MARSHALL DAY Acoustics

# MARRICKVILLE METRO
# MARRICKVILLE METRO STAGE 1B

Rp 001 R04 20169216 | 10 October 2017

MARSHALL DAY Acoustics

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Project: **MARRICKVILLE METRO**

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Report No.: **Rp 001 R04 20169216**



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# EXECUTIVE SUMMARY

Marshall Day Acoustics (MDA) has been engaged by AMP Capital Shopping Centres to prepare a noise impact assessment report for the Marrickville Metro Development Stage 1B in support of a Section 75W Modification Application of the Major Project Approval MP09_0191, for the expansion of the Marrickville Metro Shopping Centre (the Site). This assessment is to be submitted to Inner West Council as part of the Development Application for this project.

The Major Project was granted Approval by the Minister of Planning on 19th March 2012 for the carrying out of the following development:

- Demolition of existing warehouse buildings and associated structures on the Edinburgh Road site;
- Refurbishments and construction of a first-floor addition to the existing retail building on the Victoria Road site and the construction of a new building with two levels of retail on Edinburgh Road site comprising:
    - A discount department store (5,000sqm), supermarket (4,500sqm), mini-major (1,791sqm) and speciality retail (4,464sqm) [as amended];
    - An additional 21,780sqm GFA (16,767sqm GLFA) to provide a total of 50,705sqm GFA (39,700sqm GLFA)
- Authorise the use of 1606 car parking spaces comprising 1100 existing spaces and 506 additional car parking spaces [as amended].

The content of this report responds to the Secretary's Environmental Assessment Requirements (SEARs), and is intended to assist with the assessment of the modification proposal against the relevant considerations under of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The subject of this report 'Stage 1B' would comprise the new building on the Edinburgh Road site, which will become an extension of the existing Marrickville Metro Shopping Centre, and alterations to the portion of the existing building on or near Smidmore Street, as this area has a physical relationship with and provides the pedestrian connection to the new shopping centre extension.

The proposed Murray Street loading dock facility is located near the intersection of Murray Street and Edinburgh Road. Access to the facility will be provided from Murray Street with access for both north and south bound vehicles. The loading dock will primarily service Coles.

The proposed delivery times for the Murray Street Loading dock are from 0700hrs to 1900hrs, 7 days a week.

The report details the site, operations, applicable noise criteria, calculated noise emission levels in accordance with DA Consent Conditions F2, F3 & F5, the NSW Environmental Protection Authority (EPA) Industrial Noise Policy (INP) and the EPA NSW Road Noise Policy (RNP) to residential properties in the immediate vicinity of the subject site.

The project specific noise level criteria have been established based on the measured background and ambient noise levels.

Information regarding the anticipated further traffic volumes has been provided to (MDA) by The Transport Planning Partnership Pty Ltd (TPP). This information has been used to carry out an assessment of the noise levels expected at the nearest sensitive receivers from car park, loading dock operations and patrons outside restaurants. The traffic data provided is focused on peak hour movement during the AM and PM peak. Traffic volumes for the entire Day, Evening and Night assessment periods have been derived from peak hour traffic volumes under the instruction of TPP. A full derivation of the traffic volumes can be found in Appendix F.

The final mechanical design i.e. plant equipment selections and final locations has not been completed at this stage. Mechanical services will need to be designed such that the overall noise emission from the proposed Development complies with criteria established in Section 6.0 and also DA Consent Conditions F2, F3 & F5 of

the Project Approval for noise levels at the nearest noise sensitive receivers. It is envisaged that noise control measures will be required, including screening and/or the installation of appropriate attenuators to enable the project specific noise limits to be achieved.

The expected noise levels from activities associated with loading docks and car park have been assessed based on delivery vehicle numbers provided to MDA by the Client. The findings of the loading dock & car park noise assessment are included in the report.

Assessment of the proposed loading dock and car park noise emissions were found to be compliant with DA Consent Conditions F2, F3 & F5 and the INP noise criteria based on the traffic flow numbers and delivery vehicle numbers provided to us by the Client (AMP). As outlined in Section 7.0 the proposed development is capable of fully complying with the consent conditions and acoustic criteria set out in this report.

In order for the proposed alterations of the shopping centre to comply with these requirements, the following key requirements and constraints shall apply:

- Deliveries and vehicle movements to and from the loading docks must only be between the hours of 0700 and 1900 hours.
- The carpark operation hours have not assumed to be restricted. Our calculations have however been based on the project traffic flows set out an Appendix F, showing significantly lower vehicle flow volumes during the night-time period. In the event that this flow is exceeded or increased, some limits to carpark hours of operation may be required.
- Noise levels within the loading dock due to mechanical plant, (when combined with that from other sources such that from sporadic events such conversation, electric lifts and pallet jacks) is not to exceed 67 $L_{Aeq}$(15minutes) when measured *within* the loading dock.
- Final mechanical services design equipment selections and locations have not been detailed at the time of report preparation. Mechanical, cool room and refrigeration services will need to be designed such that the overall noise emission from the development complies with the acoustic criteria established in Section 6.0. It is envisaged that some noise control measures will be required to mechanical plant systems including screening, enclosures and/or the installation of appropriate attenuators to enable the project specific noise limits to be achieved.
- All mechanical plant and equipment that is part of the of the new works is be designed to ensure that its operation does not give rise to noise levels, (in combination with other operation noise sources associated with the new works) not exceed the EPA INP and the requirements of consent conditions F2 and F3.
- The hours of operation of the restaurants and bar tenancies along Smidmore Street are confined to 0700 to 12 midnight, based on “in principle” assessments included within our modelling and calculations. Key amongst our assumptions is a limitation of 50 external patrons dining at external tables using normal to raised vocal efforts. There are however other factors that can influence noise levels such as background or amplified music, seating layouts and any noise spill from internal dining areas. These factors are however dependant individual tenancy or restaurant designs and configurations. Accordingly, it will be necessary to provide specific acoustic analyses and reports pertaining to individual restaurant or tenancy uses, design and layout.

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## 1.0 INTRODUCTION

Marshall Day Acoustics (MDA) has been engaged by AMP Capital Shopping Centres to prepare a noise impact assessment report for the Marrickville Metro Development Stage 1B. This assessment is to be submitted to Inner West Council as part of the Development Application for this project.

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The content of this report responds to the Secretary's Environmental Assessment Requirements (SEARs), and is intended to assist with the assessment of the modification proposal against the relevant considerations under of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The assessment is based on the documentation set out in Table 1:

**Table 1: Documentation List**

| Prepared | Title | Number | Dated | Revision |
|---|---|---|---|---|
| Hames Sharley | General Arrangements Ground Floor Plan | EA106 | 25/09/2017 | A |
| Hames Sharley | General Arrangements Level 1 Floor Plan | EA107 | 25/09/2017 | A |
| Hames Sharley | General Arrangements Level 2 Floor Plan | EA108 | 25/09/2017 | A |
| Hames Sharley | General Arrangements Level 2A Floor Plan | EA109 | 25/09/2017 | A |
| Hames Sharley | General Arrangements Level Roof Plan | EA110 | 25/09/2017 | A |

## 2.0 SITE DESCRIPTION

The Site subject to this modification application comprises three principal land parcels:

1. Marrickville Metro Shopping Centre located at 34 Victoria Road, Marrickville. This land has an area of approximately 3.57 hectares (Lot 100 DP 715231).
2. 13-55 Edinburgh Road, which has an area of approximately 8,800sqm and is located to the south of Marrickville Metro, with frontage to Smidmore Street, Murray Street and Edinburgh Road. An industrial warehouse development currently occupies this land and this is the site of the approved shopping centre expansion (Lot 1 DP 612551).
3. The section of Smidmore Street immediately to the south of Marrickville Metro, between Murray Street to the east and Edinburgh Road to the west. This is located between the existing shopping centre and the expansion site.

Marrickville Metro is a subregional shopping centre, approximately 7km from the Sydney CBD. The shopping centre consists of the major tenants of Kmart, Woolworths and Aldi and a range of speciality stores. The shopping centre is the largest retail shopping centre in the local region and attracts in the order of five million visitations per annum.

The current shopping centre is a substantially enclosed and internalised with pedestrian entries from Victoria Road to the north and Smidmore Street to the south. Pedestrian access is also provided from the rooftop car parking areas down into the centre. Existing open loading dock areas exist along the frontage of Murray Street and from Smidmore Street. Two vehicle access ramps accessed off Smidmore and Murray Street provide car access to the roof top parking.

Located on site adjoining the shopping centre is the “Mill House”, which is a listed heritage item and currently used as the Centre Management Office. In addition, remnants of the ‘Old Vickers Mill’ façade remain along the Victoria Road frontage of the site.

The expansion to the shopping centre is consented on the 13-55 Edinburgh Road site, which is located on the opposite side of Smidmore Street to the south. The site is presently occupied by a two-storey factory/warehouse building that is built to the street frontages. Open grade car parking is located on the western side of the site.

The site location can be seen in Figure 1 below.


**Figure 1: Subject Site Location**

AMP Capital Investors (AMP) are the managers of the Shopping Centre and 13-55 Edinburgh Road on behalf of the owners Marrickville Metro Pty Ltd.

Smidmore Street which bisects the two AMP owned properties is a public road vested in Inner West Council as the local road authority. The reason that this land forms part of the proposal as there is proposed to be modifications to the road layout and street activation, whilst a new pedestrian bridge is proposed to span the road to connect the two parts of the shopping centre.

At the time of preparing this report, AMP and Inner West Council are in the process of finalising terms associated with the Agreement to Lease/Lease of the proposed bridge stratum.

## 2.1 Relevant Noise Receivers

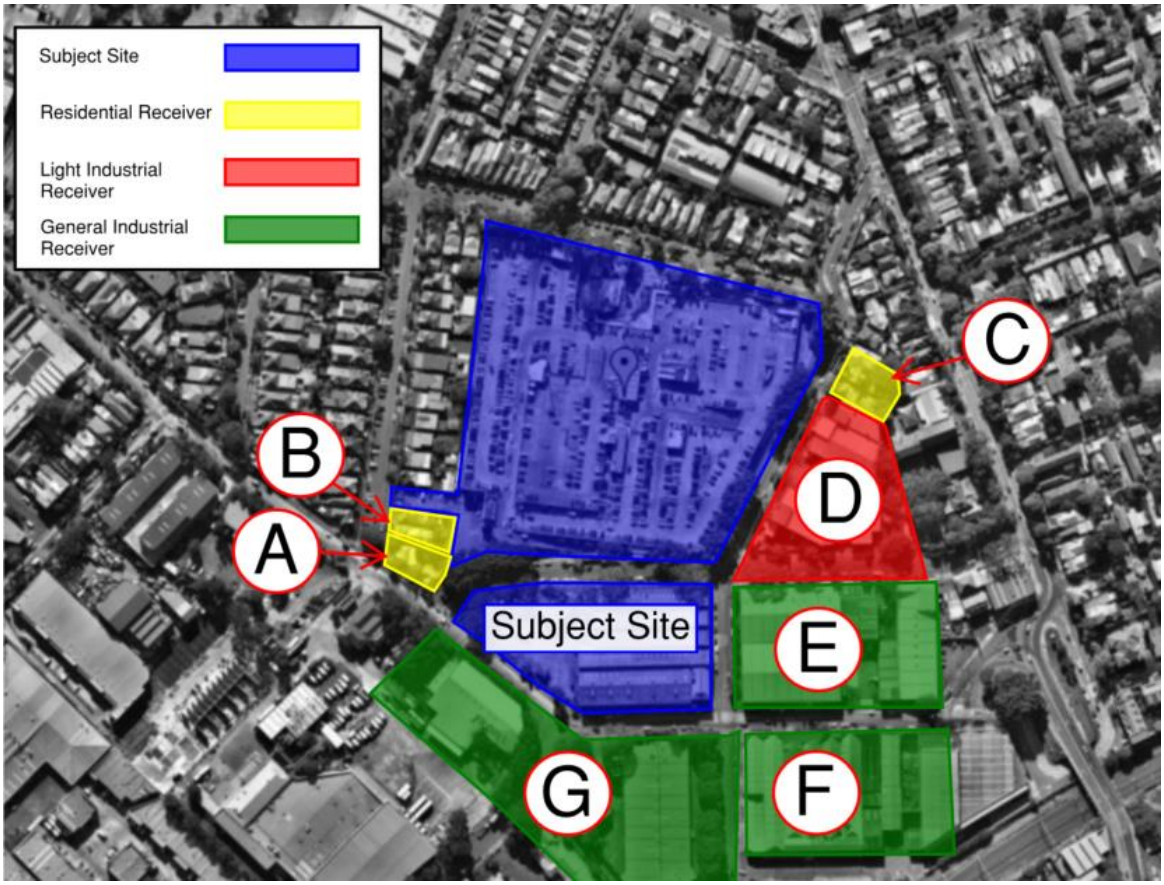
Details of the nearest residential receivers are provided below in rows A to C of Table 2. The remainder of the surrounding properties are industrial in nature, and are shown on rows D to G of Table 2.

An aerial view showing the surrounding properties is provided in Figure 2.

**Table 2: Details of the nearest affected noise receivers**

| Receiver | Location | Type | Description |
|---|---|---|---|
| A | 65 Edinburgh Road | Residential | Residential dwellings |
| B | 1-7 Bourne Street | Residential | Residential dwellings |
| C | 14 Murray Street | Residential | Residential dwellings |
| D | 16-32 Murray Street | Industrial | Light industrial warehouses |
| E | 1-11 Edinburgh Road | Industrial | General industrial warehouses |
| F | 11A Edinburgh Road | Industrial | General industrial warehouses |
| G | 74-112 Edinburgh Road | Industrial | General industrial warehouses |

**Figure 2: Noise sensitive receiver locations**



## 3.0 PROPOSED MODIFICATION

The proposed modifications are illustrated on the Architectural Plans and will comprise the following:

- A revised retail layout within the new shopping centre building proposed under Stage 1B (Edinburgh Road site), including amended travellator locations, new food and beverage uses at ground level, reconfigured shop units and alterations to the upper floor parking layout.
- Alterations to the building façade on Smidmore Street, amendments to materials used in elevations and minor increase in height of the new shopping centre building to facilitate upper floor parking, along with rooftop plant and equipment;
- Extending operating hours for a limited number of shops on the ground floor to encourage night time activation for the food and beverage shops;
- Erection of a new pedestrian bridge linking Level one of the new shopping centre building to the existing shopping centre;
- An amended road alignment and modification to the vehicular route on Smidmore Street to implement a new one-way access off Murray Street;
- Introduction of a right-hand entry into the new building from Edinburgh Road;
- Redistribution of car space provisions across the development without increasing the overall permitted car parking numbers;
- Introduction of paid parking across the site.
- Redistribution of the GFA across the site without increasing the overall permitted GFA.
- Introduction of signage / signage zones on the development along with a potential zone for mural(s) on the frontage.

### 3.1 Staging of Development

The MOD2 application which was approved in April 2015 contained an updated construction staging programme. As a result of this, the following stages of development are consented:

#### 3.1.1 Stage 1A

The proposed early stage of works or Stage 1A of the development would focus on the Victoria Road entrance and comprise:

- an upgrade to the portion of the existing building façade facing Victoria Road, which will include a minor increase in floor area which occurs with the new alignment of the external walls of the building,
- an upgrade to the main entry in the shopping centre;
- new paving and landscape treatment to ‘Civic Place’;
- archival recording of the Mill House [as required by Condition C7 of the original approval];
- preservation of the existing brick footpath [required by Condition E7 of the original approval]; and
- traffic management works and with some associated stormwater management works [required by Conditions B15(f), B15(g) and B17].

The above works which formed Stage 1A were completed in March 2017.

### 3.1.2 Stage 1B

Stage 1B would comprise the new building on the Edinburgh Road site, which will become an extension of the existing Marrickville Metro Shopping Centre, and alterations to the portion of the existing building on or near Smidmore Street, as this area has a physical relationship with and provides the pedestrian connection to the new shopping centre extension.

### 3.1.3 Stage 2

Stage 2 would continue to be the balance of the work proposed for the redevelopment of the existing shopping centre building, including an additional retail floor at first floor level and additional rooftop car parking.

This Modification application principally concerns Stage 1B of the proposed development.

Figure 3 and Figure 4 show outlines of the proposed development.


**Figure 3:– Existing Marrickville Metro Shopping Centre and adjacent site**


**Figure 4: Proposed new development site plan for the additional shopping centre areas**

## 3.2 Carpark Access and Loading Docks

### 3.2.1 Smidmore Street Carpark Access Ramp

Access to the rooftop carpark will be retained, with the existing ramp being reconfigured. Entry to the ramp from Smidmore Street will be left-in only and controlled by "No Right Turn" signage. A median island in Smidmore Street will further reinforce the banning of the right turn movement.

### 3.2.2 Murray Street (South) Loading Dock

The proposed loading dock facility is located near the intersection of Murray Street and Edinburgh Road. Access to the facility will be provided from Murray Street with access from both north and south bound vehicles.

It has been assumed in the Civil Engineering Assessment that all service vehicles larger than the Austroads 8.8m long rigid vehicle will approach this loading dock from the east along Edinburgh Road. Entry to this loading dock is thus limited to the northbound approach along Murray Street. Likewise, large service vehicles exiting this loading dock will be limited to travelling southbound along Murray Street, and then westbound along Edinburgh Road.

All entry and exit movements shall be in a forward direction via a proposed vehicular crossing. Initial analysis of ramp levels indicate that manoeuvring and loading areas will meet the requirements of AS2890.2 (2002) however; this will be confirmed in the detailed design phase.

### 3.2.3 New Consolidated Murray Street Majors and Specialty Loading Dock

In numerous locations along Murray Street there are existing loading docks associated with the Aldi store, fruit and vegetable and miscellaneous specialty shops. It is proposed to replace these facilities with a single consolidated dock facility. Note that this will be part of Stage 2 and will not be included in Stage 1B.

All entry and exit movements for the consolidated loading dock facility shall be in a forward direction via a proposed vehicular crossing. Given the constraints of the local road and intersection geometry, it has been assumed that all service vehicles larger than the Austroads 8.8m long rigid service vehicle will approach this loading dock from the east along Edinburgh Road. Entry to this loading dock is thus limited to the northbound approach along Murray Street. Likewise, large service vehicles exiting this loading dock will be limited to travelling southbound along Murray Street, and then westbound along Edinburgh Road.

### 3.2.4 Murray Street Carpark Access Ramp

The existing ramp to the rooftop carpark will be retained.

### 3.2.5 Edinburgh Road Carpark Access

The proposed Edinburgh Road carpark access will be retained; however, this will include a new right turn access from Edinburgh Road.

### 3.2.6 Existing Major Tenant, Smidmore Street Loading Dock

It is proposed to maintain the existing loading dock facility located in the south-western corner of the existing shopping centre. No amendments are being considered to this loading dock facility. Refer drawing SK-001 in Appendix B.

It has been assumed in the Civil Engineering Assessment that all service vehicles larger than the Austroads 8.8m long rigid service vehicle will approach this loading dock from the east along Edinburgh Road. Entry to this loading dock is thus limited to the northbound approach along Smidmore Street. Likewise, large service vehicles exiting this loading dock will be limited to travelling southbound along Smidmore Street, and then westbound along Edinburgh Road.

## 4.0 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.

## 4.1 Unattended Noise Survey

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

Unattended noise loggers were deployed in two locations L1 and L2, the location of the loggers can be seen in Figure 5. Baseline ambient noise levels were measured between 23 May 2017 and 05 June 2017. Ambient noise levels measured at locations L1 and L2 were used to establish the existing background noise levels at site.


**Figure 5: Unattended logging locations L1 & L2, Attended noise measurement locations N1 & N2**

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 16-707-018 located within the subject site at a location representative of the surrounding industrial area.

Logger 2 (L2) 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 3 Below. Results for the entire survey period for L1 and L2 are summarised in Appendix B.

**Table 3: Ambient noise level summary (RBL)**

| Period | Time Period | dB $L_{Aeq}$ | RBL, dB $L_{A90}$ |
|---|---|---|---|
| *Logger 1* | | | |
| Day | 0700-1800hrs | 65 | 52 |
| Evening | 1800-2200hrs | 61 | 47 |
| Night | 2200-0700hrs | 54 | 43 |

| Period | Time Period | dB $L_{Aeq}$ | RBL, dB $L_{A90}$ |
|---|---|---|---|
| *Logger 2* | | | |
| Day | 0700-1800hrs | 66 | 55 |
| Evening | 1800-2200hrs | 64 | 49 |
| Night | 2200-0700hrs | 57 | 44 |

## 4.2 Attended noise survey

Attended noise measurements were carried out in front of the nearest affected residential receiver at 65 Edinburgh Road (N1) during the Day, Evening & Night periods. An attended measurement was also carried out during the Day period at the Northern Boundary of the subject site (N2). A Summary of the measurement results is outlined in Table 4, measurement locations can be seen in Figure 5.

Attended 15 minute measurements were carried out using a Brüel and Kjær Type 2250 G-4 Hand-held Analyzer, serial number: 3010249, which was calibrated before and after measurements using a 01dB Stell Acoustic Calibrator showing no significant signs of calibration drift.

**Table 4: Attended noise measurement summary**

| Measurement Location | Start Time | LAeq15min | LA90 15min | Comments |
|---|---|---|---|---|
| N1 | 1017 hrs | 69 | 60 | The background noise environment was characterised by constant urban hum. The ambient $L_{eq}$ was dominated by vehicles driving along Edinburgh Rd and Smidmore St, vehicles stopping at lights and accelerating including buses, trucks and cars. Occasional aircraft flying overhead. |
| N2 | 1034 hrs | 67 | 60 | The background noise environment was characterised by constant urban hum. The ambient $L_{eq}$ was dominated by vehicles driving along Smidmore St, cars entering/exiting shopping centre carpark across the road. Occasional aircraft flying overhead and delivery vehicles entering the Woolworths loading dock. |

| Measurement Location | Start Time | LAeq15min | LA90 15min | Comments |
|---|---|---|---|---|
| N1 | 2138 hrs | 63 | 48 | The background noise environment was characterised by distant urban hum. The ambient $L_{eq}$ was dominated by occasional car pass-bys along Edinburgh Rd and Smidmore St, and small aircraft overhead. Noise from an adjacent warehouse site, possibly forklifts working, was audible at times. A rumbling sound occurred during the last minute of measurement, possible mech plant or distant jet engine warming up. |
| N1 | 2200 hrs | 60 | 49 | The background noise environment was characterised by distant urban hum. The ambient $L_{eq}$ was dominated by occasional car pass-bys along Edinburgh Rd and Smidmore St. Noise from an adjacent warehouse, including banging noises and possibly a forklift, was audible at times. A constant rumbling sound occurred throughout the measurement from mech plant or a distant jet engine. |

## 5.0 ENVIRONMENTAL VIBRATION SURVEY

Unattended vibration surveys were carried out at logging locations L1 and L2. Logging was carried out at location L1 from 01 June 2017 to 07 June 2017, and at location L2 from May 23 2017 to May 29 2017. A summary of the measured peak particle velocity (PPV) vibration levels are presented in Table 5 with a full summary in Appendix E.

**Table 5: Ambient vibration levels summary**

| Location | Time | PPV - min | PPV – max |
|---|---|---|---|
| *L1* | | | |
| Day | 0700-2200 | 79.5 | 126.5 |
| Night | 2200-0700 | 77.9 | 114.7 |
| L2 | | | |
| Day | 0700-2200 | 81.9 | 113.2 |
| Night | 2200-0700 | 79.6 | 113.0 |

Note: Parameters to assess human comfort have been recorded at locations L1 and L2 and can be used for future analysis.

# 6.0 CRITERIA

## 6.1 Noise Considerations

There are a number of noise sources associated with the operation of the subject site. Table 6 details the relevant legislation and guidelines applicable to the assessment of each noise source.

**Table 6: Noise Criteria**

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

## 6.2 Consent Conditions

DA Consent Conditions relating to noise emissions are as follows:

| | |
|---|---|
| F2 | The use of the premises including any plant and equipment shall not give rise to:<br>• transmission of unacceptable vibration to any place of different occupancy;<br>• a sound pressure level at any affected premises that exceeds the background (LA90) noise level in the absence of the noise under consideration by more than 5dB(A). The source noise level shall be assessed as an LAeq,15min and adjusted in accordance with Environment Protection Authority guidelines for tonality, frequency weighting, impulsive characteristics, fluctuations and temporal content as described in the NSW Environment Protection Authority's Environmental Noise Control Manual and Industrial Noise Policy 2000 and The Protection of the Environment Operations Act 1997 (NSW). |
| F3 | Noise and vibration from the use and operation of any plant and equipment and/or building services associated with the premises shall not give rise to "offensive noise' as defined by The Protection of the Environment Operations Act 1997 (NSW). In this regard the roller door to the car parking entry is to be selected, installed and maintained to ensure their operation does not adversely impact on the amenity of the surrounding neighbourhood. |
| **Loading Docks** | |
| F5 | No loading or unloading at any new or existing loading dock shall occur between the hours of 7.00pm and 7.00am on any day. |
| | After completion of Stage 2 the proponent may apply to Council to extend the hours of operation of one or more loading docks from 7pm - 10pm on any day. Relevant factors for consideration include: the effectiveness of the noise attenuation at the loading docks, the effectiveness of control over delivery vehicle access routes, and the provisions of the NSW Industrial Noise Policy in force at the time of any such application. Any extension is subject to the approval of Marrickville Council. |

## 6.3 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 3. These are summarised in Table 7 with a full derivation in Appendix E.

**Table 7: NSW INP Criteria**

| Period | Time Period | Intrusiveness Criteria dB $L_{Aeq,\ 15min}$ | Amenity Criteria dB $L_{Aeq,\ period}$ |
|---|---|---|---|
| *Residential Receivers* | | | |
| Day | 0700-1800hrs | 57 | 52 |
| Evening | 1800-2200hrs | 52 | 46 |
| Night | 2200-0700hrs | 48 | 38 |
| *Commercial Receivers* | When in use | N/A | 65 |
| *Industrial Receivers* | When in use | N/A | 70 |

## 6.4 Road Noise Policy (RNP)

The noise level criteria for increased traffic flow 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 8 presents the traffic noise criteria for this development.

**Table 8: 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) |

Source: Table3 EPA – RNP

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"*.

Additional traffic to the surrounding streets is expected as a result of the operational stage of Stage 1 and 2. An assessment to the RNP considers the impact of additional traffic from land use developments.

## 6.5 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 3 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 the site's retail car parks through the Night-time assessment period.

## 7.0 NOISE IMPACT ASSESSMENT

There are several sources associated with the operation of the Development that have the potential to increase the noise levels at the nearest noise sensitive receivers. The following noise sources have been identified as having potential for noise disturbance:

- Noise emission from external mechanical services
- Car parking activity
- Noise from delivery vehicle movements and activities associated with the loading dock
- Noise generated by the outdoor dining areas off Smidmore Street
- Additional vehicle movement on surrounding public roads

### 7.1 Car parks and loading docks assessment

The Murray Street (south) loading dock is to be located facing onto Murray Street. The main purpose of this loading dock is to service the proposed Coles store.

We have been informed by TPP that the proposed loading dock delivery hours will be limited from 0700 to 1900hrs, 7 days per week.

The carpark operation hours have not assumed to be restricted. Calculations have however been based on the project traffic flows set out an Appendix F, showing a significantly low vehicle flow during the night-time period. In the event that this flow is exceeded, some limits to carpark hours of operation may be required.

A noise assessment has been carried out for the Stage 1B car park and loading dock. Information regarding the anticipated traffic volumes has been provided to us by *The Transport Planning Partnership Pty Ltd* (TPP) on 28 August 2017.These traffic volumes have been used to carry out an assessment of the noise levels expected at the nearest receivers to the car park and loading dock operations.

Car park and loading dock vehicle volumes used in our assessment as provided by TPP are provided in Appendix F.

The loading dock must comply with Consent Condition B35 and the criteria set out in this report.

## 7.2 Calculation Procedures and Assumptions

### 7.2.1 Carpark calculation procedure and assumptions

$L_{eq}$ noise levels from the truck and car movements on site as well as vehicle and unloading activity in the loading dock have been calculated.

Loading dock emissions have been calculated in accordance with the ISO 9613-2:1996 methodology for propagation and truck and loading dock emissions.

Carpark emissions are calculated using the Bavarian Parking Lot Study (Bayerisches Landesamt fur Umwelt) (2007) methodology.

The Bavarian Parking Lot Study incorporates various selectable acoustic parameters $K_{PA}$, $K_I$ and $L_{max}$ which are defined on the basis of car park type and expected activity. The calculations allow for vehicles navigating the carpark including parking (including door closing and engine starts) as well as noise from shopping trolleys and customers. Values for $K_{PA}$, $K_I$ and $L_{max}$ have been taken from the (2007) *Bayerisches Landesamt fur Umwelt Parking Area Noise Study 6, 2007* and incorporated into the modelling. Values of +3dB(A) for correction factor $K_{PA}$ and +4dB(A) for correction factor $K_I$ have been applied in accordance with the Study for shopping centre parking lots

Vehicle volumes entering/exiting the car park have been summarised in Table 9 below.

**Table 9: Assumptions made for traffic volumes per period – Stage 1B**

| Period | Time | Hrs | Total Trips Per Period | Total Trips Per Busiest 15 min Period |
|---|---|---|---|---|
| *Carpark Entrance Edinburgh Road* | | | | |
| Day | 0700-1800hrs | 11 | 1226 | 34 |
| Evening | 1800-2200 hours | 4 | 287 | 33 |
| Night | 2200-0700 hours | 9 | 14 | 3 |

*Note: 1 Trip = 1 Vehicle both entering and exiting the carpark.*

All full derivation of the traffic volumes as instructed by The Transport Planning Partnership Pty Ltd (TPP) is provided in Appendix F.

### 7.2.2 Loading dock & delivery vehicle procedure and assumptions

The delivery vehicle modelling is based on vehicle movement estimates provided by the TPP, these vehicle numbers have been summarised in Table 10.

**Table 10: Coles Loading Dock - Delivery Vehicle Movements - Per Period & Busiest 15mins**

| Period | Time of Period | Semi-trailer Trucks Per Period | Rigid Trucks Per Period | Small Trucks Per Period | Vans Per Period | Semi-trailer Trucks Busiest 15mins | Rigid Truck Busiest 15mins | Small Trucks Busiest 15mins | Vans Busiest 15mins |
|---|---|---|---|---|---|---|---|---|---|
| *Loading Dock Stage 1B* | | | | | | | | | |
| Day | 0700-1800hrs | 10 | 24 | 5 | 25 | 1 | 1 | 1 | 1 |
| Evening | 1800-2200hrs | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Night | 2200-0700hrs | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Note: For the purpose of our assessment it is assumed that each delivery will take a minimum of 15 minutes to complete.

### 7.2.3 Loading dock internal noise level

Impacts of noise during the daytime (0700-1800) use of the loading dock are based on the following typical activities:

- Delivery vehicle movements, engines starts & idling delivery vehicles
- Pallet jacks
- Conversation from loading dock staff and delivery drivers etc
- Electric lifts to transport goods to upper levels within the shopping centre if needed

We have from our records, derived an expected noise level of 78 $L_{Aeq}$ (15 minutes) within the loading dock for the daytime (0700-1800) operating scenario

Deliveries to the loading dock outside the hours of 0700 and 1800 are not proposed. It is possible however that some residual activities may remain. This could include the occasional use of an electric pallet jack, conversation between night shift workers, electric lift to transport goods, stock trolleys being pushed around the loading dock, but **not** delivery vehicles or engines as there are no deliveries during the Evening and Night assessment periods. The expected evening and night-time noise levels within the loading dock under these conditions is 67 $L_{Aeq\ (15\ minutes)}$.

We note that any mechanical plant such as fans, air conditioners, refrigeration, bailers, and the like must be specified and such that noise levels noted, in combination with all other loading dock noise sources, above are not exceeded

Loading dock 1/1 octave band internal sound pressure levels are presented in Table 11 below.

**Table 11: Loading dock internal sound pressure level – SPL dB**

| Loading Dock | 1/1 Octave Band Sound Pressure Level | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Internal SPL** | **63** | **125** | **250** | **500** | **1k** | **2k** | **4k** | **8k** | **A** |
| **Day** | 75 | 72 | 73 | 76 | 73 | 71 | 67 | 59 | 78 |

| Loading Dock | 1/1 Octave Band Sound Pressure Level | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Evening & Night *** | 63 | 60 | 61 | 64 | 61 | 60 | 56 | 50 | 67 |

Note: The loading dock internal noise levels above includes typical loading dock activities such as unloading goods from delivery vehicles.

*The Evening & Night internal level includes night shift works using electric pallet jacks, occasional conversation, electric lift and hoist, rolling stock cages but does **not** include delivery vehicle engines. This internal noise level is based on previously measured levels at a similar loading dock during a night shift.

### 7.2.4 Mechanical plant assumptions

The final mechanical services design equipment selections and locations have not been detailed at the time of report preparation. Mechanical, cool room and refrigeration services will need to be designed such that the overall noise emission from the development complies with the acoustic criteria established in Section 6.0. It is envisaged that some noise control measures will be required including screening, enclosures and/or the installation of appropriate attenuators to enable the project specific noise limits to be achieved as set out in Consent Conditions B34, E19, F2 & F3 regarding mechanical plant noise.

### 7.2.5 Construction noise

Methodologies for construction works are not yet defined. It will be necessary for the contractor to comply with the construction management plan, EPA's Interim Construction Noise Guideline and Consent Condition D20.

### 7.2.6 Patrons outside restaurants & bars along Smidmore St.

As per instruction by the Client we have included in our model & calculations, noise from patrons talking at normal to raised speaking level outside the proposed hospitality business facing onto Smidmore Street, which is based on typical noise levels from patrons at a restaurant and licensed premises. In order to create a worst-case scenario of patron noise we have assumed 50% of people will be talking at one time and that the seating outside each restaurant tenancy will be at full capacity when in use. Based on the allocated seating positions shown in plans provided, we estimate a likely external capacity of 50 patrons. Accordingly, we have included a total of 50 patrons seated in the outdoor areas in our calculations from 0700hrs to 0000hrs (midnight) only, 7 days a week. The 1/1 octave band sound power level spectrum used in our noise model is presented in below.

The modelled patron voice level is shown in Table 12. Overall noise levels for a loud voice and spectral content are derived from the Handbook of Noise Control, Harris & Crede. Patrons are assumed to not be facing any particular direction. The correction for a random speaker direction is shown in Table 13 (source: AAAC Draft Licensed premises guidelines 2016).

**Table 12: Patron voice level efforts, raised voice**

| • Location, Source | Measure | Octave Band Centre Frequency (Hz) | | | | | | | | | Overall |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 31.5 | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | dBA |
| Outdoor patrons, log average male and female with background music | $L_{10}$ @ 1m in front | -* | 52* | 58 | 64 | 67 | 64 | 60 | 55 | 50 | 68 |

* Conservatively estimated at 63Hz, no substantive component expected at 31.5Hz

**Table 13: Correction for random directionality**

| Location, Source | Octave Band Centre Frequency (Hz) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 31.5 | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
| Correction for directionality | - | - | -1 | -2 | -2 | -2 | -4 | -4 | -5 |

## 7.3 Calculated Noise Levels – INP Assessment

Based on delivery vehicle volumes in Table 9, delivery vehicle volumes in Table 10, cumulative noise emission including noise from carpark, loading dock and patrons in outdoor areas (excluding mechanical plant noise emissions) levels have been calculated and are detailed in Table 14.

**Table 14: 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* | | | | | | |
| Day | 47 | 57 | ✓ | 46 | 52 | ✓ |
| Evening | 47 | 52 | ✓ | 45 | 46 | ✓ |
| Night | 38 | 48 | ✓ | 35 | 38 | ✓ |
| *Receiver B Residential* | | | | | | |
| Day | 46 | 57 | ✓ | 46 | 52 | ✓ |
| Evening | 46 | 52 | ✓ | 45 | 46 | ✓ |
| Night | 38 | 48 | ✓ | 36 | 38 | ✓ |
| *Receiver C Residential* | | | | | | |
| Day | 38 | 57 | ✓ | 38 | 52 | ✓ |
| Evening | 37 | 52 | ✓ | 35 | 46 | ✓ |
| Night | 28 | 48 | ✓ | 22 | 38 | ✓ |
| *Receiver D Industrial* | | | | | | |
| When in use* | - | - | - | 47 | 70 | ✓ |
| Receiver E *Industrial* | | | | | | |
| When in use* | - | - | - | 60 | 70 | ✓ |
| Receiver F *Industrial* | | | | | | |
| When in use* | - | - | - | 51 | 70 | ✓ |
| Receiver G *Industrial* | | | | | | |
| When in use* | - | - | - | 50 | 70 | ✓ |

*For the purpose of this assessment impacts for Industrial receivers have been calculated over a 'when in use' period of assessment.

*Sleep Disturbance*

To assess the potential for sleep disturbance, we have predicted maximum noise levels from vehicular access including maximum noise levels from cars entering/exiting the car parks at the façade of the nearest affected residential receivers. The calculated maximum noise levels are detailed in Table 15.

**Table 15: Sleep disturbance assessment**

| Receiver | Period | Predicted $L_{Amax}$ (external) | Criteria (external) | Compliance? |
|---|---|---|---|---|
| A | Night | 52 | 59 | ✓ |
| B | Night | 51 | 59 | ✓ |
| C | Night | 43 | 59 | ✓ |

Furthermore, the predicted internal level (assuming a 10dB reduction from outside to inside with open windows) would be below 42dB $L_{Amax}$ at each of these receivers. This is below the 50-55 $L_{Amax}$ guidance provided by the EPA, indicating that such levels are unlikely to cause awakening reactions.

## 7.4 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.

Calculations are based on the existing and future increased traffic numbers provided to us by TPP, as summarised in Appendix F. The site surrounding the existing residential receivers has been assessed to the NSW Road Noise Policy. $L_{10\,(18hr)}$ traffic noise emission shave been calculated for residential receivers along Edinburgh Road, Bourne Street and Murray Street in accordance with the calculation method outlined in Calculation of Road Traffic Noise 1988 (CoRTN). A $L_{eq\,(15hr)}$ (Day) and 9hr $L_{eq\,(9hr)}$ (Night) traffic noise emission levels have been calculated from the $L_{10\,(18hr)}$ levels based on the existing and future traffic volumes provided to us by the Client.

The results of our calculations indicate a traffic noise emission increase in the order of +2dB $L_{10}$ at the nearest affected receivers adjacent to Edinburgh Road, Bourne Street and Murray Street.

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.

## 8.0 DISCUSSION AND REQUIRED NOISE CONTROLS

The analyses carried out within this report, as outlined in Section 7.0, demonstrates that it is possible for the proposed shopping centre development to comply with the requirements of the NSW Industrial Noise Policy and the Road Noise Policy. Based on the traffic flow numbers, delivery vehicle numbers and proposed site designs provided to us by the Client (AMP) the proposed development is capable of fully complying with the acoustic criteria set out in this report.

In order for the proposed alterations of the shopping centre to comply with these requirements, the following key requirements and constraints shall apply:

- Deliveries and vehicle movements to and from the loading docks must only be between the hours of 0700 and 1900 hours
- The carpark operation hours have not assumed to be restricted. The calculations have however been based on the project traffic flows set out an Appendix F , showing significantly lower vehicle flow volumes during the night-time period. In the event that this flow is exceeded or increased, some limits to carpark hours of operation may be required.
- Noise levels within the loading dock due to mechanical plant,(when combined with that from other sources such that from sporadic events such conversation, electric lifts and pallet jacks) is not to exceed 67 $L_{Aeq}$(15minutes) when measured *within* the loading dock.
- Final mechanical services design equipment selections and locations have not been detailed at the time of report preparation. Mechanical, cool room and refrigeration services will need to be designed such that the overall noise emission from the development complies with the acoustic criteria established in Section 6.0. It is envisaged that some noise control measures will be required to mechanical plant systems including screening, enclosures and/or the installation of appropriate attenuators to enable the project specific noise limits to be achieved.
- All mechanical plant and equipment that is part of the of the new works is be designed to ensure that its operation does not give rise to noise levels, (in combination with other operation noise sources associated with the new works) not exceed the EPA INP and the requirements of consent conditions F2 and F3.
- The hours of operation of the restaurants and bar tenancies along Smidmore Street are confined to 0700 to 12 midnight, based on “in principle” assessments included within our modelling and calculations. Key amongst our assumptions is a limitation of 50 external patrons dining at external tables using normal to raised vocal efforts. There are however other factors that can influence noise levels such as background or amplified music, seating layouts and any noise spill from internal dining areas. These factors are however dependant individual tenancy or restaurant designs and configurations. Accordingly, it will be necessary to provide specific acoustic analyses and reports pertaining to individual restaurant or tenancy uses, design and layout.

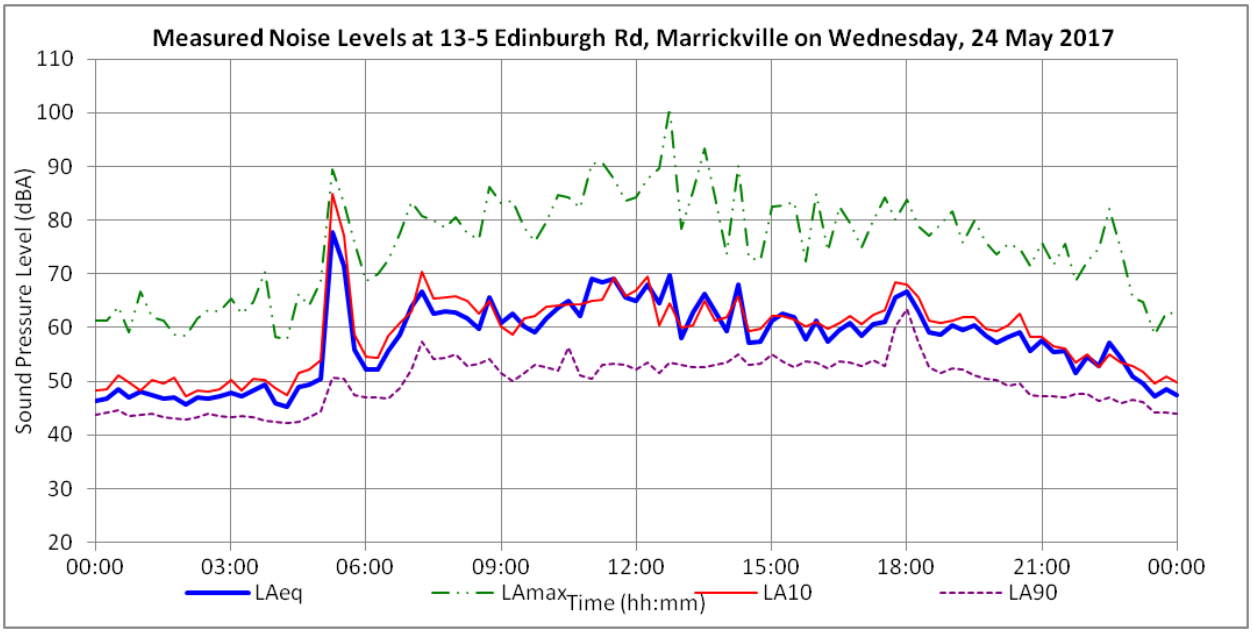
## APPENDIX A

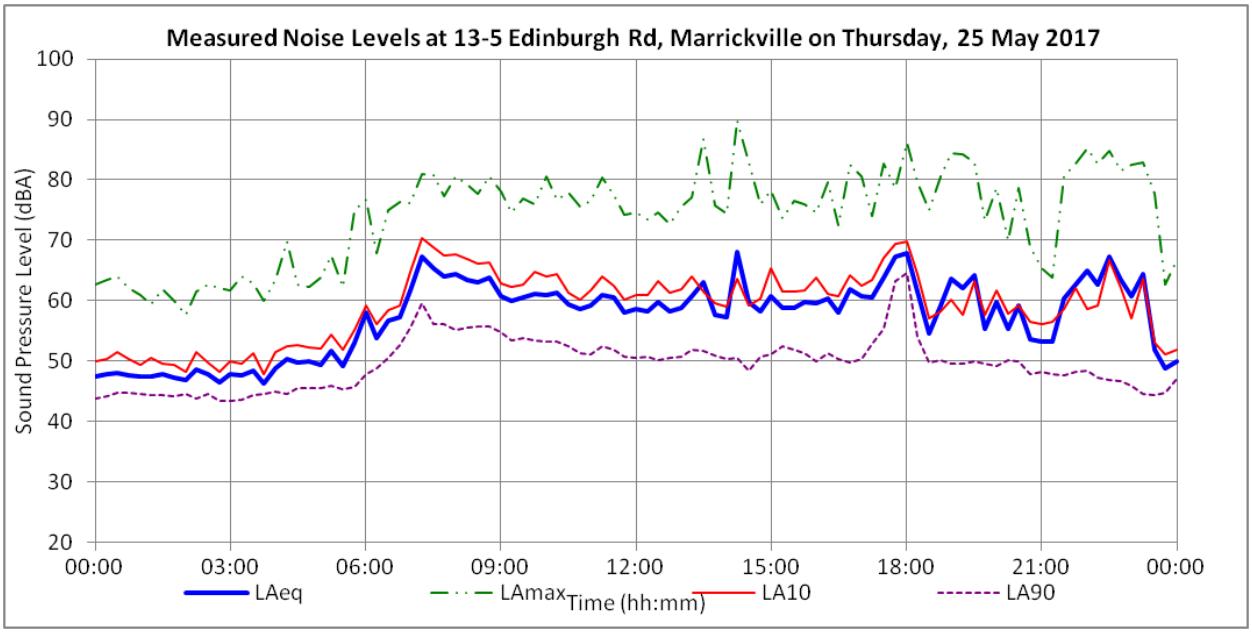
## GLOSSARY OF TERMINOLOGY

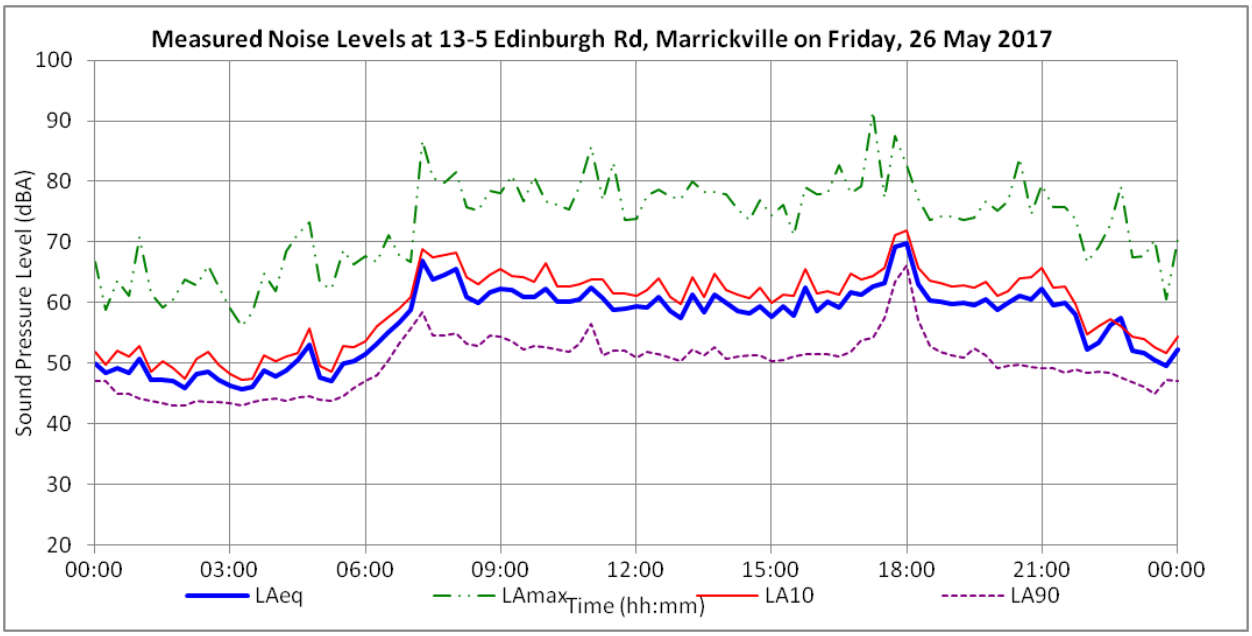
| | |
|---|---|
| **A-weighting** | The process by which noise levels are corrected to account for the non-linear frequency response of the human ear. |
| **dB** | Decibel<br>The unit of sound level. |
| **Frequency** | The number of pressure fluctuation cycles per second of a sound wave. Measured in units of Hertz (Hz). |
| **Hertz (Hz)** | Hertz is the unit of frequency. One hertz is one cycle per second.<br>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




Measured Noise Levels at 13-5 Edinburgh Rd, Marrickville on Friday, 26 May 2017
Sound Pressure Level (dBA)
100
90
80
70
60
50
40
30
20
00:00
03:00
06:00
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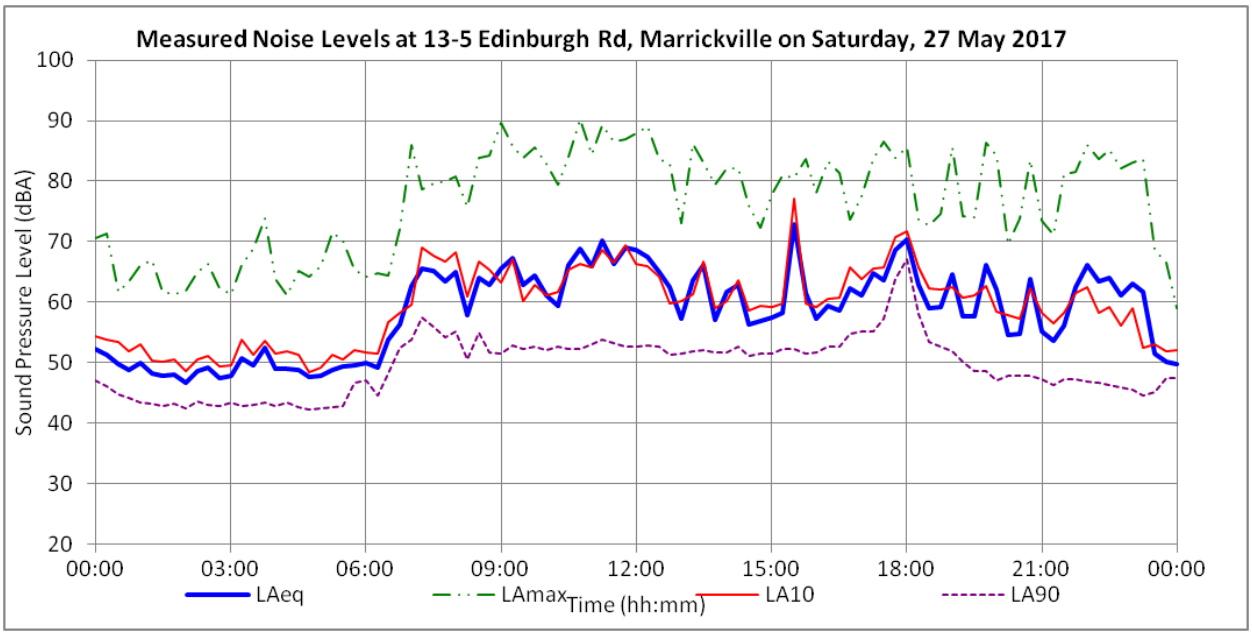
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)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Sound Pressure Level (dBA)
100
90
80
70
60
50
40
30
20
00:00
03:00
06:00
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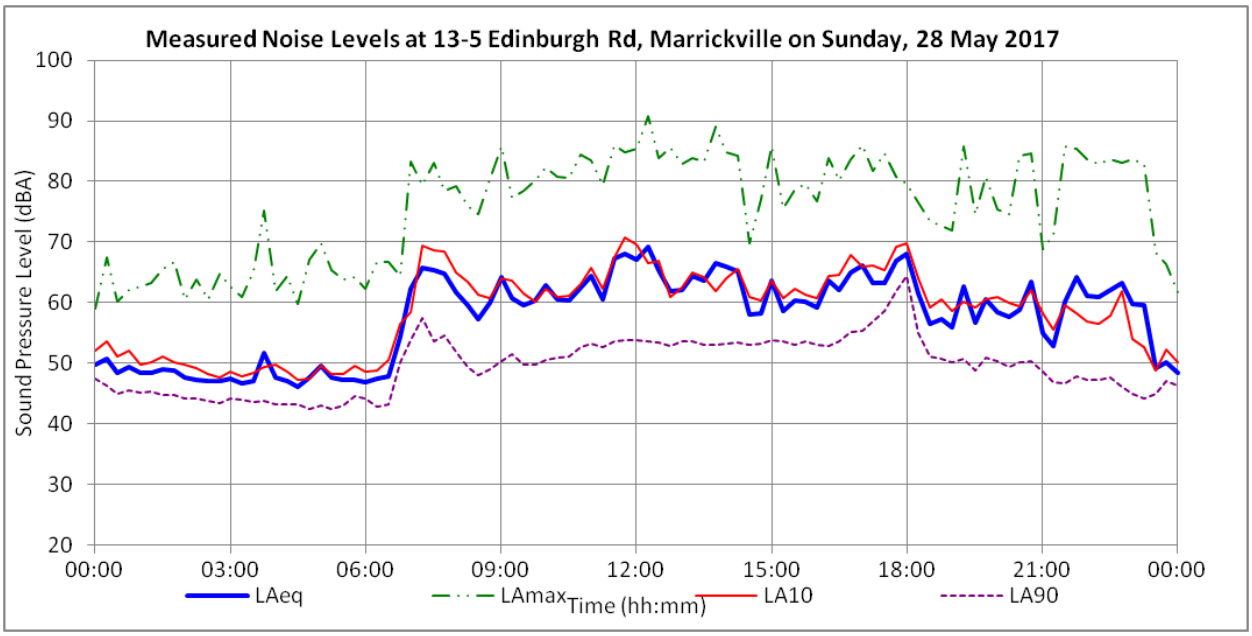
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)


Measured Noise Levels at 13-5 Edinburgh Rd, Marrickville on Sunday, 28 May 2017
Sound Pressure Level (dBA)
100
90
80
70
60
50
40
30
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00:00
03:00
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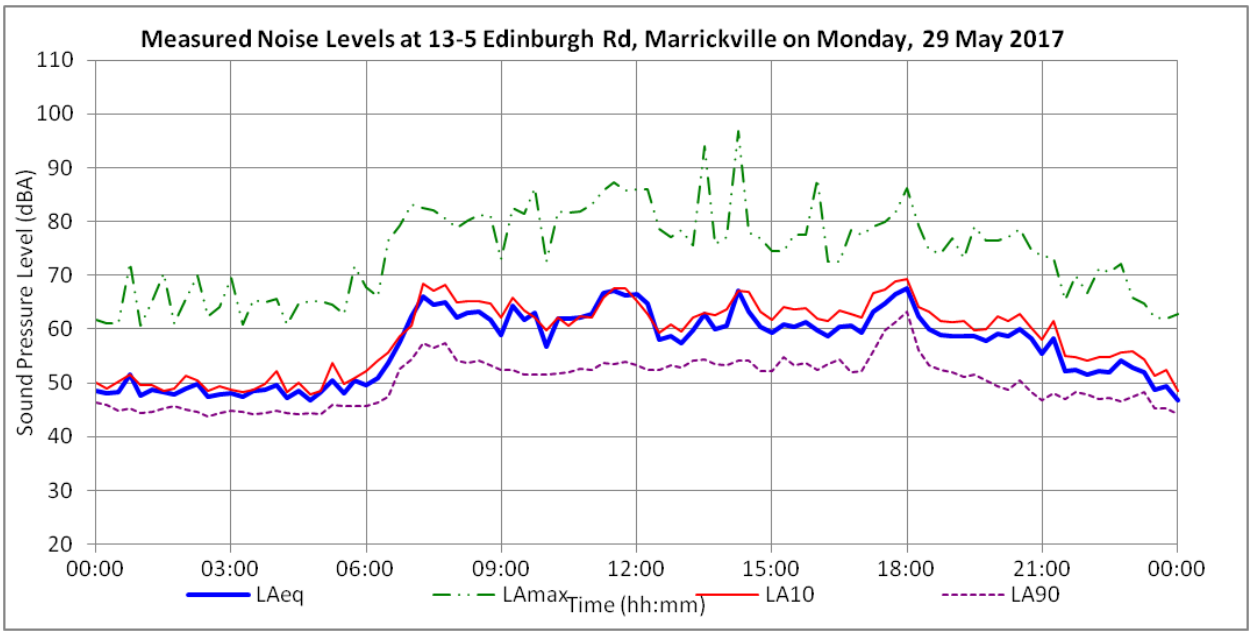
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)


Measured Noise Levels at 13-5 Edinburgh Rd, Marrickville on Monday, 29 May 2017
Sound Pressure Level (dBA)
110
100
90
80
70
60
50
40
30
20
00:00
03:00
06:00
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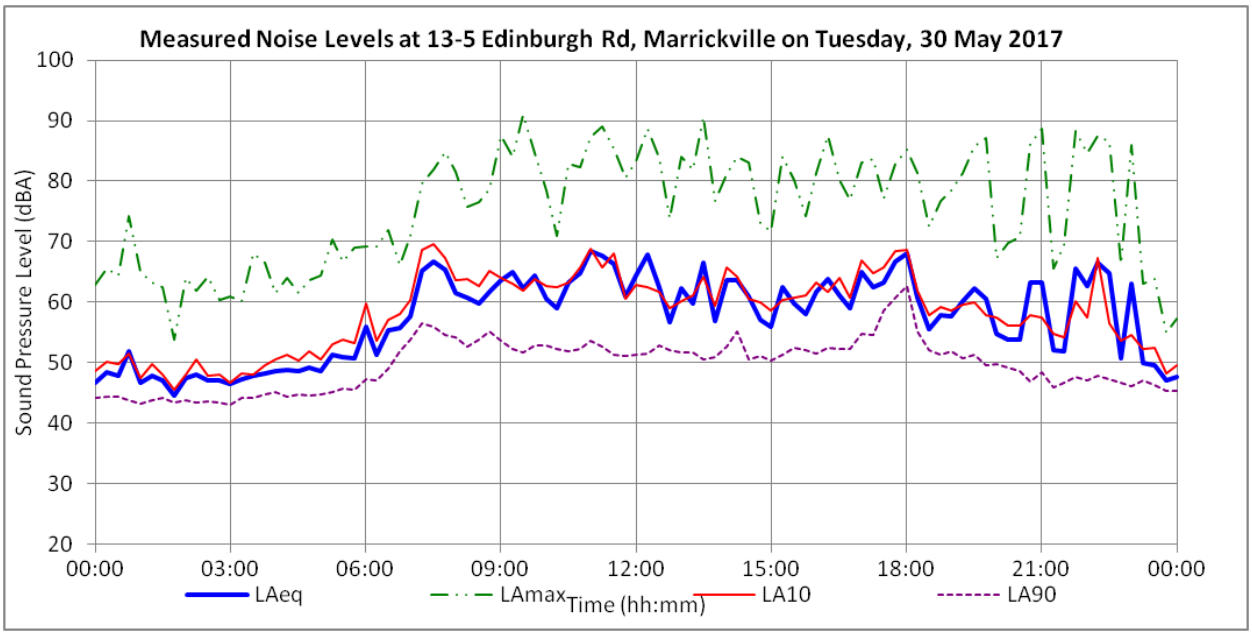
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)


Measured Noise Levels at 13-5 Edinburgh Rd, Marrickville on Tuesday, 30 May 2017
Sound Pressure Level (dBA)
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90
80
70
60
50
40
30
20
00:00
03:00
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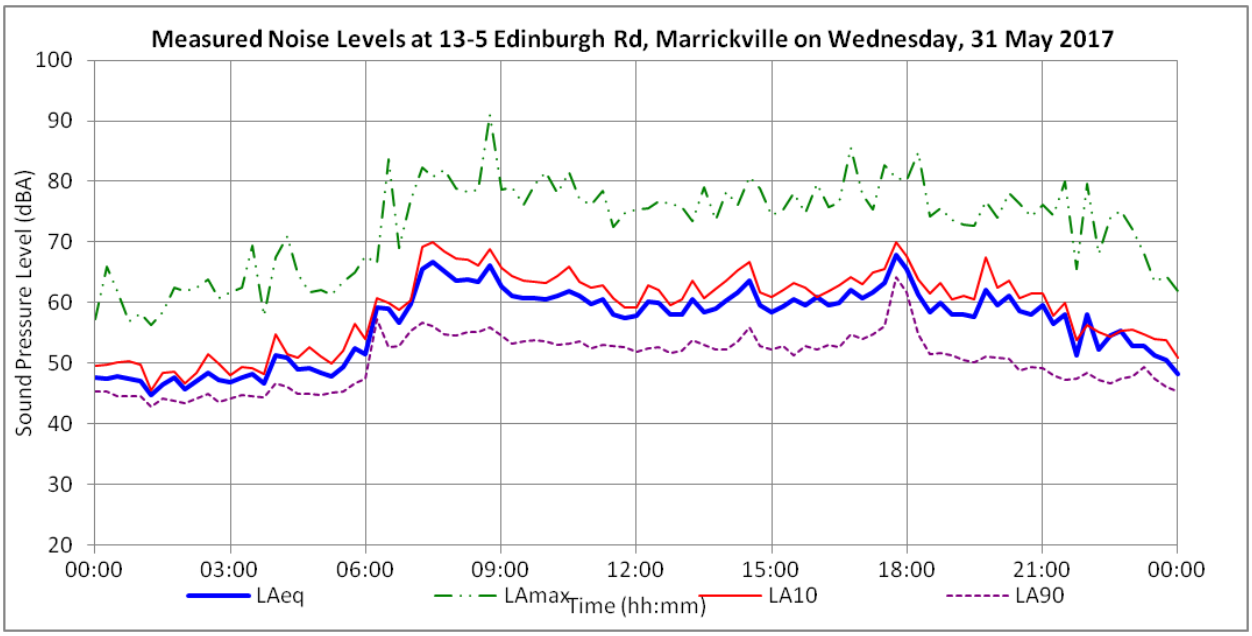
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)


Measured Noise Levels at 13-5 Edinburgh Rd, Marrickville on Wednesday, 31 May 2017
Sound Pressure Level (dBA)
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90
80
70
60
50
40
30
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00:00
03:00
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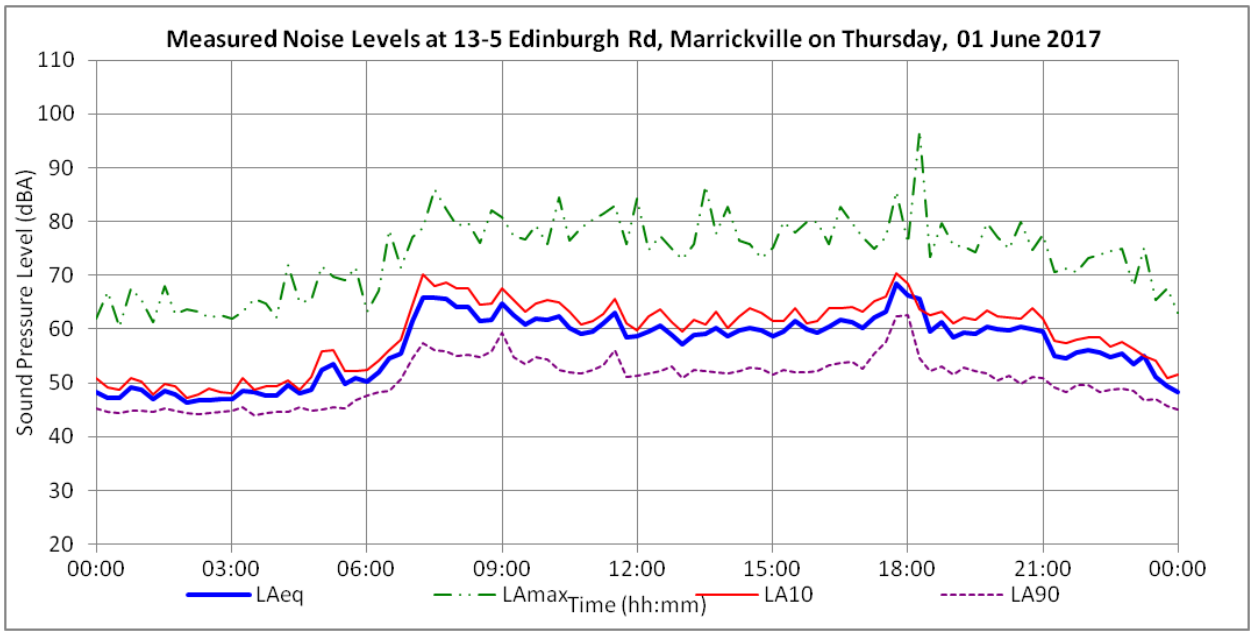
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)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Sound Pressure Level (dBA)
110
100
90
80
70
60
50
40
30
20
00:00
03:00
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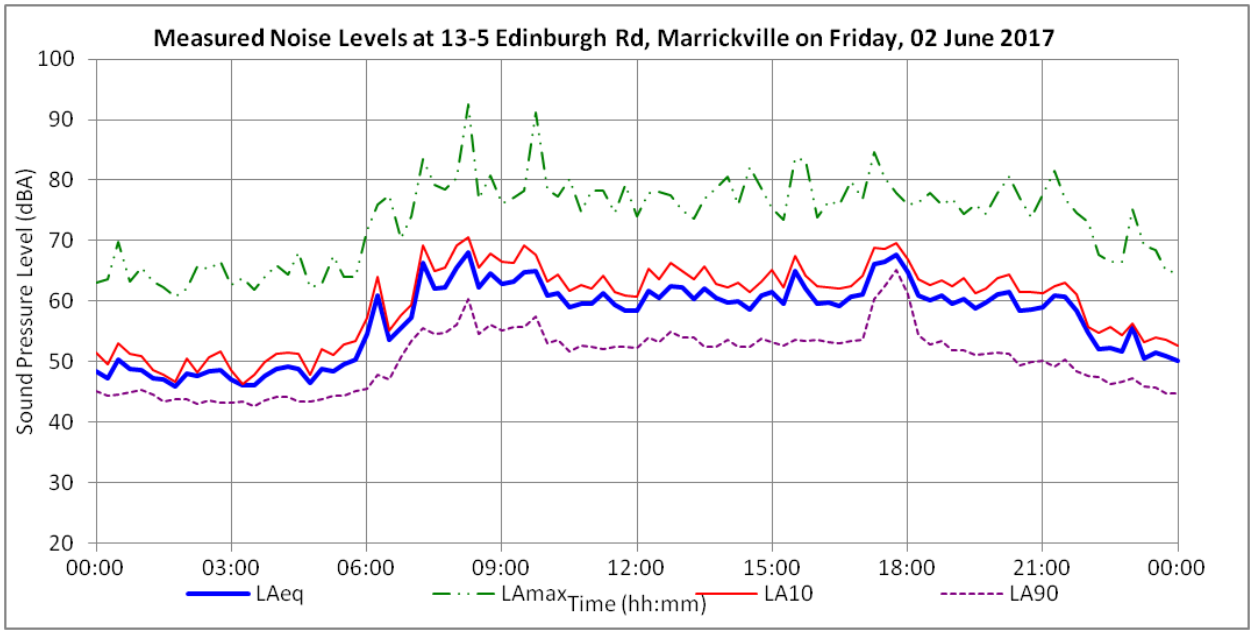
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)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Sound Pressure Level (dBA)
100
90
80
70
60
50
40
30
20
00:00
03:00
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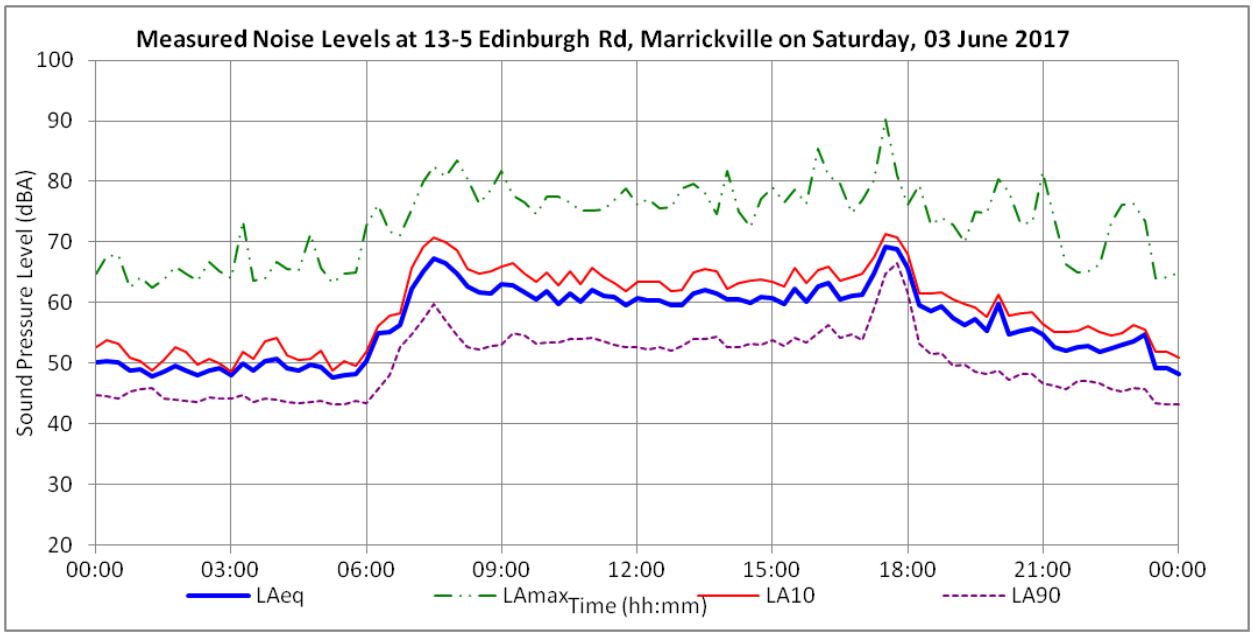
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)


Measured Noise Levels at 13-5 Edinburgh Rd, Marrickville on Saturday, 03 June 2017
Sound Pressure Level (dBA)
100
90
80
70
60
50
40
30
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00:00
03:00
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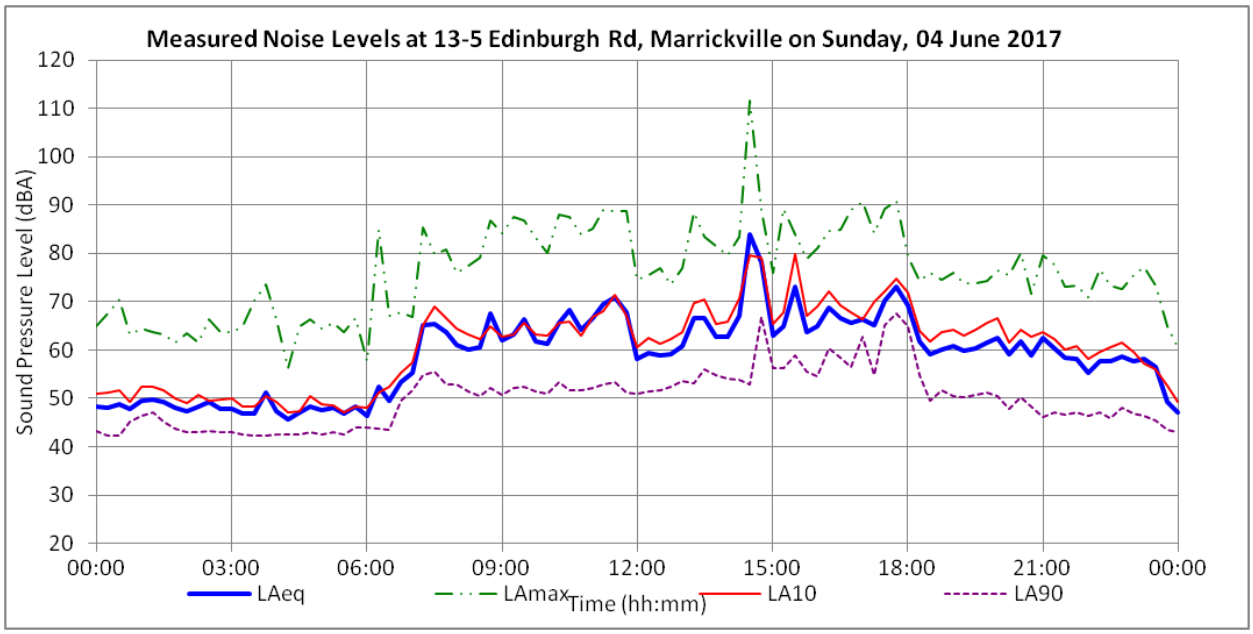
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)


Measured Noise Levels at 13-5 Edinburgh Rd, Marrickville on Sunday, 04 June 2017
Sound Pressure Level (dBA)
120
110
100
90
80
70
60
50
40
30
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00:00
03:00
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12:00
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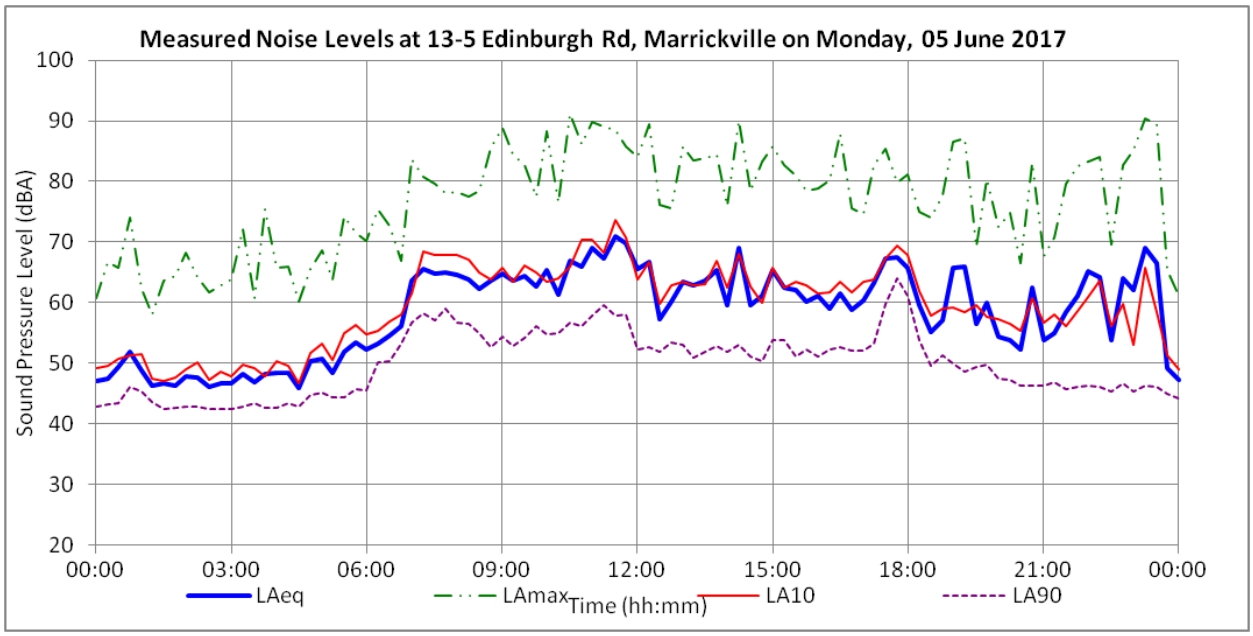
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)


Measured Noise Levels at 13-5 Edinburgh Rd, Marrickville on Monday, 05 June 2017
Sound Pressure Level (dBA)
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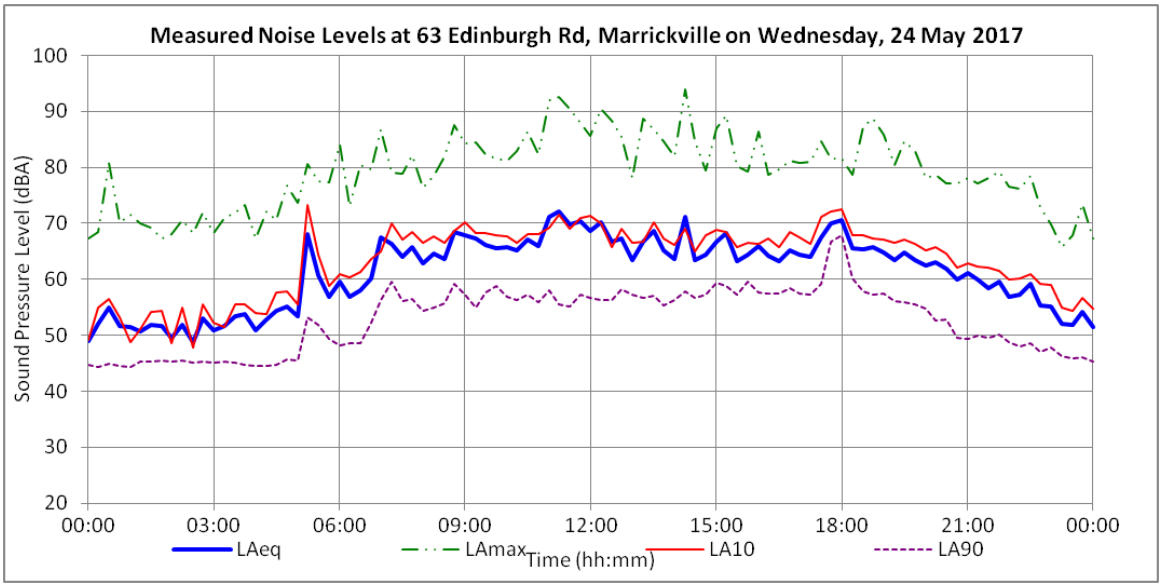
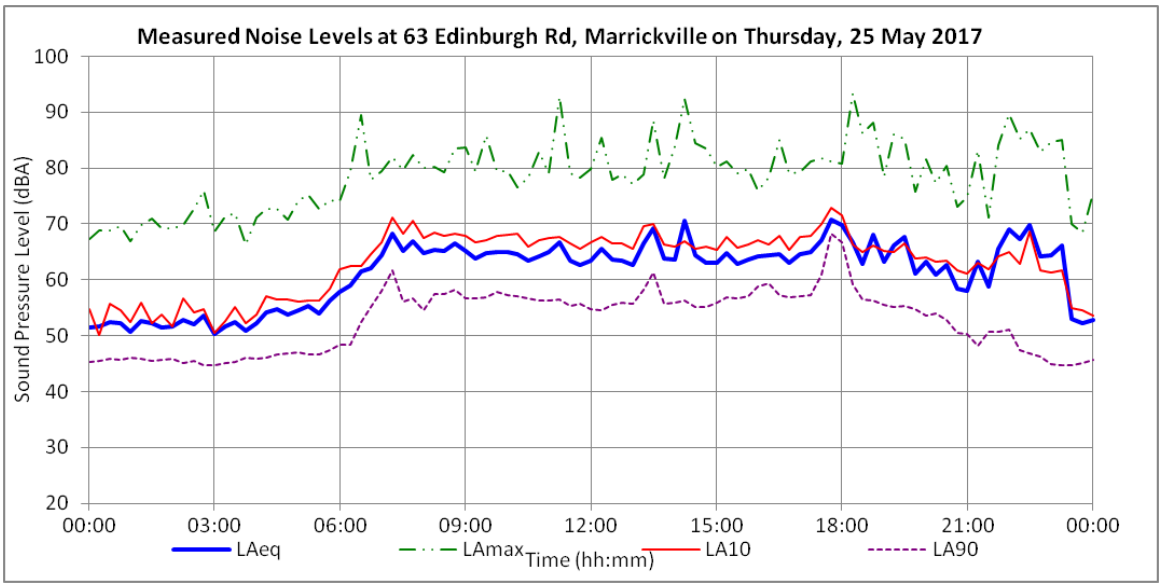
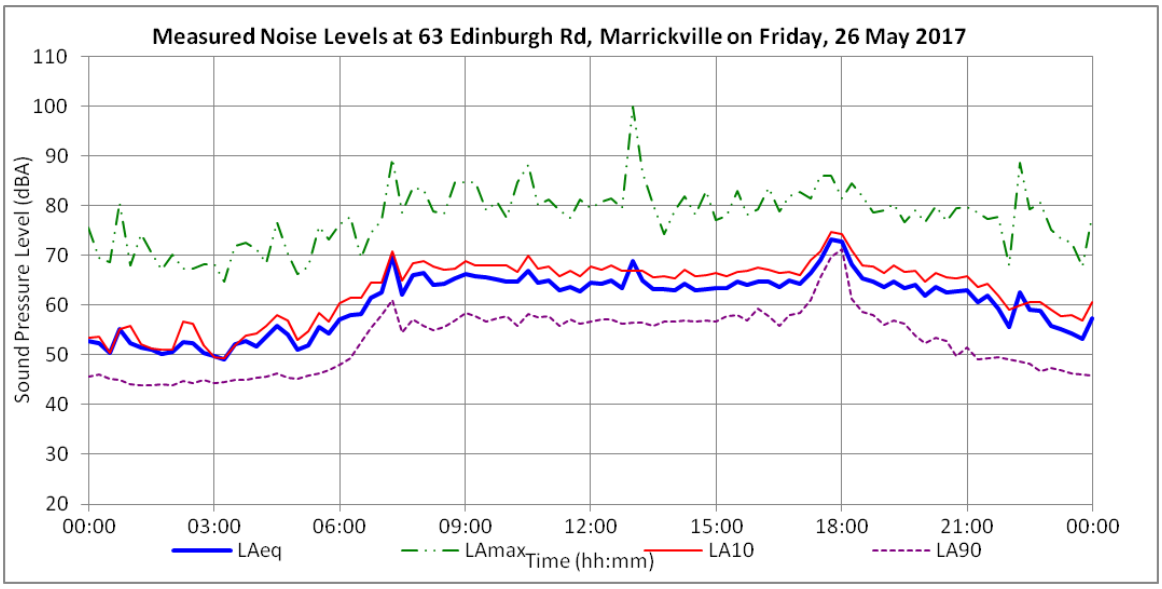
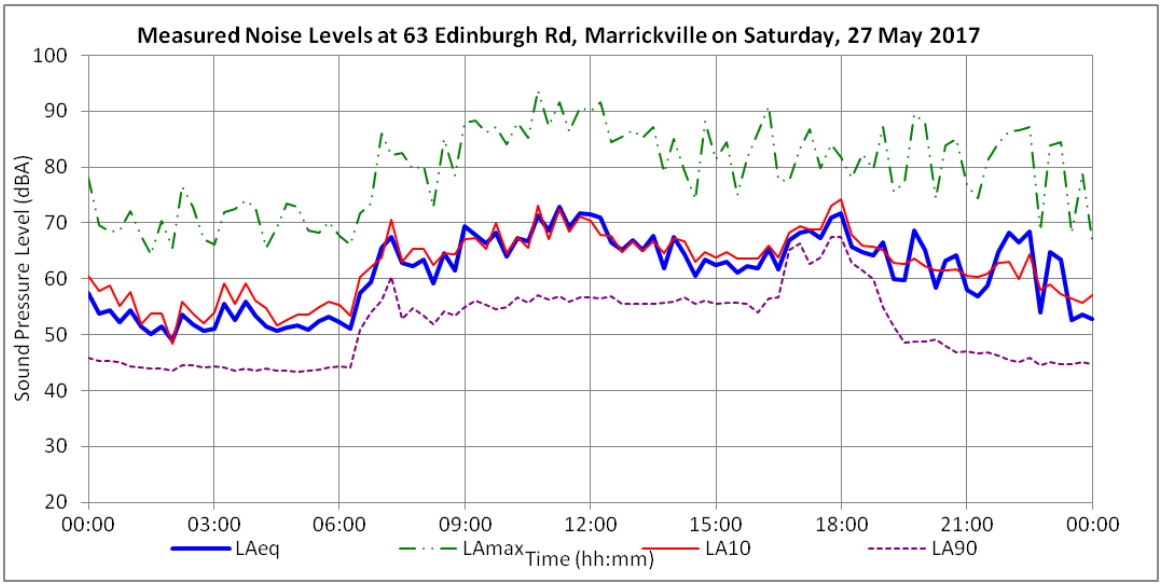
90
80
70
60
50
40
30
20
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)

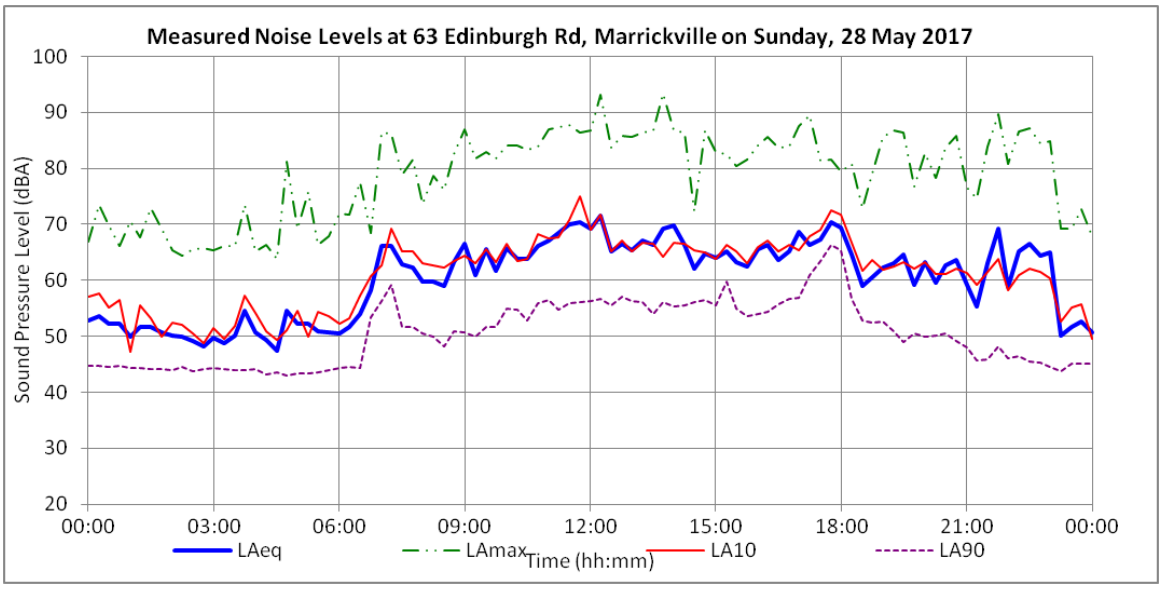
## B2 Noise Logging Results – Logger L2

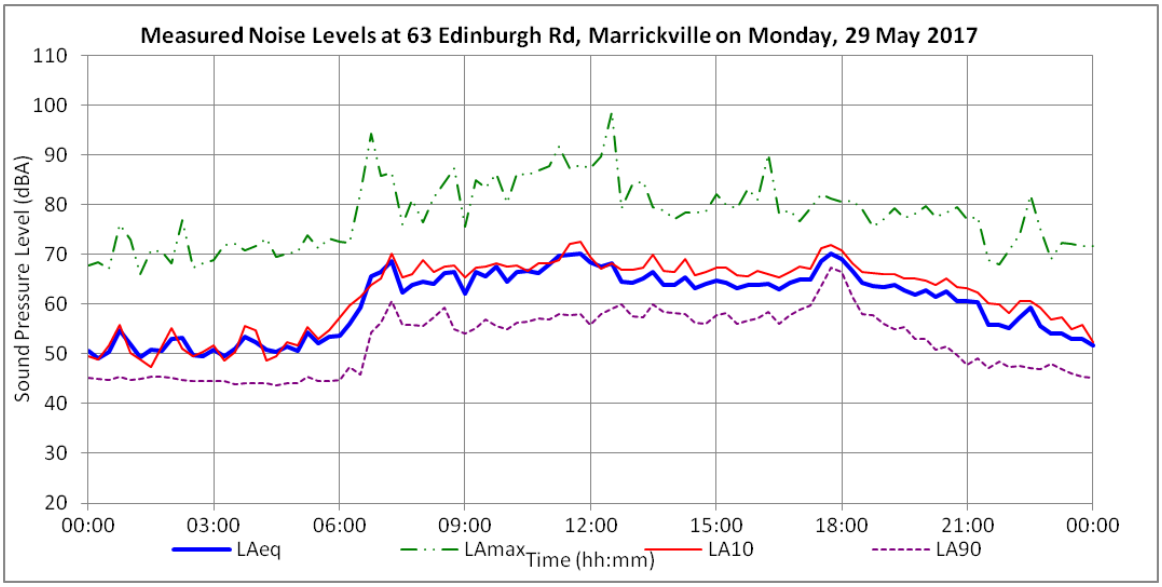


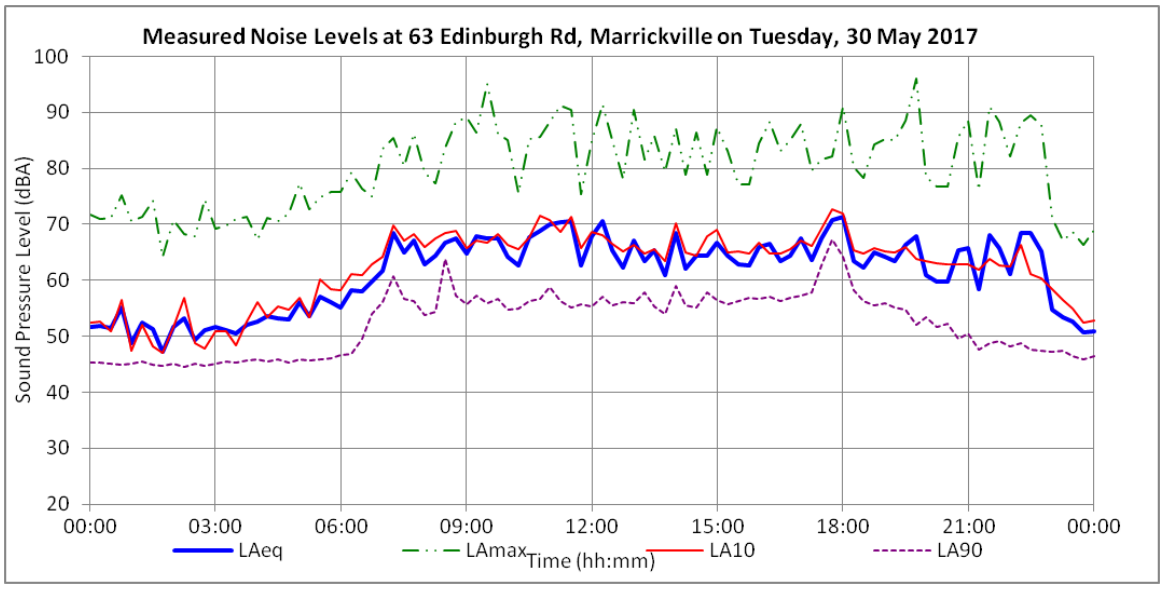



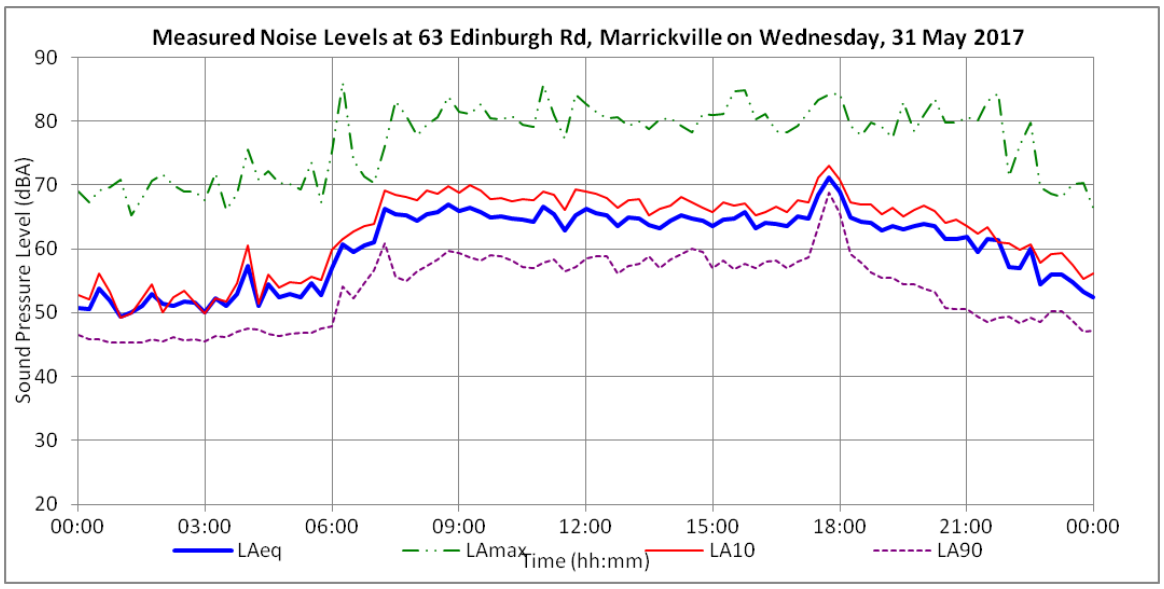

Measured Noise Levels at 63 Edinburgh Rd, Marrickville on Friday, 26 May 2017
Sound Pressure Level (dBA)
110
100
90
80
70
60
50
40
30
20
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)

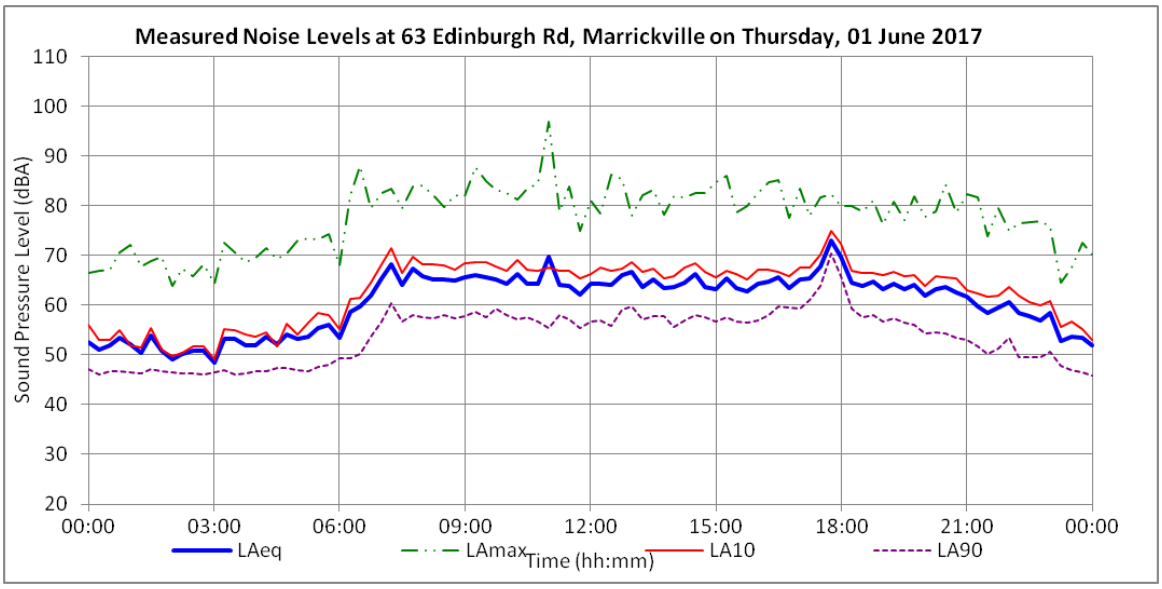

Measured Noise Levels at 63 Edinburgh Rd, Marrickville on Saturday, 27 May 2017
Sound Pressure Level (dBA)
100
90
80
70
60
50
40
30
20
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)

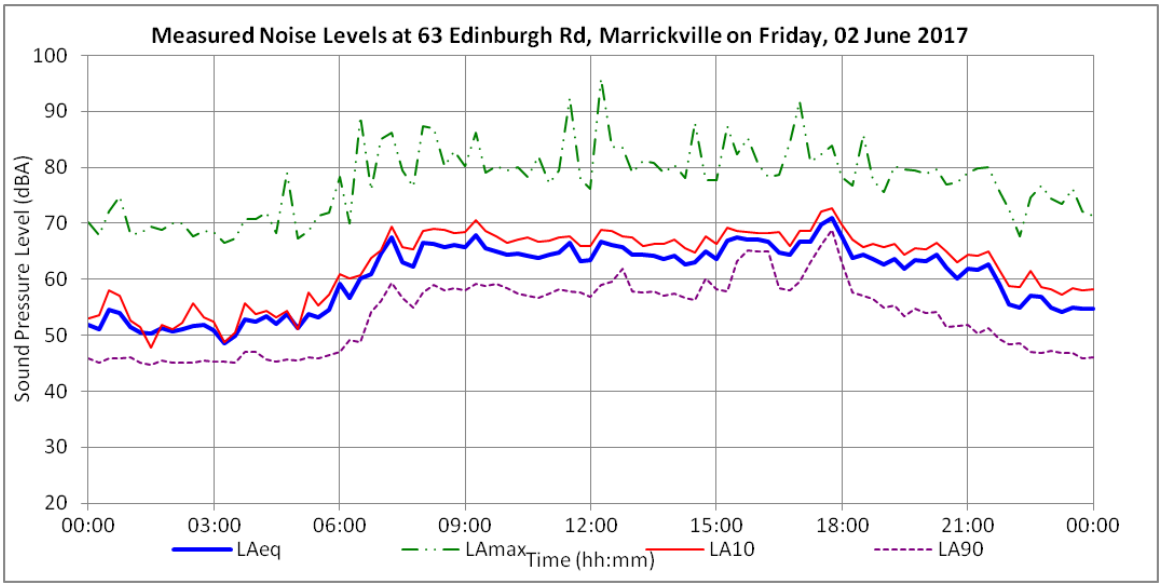

Measured Noise Levels at 63 Edinburgh Rd, Marrickville on Sunday, 28 May 2017
Sound Pressure Level (dBA)
100
90
80
70
60
50
40
30
20
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)

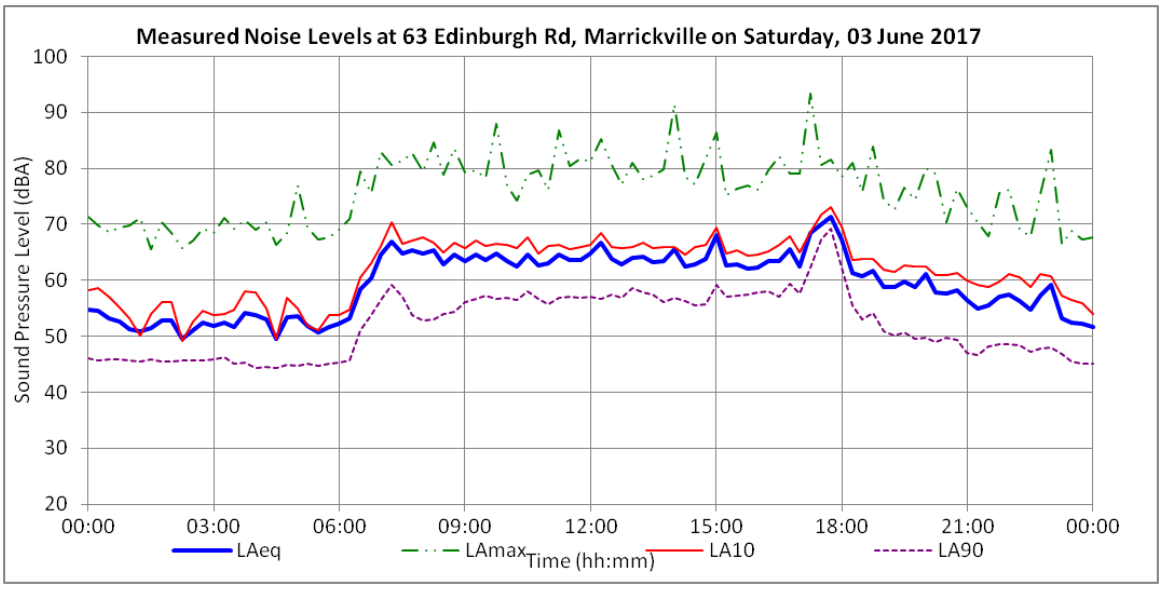

Measured Noise Levels at 63 Edinburgh Rd, Marrickville on Monday, 29 May 2017
Sound Pressure Level (dBA)
110
100
90
80
70
60
50
40
30
20
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)

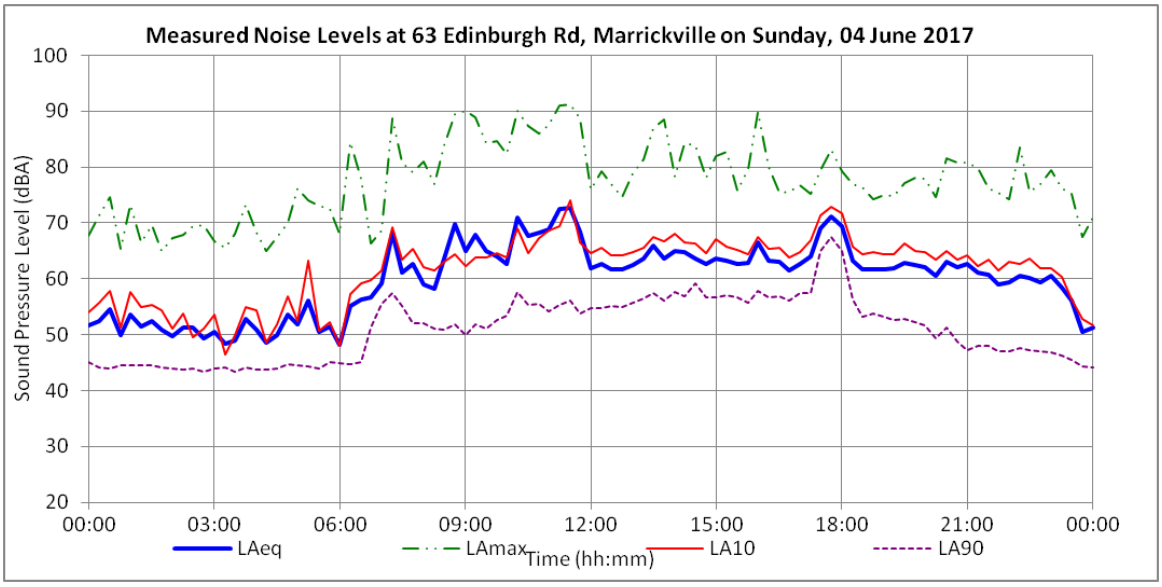

Measured Noise Levels at 63 Edinburgh Rd, Marrickville on Tuesday, 30 May 2017
Sound Pressure Level (dBA)
100
90
80
70
60
50
40
30
20
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)


Measured Noise Levels at 63 Edinburgh Rd, Marrickville on Wednesday, 31 May 2017
Sound Pressure Level (dBA)
90
80
70
60
50
40
30
20
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)


Measured Noise Levels at 63 Edinburgh Rd, Marrickville on Thursday, 01 June 2017
Sound Pressure Level (dBA)
110
100
90
80
70
60
50
40
30
20
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)

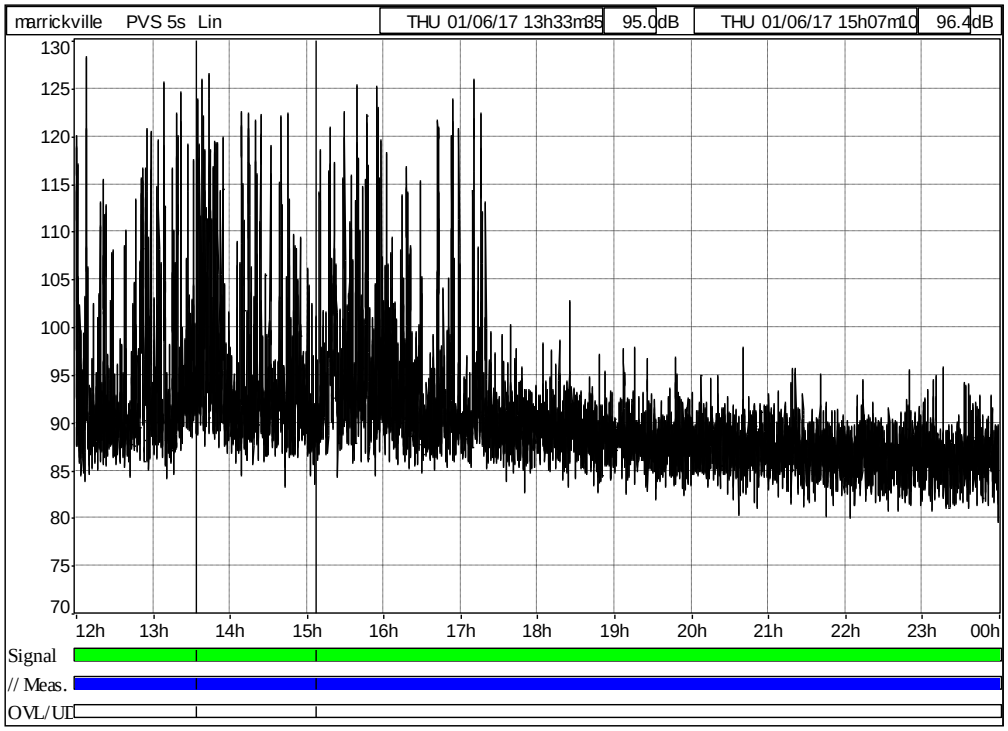

Measured Noise Levels at 63 Edinburgh Rd, Marrickville on Friday, 02 June 2017
Sound Pressure Level (dBA)
100
90
80
70
60
50
40
30
20
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)

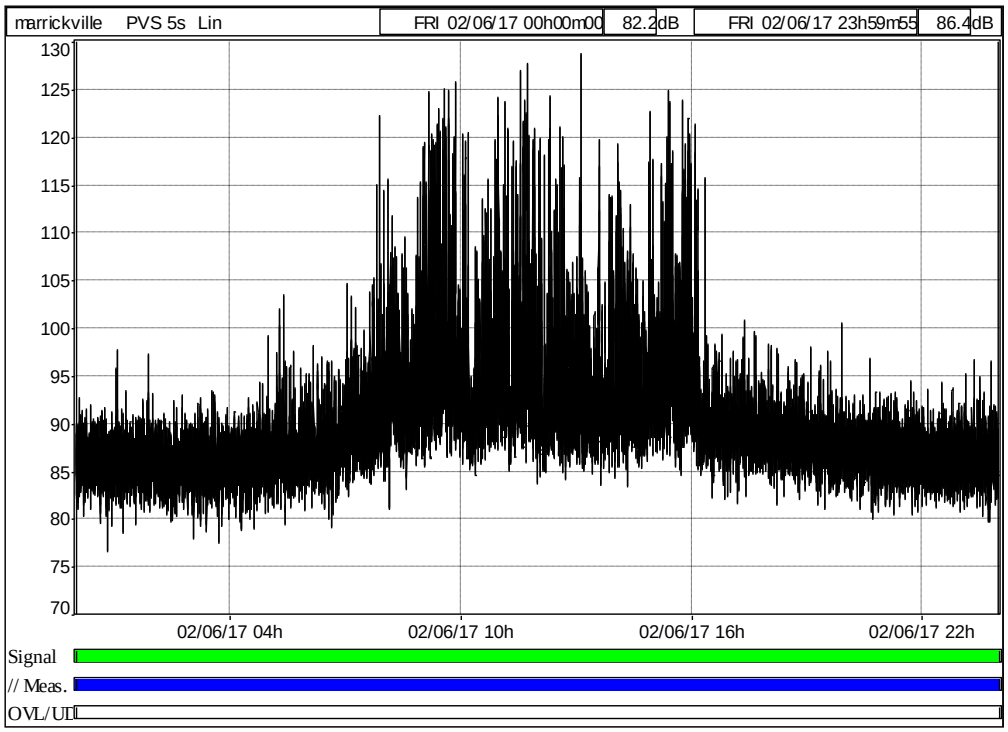

Measured Noise Levels at 63 Edinburgh Rd, Marrickville on Saturday, 03 June 2017
Sound Pressure Level (dBA)
100
90
80
70
60
50
40
30
20
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)

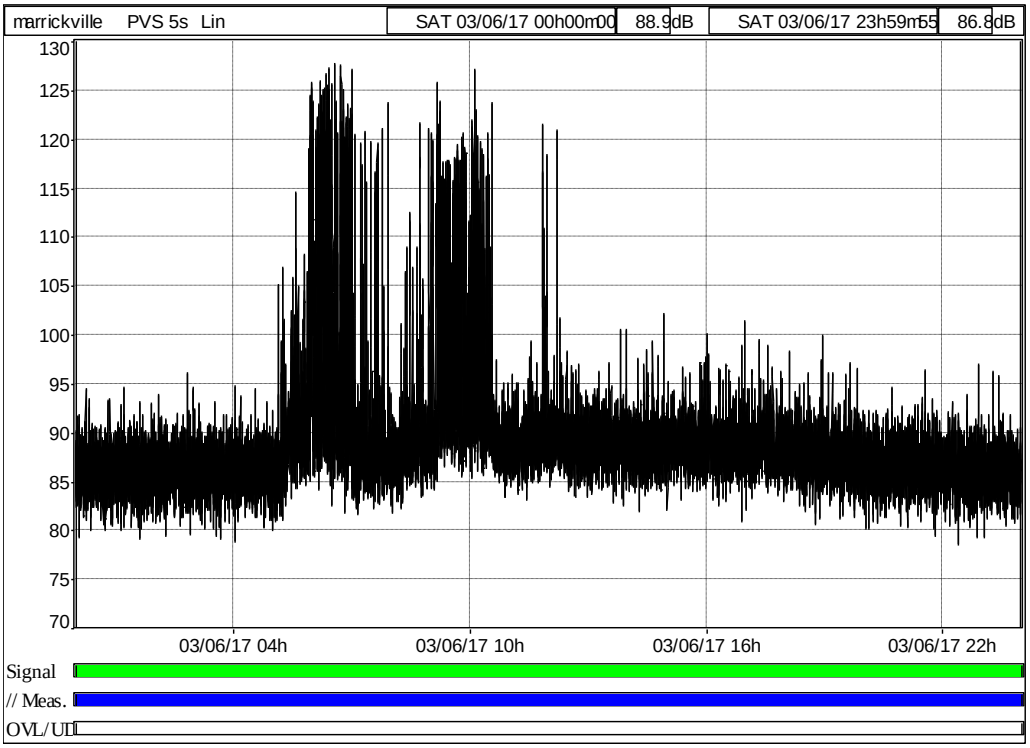

Measured Noise Levels at 63 Edinburgh Rd, Marrickville on Sunday, 04 June 2017
Sound Pressure Level (dBA)
100
90
80
70
60
50
40
30
20
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)

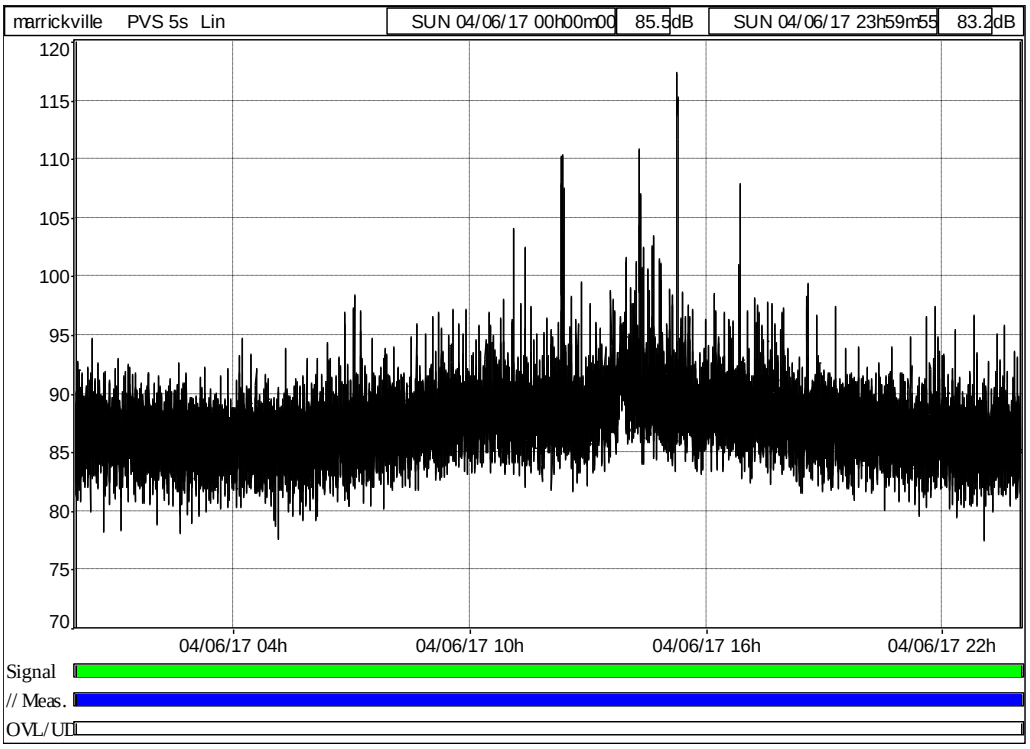
# APPENDIX C VIBRATION SURVEY RESULTS

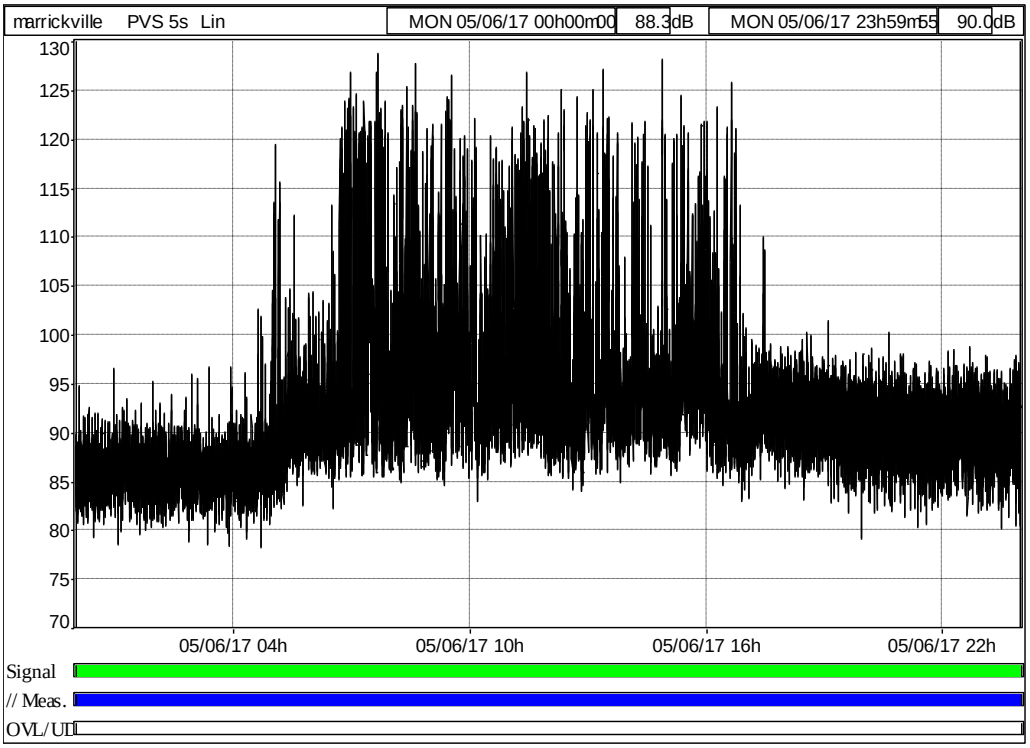
## C1 Vibration Logging Results – Logging position L1

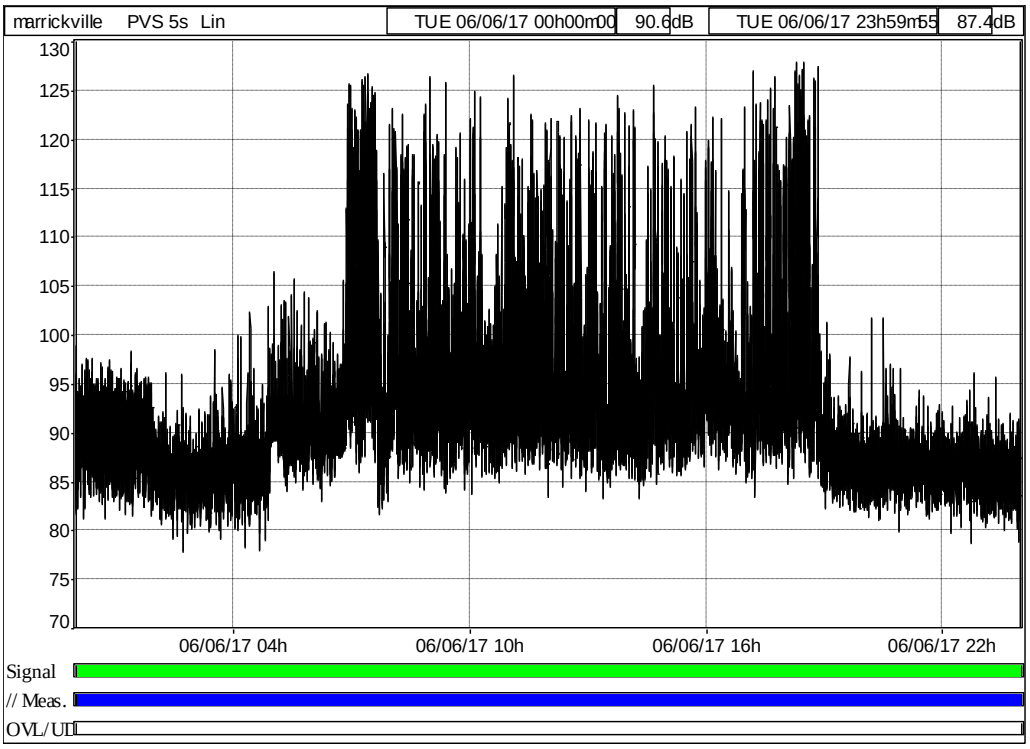


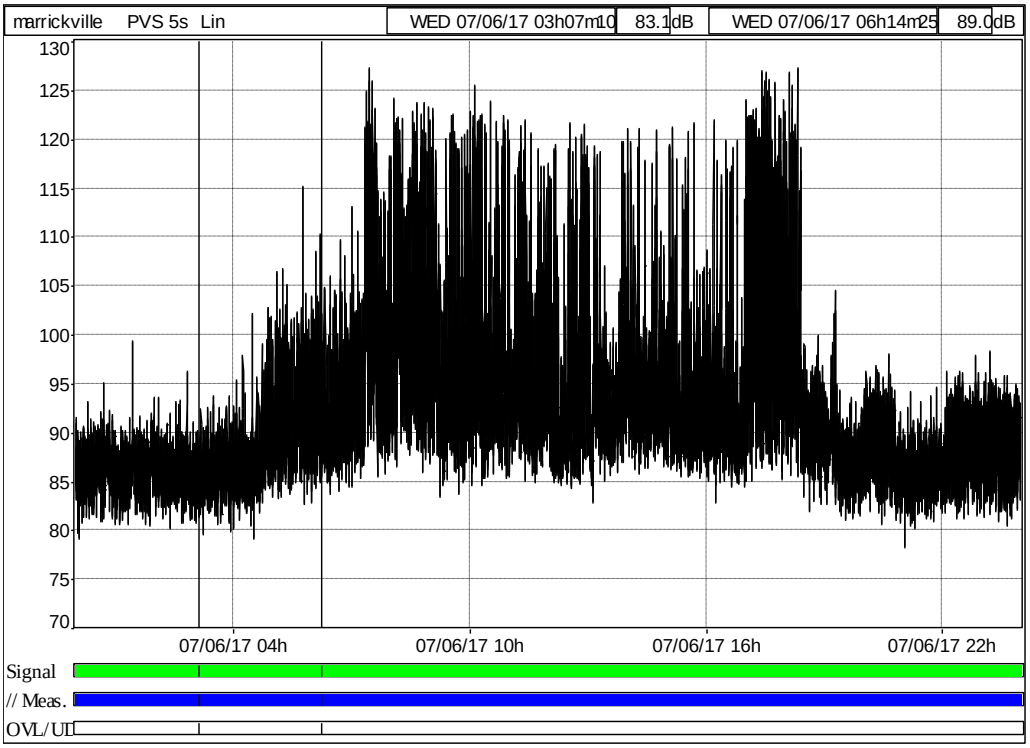




marrickville PVS 5s Lin
SAT 03/06/17 00h00m00 88.9dB
SAT 03/06/17 23h59m55 86.8dB
130
125
120
115
110
105
100
95
90
85
80
75
70
03/06/17 04h
03/06/17 10h
03/06/17 16h
03/06/17 22h
Signal
// Meas.
OVL/UI

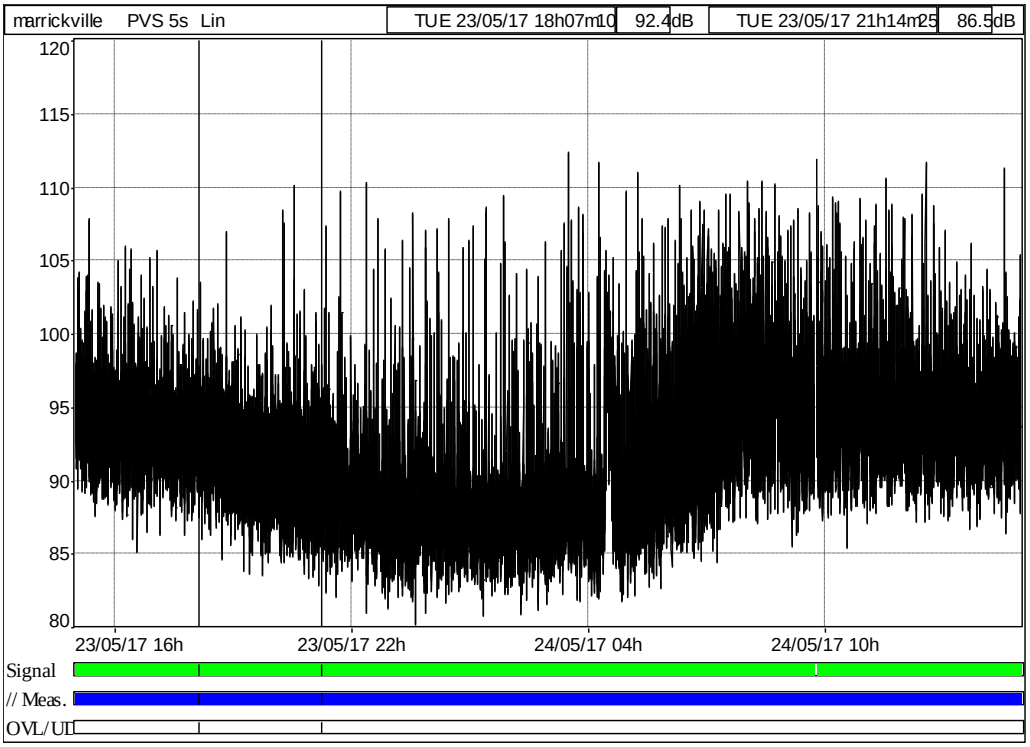

marrickville PVS 5s Lin
SUN 04/06/17 00h00m00 85.5dB
SUN 04/06/17 23h59m55 83.2dB
120
115
110
105
100
95
90
85
80
75
70
04/06/17 04h
04/06/17 10h
04/06/17 16h
04/06/17 22h
Signal
// Meas.
OVL/UI

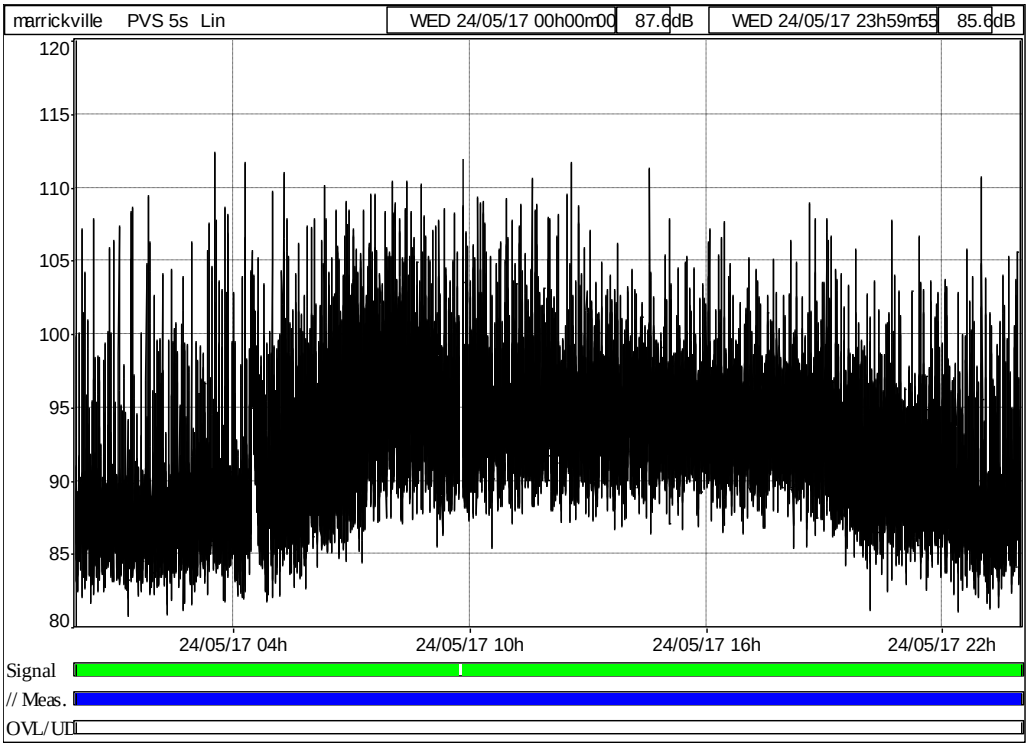

marrickville PVS 5s Lin
MON 05/06/17 00h00m00 88.3dB
MON 05/06/17 23h59m55 90.0dB
130
125
120
115
110
105
100
95
90
85
80
75
70
05/06/17 04h
05/06/17 10h
05/06/17 16h
05/06/17 22h
Signal
// Meas.
OVL/UI

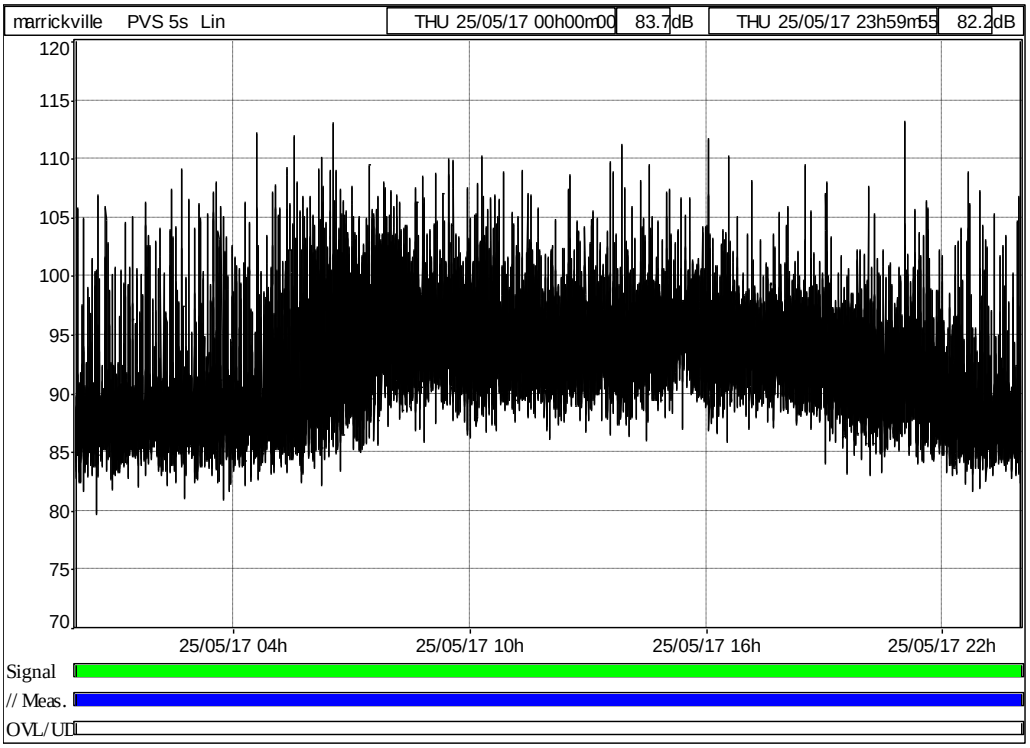

marrickville PVS 5s Lin
TUE 06/06/17 00h00m00 90.6dB
TUE 06/06/17 23h59m55 87.4dB
130
125
120
115
110
105
100
95
90
85
80
75
70
06/06/17 04h
06/06/17 10h
06/06/17 16h
06/06/17 22h
Signal
// Meas.
OVL/UI

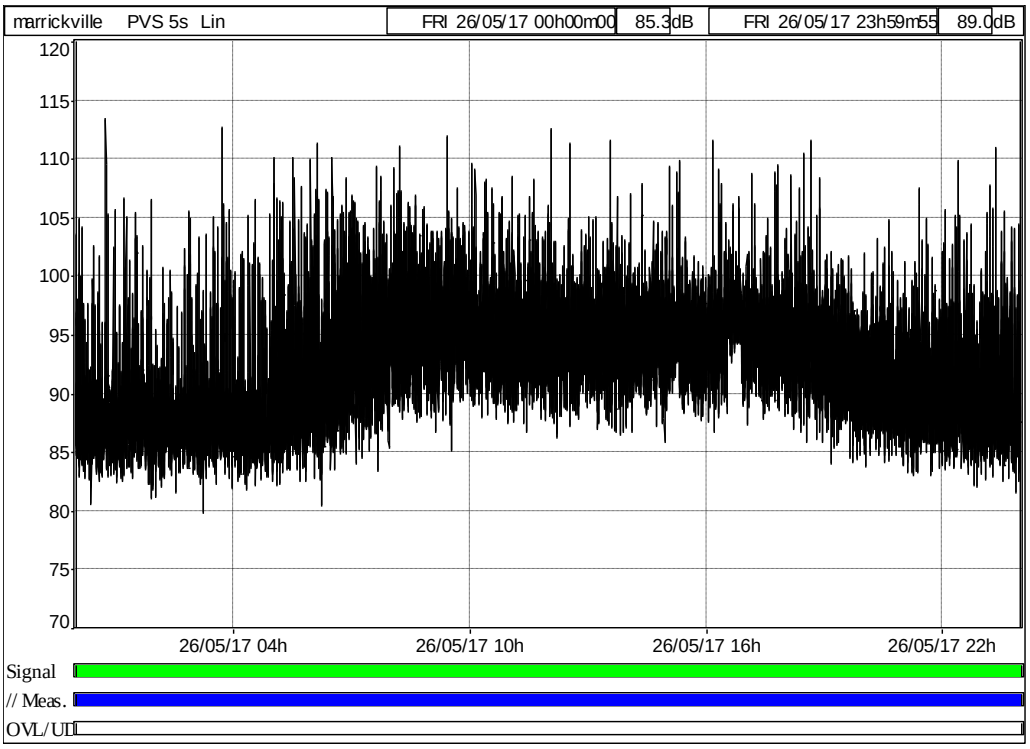

marrickville PVS 5s Lin
WED 07/06/17 03h07m10 83.1dB
WED 07/06/17 06h14m25 89.0dB
130
125
120
115
110
105
100
95
90
85
80
75
70
07/06/17 04h
07/06/17 10h
07/06/17 16h
07/06/17 22h
Signal
// Meas.
OVL/UL

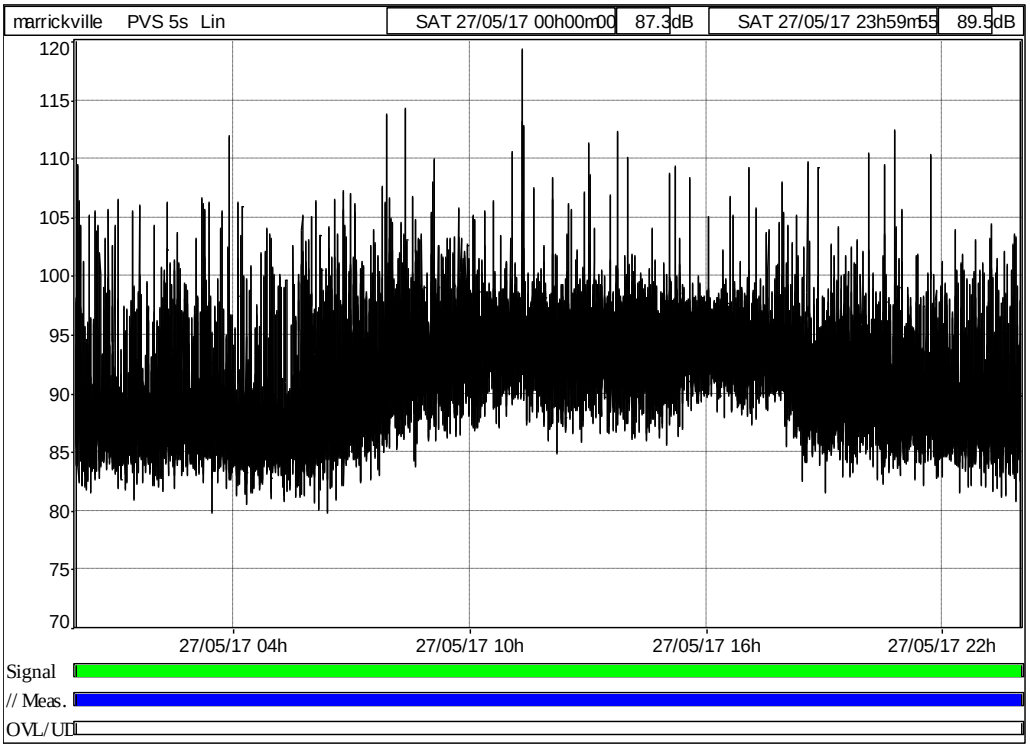
## C2 Vibration Logging Results – Logging position L2

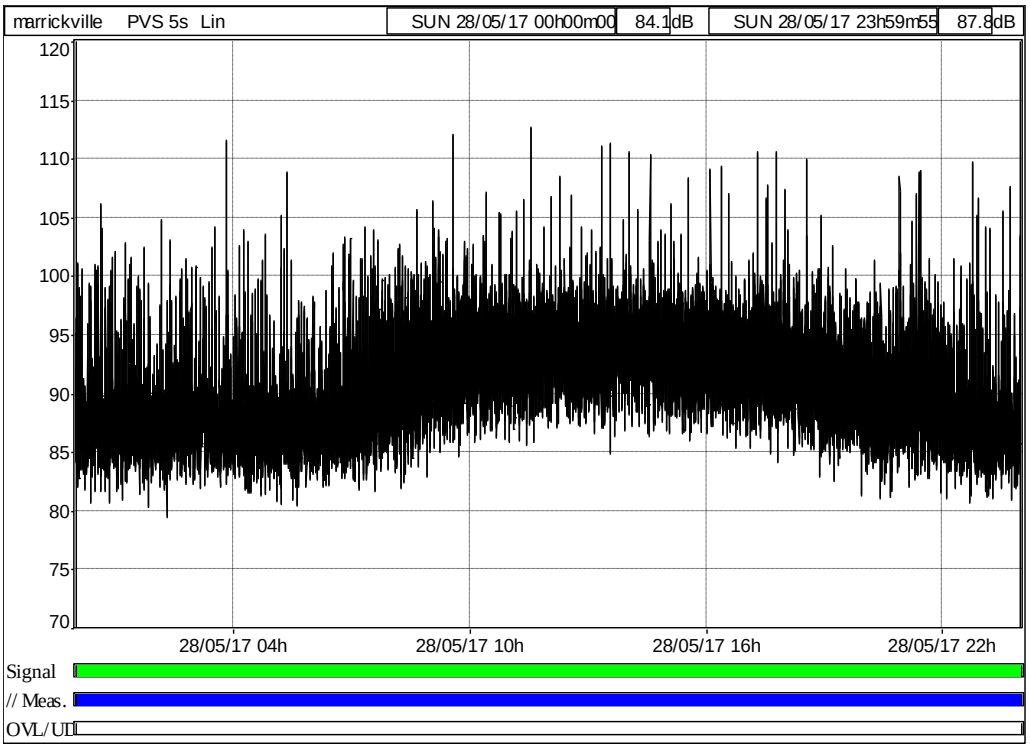


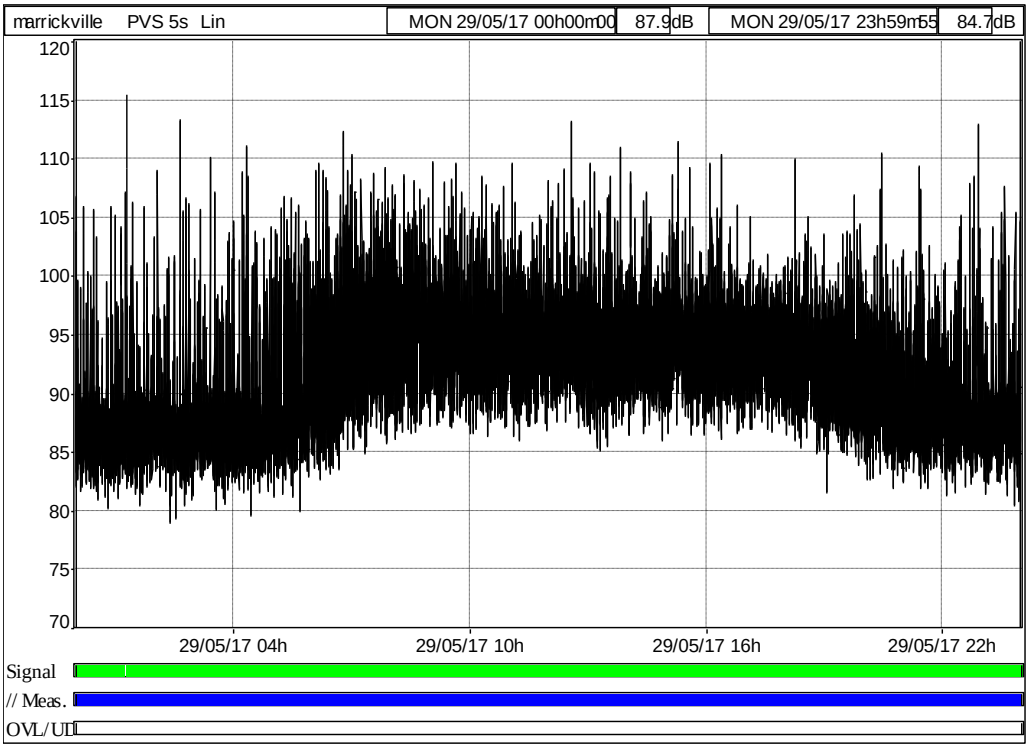



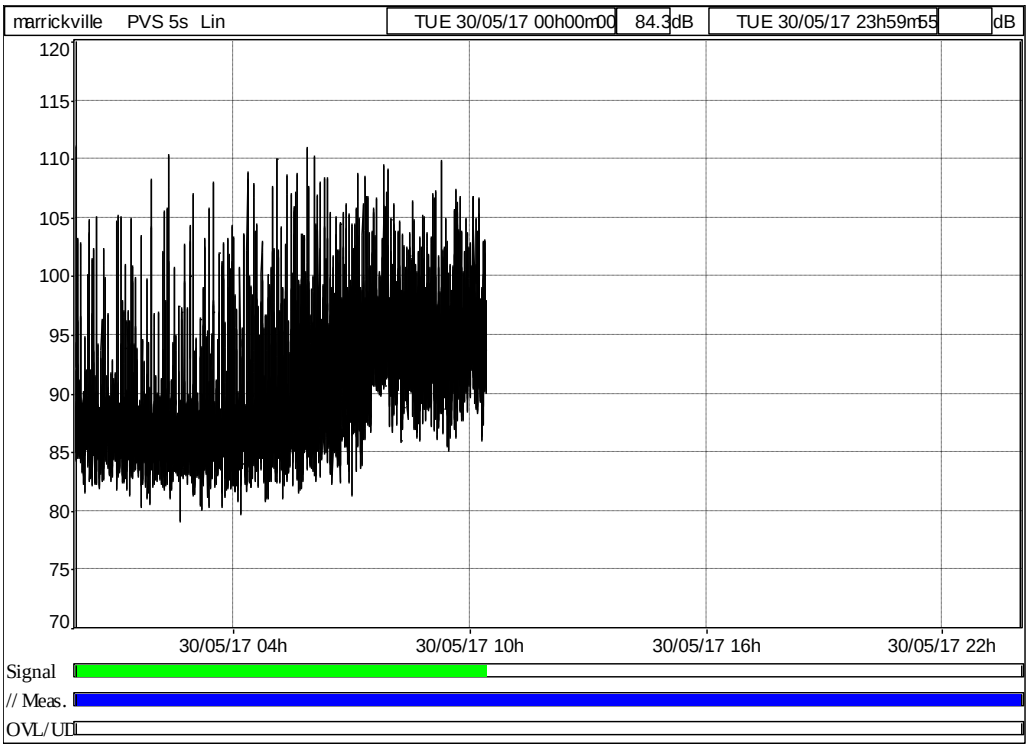

marrickville PVS 5s Lin
THU 25/05/17 00h00m00 83.7dB
THU 25/05/17 23h59m55 82.2dB
120
115
110
105
100
95
90
85
80
75
70
25/05/17 04h
25/05/17 10h
25/05/17 16h
25/05/17 22h
Signal
// Meas.
OVL/UI


marrickville PVS 5s Lin
FRI 26/05/17 00h00m00 85.3dB
FRI 26/05/17 23h59m55 89.0dB
120
115
110
105
100
95
90
85
80
75
70
26/05/17 04h
26/05/17 10h
26/05/17 16h
26/05/17 22h
Signal
// Meas.
OVL/UI


marrickville PVS 5s Lin
SAT 27/05/17 00h00m00 87.3dB
SAT 27/05/17 23h59m55 89.5dB
120
115
110
105
100
95
90
85
80
75
70
27/05/17 04h
27/05/17 10h
27/05/17 16h
27/05/17 22h
Signal
// Meas.
OVL/UI


marrickville PVS 5s Lin
SUN 28/05/17 00h00m00 84.1dB
SUN 28/05/17 23h59m55 87.8dB
120
115
110
105
100
95
90
85
80
75
70
28/05/17 04h
28/05/17 10h
28/05/17 16h
28/05/17 22h
Signal
// Meas.
OVL/UI


marrickville PVS 5s Lin
MON 29/05/17 00h00m00 87.9dB
MON 29/05/17 23h59m55 84.7dB
120
115
110
105
100
95
90
85
80
75
70
29/05/17 04h
29/05/17 10h
29/05/17 16h
29/05/17 22h
Signal
// Meas.
OVL/UI


marrickville PVS 5s Lin
TUE 30/05/17 00h00m00 84.3dB
TUE 30/05/17 23h59m55 dB
120
115
110
105
100
95
90
85
80
75
70
30/05/17 04h
30/05/17 10h
30/05/17 16h
30/05/17 22h
Signal
// Meas.
OVL/UI

# APPENDIX E ENVIRONMENTAL NOISE CRITERIA

## E1 NSW Industrial Noise Policy

In NSW, the EPA Industrial Noise Policy (INP) is the guideline for assessing noise emissions from industrial and commercial facilities including vehicle movements on site.

The INP sets out a procedure where a development can be assessed against a series of noise level criteria. In the INP, these criteria are called the *project specific noise levels* and are derived from an analysis of the ambient noise environment and zoning information with the background level described as the Rating Background Level (RBL).

In order to determine the existing noise levels in the residential area surround the site noise logging was carried out within the development site.

Unattended noise loggers were deployed in two locations L1 and L2, the location of the loggers can be seen in Figure 5. Baseline ambient noise levels were measured between 23 May 2017 and 05 June 2017. Ambient noise levels measured at locations L1 and L2 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 16-707-018 located within the subject site.

Logger 2 (L2) 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 results from the noise logger are shown in Table 16 below. The survey results for the full period are shown in Appendix B.

**Table 16: Noise Logging Results = dBA**

| Period | $L_{Aeq}$ | RBL ($L_{A90}$) |
|---|---|---|
| Logger 1 | | |
| Day | 65 | 52 |
| Evening | 61 | 47 |
| Night | 54 | 43 |
| Logger 2 | | |
| Day | 66 | 55 |
| Evening | 64 | 49 |
| Night | 57 | 44 |

Note 1: Periods correspond to;

Day: 7:00am to 6:00pm Monday to Saturday; or 08:00am to 6:00pm on Sundays and public holidays

Evening: 6:00pm to 10:00pm

Night: remaining periods

*Intrusiveness criteria*

The intrusiveness noise assessment is based on knowledge of the background noise level at the receiver location. The intrusiveness criterion is the background noise level at the nearest noise sensitive location plus 5dB. Therefore the noise emissions from the premises are considered to be intrusive if the A-weighted source noise level ($L_{Aeq, 15mins}$) is greater than the background noise level ($L_{A90}$) plus 5 dB.

The intrusiveness of a stationary noise source may be considered acceptable if the average of the maximum A-weighted levels of noise, $LA_{eq\ 15min}$ from the source do not exceed by more than 5dB the Rating Background Level (RBL) measured in the absence of the source. This applies during all times of the day and night. There is also an adjustment factor $K_i$ to be applied according to the character of the noise. This includes factors such as tonal, fluctuating, low frequency impulsive, intermittent etc qualities of noise. No adjustment factor has been added to the calculated noise levels for this site.

Based upon noise logging conducted, noise limits for intrusiveness have been derived in accordance with the INP and are presented in Table 17.

**Table 17: INP Intrusiveness Criteria**

| Period | Rating Background Level, $L_{90}$ dBA | Intrusiveness Criteria (RBL + 5 dB) $L_{eq\ 15\ min}$ dBA |
|---|---|---|
| *Logger 1* | | |
| Day | 52 | 57 |
| Evening | 47 | 52 |
| Night | 43 | 48 |
| *Logger 2* | | |
| Day | 55 | 60 |
| Evening | 49 | 54 |
| Night | 44 | 49 |

*Amenity Criteria*

The Amenity Criteria are designed to prevent industrial noise continually increasing above an acceptable level. The initial stage in determining the Amenity Criteria is to correct the acceptable noise level set for the appropriate amenity area with the baseline noise monitoring. Based on defining characteristics outlined in the INP, nearby receivers to the site have been defined as Urban.

In order to 'protect noise amenity' within the area from industrial noise sources, Table 2.2 in the INP has been used to calculate the Amenity criteria for Stage 1B.

Industrial noise levels observed and measured while on site have been used to derive as per Table 2.2 in the INP as follows:

- During the Day period we observed and measured existing (i.e. not from traffic or existing shopping centre) industrial noise sources to be in the order of 60 LAeq Day, therefore based on the table 2.2 modification to the acceptable Day period level for Urban areas the Amenity criteria becomes 52dB
- During the Evening period we observed and measured industrial noise sources to be in the order of 48dbA, therefore based on the acceptable Evening period level for Urban areas the Amenity criteria becomes 46dB

- During the Night period we observed and measured industrial noise sources to be in the order of 48dbA, therefore based on the acceptable Night period level for Urban areas the Amenity criteria becomes 38dB

**Table 18: Recommended Amenity LAeq noise levels – Stage 1B**

| Receiver | Period | Recommended Noise Level $L_{eq}$ dBA | | |
|---|---|---|---|---|
| | | Acceptable | Recommended Maximum | Project Specific Amenity (As per INP Table 2.2 modifications) |
| A-C (Residential) | Day | 60 | 55 | 52 |
| | Evening | 50 | 55 | 46 |
| | Night | 45 | 50 | 38 |
| - (Commercial) | When in use | 65 | 70 | 65 |
| D-G (Industrial) | When in use | 70 | 75 | 70 |

Source: Table 2.1 NSW DECCW Industrial Noise Policy

## E2 Sleep Disturbances Criteria

*Noise Guide for Local Government*

In its NGLG, the NSW EPA provides the following criteria as an example of a "screening test" to determine the potential for sleep arousal:

- The $L_1$ level of any specific noise source should not exceed the background noise level ($L_{90}$) by more than 15dBA when measured outside a bedroom window.

$L_1$ is defined as the noise level that is exceeded for 1% of the measurement time and is similar to, but numerically lower than $L_{max}$. The EPA has stated that it will accept analysis based on either $L_1$ or $L_{max}$ descriptors.

In this instance, the screening test for sleep disturbance becomes 58dB $L_{Amax}$ at the façade of the nearest affected residential receivers A-D.

*INP*

In the INP application notes dated 4 May 2006, the EPA have 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.*"

The EPA recommends that detailed analysis is carried out to address the extent to which sleep disturbance may occur. The use of the RNP (formerly the ECRTN) by the EPA 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 50-55dBA are unlikely to awake people from sleep
- One or two noise events per night, with maximum internal noise levels of 65-70dBA, are not likely to affect health and well-being 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.

## APPENDIX F TRAFFIC VOLUMES

This section of the report provides vehicle volumes to the car park and loading dock as provided to us by *The Transport Planning Partnership Pty Ltd (TPP). We have also been provided with a breakdown of the percentage of vehicles entering/exiting the car park per 15minutes.*

### F1 Car Park Vehicle Volumes

The calculations in this report are based on the Edinburgh Road Access (vehicles per hour).

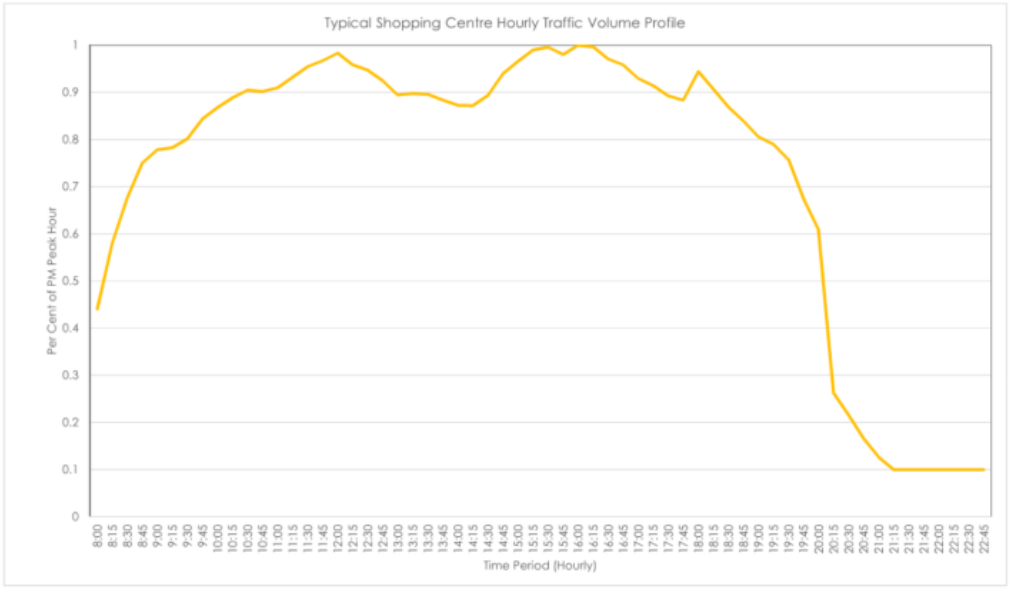
**Marrickville Metro Future Development Traffic (Stages 1B and 2)**

**Peak Hour Customer Traffic**

| | Edinburgh Rd Access (vehicles per hour) | | Murray St Access (vehicles per hour) | | Smidmore St Access (vehicles per hour) | | TOTAL |
|---|---|---|---|---|---|---|---|
| Peak | IN | OUT | IN | OUT | IN | OUT | |
| Thursday AM Peak Hour | 60 | 71 | 42 | 49 | 99 | 115 | 437 |
| Thursday PM Peak Hour | 141 | 136 | 148 | 143 | 181 | 175 | 924 |

**Figure 6: Typical Shopping Centre Hourly Traffic Volume Profile - %**

| Time Period | Average |
|---|---|
| 8:00 | 0.44 |
| 8:15 | 0.58 |
| 8:30 | 0.68 |
| 8:45 | 0.75 |
| 9:00 | 0.78 |
| 9:15 | 0.78 |
| 9:30 | 0.80 |
| 9:45 | 0.84 |
| 10:00 | 0.87 |
| 10:15 | 0.89 |
| 10:30 | 0.91 |
| 10:45 | 0.90 |
| 11:00 | 0.91 |
| 11:15 | 0.93 |
| 11:30 | 0.96 |
| 11:45 | 0.97 |
| 12:00 | 0.98 |
| 12:15 | 0.96 |
| 12:30 | 0.95 |
| 12:45 | 0.92 |
| 13:00 | 0.89 |
| 13:15 | 0.90 |
| 13:30 | 0.90 |
| 13:45 | 0.88 |
| 14:00 | 0.87 |
| 14:15 | 0.87 |
| 14:30 | 0.89 |
| 14:45 | 0.94 |
| 15:00 | 0.97 |
| 15:15 | 0.99 |
| 15:30 | 1.00 |
| 15:45 | 0.98 |
| 16:00 | 1.00 |
| 16:15 | 1.00 |
| 16:30 | 0.97 |
| 16:45 | 0.96 |
| 17:00 | 0.93 |
| 17:15 | 0.91 |
| 17:30 | 0.89 |
| 17:45 | 0.88 |
| 18:00 | 0.94 |
| 18:15 | 0.91 |
| 18:30 | 0.87 |
| 18:45 | 0.84 |
| 19:00 | 0.81 |
| 19:15 | 0.79 |
| 19:30 | 0.76 |
| 19:45 | 0.67 |
| 20:00 | 0.61 |
| 20:15 | 0.26 |
| 20:30 | 0.22 |
| 20:45 | 0.17 |
| 21:00 | 0.13 |
| 21:15 | 0.10 |
| 21:30 | 0.10 |
| 21:45 | 0.10 |
| 22:00 | 0.10 |
| 22:15 | 0.10 |
| 22:30 | 0.10 |
| 22:45 | 0.10 |



For the purpose of our assessment, final traffic volumes have been derived based on the measured peak hour traffic flows and 15minute 'typical shopping centre traffic volume profile' percentages % provided above in Figure 6. The final derived traffic numbers used throughout our calculation and assessment are summarised in **Table 19** below.

**Table 19: Assumptions made for traffic volumes per period – Stage 1B**

| Period | Time | Hrs | Total Trips Per Period | Total Trips Per Busiest 15 min Period |
|---|---|---|---|---|
| Carpark Entrance Edinburgh Road | | | | |
| Day | 0700-1800hrs | 11 | 1226 | 34 |
| Evening | 1800-2200 hours | 4 | 287 | 33 |
| Night | 2200-0700 hours | 9 | 14 | 3 |

Note: 1 Trip = 1 Vehicle entering/exiting the carpark.

## F2 Loading Dock Vehicle Volumes

Delivery vehicle volumes for the Coles loading dock to Murray Street south have also been provided by TPP, these are summarised in Table 20 below. TPP have advised us that deliveries to the Coles loading dock are limited to 0700-1900hrs and will therefore fall into the Day assessment period.

**Table 20: Coles Loading Dock - Delivery Vehicle Movements - Per Period & Busiest 15mins**

| Period | Time of Period | Semi-trailer Trucks Per Period | Rigid Trucks Per Period | Small Trucks Per Period | Vans Per Period | Semi-trailer Trucks Busiest 15mins | Rigid Truck Busiest 15mins | Small Trucks Busiest 15mins | Vans Busiest 15mins |
|---|---|---|---|---|---|---|---|---|---|
| *Coles Loading Dock Stage 1B* | | | | | | | | | |
| Day | 0700-1800hrs | 10 | 24 | 5 | 25 | 1 | 1 | 1 | 1 |
| Evening | 1800-2200hrs | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Night | 2200-0700hrs | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Note: For the purpose of our assessment it is assumed that each delivery will take a minimum of 15 minutes to complete.