, we advise that the predicted maximum road traffic noise associated with the use and operation of the proposed development **complies** with the relevant noise emission criteria.

## 5 RECOMMENDATIONS & ADVICE

Acoustic Dynamics' calculations and analysis indicate that based on the proposed operation of the site, which will continue at the same level as is current, the noise emission due to competitive sporting activities fails to comply with the most relevant guidelines at the two closest residential receivers. However, Acoustic Dynamics also understands that the facility in question has been in operation for over 12 years, and during this time has provided great social benefit to the local community. Additionally, guidelines used for assessment of the facility were applied in lieu of any relevant current documentation, be that at local, state or national level.

For these reasons, Acoustic Dynamics recommends that the relevant authority apply their own discretion in determining the level of action needed in addressing the current noise

emission, by considering the social impact of the sports fields on the community and any previously made noise complaints against the facility. Acoustic Dynamics has provided two noise mitigation measures below should the relevant authority believe that noise mitigation is necessary.

## 5.1 ACOUSTIC MITIGATION

Acoustic Dynamics has provided two options below to help reduce the noise emission predicted from the facility, should the relevant authority deem it necessary.

### Option A: Noise barrier along southwestern corner of fields (Moderate Attenuation)

We advise that a barrier should be constructed as described below, and positioned as shown in **Appendix A**, extending around the southwestern corner of the fields. This barrier will provide a medium degree of attenuation to the nearest residential receivers. The barrier shall also extend from the ground upwards to a height of at least 2m.

With this barrier, Acoustic Dynamics makes the following noise emission predictions at the nearest residential receivers:

**Table 5.1 Option A External Noise Emission Levels & Relevant Criteria – Nearest External Receivers**

Receiver Location	Assessment Description & Period	Noise Source	Noise Emission Criteria	Maximum Noise Emission Level <sup>2</sup> [dB]	Complies with Criteria?
Residential Receiver at 31 Bennett St	Evening <sup>1</sup> (6pm to 10pm)	Training activities + ingress/egress	$L_{A10} \leq 48$ dB	$L_{A10} = 44$	<b>Yes</b>
		Competitive activities + ingress/egress		$L_{A10} = 52$	<b>No</b>
Residential Receiver at 50 Stirgess Ave		Training activities + ingress/egress		$L_{A10} = 41$	<b>Yes</b>
		Competitive activities + ingress/egress		$L_{A10} = 49$	<b>Yes<sup>3</sup></b>

Note: 1) Acoustic Dynamics advises that by achieving compliance with the more stringent evening criteria, compliance will also be achieved with the less stringent daytime criteria.  
 2) Cumulative noise emission from the use and operation of the facility and ingress/egress of patrons, based on worst-case noise emission.  
 3) Marginal compliance is achieved as sound level differences of 1–2 dB are generally considered acoustically insignificant.

## **Option B: Noise barrier along southern border of fields (High Attenuation)**

We advise that a barrier should be constructed as described below, and positioned as shown in **Appendix A**, extending around the full southern edge of the fields. This barrier will provide a significant degree of attenuation to the nearest residential receivers. The barrier shall also extend from the ground upwards to a height of at least 2m.

With this barrier, Acoustic Dynamics makes the following noise emission predictions at the nearest residential receivers:

**Table 5.2 Option B External Noise Emission Levels & Relevant Criteria – Nearest External Receivers**

Receiver Location	Assessment Description & Period	Noise Source	Noise Emission Criteria	Maximum Noise Emission Level <sup>2</sup> [dB]	Complies with Criteria?
Residential Receiver at 31 Bennett St	Evening <sup>1</sup> (6pm to 10pm)	Training activities + ingress/egress	$L_{A10} \leq 48$ dB	$L_{A10} = 33$	<b>Yes</b>
		Competitive activities + ingress/egress		$L_{A10} = 41$	<b>Yes</b>
Residential Receiver at 50 Stirgess Ave		Training activities + ingress/egress		$L_{A10} = 28$	<b>Yes</b>
		Competitive activities + ingress/egress		$L_{A10} = 36$	<b>Yes</b>

Note: 1) Acoustic Dynamics advises that by achieving compliance with the more stringent evening criteria, compliance will also be achieved with the less stringent daytime criteria.

2) Cumulative noise emission from the use and operation of the facility and ingress/egress of patrons, based on worst-case noise emission.

The barrier constructed must provide a minimum surface density of 15 kg/m<sup>2</sup>, and contain no gaps along the surface of the barrier. All gaps are to be adequately sealed using a flexible mastic sealant. Acoustic Dynamics advises that the acoustic barrier could be constructed to be:

- A double layer Colorbond™ (Custom Blue Orb® or equivalent) barrier(s); or
- A minimum 9mm thick compressed fibre-cement sheeting on a timber or steel stud; or
- Other suitable material (minimum surface density of 15 kg/m<sup>2</sup>) such as Perspex or equivalent.

All building materials specified must be tested and certified by a locally recognised and accepted testing agency in respect of their intended use. Where appropriate, materials and noise mitigation measures specified by Acoustic Dynamics must be certified by a locally recognised (qualified) and accepted professional for suitability (structural, wind loading, or other) for the intended use.

## 5.2 RECOMMENDED MANAGEMENT PLAN

Acoustic Dynamics recommends that a management plan incorporating measures to protect the acoustic amenity of the surrounding area be implemented by the proprietor. Such a management plan should outline policies and procedures to ensure noise emission from patrons at the subject site are kept to a minimum, including:

- 1) Ensuring patrons leave the premises in a quiet and sensible manner to minimise any potential impacts on the surrounding amenity, including signage reminding patrons to be aware of their neighbours and to leave in a quiet manner; and
- 2) Ensuring that sporting activities occur only on the field, and whistles are not used in any place other than on the field (such as in the carpark);

Acoustic Dynamics advises that incorporation of the above recommendations will protect the acoustic amenity of the surrounding area, and limit any adverse impact on nearby receivers.

## 6 CONCLUSION

Acoustic Dynamics has conducted an acoustic assessment of the noise emission resulting from the use and operation of the proposed sporting fields at KIKOFF Harbord. Acoustic Dynamics notes that the proposed works at the site will result in no noise increase over the current noise levels.

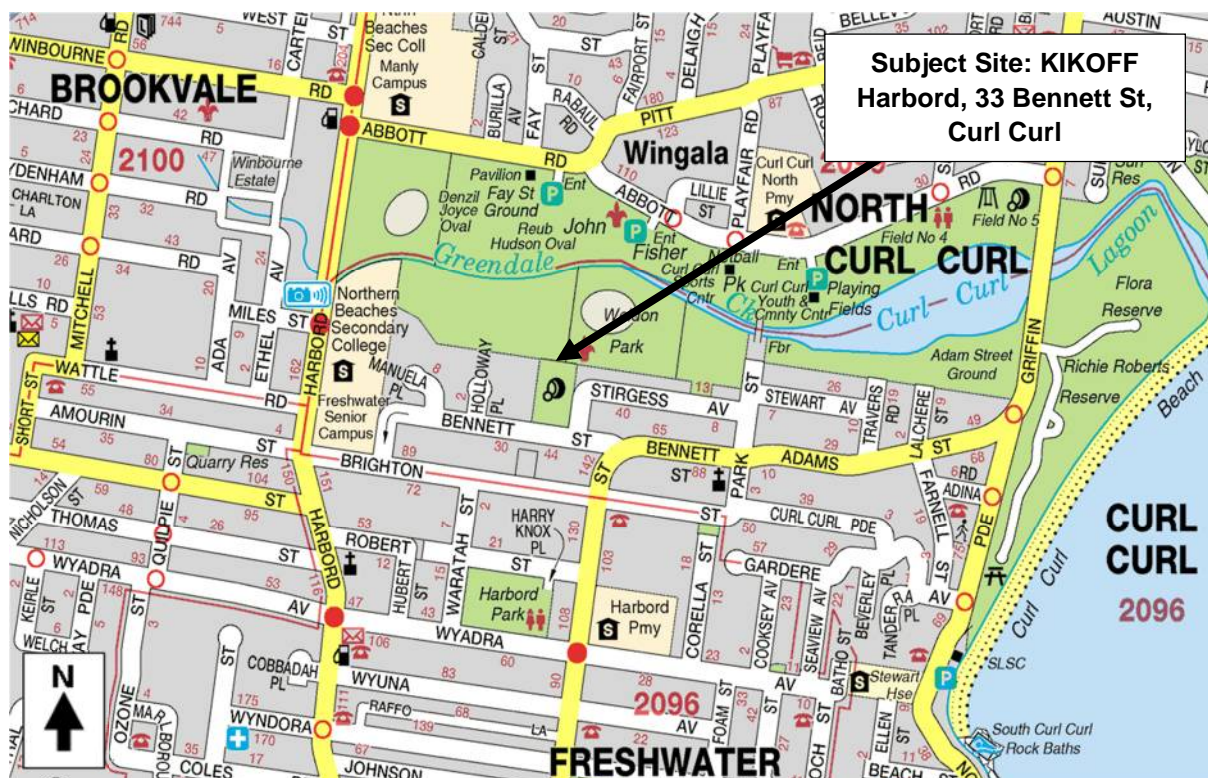
### ***Acoustic Opinion***

**Further to the noise monitoring and measurements conducted, our review of the relevant acoustic criteria and requirements and our calculations, Acoustic Dynamics advises that the proposed KIKOFF facility, with the incorporations of the recommendations detailed within Section 5 above, will comply with the most relevant acoustic criteria of Northern Beaches Council, the NSW POEO Act 1997 and the NSW EPA.**

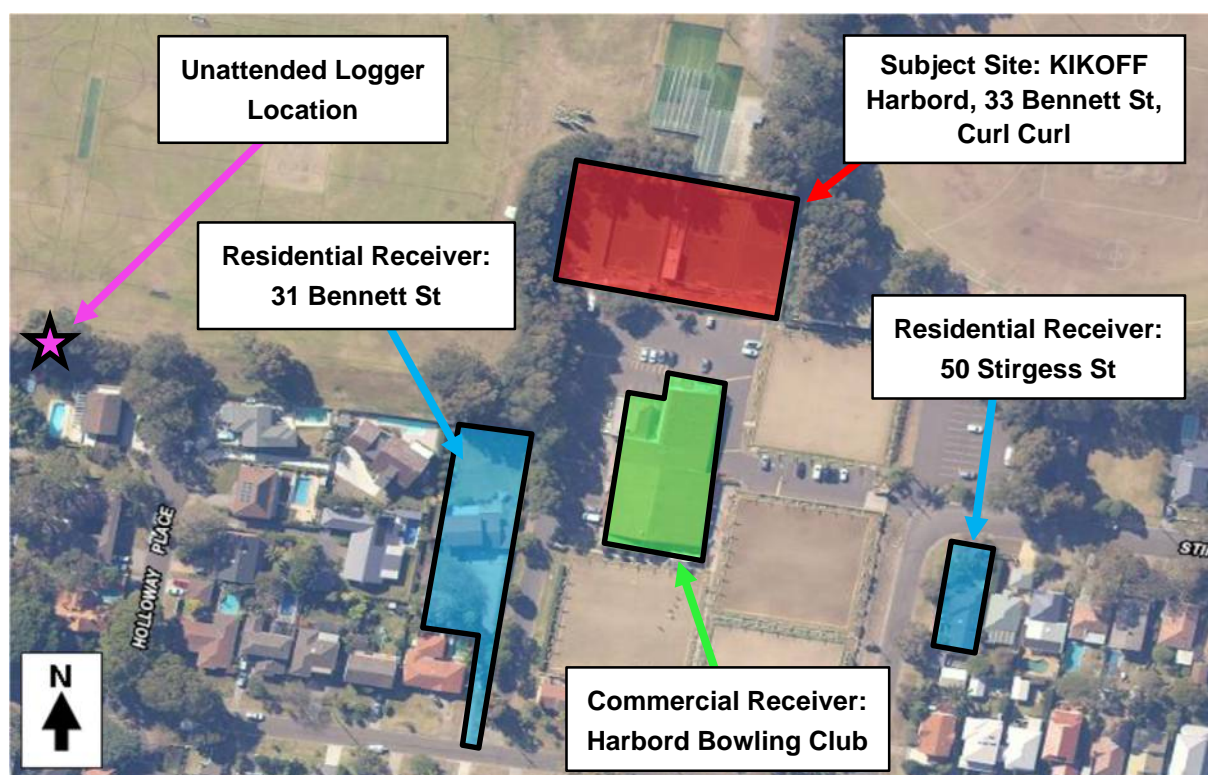
We trust that the above information meets with your requirements and expectations. Please do not hesitate to contact us on 02 9908 1270 should you require more information.

## APPENDIX A –LOCATION MAP, AERIAL IMAGE AND ACOUSTIC MARK-UP

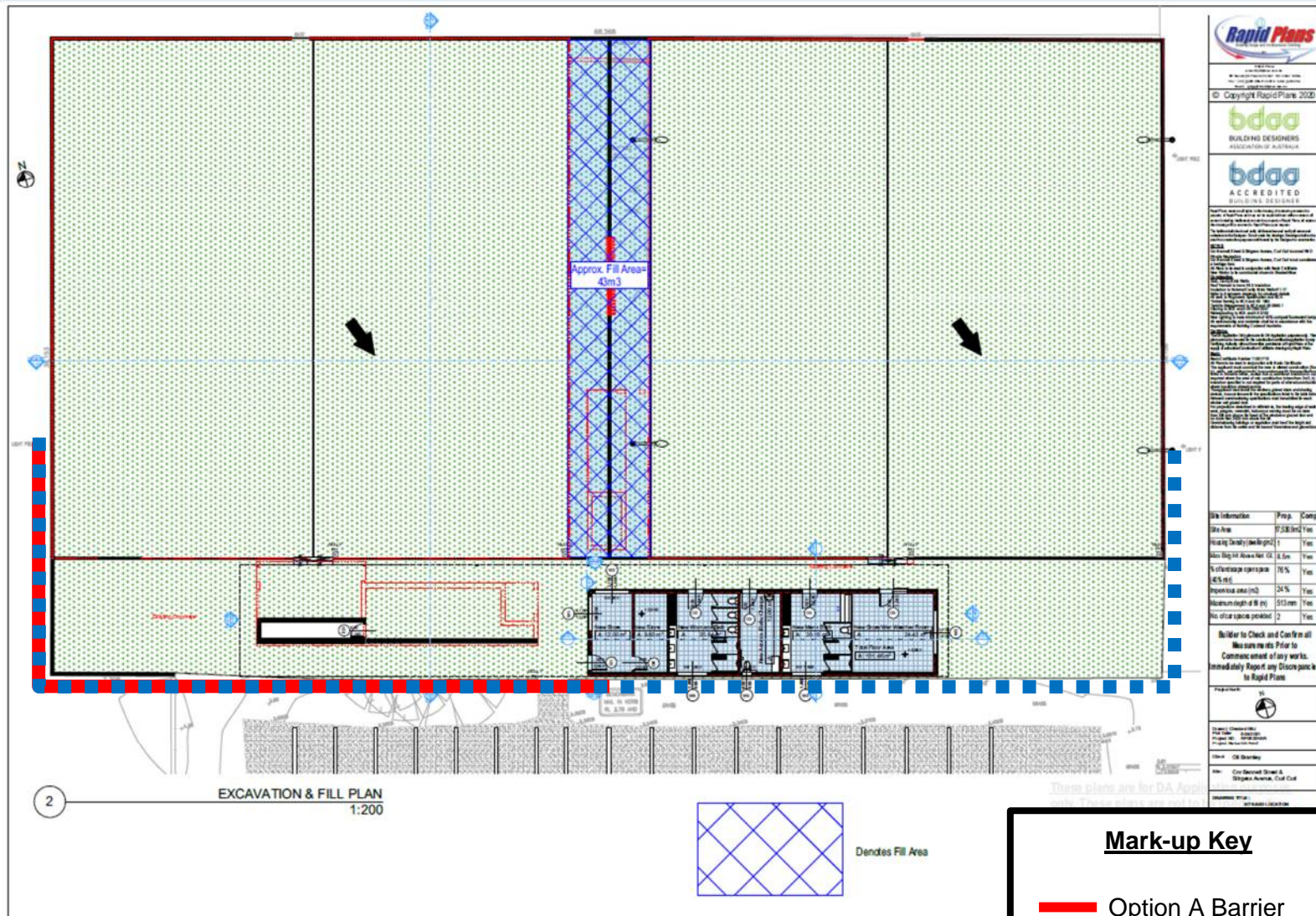
### A.1 LOCATION MAP



### A.2 AERIAL IMAGE (COURTESY OF SIXMAPS.COM)



## A.3 ACOUSTIC MARK-UP



**Rapid Plans**  
BUILDING DESIGNERS  
ASSOCIATION OF AUSTRALIA  
ACCREDITED  
BUILDING DESIGNER

**Site Information**

Item	Prop.	Comp.
Site Area	17,518.34m²	Yes
Plotting (Survey) (m²)	1	Yes
Plotting (Survey) (m²)	1	Yes
% of site area open space	75%	Yes
% of site area open space	75%	Yes
Open space area (m²)	24%	Yes
Maximum depth of fill (m)	0.13m	Yes
No. of car spaces provided	2	Yes

**Builder to Check and Confirm all**  
Measurements Prior to  
Commencement of any works.  
Immediately Report any Discrepancies  
to Rapid Plans

**Project Details**

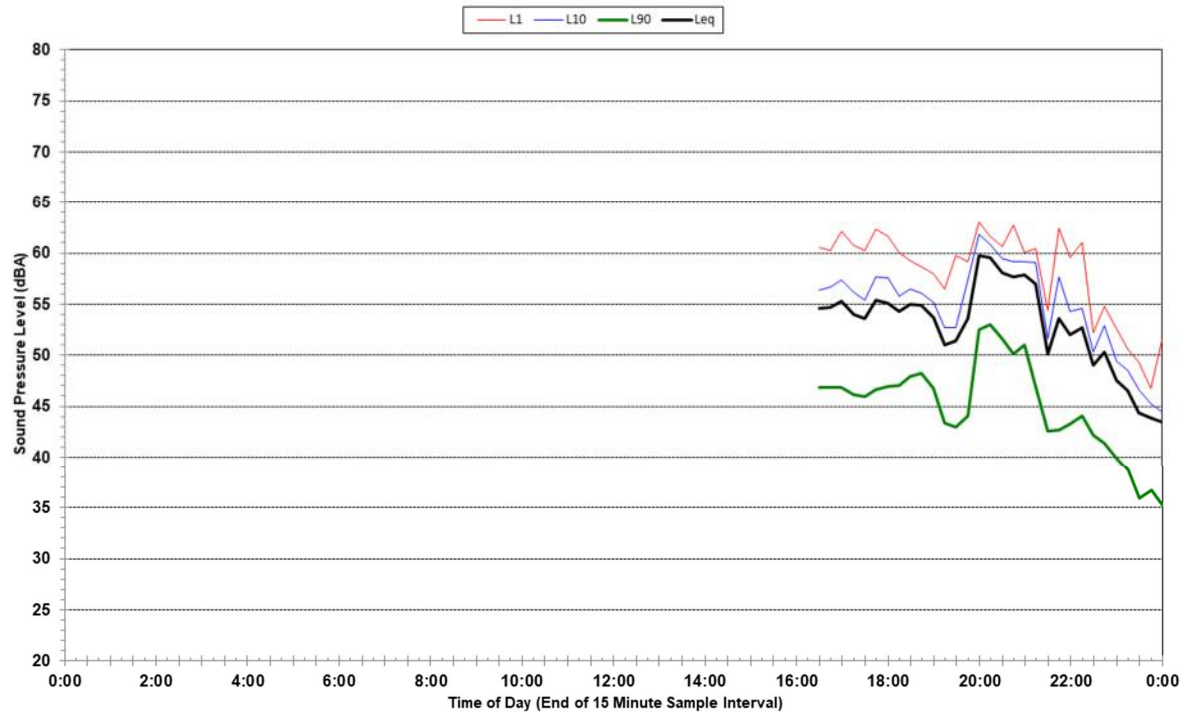
Project Name: 5260R001.NW.AppA  
Project No.: 5260R001.NW.AppA  
Project Date: 10/10/2020  
Project Location: 5260R001.NW.AppA

**Client**  
Client Name: 5260R001.NW.AppA  
Client Address: 5260R001.NW.AppA  
Client Contact: 5260R001.NW.AppA

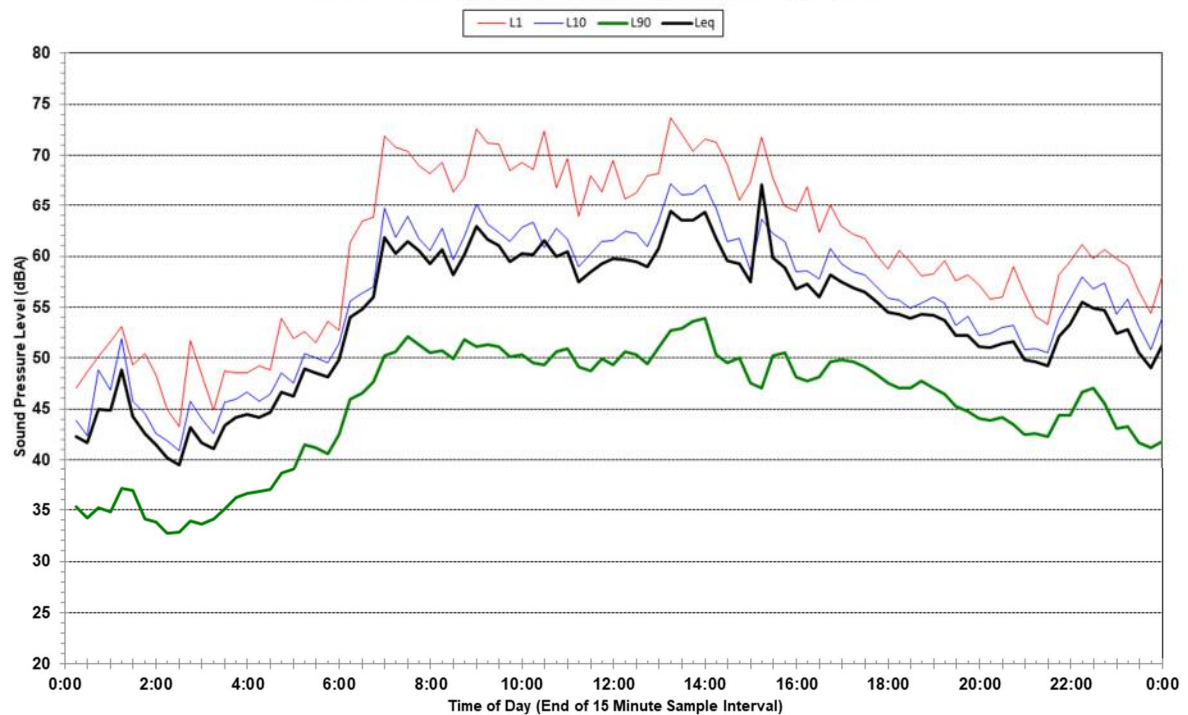
**Drawn**  
Drawn By: 5260R001.NW.AppA  
Drawn Date: 10/10/2020  
Drawn Location: 5260R001.NW.AppA

## APPENDIX B – UNATTENDED NOISE LOGGER DATA

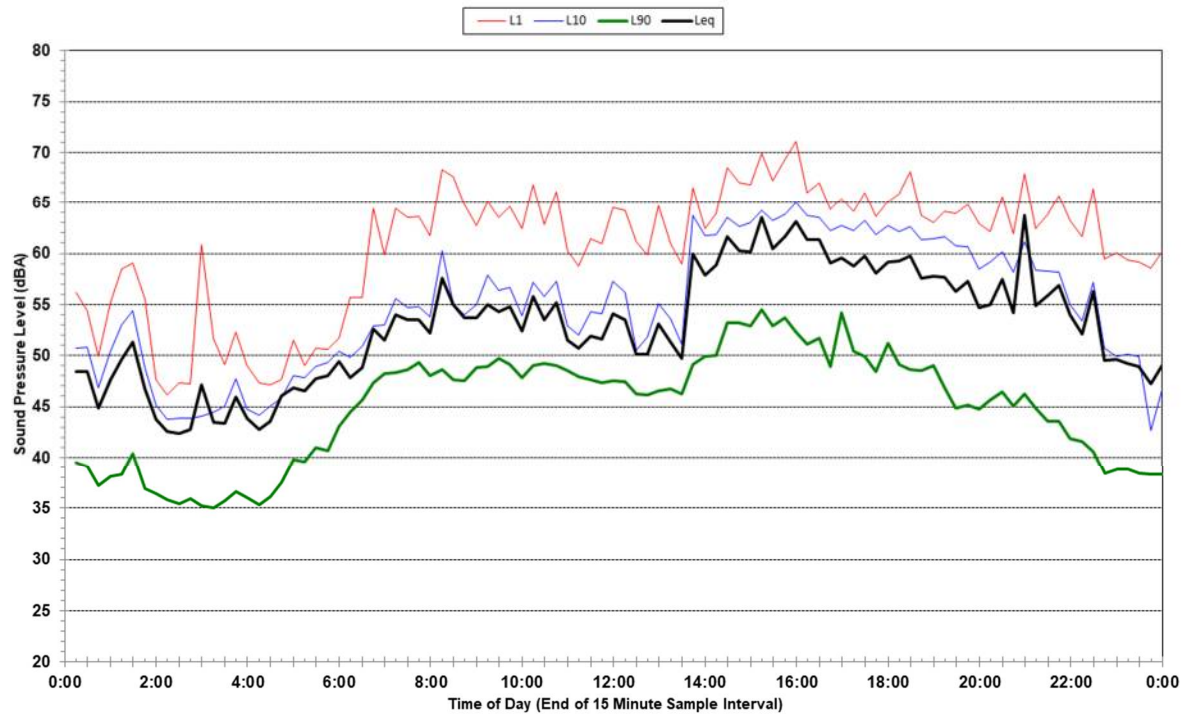
**Statistical Ambient Noise Levels  
KIKOFF - Harbord Bowling Club - Tuesday 8 June 2021**



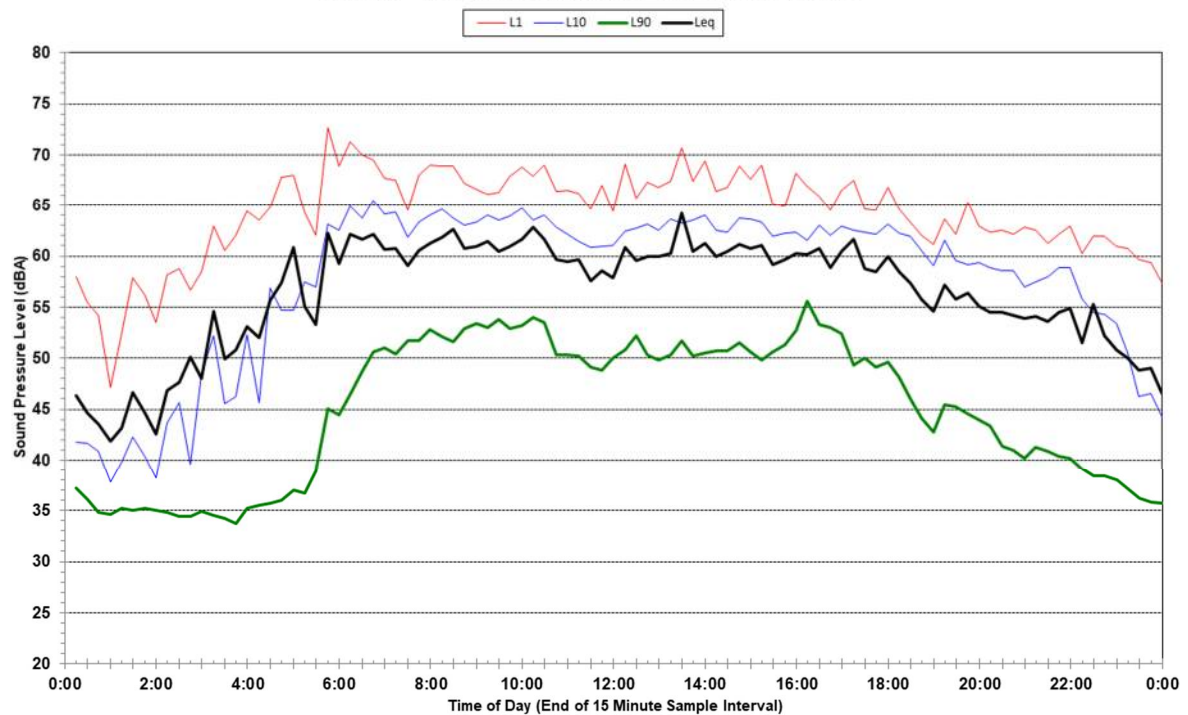
**Statistical Ambient Noise Levels  
KIKOFF - Harbord Bowling Club - Wednesday 9 June 2021**



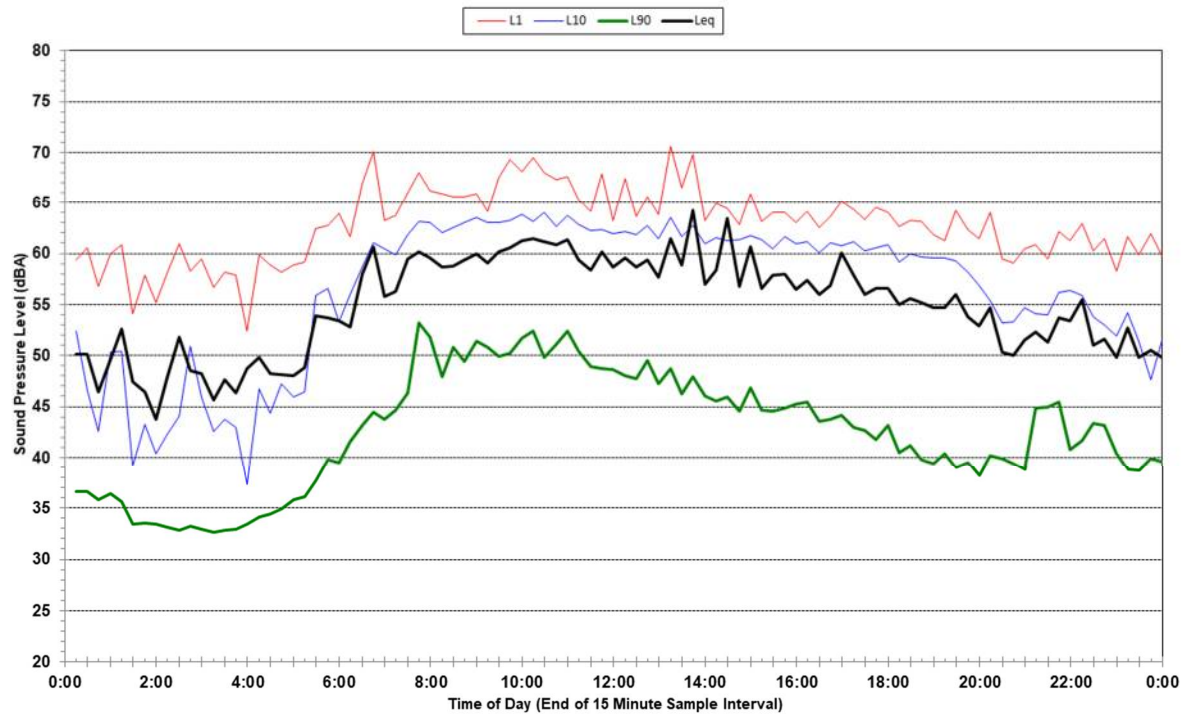
**Statistical Ambient Noise Levels**  
**KIKOFF - Harbord Bowling Club - Thursday 10 June 2021**



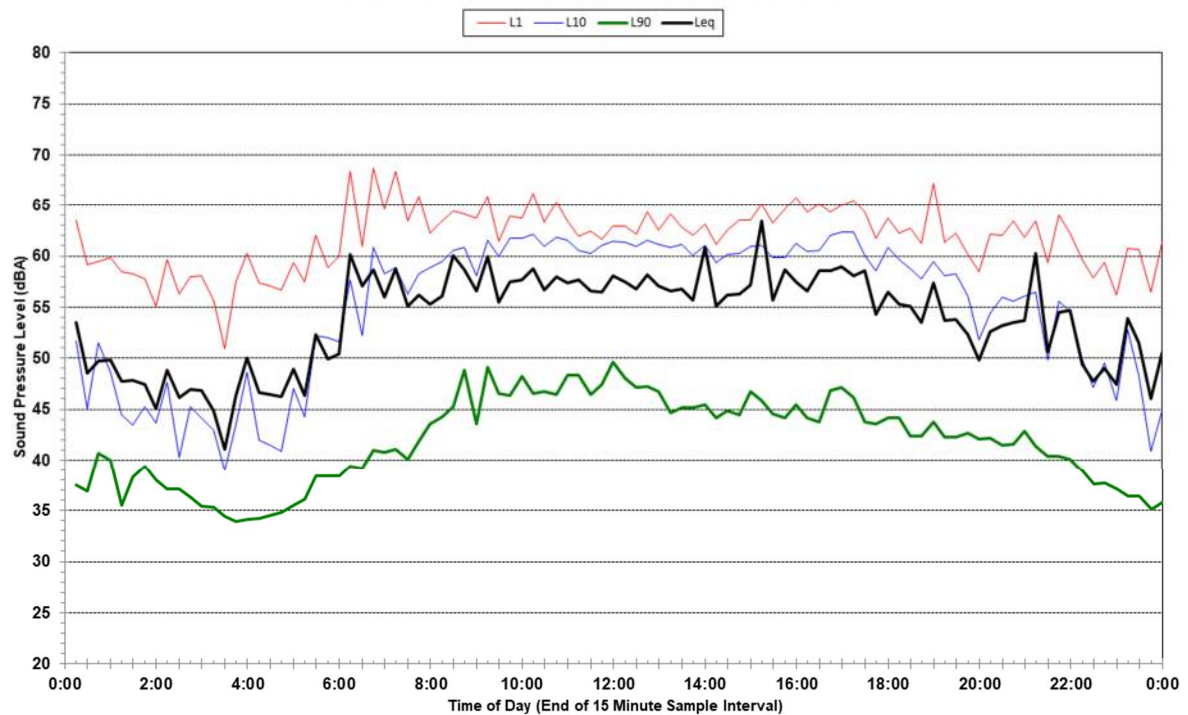
**Statistical Ambient Noise Levels**  
**KIKOFF - Harbord Bowling Club - Friday 11 June 2021**



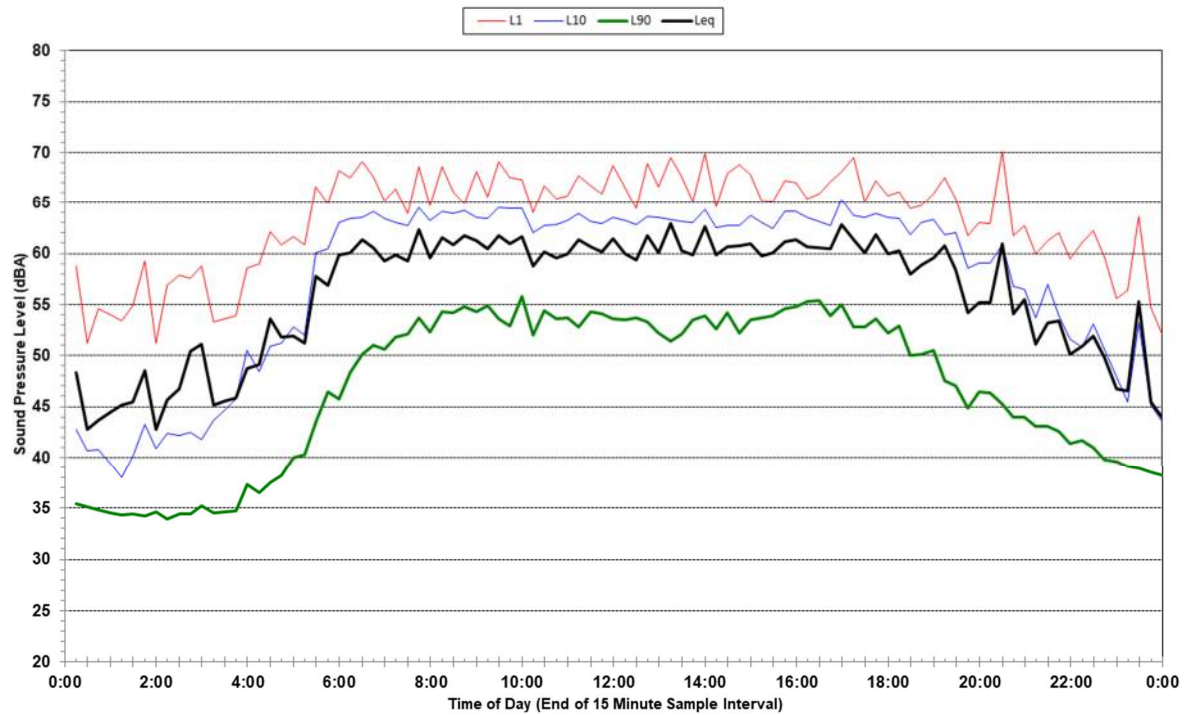
**Statistical Ambient Noise Levels**  
**KIKOFF - Harbord Bowling Club - Saturday 12 June 2021**



**Statistical Ambient Noise Levels**  
**KIKOFF - Harbord Bowling Club - Sunday 13 June 2021**



**Statistical Ambient Noise Levels  
KIKOFF - Harbord Bowling Club - Monday 14 June 2021**



**Statistical Ambient Noise Levels  
KIKOFF - Harbord Bowling Club - Tuesday 15 June 2021**

