



Lloyd George Acoustics

PO Box 717

Hillarys WA 6923

T: 9300 4188 F: 9300 4199

E: daniel@lgacoustics.com.au W: www.lgacoustics.com.au

Transportation Noise Assessment

Perth-Darwin National Highway Project

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Lloyd George Acoustics Pty Ltd ABN: 79 125 812 544 PO Box 717 Hillarys WA 6923 T: 9300 4188 / 9401 7770 F: 9300 4199				
Contacts	Daniel Lloyd	Terry George	Mike Cake	Matt Moyle
E:	daniel@lgacoustics.com.au	terry@lgacoustics.com.au	mike@lgacoustics.com.au	matt@lgacoustics.com.au
M:	0439 032 844	0400 414 197	0438 201 071	0412 611 330

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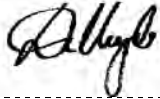

Prepared By:	Daniel Lloyd	
Position:	Project Director	
Verified	Terry George	
Date:	29 June 2015	

Table of Contents

1	INTRODUCTION	1
2	CRITERIA	3
3	METHODOLOGY	4
3.1	Site Measurements	4
3.2	Noise Modelling	8
3.2.1	Ground Topography, Road Design, Barriers & Cadastral Data	8
3.2.2	Traffic Data	8
3.2.3	Ground Attenuation	9
3.2.4	Parameter Conversion	9
4	RESULTS	9
4.1	Noise Monitoring	9
4.2	Noise Modelling	11
5	DISCUSSION	19
6	CONCLUSION	19

List of Tables

Table 2-1	Outdoor Noise Criteria	3
Table 3-1	Noise Relationship Between Different Road Surfaces	8
Table 4-1	Measured Average Noise Levels – Monitoring Locations	9
Table 4-2	Comparison Between Measured and Predicted Noise Levels at Monitoring Locations	10
Table 4-3	Predicted Noise Levels to Noise Sensitive Receivers North of Ellenbrook	11

List of Figures

Figure 1-1 Road Project Locality _____	2
Figure 3-1 Monitoring Locations A to L _____	5
Figure 3-2 Monitoring Locations M to O _____	6
Figure 3-3 Monitoring Locations P to S _____	7
Figure 4-1 Predicted Noise Levels Reid Highway Beechboro Rd to Altone Rd _____	13
Figure 4-2 Predicted Noise Levels Reid Highway to Hepburn Avenue _____	14
Figure 4-3 Predicted Noise Levels North of The Promenade _____	15
Figure 4-4 Predicted Noise Levels North of Ellenbrook _____	16
Figure 4-5 Noise Sensitive Receivers North of Ellenbrook _____	17
Figure 4-6 Noise Sensitive Receivers South of Brand Highway _____	18

Appendices

A	Road Surfaces, Posted Speeds and Future Traffic Volumes
B	Detailed Measurement Results
C	Noise Wall Details
D	Predicted Noise Levels With and Without Noise Walls
E	Package B Architectural Treatment Package
F	Terminology

1 INTRODUCTION

Main Roads Western Australia (Main Roads) is currently planning for delivery of the NorthLink WA project, as shown in *Figure 1-1*, which comprises the following two components:

- Perth Darwin National Highway (PDNH) – construction of a new 37km highway link between the junction of Reid Highway/Tonkin Highway and Great Northern Highway/Brand Highway at Muchea; and
- Tonkin Grade Separations – the grade separation of Tonkin Highway with Collier Road, Morley Drive and Benara Road together with associated works including potential widening of the Tonkin Highway.

The Perth Darwin National Highway will form part of the Australian National Land Freight Network, which aims to provide an interconnected network of freight corridors to the nation's major seaports, airports and freight generating areas, maximising Australia's international competitiveness. The PDNH will connect Perth to the Pilbara and North West WA. Within the Perth metropolitan region, Tonkin Highway and PDNH will form part of the strategic freight network, linking strategic industrial centres to the Kewdale/Welshpool intermodal terminal. The route will also support further development along the northeast metropolitan corridor, and allow planning provision for a heavy passenger rail line within the Highway median (between Morley Drive and Whiteman to Yanchep Highway).

The NorthLink WA project seeks to deliver a transport corridor that can accommodate the predicted growth in the regional freight task to the State's North West, as well as accommodating the urban traffic demand up to 2050.

This report considers the potential noise impacts associated with the Perth Darwin National Highway section by:

- Measuring existing noise levels along the project route;
- Constructing a noise model of the existing road network and calibrating the predicted noise levels against the measured noise levels;
- Using the calibration from the existing model, calculate the noise levels for the year 2050.
- Determine appropriate noise mitigation options to achieve compliant noise levels at surrounding noise sensitive premises.

Appendix F contains a description of some of the terminology used throughout this report.

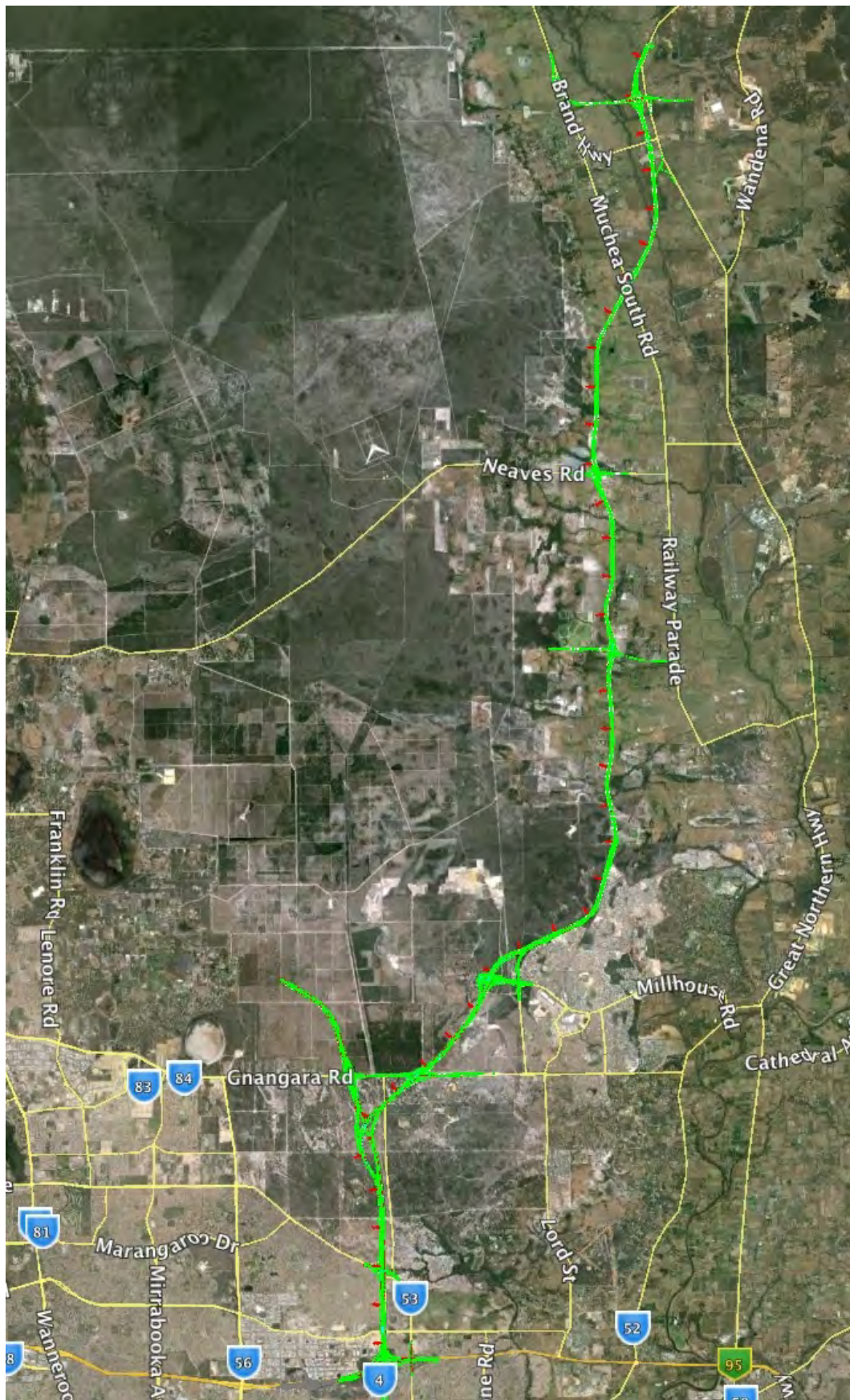


Figure 1-1 Road Project Locality

2 CRITERIA

The criteria relevant to this assessment is the *State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning* (hereafter referred to as the Policy) produced by the Western Australian Planning Commission (WAPC). The objectives in the Policy are to:

- Protect people from unreasonable levels of transport noise by establishing a standardised set of criteria to be used in the assessment of proposals;
- Protect major transport corridors and freight operations from incompatible urban encroachment;
- Encourage best practice design and construction standards for new development proposals and new or redevelopment transport infrastructure proposals;
- Facilitate the development and operation of an efficient freight network; and
- Facilitate the strategic co-location of freight handling facilities.

When considering the noise levels, the Policy's outdoor noise criteria are shown below in *Table 2-1*. These criteria apply at any point 1-metre from a ground floor habitable façade of a noise sensitive premises.

Table 2-1 Outdoor Noise Criteria

Period	Target	Limit
Day (6am to 10pm)	55 dB $L_{Aeq}(\text{Day})$	60 dB $L_{Aeq}(\text{Day})$
Night (10pm to 6am)	50 dB $L_{Aeq}(\text{Night})$	55 dB $L_{Aeq}(\text{Night})$

Note: The 5 dB difference between the target and limit is referred to as the margin.

In the application of these outdoor noise criteria to new major transport projects, the objectives of this Policy is that it be designed and constructed so that noise emissions are at a level that -

- provides an acceptable level of acoustic amenity for existing noise-sensitive land uses and for the planning of new noise-sensitive developments;
- is consistent with other planning policies and community expectations; and
- is practicably achievable.

Where a transport infrastructure project will emit transport noise levels that meet the noise target, no further measures are required under this policy.

Transport infrastructure providers are required to consider design measures to meet the noise *target* of $L_{Aeq}(\text{Day})$ 55dB and $L_{Aeq}(\text{Night})$ 50dB, and to implement these measures where reasonable and practicable. This is particularly relevant for areas where new roads are proposed or in quiet areas such as Ellenbrook. Otherwise transport infrastructure providers should design mitigation measures to achieve the noise *limit* of $L_{Aeq}(\text{Day})$ 60dB and $L_{Aeq}(\text{Night})$ 55dB, when assessed at 1m from the façade at ground floor level.

It should be noted that this assessment has been undertaken using 2050 traffic volumes, which exceeds the requirements of the Policy.

3 METHODOLOGY

Noise measurements and modelling have been undertaken to determine the existing and future noise levels associated with the Project. This section details the methodology and assumptions used to undertake this assessment.

3.1 Site Measurements

Noise monitoring was undertaken at 19 locations in order to quantify the existing noise levels. As there are no roads along the project alignment north of Reid Highway, the calibration of the noise model has been calculated using measurements taken south of the project area between Collier Road and Reid Highway. These measurements, which were undertaken as part of the Tonkin Highway Grade Separation project (TGS), are considered relevant to this project, as the PDNH is an extension to the TGS.

The instruments used were ARL Type 316 and ARL Type Ngara noise data loggers. The loggers were positioned at one metre from the façade of interest. Each logger was placed at least one metre from any corner of the building and the microphone height was 1.4 metres above ground floor level.

The loggers were programmed to record hourly L_{A1} , L_{A10} , L_{A90} , and L_{Aeq} levels. From the hourly measurements, the $L_{A10,18 \text{ hour}}$, $L_{Aeq,24 \text{ hour}}$, $L_{Aeq(\text{Day})}$ and $L_{Aeq(\text{Night})}$ values were determined for each complete measurement day. These results were averaged and the mean level reported.

The instruments comply with the instrumentation requirements of *Australian Standard 2702-1984 Acoustics – Methods for the Measurement of Road Traffic Noise*. The loggers were field calibrated before and after the measurement session and found to be accurate to within +/- 1 dB. Lloyd George Acoustics also holds current laboratory calibration certificates for the loggers.

The noise data collected was verified by inspection and professional judgement. Where hourly data was considered atypical, an estimated value was inserted and highlighted by bold italic lettering.

The weather conditions during the measurement period were obtained from the Bureau of Meteorology's, Perth Metro (Mount Lawley) and Pearce RAAF stations. This data was compared against the Main Roads Western Australia (MRWA) specifications for measurement conditions and any unacceptable conditions commented on.

The locations of the monitoring are provided in *Figures 3-1 to 3-3*, and were chosen to reflect the changing conditions along the project route. The full noise monitoring report is attached at *Appendix B*.



Figure 3-1 Monitoring Locations A to L

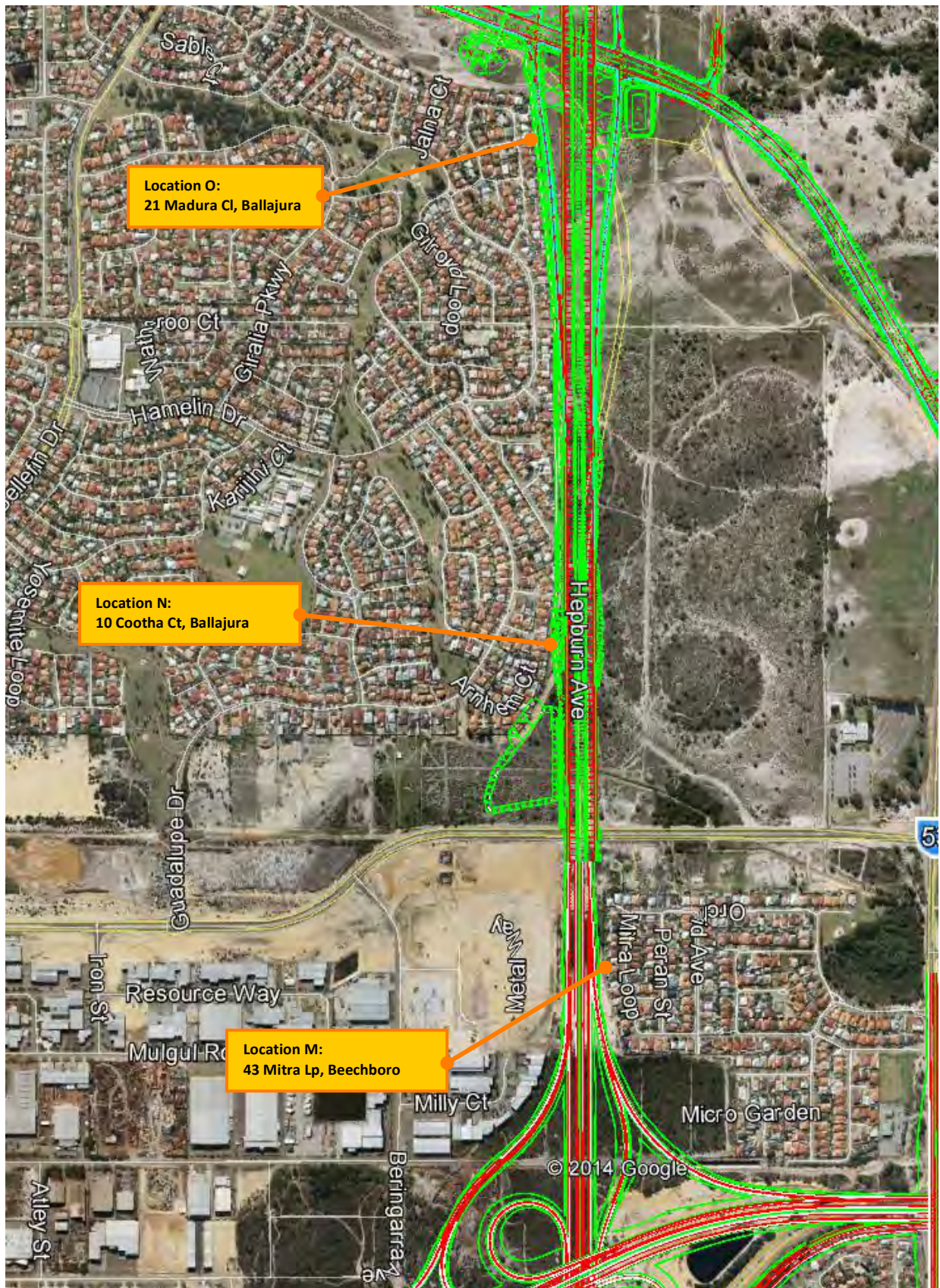


Figure 3-2 Monitoring Locations M to O

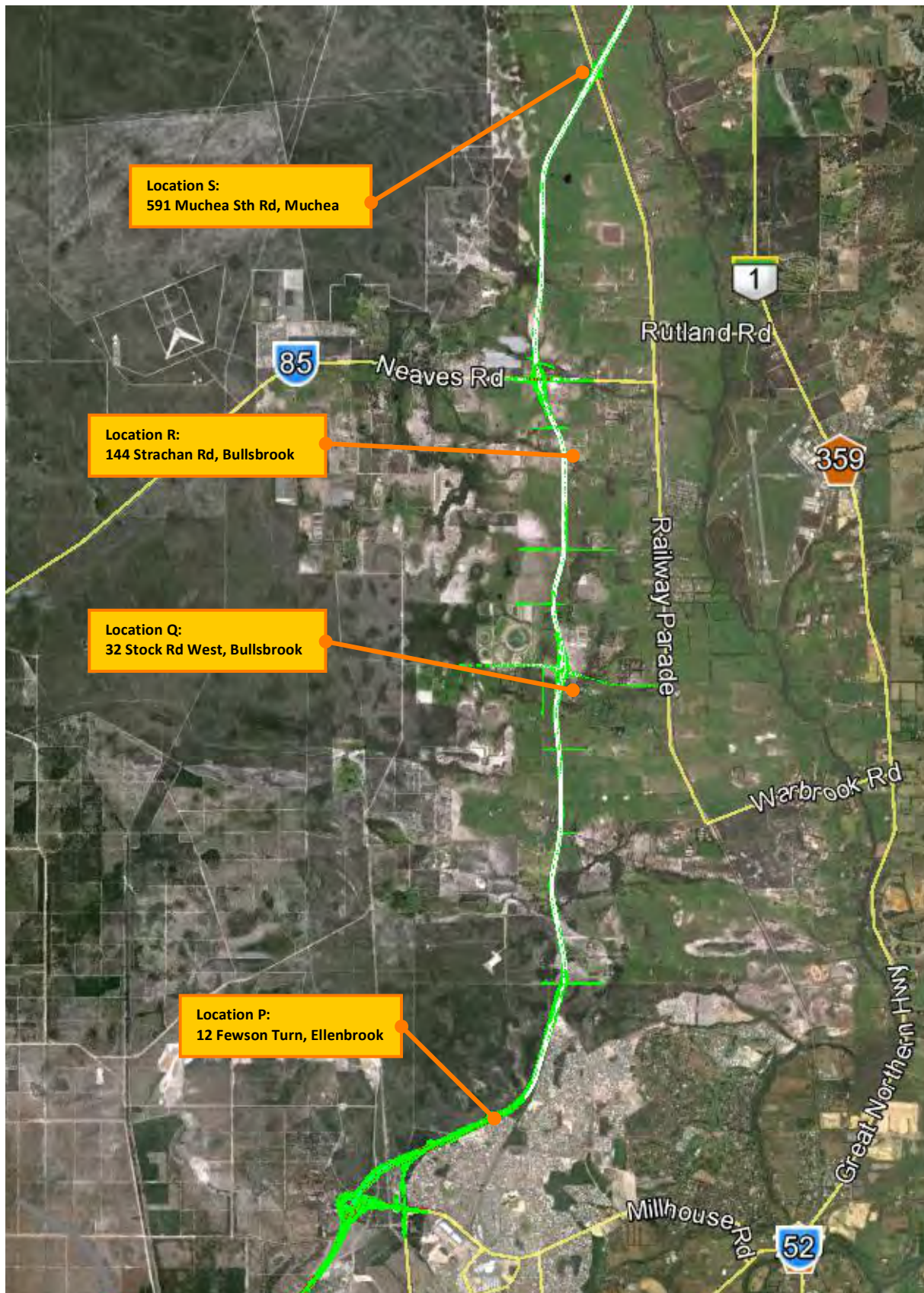


Figure 3-3 Monitoring Locations P to S

3.2 Noise Modelling

The computer programme *SoundPLAN 7.3* was utilised incorporating the *Calculation of Road Traffic Noise* (CoRTN) algorithms, modified to reflect Australian conditions. The modifications included the following:

- Vehicles were separated into heavy (Austroads Class 3 upwards) and non-heavy (Austroads Classes 1 & 2) with non-heavy vehicles having a source height of 0.5 metres above road level and heavy vehicles having two sources, at heights of 1.5 metres and 3.6 metres above road level, to represent the engine and exhaust respectively. By splitting the noise source into three, allows for less barrier attenuation for high level sources where barriers are to be considered. Note that corrections are applied to the exhaust of –8.0 dB (based on *Transportation Noise Reference Book, Paul Nelson, 1987*) and to the engine source of –0.8 dB, so as to provide consistent results with the CoRTN algorithms;
- An adjustment of has been applied to the predicted levels based on the measured traffic noise levels.

Predictions are made at heights of 1.4 metres above ground floor level and at 1.0 metre from an assumed building façade (resulting in a + 2.5 dB correction due to reflected noise).

3.2.1 Ground Topography, Road Design, Barriers & Cadastral Data

Topographical data, was based on that provided by BG&E, with the contours being in 1.0 metre intervals. The new road design has been integrated into the existing topography. Existing property fences located along the project route have been included in the model.

Buildings have also been included as these can provide barrier attenuation when located between a source and receiver, in much the same way as a hill or wall provides noise shielding. All buildings are assumed to have a height of 4 metres.

3.2.2 Traffic Data

Traffic data used in the noise prediction modelling is presented below:

Road Surfaces, Traffic Volumes and Posted Speeds

The road surfaces, traffic volumes, percentage of heavy vehicles and posted speeds for each section of the project are provided at *Appendix A*. The noise relationship between the various road surfaces is provided in *Table 3-1*. As a guide, 14mm chip seal would be the noisiest surface and Open Graded Asphalt the quietest.

Table 3-1 Noise Relationship Between Different Road Surfaces

Road Surfaces						
Chip Seal			Asphalt			
14mm	10mm	5mm	Dense Graded	Novachip	Stone Mastic	Open Graded
+3.5 dB	+2.5 dB	+1.5 dB	0.0 dB	-0.2 dB	-1.0 dB	-2.5 dB

3.2.3 Ground Attenuation

The ground attenuation has been assumed to be 0.0 (0%) for the roads, 0.7 (70%) between the roads and the receivers. Note 0.0 represents hard reflective surfaces such as water and 1.00 represents absorptive surfaces such as grass. This is considered to be a reasonable approach for assessment.

3.2.4 Parameter Conversion

The CoRTN algorithms used in the *SoundPLAN* modelling package were originally developed to calculate the $L_{A10,18\text{hour}}$ noise level. The WAPC Policy however uses $L_{Aeq(\text{Day})}$ and $L_{Aeq(\text{Night})}$. The relationship between the parameters varies depending on the composition of traffic on the road (volumes in each period and percentage heavy vehicles).

As noise monitoring was undertaken, the relationship between the parameters is based on the results of the monitoring – refer *Section 4.1*.

4 RESULTS

4.1 Noise Monitoring

The results of the noise monitoring are summarised below in *Table 4-1*. Detailed measurement results are provided at *Appendix B*.

Table 4-1 Measured Average Noise Levels – Monitoring Locations

No.	Address	Average Weekday Noise Level, dB		
		$L_{A10,18\text{hour}}$	$L_{Aeq(\text{Day})}$	$L_{Aeq(\text{Night})}$
A	2 Redlands St, Bayswater	55.3	54.2	48.8
B	16 Harvest Rd, Morley	60.8	58.8	54.4
C	28A Bruce Rd, Morley	60.5	58.5	53.3
D	2A Abbey Street, Morley	61.6	59.0	52.5
E	9 Clandon Way, Morley	59.4	57.9	52.9
F	48 Alfreda Ave, Morley	59.3	57.1	53.4
G	100 Alfreda Ave, Morley	59.3	56.9	54.6
H	8 Wells Court, Noranda	51.5	49.9	45.5
I	15 Davis Court, Morley	48.3	50.1	44.3
J	6 Acacia Court, Beechboro	57.1	54.9	50.9
K	11 Willow Place, Beechboro	53.9	52.2	48.0
L	8 Jarrah Court, Beechboro	51.6	50.6	45.5
M	43 Mitra Loop, Beechboro	50.9	50.1	52.8
N	10 Cootha Court, Ballajura	47.8	47.4	43.2
O	21 Madura Close, Ballajura	50.3	49.4	47.0
P	12 Fewson Turn, Ellenbrook	45.6	49.1	44.1

Table 4-1 (cont) Measured Average Noise Levels – Monitoring Locations

No.	Address	Average Weekday Noise Level, dB		
		L _{A10,18hour}	L _{Aeq (Day)}	L _{Aeq (Night)}
Q	32 Stock Road West, Bullsbrook	51.1	54.2	48.2
R	144 Strachan Road, Bullsbrook	45.6	47.7	43.2
S	591 Muchea South Road, Muchea	52.1	50.7	49.3

As described previously, the measurement data is used to determine the difference between the L_{A10,18hour} and L_{Aeq (Day)} or L_{Aeq (Night)} noise descriptors, as well as to determine if the day or night period traffic noise is dominant when compared to the Policy criteria.

From the measurement results the difference between the L_{Aeq (Day)} and L_{Aeq (Night)} levels is between 4 dB and 7 dB. Generally, as traffic volumes increase, the day levels increase greater than the night levels. Therefore, for this project it is assumed that for future traffic volumes, the day traffic noise levels will be more than 5 dB above the night traffic noise levels and it will be the day levels that would be compared against the Policy criteria.

The measurement results are also used to calibrate the noise model by comparing the predicted existing noise levels to the measured levels at the noise logger locations. This comparison is shown in Table 4-2.

Table 4-2 Comparison Between Measured and Predicted Noise Levels at Monitoring Locations

Rec ID	Address	Measured L _{Aeq (Day)}	Predicted L _{Aeq (Day)}	Difference
A	2 Redlands St, Bayswater	54.2	60.9	-6.7
B	16 Harvest Rd, Morley	58.8	68.3	-9.5
C	28A Bruce Rd, Morley	58.5	67.2	-8.7
D	2A Abbey Street, Morley	59	67.5	-8.5
E	9 Clandon Way, Morley	57.9	64.2	-6.3
F	48 Alfreda Ave, Morley	57.1	64.9	-7.8
G	100 Alfreda Ave, Morley	56.9	64.5	-7.6
H	8 Wells Court, Noranda	49.9	60.6	-10.7
I	15 Davis Court, Morley	50.1	61.2	-11.1
J	6 Acacia Court, Beechboro	54.9	60.1	-5.2
K	11 Willow Place, Beechboro	52.2	60.8	-8.6
L	8 Jarrah Court, Beechboro	50.6	56.2	-5.6

As there is a large variation in the differences between the measured and predicted noise levels, which may be the result of the congestion experienced along the existing Tonkin Highway, it was considered prudent to use the 95th percentile of the difference as the calibration value for the model. The result showed that the model was over predicting the noise by 5.4 dB and the modelling results will be adjusted accordingly.

4.2 Noise Modelling

The results of the noise prediction modelling with mitigation, from Reid Highway to Ellenbrook, are shown in *Figures 4-1 to 4-4* (small scale) and *Appendix D* (large scale).

For the Tonkin Highway / Reid Highway Interchange and the section of the PDNH between Reid Highway and Hepburn Avenue, the noise walls have been designed to ensure, where practicable, all noise sensitive premises receive a noise below $L_{Aeq (Day)}$ 60 dB, assuming future (2050) traffic volumes.

In the vicinity of the residential area of Ellenbrook, the noise walls have been designed to ensure, where practicable, all noise sensitive premises receive a noise below $L_{Aeq (Day)}$ 55 dB, assuming 2050 traffic volumes. This is due to the quiet environment within this area. Details of noise wall locations and heights can be found at *Appendix C*.

For the rural residential properties north of Ellenbrook, the proposed 2.4 m high screen walls (details of which are provided in other assessments) will provide some noise mitigation, and further mitigation, where noise levels exceed the *limit* criterion ($L_{Aeq (Day)}$ 60 dB), would be provided in the form of noise mitigation packages. While the appropriate noise mitigation package would be developed for each residence, based on the existing building construction and through negotiations with the property owners, for the purposes of this assessment reference to the “deemed to comply” façade packages provided in the Policy Guidelines is made (refer *Appendix E*). It should be noted that the use of façade protection in lieu of noise walls, is a common strategy for rural areas where large sections of wall would be required to protect a small number of properties.

The maximum height of a noise wall, in terms of practicability, has been set to 5.0 m. Where it is not practicable to construct a wall due to, for example, the loss of driveway access, or if the maximum height of noise wall is not sufficient, then facade protection packages would potentially supplement noise walls at these locations.

The predicted noise levels to receivers north of Ellenbrook is provided in *Table 4-3*, with property locations shown in *Figures 4-5 and 4-6*. In addition, *Table 4-3* indicates the level of facade protection that is likely to be required, referencing the noise control packages contained within the Policy Guidelines and assuming that those packages are appropriate for the particular property.

Table 4-3 Predicted Noise Levels to Noise Sensitive Receivers North of Ellenbrook

Rec No	Predicted Future Noise Level $L_{Aeq (Day)}$ dB	Comment	Facade Package Requirement
1	58	Exceeds Target	-
2	56	Exceeds Target	-
3	53	Exceeds Target	-
4	59	Exceeds Target	-
5	64	Exceeds Limit	Package B
6	64	Exceeds Limit	Package B

Table 4-3 (cont) Predicted Noise Levels to Noise Sensitive Receivers

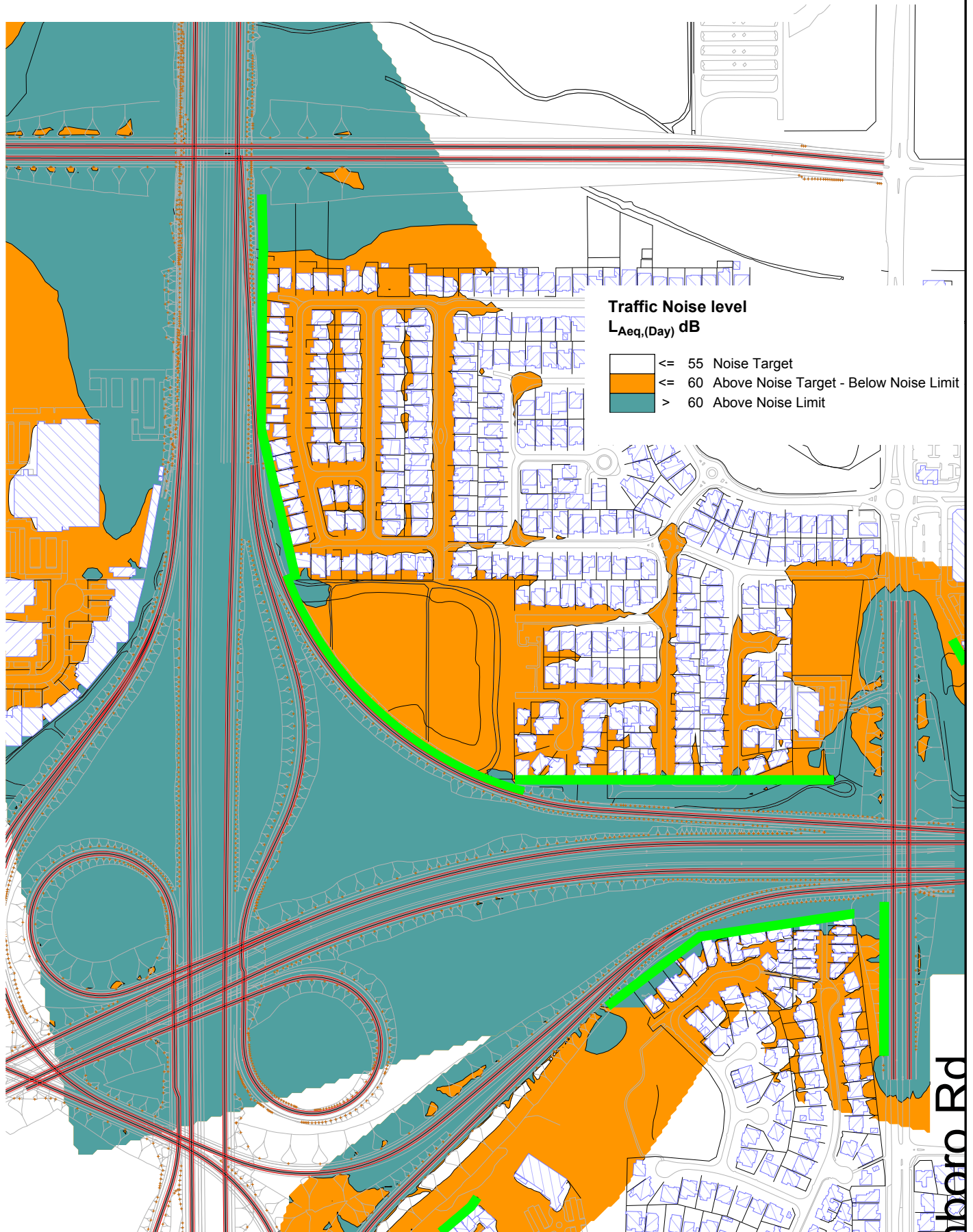
Rec No	Predicted Future Noise Level L _{Aeq} (Day) dB	Compliance with Policy?	Facade Package Requirement
7	57	Exceeds Target	-
8	57	Exceeds Target	-
9	64	Exceeds Limit	Package B
10	59	Exceeds Target	-
11	60	Exceeds Target	-
12	58	Exceeds Target	-
13	50	Exceeds Target	-
14	65	Exceeds Limit	Package B
15	55	No More Than Target	-
16	57	Exceeds Target	-
17	59	Exceeds Target	-
18	64	Exceeds Limit	Package B
19	62	Exceeds Limit	Package B
20	63	Exceeds Limit	Package B
21	58	Exceeds Target	-
22	60	Exceeds Target	-
23	50	No More Than Target	-
24	55	No More Than Target	-
25	59	Exceeds Target	-
26	55	No More Than Target	-
27	59	Exceeds Target	-
28	63	Exceeds Limit	Package B
29	59	Exceeds Target	-
30	30	No More Than Target	-
31	46	No More Than Target	-

In addition to the predicted noise levels assuming the proposed noise mitigation, the predicted noise levels assuming no mitigation is provided at *Appendix D*.

Perth Darwin National Highway Project - Reid Hwy to Marshall Rd

L_{Aeq,Day} Noise Level Contours - With Recommended Noise Walls

Figure 4-1



Scale

0 30 60 120 180 m



Signs and symbols

— Road Source

▨ Building

— Noise Wall



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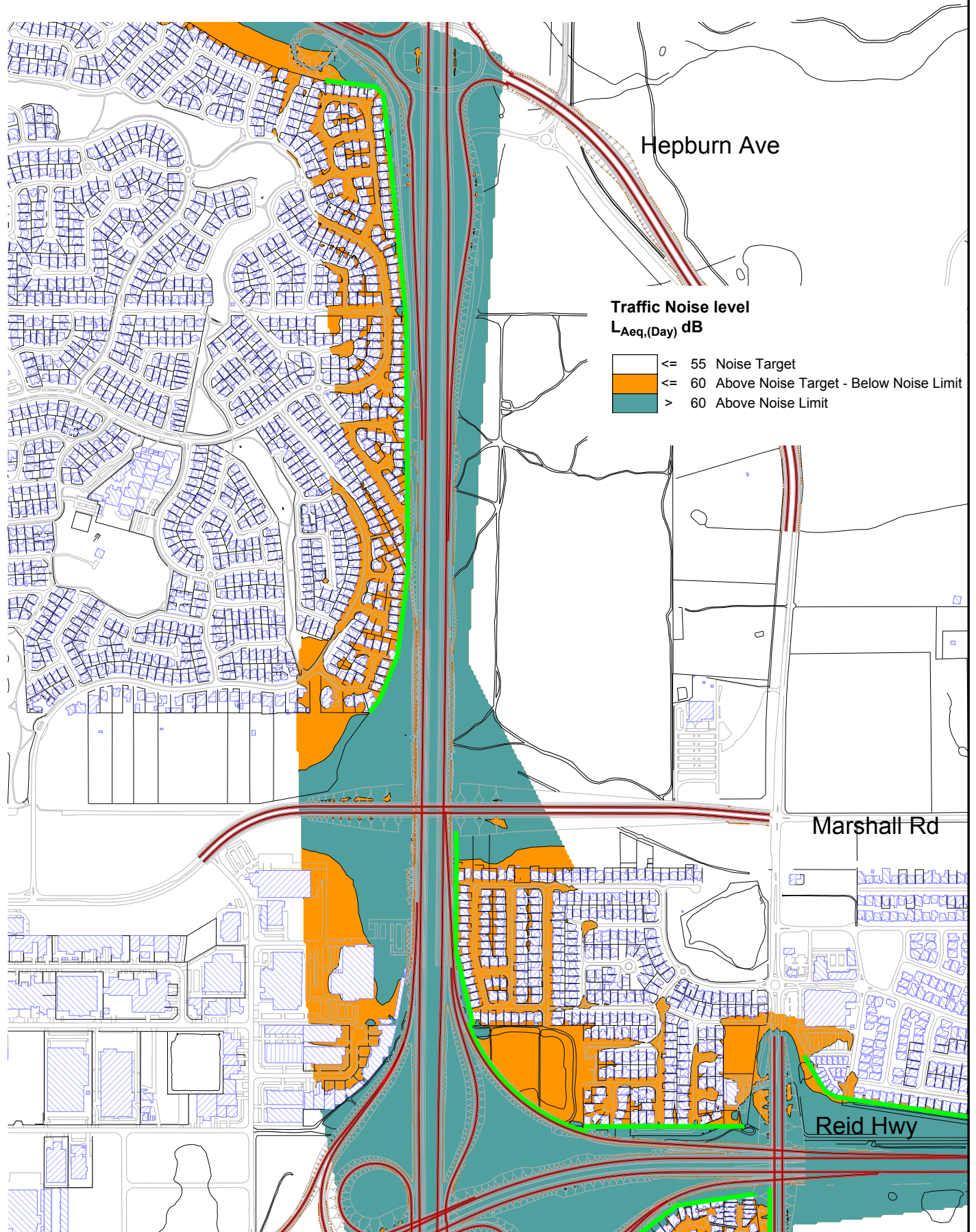
terry@lgacoustics.com.au

(08) 9401 7770

Perth Darwin National Highway Project - Reid Hwy to Hepburn Ave

L_{Aeq,Day} Noise Level Contours - With Recommended Noise Walls

Figure 4-2



Scale

0 50 100 200 300 m



Signs and symbols

- Road Source
- ▨ Building
- Noise Wall



Lloyd George Acoustics

by Terry George
terry@lgacoustics.com.au
 (08) 9401 7770




Perth Darwin National Highway Project - North of The Promenade

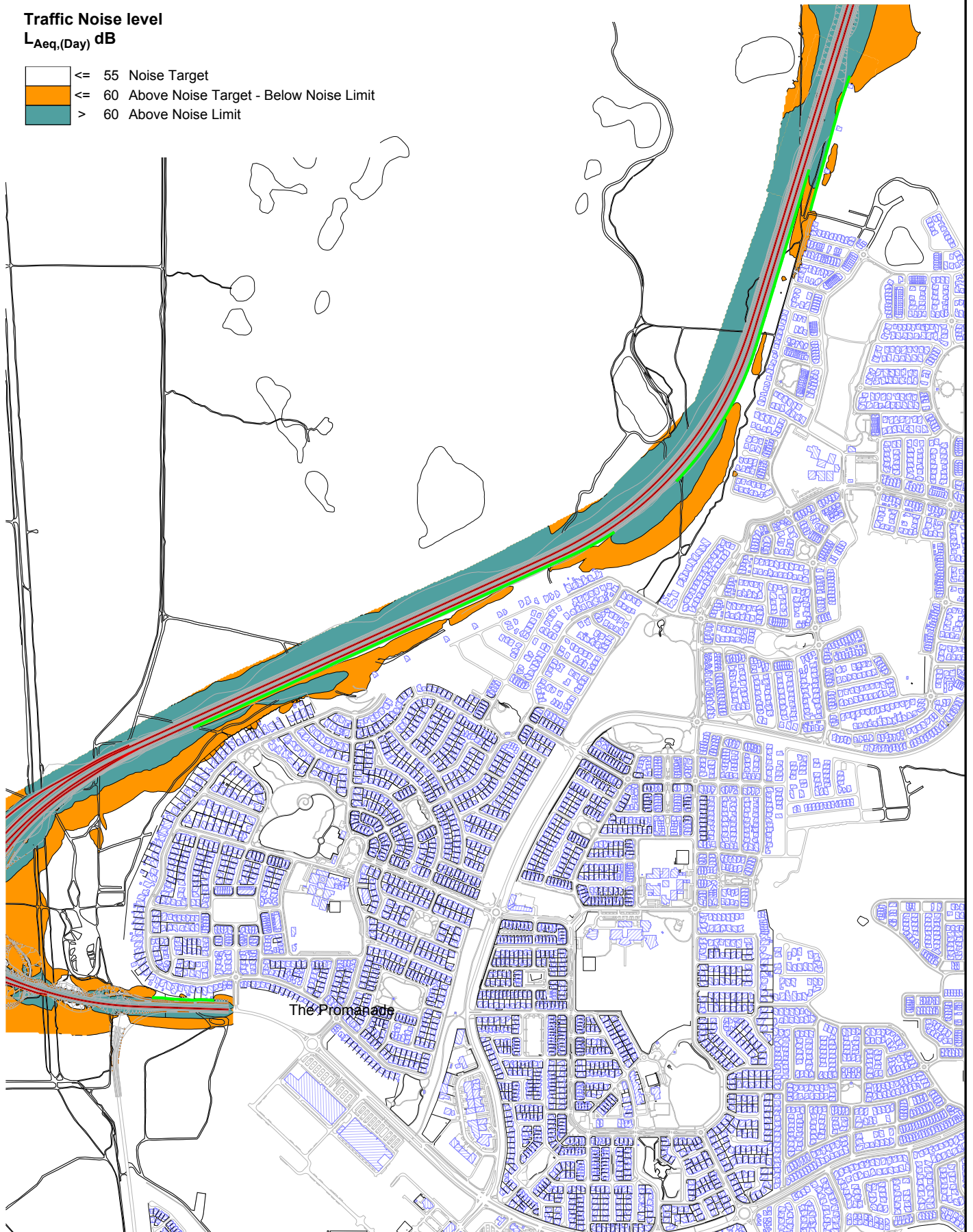
$L_{Aeq,Day}$ Noise Level Contours - With Recommended Noise Walls on Road Reserve Boundary

Figure 4-3

Traffic Noise level

$L_{Aeq,(Day)}$ dB

	≤ 55	Noise Target
	≤ 60	Above Noise Target - Below Noise Limit
	> 60	Above Noise Limit






Scale

0 100 200 400 600 m



Signs and symbols

-  Road Source
-  Building
-  Noise Wall



Lloyd George Acoustics

by Terry George

terry@lgacoustics.com.au

(08) 9401 7770

Perth Darwin National Highway Project - North of Ellenbrook

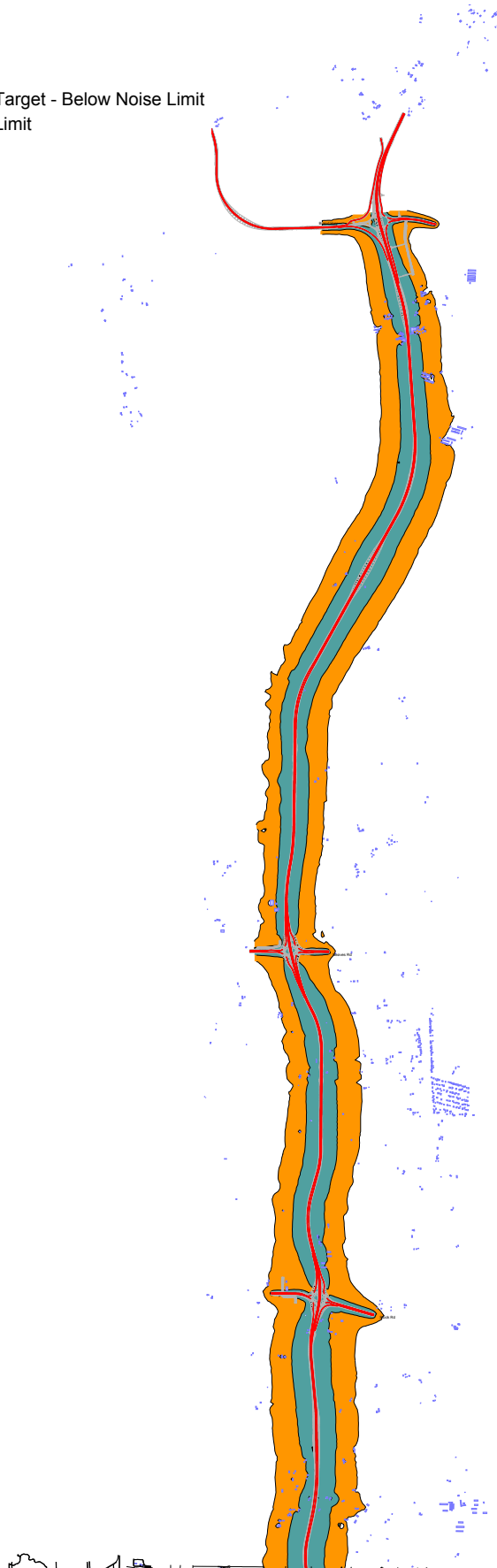
$L_{Aeq,Day}$ Noise Level Contours

Figure 4-4

Traffic Noise level

$L_{Aeq,(Day)}$ dB

	<=	55	Noise Target
	<=	60	Above Noise Target - Below Noise Limit
	>	60	Above Noise Limit



Signs and symbols

— Road Source

■ Building

Scale

0 500 1000 2000 3000 m



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by Terry George

terry@lgacoustics.com.au

(08) 9401 7770

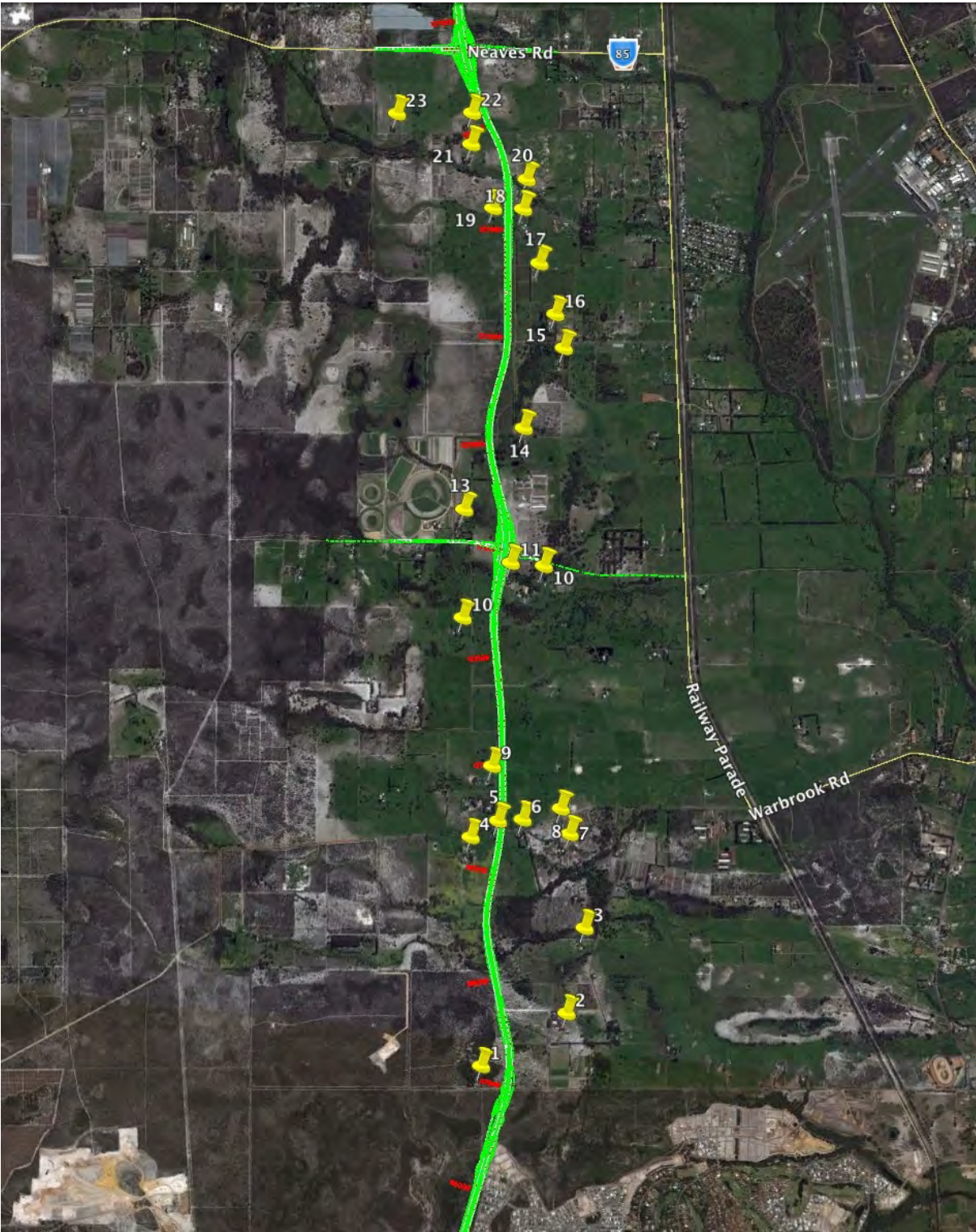


Figure 4-5 Noise Sensitive Receivers North of Ellenbrook

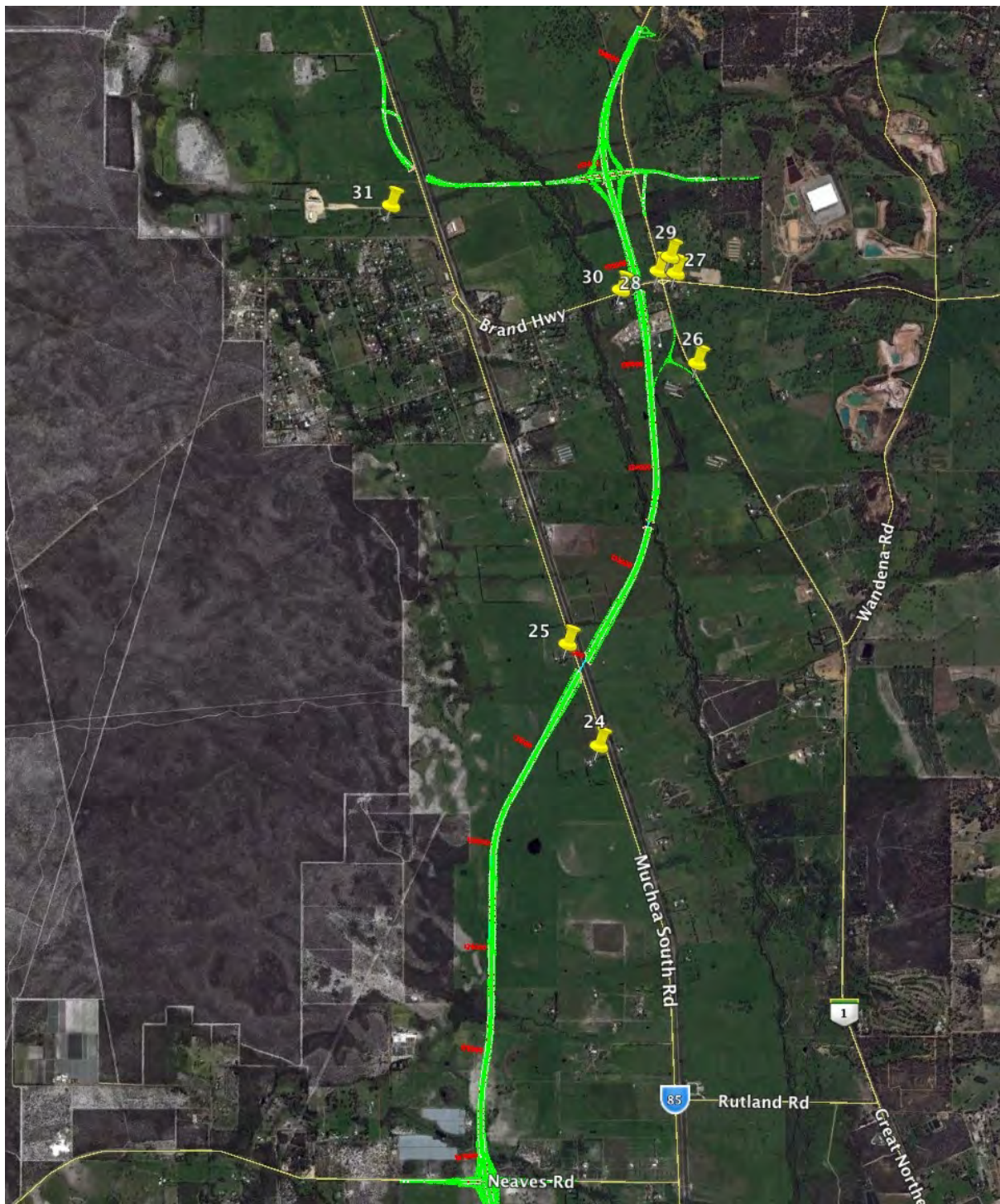


Figure 4-6 Noise Sensitive Receivers South of Brand Highway

5 DISCUSSION

The results of this noise assessment show that the Policy *limit* criterion of $L_{Aeq (Day)}$ 60 dB can be achieved at all properties by incorporating noise mitigation measures into the design of the project. It should be noted that the mitigation measures have been designed assuming the predicted traffic volumes in 2050, which significantly exceeds the requirement of the Policy (2031 volumes).

For the properties north of The Promenade (Ellenbrook), the *target* criterion of $L_{Aeq (Day)}$ 55 dB is achieved at most premises, with the *target* only being exceeded where the required noise wall exceeds a height of 5.0m. The noise barriers, detailed in *Appendix C*, range from 2.4 m to 5.0 m high and would need to be constructed using materials with a surface density exceeding 15 kg/m².

For the rural residential properties north of Ellenbrook, the noise mitigation provided by the proposed screen walls plus façade protection as detailed in the Policy Guidelines would result in acceptable internal noise levels. The properties requiring mitigation packages are provided in *Table 4-3*.

6 CONCLUSION

With the incorporation of noise walls into the project design and the installation of facade protection to a small number of residences, this project has been shown to comply with the requirements prescribed in the *State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning*.

Appendix A

Road Surfaces, Posted Speeds and Traffic Volumes

	AAWT	% Heavies	Speed	Pavement
North of Reid Hwy				
North	81000	11.3%	100	OGA
South	82000	11.5%	100	OGA
North of Marshall Rd				
Off Ramp N	11500	6.0%	70	DGA
On Ramp South	10500	7.0%	70	DGA
Marshall Rd				
East	16000	11.7%	60	DGA
West	16000	11.7%	60	DGA
Hepburn Ave				
West EB	17800	8.0%	70	DGA
West WB	17800	8.0%	70	DGA
East EB	10800	11.5%	70	DGA
East WB	10800	11.5%	70	DGA
North of Hepburn Ve				
North	77500	12.5%	100	OGA
South	81000	12.7%	100	OGA
On Ramp from Hep	8000	16.0%	100	OGA
Off Ramp to Hep	9000	16.0%	100	OGA
At Split				
NB to PDNH	38000	17.5%	100	OGA
SB from PDNH	43000	17.8%	100	OGA
NB to EWNS	39000	8.0%	100	OGA
SB from EWNS	38000	7.0%	100	OGA
South of Gngara Rd				
Off ramp EWNS	5500	11.7%	70	DGA
On ramp EWNS	4500	10.0%	70	DGA
Off ramp PDNH	9500	21.0%	70	DGA
On ramp PDNH	10000	12.9%	70	DGA
EWNS				
Gngara Rd				
East EB	17800	10.5%	90	OGA
East WB	17800	10.5%	90	OGA

	AAWT	% Heavies	Speed	Pavement
North of Gngara Rd				
North	40800	8.0%	100	OGA
South	41300	7.0%	100	OGA
on Ramp	7300	6.0%	70	DGA
of ramp	7800	6.0%	70	DGA
PDNH				
North of Gngara Rd				
North	34000	15.3%	100	OGA
South	38000	18.8%	100	OGA
on Ramp	5000	10.0%	70	DGA
off ramp	5500	14.5%	70	DGA
South of The Promanade				
Off Ramp	8000	13.0%	100	OGA
OnRamp	13000	15.0%	100	OGA
The Promanade				
Both Dir	22600	10.0%	60	DGA
North of The Promanade				
On Ramp	3500	9.5%	70	DGA
Off Ramp	5000	10.5%	70	DGA
North	29500	15.0%	110	OGA
South	30000	15.0%	110	OGA
North of Maralla Rd				
North	29500	15.0%	110	Chip
South	30000	15.0%	110	Chip
South of Stock Rd				
Off Ramp	13500	12.6%	70	DGA
On Ramp	14000	13.0%	70	DGA
Stock Rd				
West Both Dir	5500	18.0%	70	DGA
East Both Dir	17000	13.0%	70	DGA
North of Stock Rd				
On Ramp	5000	13.0%	70	DGA
Off Ramp	5500	11.5%	70	DGA

	AAWT	% Heavies	Speed	Pavement
South of Neaves Rd				
North	20500	16.6%	110	Chip
South	21000	16.1%	110	Chip
Off Ramp	9000	10.2%	70	DGA
On Ramp	5000	9.3%	70	DGA
Neaves Rd				
West Both Dir	14000	11.2%	70	DGA
East Both Dir	10500	8.0%	70	DGA
North of Neaves Rd				
On ramp	3500	13.0%	70	DGA
Off ramp	3000	14.0%	70	DGA
South of Brand Hwy				
North	15300	19.0%	110	Chip
South	14500	20.0%	110	Chip
Off Ramp	10600	19.0%	70	DGA
On Ramp	9800	18.0%	70	DGA
North of Brand				
On Ramp	100	20.0%	70	DGA
Off Ramp	100	20.0%	70	DGA
North	4700	19.0%	80	DGA
South	5000	24.0%	80	DGA
Brand Hwy				
West Both	4300	26.0%	80	DGA
East Both	5600	11.2%	80	DGA

Appendix B

Detailed Measurement Results

Table A1 – Results of Noise Logging 2 Redlands Street, Bayswater

Date	L_{A10,18hour}, dB	L_{Aeq,24hour}, dB	L_{Aeq(Day)}, dB	L_{Aeq(Night)}, dB
1 September 2014	40.1	37.6	38.8	33.3
2 September 2014	43.3	40.7	42.0	35.3
3 September 2014	41.0	39.4	40.2	37.2
4 September 2014	38.7	36.2	37.3	32.4
5 September 2014	38.3	36.3	37.6	31.0
Weekday Average	40.3	38.1	39.2	33.8

**Photograph A1 – Noise Logger at 2 Redlands Street, Bayswater**

Traffic Noise Measurement Data

Item	Details
LOCATION	
Project	Perth-Darwin Highway NorthlinkWA
Street address	No. 2 Redlands St.
Locality	Bayswater
Occupier	Kathleen Johnson
Dates	1/9/2014 to 5/9/2014.
Category	Main Roads will provide this information if required.
SITE	
Distance from the microphone to the kerb	75m to road
Height of the road in relation to the ground	+1m
Road surface type	OGA
Speed zone	90 km/hr
Absorbing ground	60%
Angle of view	100
Road gradient	flat
Traffic flow	Vehicles per day. Main Roads to provide this information
Heavy vehicles	Percentage. Main Roads to provide this information
House-Road orientation.	West
Carriageways & lanes.	2,5
COMMENT	
Comment	Solid noise wall between microphone and road Logger placed at front of house, near bedroom window.
REFERENCES	
AMG Z50 E/N	
Road name	Tonkin Highway.
EXCEL file	2 Redlands St MRWA Logger Sheet.xlsx
Raw data file	2 Redlands.csv
EQUIPMENT	
Analyser number	15-203-505
Microphone number	15-203-505
Calibrator number	34883971
Calibrator values	94.1, 93.8
Operator	Lloyd George Acoustics Pty Ltd - Matt Moyle
WEATHER	
Wind	Wind acceptability based on Mt Lawley Data 1/09/14 - Neg Winds 11-17 km/h from 10am 5pm 2/09/14 - Calm conditions Variable winds under 9km/h 3/09/14 - Variable winds up to 11km/h 4/09/14 - Neg winds 9-15km/h for 13 hours of day 5/09/14 - Variable winds up to 15km/h

Hourly Noise Level Data

2 Redlands St, Bayswater

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
1/09/2014	1/09/2014	39.9	35.1	32.4	26.9	0	0	0
1/09/2014	2:00	38.5	34.2	31.4	25.8	0	0	0
1/09/2014	3:00	38.3	32.5	30	24.6	0	170	5
1/09/2014	4:00	40.4	33.5	31.4	25	0	0	0
1/09/2014	5:00	40.6	36.8	33.6	27.9	0	170	5
1/09/2014	6:00	42.9	39.5	36.7	31.7	0	80	5
1/09/2014	7:00	45.7	42.1	39.9	33.9	0	60	8
1/09/2014	8:00	48.8	42.5	40.9	34	0	90	8
1/09/2014	9:00	48.1	40.7	39.4	32.2	0	80	5
1/09/2014	10:00	46.3	40.7	38.1	30.7	0	80	11
1/09/2014	11:00	45.6	40.3	37.9	30.8	0	50	17
1/09/2014	12:00	44.6	39.6	37	30.9	0	70	13
1/09/2014	13:00	48.4	40.6	37.5	30.8	0	50	15
1/09/2014	14:00	46.6	40	38	30.9	0	60	15
1/09/2014	15:00	48.8	40.7	39.2	32.2	0	60	15
1/09/2014	16:00	47.7	41.5	39.5	33.1	0	30	13
1/09/2014	17:00	48.4	40.8	40.4	33.1	0	70	13
1/09/2014	18:00	49.1	40.9	40	33.4	0	70	9
1/09/2014	19:00	45.8	42	39.7	33.2	0	100	8
1/09/2014	20:00	43.4	40.9	38.3	32.2	0	100	4
1/09/2014	21:00	41.4	38.6	35.9	30.7	0	90	2
1/09/2014	22:00	41.8	38.1	35.4	30.5	0	0	0
1/09/2014	23:00	40.8	37.1	34.5	29.8	0	90	4
1/09/2014	0:00	38.7	35.1	32.7	28	0	80	5
2/09/2014	2/09/2014	40.3	35.3	32.7	27.3	0	80	5
2/09/2014	2:00	39.6	34.7	31.6	25.6	0	80	4
2/09/2014	3:00	37.6	32.6	29.9	24.5	0	150	5
2/09/2014	4:00	40.4	34.6	31.6	25.4	0	100	8
2/09/2014	5:00	43.6	38.3	35.3	28.9	0	100	8
2/09/2014	6:00	44.6	41.2	38.3	32.3	0	90	5
2/09/2014	7:00	46.5	43.3	40.5	35.2	0	90	2
2/09/2014	8:00	47	41.9	40.4	34.4	0	360	4
2/09/2014	9:00	51	42.8	42	34.9	0	90	8
2/09/2014	10:00	48.9	43.9	41.8	33.4	0	90	5
2/09/2014	11:00	55.4	44.1	41.7	34.4	0	90	5
2/09/2014	12:00	48.9	43	41.6	33.4	0	90	2
2/09/2014	13:00	49.2	43.7	42.7	34.9	0	90	4
2/09/2014	14:00	53.4	44.8	43.8	35.4	0	40	9
2/09/2014	15:00	50	46.6	44	38.7	0	340	8
2/09/2014	16:00	51	47.3	45.2	39.8	0	280	8
2/09/2014	17:00	51.9	44.8	43.4	37.3	0	260	8
2/09/2014	18:00	48.8	43.5	41.4	35.7	0	260	5
2/09/2014	19:00	47.1	43.3	40.7	34.5	0	250	8
2/09/2014	20:00	45.4	42.2	39.1	33	0	250	5
2/09/2014	21:00	44.2	41.2	38.2	32.2	0	240	5
2/09/2014	22:00	45	42.1	39.4	33.8	0	0	0
2/09/2014	23:00	43.7	41	38	32.6	0	0	0
2/09/2014	0:00	42.9	39.4	36.9	31.9	0	0	0
3/09/2014	3/09/2014	44.1	39.7	37.1	32.2	0	0	0
3/09/2014	2:00	44.4	38.4	35.7	29.3	0	0	0
3/09/2014	3:00	43.1	37.6	34.4	27.2	0	0	0
3/09/2014	4:00	44.2	38.7	35.8	29.2	0	230	5
3/09/2014	5:00	45.2	41.7	38.5	32.7	0	180	9
3/09/2014	6:00	47.2	44.2	41.6	36.3	0	180	9
3/09/2014	7:00	49.5	46.4	43.9	38.6	0	170	11
3/09/2014	8:00	49.6	45.9	43.3	37.3	0	170	8
3/09/2014	9:00	51	45.4	43.4	36.3	0	150	9
3/09/2014	10:00	49.6	44	41.5	33.8	0	170	11
3/09/2014	11:00	47.8	42.9	40.2	33.6	0	120	8
3/09/2014	12:00	48	42.8	40	32.7	0	90	8
3/09/2014	13:00	48.8	41.9	39.6	31.3	0	140	5
3/09/2014	14:00	46.8	41	39.6	31.1	0	130	5
3/09/2014	15:00	49.5	40.4	39.6	31	0	120	8
3/09/2014	16:00	47.6	40.3	38.5	30.5	0	60	9
3/09/2014	17:00	45.4	39.2	37.3	30.1	0	60	11
3/09/2014	18:00	43.9	39.3	37.3	29.2	0	70	11
3/09/2014	19:00	43.6	39.4	37.2	30.9	0	70	8
3/09/2014	20:00	43.3	39.2	37.4	30.4	0	0	0
3/09/2014	21:00	42	38.9	36.1	30	0	0	0
3/09/2014	22:00	41.4	38.3	35.4	29.3	0	0	0
3/09/2014	23:00	41.5	38.1	35.3	29.7	0	60	4
3/09/2014	0:00	37.4	34.8	32.1	27.7	0	60	5

Hourly Noise Level Data

2 Redlands St, Bayswater

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
4/09/2014	4/09/2014	36.8	33.5	31.3	27.5	0	0	0
4/09/2014	2:00	36.4	32.6	30.2	26.3	0	70	5
4/09/2014	3:00	37.1	31.9	29.2	24.4	0	90	8
4/09/2014	4:00	39	34.2	31.8	27.3	0	90	11
4/09/2014	5:00	39.8	36.2	33.4	28.2	0	90	13
4/09/2014	6:00	42.2	39.2	36.4	31.4	0	90	9
4/09/2014	7:00	45.1	41.3	38.9	34.7	0	90	11
4/09/2014	8:00	46.2	40.8	38.6	33.6	0	100	13
4/09/2014	9:00	45.6	40.5	38.1	32.7	0	90	11
4/09/2014	10:00	46.2	39.8	37.6	31.6	0	90	13
4/09/2014	11:00	43.6	39.6	37.1	32.1	0	100	13
4/09/2014	12:00	44.1	39.5	37.2	32.1	0	100	15
4/09/2014	13:00	45.2	39.6	37.7	31.6	0	110	15
4/09/2014	14:00	43.7	39.3	37.6	31.5	0	110	11
4/09/2014	15:00	44	40	37.5	32.5	0	100	11
4/09/2014	16:00	45.7	40.7	38.4	31.8	0	130	13
4/09/2014	17:00	46.3	40.8	38.7	30.8	0	110	9
4/09/2014	18:00	45.5	39.6	37	30.4	0	110	8
4/09/2014	19:00	44.4	39.2	37	30.6	0	90	5
4/09/2014	20:00	41	37.8	35.2	29.3	0	100	5
4/09/2014	21:00	40.8	36.7	33.9	27.3	0	0	0
4/09/2014	22:00	39.6	35.3	32.8	26.7	0	100	5
4/09/2014	23:00	38.1	34.3	31.8	26.9	0	130	5
4/09/2014	0:00	36.5	32.5	30.1	25.4	0	70	9
5/09/2014	5/09/2014	36.4	31.6	29.3	25	0	110	8
5/09/2014	2:00	33.8	29.4	27.3	23.8	0	60	13
5/09/2014	3:00	37	30	27.9	23.1	0	80	8
5/09/2014	4:00	38.7	31.8	29.7	24.2	0	90	8
5/09/2014	5:00	38.7	34.4	31.6	26.5	0	70	9
5/09/2014	6:00	41.6	38.8	35.7	30.4	0	60	4
5/09/2014	7:00	45.3	41.5	38.7	33	0	60	5
5/09/2014	8:00	45.4	40.2	37.9	32.4	0	60	2
5/09/2014	9:00	44.7	39.4	37.4	31.1	0	50	8
5/09/2014	10:00	45	38.4	36.9	29.5	0	40	13
5/09/2014	11:00	44.7	38.5	36.3	29.8	0	60	15
5/09/2014	12:00	44.8	39.7	37.2	30	0	50	13
5/09/2014	13:00	44.7	37.9	36.8	28.7	0	50	15
5/09/2014	14:00	44.9	38.3	36.4	29.3	0	30	13
5/09/2014	15:00	45.2	39.5	37.5	29.7	0	30	11
5/09/2014	16:00	48.3	42.8	39.5	32.6	0	270	11
5/09/2014	17:00	48.8	43.2	41.5	34	0	290	11
5/09/2014	18:00	48.4	42.6	40.8	31.6	0	280	11
5/09/2014	19:00	43	38	35.6	29.7	0	290	8
5/09/2014	20:00	40.3	35.7	33.4	27.9	0	0	0
5/09/2014	21:00	39	34.1	32	26.2	0	290	5
5/09/2014	22:00	38.5	34.2	31.9	26.7	0	290	8
5/09/2014	23:00	36.2	33	30.5	26.1	0	290	5
5/09/2014	0:00	35.4	31.5	29.2	25.6	0	290	5

Noise Logging - 2 Redlands Street, Bayswater

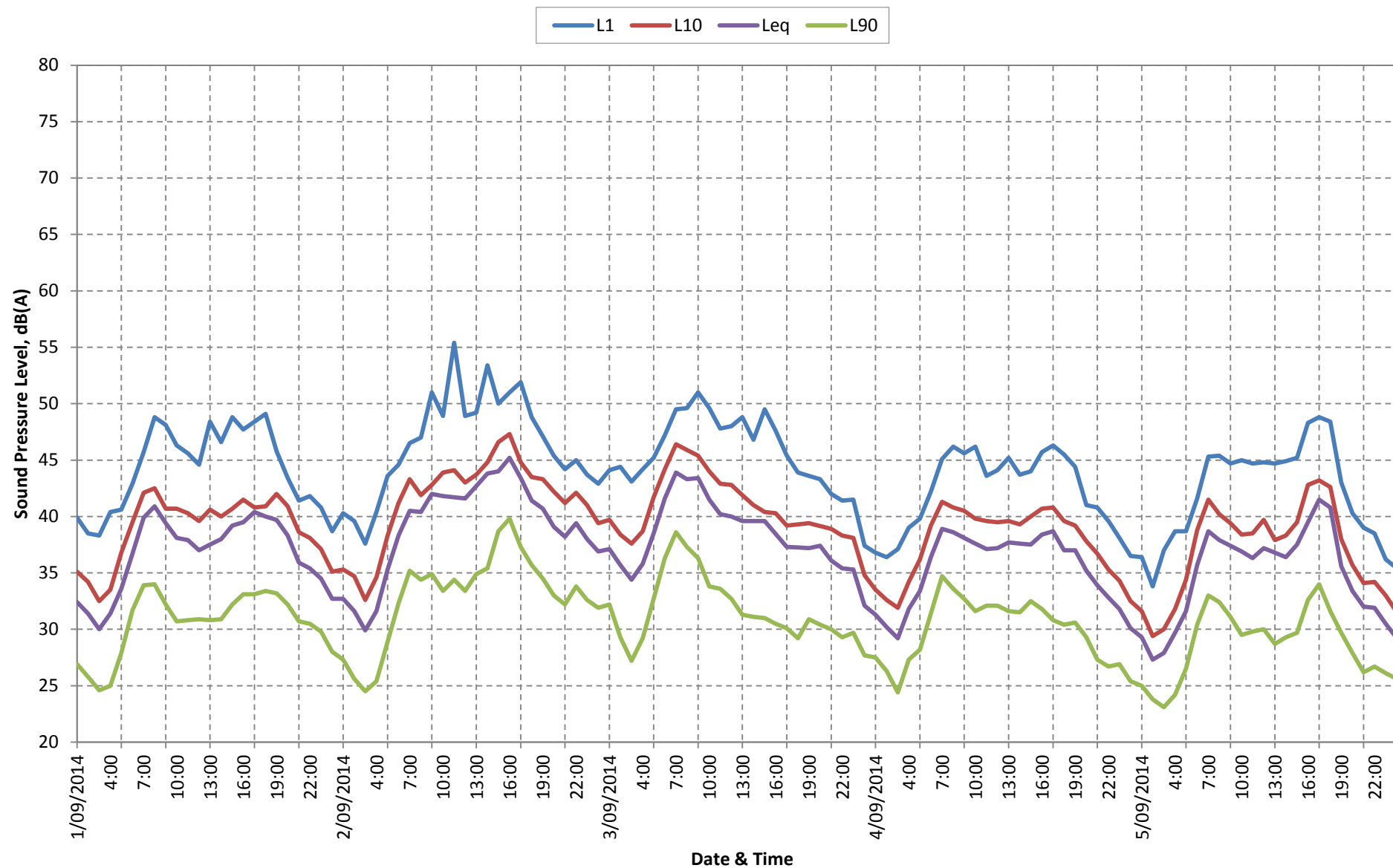


Table A2 – Results of Noise Logging 16 Harvest Road, Morley

Date	L_{A10,18hour}, dB	L_{Aeq,24hour}, dB	L_{Aeq(Day)}, dB	L_{Aeq(Night)}, dB
1 September 2014	59.9	56.9	57.8	54.1
2 September 2014	61.6	58.5	59.7	54.6
3 September 2014	61.3	58.3	59.2	55.4
4 September 2014	60.4	57.7	58.8	54.1
5 September 2014	60.5	57.6	58.7	53.9
Weekday Average	60.8	57.8	58.8	54.4

**Photograph A2 – Noise Logger at 16 Harvest Road, Morley**

Traffic Noise Measurement Data

Item	Details
LOCATION	
Project	Perth-Darwin Highway NorthlinkWA
Street address	No. 16 Harvest St.
Locality	Morley
Occupier	Debra Hallen
Dates	1/9/2014 to 5/9/2014.
Category	Main Roads will provide this information if required.
SITE	
Distance from the microphone to the kerb	45m to road
Height of the road in relation to the ground	+2m
Road surface type	OGA
Speed zone	90 km/hr
Absorbing ground	60%
Angle of view	170
Road gradient	flat
Traffic flow	Vehicles per day. Main Roads tp provide this information
Heavy vehicles	Percentage. Main Roads to provide this information
House-Road orientation.	West
Carriageways & lanes.	2,4
COMMENT	
Comment	Solid noise wall (Fibre Cement) between microphone and road Logger placed at front of house, near bedroom window.
REFERENCES	
AMG Z50 E/N	
Road name	Tonkin Highway.
EXCEL file	16 Harvest Rd MRWA Logger Sheet.xlsx
Raw data file	16 Harvest_sta.csv
EQUIPMENT	
Analyser number	16-004-041
Microphone number	16-004-041
Calibrator number	34883971
Calibrator values	93.9, 93.8
Operator	Lloyd George Acoustics Pty Ltd - Matt Moyle
WEATHER	
Wind	Wind acceptability based on Mt Lawley Data 1/09/14 - Neg Winds 11-17 km/h from 10am 5pm 2/09/14 - Calm conditions Variable winds under 9km/h 3/09/14 - Variable winds up to 11km/h 4/09/14 - Neg winds 9-15km/h for 13 hours of day 5/09/14 - Variable winds up to 15km/h

Hourly Noise Level Data
16 Harvest Road, Morley

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
1/09/2014	1/09/2014	60.2	56.3	52.6	38.1	0	0	0
1/09/2014	2:00	59.2	55.5	51.5	35.9	0	0	0
1/09/2014	3:00	58.7	54	49.9	32.9	0	170	5
1/09/2014	4:00	60.1	55.4	51.7	37.3	0	0	0
1/09/2014	5:00	62	58.8	55	45.2	0	170	5
1/09/2014	6:00	63.9	61.9	59.1	52.4	0	80	5
1/09/2014	7:00	65.05	62.8	60	53.8	0	60	8
1/09/2014	8:00	66.2	63.7	60.9	55.2	0	90	8
1/09/2014	9:00	65.1	61.6	59	52.5	0	80	5
1/09/2014	10:00	63.4	60.6	57.9	51.1	0	80	11
1/09/2014	11:00	63.1	60.3	57.6	51	0	50	17
1/09/2014	12:00	63.7	60.4	57.7	50.2	0	70	13
1/09/2014	13:00	64.3	60.5	57.8	49.4	0	50	15
1/09/2014	14:00	62.4	59.3	56.4	48.2	0	60	15
1/09/2014	15:00	63.2	59.7	56.8	47.5	0	60	15
1/09/2014	16:00	65.9	60.3	56.9	46.7	0	30	13
1/09/2014	17:00	62.6	59.5	56.9	49.6	0	70	13
1/09/2014	18:00	63.6	59.8	57.6	51.3	0	70	9
1/09/2014	19:00	62.9	61.2	58	48.8	0	100	8
1/09/2014	20:00	62.1	59.9	56.7	46.9	0	100	4
1/09/2014	21:00	61.1	58.8	55.5	46.3	0	90	2
1/09/2014	22:00	61.1	58.5	54.9	44.5	0	0	0
1/09/2014	23:00	59.8	57.1	53.7	43.7	0	90	4
1/09/2014	0:00	57.1	54.2	50.7	39.8	0	80	5
2/09/2014	2/09/2014	58.1	54.3	51	36.6	0	80	5
2/09/2014	2:00	58.5	53.8	49.9	32.5	0	80	4
2/09/2014	3:00	59.4	53.7	49.8	31.4	0	150	5
2/09/2014	4:00	60.5	55.9	51.7	36.1	0	100	8
2/09/2014	5:00	62.7	59.4	55.8	45.2	0	100	8
2/09/2014	6:00	64.5	61.8	59.2	52.5	0	90	5
2/09/2014	7:00	65	62.2	59.8	56.5	0	90	2
2/09/2014	8:00	66	62.5	60.3	55.9	0	360	4
2/09/2014	9:00	65.9	62.6	59.9	54.2	0	90	8
2/09/2014	10:00	65.2	62.7	59.8	53.3	0	90	5
2/09/2014	11:00	65.4	62.6	59.7	52	0	90	5
2/09/2014	12:00	64.4	61.2	58.6	50.7	0	90	2
2/09/2014	13:00	67.4	61.3	59.3	51.4	0	90	4
2/09/2014	14:00	67.8	61.6	60.4	52.2	0	40	9
2/09/2014	15:00	66.6	64.2	61.2	53.2	0	340	8
2/09/2014	16:00	67.4	64.5	61.7	54.1	0	280	8
2/09/2014	17:00	65.8	62.5	60.2	54.5	0	260	8
2/09/2014	18:00	64.5	61.9	59.6	54.9	0	260	5
2/09/2014	19:00	64.3	62.2	59.5	52.8	0	250	8
2/09/2014	20:00	63.7	60.9	57.8	47.7	0	250	5
2/09/2014	21:00	62.5	60	57	47.1	0	240	5
2/09/2014	22:00	62.7	59.8	56.7	48.3	0	0	0
2/09/2014	23:00	61.4	59	55.5	46.1	0	0	0
2/09/2014	0:00	60.3	57.3	54.1	43.4	0	0	0
3/09/2014	3/09/2014	59.4	56.3	52.8	41.1	0	0	0
3/09/2014	2:00	60	55.3	51.3	36.1	0	0	0
3/09/2014	3:00	60.1	54.8	50.9	34.3	0	0	0
3/09/2014	4:00	61.5	57.1	52.9	36.8	0	230	5
3/09/2014	5:00	64	60.8	57.1	48.1	0	180	9
3/09/2014	6:00	65	62.8	60.1	53.6	0	180	9
3/09/2014	7:00	67.1	64.9	62.3	57.5	0	170	11
3/09/2014	8:00	67.1	64.6	62.3	56.7	0	170	8
3/09/2014	9:00	67	64.6	61.7	55.2	0	150	9
3/09/2014	10:00	65.6	61.9	59.1	50.7	0	170	11
3/09/2014	11:00	64.8	61.9	58.7	49.6	0	120	8
3/09/2014	12:00	65.1	62.4	59.2	50.3	0	90	8
3/09/2014	13:00	69.8	62	59.1	50	0	140	5
3/09/2014	14:00	65.2	61.8	58.9	50.2	0	130	5
3/09/2014	15:00	63.9	60.9	57.7	48.5	0	120	8
3/09/2014	16:00	62.8	59.8	56.9	48.8	0	60	9
3/09/2014	17:00	64.1	59.3	57.5	50.2	0	60	11
3/09/2014	18:00	61.8	59.3	56.9	51.1	0	70	11
3/09/2014	19:00	62.7	61	58.2	51.1	0	70	8
3/09/2014	20:00	64.3	62.2	58.9	48.2	0	0	0
3/09/2014	21:00	63.5	60.6	57.5	48.3	0	0	0
3/09/2014	22:00	62.5	59.8	56.6	46.6	0	0	0
3/09/2014	23:00	61.8	59.4	56.1	45.9	0	60	4
3/09/2014	0:00	60	57.1	53.3	41	0	60	5

Hourly Noise Level Data
16 Harvest Road, Morley

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
4/09/2014	4/09/2014	59.3	55.4	51.5	39.4	0	0	0
4/09/2014	2:00	58.2	53.4	49.4	35.3	0	70	5
4/09/2014	3:00	59.4	53.3	49.2	32.9	0	90	8
4/09/2014	4:00	60	55.4	51.4	37.5	0	90	11
4/09/2014	5:00	62	59.4	55.7	45.7	0	90	13
4/09/2014	6:00	64.8	62.3	59.4	52.2	0	90	9
4/09/2014	7:00	66.3	64	61.3	56.5	0	90	11
4/09/2014	8:00	65.9	63.5	60.9	56.3	0	100	13
4/09/2014	9:00	64.2	62	59.3	54	0	90	11
4/09/2014	10:00	65.3	61	59.6	51.1	0	90	13
4/09/2014	11:00	63.7	61.2	58.3	50.5	0	100	13
4/09/2014	12:00	64.5	61.1	58.3	51.5	0	100	15
4/09/2014	13:00	63.9	60.9	57.9	50	0	110	15
4/09/2014	14:00	64.8	62.1	59.9	50.2	0	110	11
4/09/2014	15:00	66	62.1	60.6	50.9	0	100	11
4/09/2014	16:00	65.9	61.3	59.9	52	0	130	13
4/09/2014	17:00	63.1	60.4	57.9	52.4	0	110	9
4/09/2014	18:00	62	59.6	57	51.2	0	110	8
4/09/2014	19:00	63.5	60.5	57.0	50.1	0	90	5
4/09/2014	20:00	62.4	60.3	56.9	48	0	100	5
4/09/2014	21:00	61.9	58.4	55.9	45.8	0	0	0
4/09/2014	22:00	60.8	57.7	54.5	44	0	100	5
4/09/2014	23:00	59.4	56.8	53.4	43.4	0	130	5
4/09/2014	0:00	58.4	55	51.5	41.1	0	70	9
5/09/2014	5/09/2014	57.7	53.5	49.9	36.5	0	110	8
5/09/2014	2:00	56.8	52.6	48.6	33.5	0	60	13
5/09/2014	3:00	59.8	53	49.5	31.9	0	80	8
5/09/2014	4:00	59.5	54.9	51.6	38.9	0	90	8
5/09/2014	5:00	61.4	58.2	54.6	45.1	0	70	9
5/09/2014	6:00	63.8	61.5	58.9	52	0	60	4
5/09/2014	7:00	64.9	62.5	60.1	55.6	0	60	5
5/09/2014	8:00	64.3	62.2	59.6	54.6	0	60	2
5/09/2014	9:00	64.6	61.4	58.7	53.1	0	50	8
5/09/2014	10:00	62.7	59.8	57.2	50.4	0	40	13
5/09/2014	11:00	64.6	60	58.3	51.9	0	60	15
5/09/2014	12:00	63.5	60.1	57.9	51.9	0	50	13
5/09/2014	13:00	64	59.8	57.8	49.4	0	50	15
5/09/2014	14:00	65.8	60.1	58.1	48.7	0	30	13
5/09/2014	15:00	66.9	61	58.4	51.1	0	30	11
5/09/2014	16:00	66	62.5	59.9	53.8	0	270	11
5/09/2014	17:00	66.3	63.4	60.9	54.8	0	290	11
5/09/2014	18:00	64.7	62	59.8	54.4	0	280	11
5/09/2014	19:00	63.7	61.7	59	52.4	0	290	8
5/09/2014	20:00	63.1	60.5	57.6	50	0	0	0
5/09/2014	21:00	63	59.8	56.6	47.5	0	290	5
5/09/2014	22:00	61.3	58.8	55.8	48.4	0	290	8
5/09/2014	23:00	60.7	58.5	55.3	47.5	0	290	5
5/09/2014	0:00	58.4	55	51.5	41.1	0	290	5

Noise Logging - 16 Harvest Road, Morley

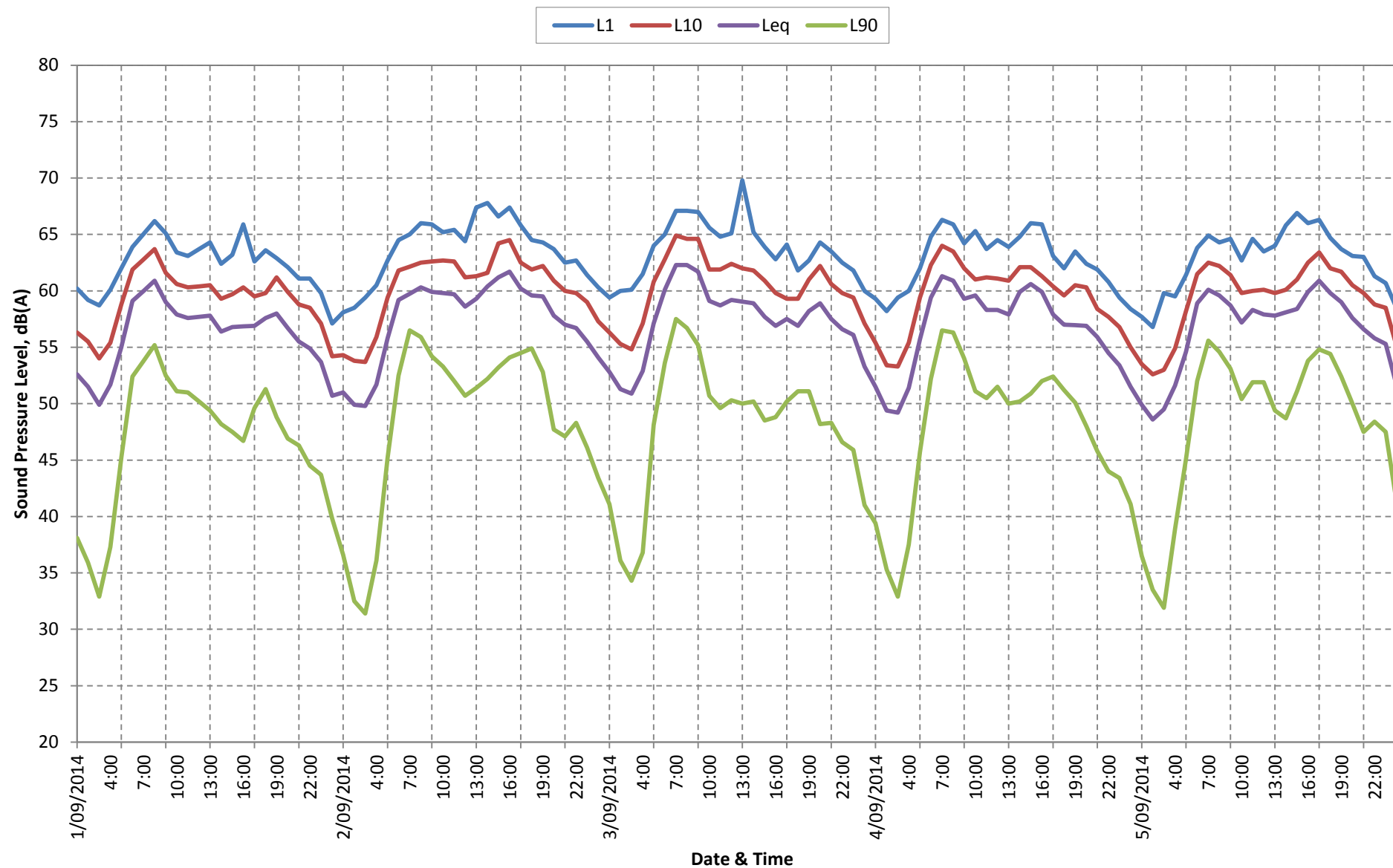


Table A3 – Results of Noise Logging 28A Bruce Road, Morley

Date	L_{A10,18hour}, dB	L_{Aeq,24hour}, dB	L_{Aeq(Day)}, dB	L_{Aeq(Night)}, dB
1 September 2014	60.9	57.7	59.1	51.9
2 September 2014	59.9	56.8	57.9	53.2
3 September 2014	60.6	57.3	58.5	53.4
4 September 2014	60.9	58.0	59.0	54.5
5 September 2014	60.1	57.1	58.2	53.3
Weekday Average	60.5	57.4	58.5	53.3

**Photograph A3 – Noise Logger at 28A Bruce Road, Morley**

Traffic Noise Measurement Data

Item	Details
LOCATION	
Project	Perth-Darwin Highway NorthlinkWA
Street address	No. 28A Bruce Rd.
Locality	Morley
Occupier	Kaye Bailey 0408082068
Dates	1/9/2014 to 5/9/2014.
Category	Main Roads will provide this information if required.
SITE	
Distance from the microphone to the kerb	25m to Tonkin Hwy
Height of the road in relation to the ground	0m
Road surface type	DGA,
Speed zone	80 km/hr (Near Intersection)
Absorbing ground	70%
Angle of view	150
Road gradient	flat
Traffic flow	Vehicles per day. Main Roads to provide this information
Heavy vehicles	Percentage. Main Roads to provide this information
House-Road orientation.	East to Tonkin Hwy
Carriageways & lanes.	2,6;
COMMENT	
Comment	Microphone placed on west façade. Logger placed at Side (South East) of house, away from pool. Rear Property fence between Microphone and Road.
REFERENCES	
AMG Z50 E/N	
Road name	Tonkin Highway.
EXCEL file	2A Abbey St MRWA Logger Sheet.xlsx
Raw data file	2A Abbey St_sta.csv
EQUIPMENT	
Analyser number	15-203-999
Microphone number	15-203-999
Calibrator number	34883971
Calibrator values	94.0, 93.8
Operator	Lloyd George Acoustics Pty Ltd - Matt Moyle
WEATHER	
Wind	Wind acceptability based on Mt Lawley Data 1/09/14 - Pos Winds 11-17 km/h from 10am 5pm 2/09/14 - Calm conditions Variable winds under 9km/h 3/09/14 - Variable winds up to 11km/h 4/09/14 - Pos winds 9-15km/h for 13 hours of day 5/09/14 - Variable winds up to 15km/h

Hourly Noise Level Data
28A Bruce Road, Morley

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
1/09/2014	1/09/2014	54.3	49.8	47.4	41	0	0	0
1/09/2014	2:00	52.4	48.1	45.6	38	0	0	0
1/09/2014	3:00	56.9	49	46.8	38	0	170	5
1/09/2014	4:00	62	50.9	50.4	40.4	0	0	0
1/09/2014	5:00	63.6	55.7	53.8	45	0	170	5
1/09/2014	6:00	66.3	59.2	56.5	48.9	0	80	5
1/09/2014	7:00	67.4	62.1	58.9	50.2	0	60	8
1/09/2014	8:00	68.1	62.7	59.4	51.1	0	90	8
1/09/2014	9:00	69.8	63	60.1	50.5	0	80	5
1/09/2014	10:00	68.1	63.8	60.5	51.7	0	80	11
1/09/2014	11:00	68.6	63.9	60.4	50.8	0	50	17
1/09/2014	12:00	67.1	63.4	59.5	50.5	0	70	13
1/09/2014	13:00	67.9	63.5	59.9	50.3	0	50	15
1/09/2014	14:00	67.5	63.2	59.5	50.3	0	60	15
1/09/2014	15:00	68	63.3	60.1	50.7	0	60	15
1/09/2014	16:00	69	63.5	60.6	51.7	0	30	13
1/09/2014	17:00	67.1	62.9	60	51.6	0	70	13
1/09/2014	18:00	67.1	61.2	58.6	51.2	0	70	9
1/09/2014	19:00	65.4	59.5	57	49.8	0	100	8
1/09/2014	20:00	63.9	57.6	55.6	48.4	0	100	4
1/09/2014	21:00	61.7	56.9	54.5	48.2	0	90	2
1/09/2014	22:00	61.9	56.6	54.1	47.7	0	0	0
1/09/2014	23:00	60.5	55.3	52.4	45.7	0	90	4
1/09/2014	0:00	59.1	54.1	51.1	43.6	0	80	5
2/09/2014	2/09/2014	58.9	52.6	49.9	41.6	0	80	5
2/09/2014	2:00	57.7	51.6	48.4	38.8	0	80	4
2/09/2014	3:00	60.6	52.4	49.6	37.2	0	150	5
2/09/2014	4:00	61.2	53.9	51.1	41.4	0	100	8
2/09/2014	5:00	64.7	58.4	55.5	47.4	0	100	8
2/09/2014	6:00	65.8	61.2	58.1	50.9	0	90	5
2/09/2014	7:00	67.6	62.9	60.2	54.1	0	90	2
2/09/2014	8:00	67.3	63	60.3	54.2	0	360	4
2/09/2014	9:00	68.1	62.1	59.2	51.3	0	90	8
2/09/2014	10:00	67.4	62	58.5	50.4	0	90	5
2/09/2014	11:00	66.2	62.2	58.4	49.6	0	90	5
2/09/2014	12:00	66.1	62.1	58.3	49.2	0	90	2
2/09/2014	13:00	67.2	62.1	58.7	49.3	0	90	4
2/09/2014	14:00	66.3	61.8	58.3	49	0	40	9
2/09/2014	15:00	67.4	61.3	58.2	49	0	340	8
2/09/2014	16:00	65.6	60.7	57.5	49.2	0	280	8
2/09/2014	17:00	66	60.8	57.7	49.7	0	260	8
2/09/2014	18:00	64.4	59.6	56.8	49	0	260	5
2/09/2014	19:00	63.9	58.6	56.1	48.6	0	250	8
2/09/2014	20:00	63.5	57.7	54.6	46.9	0	250	5
2/09/2014	21:00	61.8	56.6	53.5	46.9	0	240	5
2/09/2014	22:00	61.5	56.2	52.8	47.4	0	0	0
2/09/2014	23:00	59.3	55.2	52	46.2	0	0	0
2/09/2014	0:00	59.7	53.5	51	43.7	0	0	0
3/09/2014	3/09/2014	58.3	53.2	50.5	43.8	0	0	0
3/09/2014	2:00	59	52.4	49.3	39.7	0	0	0
3/09/2014	3:00	59.9	52.1	49.4	39.9	0	0	0
3/09/2014	4:00	60.8	53.7	50.9	41.2	0	230	5
3/09/2014	5:00	63.1	57.3	54.6	48.2	0	180	9
3/09/2014	6:00	65.4	60.6	57.7	51.6	0	180	9
3/09/2014	7:00	66.6	62.3	59.9	54.7	0	170	11
3/09/2014	8:00	67.3	62.2	59.6	53.7	0	170	8
3/09/2014	9:00	67.5	62.4	59.5	51.5	0	150	9
3/09/2014	10:00	67.2	62	58.7	49.8	0	170	11
3/09/2014	11:00	66.1	61.7	58.2	48.9	0	120	8
3/09/2014	12:00	66.3	61.7	58.7	49.2	0	90	8
3/09/2014	13:00	67.2	61.8	58.4	47.9	0	140	5
3/09/2014	14:00	67.3	61.9	58.7	48.9	0	130	5
3/09/2014	15:00	67.5	62.8	59.2	50.2	0	120	8
3/09/2014	16:00	66.9	62.3	59.2	51	0	60	9
3/09/2014	17:00	67.2	62.5	59.8	51.9	0	60	11
3/09/2014	18:00	65.9	61.5	58.7	51.7	0	70	11
3/09/2014	19:00	64.4	59.6	56.8	50.1	0	70	8
3/09/2014	20:00	64	58.6	56	49.8	0	0	0
3/09/2014	21:00	62.7	57.9	55.2	49.9	0	0	0
3/09/2014	22:00	61.2	57.4	54.4	49	0	0	0
3/09/2014	23:00	62.6	56.6	54.2	48.7	0	60	4
3/09/2014	0:00	60.7	56.4	53.4	47.2	0	60	5

Hourly Noise Level Data
28A Bruce Road, Morley

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
4/09/2014	4/09/2014	60.2	55.3	52.4	44.8	0	0	0
4/09/2014	2:00	60.6	53.7	50.8	41.7	0	70	5
4/09/2014	3:00	61.6	53.2	50.5	39.8	0	90	8
4/09/2014	4:00	63.2	55.3	52.9	44.8	0	90	11
4/09/2014	5:00	64.1	58.7	56.1	49.5	0	90	13
4/09/2014	6:00	65.9	62.3	59.3	52.9	0	90	9
4/09/2014	7:00	66.4	62.6	59.8	54.1	0	90	11
4/09/2014	8:00	66.8	62.9	60.2	55.2	0	100	13
4/09/2014	9:00	66.5	62.5	59.6	53.4	0	90	11
4/09/2014	10:00	66.4	62.6	59.4	52.3	0	90	13
4/09/2014	11:00	67.4	62.3	59.2	51.4	0	100	13
4/09/2014	12:00	67.3	63	59.8	51.8	0	100	15
4/09/2014	13:00	67.4	63.1	59.7	51.4	0	110	15
4/09/2014	14:00	66.3	62.6	59.3	51.5	0	110	11
4/09/2014	15:00	66.2	62.5	59.3	51.4	0	100	11
4/09/2014	16:00	67.5	62.7	59.8	52.1	0	130	13
4/09/2014	17:00	67.4	62.1	59.6	52.3	0	110	9
4/09/2014	18:00	65.7	61.2	58.4	51.1	0	110	8
4/09/2014	19:00	68.5	60.4	58.9	50	0	90	5
4/09/2014	20:00	63	58.4	55.7	48.4	0	100	5
4/09/2014	21:00	67.5	58.2	56.8	47.8	0	0	0
4/09/2014	22:00	63.6	57.5	55.7	47.6	0	100	5
4/09/2014	23:00	62.6	57.1	54.6	47.4	0	130	5
4/09/2014	0:00	59.8	54.2	51.2	44.1	0	70	9
5/09/2014	5/09/2014	60.2	54.1	51.1	42.8	0	110	8
5/09/2014	2:00	57.5	51.4	48.5	39.3	0	60	13
5/09/2014	3:00	61.7	52.1	50.1	38.2	0	80	8
5/09/2014	4:00	62.4	54.7	52.7	43.1	0	90	8
5/09/2014	5:00	62.6	56.6	53.9	46.8	0	70	9
5/09/2014	6:00	65.1	60.7	57.5	50.6	0	60	4
5/09/2014	7:00	66.7	61.9	58.9	52.1	0	60	5
5/09/2014	8:00	68.2	63	60.3	53.6	0	60	2
5/09/2014	9:00	67.3	62.3	59.3	51.9	0	50	8
5/09/2014	10:00	67.3	62.8	59.3	51.4	0	40	13
5/09/2014	11:00	69	62.7	59.9	50.7	0	60	15
5/09/2014	12:00	67.2	62.5	59.1	49.6	0	50	13
5/09/2014	13:00	67	62.4	59	50	0	50	15
5/09/2014	14:00	66.4	61.5	58.3	50	0	30	13
5/09/2014	15:00	66.2	60.8	57.8	49.9	0	30	11
5/09/2014	16:00	66	60	57.2	49.5	0	270	11
5/09/2014	17:00	65.5	59.7	56.8	50.1	0	290	11
5/09/2014	18:00	64.4	59	57	49.6	0	280	11
5/09/2014	19:00	65.1	59.3	56.5	48.7	0	290	8
5/09/2014	20:00	64.1	57.8	57	47.3	0	0	0
5/09/2014	21:00	65	58.4	56.1	47.6	0	290	5
5/09/2014	22:00	63	56.6	54	47.6	0	290	8
5/09/2014	23:00	61.3	55.6	53.3	46.4	0	290	5
5/09/2014	0:00	61.9	55.1	53.2	45.5	0	290	5

Noise Logging - 28A Bruce Road, Morley

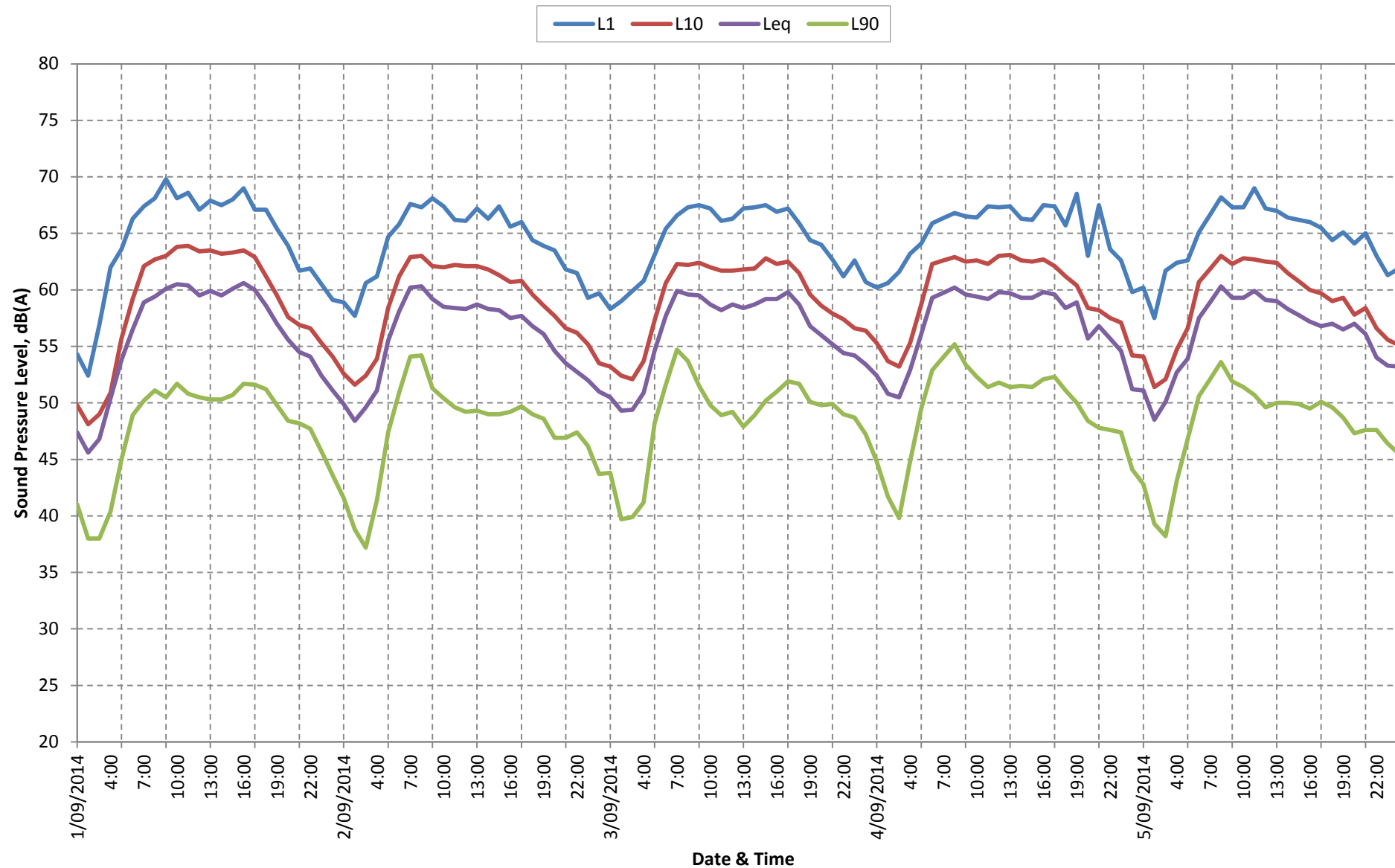


Table A4 – Results of Noise Logging 2A Abbey St, Morley

Date	L_{A10,18hour}, dB	L_{Aeq,24hour}, dB	L_{Aeq(Day)}, dB	L_{Aeq(Night)}, dB
1 September 2014	61.0	57.2	58.5	52.1
2 September 2014	62.0	58.2	59.6	52.4
3 September 2014	61.8	57.8	59.0	53.5
4 September 2014	61.6	57.7	59.0	52.1
5 September 2014	61.8	57.9	59.2	52.6
Weekday Average	61.6	57.7	59.0	52.5

**Photograph A4 – Noise Logger at 2A Abbey St, Morley**

Traffic Noise Measurement Data

Item	Details
LOCATION	
Project	Perth-Darwin Highway NorthlinkWA
Street address	No. 2A Abbey St.
Locality	Morley
Occupier	Warren Fayers (Tenant)
Dates	1/9/2014 to 5/9/2014.
Category	Main Roads will provide this information if required.
SITE	
Distance from the microphone to the kerb	140m to Tonkin Hwy, 15m to Morley Dr
Height of the road in relation to the ground	+2m
Road surface type	OGA on Tonkin Hwy, DGA on Morley Dr
Speed zone	90 km/hr (Tonkin Hwy), 70 km/hr (Morley Hwy)
Absorbing ground	60%,30%
Angle of view	150 (Tonkin Hwy), 80 (Morley Dr)
Road gradient	flat
Traffic flow	Vehicles per day. Main Roads to provide this information
Heavy vehicles	Percentage. Main Roads to provide this information
House-Road orientation.	West to Tonkin Hwy, South to Morley Dr
Carriageways & lanes.	2,6 (Tonkin); 2,4 (Morley)
COMMENT	
Comment	Microphone placed on west façade. Logger placed at front of house, near bedroom window.
REFERENCES	
AMG Z50 E/N	
Road name	Tonkin Highway.
EXCEL file	2A Abbey St MRWA Logger Sheet.xlsx
Raw data file	2A Abbey St_sta.csv
EQUIPMENT	
Analyser number	87803E
Microphone number	87803E
Calibrator number	34883971
Calibrator values	94.0, 94
Operator	Lloyd George Acoustics Pty Ltd - Matt Moyle
WEATHER	
Wind	Wind acceptability based on Mt Lawley Data 1/09/14 - Neg Winds 11-17 km/h from 10am 5pm 2/09/14 - Calm conditions Variable winds under 9km/h 3/09/14 - Variable winds up to 11km/h 4/09/14 - Variable winds 9-15km/h for 13 hours of day 5/09/14 - Variable winds up to 15km/h

Hourly Noise Level Data

2A Abbey Street, Morley

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
1/09/2014	1/09/2014	62.7	51.7	50.7	40.6	0	0	0
1/09/2014	2:00	60	49.7	48.7	37.7	0	0	0
1/09/2014	3:00	60.1	49.7	48.9	35.1	0	170	5
1/09/2014	4:00	62.8	51.4	50.3	37.2	0	0	0
1/09/2014	5:00	62.2	54.1	51.6	42.1	0	170	5
1/09/2014	6:00	65.8	59.2	56.3	47	0	80	5
1/09/2014	7:00	68.2	62.2	57.8	52.5	0	60	8
1/09/2014	8:00	67.3	62.5	59.2	52.1	0	90	8
1/09/2014	9:00	67.3	62.4	58.8	51.1	0	80	5
1/09/2014	10:00	67.3	61.7	58.2	49.5	0	80	11
1/09/2014	11:00	68.1	61.3	58.2	48.5	0	50	17
1/09/2014	12:00	68.6	61.9	58.5	49.4	0	70	13
1/09/2014	13:00	69.1	62.5	58.8	49.1	0	50	15
1/09/2014	14:00	66.8	61.9	58.4	48.8	0	60	15
1/09/2014	15:00	67	62.6	58.5	49.9	0	60	15
1/09/2014	16:00	67.2	63.1	60.3	51	0	30	13
1/09/2014	17:00	68.2	63.3	59.6	50.8	0	70	13
1/09/2014	18:00	68	63.7	60.6	51	0	70	9
1/09/2014	19:00	66.4	62.2	58	49.3	0	100	8
1/09/2014	20:00	65.9	60.9	56.6	46.8	0	100	4
1/09/2014	21:00	65.9	59.5	55.7	45.3	0	90	2
1/09/2014	22:00	65.5	58.2	55.3	43.7	0	0	0
1/09/2014	23:00	65.2	55.9	53.8	42.1	0	90	4
1/09/2014	0:00	62.9	52.6	50.5	38.3	0	80	5
2/09/2014	2/09/2014	62.3	50.6	49.6	36.9	0	80	5
2/09/2014	2:00	58.9	47.6	47	35.2	0	80	4
2/09/2014	3:00	60.2	49.1	47.9	34.6	0	150	5
2/09/2014	4:00	59.6	50.9	49.2	36.9	0	100	8
2/09/2014	5:00	61.6	54.3	51.6	43	0	100	8
2/09/2014	6:00	65.6	59.1	56.4	48.3	0	90	5
2/09/2014	7:00	67.8	61.8	58.8	51.9	0	90	2
2/09/2014	8:00	67.4	62.1	58.8	52.2	0	360	4
2/09/2014	9:00	67.2	62.5	59.1	52.1	0	90	8
2/09/2014	10:00	67.4	62.3	58.9	50.9	0	90	5
2/09/2014	11:00	67.6	62.4	59.2	50.9	0	90	5
2/09/2014	12:00	67.5	62.4	58.8	49.9	0	90	2
2/09/2014	13:00	67.2	62.4	58.6	50	0	90	4
2/09/2014	14:00	67.9	62.8	59.7	50.4	0	40	9
2/09/2014	15:00	68.2	64.2	61.3	54.2	0	340	8
2/09/2014	16:00	69	64.9	61.8	56.1	0	280	8
2/09/2014	17:00	69.5	64.7	61.8	55.1	0	260	8
2/09/2014	18:00	67.4	63.8	60.3	54.2	0	260	5
2/09/2014	19:00	67.7	63.4	60.1	52.1	0	250	8
2/09/2014	20:00	67.1	61.5	57.8	49.1	0	250	5
2/09/2014	21:00	66.8	60.8	57.4	48.6	0	240	5
2/09/2014	22:00	66.8	60.1	57.8	48.6	0	0	0
2/09/2014	23:00	65.1	57.5	54.8	46.3	0	0	0
2/09/2014	0:00	64.6	55.7	53.6	44.2	0	0	0
3/09/2014	3/09/2014	61.6	53.4	51.5	43.7	0	0	0
3/09/2014	2:00	60.9	51.8	50.1	39.6	0	0	0
3/09/2014	3:00	61.4	51.5	50	38.7	0	0	0
3/09/2014	4:00	61.2	52.8	50.9	40.4	0	230	5
3/09/2014	5:00	63.3	56.6	54.2	47.6	0	180	9
3/09/2014	6:00	65.4	59.8	57.3	51.9	0	180	9
3/09/2014	7:00	68.5	63.2	60.5	55.7	0	170	11
3/09/2014	8:00	68.5	63.9	60.9	55.3	0	170	8
3/09/2014	9:00	68.3	63.5	60.2	54.4	0	150	9
3/09/2014	10:00	67.9	62.4	59	50.5	0	170	11
3/09/2014	11:00	67	62	58.1	49.1	0	120	8
3/09/2014	12:00	67.6	62.2	58.7	49.2	0	90	8
3/09/2014	13:00	67.2	62.4	58.5	49	0	140	5
3/09/2014	14:00	67.5	62.7	59.1	49.4	0	130	5
3/09/2014	15:00	67.5	62.5	58.8	49.6	0	120	8
3/09/2014	16:00	67.2	62.9	59.3	50.7	0	60	9
3/09/2014	17:00	68.3	62.8	59.0	50.8	0	60	11
3/09/2014	18:00	66.7	62.7	58.6	50.1	0	70	11
3/09/2014	19:00	67.2	63.1	58.8	50	0	70	8
3/09/2014	20:00	67.5	61.5	58.5	49	0	0	0
3/09/2014	21:00	67.2	60.8	57.1	47.7	0	0	0
3/09/2014	22:00	66.4	60.5	56.6	46.7	0	0	0
3/09/2014	23:00	65.7	58.2	55	45.2	0	60	4
3/09/2014	0:00	64.9	54.8	52.8	42.4	0	60	5

Hourly Noise Level Data

2A Abbey Street, Morley

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
4/09/2014	4/09/2014	62.5	50.6	50.3	40.1	0	0	0
4/09/2014	2:00	60.4	49	47.8	36.1	0	70	5
4/09/2014	3:00	60.8	49.6	48.1	35	0	90	8
4/09/2014	4:00	61.3	51.1	50	38.4	0	90	11
4/09/2014	5:00	62.7	53.9	51.7	43.4	0	90	13
4/09/2014	6:00	65.6	58.5	55.9	48.4	0	90	9
4/09/2014	7:00	68.2	62.3	59.1	52.5	0	90	11
4/09/2014	8:00	67.9	62.3	58.9	52.1	0	100	13
4/09/2014	9:00	66.8	61.8	58.1	51.2	0	90	11
4/09/2014	10:00	67.7	61.8	58.5	49.4	0	90	13
4/09/2014	11:00	69.5	63	59.4	48.3	0	100	13
4/09/2014	12:00	67.1	62.5	59	50.8	0	100	15
4/09/2014	13:00	67.2	61.7	58.1	48.1	0	110	15
4/09/2014	14:00	67.9	61.6	59	48.7	0	110	11
4/09/2014	15:00	69.3	63.1	59.6	50.5	0	100	11
4/09/2014	16:00	68.8	63.3	60	51.5	0	130	13
4/09/2014	17:00	70.2	63.6	60.2	52.6	0	110	9
4/09/2014	18:00	71.5	63.8	60.4	50.1	0	110	8
4/09/2014	19:00	68.5	63.3	59.5	49.8	0	90	5
4/09/2014	20:00	68.8	61.6	58.3	46.9	0	100	5
4/09/2014	21:00	67.7	61.2	57.8	45.2	0	0	0
4/09/2014	22:00	66.4	60.3	56.7	43.8	0	100	5
4/09/2014	23:00	65.8	57.2	54.3	41.7	0	130	5
4/09/2014	0:00	64.1	54	51.8	38.8	0	70	9
5/09/2014	5/09/2014	63.5	52	50.5	36.5	0	110	8
5/09/2014	2:00	60.1	47.2	45.8	33.7	0	60	13
5/09/2014	3:00	60.9	49.5	47.0	33.1	0	80	8
5/09/2014	4:00	60	49.8	48.2	37.3	0	90	8
5/09/2014	5:00	61.6	53.6	51.1	41.2	0	70	9
5/09/2014	6:00	65.7	58.2	55.8	47	0	60	4
5/09/2014	7:00	67.2	61.2	58.2	50.7	0	60	5
5/09/2014	8:00	68.1	62.6	58.9	51.6	0	60	2
5/09/2014	9:00	67.8	63	58.5	51.6	0	50	8
5/09/2014	10:00	67.4	61	58.1	48.5	0	40	13
5/09/2014	11:00	67.1	61.2	58.2	49.7	0	60	15
5/09/2014	12:00	67	61.5	58.3	49.7	0	50	13
5/09/2014	13:00	68.4	62.4	58.8	49.7	0	50	15
5/09/2014	14:00	67.4	61.6	58.5	49.1	0	30	13
5/09/2014	15:00	67.2	62.3	58.9	51.3	0	30	11
5/09/2014	16:00	68.9	64.2	61	53.9	0	270	11
5/09/2014	17:00	70.7	64.2	61.9	54.9	0	290	11
5/09/2014	18:00	69.6	64.1	61.8	54.4	0	280	11
5/09/2014	19:00	67.4	62.7	59.2	51.6	0	290	8
5/09/2014	20:00	67.2	61.4	57.8	48.2	0	0	0
5/09/2014	21:00	67.6	61.2	57.6	47.6	0	290	5
5/09/2014	22:00	66.1	60.3	56.7	47.3	0	290	8
5/09/2014	23:00	66.1	58.9	56.1	45.5	0	290	5
5/09/2014	0:00	65.3	57.8	54.6	43.5	0	290	5

Noise Logging - 2A Abbey Street, Morley

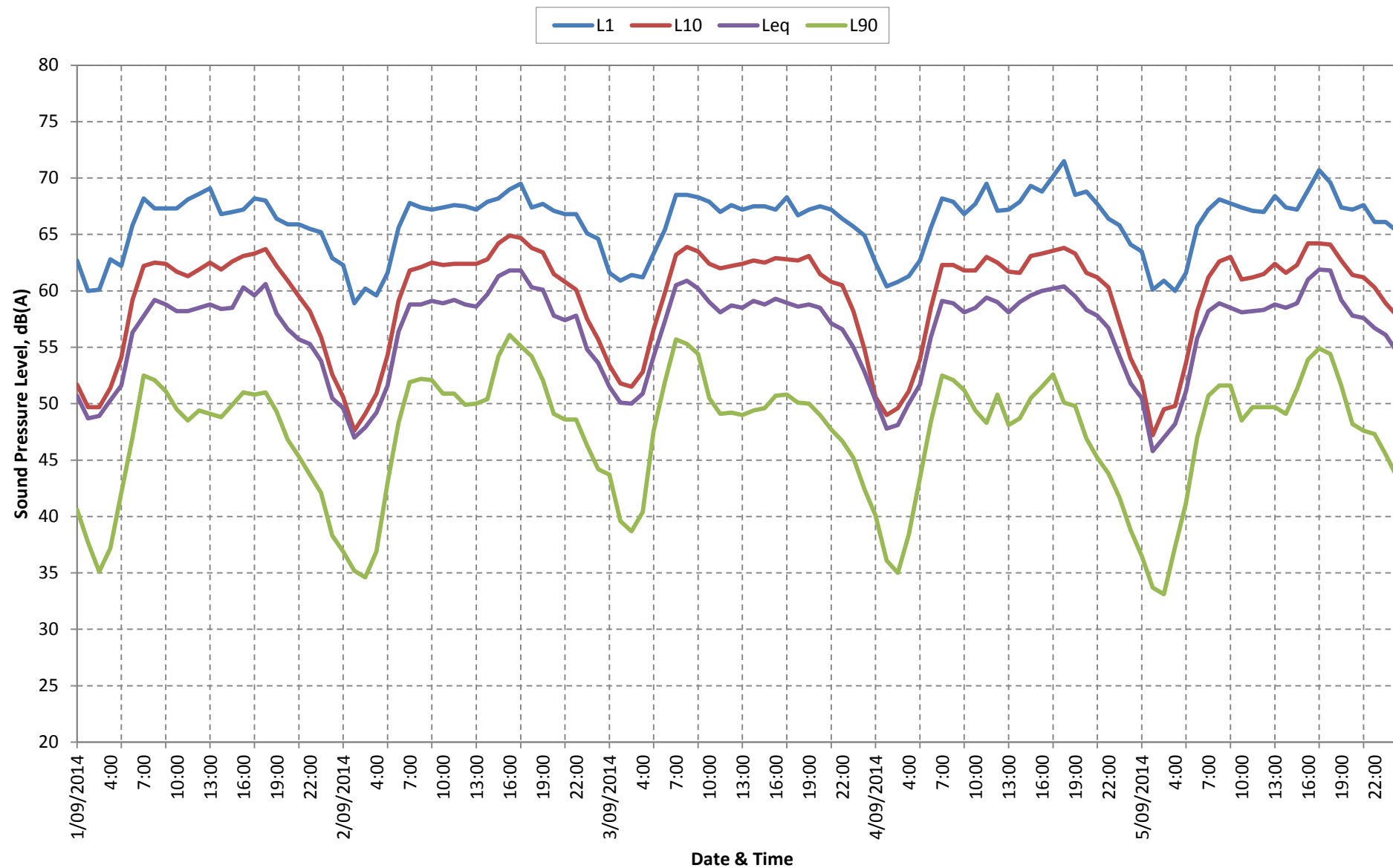


Table A5 – Results of Noise Logging 9 Clandon Way, Morley

Date	L_{A10,18hour}, dB	L_{Aeq,24hour}, dB	L_{Aeq(Day)}, dB	L_{Aeq(Night)}, dB
1 September 2014	59.3	56.7	57.8	52.7
2 September 2014	59.1	56.3	57.5	52.1
3 September 2014	59.8	57.1	58.2	53.9
4 September 2014	59.8	57.2	58.3	53.7
5 September 2014	59.1	56.5	57.7	52.2
Weekday Average	59.4	56.8	57.9	52.9

**Photograph A5 – Noise Logger at 9 Clandon Way, Morley**

Traffic Noise Measurement Data

Item	Details
LOCATION	
Project	Perth-Darwin Highway NorthlinkWA
Street address	No. 9 Clandon Way.
Locality	Morley
Occupier	Mike Williamson 92767107
Dates	1/9/2014 to 5/9/2014.
Category	Main Roads will provide this information if required.
SITE	
Distance from the microphone to the kerb	35m to Morley Dr
Height of the road in relation to the ground	0m
Road surface type	DGA
Speed zone	70 km/hr (Near Intersection)
Absorbing ground	50%
Angle of view	170
Road gradient	flat
Traffic flow	Vehicles per day. Main Roads to provide this information
Heavy vehicles	Percentage. Main Roads to provide this information
House-Road orientation.	South to Morley Dr
Carriageways & lanes.	2,4;
COMMENT	
Comment	Microphone placed on South façade at front of house Clear line of sight to Road.
REFERENCES	
AMG Z50 E/N	
Road name	Tonkin Highway.
EXCEL file	9 Clandon Way MRWA Logger Sheet.xlsx
Raw data file	9 Clandon 16-707-043_sta.csv
EQUIPMENT	
Analyser number	16-707-043
Microphone number	16-707-043
Calibrator number	34883971
Calibrator values	93.9, 93.8
Operator	Lloyd George Acoustics Pty Ltd - Matt Moyle
WEATHER	
Wind	Wind acceptability based on Mt Lawley Data 1/09/14 - Negative Winds 11-17 km/h from 10am 5pm 2/09/14 - Calm conditions Variable winds under 9km/h 3/09/14 - Variable winds up to 11km/h 4/09/14 - Variable winds 9-15km/h for 13 hours of day 5/09/14 - Negative winds up to 15km/h

Hourly Noise Level Data
9 Clandon Way, Morley

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
1/09/2014	1/09/2014	59.1	53.8	51	45.1	0	0	0
1/09/2014	2:00	56.8	52.1	49.2	42.3	0	0	0
1/09/2014	3:00	58.2	51.3	48.9	41.4	0	170	5
1/09/2014	4:00	59.4	53.5	50.6	43	0	0	0
1/09/2014	5:00	62.5	56.7	54.1	47.7	0	170	5
1/09/2014	6:00	64.4	60.4	57.6	52.2	0	80	5
1/09/2014	7:00	66.5	61.3	59	54.3	0	60	8
1/09/2014	8:00	66.8	61.6	59.3	54.9	0	90	8
1/09/2014	9:00	67.4	61.6	59.4	54.8	0	80	5
1/09/2014	10:00	66.4	60.7	58.8	52.4	0	80	11
1/09/2014	11:00	64.8	60	57.6	52	0	50	17
1/09/2014	12:00	65.1	60.2	57.5	51.7	0	70	13
1/09/2014	13:00	66.2	61.1	58.4	52.4	0	50	15
1/09/2014	14:00	65.7	60.8	58.0	51.6	0	60	15
1/09/2014	15:00	65.1	60.4	57.6	51.9	0	60	15
1/09/2014	16:00	67.3	60.7	58.6	53	0	30	13
1/09/2014	17:00	65	60.2	57.8	52.9	0	70	13
1/09/2014	18:00	68.1	60.1	57.7	52.5	0	70	9
1/09/2014	19:00	65.3	59.1	57.6	52	0	100	8
1/09/2014	20:00	63.5	58.2	55.7	50.2	0	100	4
1/09/2014	21:00	61	56.7	54.4	49.3	0	90	2
1/09/2014	22:00	61.9	56.9	54.3	48.2	0	0	0
1/09/2014	23:00	60.5	55.2	52.1	44.5	0	90	4
1/09/2014	0:00	58.5	52.4	49.6	42.3	0	80	5
2/09/2014	2/09/2014	58.6	51.5	49.6	41.1	0	80	5
2/09/2014	2:00	57	50.2	47.3	39.6	0	80	4
2/09/2014	3:00	56.4	51	47.6	38.7	0	150	5
2/09/2014	4:00	58.2	52.2	49	41	0	100	8
2/09/2014	5:00	61.4	56.1	53.1	46.6	0	100	8
2/09/2014	6:00	63.2	59.7	56.8	51	0	90	5
2/09/2014	7:00	66.6	61.3	58.8	53.9	0	90	2
2/09/2014	8:00	67.2	61.3	59.2	54.3	0	360	4
2/09/2014	9:00	66.4	60.5	58.4	52.7	0	90	8
2/09/2014	10:00	65.1	60	57.1	50.7	0	90	5
2/09/2014	11:00	65	59.9	57.4	51	0	90	5
2/09/2014	12:00	65.7	60.1	57.6	50.2	0	90	2
2/09/2014	13:00	65.7	59.7	57.1	49.8	0	90	4
2/09/2014	14:00	64.1	59.1	56.3	49.5	0	40	9
2/09/2014	15:00	65.7	59.7	57.4	51.1	0	340	8
2/09/2014	16:00	66.4	60.2	57.9	52.7	0	280	8
2/09/2014	17:00	66.1	60.1	58.3	52.4	0	260	8
2/09/2014	18:00	66.3	60.1	58.2	52.4	0	260	5
2/09/2014	19:00	65.3	59.3	57.1	52.2	0	250	8
2/09/2014	20:00	63.7	58.4	56	50.2	0	250	5
2/09/2014	21:00	63	57.6	55.4	50.2	0	240	5
2/09/2014	22:00	61.8	57.1	55	50.4	0	0	0
2/09/2014	23:00	60.5	55.7	53.3	48.1	0	0	0
2/09/2014	0:00	59.7	53.9	51	44.7	0	0	0
3/09/2014	3/09/2014	59.3	54.1	51.7	45.3	0	0	0
3/09/2014	2:00	59.6	53.3	50.4	42.1	0	0	0
3/09/2014	3:00	58.4	52.9	49.8	42	0	0	0
3/09/2014	4:00	59	54.1	50.9	43.4	0	230	5
3/09/2014	5:00	61.3	57.1	54.6	50.1	0	180	9
3/09/2014	6:00	64.1	60.9	58.3	53.6	0	180	9
3/09/2014	7:00	67	61.8	60	56.9	0	170	11
3/09/2014	8:00	67.5	61.9	60.1	56.1	0	170	8
3/09/2014	9:00	68.5	62.1	59.9	55.3	0	150	9
3/09/2014	10:00	66.9	60.9	58.6	51.7	0	170	11
3/09/2014	11:00	67.4	60.6	58.1	51.5	0	120	8
3/09/2014	12:00	65.9	60.3	57.9	51.3	0	90	8
3/09/2014	13:00	66	59.8	57.4	49.6	0	140	5
3/09/2014	14:00	67	60.5	58	50.7	0	130	5
3/09/2014	15:00	66.2	60.4	58.2	52	0	120	8
3/09/2014	16:00	68.4	60.3	58.3	53	0	60	9
3/09/2014	17:00	67.1	60.2	58.4	52.8	0	60	11
3/09/2014	18:00	65.2	60	57.6	52.7	0	70	11
3/09/2014	19:00	64.7	59.2	56.8	51.3	0	70	8
3/09/2014	20:00	64	59	56.5	51.1	0	0	0
3/09/2014	21:00	63.6	58.5	56.7	51.6	0	0	0
3/09/2014	22:00	62.2	57.6	55.2	50.2	0	0	0
3/09/2014	23:00	61.8	57	54.6	49.8	0	60	4
3/09/2014	0:00	60.7	55.5	53.4	47.4	0	60	5

Hourly Noise Level Data

9 Clandon Way, Morley

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
4/09/2014	4/09/2014	59.3	54.4	52	45.7	0	0	0
4/09/2014	2:00	58	52.2	49.2	41.5	0	70	5
4/09/2014	3:00	58.7	51.7	48.8	39.8	0	90	8
4/09/2014	4:00	60.8	53.8	51.5	44.3	0	90	11
4/09/2014	5:00	63.3	57.2	54.7	48.4	0	90	13
4/09/2014	6:00	64.8	61.4	58.8	53.6	0	90	9
4/09/2014	7:00	67.3	61.4	59.0	57.3	0	90	11
4/09/2014	8:00	65.5	61.3	59.1	55.3	0	100	13
4/09/2014	9:00	66.1	60.7	58.5	54.2	0	90	11
4/09/2014	10:00	70.7	62.4	59.5	54.1	0	90	13
4/09/2014	11:00	68.3	62	59.1	53.2	0	100	13
4/09/2014	12:00	65.9	61	58.6	53.5	0	100	15
4/09/2014	13:00	65.6	60.6	58.2	52.9	0	110	15
4/09/2014	14:00	68.6	61.0	59.7	53	0	110	11
4/09/2014	15:00	68.6	61.3	59.6	53.4	0	100	11
4/09/2014	16:00	67.8	61	58.9	53.6	0	130	13
4/09/2014	17:00	66.5	60.2	58.1	53	0	110	9
4/09/2014	18:00	66.2	60.9	58.1	51.9	0	110	8
4/09/2014	19:00	64.8	59.7	56.9	51.3	0	90	5
4/09/2014	20:00	63.4	58.4	55.6	49.1	0	100	5
4/09/2014	21:00	65.9	58.1	56	48	0	0	0
4/09/2014	22:00	62.9	57.3	55.0	47.8	0	100	5
4/09/2014	23:00	62.3	56.2	53.9	47.6	0	130	5
4/09/2014	0:00	59.4	53.4	50.6	43.2	0	70	9
5/09/2014	5/09/2014	59.6	52.3	50.6	40.8	0	110	8
5/09/2014	2:00	55.5	49.3	46	37.1	0	60	13
5/09/2014	3:00	58.2	49.4	46.8	37	0	80	8
5/09/2014	4:00	58.4	51.7	48.3	38.5	0	90	8
5/09/2014	5:00	60.6	54.9	51.7	43.4	0	70	9
5/09/2014	6:00	63.7	60.3	57.1	49.4	0	60	4
5/09/2014	7:00	65.2	60.6	58.1	53	0	60	5
5/09/2014	8:00	67.1	60.9	58.4	52.8	0	60	2
5/09/2014	9:00	66	60.1	58.3	52	0	50	8
5/09/2014	10:00	65.6	60.4	57.8	51.6	0	40	13
5/09/2014	11:00	67.9	60.3	58.1	50.6	0	60	15
5/09/2014	12:00	66.5	59.6	57.7	50.4	0	50	13
5/09/2014	13:00	66.6	59.5	57.6	50.4	0	50	15
5/09/2014	14:00	65.3	59.3	57.4	50.4	0	30	13
5/09/2014	15:00	67.7	59.8	58	50.7	0	30	11
5/09/2014	16:00	68.5	61.1	58.5	51.6	0	270	11
5/09/2014	17:00	68.9	60.7	58.8	51.2	0	290	11
5/09/2014	18:00	66.2	59.6	58.2	50.2	0	280	11
5/09/2014	19:00	66.9	58.9	57.4	52.1	0	290	8
5/09/2014	20:00	65.2	58.2	56.6	47.7	0	0	0
5/09/2014	21:00	65.9	57.9	55.3	46.4	0	290	5
5/09/2014	22:00	65.6	57.3	54.4	46.1	0	290	8
5/09/2014	23:00	61.3	55.7	53.5	43.9	0	290	5
5/09/2014	0:00	62.4	54.7	52.2	42.4	0	290	5

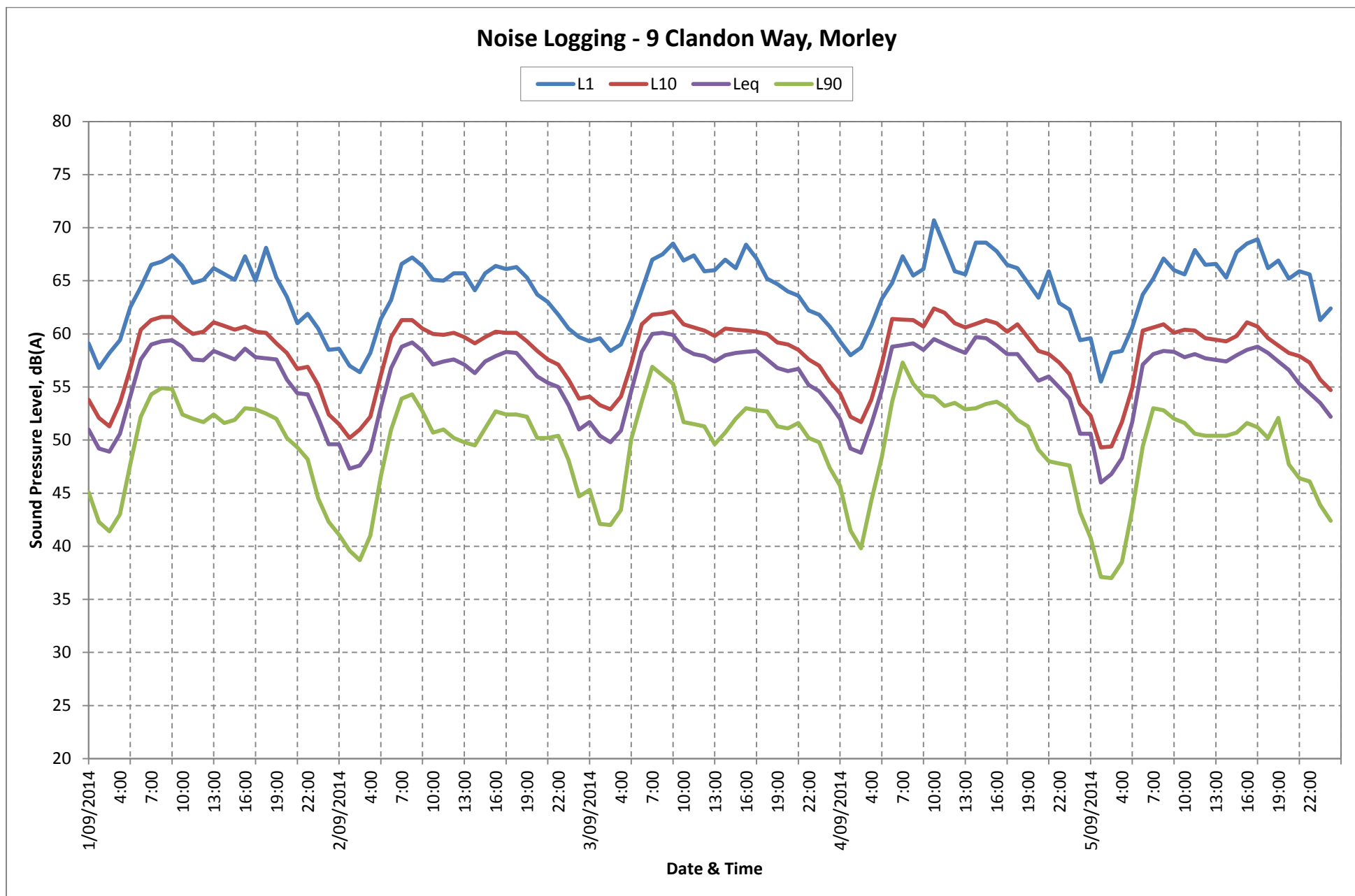


Table A6 – Results of Noise Logging 48 Alfreda Avenue, Morley

Date	L_{A10,18hour}, dB	L_{Aeq,24hour}, dB	L_{Aeq(Day)}, dB	L_{Aeq(Night)}, dB
8 September 2014*	60.6	58.3	58.5	57.9
9 September 2014	58.5	55.7	56.7	52.3
10 September 2014	58.6	55.1	56.1	52.2
11 September 2014	60.0	56.6	57.6	53.9
12 September 2014	60.2	57.1	57.9	55.2
Weekday Average	59.3	56.1	57.1	53.4

*Day excluded from the Average due to unacceptable weather conditions.

**Photograph A6 – Noise Logger at 48 Alfreda Avenue, Morley**

Traffic Noise Measurement Data

Item	Details
LOCATION	
Project	Perth-Darwin Highway NorthlinkWA
Street address	48 Alfreda Way.
Locality	Morley
Occupier	Marco Comito 0438990059
Dates	8/9/2014 to 12/9/2014.
Category	Main Roads will provide this information if required.
SITE	
Distance from the microphone to the kerb	70m to Tonkin Hwy
Height of the road in relation to the ground	0m
Road surface type	DGA
Speed zone	90 km/hr
Absorbing ground	80%
Angle of view	180
Road gradient	flat
Traffic flow	Vehicles per day. Main Roads to provide this information
Heavy vehicles	Percentage. Main Roads to provide this information
House-Road orientation.	East
Carriageways & lanes.	2,4;
COMMENT	
Comment	Microphone placed on East façade at front of house Vegetation buffer between Alfreda Ave and Tonkin Hwy.
REFERENCES	
AMG Z50 E/N	
Road name	Tonkin Highway.
EXCEL file	48 Alfreda Ave MRWA Logger Sheet.xlsx
Raw data file	48 Alfreda 15-301-468_sta.csv
EQUIPMENT	
Analyser number	15-301-468
Microphone number	15-301-468
Calibrator number	34883971
Calibrator values	94.0, 93.6
Operator	Lloyd George Acoustics Pty Ltd - Matt Moyle
WEATHER	
Wind	Wind acceptability based on Mt Lawley Data 8/09/14 - High Neg Winds up to 30 km/h All day, some showers, excluded 9/09/14 - Negs winds up to 18km/h in morning, Avg 13 km/h Neg wind during 10/09/14 - Neg winds up to 13km/h, one hour at 15km/h 11/09/14 - Variable winds up to 13km/h 12/09/14 - Negative winds up to 18km/h

Hourly Noise Level Data
48 Alfreda Ave, Morley

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
8/09/2014	8/09/2014	67.2	62.7	59.5	53.2	0.4	260	30
8/09/2014	2:00	65.9	61.1	57.6	50.8	0.2	270	26
8/09/2014	3:00	69.8	61.8	59.3	50.6	0	270	21
8/09/2014	4:00	66.5	62	58.8	52.2	0.6	260	31
8/09/2014	5:00	65.7	61.2	58.3	52.6	0	260	22
8/09/2014	6:00	65	61.5	58.7	53	0.2	260	24
8/09/2014	7:00	64.1	61.8	58.8	52.9	0	260	22
8/09/2014	8:00	63.9	60.8	57.8	50.5	0	260	22
8/09/2014	9:00	65.1	60.6	57.6	48.8	0	270	13
8/09/2014	10:00	64.4	60.9	57.9	50.7	0	270	18
8/09/2014	11:00	65.9	61.5	58.6	52.5	0	290	22
8/09/2014	12:00	64	61.1	58.4	52.4	0.2	300	18
8/09/2014	13:00	65.4	61.6	58.7	51.7	0	280	21
8/09/2014	14:00	65	62	59.2	54	0	290	21
8/09/2014	15:00	66.2	62.5	59.8	53.8	0	280	18
8/09/2014	16:00	65.6	62	59.5	53.2	0	290	28
8/09/2014	17:00	66.3	61.8	59.3	53	0	300	21
8/09/2014	18:00	66.4	61.6	59	52.9	0.4	290	22
8/09/2014	19:00	67.5	62.4	59.7	52.7	0	290	24
8/09/2014	20:00	63.5	59.9	57.1	51.3	0	290	21
8/09/2014	21:00	63.9	59.9	56.8	51.2	0	280	22
8/09/2014	22:00	63.7	58.3	55.8	49	0	290	24
8/09/2014	23:00	60.8	56.8	54.3	48.1	0	270	22
8/09/2014	0:00	58.2	55.1	52.2	46.3	0.2	250	22
9/09/2014	9/09/2014	58.5	54.5	51.5	44.5	0	260	21
9/09/2014	2:00	59	52.9	50.1	41.8	0	240	18
9/09/2014	3:00	57.2	51.9	48.5	38.5	0	250	17
9/09/2014	4:00	58.4	53.1	50	40.4	0	250	17
9/09/2014	5:00	61.1	57.2	54.1	46.2	0	230	15
9/09/2014	6:00	63	60.1	57	50.2	0	240	15
9/09/2014	7:00	64	61.4	58.3	50.6	0	250	17
9/09/2014	8:00	64.9	61.9	58.8	51.7	0	250	9
9/09/2014	9:00	66.3	62.5	59.6	51.1	0	250	5
9/09/2014	10:00	64.7	61.5	58	47.3	0	230	2
9/09/2014	11:00	62.6	59.3	56.5	50.4	0	260	13
9/09/2014	12:00	65.2	60.6	58.5	50.7	0	240	15
9/09/2014	13:00	63.3	58.9	56.1	47.3	0	260	15
9/09/2014	14:00	63.9	59.3	56.4	45.5	0	240	13
9/09/2014	15:00	62.3	59.2	55.9	44.9	0	270	13
9/09/2014	16:00	63.1	58.9	56	45.4	0	260	13
9/09/2014	17:00	62.2	58.3	56.4	46.3	0	270	11
9/09/2014	18:00	61.7	58.2	55.5	46	0	250	13
9/09/2014	19:00	62.3	58.4	55.7	43.1	0	270	9
9/09/2014	20:00	60.7	56.6	53.9	43.3	0	240	5
9/09/2014	21:00	59.8	56.2	53	42.5	0	260	5
9/09/2014	22:00	59.3	55.6	52.6	42.9	0	270	4
9/09/2014	23:00	57.4	53.7	50	39.6	0	270	11
9/09/2014	0:00	56.9	52.9	49.1	36.2	0	310	8
10/09/2014	10/09/2014	55.5	50.8	47.4	34.5	0	280	11
10/09/2014	2:00	58.8	52.3	48.6	31.2	0	0	0
10/09/2014	3:00	56.7	50.5	46.8	30.6	0	280	4
10/09/2014	4:00	58.9	52.4	49.1	34.6	0	270	8
10/09/2014	5:00	60.2	56.6	53.4	43.9	0	310	5
10/09/2014	6:00	63.1	59.5	56.3	47.1	0	260	11
10/09/2014	7:00	64.2	60.6	57.2	49.4	0	250	9
10/09/2014	8:00	64.1	60.3	57.5	48.5	0	260	9
10/09/2014	9:00	64.1	59.7	56.8	45.6	0	260	9
10/09/2014	10:00	63.4	59.6	56.2	45.4	0	280	9
10/09/2014	11:00	62.9	58.6	55.7	46.5	0	290	11
10/09/2014	12:00	62.3	58.8	55.2	42.5	0	280	11
10/09/2014	13:00	61.8	58.7	55.1	42.2	0	310	11
10/09/2014	14:00	62.5	58.6	55.3	43.6	0	270	13
10/09/2014	15:00	62.3	58.8	55.6	44.6	0	270	13
10/09/2014	16:00	62.7	58.7	55.9	46	0	280	15
10/09/2014	17:00	63.3	58.3	57.3	46.7	0	270	11
10/09/2014	18:00	62	58.3	56.5	47.5	0	240	9
10/09/2014	19:00	61.7	58	55	43.1	0	230	9
10/09/2014	20:00	61.9	58.4	56.3	45.7	0	210	11
10/09/2014	21:00	61.6	58	54.7	45	0	170	9
10/09/2014	22:00	61.8	58.5	55.4	46.2	0	190	5
10/09/2014	23:00	61.1	57.5	54	44.6	0	190	4
10/09/2014	0:00	57.9	54.6	52.1	42.1	0	0	0

Hourly Noise Level Data
48 Alfreda Ave, Morley

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
11/09/2014	11/09/2014	58.2	54.2	50.8	40.3	0	0	0
11/09/2014	2:00	58.2	53.1	49.3	34.5	0	0	0
11/09/2014	3:00	60.7	53.4	49.9	34	0	0	0
11/09/2014	4:00	59.1	54.5	50.8	37.5	0	20	8
11/09/2014	5:00	62.2	58	54.7	45	0	20	4
11/09/2014	6:00	64.3	62	58.5	49.4	0	10	4
11/09/2014	7:00	65.2	62.7	59.7	51.7	0	30	2
11/09/2014	8:00	65	62.6	59.5	51.4	0	30	2
11/09/2014	9:00	65.8	62.9	59.3	48.2	0	30	8
11/09/2014	10:00	64.6	61.9	58.3	46.5	0	40	8
11/09/2014	11:00	64.8	61.4	58.3	49.9	0	20	9
11/09/2014	12:00	63.4	59.6	56.6	48.7	0	360	8
11/09/2014	13:00	67.5	59.2	57.1	47	0	290	11
11/09/2014	14:00	65.6	59.5	56.8	42.1	0	290	9
11/09/2014	15:00	62.1	58.5	55.3	44.1	0	290	13
11/09/2014	16:00	62	58.2	55.2	45.9	0	270	11
11/09/2014	17:00	62.5	58.8	55.9	44.5	0	260	13
11/09/2014	18:00	62.7	59.1	56.6	47.2	0	250	11
11/09/2014	19:00	62.1	59.5	56.2	45.6	0	240	11
11/09/2014	20:00	63.7	60.2	57.4	48	0	220	9
11/09/2014	21:00	64	61.3	58.1	49.6	0	0	0
11/09/2014	22:00	62.6	60	57	49.6	0	0	0
11/09/2014	23:00	61.8	58.3	55.3	46.6	0	0	0
11/09/2014	0:00	60.7	56.4	53.2	43.4	0	0	0
12/09/2014	12/09/2014	58.9	55.2	51.6	41	0	0	0
12/09/2014	2:00	59.7	54.2	50.8	38.6	0	0	0
12/09/2014	3:00	61.1	54.3	50.8	37.1	0	0	0
12/09/2014	4:00	60.8	55.9	52.5	41.3	0	0	0
12/09/2014	5:00	62.7	59.1	55.8	46.4	0	0	0
12/09/2014	6:00	66.1	63	59.8	51.9	0	0	0
12/09/2014	7:00	66.1	63.8	61.1	54.1	0	220	2
12/09/2014	8:00	66.9	63.7	60.7	52.2	0	210	9
12/09/2014	9:00	65.5	62.6	59.4	49.5	0	30	8
12/09/2014	10:00	65.9	62.6	59.5	47	0	30	9
12/09/2014	11:00	64.9	61.3	58.1	46.3	0	20	9
12/09/2014	12:00	68.1	60.8	58.4	46.8	0	340	8
12/09/2014	13:00	65.0	59.3	56.6	45.1	0	300	5
12/09/2014	14:00	61.9	57.8	54.7	43.4	0	310	11
12/09/2014	15:00	61.7	58.5	55.5	46.3	0	240	15
12/09/2014	16:00	62.2	58.8	55.8	47.3	0	260	17
12/09/2014	17:00	61.4	57.8	55.2	50.1	0	250	17
12/09/2014	18:00	63	59.3	56.7	49.7	0	240	18
12/09/2014	19:00	62.9	60	56.9	47.5	0	230	13
12/09/2014	20:00	62.9	59	55.7	45.5	0	220	13
12/09/2014	21:00	64.3	59.9	56.8	46.6	0	220	9
12/09/2014	22:00	63.9	61.2	57.9	49.5	0	0	0
12/09/2014	23:00	63.5	59.1	56.2	48.4	0	0	0
12/09/2014	0:00	62.3	57.8	54.9	46.4	0	0	0

Noise Logging - 48 Alfreda Ave, Morley

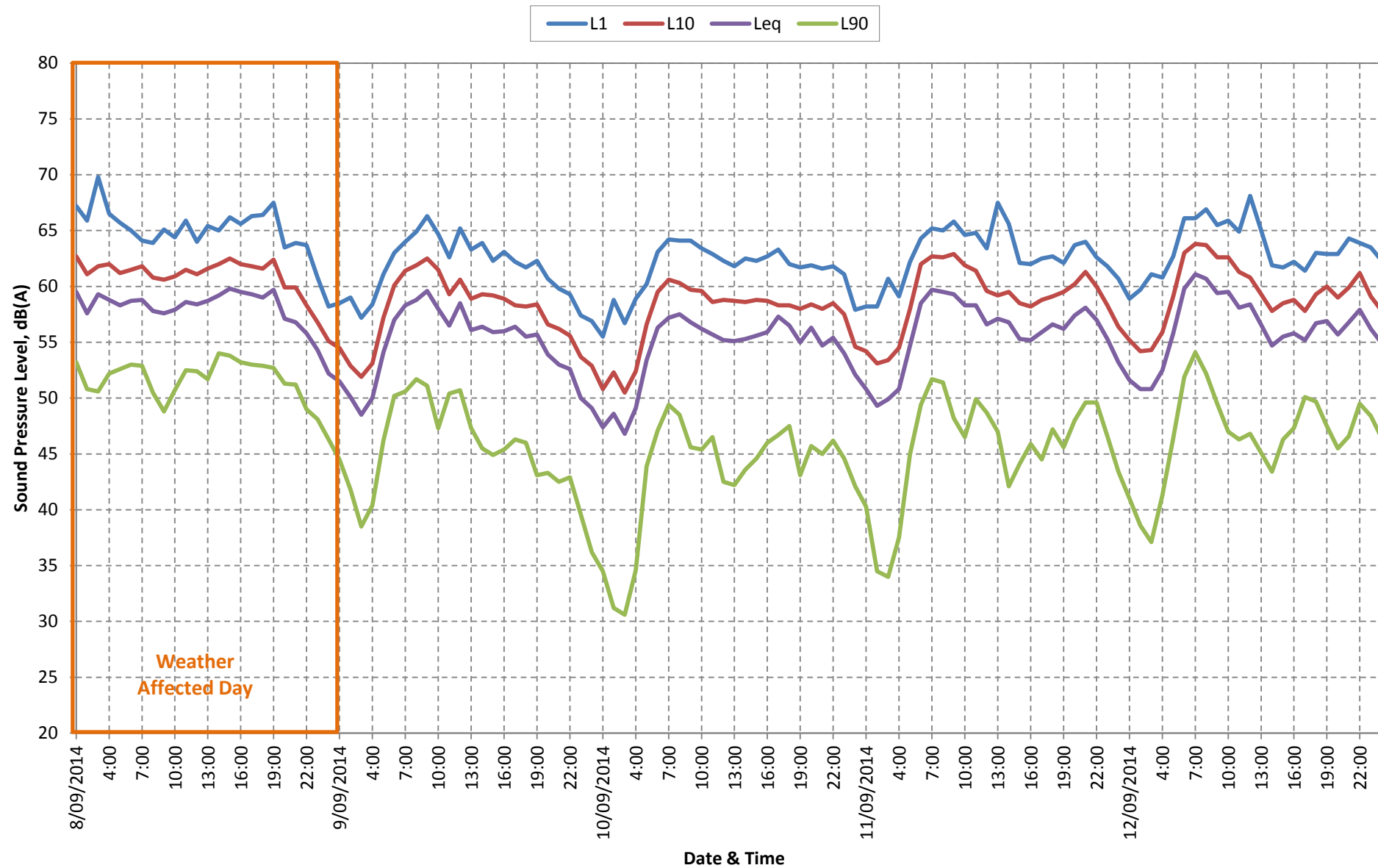


Table A7 – Results of Noise Logging 100 Alfreda Avenue, Morley

Date	L_{A10,18hour}, dB	L_{Aeq,24hour}, dB	L_{Aeq(Day)}, dB	L_{Aeq(Night)}, dB
8 September 2014*	60.0	57.9	58.3	57.1
9 September 2014	58.4	55.3	56.3	52.3
10 September 2014	58.7	55.4	56.0	54.0
11 September 2014	60.2	57.1	57.6	55.6
12 September 2014	59.9	57.3	57.6	56.6
Weekday Average	59.3	56.3	56.9	54.6

*Day excluded from the Average due to unacceptable weather conditions.

**Photograph A7 – Noise Logger at 100 Alfreda Avenue, Morley**