MATTHEW PALAVIDIS
VICTOR FATTORETTO
MATTHEW SHIELDS

2 Greenwich Road, Greenwich

DA Acoustic Assessment

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

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

Project ID	20200124.1
Document Title	DA Acoustic Assessment
Attention To	Alceon Group No 55 Pty Ltd ATF Greenwich Road

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	24/03/20	20200124.1/2403A/R0/GK	GK	GC	GC
1	24/04/20	20200124.1/2404A/R1/GK	GK		GK

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 Senior Living mixed-use development to be constructed at 2 Greenwich Road, Greenwich.

This document addresses noise impacts associated with the following:

- Traffic noise impacts from Greenwich Road
- Noise emissions from the mechanical plant servicing the development.

ALC have utilised the following documents and regulations in the assessment of noise associated with the development:

- Lane Cove Municipal Council Development Control Plan (DCP) 2016;
- Australian Standard AS 3671:1989 *'Acoustics – Road traffic noise intrusion – building siting and construction'*;
- Australian and New Zealand Standard AS/NZS 2107:2016 *'Recommended design sound levels and reverberation times for building interiors'*; and
- NSW Environmental Protection Authority (EPA) document – *'Noise Policy for Industry (NPfI) 2017'*

This assessment has been conducted using the Marchese Partners architectural drawings for D.A Submission, see table below.

Table 1-1 – Architectural Sheet Information

Drawing Author	Drawing No.	Drawing Title	Revision	Date
Marchese Partners	DA0.01	Cover Sheet	B	22.04.2020
	DA1.04	Survey	B	
	DA1.04	Existing trees to be removed	A	
	DA1.05	LEP&DCP Constraints Diagram	B	
	DA2.01	Basement 3	B	
	DA2.02	Basement 2	B	
	DA20.3	Basement 1	B	
	DA2.04	Lower Ground	B	
	DA2.05	Ground Level	B	
	DA2.06	Level 1	A	
	DA2.07	Level 2	B	
	DA2.08	Level 3	B	
	DA2.09	Level 4	B	
	DA2.10	Level 5	A	
	DA2.11	Level 6	A	
	DA2.12	Roof Top Garden	B	
	DA3.01	North Elevation	B	
	DA3.02	South Elevation	B	
	DA3.03	East Elevation	B	
	DA3.04	West Elevation	B	
	DA4.01	Section 1	B	
	DA4.02	Section 2	B	
	DA4.03	Access Ramp Sections	B	
	DA5.01	GFA (LEP)	B	
	DA5.02	GFA (SEPP)	B	
	DA5.11	Cross Ventilation	B	
	DA5.21	Solar Access – Sheet 1	B	
	DA5.22	Solar Access – Sheet 2	B	

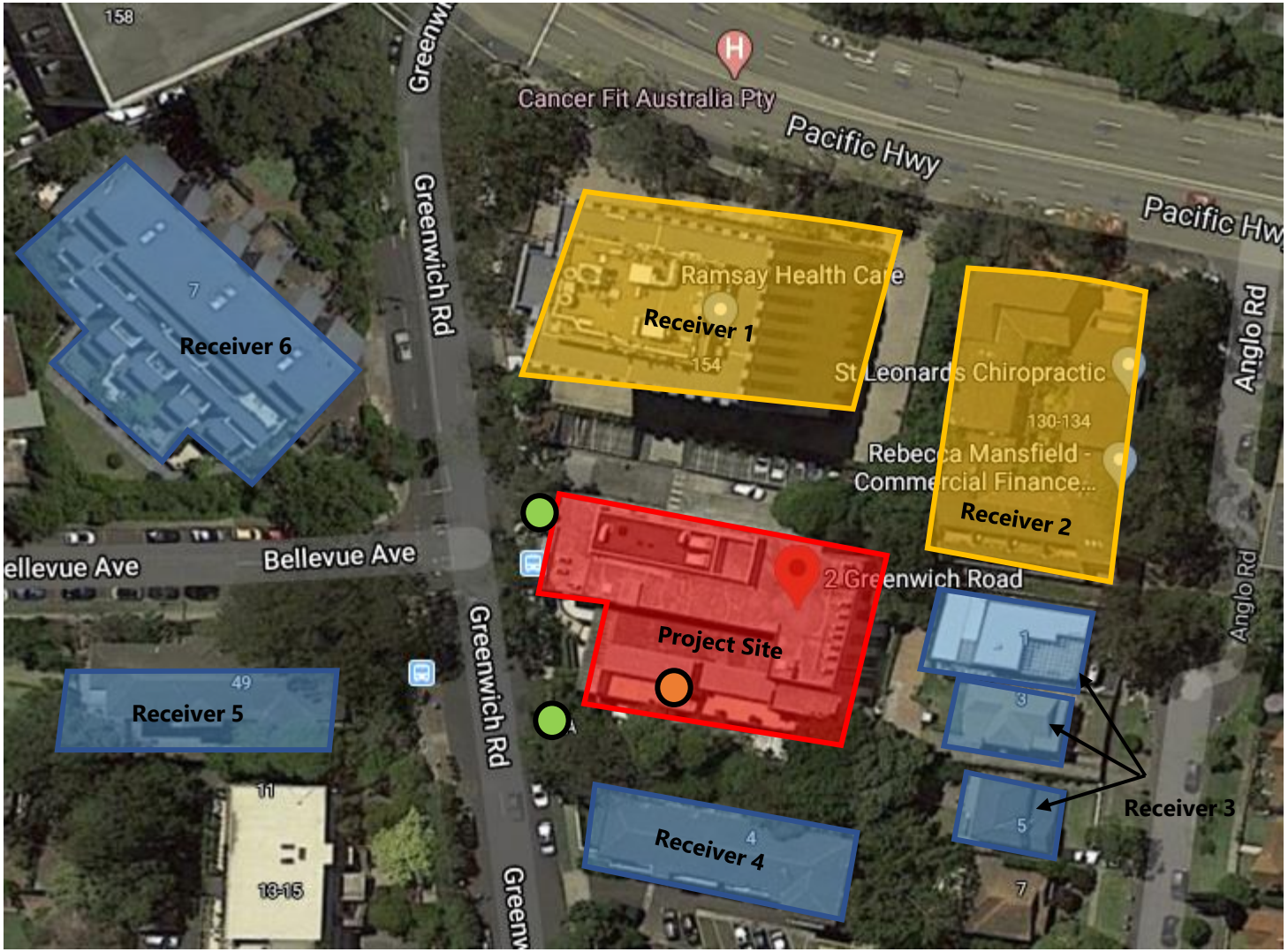
2 SITE DESCRIPTION/PROPOSED DEVELOPMENT

Onsite acoustic investigation has been carried out by this office regarding the surrounding acoustic environment around the proposed development, which has been detailed below:

- Existing Commercial buildings located along the northern boundary of the site;
- Existing Commercial buildings located along the north-eastern boundary of the site;
- Existing residential dwellings located along the eastern boundary of the site;
- Existing residential dwellings located along the southern boundary of the site;
- Existing residential dwellings located along the south-western boundary of the site; and
- Existing residential dwellings located along the north-western boundary of the site;

The nearest noise receivers around the project site include:

- **Receiver 1** – Commercial buildings located at 154 Princess Highway, Greenwich, situated along the northern boundary of the site, commercial receivers are multi-story;
- **Receiver 2** – Commercial buildings located at 130-134 Princess Highway, Greenwich, situated along the north-eastern boundary of the site, commercial receivers are multi-story;
- **Receiver 3** – Residential dwellings located at 1,3,5 Anglo Road, Greenwich, situated along the eastern boundary of the site, residential receivers are multi-story;
- **Receiver 4** – Residential dwellings located at 4 Greenwich Road, Greenwich, situated along the southern boundary of the site, residential receivers are multi-story;
- **Receiver 5** – Residential dwellings located at 49 Bellevue Avenue, Greenwich, situated along the south-western boundary of the site, residential receivers are multi-story; and
- **Receiver 6** – Residential dwellings located at 7 Greenwich Road, Greenwich, situated along the north-western boundary of the site, residential receivers are multi-story.



Unattended Noise Measurements

Attended Noise Measurements

Residential Receiver

Commercial Receiver

Figure 2-1: Site Survey and Monitoring Positions – Site Map Sourced SIX Maps

3 EXISTING ACOUSTIC ENVIRONMENT

The acoustic environment is categorised by moderate background noise levels during the day and evening period and low background noise levels during the night period as most of the volume of traffic has finished for the day.

Acoustic monitoring was conducted near the site 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 in the following sections.

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 along the Western Boundary of the project site. See Figure 2-1 above for a detailed monitoring location.

3.2.3 Measurement Period

Unattended noise monitoring was conducted from Tuesday, 25th February 2020 to Wednesday, 4th March 2020.

3.2.4 Measured Background Noise Levels

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

3.2.4.1 Unattended Noise Measurements

Table 3-1 – Unattended Noise Monitor – Logger Location – Rating Background Noise Level

Date	Rating Background Noise Level dB(A)L_{90}		
	Day (7am-6pm)	Evening (6pm-10pm)	Night (10pm-7am Next Day)
Tuesday, 25th February 2020	-	45	35
Wednesday, 26th February 2020	50	48	34
Thursday, 27th February 2020	48	44	34
Friday, 28th February 2020	49	43	34
Saturday, 29th February 2020	47	43	33
Sunday, 1st March 2020	44	44	34
Monday, 2nd March 2020	48	45	34
Tuesday, 3rd March 2020	50	44	35
Wednesday, 4th March 2020	-	-	-
Median	**48**	**44**	**34**

3.2.4.2 Summarised Rating Background Noise Levels

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

Table 3-2 – Summarised Rating Background Noise Level

Location	Time of day	Rating Background Noise Level dB(A)$L_{90(Period)}$
2 Greenwich Road, Greenwich	Day (7am-6pm)	48
	Evening (6pm-10pm)	44
	Night (10pm-7am)	34

4 EXTERNAL NOISE INTRUSION ASSESSMENT

Site investigation indicates that the major external noise source around the project site is traffic noise from Greenwich Road, Greenwich.

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:

- '*Lane Cove Council Development Control Plan (DCP) 2016'*;
- Australian Standard AS 3671:1989 *'Acoustics – Road traffic noise intrusion – building siting and construction'*; and
- Australian and New Zealand Standard AS/NZS 2107:2016 *'Recommended design sound levels and reverberation times for building interiors*.

4.1.1 Lane Cove Council Development Control Plan (DCP) 2016

The Lane Cove Council Development Control Plan (DCP) 2016, outlines the following in regard to noise intrusion.

'For residential and the residential part of any mixed use development, appropriate measures must be taken to ensure that the following LAeq levels are not exceeded:

- *In any bedroom in the building: 35dB(A) at anytime 10pm-7am;*
- *Anywhere else in the building (other than a garage, kitchen, bathroom or hallway):40dB(A) at any time.'*

4.2 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 development.

4.2.1 Measurement Equipment

Attended short term measurements of traffic noise were conducted 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.

4.2.2 Measurement Location

Unattended Noise Monitoring: An unattended noise monitor was installed along the Western Boundary of the 2 Greenwich Road project site. The noise monitor was approximately 5m from the kerb and had a 180° view of Greenwich Road. For a detailed monitoring location refer to Figure 2-1.

Attended Noise Measurements: Attended noise measurements were undertaken along the Western Boundary of the 2 Greenwich Road project site, Noise measurements were conducted at 5m from the kerb and had a 180° view of Greenwich Road. For a detailed measurement location refer to Figure 2-1.

4.2.3 Measurement Period

Unattended Noise Monitoring: Unattended noise monitoring was conducted from Tuesday, 25th February 2020 to Wednesday, 4th March 2020.

Attended Noise Measurements: Attended noise measurements were conducted on Tuesday, 25th February 2020 between the hours of 3:30pm – 4:30pm.

4.2.4 Measured Traffic Noise Measurements

Attended traffic noise measurements have been summarised below for all locations.

4.2.4.1 Attended Traffic Noise Measurements

Results of the attended noise measurements which were conducted around the project site have been summarised below for each of the measurement locations.

Table 4-1 – Attended Noise Measurements

Location	Time of Measurement	Measured Noise Level dB(A)L_{eq}
Greenwich Road, Greenwich 5m from Kerb, 180° view of road (See Figure 2-1)	Tuesday, 25th February 2020 3:30pm-4:30pm	65dB(A)L_{eq}

4.2.4.2 Summarised External Noise Levels

The existing traffic noise levels listed in the table below were determined based on the unattended noise monitoring and attended noise measurements presented above.

Table 4-2 – Measured Existing Traffic Noise Levels

Location	Summary of Measured Existing Traffic Noise Level	
	Daytime (7am-10pm) dB(A)$L_{eq\ (15hour)}$	**Night time (10pm-7am) dB(A)$L_{eq\ (9hour)}$***
Greenwich Road, Greenwich 5m from Kerb, 180° view of road (See Figure 2-1)	65dB(A)$L_{eq(15\ Hour)}$	59dB(A)$L_{eq(9\ Hour)}$

* The daytime/night-time background noise level difference has been applied.

4.3 NOISE INTRUSION ANALYSIS

Traffic noise intrusion into the proposed development was assessed using the measured noise levels presented in section 4.2 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.

4.4 RECOMMENDED CONSTRUCTIONS

To ensure compliance with the internal noise levels as nominated above the following building constructions are recommended.

4.4.1 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 4-3 – Recommended Glazing Constructions

Façade	Levels	Space	Recommended Constructions	Acoustic Seals
Northern Façade	All	Living Room	6.38mm Laminated	Yes
		Bedroom	10mm Float	Yes
	Ground Level	Cafe	10mm Float	Yes
Southern Façade	All	Living Room	6.38mm Laminated	Yes
		Bedroom	6.38mm Laminated	Yes
	Ground	Gallery/Library/Wellness Centre	10mm Float	Yes
Eastern Façade	All	Living Room	6.38mm Laminated	Yes
		Bedroom	6.38mm Laminated	Yes
	Ground Level	Cafe	10mm Float	Yes
Western Façade	All	Living Room	6.38mm Laminated	Yes
		Bedroom	10mm Float	Yes
	Ground	Commercial Spaces/offices	6.38mm Laminated	Yes

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 Rw 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 4-4 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.

Given the above recommendations are implemented into the design of the project site, the building will comply with the outlined above noise intrusion criteria.

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

Glazing Assembly	Minimum Rw of Installed Window
6.38mm Laminate	31
10mm Float	33

4.4.2 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.

4.4.3 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 through the external skin, an acoustic sealant should be used to minimise all gaps.

4.4.4 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

5.1.1 'Lane Cove Council Development Control Plan 2016'

1.8.2 Privacy – Visual and Acoustic

d) *The noise generated by mechanical equipment of any sort must not exceed the background noise level by more than 5dB (A) when measured in or on the lot adjacent to the equipment. Where sound levels are exceeded, sound proofing measures will be required.*

5.1.2 NSW Environmental Protection Authority (EPA) document – *'Noise Policy for Industry (NPfI)'*

The NPfI provides guidelines for assessing noise impacts from developments. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The NPfI has two requirements which both have to be complied with, namely an amenity criterion and an intrusiveness criterion.

5.1.2.1 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor not exceed the background noise level by more than 5 dB(A).

Table 5-1 – NPfI Intrusiveness Criteria

Receiver	Time of day	Background Noise Level dB(A)L_{90}	Intrusiveness Criteria (Background + 5dB(A)
Residential Receivers	Day (7am-6pm)	48	53
	Evening (6pm-10pm)	44	49
	Night (10pm-7am)	34	39

5.1.2.2 Amenity Criterion

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment.

The Noise Policy for Industry sets out acceptable noise levels for various land uses. Table 2.3 on page 12 of the policy has four categories to distinguish different residential areas.

For the purposes of a conservative assessment, ALC will assess noise emissions in accordance with the 'Suburban' category.

Table 5-2 – NPfI Project Amenity Criteria

Type of Receiver	Time of day	Recommended Project Acceptable Noise Level dB(A)$L_{eq(15mins)}$
Residential (Suburban)	Day (7am-6pm)	53
	Evening (6pm-10pm)	43
	Night (10pm-7am)	38
Commercial	When in use	63

5.1.3 Summarised Mechanical Noise Emission Criteria

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

Table 5-3 – Summary of Noise Emission Criteria (Mechanical Noise)

Type of Receiver	Time of day	Background Noise Level dB(A)L_{90}	Project Amenity Criteria dB(A)L_{eq}	Intrusiveness Criteria (Background + 5dB(A)
Residential Receivers	Day (7am-6pm)	48	53	53
	Evening (6pm-10pm)	44	43	49
	Night (10pm-7am)	34	38	39
Commercial Receivers	When in use	N/A	63	N/A

5.2 MECHANICAL PLANT NOISE

Detailed plant selection has not been undertaken at this stage, as plant selections have not been determined. Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels. Satisfactory levels will be achievable through appropriate plant selection and location and, if necessary, standard acoustic treatments such as duct lining, acoustic silencers and enclosures.

Noise emissions from all mechanical services plant to the closest receivers should comply with the noise emission criteria in Section above.

6 CONCLUSION

This report presents an acoustic assessment of noise impacts associated with the proposed Senior Living mixed-use development to be located at 2 Greenwich Road, Greenwich.

Provided that the treatments set out in section 5 of this report are employed, internal noise levels shall comply with the requirements below:

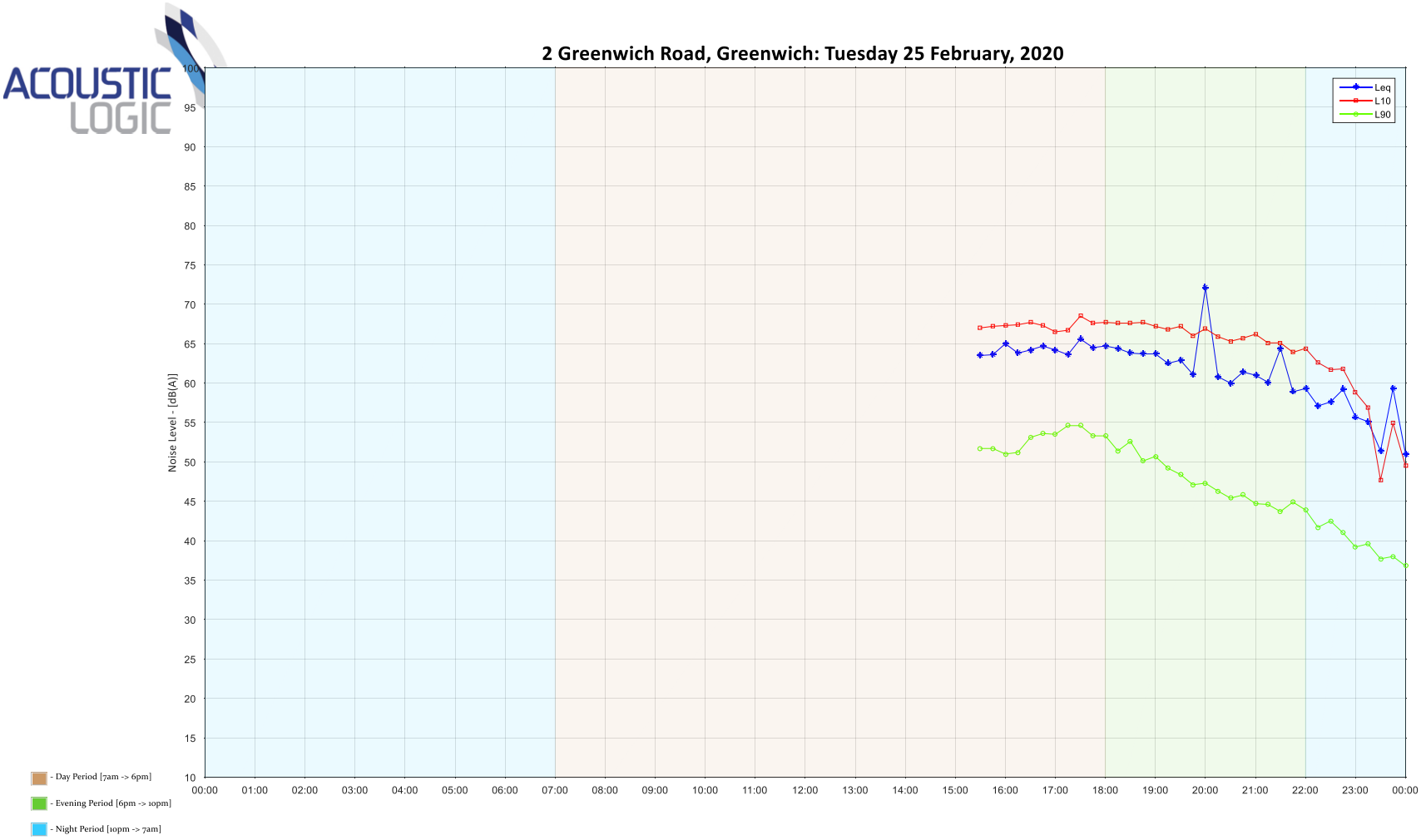
- Lane Cove Municipal Council Development Control Plan (DCP) 2016;
- Australian Standard AS 3671:1989 *'Acoustics – Road traffic noise intrusion – building siting and construction'*;
- Australian and New Zealand Standard AS/NZS 2107:2016 *'Recommended design sound levels and reverberation times for building interiors'*; and
- NSW Environmental Protection Authority (EPA) document – *'Noise Policy for Industry (NPfI) 2017'*

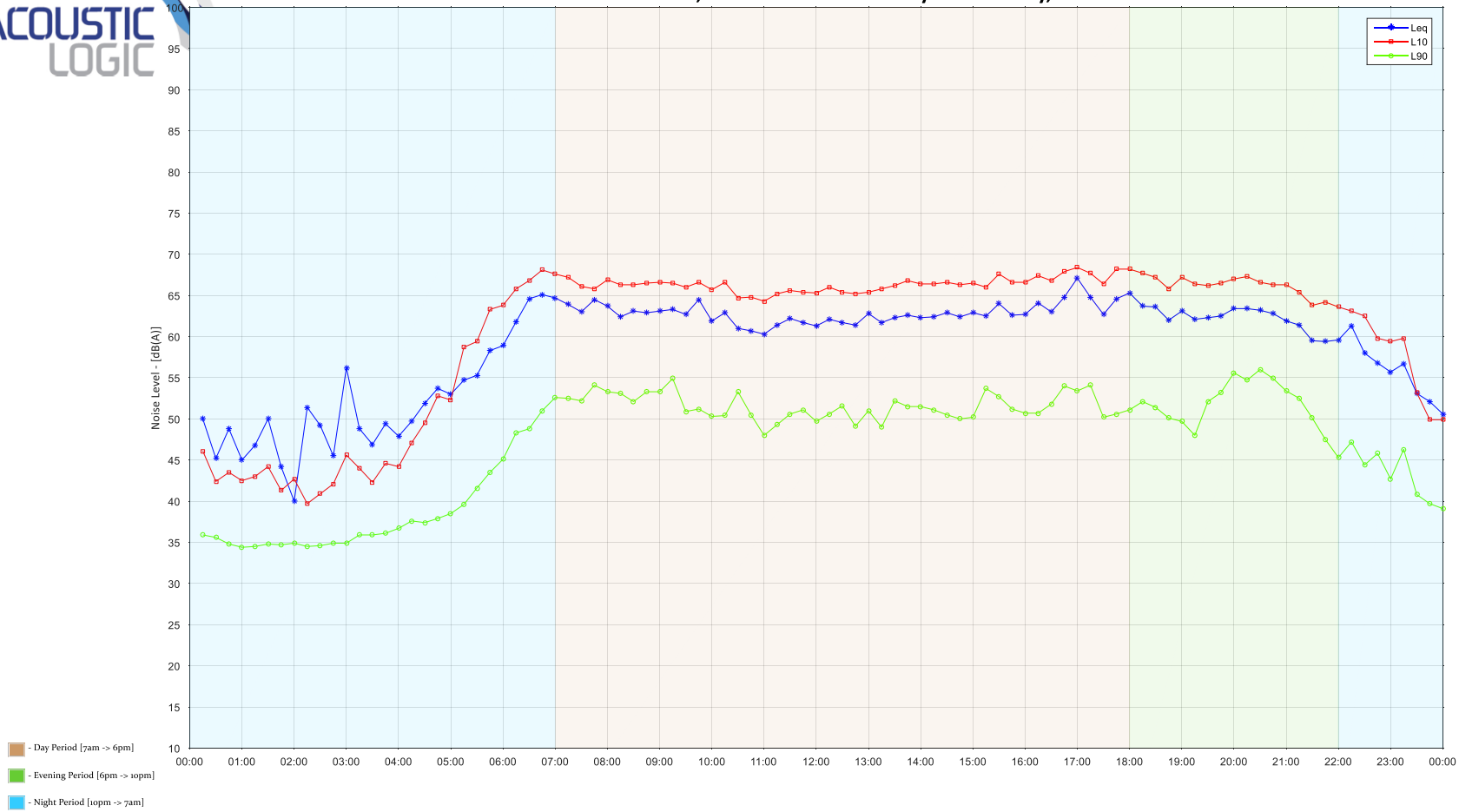
We trust this information is satisfactory. Please contact us should you have any further queries.

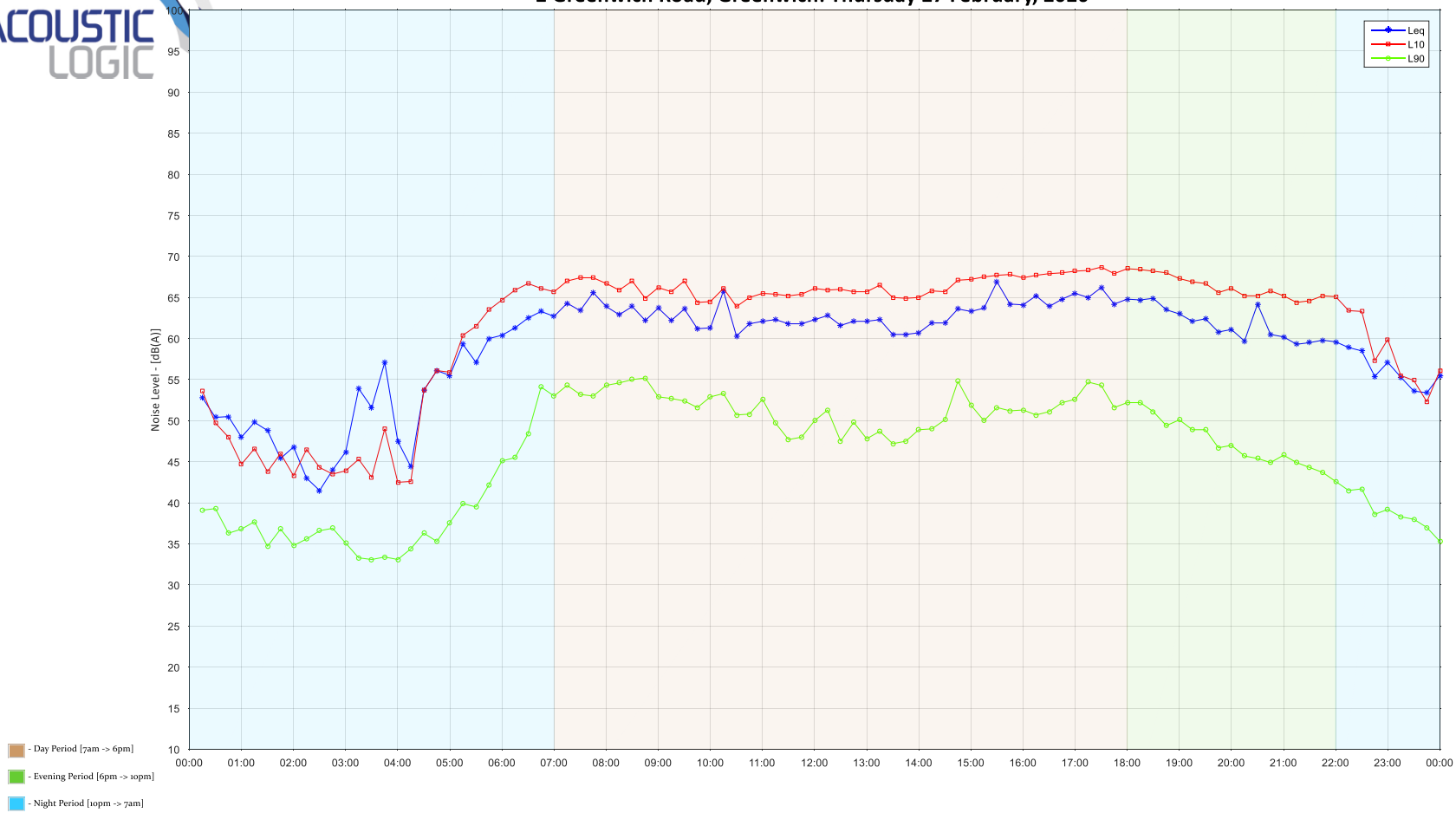
Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
George Kinezos

APPENDIX 1 – NOISE MONITORING RESULTS


2 Greenwich Road, Greenwich: Tuesday 25 February, 2020
Noise Level - [dB(A)]
Leq
L10
L90
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


2 Greenwich Road, Greenwich: Wednesday 26 February, 2020
Noise Level - [dB(A)]
Leq
L10
L90
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


2 Greenwich Road, Greenwich: Thursday 27 February, 2020
Noise Level - [dB(A)]
Leq
L10
L90
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

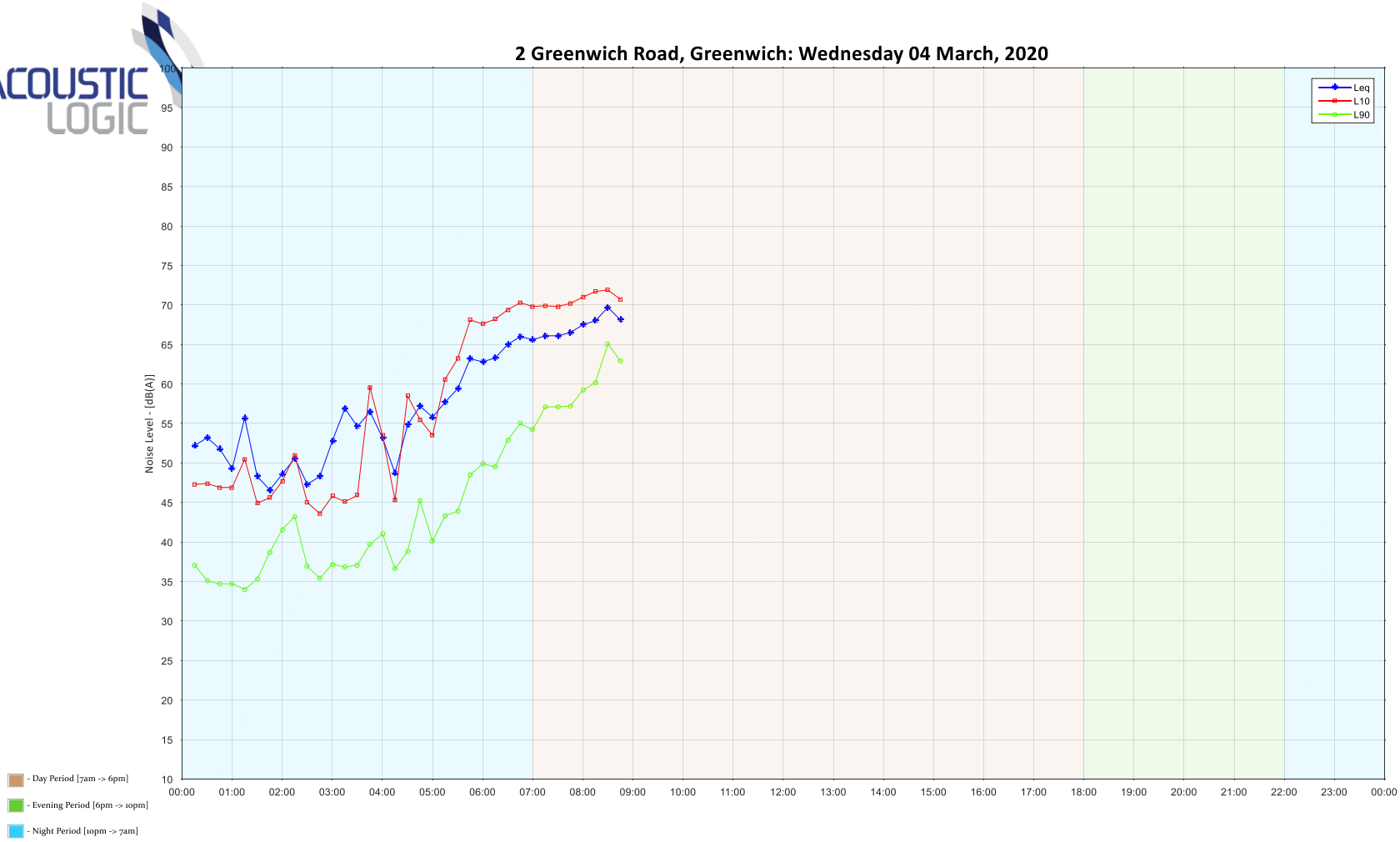

2 Greenwich Road, Greenwich: Friday 28 February, 2020
Noise Level - [dB(A)]
Leq
L10
L90
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


2 Greenwich Road, Greenwich: Saturday 29 February, 2020
Noise Level - [dB(A)]
Leq
L10
L90
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


2 Greenwich Road, Greenwich: Sunday 01 March, 2020
Noise Level - [dB(A)]
Leq
L10
L90
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


2 Greenwich Road, Greenwich: Monday 02 March, 2020
Noise Level - [dB(A)]
Leq
L10
L90
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


2 Greenwich Road, Greenwich: Tuesday 03 March, 2020
Noise Level - [dB(A)]
Leq
L10
L90
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


2 Greenwich Road, Greenwich: Wednesday 04 March, 2020
Noise Level - [dB(A)]
Leq
L10
L90
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]