MARSHALL DAY Acoustics

MARRICKVILLE METRO LOADING DOCK 4
REVISED OPERATING HOURS

Rp 002 R01 20169216 | 20 April 2018

MARSHALL DAY Acoustics

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Project: **MARRICKVILLE METRO LOADING DOCK 4**

Prepared for: **AMP Capital Shopping Centre**
50 Bridge Street
Sydney NSW 2000

Attention: **Robert Lewis**

Report No.: **Rp 002 20169216**

Document Control

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Issued			20 April 2018	N. Lynar	S. Connolly
Issued	01		24 April 2018	N. Lynar	S. Connolly

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1.0 INTRODUCTION

AMP Capital Shopping Centre (AMP) has requested that Marshall Day Acoustics (MDA) carry out an acoustic assessment for the existing Loading Dock 4 as part of the redevelopment of the Marrickville Metro Shopping Centre located at 34 Victoria Road, Marrickville, NSW, 2204.

It is our understanding the purpose of this assessment is to assist in the decision to revise the hours of use for the loading dock from 0700-1900hours to a new proposed time of 0500-1100hrs daily.

2.0 SITE DESCRIPTION

The Subject of this report is known as Loading Dock 4, located on Smidmore Street, facing out onto the southern boundary of the existing Marrickville Metro Shopping Centre. The location can be seen in Figure 1 & Figure 2.

Figure 1: Loading Dock 4 Location (image courtesy NearMaps)

Figure 2: Loading Dock 4 Location (image courtesy Google Street View 2018)

2.1 Relevant Noise Receiver

Details of the nearest residential receiver are provided in Table 1. As the remainder of the surrounding properties are industrial in nature, compliance at receiver A due to loading dock activities will result in compliance at all other residential receiver locations. The rear window of receiver A has a direct line of site to the location of Loading Dock 4 (although the internal spaces within the dock will be obscured by the angle of view) and would therefore the worst affected receiver in this instance.

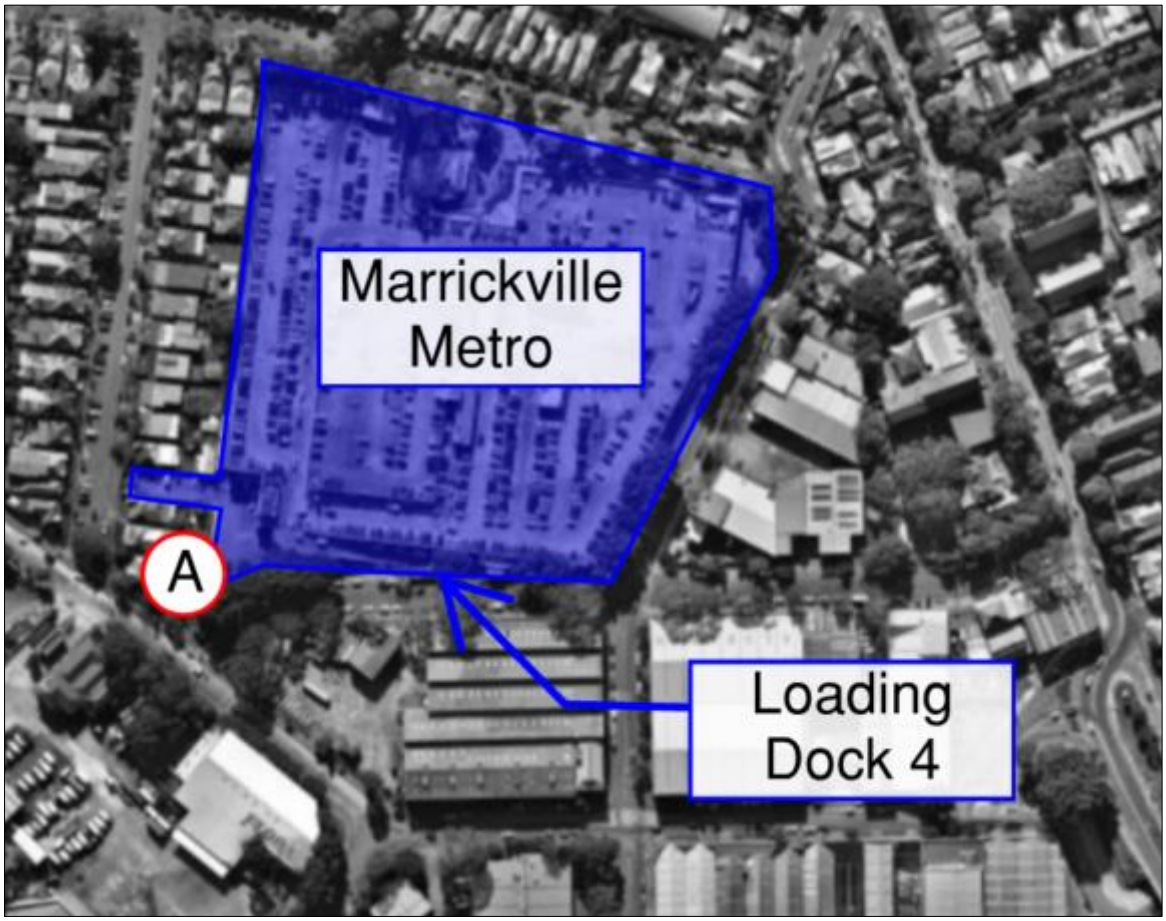
Location of the most affected residential receiver is shown in Figure 3.

Table 1: Details of the nearest affected noise receiver

Receiver	Location	Type	Description
A	65 Edinburgh Road	Residential	Residential dwellings

This property at 65 Edinburgh Road at is approximately 100m west of the loading dock entry.

Figure 3: Noise sensitive receiver location



3.0 ENVIRONMENTAL NOISE SURVEY

In order to measure the baseline ambient noise levels typical to the area surrounding the site both attended and unattended noise measurements were carried out within the vicinity of the site and at the nearest affected residential noise sensitive receiver at times when maximum impact is likely to occur, specifically during the early morning time period between 0500-0700hrs during the Night-time assessment period.

3.1 Unattended Environmental Noise Survey

An environmental noise survey was carried out previously at Receiver A location by MDA for AMP Marrickville Metro between 23 May and 05 June 2017. These measured levels have been utilised to calculate noise criteria for the site and loading dock activities.

Ambient noise levels were measured in accordance with the methodology outlined in the NSW Industrial Noise Policy (INP). A survey of baseline noise level was recorded at locations that represent the most affected noise sensitive residential receiver and within the subject site.

An unattended noise logger was located at location L1 between 23 May and 05 June 2017. Ambient noise levels measured at this location were used to establish the existing background noise levels at site.

In order to accurately determine existing ambient noise levels, any data affected by extraneous weather events including rainfall and heavy winds has been excluded in accordance with the EPA guidance. Each logger was calibrated using a 01dB Stell Acoustic Calibrator before and after logging showing no significant signs of calibration drift.

Logger 1 (L1) was an ARL Type 1, Class A Noise logger, serial number ARL 16-707-019 located at a location representative of the nearest affected residential receiver, behind 63 Edinburgh Road, Marrickville.

In the INP the background noise level is known as the Rating Background Level (RBL) The RBL is calculated for the Day, Evening and Night-time periods as defined in the INP.

The measured RBL is outlined in Table 2 below. Results for the entire survey period for L1 are presented in Appendix B.

Table 2: Ambient noise level summary (RBL)

Period	Time Period	dB L_{Aeq}	RBL, dB L_{A90}
Logger 1 (L1)			
Day	0700-1800hrs	66	55
Evening	1800-2200hrs	64	49
Night	2200-0700hrs	57	44

3.1.1 Short term unattended noise survey

A short term unattended noise survey was carried out inside and surrounding the loading dock to assist with calculating the existing noise impact from loading dock activities. The 3 loggers were on site from 1000hrs 11 April through to 1000hrs 13 April 2018. Locations of the noise loggers can be seen in Figure 4.

Details of the three (3) short-term unattended noise loggers are as follows:

- Logger 2 (L2) located within the loading dock to capture the internal noise levels including mechanical plant noise, general delivery noise including pallet jacks and delivery vehicle noise.

  Logger 2 was a 01dB Type 1, Class A Noise logger, serial number: DUO10315

- Logger 3 (L3) located 2-3 metres outside the loading dock opening to capture noise from delivery vehicles pulling into the loading dock as well as mechanical plan noise breakout.

  Logger 3 was an ARL Type 1, Class A Noise logger, serial number ARL 16-707-018

- Logger 4 L4) located directly across the road at an adjacent warehouse site, to capture noise breakout and noise propagation from all loading dock noise sources.

  Logger 4 was a 01dB Type 1, Class A Noise logger, serial number: DUO1419

Each noise logger was calibrated before and after measurements using a 01dB Stell Acoustic Calibrator showing no significant signs of calibration drift.

AMP provided MDA with time stamped photos during peak delivery times. From the information provided in the photos, LAeq dBA noise levels were extrapolated from the measured logger data. The photos and time periods used for the purpose of our assessed are presented in Appendix C. A summary of the measured noise levels during these peak delivery periods has been summarised in

Table 3 below for loggers L2, L3 & L4. The time periods we have chosen included the least amount of noise intrusion from non-loading dock related activities.

Table 3: Measured delivery noise levels – dBA

Logger	$L_{Aeq\ period}$

L2	76 - 77 dBA
L3	70 - 71 dBA
L4	66 - 68 dBA

Note: The time length of the LAeq period ranges from 3-5 minutes depending on the period of highest noise for each delivery.

Figure 4: Unattended logger locations

3.2 Attended noise survey

Attended noise measurements and observations were carried behind the nearest affected residential Receiver (A) at 0515hrs during the proposed altered hours time period. Attended observations and measurements were also carried out closer to Loading Dock 4 to verify results from the unattended noise loggers. A summary of the measurement results is outlined in Table 4, measurement location (N1) can be seen in Figure 4)

Attended 15-minute measurement was carried out using 01dB Type 1, Class A Noise logger, serial number: DUO10194.

Table 4: Attended noise measurement details

Measurement Location	Start Time	LAeq15min	LA90 15min	Comments
N1	5015 hrs	66	51	The background noise environment was characterised by constant urban hum. The ambient L_{eq} was dominated by vehicles driving Smidmore St including several Council garbage trucks, buses, small trucks and cars. Constant mechanical plant noise from the existing Woolworths loading dock and birds in the trees were also present

4.0 CRITERIA

4.1 Noise Considerations

There are a number of noise sources associated with the proposed extended operating hours of Loading Dock 4.

Table 5: Noise Criteria

Noise source	Assessment Criteria
Mechanical services noise	NSW Industrial Noise Policy (INP)
Loading dock activities	NSW Industrial Noise Policy (INP)
Additional vehicle flows on public roads	NSW Road Noise Policy (RNP)

4.2 NSW Industrial Noise Policy (INP)

Operational noise from the site must be assessed against the EPA's NSW Industrial Noise Policy (INP).

Noise criteria have been derived for the operation of the proposed development based on measured levels presented in Table 2. These are summarised in **Table 6**

4.2.1 Intrusiveness Criteria

RBL night L_{A90} + 5 = 44 + 5 = 49 $L_{Aeq(15\ minute)}$

4.2.2 Amenity Criteria

Acceptable Noise Level (ANL) 50 L_{Aeq} (period of Use) per INP table 2.1 Urban receivers
Existing Night-time Noise 57 $L_{Aeq(10pm\ to\ 7am)}$ Includes other industrial noise sources
Allow modified acceptable noise level (ANL) per INP table 2.2 57-10 = 47 $L_{Aeq\ (10\ to\ 7am)}$

Table 6: NSW INP Project Specific Noise Criteria

Period	Time Period	Intrusiveness Criteria dB $L_{Aeq, 15min}$	Amenity Criteria dB $L_{Aeq, 10pm\ to\ 7am}$
Residential Receivers			
Night	2200-0700hrs	49	47
Commercial Receivers	When in use	N/A	65
Industrial Receivers	When in use	N/A	70

The acceptable noise emissions from the loading dock will therefore be defined by the INP Intrusiveness criteria, due to the shorter assessment period of 15 minutes.

4.3 Road Noise Policy (RNP)

The noise level criteria for increased traffic flow during the Night-time assessment period as a result of land-use development with the potential to create additional traffic is set by the EPA's NSW *Road Noise Policy (RNP)*. Table 7 presents the traffic noise criteria for this development.

Table 7: Road Traffic Noise Criteria

Type of Development	Criteria	
	Day 0700-2200hrs	Night 2200-0700hrs
Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{eq(15hr)}$ 60dBA (external)	$L_{eq(9hr)}$ 55dBA (external)
Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{eq(1hr)}$ 55dBA (external)	$L_{eq(1hr)}$ 50dBA (external)

In addition to the above criteria, Section 3.4 of the RNP notes that "*an increase of up to 2dB represents a minor impact that is considered barely perceptible to the average person*" and that "*for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2dB above that of the corresponding 'no build option"*.

Minimal additional traffic to surrounding streets is expected as a result of the extended loading dock hours. An assessment to the RNP considers the impact of additional traffic from land use developments

4.4 Sleep Disturbance Criteria

Activities occurring on-site during the night period have the potential to cause sleep disturbance for the nearby residents. These include activities associated with the Development after 2200hrs and before 0700hrs.

The NSW Environmental Protection Authority EPA does not currently provide any criteria to assess sleep disturbance. Some discussion of the issue is given in the *Noise Guide for Local Government (NGLG)* and the EPA's most recent summary of research available is given in the *NSW Road Noise Policy (RNP)*.

In the *Noise Guide for Local Government* (NGLG), the EPA provides the following example of a 'screening test' to determine the potential for sleep arousal:

- The L_{A1} level of any specific noise source should not exceed the background noise level (L_{A90}) by more than 15dB when measured outside a bedroom window.

L_{A1} is defined as the A-weighted noise level that is exceeded for 1% of the measurement time and is similar to, but numerically lower than L_{Amax}. The EPA has stated that it will accept analysis based on either L_{A1} or L_{Amax} descriptors.

Based on the measured Night-time L_{A90} ambient noise level in Table 2 in this instance, the 'screening test' criteria for sleep disturbance becomes 59dB L_{Amax} at the facade of residential receivers.

In the INP application notes (last updated 12 June 2013), the EPA has recognised that the above criteria are *"not ideal"*. However, the EPA *"will continue to use it as a guide to identify the likelihood of sleep disturbance. This means that where the criterion is met, sleep disturbance is not likely, but where it is not, a more detailed analysis is required."*

Where the screening test is exceeded the EPA recommends that detailed analysis is carried out to address the extent to which sleep disturbance may occur. The use of the EPA *NSW Road Noise Policy* (RNP) is recommended to review the extent of possible impacts.

The RNP suggests that potential sleep arousal from traffic should be assessed. The RNP has compared a number of sleep disturbance criteria and concluded the following:

- *Maximum internal noise levels below 50-55dB L_{Amax} are unlikely to cause awakening reactions*
- *One or two noise events per night, with maximum internal noise levels of 65-70dB L_{Amax} are not likely to affect health and wellbeing significantly.*

Based on these findings, a noise level of 60-65dB L_{Amax} outside an open bedroom window would be unlikely to cause awakening reactions (assuming that the facade of the residential building provides 10dB attenuation, which would be typical of a facade with partially open windows). Furthermore, one or two events with a noise level of 75-80dB L_{Amax} outside an open bedroom window would be unlikely to affect health and well-being significantly.

The noise source with potential for sleep disturbance from the development will be due to vehicles entering Loading Dock 4 through the Night-time assessment period.

5.0 NOISE COMPLIANCE ASSESSMENT – REVISED OPERATING HOURS

Noise levels from loading dock activities within and surrounding the loading dock during the proposed 0500-1100hrs period have been calculated to the nearest affected noise sensitive receiver (A).

There are several sources that require consideration during the revised hours of 5am to 7am of the Loading Dock 4 that have the potential to impact the nearest residential receiver.

The following noise sources have been identified as having potential for noise disturbance.

- Noise emissions from delivery vehicles
- Unloading deliveries and delivery workers conversation
- Additional vehicle movement on surrounding public roads during the Night-time assessment period

5.1 Calculation Assumptions

In order to create a 'worst case' 15minute operational scenario for the purpose of our calculations, the following modelling assumptions have been made:

- Each delivery will take a maximum of 15 minutes (as per the signage in the loading dock)
- The following expected number of vehicles within the worst case 15 minute period have been included within our assessment:
    - 1 MR Truck
    - 2 Small delivery trucks
    - 2 Delivery Vans
- Mechanical plant operating as measured during our attended survey throughout the 15 minute period.
- The noise levels used throughout our calculations have been derived from the noise data collected at loggers L2, L3 and L4 as well as attended measurements and observations inside and surrounding Loading Dock 4.
- We have derived a worst case loading dock sound power level by corelating the internal to external noise loss between loggers L2 (internal) to L3 (external), as well as the noise propagation due to distance loss from the noise levels measured at L3 to L4 located 30 metres across Smidmore street. Using a similar calculation methodology with a directivity loss factor, the noise level has been calculated to Receiver A.

5.2 Calculated Noise Levels – INP Compliance Assessment

Based on the delivery vehicle volumes and loading dock assumptions in Section -, noise from operation of Loading Dock 4 during the sought extension of hours has been demonstrated and being capable of compliance with the applicable INP NSW noise criteria.

Table 8: INP Noise Impact Assessment - L_{Aeq} dB

Period	Calculated noise level dB $L_{Aeq, 15mins}$	Intrusiveness criteria, dB $L_{Aeq, 15mins}$	Compliance	Calculated noise level, dB $L_{Aeq, period}$	Amenity criterion, dB $L_{Aeq, period}$	Compliance
Receiver A Residential						
Night 0500-0700hrs	33	49	✓	33	38	✓

Note that compliance at Receiver A during the Night-time assessment period will result in compliance at all other noise sensitive receivers during the Day, Evening and Night assessment periods.

5.3 Sleep Disturbance

To assess the potential for sleep disturbance, we have assumed a maximum noise level of 104dbA LWmax from MR delivery truck accessing Loading Dock 4, calculated to the façade of Residential Receiver A. The calculated maximum noise level is detailed in Table 9.

Table 9: Sleep disturbance assessment

Receiver	Period	Predicted L_{Amax} (external)	Criteria (external)	Compliance?
A	Night	59	59	✓

5.4 Increased Traffic Noise – RNP Assessment

We have assessed the impact of increased traffic noise levels to existing residential receivers surrounding the development against the EPA's NSW Road Noise Policy.

The results of our calculations indicate a traffic noise emission increase in the order +2dB during the sought extension of hours period at the nearest affected receivers adjacent to Edinburgh Road, Bourne Street and Murray Street. We note that we do not have data for existing traffic flow information for the roads surrounding the shopping centre.

The RNP note that *'in assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person',* therefore no further traffic noise assessment is required at this time.

6.0 CONCLUSION

MDA has conducted an assessment of the noise compliance associated with the operation of Loading Dock 4 at Marrickville Metro Shopping Centre during the sought 0500 to 1100hrs extension of hours period. Noise from all loading dock activities and delivery vehicles has been considered.

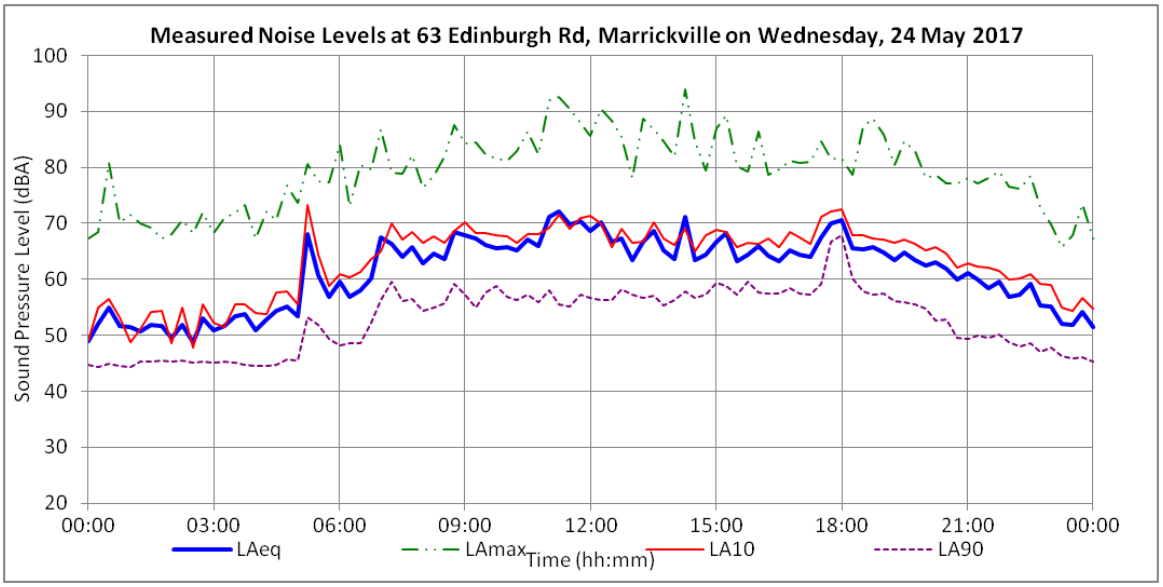
Based on the delivery vehicle volumes, worst case scenario and loading dock assumptions in Section 5.1, noise from operation of Loading Dock 4 during the sought extension of hours has been demonstrated and being capable of compliance with the applicable NSW EPA's INP noise criteria.

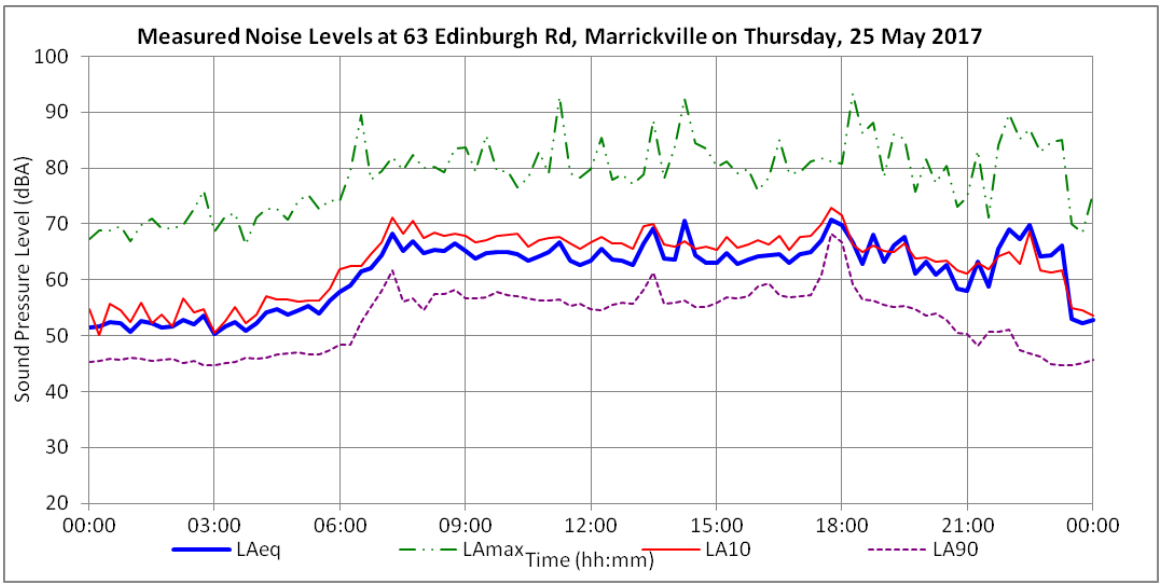
APPENDIX A GLOSSARY OF TERMINOLOGY

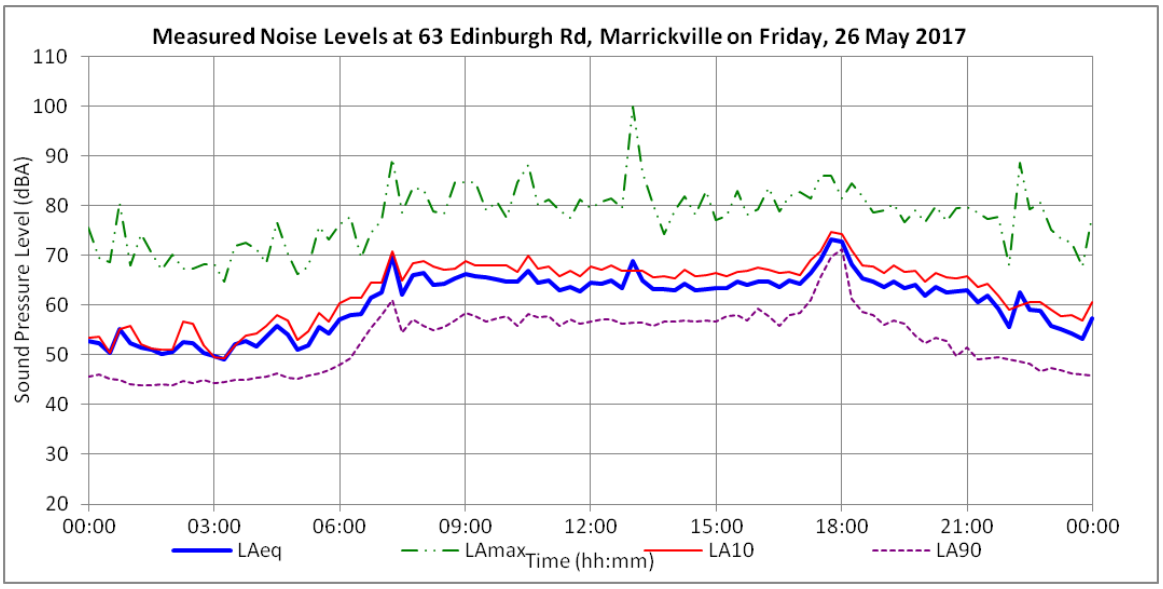
A-weighting	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
dB	Decibel The unit of sound level.
Frequency	The number of pressure fluctuation cycles per second of a sound wave. Measured in units of Hertz (Hz).
Hertz (Hz)	Hertz is the unit of frequency. One hertz is one cycle per second. One thousand hertz is a kilohertz (kHz).
L_{A90}	The noise level exceeded for 90% of the measurement period, measured in dB. This is commonly referred to as the background noise level.
L_{Aeq}	The equivalent continuous sound level. This is commonly referred to as the average noise level and is measured in dB.
L_{Amax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
L_{A10}	The A-weighted noise level equalled or exceeded for 10% of the measurement period. This is commonly referred to as the average maximum noise level.
L_w (or SWL)	Sound Power Level. The level of total sound power radiated by a sound source.
Octave Band	A range of frequencies where the highest frequency included is twice the lowest frequency. Octave bands are referred to by their logarithmic centre frequencies, these being 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, and 16 kHz for the audible range of sound.
Rating background level (RBL)	The overall single-figure background level representing each assessment period (Day/Evening/Night) over the whole monitoring period (as opposed to over each 24-hr period used for the assessment background level). This level is used for assessment purposes. It is defined as the median value of all the assessment background levels over the monitoring period for the Day/Evening and Night.

APPENDIX B NOISE LOGGING DATA

B1 Noise Logging Results – Logger L1



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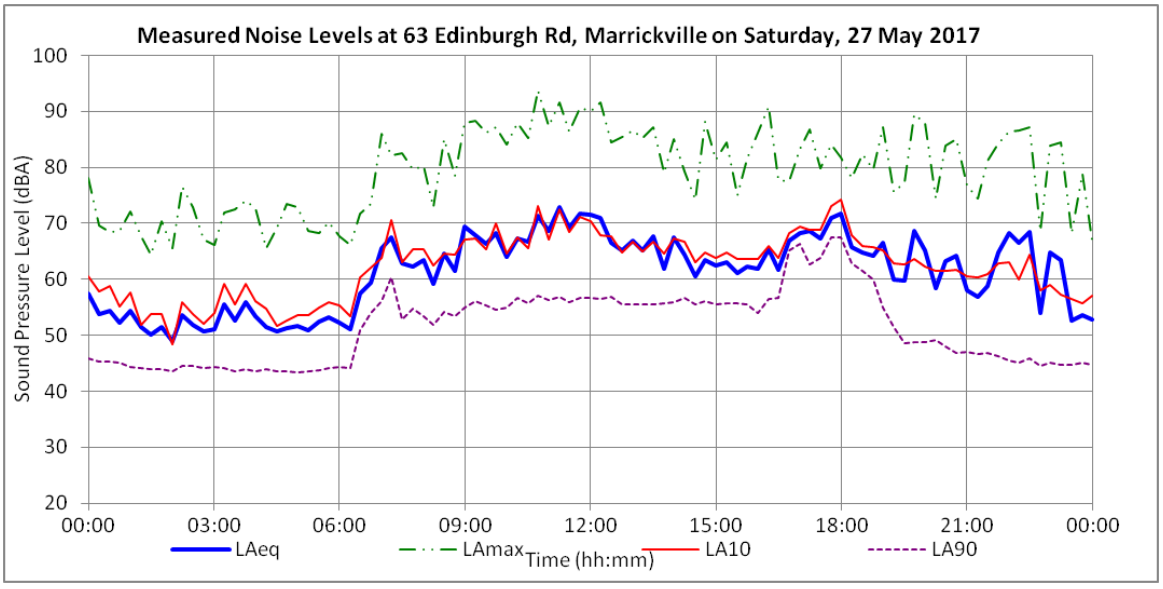
LAeq
LAmax
LA10
LA90
Time (hh:mm)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LAeq
LAmax
LA10
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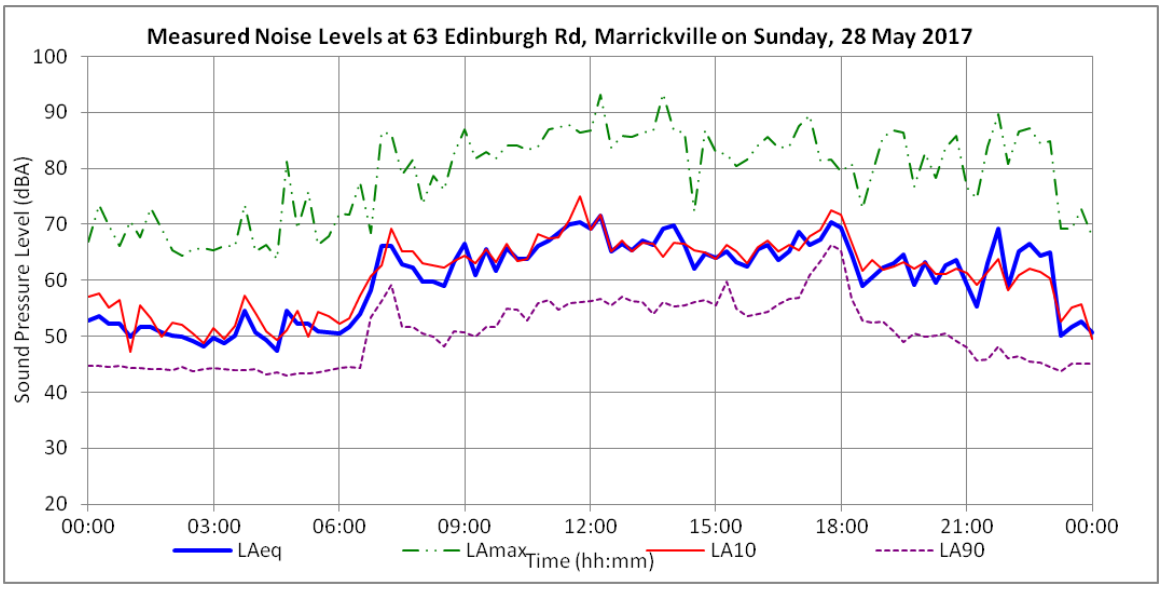
Time (hh:mm)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LAeq
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Time (hh:mm)
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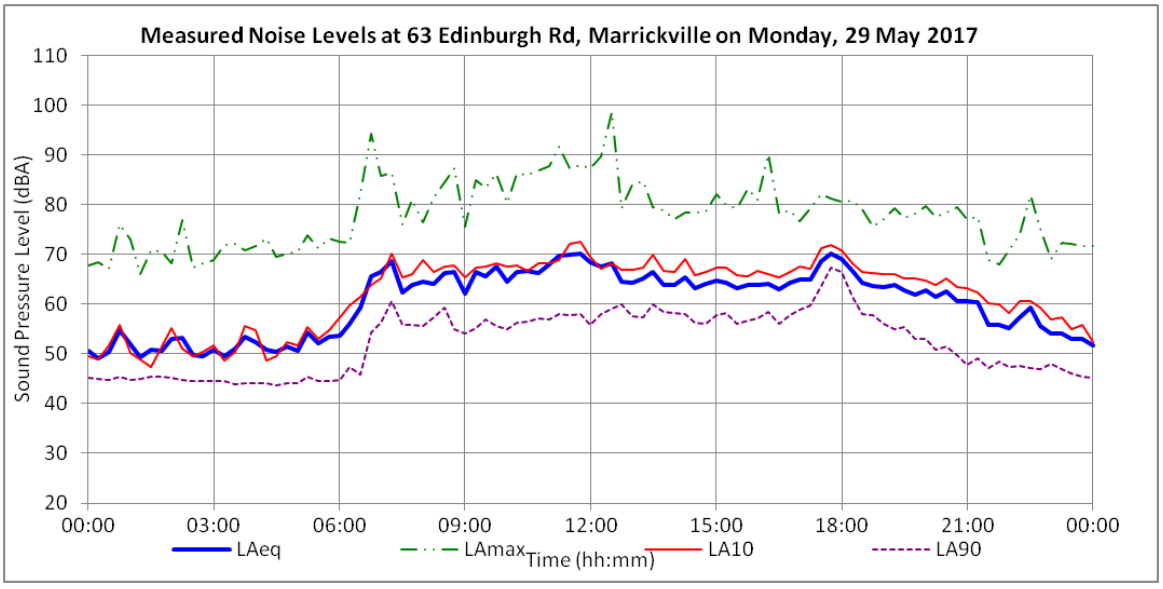
LA90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Time (hh:mm)
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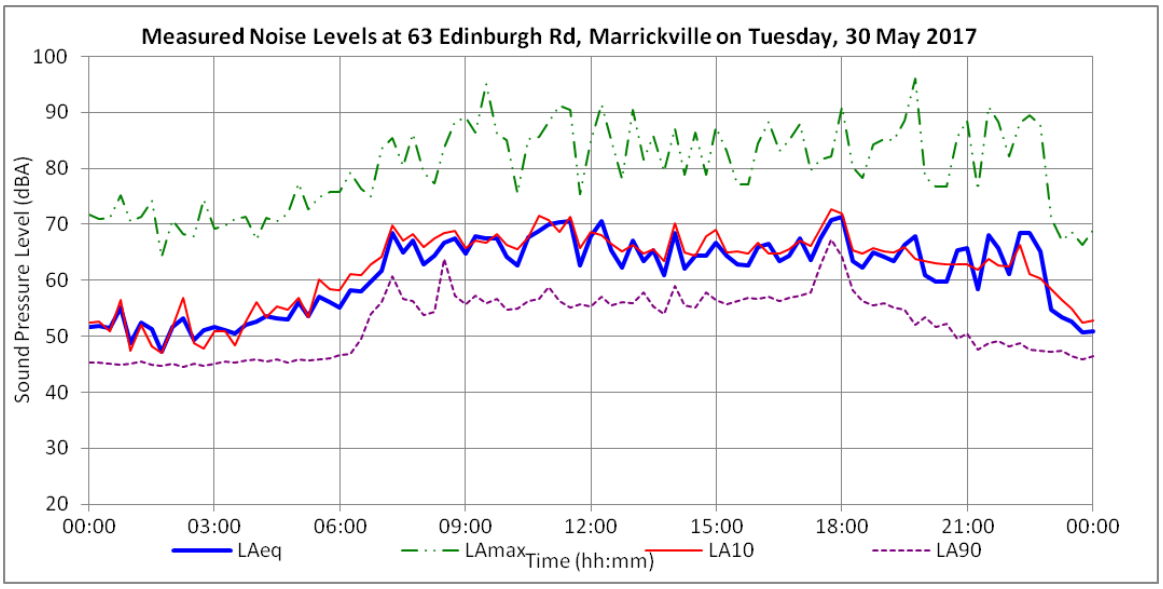
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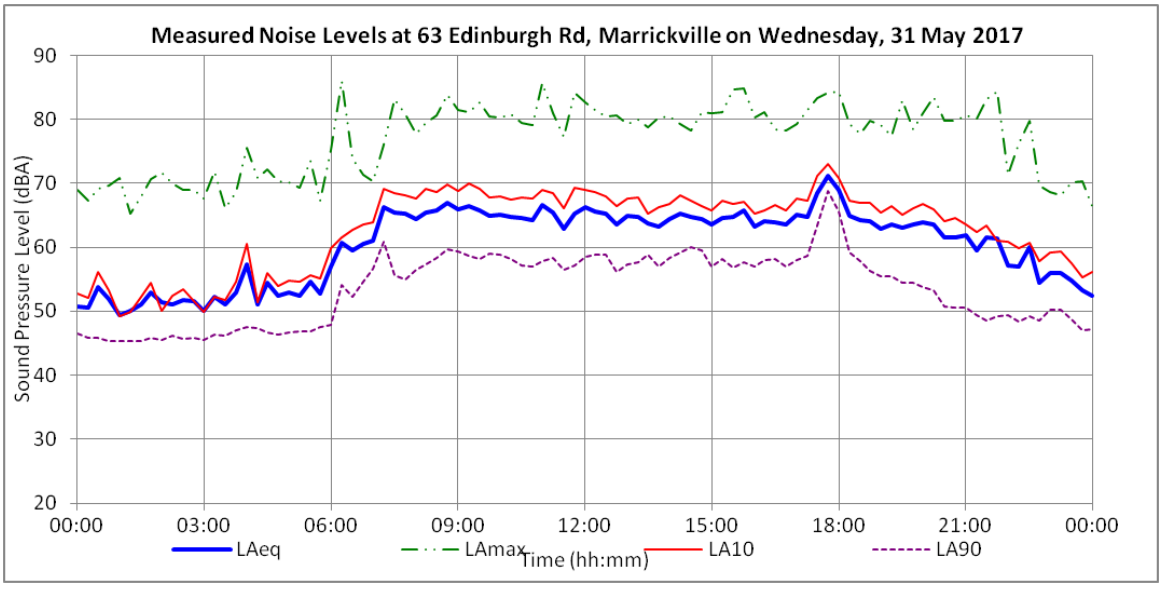
Time (hh:mm)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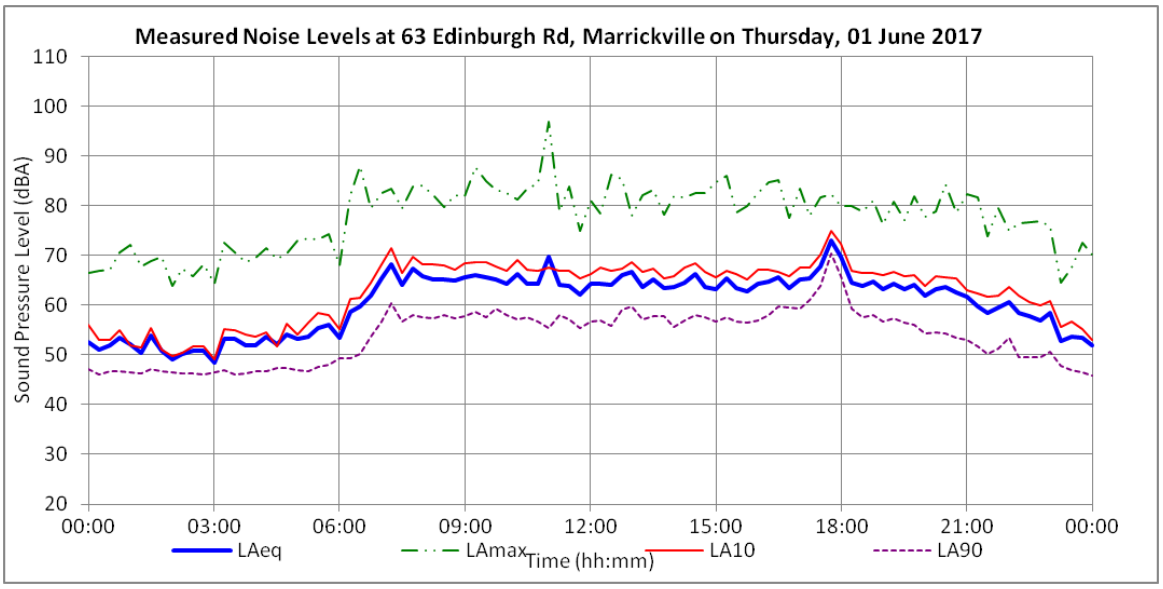
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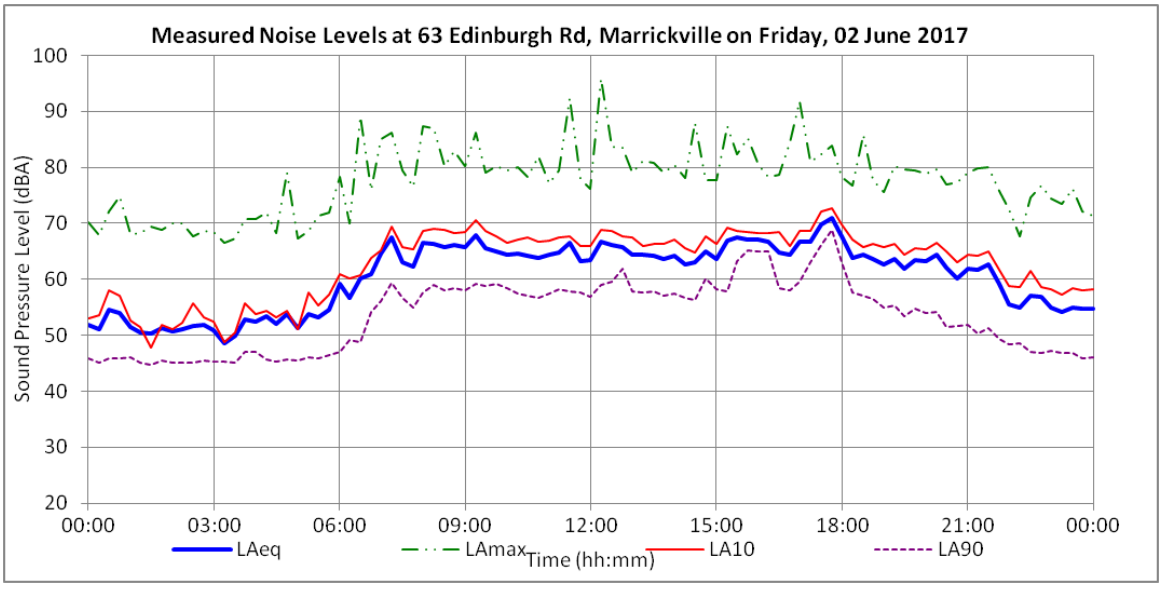
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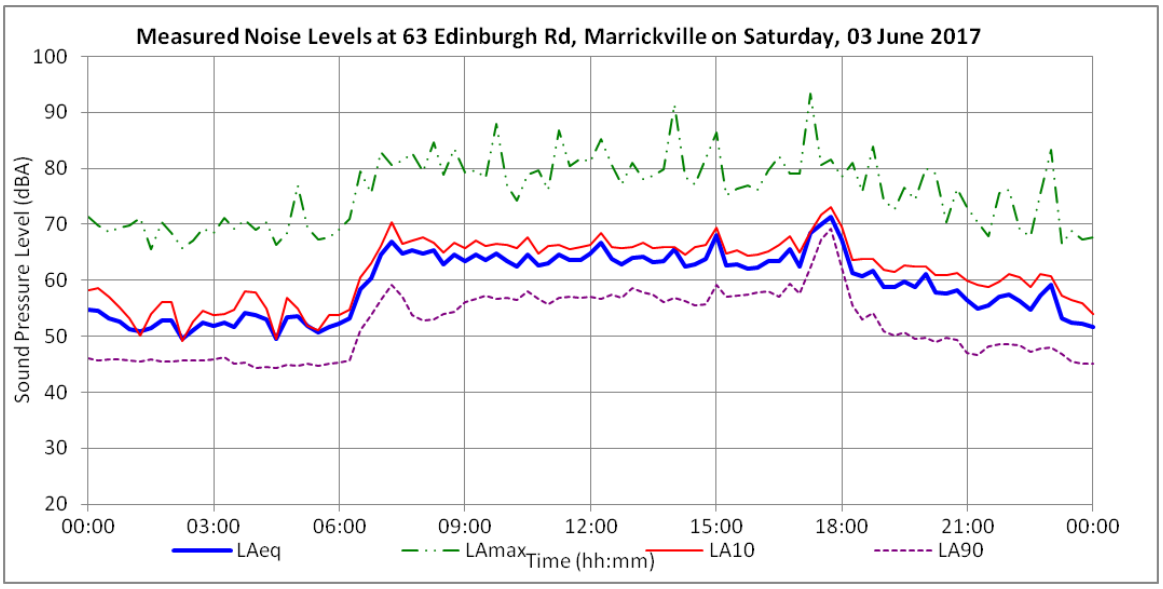
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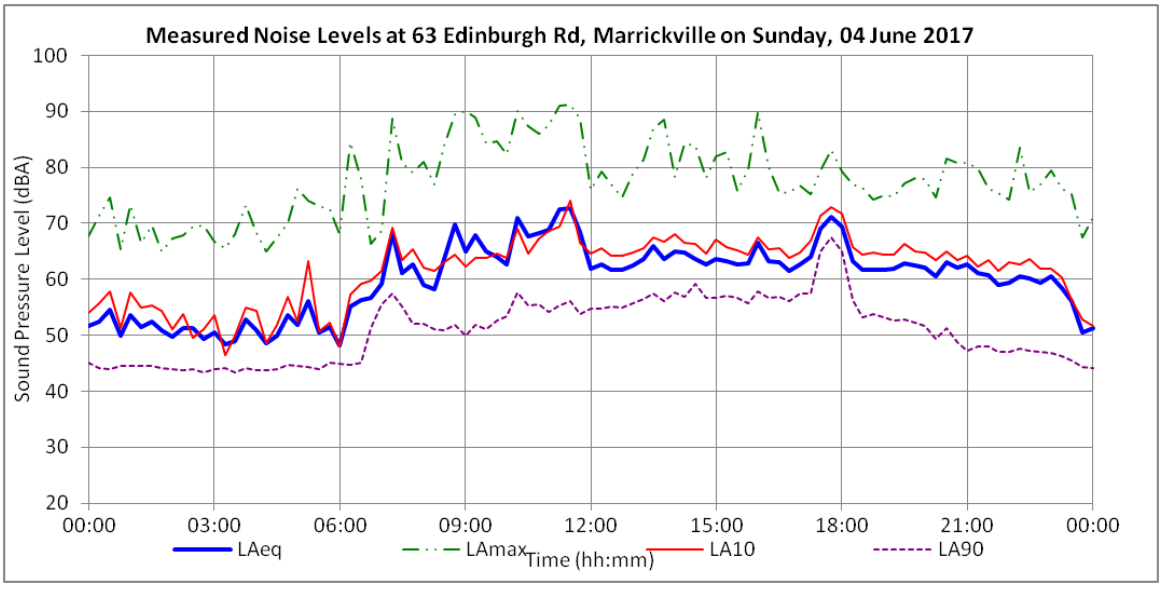
Time (hh:mm)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15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)

APPENDIX C DELIVERY PHOTOS

The time stamped photos provided below are the delivery periods we have reviewed to derive the noise levels for use in our calculations.


2018-Apr-12 01:19:39.899 PM
FIRM TOFU
Fortune
Traditional
Dock 4
Above Bakers Delight Rear Door