MATTHEW PALAVIDIS
VICTOR FATTORETTO
MATTHEW SHIELDS

34 Curragul Road, Turramurra

Development Application

SYDNEY
9 Sarah St
MASCOT NSW 2020
(02) 8339 8000

ABN 11 068 954 343
www.acousticlogic.com.au

Project ID	20191478.1
Document Title	Development Application
Attention To	Northside Constructions

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	4/12/2019	20191478.1/0412A/R0/GK	GK		GW
1	19/08/2020	20191478.1/1908A/R1/GK	GK		GC

TABLE OF CONTENTS

1 INTRODUCTION

Acoustic Logic Consultancy (ALC) have been engaged to conduct an acoustic assessment of potential noise impacts associated with the proposed Aged Care Facility development to be constructed at 34 Curragul Road, Turramurra.

This document addresses noise impacts associated with the following:

- Traffic noise impacts from Curragul Road; and
- Noise emissions principle from mechanical plant to service the base building.

Acoustic Logic Consultancy have utilised the following documents and regulations on the assessment of noise associated with the development:

- Ku-ring-gai Council document – *'Ku-ring-gai Development Control Plan (DCP) 2019';*
- AS/NZS 2107:2016 'Acoustics – Recommended design sound levels and reverberation times for building interiors'.

This assessment has been conducted using the Gartner Trovato Architects Architectural Drawings for D.A submission, please see table below.

Table 1 – Architectural Sheet Information

Drawing Author	Project	Drawing Title	Revision	Date
Gartner Trovato	Turramurra House	Lower Basement	P-08	6/11/2019
		Basement + Carpark	P-08	
		Ground Floor	P-08	
		Level 01	P-08	
		Level 02	P-08	
		Elevations	P-08	
		Sections	P-08	

2 SITE DESCRIPTION/PROPOSED DEVELOPMENT

Onsite acoustic investigation has been carried out by this office in regard to the surrounding environment around the project site, which has been detailed below:

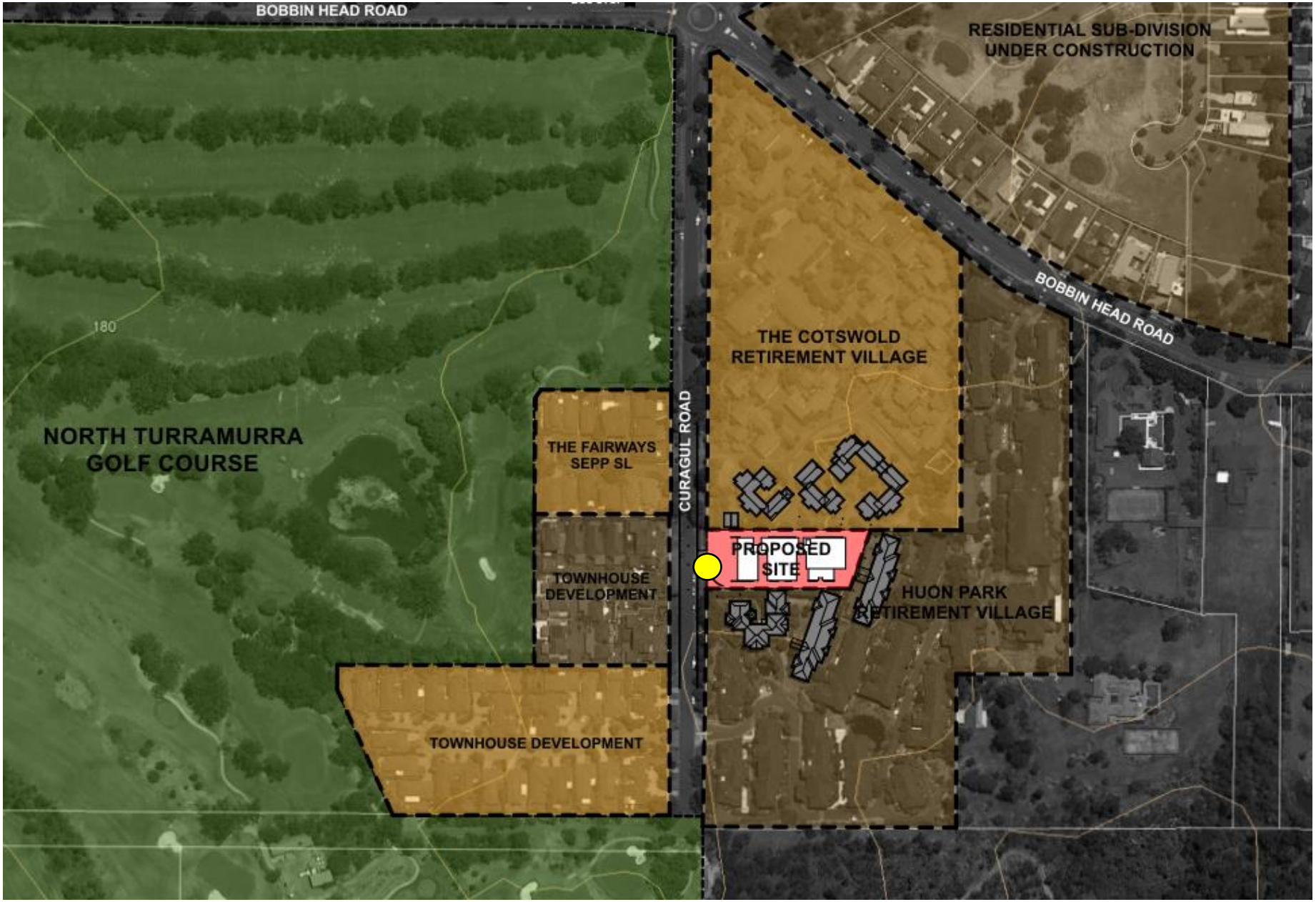
- Existing Residential aged care facility located along the northern boundary of the project site (Huon Park Retirement Village);
- Existing Residential aged care facility located to the eastern boundary of the project site (Huon Park Retirement Village);
- Curragul Road located to the southern boundary of the project site, with residential housing further that; and
- Existing aged care residential facility (The Cotsworld Retirement Village) located along the western boundary of the project site.

Curragul Road is a local road and carries a low volume of traffic, mainly used by residents in close proximity of the site.

The nearest noise sensitive receivers around the project site include:

- **Receiver 1** – The Cotsworld Retirement Village located along the western boundary of the project site;
- **Receiver 2** – The Hudson Park Retirement Village located along the north and eastern boundary of the project site;
- **Receiver 3** – Residential Housing located along the southern boundary of the project site across Curagul Road, 9 Curagul Road "The Fairways".

A site map, measurement description and surrounding receivers are presented in figures 2-1 below.



\\SYD-DC01\data\Australia\Jobs\2019\20191478\20191478.1\20200819GK

Figure 2-1 Site Map and Measurement Location map sourced Gartner Trovato Context Plan

6 Unattended noise monitor

3 EXISTING ACOUSTIC ENVIRONMET

Acoustic monitoring was conducted on the property to establish the background noise levels which will be used as basis for this assessment.

3.1 ENVIRONMENTAL NOISE DESCRIPTORS

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental noise a 15-minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters.

In analysing environmental noise, three-principle measurement parameters are used, namely L_{10}, L_{90} and L_{eq}.

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the 15-minute period. L_{eq} is important in the assessment of environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

3.2 BACKGROUND NOISE LEVELS

Background noise levels which will be used as a basis for this assessment are detailed below.

3.2.1 Measurement Equipment

Unattended noise monitoring was conducting using one Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning and the end of each measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

3.2.2 Measurement Location

An unattended noise monitor was installed on ground level along the southern boundary of the proposed project site 34 Curragul Road, Turramurra.

3.2.3 Measurement Period

Unattended noise monitoring was conducted from Wednesday the 4th of December to the 10th of December 2019.

3.2.4 Measured Background Noise Levels

The background noise levels established from the unattended noise monitoring are detailed in the Table below.

NSW EPA's RBL assessment procedure requires determination of background noise level for each day (the ABL) then the median of the individual days as set out for the entire monitoring period.

This report provides detailed results of the unattended noise monitoring. Weather affected data was excluded from the assessment. The processed Rating Background Noise Levels (lowest 10th percentile noise levels during operation time period) are presented in Table below.

Unattended and attended noise measurements have been undertaken as per the procedures outlined in Fact Sheet A and B of the NSW EPA Noise Policy for Industry.

Weather affected data (rain fall and wind speeds above 5m/s) have been excluded from the assessment as per Fact Sheet A and B. Where interval periods (day, evening and night) have 18%, 13% and 11% respectively, these periods have been excluded from the assessment.

Unattended Noise Monitor – Logger location 1 – Rating Background Noise Level

Date	dB(A)$L_{90(Period)}$ [1]		
	Day (7am-6pm)	**Evening (6pm-10pm)**	**Night (10pm-7am Next Day)**
4th December 2019	38	32	32
5thDecember 2019	37	35	31
6thDecember 2019	34	36	33
7thDecember 2019	34	33	28
8thDecember 2019	34	32	27
9thDecember 2019	37	33	28
10thDecember 2019	39	39	32
11thDecember 2019	37	34	31
Median	**35**	**33**	**30**

Table Notes:

1. Periods marked "-" above did not collect the enough data to be considered valid as the monitor as either installed before, during or after the interval.

Onsite attended and unattended noise measurements indicate that the acoustic environment for the project site are as below.

Table 3-1 – Summarised Rating Background Noise Level

Location	Time of day	Rating Background Noise Level dB(A)$L_{90(Period)}$
34 Curragul Road, Turramurra.	Day (7am-6pm)	35
	Evening (6pm-10pm)	33
	Night (10pm-7am)	30

4 EXTERNAL NOISE INTRUSION ASSESSMENT

Site investigation indicates that the major external noise source around project site is traffic noise form Curagul Road

The following noise intrusion assessment will be carried out in accordance with criteria nominated in section 4.1 of this report.

4.1 NOISE INTRUSION CRITERIA

A traffic noise intrusion assessment has been conducted based off the requirements of the following acoustic noise criteria/standards;

- Ku-ring-gai Council document – 'Ku-ring-gai Development Control Plan (DCP) 2019';
- Australian and New Zealand Standard AS/NZS 2107:2016 *'Recommended design sound levels and reverberation times for building interiors'*.

4.2 KU-RING-GAI COUNCIL DOCUMENT – 'KU-RING-GAI DEVELOPMENT CONTROL PLAN (DCP) 2019';

Ku-ring-gai Development Control Plan (DCP) 2019 Specifies the following in regard to internal noise criteria.

'Buildings are to be designed to minimise the impact of noise through planning, construction and materials in accordance with the relevant acoustic standards in relation to noise transmission between and within buildings, including AS2107-2000: Acoustics- Recommended design sound levels and reverberation for building interiors.'

(Please note that AS2107-2000 has been superseded by AS2107-2016)

4.2.1 Australian and New Zealand Standard AS/NZS 2107:2016 'recommended design sound levels and reverberation times for building interiors'

AS2107-2016: Recommended design sound levels and reverberation times for building interiors specifies allowable internal noise levels for internal spaces within residential and commercial buildings. Table 1, in Section 5 of AS2107-2016, gives the following recommended internal noise levels for commercial buildings and residential buildings.

Table 4-1 – Recommended Design Sound Level

Space /Activity Type	Recommended Design Sound Level
Sleeping Areas	35dB(A)$L_{eq(1hr)}$
Living Areas	45dB(A)$L_{eq(1hr)}$

4.3 EXTERNAL NOISE MEASUREMENTS

This section of the report details noise measurements conducted at the site to establish traffic and surrounding environmental noise levels impacting the future development.

4.3.1 Measurement Equipment

Attended short term measurements of traffic noise which were undertaken by this office, to supplement the unattended noise monitoring. Measurements were conducted using a Norsonic 140 Sound Analyser. The analyser was set to fast response and calibrated before and after the measurements using a Norsonic Sound Calibrator type 1251. No significant drift was noted.

Unattended noise monitoring was conducting using one Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning and the end of each measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

4.3.2 Measurement Location

An unattended noise monitor was installed on ground level along the southern boundary of the project site. please see figure 2-1 above for further detail.

In addition, review of long term noise data recorded at the site was used in order to determine the difference between daytime and night time traffic noise levels.

4.3.3 Measured Noise Measurements

Measured noise levels are presented below:

Table 2 – Measured Existing Traffic Noise Levels

Location	Measured Traffic Noise Level	
	Daytime (7am-10pm) dB(A)($L_{eq(worst\ 1hr)}$)	Night (10pm-7am) dB(A)($L_{eq(Worst\ 1hr)}$)
34 Curragul Road, Turramurra.	55	48

4.4 NOISE INTRUSION ANALYSIS

Traffic noise intrusion into the proposed development was assessed using the measured noise levels presented in section 4.2.3 above.

Calculations were undertaken considering the orientation of windows, barrier effects *(where applicable)*, the total area of glazing, facade transmission loss and room sound absorption characteristics. In this way the likely interior noise levels can be predicted.

4.5 RECOMMENDED CONSTRUCTIONS

To ensure compliance with the internal noise levels as nominated in section 4.1 of this report, the following building constructions are recommended.

4.5.1 Glazed Windows and Doors

The following constructions are recommended to comply with the project noise objectives. Aluminium framed/sliding glass doors and windows will be satisfactory provided they meet the following criteria. All external windows and doors listed are required to be fitted with Q-lon type acoustic seals. (**Mohair Seals are unacceptable**).

Thicker glazing may be required for structural, safety or other purposes. Where it is required to use thicker glazing than scheduled, this will also be acoustically acceptable.

The recommended constructions are listed in the table below.

Table 3 – Recommended Glazing Constructions

Project Site	Facade	Level	Space	Glazing Thickness	Acoustic Seals
34 Curragul Road, Turramurra.	Northern	Ground	All	6mm	Yes Q-lon type acoustic seals. (**Mohair Seals are unacceptable**)
		Level 1	All		
		Level 2	All		
	Eastern	Ground	All	6mm	
		Level 1	All		
		Level 2	All		
	Southern	Ground	All	6mm	
		Level 1	All		
		Level 2	All		
	Western	Ground	All	6mm	
		Level 1	All		
		Level 2	All		

It is recommended that only window systems having test results indicating compliance with the required ratings obtained in a certified laboratory be used where windows with acoustic seals have been recommended.

In addition to complying with the minimum scheduled glazing thickness, the R_w rating of the glazing fitted into open-able frames and fixed into the building opening should not be lower than the values listed in Table 5 Recommended Glazing Construction for all rooms. Where nominated, this will require the use of acoustic seals around the full perimeter of open-able frames and the frame will need to be sealed into the building opening using a flexible sealant.

Table 4 - Minimum Rw of Glazing (with Acoustic Seals)

Glazing Assembly	Minimum R_w of Installed Window
6mm	30

4.5.2 External Roof/Ceiling Construction

The external roof structure will be constructed from concrete elements, no additional upgrades will be required for acoustics.

In the event that any penetrations are required thru the external skin, an acoustic sealant should be used to minimise all gaps.

4.5.3 External Wall Construction

The external façade is to be constructed out of either concrete or masonry construction, no additional upgrades will be required for acoustics.

In the event that any penetrations are required thru the external skin, an acoustic sealant should be used to minimise all gaps.

4.5.4 Apartment Entry Doors

Entry doors will be via internal corridors and as such, constructions will be formulated pursuant to the Building Code of Australia.

5 NOISE EMISSION ASSESSMENT

A noise emission assessment has been carried out to ensure noise emitted from the use of the site is in accordance with the requirements listed below.

5.1 NOISE EMISSION CRITERIA

5.2 KU-RING-GAI COUNCIL DOCUMENT – 'KU-RING-GAI DEVELOPMENT CONTROL PLAN (DCP) 2019';

Ku-ring-gai Development Control Plan (DCP) 2019 Specifies the following in regard to Noise Emissions from the project site.

'The maximum LAeq (1 hour) noise levels of any development must not exceed the levels as set out in Table 8C.19-1, when measured at the window of a habitable room within a residential occupancy and in any case not more than 5 dB(A) above the background level during the day and evening and not exceeding the background level at night.'

Time of Day	***Maximum noise level -Windows Open***	***Maximum noise level -Windows Closed***
Day	*55 dB(A)*	*45 dB(A)*
Evening	*50 dB(A)*	*40 dB(A)*
Night	*45 dB(A) bedrooms only*	*35 dB(A) bedrooms only*
	50 dB(A) living areas	*40 dB(A) living areas*

Table 8C.19.1

Day1: From 7:00am to 6:00pm Monday to Saturday; or 8:00am to 6:00pm on Sundays and public holidays

Evening: The period from 6:00pm to 10:00pm

Night: The remaining time periods.

Note: LAeq (1 hour), or 'equivalent continuous noise level', means the level of noise equivalent to the energy average of noise levels occurring over a measurement period (in this case 1 hour). Refer to www.environment.nsw.gov.au/noise/ for more information

5.2.1 Summarised Noise Emission Criteria

Summary for noise emission criteria for noise emissions associated with the development has been summarised below.

Table 5-1 – Summary of Noise Emission Criteria

Receiver	Time of day	Background Noise Level dB(A)$L_{90(Period)}$	External Noise Emission Criteria (at Window) $L_{Aeq(1hr)}$	Internal Noise Emission Criteria $L_{Aeq(1hr)}$ - Windows Open	Internal Noise Emission Criteria $L_{Aeq(1hr)}$ - Windows Closed
Residential Receivers	Day (7am-6pm)	35	40 dB(A)	55 dB(A)	45 dB(A)
	Evening (6pm-10pm)	33	38 dB(A)	50 dB(A)	40 dB(A)
	Night (10pm-7am)	30	35 dB(A)	45 dB(A) bedrooms only	35 dB(A) bedrooms only
				50 dB(A) living areas	40 dB(A) living areas

5.3 MECHANICAL PLANT NOISE

Detailed plant review has not been undertaken at this stage, as plant selections have not been determined. A detailed acoustic review of mechanical plant is recommended prior to the issue of a CC to determine acoustic treatments to control noise and vibrations emissions to satisfactory levels.

However, as a proof of concept we have provided a preliminary review based on our experience of similar projects:

Residential Air Condition Condensers

- It is proposed that residential condensers are located in plant room located on ground level along the western façade of the building (adjacent to the driveway).
- Sound power level (SWL) of a typical residential air conditioning condenser is 65dB(A).
- On the assumption that all condenser units which are located in a plant room in operation (a worst-case scenario). Resultant noise level to the residents to the south, east and west the resultant noise level would be between 39-43dB(A)L_{eq} with the installation of an acoustic grade louvre for any opening in the plant room (indicatively 300mm Deep).
- This is compliant with the day and evening requirement as listed in section 0 above. As for the night period, it is recommended that all air conditioning condensers have a night operation card installed or night mode which would ensure compliance with the night period as well.
- In order to control vibration emissions, it would be recommended that all condensers are installed on Embelton Supershearflex pads or equal. Ensuring compliance with the NSW EPA document *Assessing Vibration: A technical guideline*.

Mechanical Ventilation Systems for Basement

- It is expected that the basements inside the project site will require mechanical ventilation systems to provide air in and out of the space. Typically, this is done by using a fan for the supply and another for the exhaust.
- Sound Power Levels of a typical basement ventilation fans is 85dB(A) (SWL).
- On the assumption that both the supply and exhaust fans are operating at 100% (a worst-case scenario) the resultant noise level at the same location would be 35-38dB(A)L_{eq}. This is achieved by installing internally lined ductwork or attenuators on the intake of supply fans and discharge of exhaust fans.
- In order to control vibration emissions, it would be recommended that all ventilation fans are installed on 25mm static deflection springs or equal. Ensuring compliance with the NSW EPA document *Assessing Vibration: A technical guideline*.

As shown above, the proposed development is more than capable of complying the requirements listed in section 0 of this report in relation to noise and vibration emissions.

Mechanical Ventilation Systems for Bathrooms

Apartment Bathroom exhausts would be located within the ceiling space of the residences and ducted to the perimeter of the building. The exhaust ducting would typically incorporate a length of flexible ducting which will reduce noise emissions to levels complying with the assessment criteria.

However, as previously mentioned it is recommended that a detailed review of mechanical plant noise emissions is to be undertaken prior to the issue of a CC. This will ensure any required standard acoustic treatments such as duct lining, acoustic silencers and enclosures are included in the design.

6 CONCLUSION

This report presents an acoustic assessment of noise impacts associated with the proposed aged care facility development to be located at 34 Curragul Road, Turramurra. Based on the information provided above we conclude the following;

Provided that the treatments set out in section 4 of this report are employed, internal noise levels shall comply with the requirements below:

- Ku-ring-gai Council document – 'Ku-ring-gai Development Control Plan (DCP) 2019';
- AS/NZS 2107:2016 'Acoustics – Recommended design sound levels and reverberation times for building interiors'.

External noise emissions criteria have been setup in this report to satisfy the requirements from the following documents;

- Ku-ring-gai Council document – 'Ku-ring-gai Development Control Plan (DCP) 2019';

Detailed acoustic review of the noise emissions from the proposed development should be reviewed at CC stage.

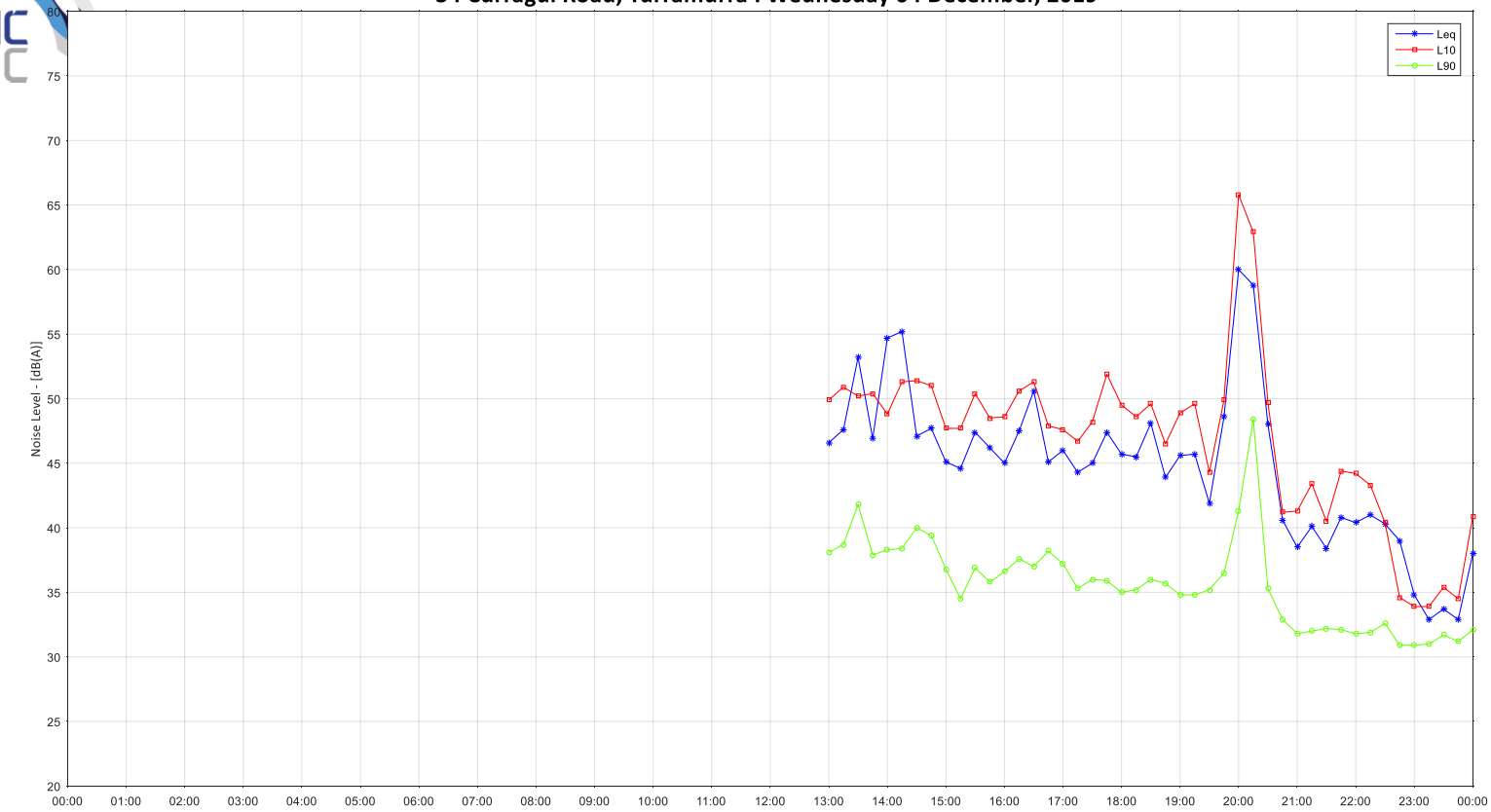
We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

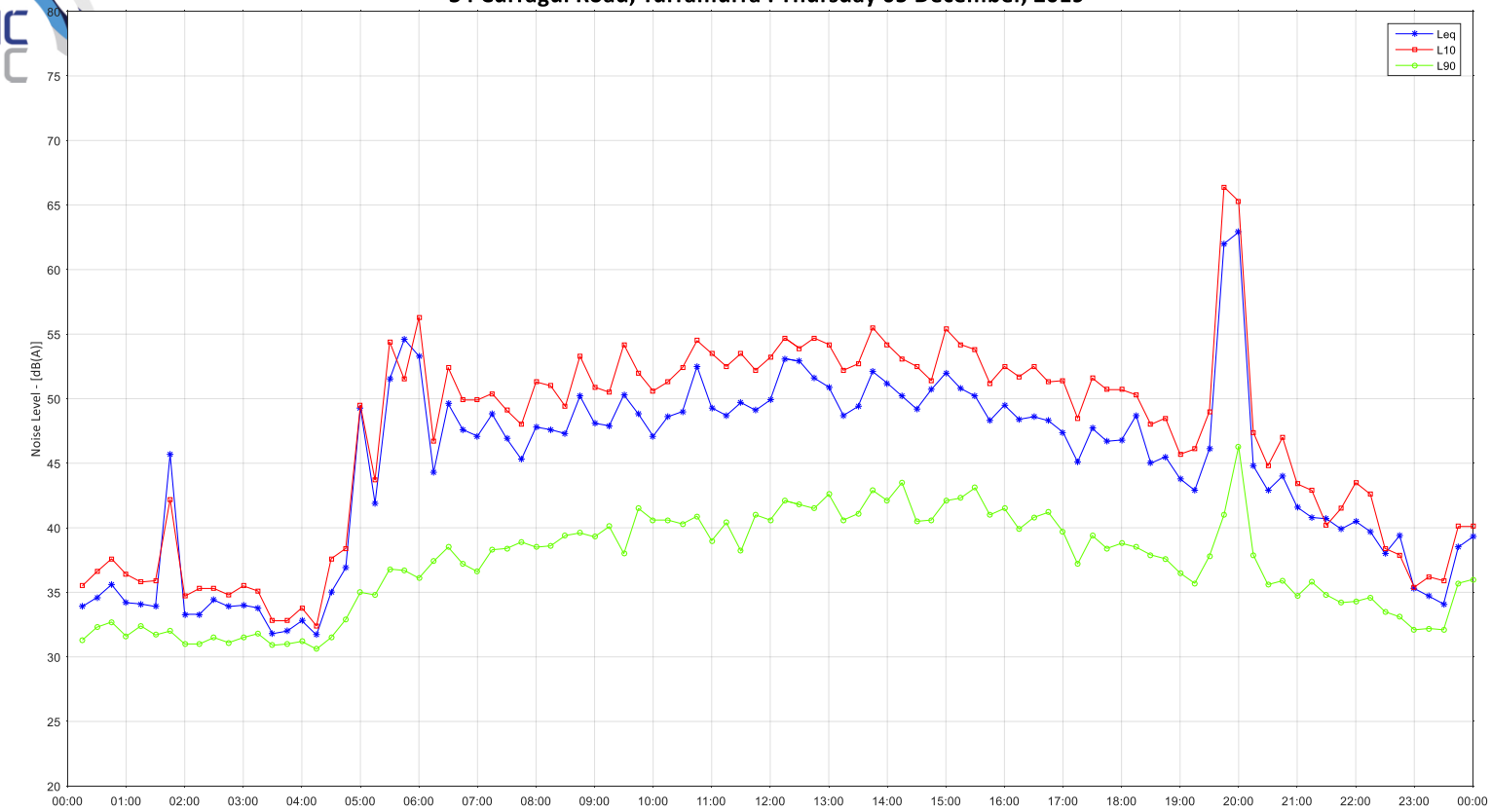
Acoustic Logic Consultancy Pty Ltd
George Kinezos

APPENDIX 1 – NOISE LOGGING DATA

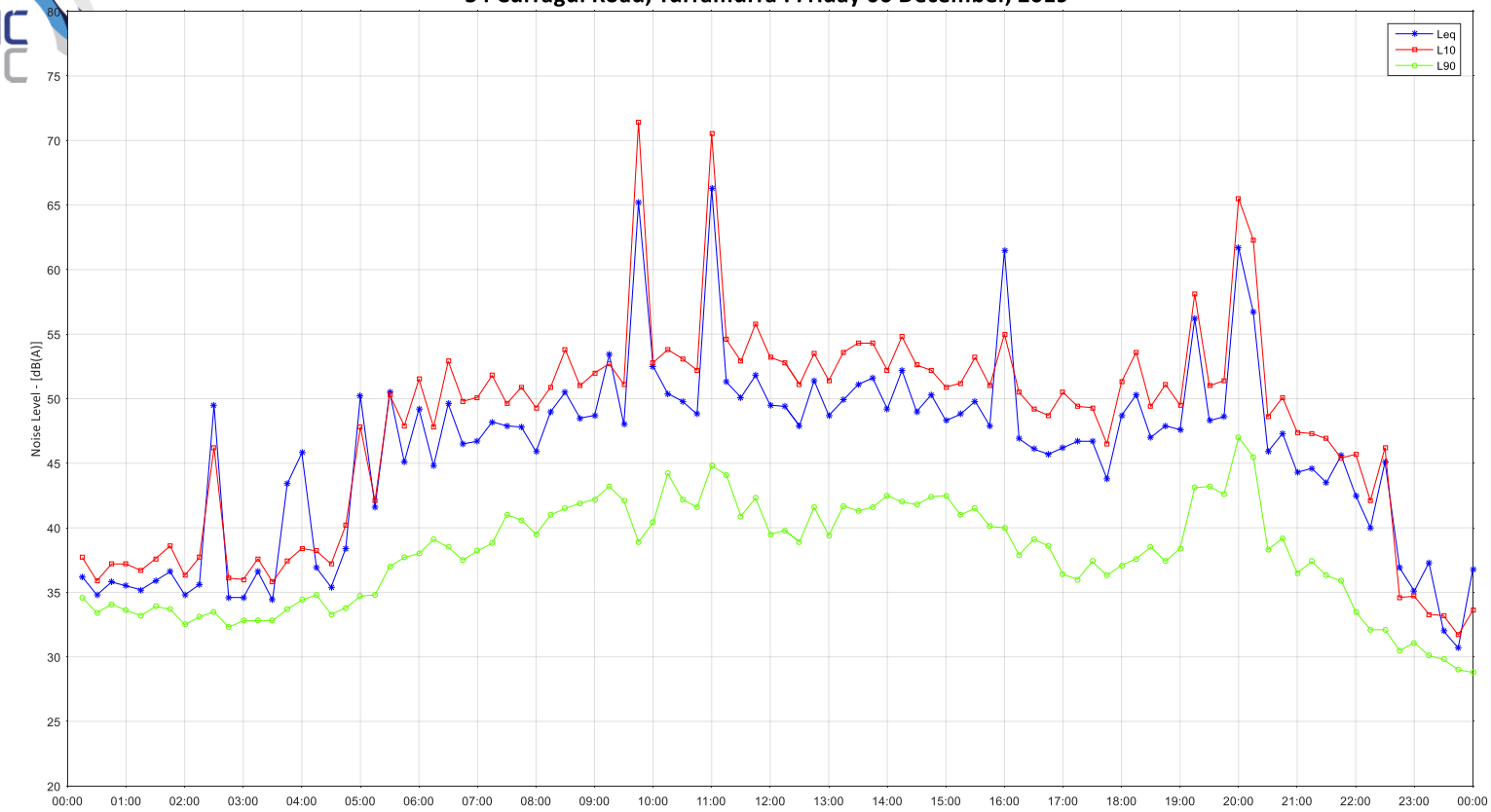
34 Curragul Road, Turramurra : Wednesday 04 December, 2019



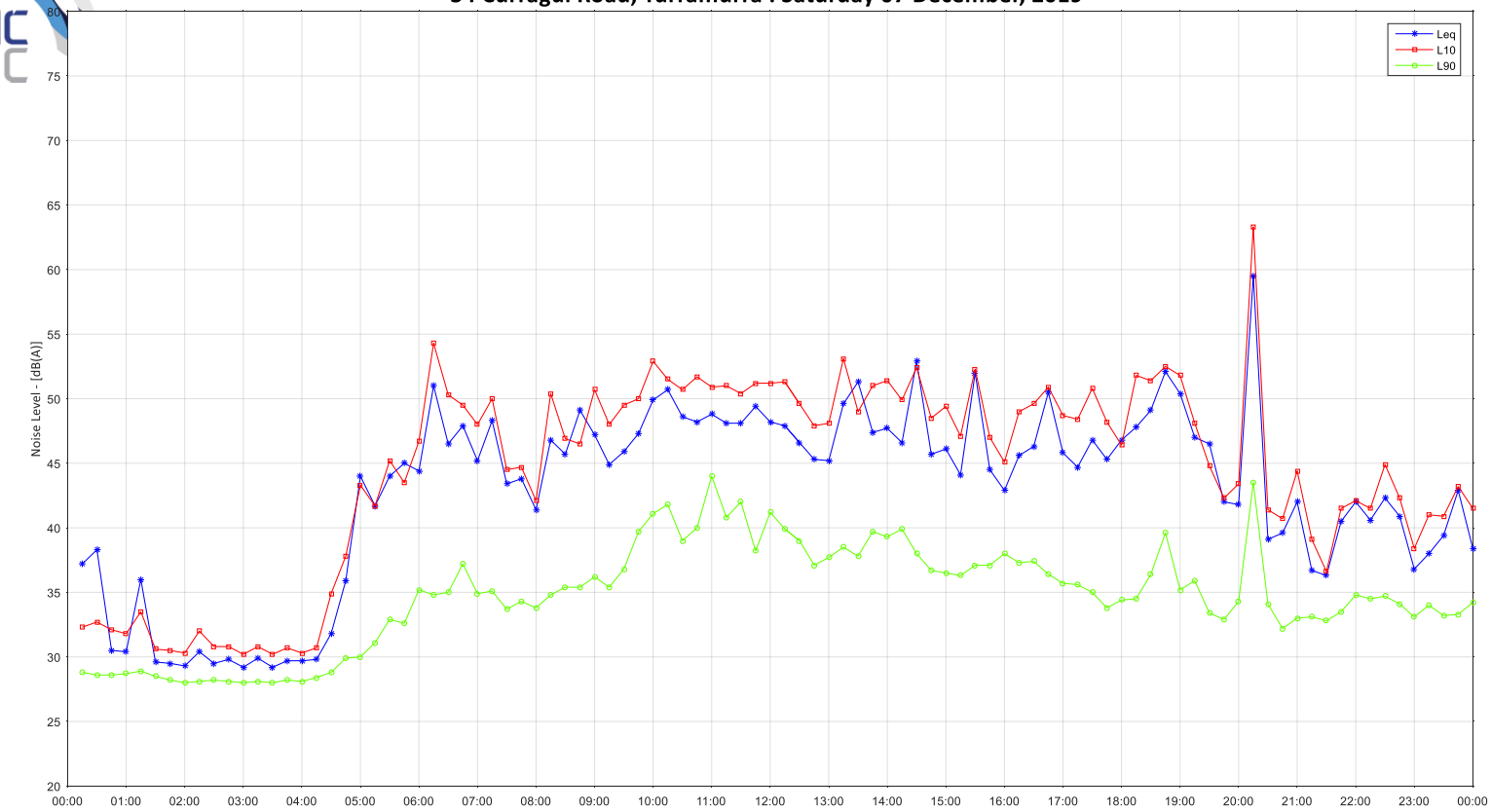
34 Curragul Road, Turramurra : Thursday 05 December, 2019



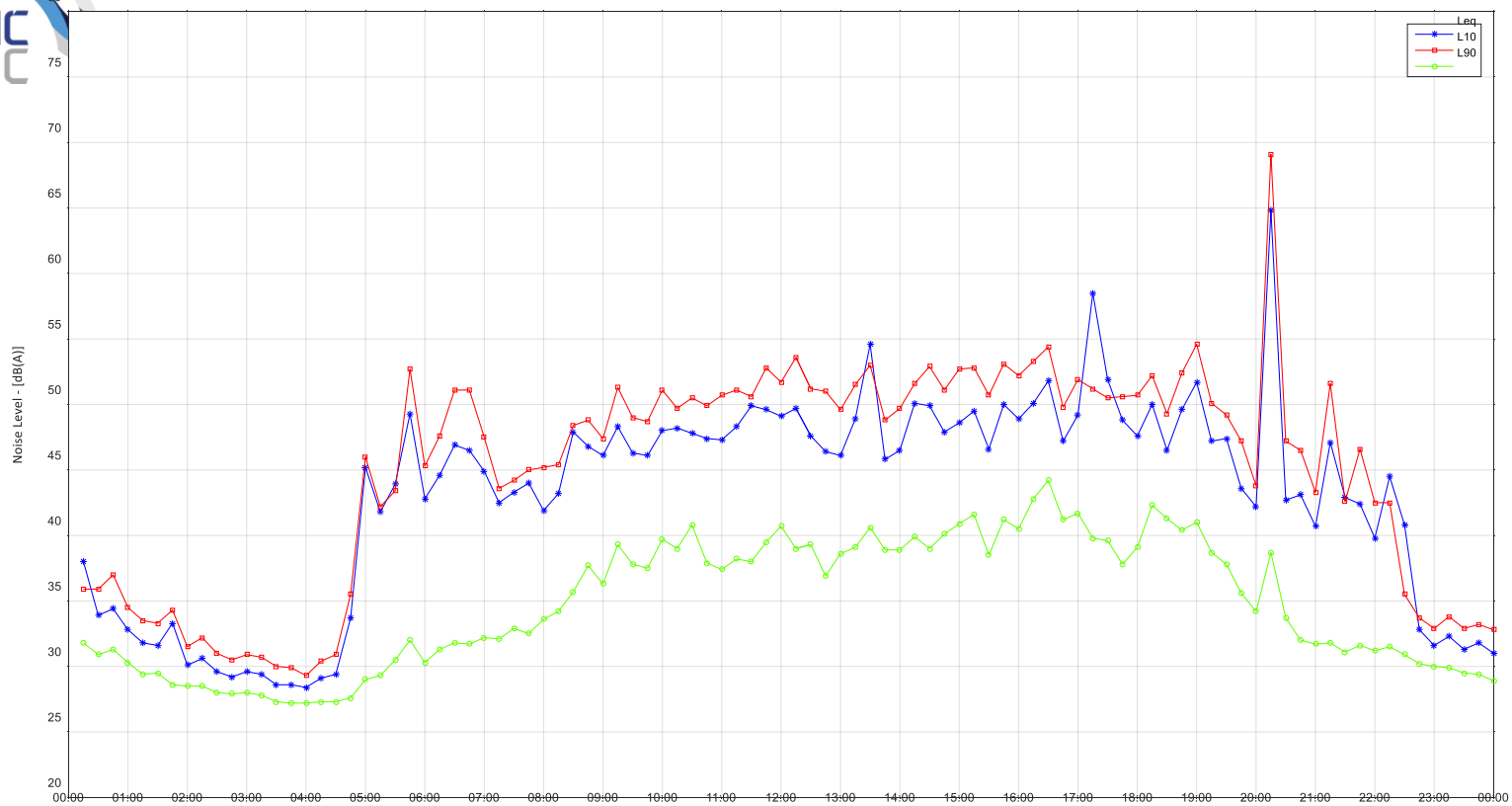
34 Curragul Road, Turramurra : Friday 06 December, 2019

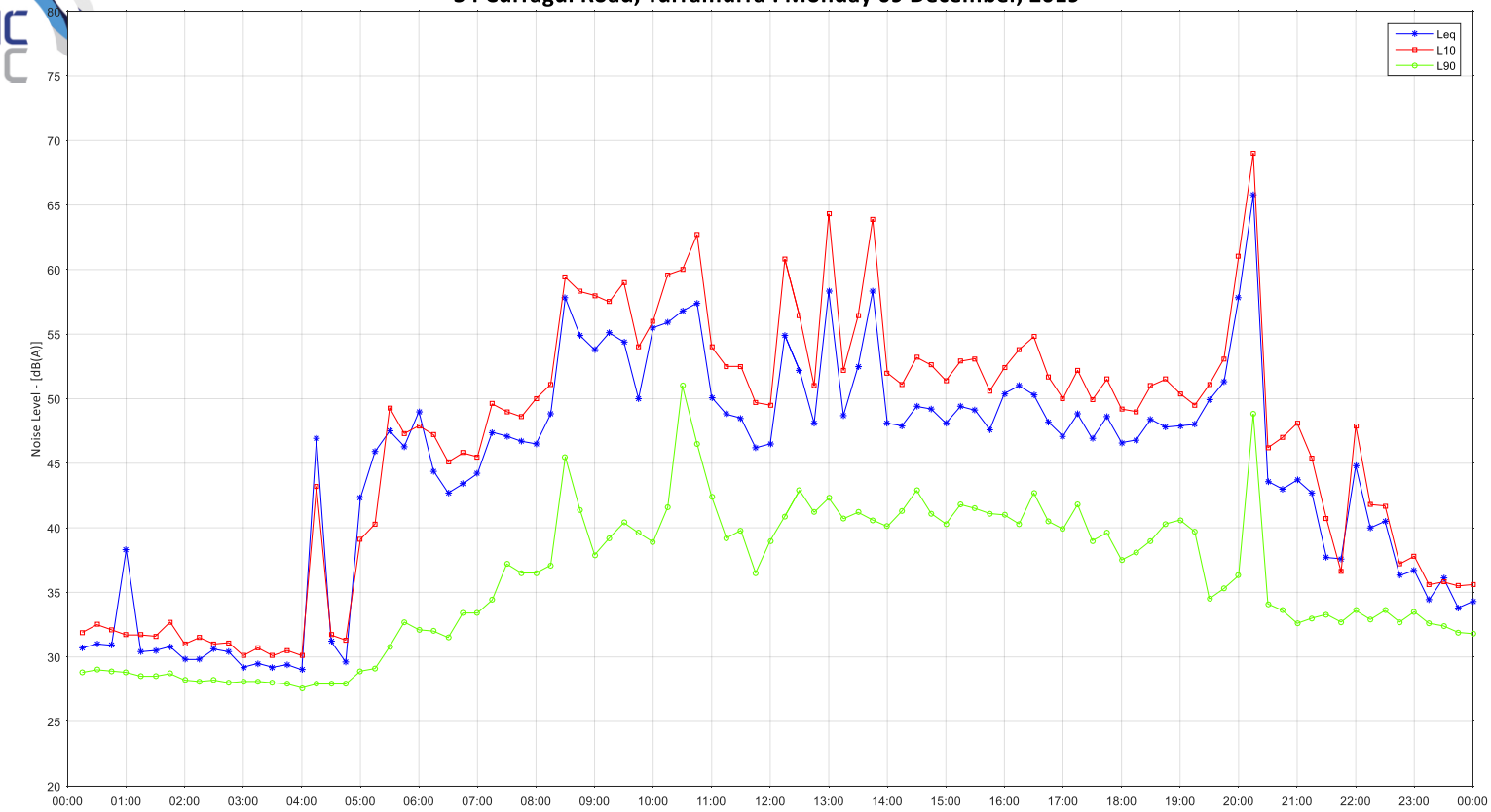


34 Curragul Road, Turramurra : Saturday 07 December, 2019

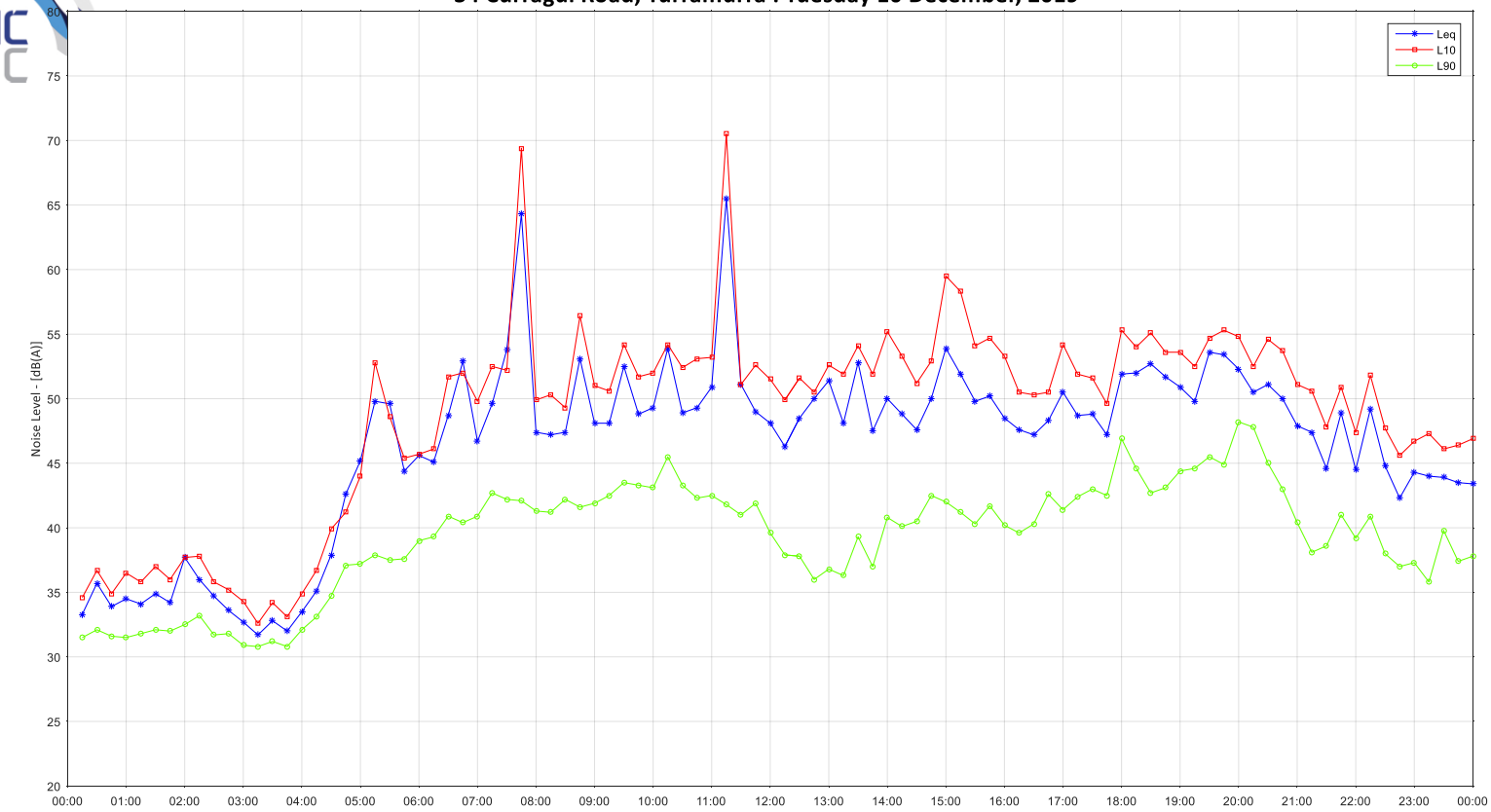


34 Curragul Road, Turramurra : Sunday 08 December, 2019




34 Curragul Road, Turramurra : Monday 09 December, 2019
Noise Level - [dB(A)]
Leq
L10
L90
80
75
70
65
60
55
50
45
40
35
30
25
20
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00

34 Curragul Road, Turramurra : Tuesday 10 December, 2019



34 Curragul Road, Turramurra : Wednesday 11 December, 2019