



Operational Noise Emission Assessment

39 Cabbage Tree Road, Bayview, NSW



Client:
Jason & Janine Crawford
C/o- Turnbull Planning International
Pty Ltd

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Sydney Head Office
Suite 2
174 Willoughby Rd
St Leonards 2065
T: 02 9908 1270

Melbourne Office
Suite 11
70 Racecourse Rd
Nth Melbourne 3051
T: 03 7015 5112

ABN: 36 105 797 715
PO Box 270
Neutral Bay NSW 2089
E: info@acousticdynamics.com.au
W: www.acousticdynamics.com.au




Client	Mr Jason & Ms Janine Crawford C/o – Turnbull Planning International Pty Ltd
Contact	Ms Tia Gao
Address	Suite 2301, 4 Daydream Street, Warriewood, NSW, 2102
Phone	02 9979 4922
Email	tia@turnbullplanning.com.au

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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

L_{eq} – The 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.

L_{Aeq(15min)} – The A-weighted average equivalent sound level over a 15-minute period.

L_{A90} – The A-weighted noise level that has been exceeded for 90% of the measurement duration. This descriptor is used to describe the background noise level.

L_{A1} – The A-weighted noise level exceeded for 1% of the sample time.

RBL – Rating Background Level. The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period (as opposed to over each 24hr period used for assessment background level) This is the level used for assessment purposes.

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 (μPa) = 2×10^{-5} Pa, the quietest sound a human can hear.

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 **Mr Jason & Ms Janine Crawford** to assess noise emission resulting from the operation of the proposed indoor recreational facility located at 39 Cabbage Tree Road Bayview, NSW.

This document provides an assessment of noise emission levels at nearby receivers resulting from various operational noise sources associated with the proposed indoor recreational 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 DESCRIPTION OF PROPOSAL AND LOCATION

The proposal is for the development of an indoor recreational facility. The location of the subject site is at 39 Cabbage Tree Road, Bayview NSW.

The subject commercial site has one road frontage with the northern boundary direct to Cabbage Tree Road. The subject three-storey recreational facility will consist of two indoor gyms, meeting rooms and other associated facilities and amenities and car parking.

The patrons of the facility will be mostly members of nearby retirement villages or private homes for light recreation and rehabilitation purposes. The facility proposes to operate with a maximum of 40 occupants at one time.

The nearest existing residential receivers are located to the north, at 44, 46A, 48 and 50A Cabbage Tree Road, from the subject site.

The subject building and surrounding area is shown in the Location Map and Aerial Photograph presented within **Appendix A**.

1.3 SCOPE

Acoustic Dynamics has been engaged to provide a mechanical noise emission assessment suitable for submission to the relevant authorities prior to the issue of a Construction Certificate by the client.

- Review of legislation, Council criteria and Australian Standards relevant to the mechanical noise emission from the proposed development;
- Examination of drawings of the proposal;
- Travel to site to conduct inspections and measurements;
- Conduct long term unattended noise monitoring to establish background noise levels at the development site;
- Perform relevant calculations to determine the predicted external noise emission at the nearby receiver locations;

- Prepare a concise noise impact assessment report; and
- Where possible, provide recommendations for noise mitigation treatments to reduce noise emission to acceptable and complying levels.

Acoustic Dynamics advises that the proposed recreational facility will be operating at the following times:

- Monday to Saturday 8:00am – 6:30pm

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 emission assessment from the subject site.

2.1 NORTHERN BEACHES COUNCIL CRITERIA & REQUIREMENTS

2.1.1 LOCAL ENVIRONMENT PLAN

A review of the Pittwater Council Local Environment Plan (LEP) 2014 was conducted. No relevant acoustic requirements and relevant noise criteria were presented within the LEP.

2.1.2 DEVELOPMENT CONTROL PLANS

A review of the Pittwater 21 Development Control Plan (DCP) 2014 was conducted and references to relevant acoustic requirements and relevant noise criteria were presented below.

“C2 Design Criteria for Business Development

C2.10 Pollution Control

Outcomes

*Development does not adversely impact public health, the environment or other lands.
(S, E)*

Controls

All developments must be designed, constructed, maintained, and operated in a proper and efficient manner to prevent air, water, noise or land pollution

Development and business operation must comply with the Protection of the Environment Operations Act 1997, and any relevant legislation.

Compliance with the NSW Environment Protection Authority Industrial Noise Policy (January 2000).

C2.22 Plant, Equipment Boxes and Lift Over-Run

Outcomes

To achieve the desired future character of the Locality.

The bulk and scale of the built form is minimised. (En, S)

Equitable preservation of views and vistas to and/or from public/private places. (S)

To achieve reduction in visual clutter. (En, S)

The appropriate location and design of noise generating equipment.

Controls

Where provided, plant and equipment boxes and lift over-runs are to be integrated internally into the design fabric of the built form of the building.

Locate and design all noise generating equipment such as mechanical plant rooms, mechanical equipment, air conditioning units, mechanical ventilation from car parks, driveway entry shutters, garbage collection areas or similar to protect the acoustic privacy of workers, residents and neighbours.”

2.2 NSW EPA’S PROTECTION OF THE ENVIRONMENT OPERATIONS ACT

2.2.1 THE EPA’S POEO 1997

In accordance with the noise emission requirements contained within Ku-ring-gai Council’s requirements, we advise that noise emission from the proposed mechanical plant and equipment must also comply with the requirements of the relevant legislation, being the *Protection of the Environment Operations (POEO) Act 1997*. The POEO Act 1997 requires that the subject plant and equipment must not generate “offensive noise”.

Offensive noise is defined as follows:

““offensive noise” means noise:

- (a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:*
 - (i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or*
 - (ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or*
- (b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances, prescribed by the regulations.”*

2.3 NSW EPA'S ENVIRONMENTAL NOISE CRITERIA

2.3.1 NOISE POLICY FOR INDUSTRY (NPFI)

Acoustic Dynamics advises that noise emission assessment at nearby and adjacent noise sensitive receivers has been conducted with reference to relevant acoustic criteria and standards and has yielded the following information.

The newly implemented NSW Noise Policy for Industry (NPFI, 2017) has replaced the NSW Industrial Noise Policy (INP, 2000), with certain specific exceptions. Acoustic Dynamics advise that the following criteria have been applied for the assessment of the mechanical plant associated with facility and the general operations of the proposed recreational facility.

Project Intrusiveness Noise Level

The intrusiveness noise level is determined as follows:

$L_{Aeq, 15min} = \text{rating background noise level} + 5 \text{ dB}$	
where:	
$L_{Aeq, 15min}$	represents the equivalent continuous (energy average) A-weighted sound pressure level of the source over 15 minutes.
and	
Rating background noise level	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:

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

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.”

To establish the acoustic environment at the subject site in accordance with the guidelines of the NSW EPA’s NPfI, an unattended noise logger was deployed at the subject development site between Monday 19 February 2018 and Monday 26 February 2018. The logger was deployed within the front yard of the subject site. Acoustic Dynamics advises the selected location is likely to be representative of the existing noise environment of the nearest receivers to the subject development site. Operator-attended background noise measurements were undertaken on site to supplement unattended background noise monitoring data collected.

The results of the unattended noise monitoring are presented graphically as **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 3.1**. Acoustic Dynamics notes that the measured L_{A90} background noise levels in the area are dominated by road traffic noise and at or below Northern Beaches Council’s recommended L_{A90} background noise levels for residential areas.

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

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**.

Table 2.1 Summary of Measured Noise Levels and Noise Emission Criteria – At Residences

Location	Time of Day	L_{A90} Rating Background Noise Level (RBL) [dB]	Measured L_{Aeq} [dB]	Project Intrusive Noise Level [dB]	Project Amenity Noise Level ³ L_{Aeq} [dB]	Project Noise Trigger Level L_{Aeq} [dB]
Nearest residential receiver(s)	Daytime ¹ (7am to 6pm)	45	57	50	53	50
	Evening (6pm to 10pm)	35	53	40	48	40

Note: 1) 8am to 6pm on Sundays and public holidays
 2) Amenity adjustment based on “Suburban” receiver type.
 3) Amenity adjustment based on “Suburban” receiver type. 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)).

2.3.2 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 road as well as other developments with the potential to have an impact in relation to traffic noise generation. **Table 2.2** presents the relevant RNP noise criteria for the subject development site.

Table 2.2 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)
Freeway / arterial / sub arterial roads	3. Existing residences affected by additional traffic on existing freeways / arterial / sub arterial roads generated by land use developments	$L_{Aeq, (15 \text{ hour})}$ 60 (external)	$L_{Aeq, (9 \text{ hour})}$ 55 (external)

3 NOISE MEASUREMENT EQUIPMENT & 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	623588	Brüel & Kjaer Acoustic Calibrator
ARL-EL-315	16-207-012	Acoustic Research Laboratories 315 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 NOISE EMISSION ASSESSMENT

4.1 PATRON AND VEHICLE EXTERNAL NOISE EMISSION

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

Based on previous experience and the drawings and information provided by the proponent, Acoustic Dynamics has conservatively undertaken modelling and calculations to predict the likely **maximum** $L_{Aeq}(15 \text{ min})$ noise emission at the nearest receiver locations, resulting from the following noise sources and activities:

Internal

- 40 patrons within the gym area; and
- 4 staff members within the general space.

External

- 6 condenser units (each having an equivalent 80 dB(A) SWL) located on the southern side of the development, on the green roof top area with shielding provided by the southern wall of the development.

Car Park

- Maximum 10 cars within the car park area;
- Maximum 2 shuttle bus movements (trips) per hour; and
- Maximum 10 vehicle movements (ingress or egress) per hour.

Based on the above noise sources, the calculated maximum noise emission levels at the nearest receiver locations and the relevant noise emission criteria are presented in **Table 4.1** below. It is advised that by achieving compliance at the nearest residential locations, compliance will also be achieved at those further away.

Table 4.1 Calculated Max. Noise Emission & Relevant Criterion – Nearest Receivers

Receiver Location	Noise Source	Assessment Period	Maximum $L_{Aeq(15min)}$ Noise Emission [dB]	Overall $L_{Aeq(15min)}$ Noise Emission [dB]	Noise Emission $L_{Aeq(15min)}$ Criterion [dB]	Complies
Residential Receivers (44 to 50 Cabbage Tree Rd)	Vehicle Movements (Onsite & On-Street)	Daytime/Evening ¹ (8am to 6:30pm)	24	34	40	Yes
	Operational noise from facility		33			
	A/C Condensers		27			

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.

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

Table 4.2 – Maximum L_{Aeq} Road Traffic Noise Emission Levels & Criteria for Residential Receivers

All Residential Receivers	Noise Source	Quietest Period Source Operates	Calculated Maximum Noise Level $L_{Aeq(15\text{ hour})}$ [dB]	Relevant Criterion $L_{Aeq(15\text{ hour})}$ [dB]	Complies With Criteria?
Residential receivers on nearby roads	Off-site car movements	Evening ¹	42 ²	60	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.

2) Calculated on the basis of 10 cars driving in a 1 hour period every hour over a 15 hour day period, at an average of 10 metres, which is deemed to be a highly conservative estimate.

Acoustic Dynamics advises that the above road traffic noise emission assessment in **Table 4.2** has been undertaken for an unlikely scenario including 10 vehicle movements utilising Cabbage Tree Road within a one-hour period. Although this situation would occur rarely if at all, Acoustic Dynamics assesses in this way to conservatively assess compliance during the quietest time period.

The predicted noise emission levels presented above in **Table 4.1** and **Table 4.2** include allowances for relevant distance, direction and shielding losses.

Acoustic Dynamics advises that the predicted maximum noise emission associated with the use of the proposed recreational facility complies with the relevant noise emission criteria.

5 DISCUSSION

Further to our investigations and analysis, the following information was derived:

1. The six (6) air conditioner outdoor units for the proposed recreational facility are to have a maximum sound power level (SWL) of 80 dB(A) per unit; and
2. Based on the results of Acoustic Dynamics' noise modelling and calculations presented in **Table 4.1** and **Table 4.2**, we advise that the predicted maximum noise emission associated with the use and operation of the mechanical plant will achieve compliance with the external noise emission objectives of Northern Beaches Council;

6 CONCLUSION AND ACOUSTIC OPINION

Acoustic Dynamics has conducted an acoustic assessment of the noise emission resulting from the operation of the proposed indoor recreational facility, located at 39 Cabbage Tree Road, Bayview, NSW.

The relevant criteria are provided in **Section 2** and details and an assessment of noise emission from the proposed recreational facility is provided in **Section 4**.

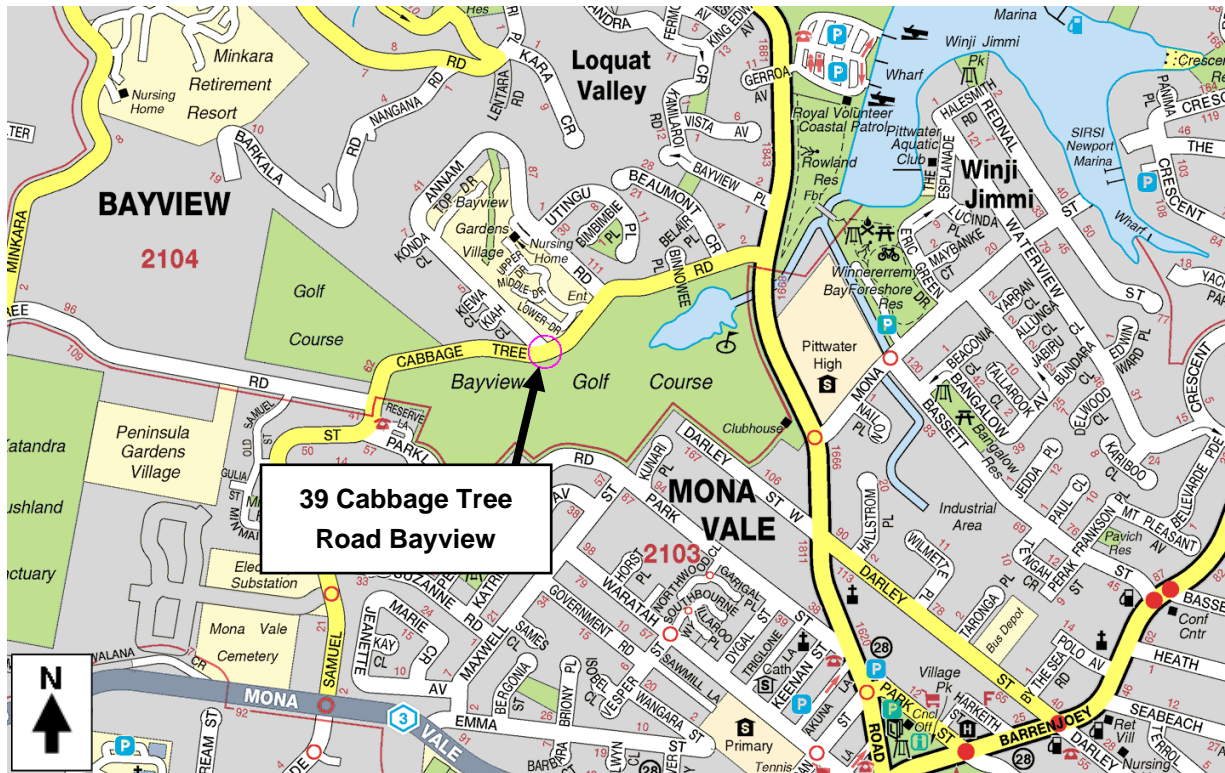
Acoustic Opinion

Further to our assessment, Acoustic Dynamics advises that noise emission resulting from the use and operation of the subject recreational facility complies with the relevant noise emission criteria of Northern Beaches Council, the NSW EPA, and will comply with the noise emission requirements of the POEO Act 1997.

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.
02 9908 1270 should you require more information.

APPENDIX A – LOCATION MAP, AERIAL PHOTO AND DRAWINGS

A.1 LOCATION MAP

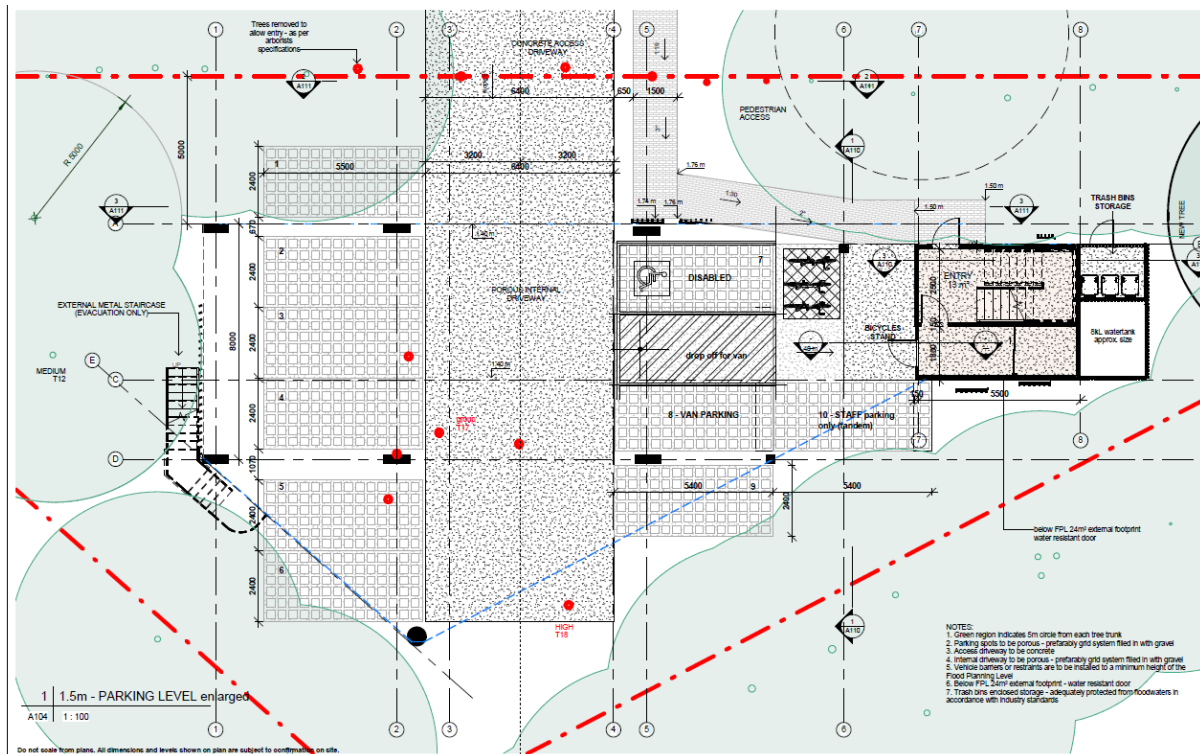


A.2 AERIAL PHOTO

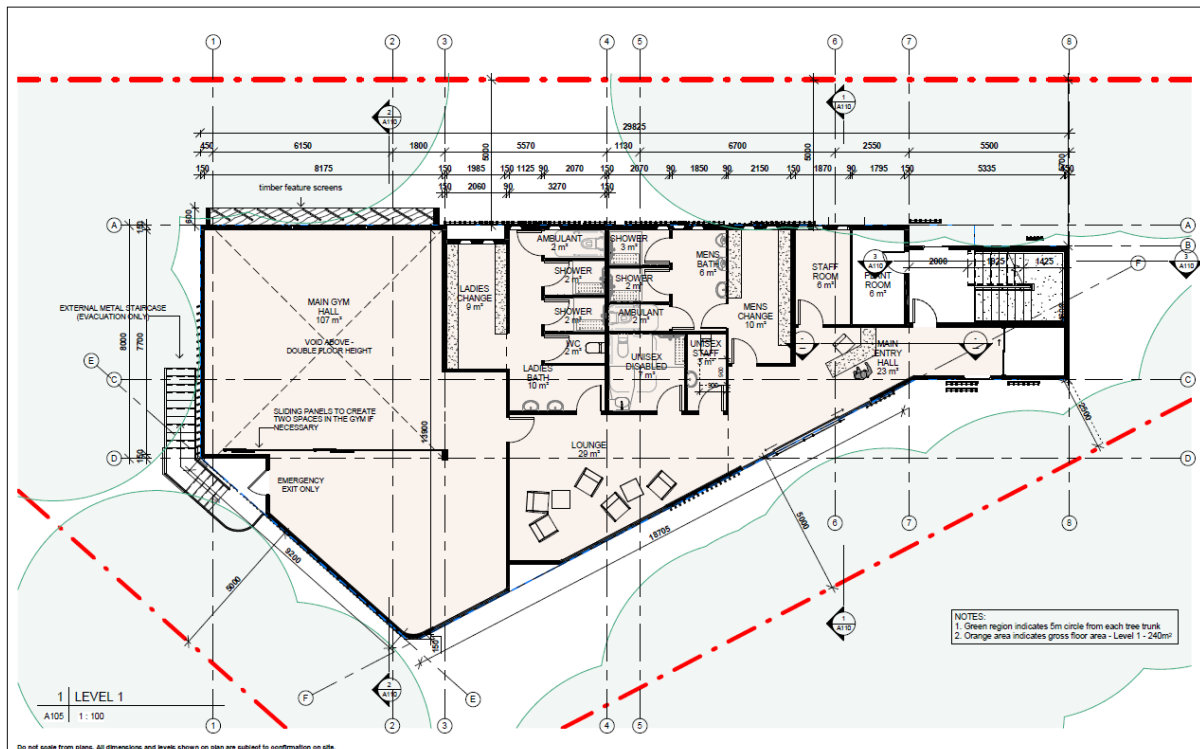


A.3 DRAWINGS

1.1.1 CAR PARK

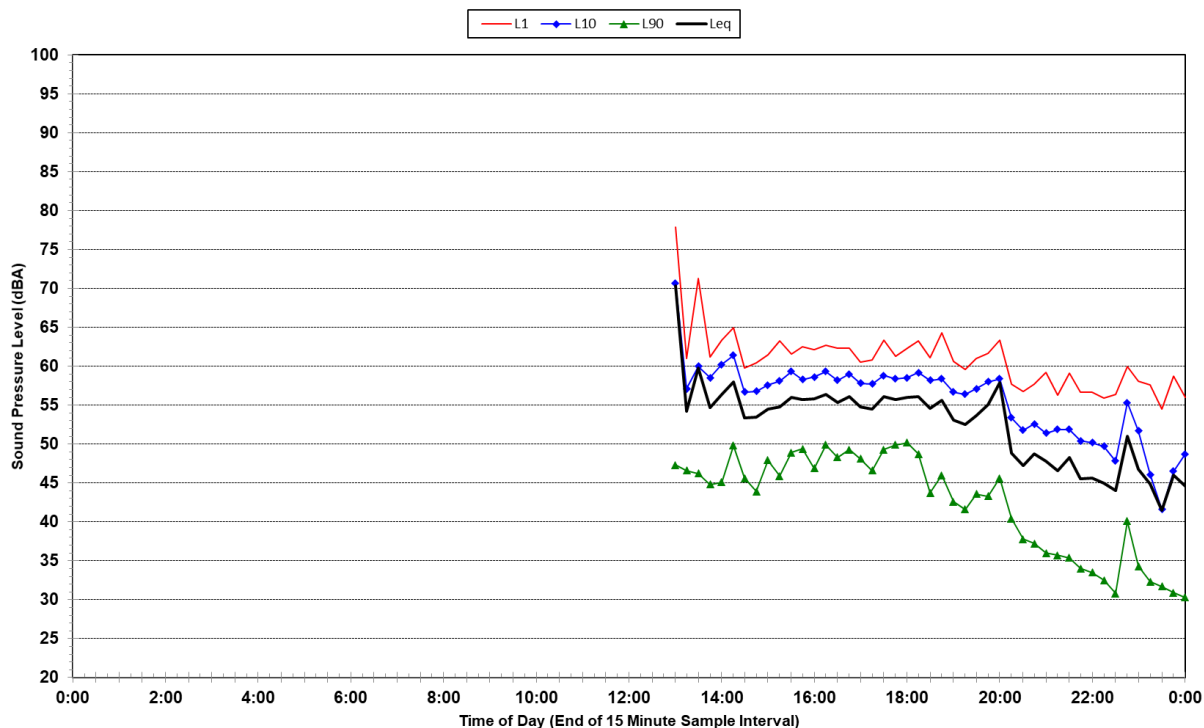


1.1.2 LEVEL 1

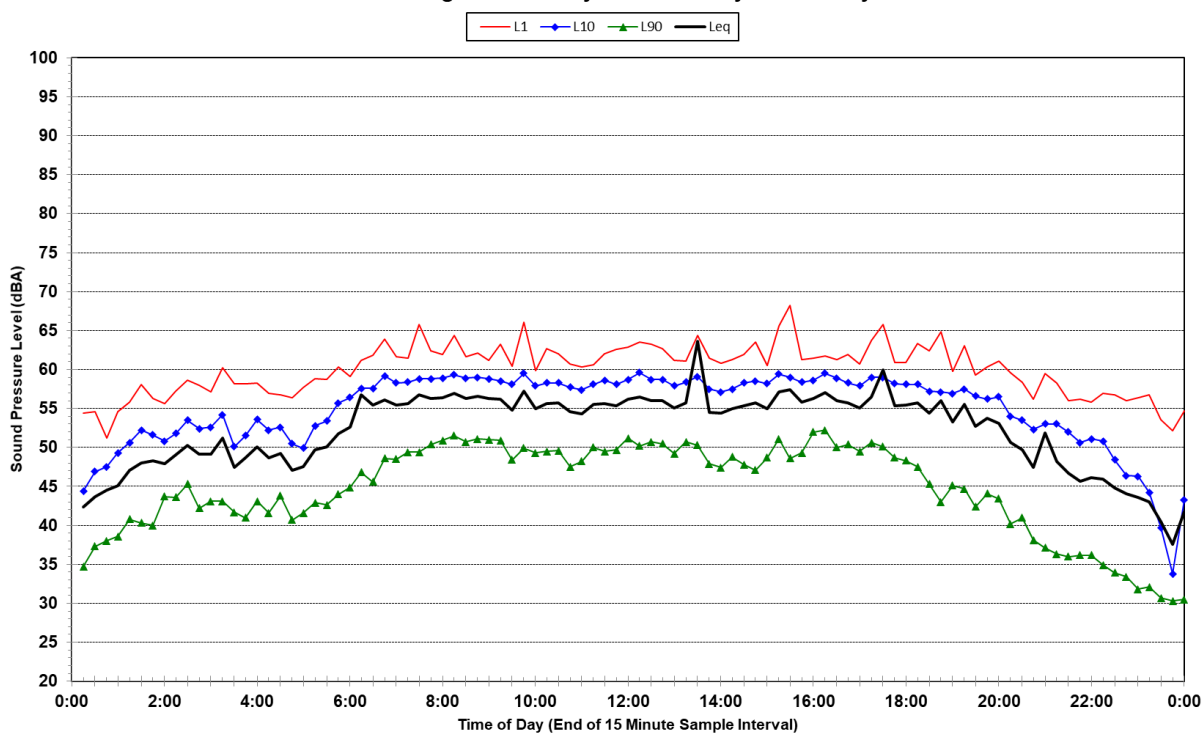


APPENDIX B – UNATTENDED NOISE LOGGER DATA

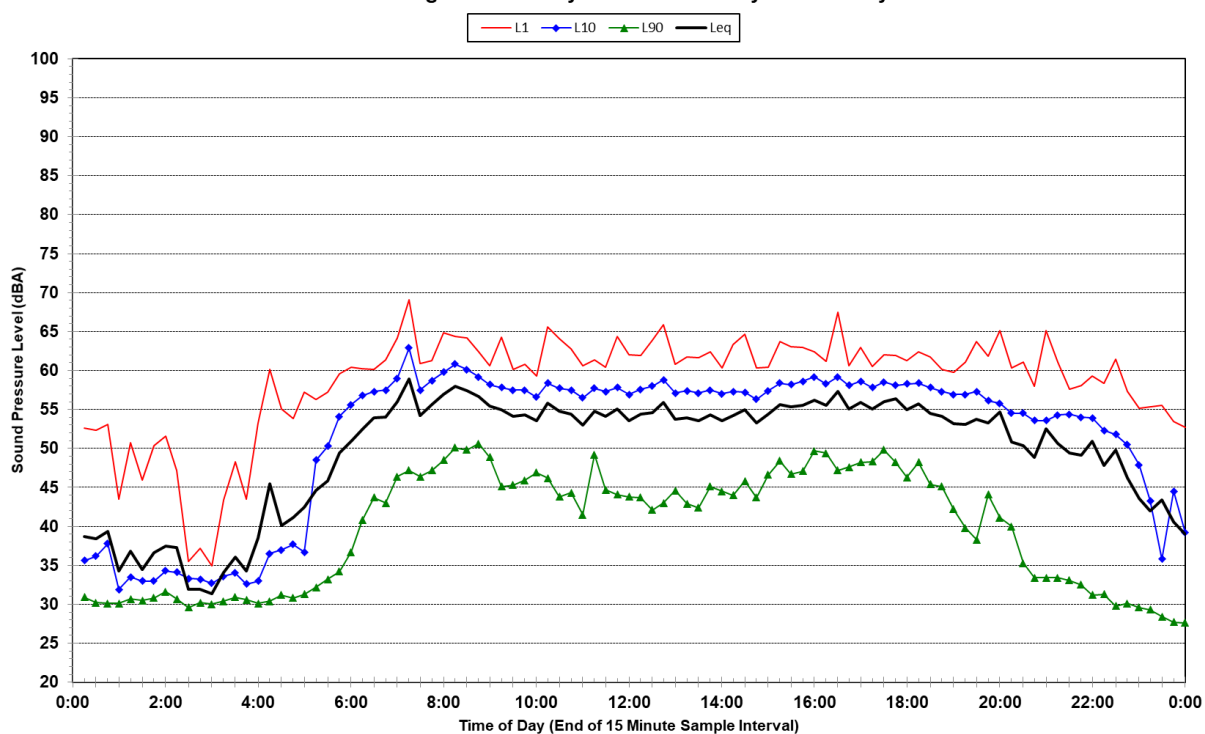
Statistical Ambient Noise Levels
4264 - 39 Cabbage Tree Rd Bayview - Monday 19 February 2018



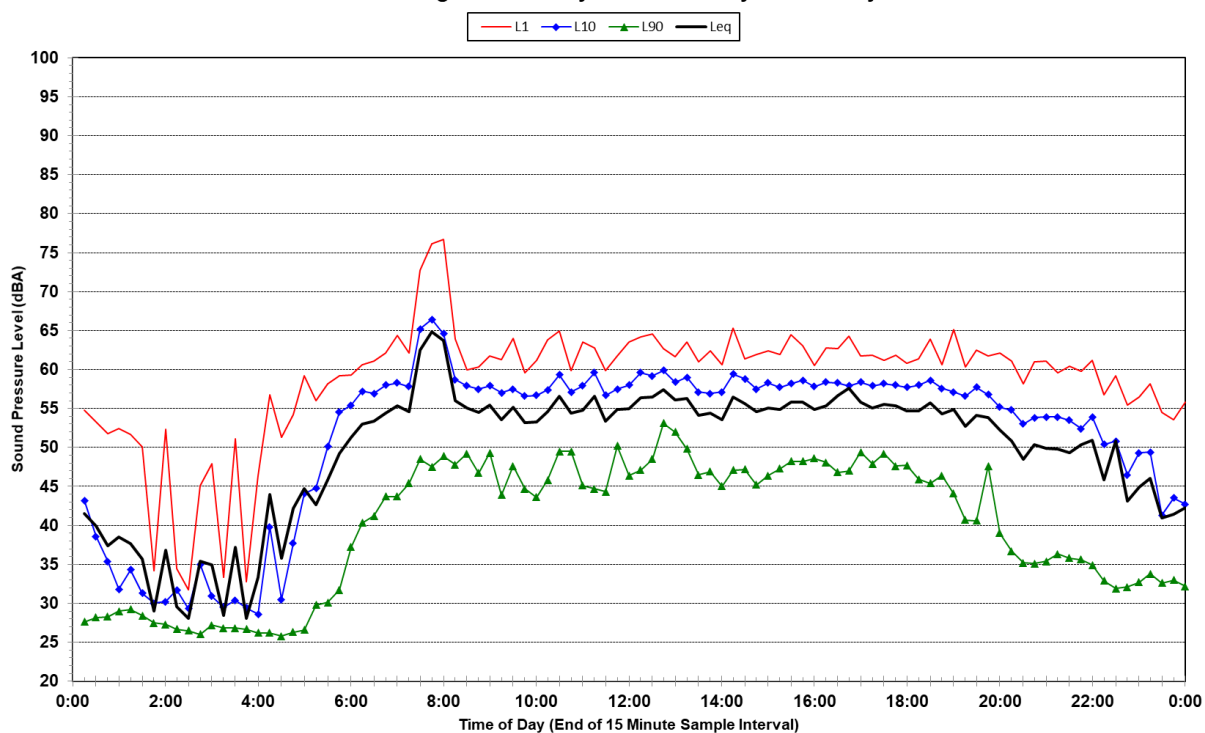
Statistical Ambient Noise Levels
4264 - 39 Cabbage Tree Rd Bayview - Tuesday 20 February 2018



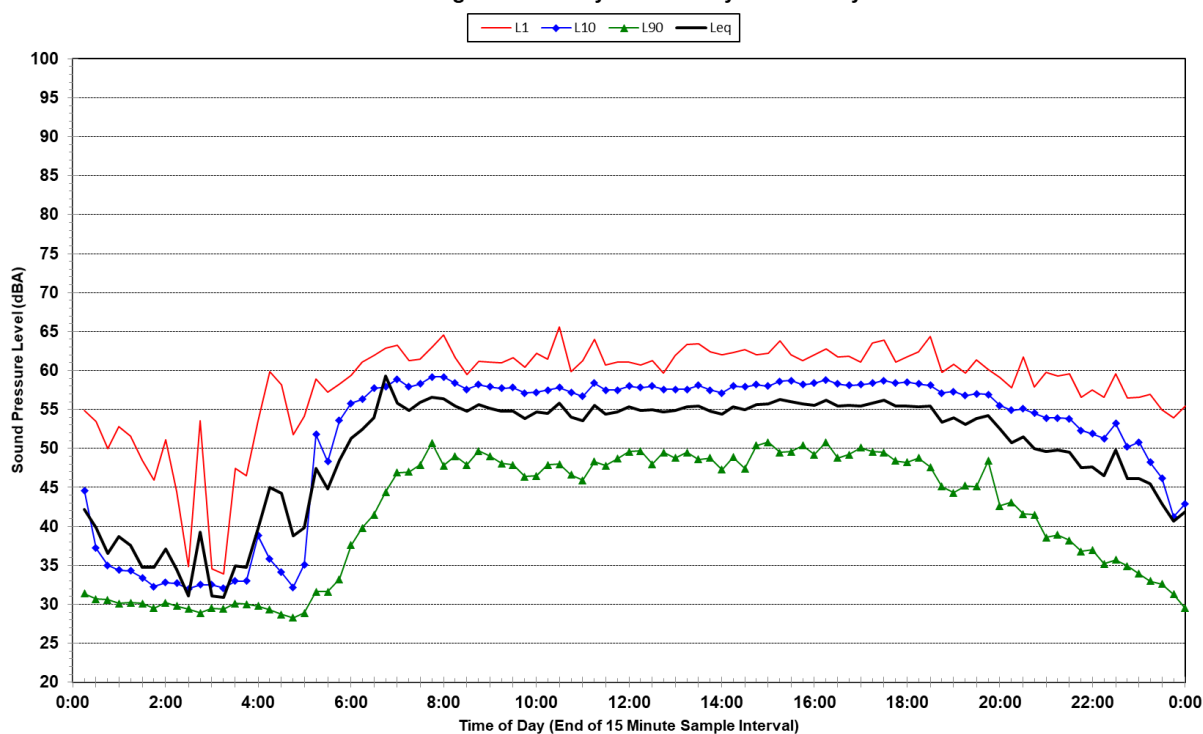
Statistical Ambient Noise Levels
4264 - 39 Cabbage Tree Rd Bayview - Wednesday 21 February 2018



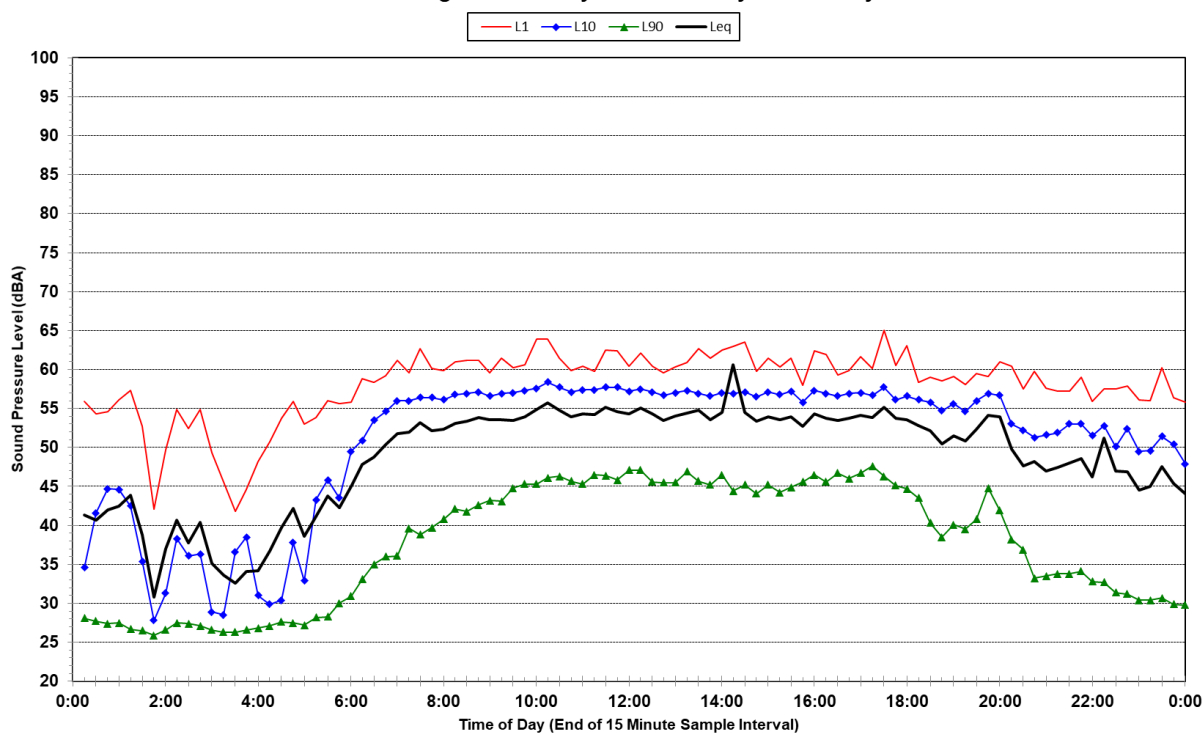
Statistical Ambient Noise Levels
4264 - 39 Cabbage Tree Rd Bayview - Thursday 22 February 2018



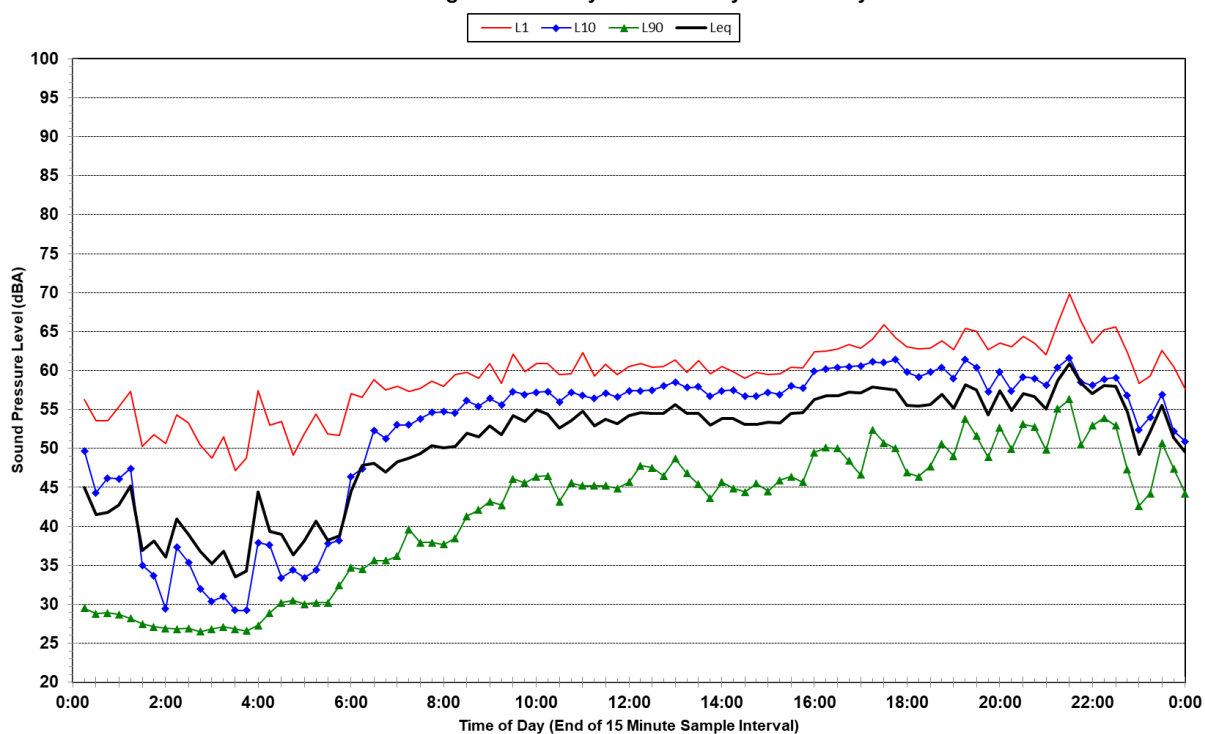
Statistical Ambient Noise Levels
4264 - 39 Cabbage Tree Rd Bayview - Friday 23 February 2018



Statistical Ambient Noise Levels
4264 - 39 Cabbage Tree Rd Bayview - Saturday 24 February 2018



Statistical Ambient Noise Levels
4264 - 39 Cabbage Tree Rd Bayview - Sunday 25 February 2018



Statistical Ambient Noise Levels
4264 - 39 Cabbage Tree Rd Bayview - Monday 26 February 2018

