

Traffic Noise Assessment

Northlink Stage 3

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1 INTRODUCTION

This report details the results of the Northlink Stage 3 post-construction traffic noise measurements. Measurements were conducted at eight locations along the project route, as shown in *Figure 1-1*.

The measurements were undertaken over the following periods:

- 1 to 9 July 2020 (locations west of highway);
- 11 to 14 August 2020 (locations east of highway).

In the first round of measurement, the timing was partially within school holiday periods, however, this was accounted for with simultaneous traffic counts being undertaken.

It should be noted that weather conditions were adverse for several days during the measurement periods and traffic management was in place at some sections. Where this is considered to affect the results, the days have been highlighted and excluded from the average noise level.

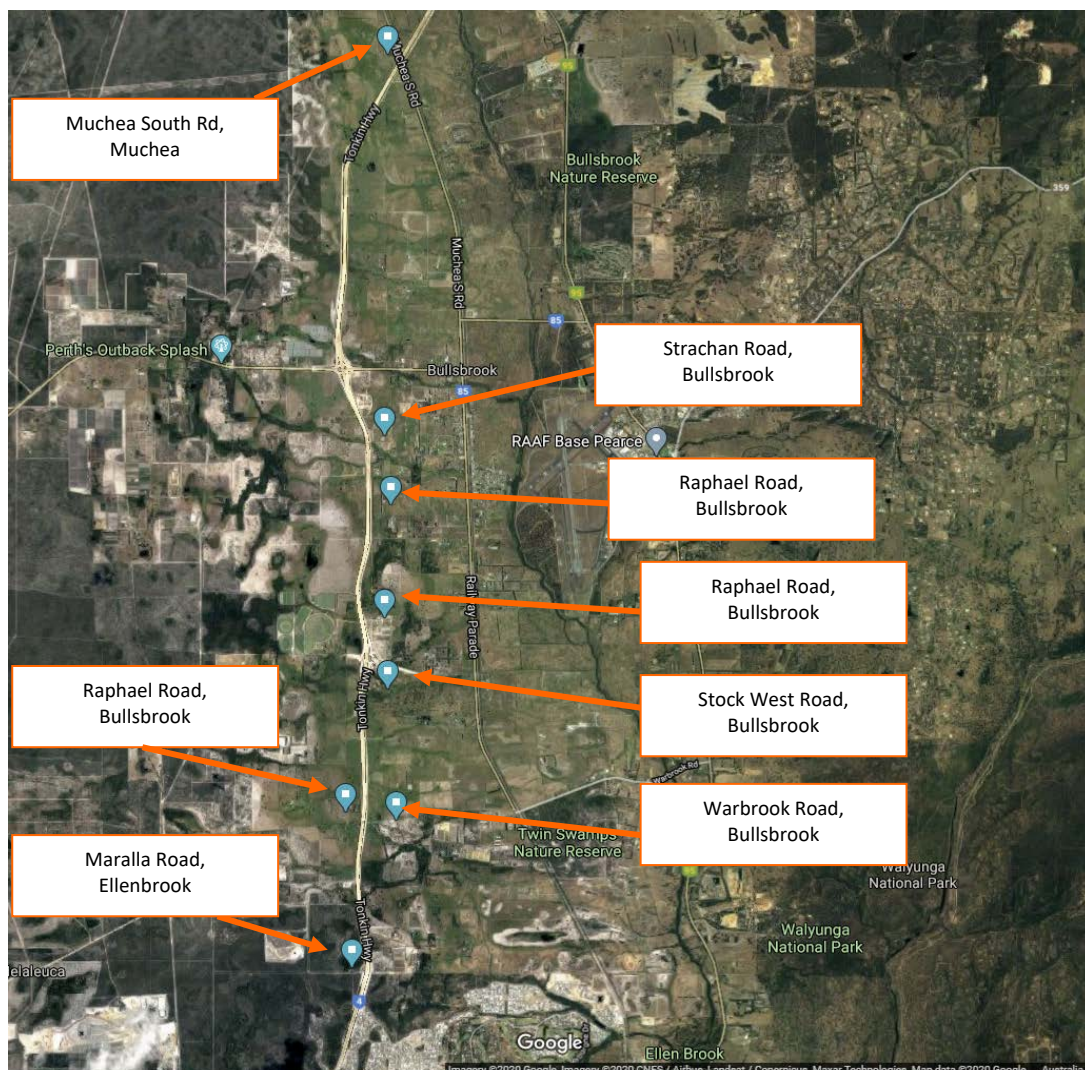


Figure 1-1 Aerial View of Sites – Google Imagery

2 METHODOLOGY

Sound pressure levels were measured in accordance with Australian Standard 2702-1984: *Acoustics - Method For Measurement of Road Traffic Noise* and Main Roads WA standard measurement procedures, with the loggers positioned at one metre from the closest habitable façade of each residence. The logger was placed at least one metre from any corner of the building and the microphone height was approximately 1.4 metres above floor level.

The statistical noise data loggers were programmed to record hourly L_{A1} , L_{A10} , L_{A90} , and L_{Aeq} levels. From the hourly measurements, the $L_{A10,18 \text{ hour}}$, $L_{Aeq,24 \text{ hour}}$, $L_{Aeq,(day)}$ and $L_{Aeq,(night)}$ values were determined for each complete measurement day. These results were averaged and the mean level reported. 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 loggers were calibrated before and after the measurements. The difference between the before and after calibrated levels was less than 1 dB.

The weather conditions during the measurement period were obtained from the Bureau of Meteorology's Pearce Airbase measurement station. This data was compared against the Main Roads WA specifications for measurement conditions and comments provided.

A description of some of the terminology used throughout this report is provided in *Appendix B*.

3 RESULTS

3.1 Noise Measurements

Table 3-1 provides a summary of the noise monitoring undertaken at each residence. Full details of the results of this survey are presented in Appendix A.

Table 3-1 Average Noise Measurement Results

Location	Average Noise Level, dB			
	L _{A10,18hour}	L _{Aeq,24hour}	L _{Aeq (Day)}	L _{Aeq (Night)}
West Locations				
Muchea South Road, Muchea*	62.6	59.2	60.6	53.6
Raphael Road, Bullsbrook	64.7	61.2	62.4	56.7
Maralla Road, Ellenbrook	57.2	54.0	57.0	50.4
East Locations				
Strachan Road, Bullsbrook	63.0	59.6	60.9	54.3
Raphael Road, Bullsbrook	61.3	57.9	59.0	54.2
Raphael Road, Bullsbrook	58.9	56.3	57.2	53.5
Stock West Road, Bullsbrook	55.1	52.2	53.5	47.3
Warbrook Road, Bullsbrook	54.7	52.7	53.6	49.7

*Measurements are average of 2 full days only, as other days deemed not suitable for inclusion.

Weather conditions during the measurement period were considered to be acceptable on all days except:

- 4 July 2020 – High winds
- 5 July 2020 – Sunday (number of vehicles was too low)
- 6 July 2020 – High winds and/or Rain, negative winds
- 7 July 2020 – Negative winds
- 9 July 2020 – Negative winds to some locations
- 11 August 2020 - High winds and/or Rain

4 ASSESSMENT

The results of the noise measurements provided in *Section 3*, have been adjusted to represent the future (2040) traffic noise levels based on the expected increase in traffic volumes on Tonkin Highway in the next 20 years.

The adjusted traffic noise levels are then compared against the predicted future traffic noise level, calculated during the design phase of the project, which was used to determine the extent of noise control to noise affected noise sensitive residences. The results of this comparison are provided in *Table 4-1*.

Table 4-1 Comparison Between Measured and Predicted Results

Location	Adjusted Noise Level Based on Measurement Results		Predicted Future Noise Level Calculated During Design Phase		Difference Day/Night dB
	L _{Aeq} (Day) dB	L _{Aeq} (Night) dB	L _{Aeq} (Day) dB	L _{Aeq} (Night) dB	
West Locations					
Muchea South Road, Muchea*	64.5	57.5	61.3	54.7	+3.2/+2.8
Raphael Road, Bullsbrook	67.4	61.7	67.3	60.6	+0.1/+1.1
Maralla Road, Ellenbrook	62.0	55.4	61.0	54.5	+1.0/+0.9
East Locations					
Strachan Road, Bullsbrook	64.9	58.3	65.0	58.4	+0.1/+0.1
Raphael Road, Bullsbrook	63.0	58.2	61.5	54.9	+1.5/+3.3
Raphael Road, Bullsbrook	61.2	57.5	61.2	54.7	0.0/+2.8
Stock West Road, Bullsbrook	58.5	51.3	61.0	54.5	-1.5/-3.2
Warbrook Road, Bullsbrook	58.6	53.7	58.1	51.6	+0.5/+2.1

*Traffic counts were not available during this measurement period. In addition, as the noise is averaged over only two days, the results are likely to be less robust.

5 DISCUSSION

The results confirm that as the daytime levels are generally greater than 5 dB above the night time levels, it is the daytime noise levels that dominate in terms of compliance with project traffic noise criteria, where daytime allowable levels are 5 dB higher than night-time allowable levels.

Apart from the residence at Muchea South Road, which is likely to be less robust as traffic counting did not occur during the measurement period and only two measurement days were useable, the measured $L_{Aeq,(day)}$ noise levels, adjusted for future traffic volumes, are within ± 1.5 dB of the predicted noise levels.

As the accuracy of traffic noise modelling, where calibration of the model is not possible (being a new road), is generally ± 3 dB, it can be seen that a very good correlation between predicted and measured noise levels is achieved.

In addition, based on the measured noise level, our calculations confirm that the noise mitigation measures specified for residences adjacent to the project route is sufficient in achieving a compliant internal noise level. This includes the residence at Muchea South Road. In this case, the recommended treatment was awning windows with 6.5mm VLam Hush glazing. Such glazing is expected to have a performance of $R_w + C_{tr}$ 30 acoustic rating, which is sufficient in achieving compliant internal noise levels considering the size of the windows and floor area.

Appendix A

NOISE MONITORING DATA SHEETS

Table A1 –Noise Measurement Summary at Muchea South Road, Muchea

Date	L _{A10,18hour} dB	L _{Aeq,24hour} dB	L _{Aeq(Day)} dB	L _{Aeq(Night)} dB
1/07/20	59.4	55.1	56.1	52.0
2/07/20	62.3	58.6	59.8	54.1
3/07/20	62.9	59.3	60.6	53.1
4/07/20	60.7	57.2	58.4	52.1
5/07/20	59.5	56.6	58.0	49.2
6/07/20	59.3	55.8	57.1	50.3
7/07/20	58.2	54.8	55.8	51.7
Average	63	59	60	54

*Highlighted rows indicate days where weather/traffic conditions were not suitable (excluded from average)



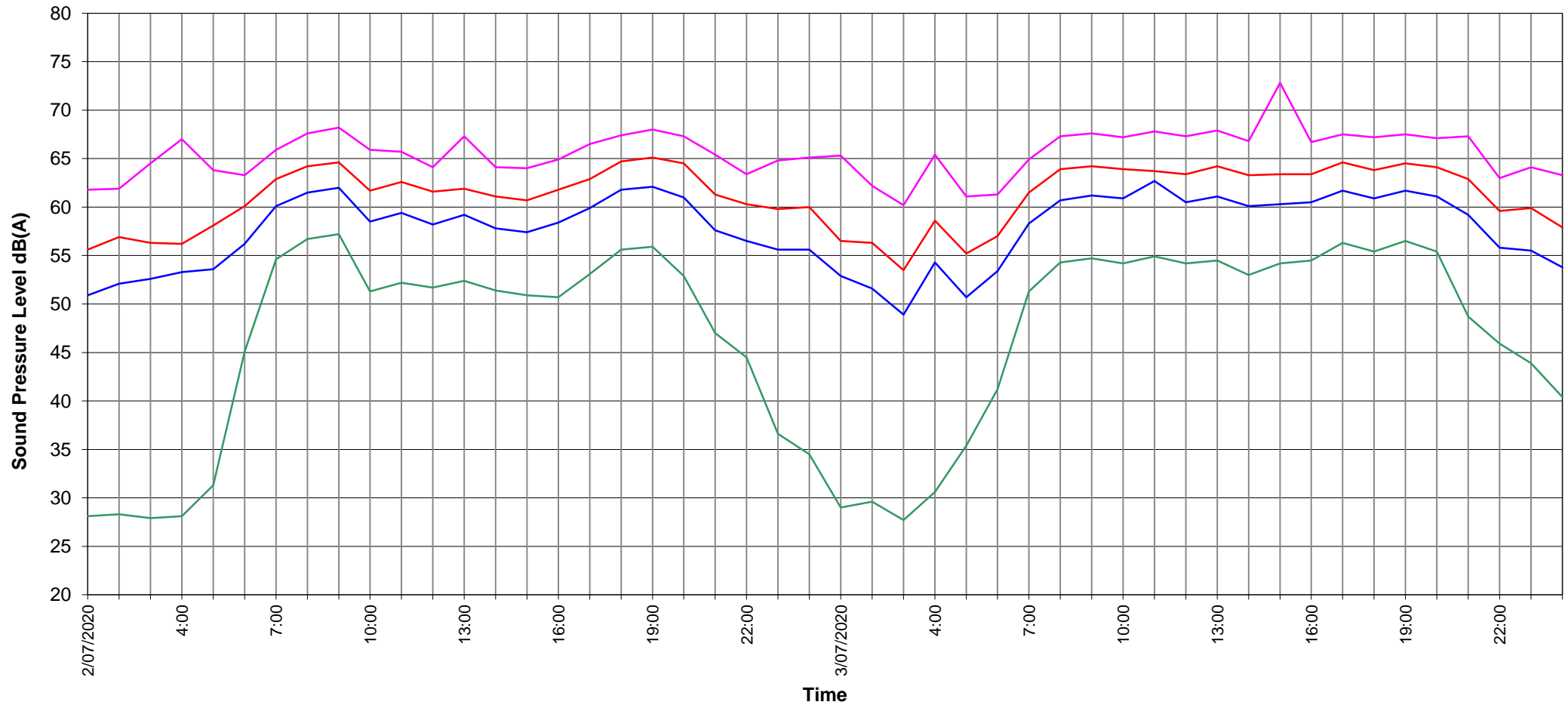
Logger Position – Muchea South Road

Traffic Noise Measurement Data

Item	Details
LOCATION	
Project	Northlink Stage 3 Northern Section
Street address	Muchea South Road, Muchea
Locality	Muchea
Occupier	
Dates	2 to 9 July 2020
Category	Main Roads to provide this information
SITE	
Distance from microphone to kerb	170 Metres
Height of the road in relation to the ground	+7m
Road surface type	Main Roads to provide this information
Speed zone	110 km/h
Absorbing ground	100%
Angle of view	150 deg
Road gradient	Level
Traffic flow	Main Roads to provide this information
Heavy vehicles	Main Roads to provide this information
House-Road orientation.	East
Carriageways & lanes.	2, 4
COMMENT	
Comment	Microphone 1.4m above ground level Microphone 1.0m from East facade of house (adjacent front door) Logger is under a small verandah Highway Bridge goes over Muchea South Road
REFERENCES	
AMG Z50 E/N	Main Roads to provide this information
Road name	Tonkin Highway
EXCEL file	MucheaS.xls
Raw data file	MucheaS_Sta.csv
EQUIPMENT	
Analyser number	15-301-468
Microphone number	15-301-468
Calibrator number	2292775
Calibrator values	93.7, 93.6
Operator	Lloyd George Acoustics Pty Ltd - Matt Moyle
WEATHER	
Wind	1/7/20 - weather is valid but abnormally low level, possible TM 4/7/20 - High winds - measurement excluded 5/7/20 - Traffic volumes low (Sunday) - measurement excluded 6/7/20 - Negative winds prevailing - measurement excluded 7/7/20 - Negative winds prevailing - measurement excluded

Traffic Noise Measurements - Muchea South Road, Muchea 2 to 3 July 2020

L1 L10 Leq L90



			Hourly Noise Level Data					
			Muchea South Rd, Muchea					
Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
2/07/2020	1	59.3	51.8	47.7	26.3	0	170	2
2/07/2020	2	60.5	53.3	48.6	25.7	0	170	8
2/07/2020	3	62.3	52.6	49.8	25.7	0	0	0
2/07/2020	4	60.6	54.0	49.5	25.8	0	0	0
2/07/2020	5	62.8	58.0	52.6	27.7	0	170	2
2/07/2020	6	63.1	60.3	56.1	37.7	0	0	0
2/07/2020	7	64.1	61.3	58.1	50.2	0	170	5
2/07/2020	8	64.4	62.0	59.7	55.3	0	170	2
2/07/2020	9	63.1	61.3	58.9	54.4	0	0	0
2/07/2020	10	61.9	59.5	56.3	50.2	0	220	2
2/07/2020	11	64.2	60.7	58.1	49.4	0	110	11
2/07/2020	12	63.6	60.2	57.4	49.9	0	80	15
2/07/2020	13	61.3	58.5	55.4	48.8	0	130	9
2/07/2020	14	65.1	57.0	55.8	42.8	0	70	11
2/07/2020	15	63.1	59.0	56.1	48.3	0	130	8
2/07/2020	16	62.1	58.2	55.0	46.4	0	130	11
2/07/2020	17	67.1	59.8	57.3	49.7	0	110	15
2/07/2020	18	62.3	59.0	56.1	49.1	0	100	13
2/07/2020	19	62.0	58.4	55.2	48.0	0	110	9
2/07/2020	20	62.5	58.8	55.4	46.5	0	110	8
2/07/2020	21	63.6	59.6	55.8	44.2	0	120	8
2/07/2020	22	62.0	58.2	54.3	39.0	0	110	5
2/07/2020	23	60.5	55.5	51.2	31.2	0	170	9
2/07/2020	0	59.3	53.3	49.1	30.2	0	190	4
3/07/2020	1	58.3	52.3	47.8	28.7	0	170	5
3/07/2020	2	61.5	54.2	49.9	28.7	0	90	11
3/07/2020	3	60.4	52.2	48.4	27.5	0	0	0
3/07/2020	4	61.3	54.2	50.4	31.6	0	20	2
3/07/2020	5	61.8	56.3	51.9	37.7	0	260	8
3/07/2020	6	63.0	59.0	54.9	41.6	0	30	13
3/07/2020	7	64.0	60.1	56.8	48.4	0	360	2
3/07/2020	8	63.0	60.0	56.5	45.7	0	60	9
3/07/2020	9	61.2	58.7	55.7	51.0	0	30	9
3/07/2020	10	61.9	59.3	56.5	51.5	0	50	15
3/07/2020	11	71.1	62.9	60.7	54.3	0	50	17
3/07/2020	12	67.5	63.1	60.4	54.7	0	60	17
3/07/2020	13	65.4	62.6	59.8	54.3	0	70	15
3/07/2020	14	64.2	61.9	59.2	53.7	0	60	21
3/07/2020	15	65.2	62.1	59.5	54.6	0	50	21
3/07/2020	16	65.0	62.3	59.5	53.9	0	60	22
3/07/2020	17	65.9	62.0	59.5	54.8	0	70	18
3/07/2020	18	64.8	62.2	59.6	54.5	0	70	13
3/07/2020	19	64.7	62.2	59.9	55.1	0	90	8
3/07/2020	20	63.7	60.9	58.1	52.1	0	90	9
3/07/2020	21	63.5	60.5	56.9	49.0	0	20	8
3/07/2020	22	61.9	58.4	54.5	43.3	0	60	13
3/07/2020	23	61.9	57.9	53.6	39.0	0	70	21
3/07/2020	0	62.6	58.6	54.2	36.5	0	50	18

Table A2 –Noise Measurement Summary at Raphael Road, Muchea

Date	L_{A10,18hour} dB	L_{Aeq,24hour} dB	L_{Aeq(Day)} dB	L_{Aeq(Night)} dB
1/07/20	65.3	61.1	62.4	56.4
2/07/20	64.4	60.9	61.9	57.5
3/07/20	65.4	61.5	62.8	56.6
4/07/20	64.4	63.6	65.1	56.0
5/07/20	61.9	58.2	59.4	54.1
6/07/20	63.6	59.9	61.2	54.8
7/07/20	64.0	60.2	61.6	54.9
8/07/20	64.1	61.3	62.7	54.8
9/07/20	64.3	61.1	62.1	58.1
Average	65	61	62	57

*Highlighted rows indicate days where weather/traffic conditions were not suitable (excluded from average)

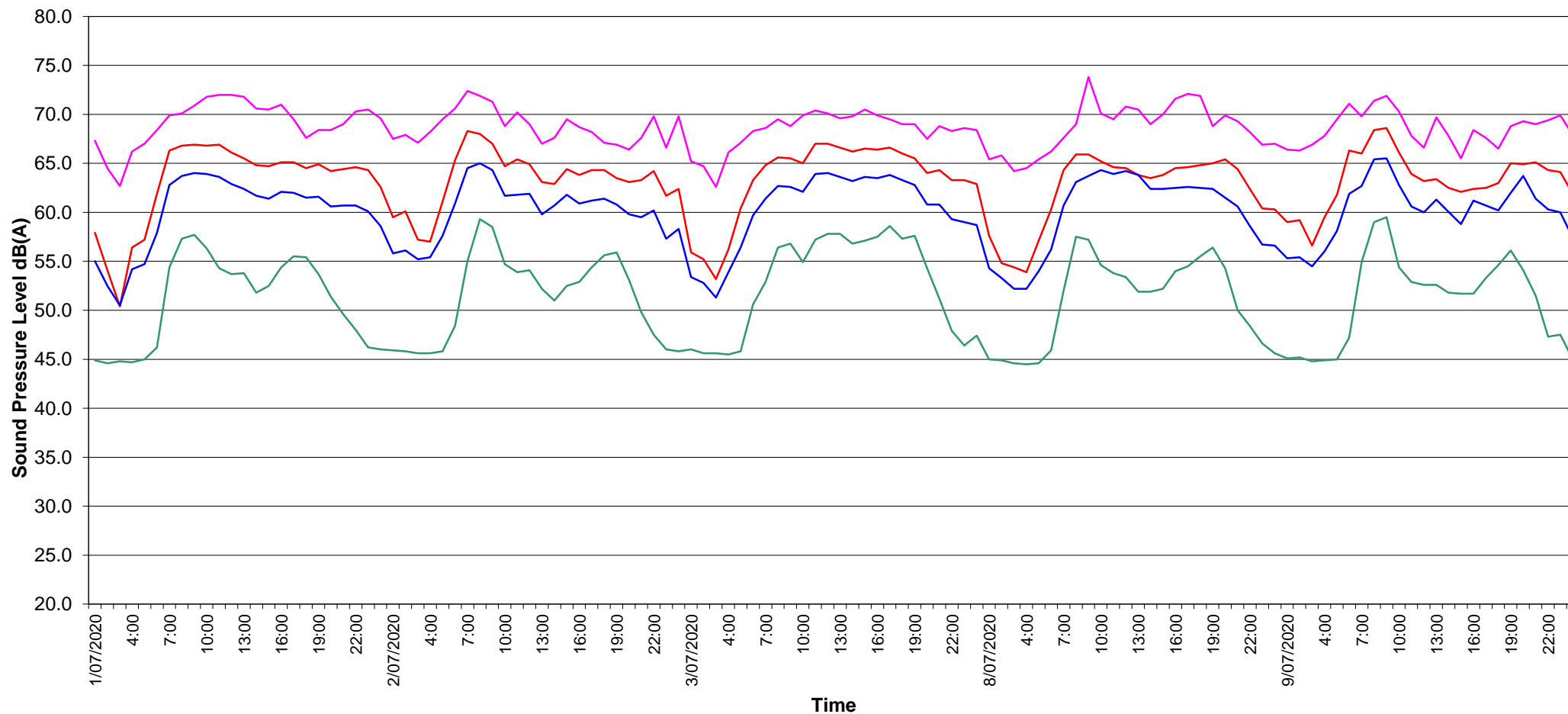
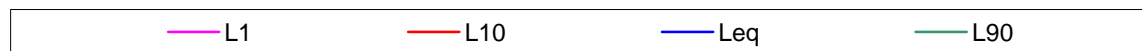


Logger Position – Raphael Road, Bullsbrook

Traffic Noise Measurement Data

Item	Details
LOCATION	
Project	Northlink Stage 3 Northern Section
Street address	Raphael Road, Bullsbrook
Locality	Bullsbrook
Occupier	
Dates	1 to 9 July 2020
Category	Main Roads to provide this information
SITE	
Distance from microphone to kerb	85 Metres
Height of the road in relation to the ground	+1m
Road surface type	Main Roads to provide this information
	Main Roads to provide this information
Speed zone	110 km/h
Absorbing ground	100%
Angle of view	150 deg
Road gradient	Level
Traffic flow	Main Roads to provide this information
Heavy vehicles	Main Roads to provide this information
House-Road orientation.	East
Carriageways & lanes.	2, 4
COMMENT	
Comment	Microphone 1.4m above ground level, on deck Microphone 1.0m from front facade of house (under verandah) small open carport to south of receiver
REFERENCES	
AMG Z50 E/N	Main Roads to provide this information
Road name	Tonkin Highway
EXCEL file	Raphael.xls
Raw data file	Raphael_Sta.csv
EQUIPMENT	
Analyser number	16-707-043
Microphone number	16-707-043
Calibrator number	2292775
Calibrator values	93.8, 93.2
Operator	Lloyd George Acoustics Pty Ltd - Matt Moyle
WEATHER	
Wind	4/7/20 - High winds - measurement excluded 5/7/20 - Traffic volumes low (Sunday) - measurement excluded 6/7/20 - Negative winds prevailing - measurement excluded 7/7/20 - Negative winds prevailing - measurement excluded

Traffic Noise Measurements - Raphael Road, Bullsbrook 1 to 9 July 2020



			Hourly Noise Level Data					
			Raphael Road, Bullsbrook					
Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
1/07/2020	1	67.3	57.9	55.0	44.9	0	270	11
1/07/2020	2	64.5	54.1	52.5	44.6	0	230	15
1/07/2020	3	62.7	50.4	50.5	44.8	0	210	17
1/07/2020	4	66.2	56.4	54.2	44.7	0.4	240	15
1/07/2020	5	67.0	57.2	54.7	45.0	2	180	13
1/07/2020	6	68.4	61.9	57.9	46.2	0	120	8
1/07/2020	7	69.9	66.3	62.8	54.4	0	120	5
1/07/2020	8	70.1	66.8	63.7	57.3	0	0	0
1/07/2020	9	70.9	66.9	64.0	57.7	0.2	120	2
1/07/2020	10	71.8	66.8	63.9	56.3	0	80	4
1/07/2020	11	72.0	66.9	63.6	54.3	0	170	9
1/07/2020	12	72.0	66.1	62.9	53.7	0	180	15
1/07/2020	13	71.8	65.5	62.4	53.8	0	170	17
1/07/2020	14	70.6	64.8	61.7	51.8	0	190	17
1/07/2020	15	70.5	64.7	61.4	52.5	0	180	15
1/07/2020	16	71.0	65.1	62.1	54.4	0	170	15
1/07/2020	17	69.5	65.1	62.0	55.5	0	200	13
1/07/2020	18	67.6	64.5	61.5	55.4	0	180	9
1/07/2020	19	68.4	64.9	61.6	53.7	0	170	8
1/07/2020	20	68.4	64.2	60.6	51.4	0	0	0
1/07/2020	21	69.0	64.4	60.7	49.6	0	0	0
1/07/2020	22	70.3	64.6	60.7	48.0	0	0	0
1/07/2020	23	70.5	64.3	60.1	46.2	0	0	0
1/07/2020	0	69.6	62.6	58.6	46.0	0	0	0
2/07/2020	1	67.5	59.5	55.8	45.9	0	170	2
2/07/2020	2	67.9	60.1	56.1	45.8	0	170	8
2/07/2020	3	67.1	57.2	55.2	45.6	0	0	0
2/07/2020	4	68.2	57.0	55.4	45.6	0	0	0
2/07/2020	5	69.5	61.1	57.6	45.8	0	170	2
2/07/2020	6	70.6	65.3	60.9	48.4	0	0	0
2/07/2020	7	72.4	68.3	64.5	55.0	0	170	5
2/07/2020	8	71.9	68.0	65.0	59.3	0	170	2
2/07/2020	9	71.3	67.0	64.3	58.5	0	0	0
2/07/2020	10	68.8	64.7	61.7	54.7	0	220	2
2/07/2020	11	70.2	65.4	61.8	53.9	0	110	11
2/07/2020	12	69.0	64.9	61.9	54.1	0	80	15
2/07/2020	13	67.0	63.1	59.8	52.2	0	130	9
2/07/2020	14	67.6	62.9	60.7	51.0	0	70	11
2/07/2020	15	69.5	64.4	61.8	52.5	0	130	8
2/07/2020	16	68.7	63.8	60.9	52.9	0	130	11
2/07/2020	17	68.2	64.3	61.2	54.4	0	110	15
2/07/2020	18	67.1	64.3	61.4	55.6	0	100	13
2/07/2020	19	66.9	63.5	60.8	55.9	0	110	9
2/07/2020	20	66.4	63.1	59.8	53.1	0	110	8
2/07/2020	21	67.6	63.3	59.5	49.8	0	120	8
2/07/2020	22	69.8	64.2	60.2	47.5	0	110	5
2/07/2020	23	66.6	61.7	57.3	46.0	0	170	9
2/07/2020	0	69.8	62.4	58.3	45.8	0	190	4

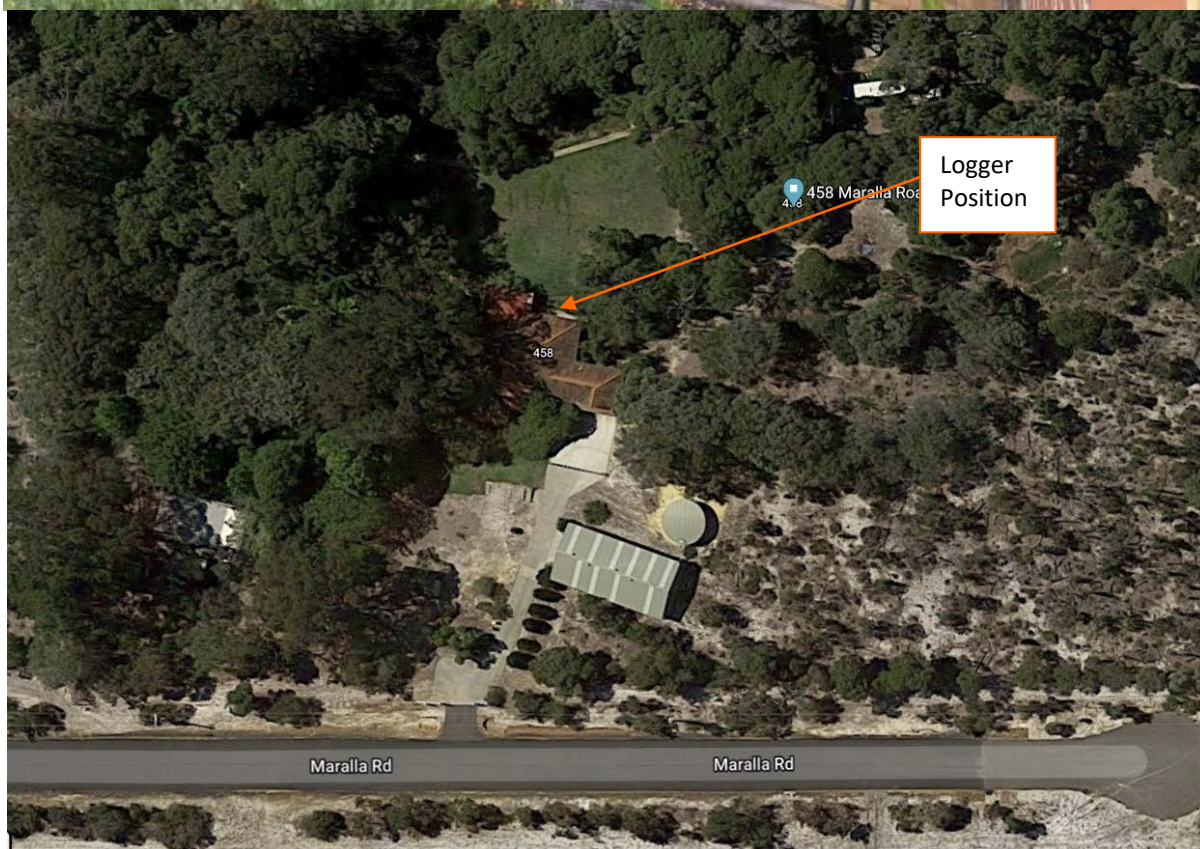
Hourly Noise Level Data Raphael Road, Bullsbrook								
Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
3/07/2020	1	65.2	55.9	53.4	46.0	0	170	5
3/07/2020	2	64.7	55.2	52.8	45.6	0	90	11
3/07/2020	3	62.6	53.2	51.3	45.6	0	0	0
3/07/2020	4	66.1	56.2	53.9	45.5	0	20	2
3/07/2020	5	67.1	60.4	56.4	45.8	0	260	8
3/07/2020	6	68.3	63.3	59.7	50.6	0	30	13
3/07/2020	7	68.6	64.8	61.4	52.9	0	360	2
3/07/2020	8	69.5	65.6	62.7	56.4	0	60	9
3/07/2020	9	68.8	65.5	62.6	56.8	0	30	9
3/07/2020	10	69.9	65.0	62.1	54.9	0	50	15
3/07/2020	11	70.4	67.0	63.9	57.2	0	50	17
3/07/2020	12	70.1	67.0	64.0	57.8	0	60	17
3/07/2020	13	69.6	66.6	63.6	57.8	0	70	15
3/07/2020	14	69.8	66.2	63.2	56.8	0	60	21
3/07/2020	15	70.5	66.5	63.6	57.1	0	50	21
3/07/2020	16	69.9	66.4	63.5	57.5	0	60	22
3/07/2020	17	69.5	66.6	63.8	58.6	0	70	18
3/07/2020	18	69.0	66.0	63.3	57.3	0	70	13
3/07/2020	19	69.0	65.5	62.8	57.6	0	90	8
3/07/2020	20	67.5	64.0	60.8	54.3	0	90	9
3/07/2020	21	68.8	64.3	60.8	51.2	0	20	8
3/07/2020	22	68.3	63.3	59.3	47.9	0	60	13
3/07/2020	23	68.6	63.3	59.0	46.4	0	70	21
3/07/2020	0	68.4	62.9	58.7	47.4	0	50	18
8/07/2020	1	65.4	57.6	54.3	45.0	0.2	350	11
8/07/2020	2	65.8	54.8	53.3	44.9	2.8	120	9
8/07/2020	3	64.2	54.4	52.2	44.6	0	0	0
8/07/2020	4	64.5	53.9	52.2	44.5	0.2	80	8
8/07/2020	5	65.4	57.1	54.0	44.6	0	360	9
8/07/2020	6	66.2	60.3	56.2	45.9	0	90	9
8/07/2020	7	67.6	64.3	60.7	52.0	0	70	8
8/07/2020	8	69.0	65.9	63.1	57.5	0	360	5
8/07/2020	9	73.8	65.9	63.7	57.2	0	50	8
8/07/2020	10	70.1	65.2	64.3	54.6	0	0	0
8/07/2020	11	69.5	64.6	63.9	53.8	0	330	8
8/07/2020	12	70.8	64.5	64.2	53.4	0	350	9
8/07/2020	13	70.5	63.8	63.8	51.9	0	250	8
8/07/2020	14	69.0	63.5	62.4	51.9	0	150	2
8/07/2020	15	70.0	63.8	62.4	52.2	0	240	21
8/07/2020	16	71.6	64.5	62.5	54.0	0	130	5
8/07/2020	17	72.1	64.6	62.6	54.5	0	0	0
8/07/2020	18	71.9	64.8	62.5	55.5	0	0	0
8/07/2020	19	68.8	65.0	62.4	56.4	0	0	0
8/07/2020	20	69.9	65.4	61.5	54.3	0	0	0
8/07/2020	21	69.3	64.4	60.6	50.0	0	0	0
8/07/2020	22	68.2	62.4	58.6	48.4	0	20	8
8/07/2020	23	66.9	60.4	56.7	46.6	0	70	8
8/07/2020	0	67.0	60.3	56.6	45.6	0	220	5

			Hourly Noise Level Data					
			Raphael Road, Bullsbrook					
Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
9/07/2020	1	66.4	59.0	55.3	45.1	0	0	0
9/07/2020	2	66.3	59.2	55.4	45.2	0	0	0
9/07/2020	3	66.9	56.6	54.5	44.8	0	0	0
9/07/2020	4	67.8	59.5	56.0	44.9	0	0	0
9/07/2020	5	69.5	61.8	58.1	45.0	0	0	0
9/07/2020	6	71.1	66.3	61.9	47.2	0	230	5
9/07/2020	7	69.8	66.0	62.7	54.9	0	150	13
9/07/2020	8	71.4	68.4	65.4	59.0	0	0	0
9/07/2020	9	71.9	68.6	65.5	59.5	0	0	0
9/07/2020	10	70.3	66.1	62.8	54.4	0	310	5
9/07/2020	11	67.8	63.9	60.6	52.9	0	160	13
9/07/2020	12	66.6	63.2	60.0	52.6	0	180	9
9/07/2020	13	69.7	63.4	61.3	52.6	0	120	11
9/07/2020	14	67.8	62.5	60.1	51.8	0	200	5
9/07/2020	15	65.5	62.1	58.8	51.7	0.2	200	5
9/07/2020	16	68.4	62.4	61.2	51.7	0	190	9
9/07/2020	17	67.6	62.5	60.7	53.3	0	210	15
9/07/2020	18	66.5	63.0	60.2	54.6	0	210	11
9/07/2020	19	68.8	65.0	62.0	56.1	0	190	5
9/07/2020	20	69.3	64.9	63.7	54.1	0	0	0
9/07/2020	21	69.0	65.1	61.4	51.5	0	0	0
9/07/2020	22	69.4	64.3	60.3	47.3	0	190	5
9/07/2020	23	69.9	64.1	60.0	47.5	0	110	2
9/07/2020	0	67.9	61.9	57.4	45.0	0	0	0

Table A3 –Noise Measurement Summary at Maralla Road, Ellenbrook

Date	L_{A10,18hour} dB	L_{Aeq,24hour} dB	L_{Aeq(Day)} dB	L_{Aeq(Night)} dB
2/07/20	58.9	55.6	56.8	51.5
3/07/20	60.9	57.4	58.7	52.1
4/07/20	59.5	56.0	57.1	52.0
5/07/20	58.0	57.1	58.6	48.8
6/07/20	56.1	53.8	55.1	48.7
7/07/20	56.0	54.1	55.2	50.7
8/07/20	57.5	54.4	55.4	51.1
9/07/20	54.6	52.0	52.5	51.0
Average	57	54	57	50

*Highlighted rows indicate days where weather/traffic conditions were not suitable (excluded from average)



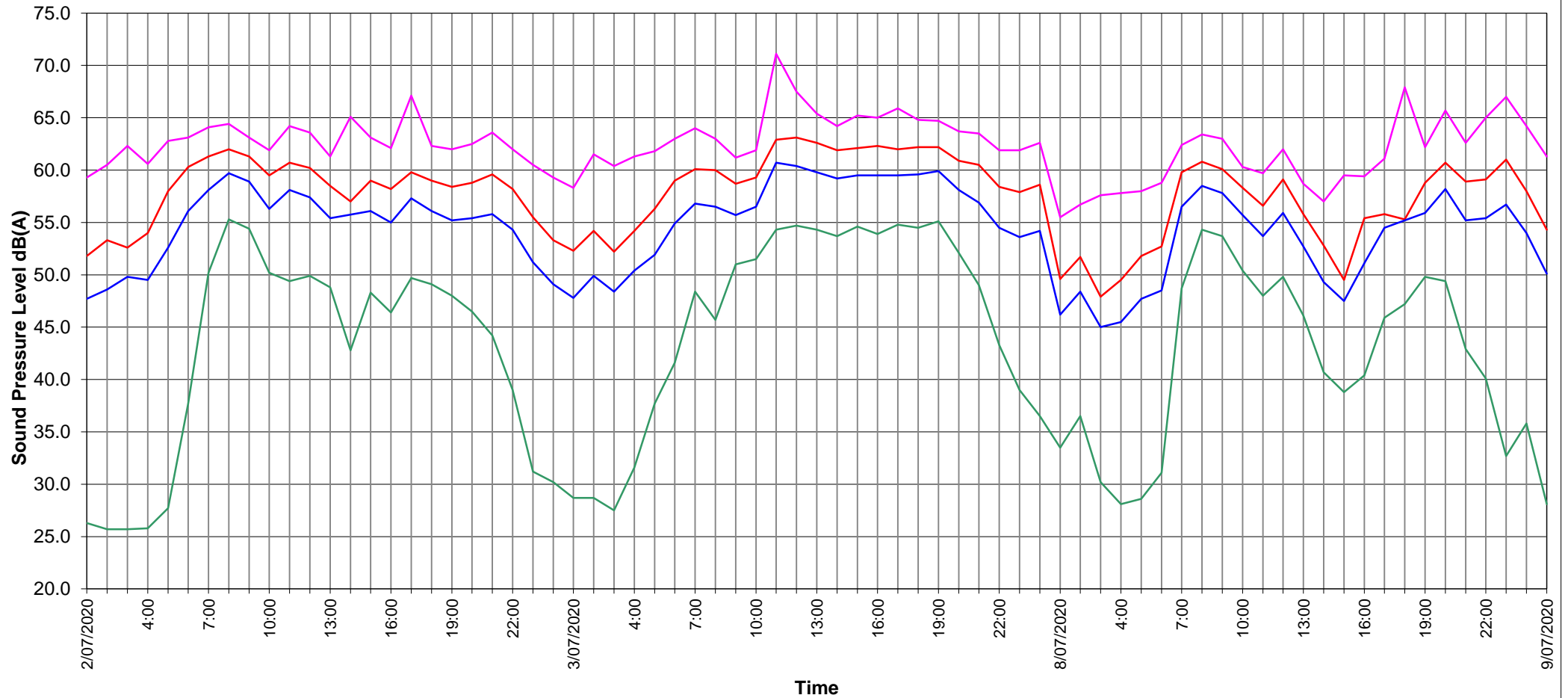
Logger Position – Maralla Road, Ellenbrook

Traffic Noise Measurement Data

Item	Details
LOCATION	
Project	Northlink Stage 3 Northern Section
Street address	Maralla Road, Ellenbrook
Locality	Ellenbrook
Occupier	
Dates	2 to 9 July 2020
Category	Main Roads to provide this information
SITE	
Distance from microphone to kerb	260 Metres
Height of the road in relation to the ground	+1m
Road surface type	Main Roads to provide this information
Speed zone	110 km/h
Absorbing ground	100%
Angle of view	120 deg
Road gradient	Level
Traffic flow	Main Roads to provide this information
Heavy vehicles	Main Roads to provide this information
House-Road orientation.	East
Carriageways & lanes.	2, 4
COMMENT	
Comment	Microphone 1.4m above ground level Microphone 1.0m from north facade of house (outside kitchen) open carport to east of receiver, nearest to corridor
REFERENCES	
AMG Z50 E/N	Main Roads to provide this information
Road name	Tonkin Highway
EXCEL file	Maralla.xls
Raw data file	Maralla_Sta.csv
EQUIPMENT	
Analyser number	87803E
Microphone number	87803E
Calibrator number	2292775
Calibrator values	94.5, 94.5
Operator	Lloyd George Acoustics Pty Ltd - Matt Moyle
WEATHER	
Wind	4/7/20 - High winds - measurement excluded 5/7/20 - Traffic volumes low (Sunday) - measurement excluded 6/7/20 - Negative winds prevailing - measurement excluded 7/7/20 - Negative winds prevailing - measurement excluded 9/7/20 - Negative winds (southerly) - measurement excluded

Traffic Noise Measurements - Maralla Road, Ellenbrook 2 to 9 July 2020

L1 L10 Leq L90



			Hourly Noise Level Data					
			Maralla Road, Ellenbrook					
Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
2/07/2020	1	59.3	51.8	47.7	26.3	0	170	2
2/07/2020	2	60.5	53.3	48.6	25.7	0	170	8
2/07/2020	3	62.3	52.6	49.8	25.7	0	0	0
2/07/2020	4	60.6	54.0	49.5	25.8	0	0	0
2/07/2020	5	62.8	58.0	52.6	27.7	0	170	2
2/07/2020	6	63.1	60.3	56.1	37.7	0	0	0
2/07/2020	7	64.1	61.3	58.1	50.2	0	170	5
2/07/2020	8	64.4	62.0	59.7	55.3	0	170	2
2/07/2020	9	63.1	61.3	58.9	54.4	0	0	0
2/07/2020	10	61.9	59.5	56.3	50.2	0	220	2
2/07/2020	11	64.2	60.7	58.1	49.4	0	110	11
2/07/2020	12	63.6	60.2	57.4	49.9	0	80	15
2/07/2020	13	61.3	58.5	55.4	48.8	0	130	9
2/07/2020	14	65.1	57.0	55.8	42.8	0	70	11
2/07/2020	15	63.1	59.0	56.1	48.3	0	130	8
2/07/2020	16	62.1	58.2	55.0	46.4	0	130	11
2/07/2020	17	67.1	59.8	57.3	49.7	0	110	15
2/07/2020	18	62.3	59.0	56.1	49.1	0	100	13
2/07/2020	19	62.0	58.4	55.2	48.0	0	110	9
2/07/2020	20	62.5	58.8	55.4	46.5	0	110	8
2/07/2020	21	63.6	59.6	55.8	44.2	0	120	8
2/07/2020	22	62.0	58.2	54.3	39.0	0	110	5
2/07/2020	23	60.5	55.5	51.2	31.2	0	170	9
2/07/2020	0	59.3	53.3	49.1	30.2	0	190	4
3/07/2020	1	58.3	52.3	47.8	28.7	0	170	5
3/07/2020	2	61.5	54.2	49.9	28.7	0	90	11
3/07/2020	3	60.4	52.2	48.4	27.5	0	0	0
3/07/2020	4	61.3	54.2	50.4	31.6	0	20	2
3/07/2020	5	61.8	56.3	51.9	37.7	0	260	8
3/07/2020	6	63.0	59.0	54.9	41.6	0	30	13
3/07/2020	7	64.0	60.1	56.8	48.4	0	360	2
3/07/2020	8	63.0	60.0	56.5	45.7	0	60	9
3/07/2020	9	61.2	58.7	55.7	51.0	0	30	9
3/07/2020	10	61.9	59.3	56.5	51.5	0	50	15
3/07/2020	11	71.1	62.9	60.7	54.3	0	50	17
3/07/2020	12	67.5	63.1	60.4	54.7	0	60	17
3/07/2020	13	65.4	62.6	59.8	54.3	0	70	15
3/07/2020	14	64.2	61.9	59.2	53.7	0	60	21
3/07/2020	15	65.2	62.1	59.5	54.6	0	50	21
3/07/2020	16	65.0	62.3	59.5	53.9	0	60	22
3/07/2020	17	65.9	62.0	59.5	54.8	0	70	18
3/07/2020	18	64.8	62.2	59.6	54.5	0	70	13
3/07/2020	19	64.7	62.2	59.9	55.1	0	90	8
3/07/2020	20	63.7	60.9	58.1	52.1	0	90	9
3/07/2020	21	63.5	60.5	56.9	49.0	0	20	8
3/07/2020	22	61.9	58.4	54.5	43.3	0	60	13
3/07/2020	23	61.9	57.9	53.6	39.0	0	70	21
3/07/2020	0	62.6	58.6	54.2	36.5	0	50	18

			Hourly Noise Level Data					
			Maralla Road, Ellenbrook					
Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
8/07/2020	1	55.5	49.6	46.2	33.5	0.2	350	11
8/07/2020	2	56.7	51.7	48.4	36.5	2.8	120	9
8/07/2020	3	57.6	47.9	45.0	30.2	0	0	0
8/07/2020	4	57.8	49.5	45.5	28.1	0.2	80	8
8/07/2020	5	58.0	51.8	47.7	28.6	0	360	9
8/07/2020	6	58.8	52.7	48.5	31.1	0	90	9
8/07/2020	7	62.4	59.8	56.5	48.7	0	70	8
8/07/2020	8	63.4	60.8	58.5	54.3	0	360	5
8/07/2020	9	63.0	60.1	57.8	53.7	0	50	8
8/07/2020	10	60.3	58.3	55.7	50.4	0	0	0
8/07/2020	11	59.7	56.6	53.7	48.0	0	330	8
8/07/2020	12	62.0	59.1	55.9	49.8	0	350	9
8/07/2020	13	58.7	55.8	52.7	46.1	0	250	8
8/07/2020	14	57.0	52.8	49.3	40.7	0	150	2
8/07/2020	15	59.5	49.5	47.5	38.8	0	240	21
8/07/2020	16	59.4	55.4	51.1	40.4	0	130	5
8/07/2020	17	61.1	55.8	54.5	45.9	0	0	0
8/07/2020	18	67.9	55.3	55.2	47.2	0	0	0
8/07/2020	19	62.2	58.8	55.9	49.8	0	0	0
8/07/2020	20	65.7	60.7	58.2	49.4	0	0	0
8/07/2020	21	62.6	58.9	55.2	42.9	0	0	0
8/07/2020	22	65.0	59.1	55.4	40.1	0	20	8
8/07/2020	23	67.0	61.0	56.7	32.7	0	70	8
8/07/2020	0	64.2	58.0	54.0	35.8	0	220	5

Table A4–Noise Measurement Summary at Strachan Road, Bullsbrook

Date	L_{A10,18hour} dB	L_{Aeq,24hour} dB	L_{Aeq(Day)} dB	L_{Aeq(Night)} dB
11/08/20	66.6	63.9	65.2	58.6
12/08/20	64.5	61.4	62.7	55.7
13/08/20	62.2	58.9	60.3	53.5
14/08/20	62.4	58.6	59.8	53.9
Average	63	60	61	54

*Highlighted rows indicate days where weather/traffic conditions were not suitable (excluded from average)



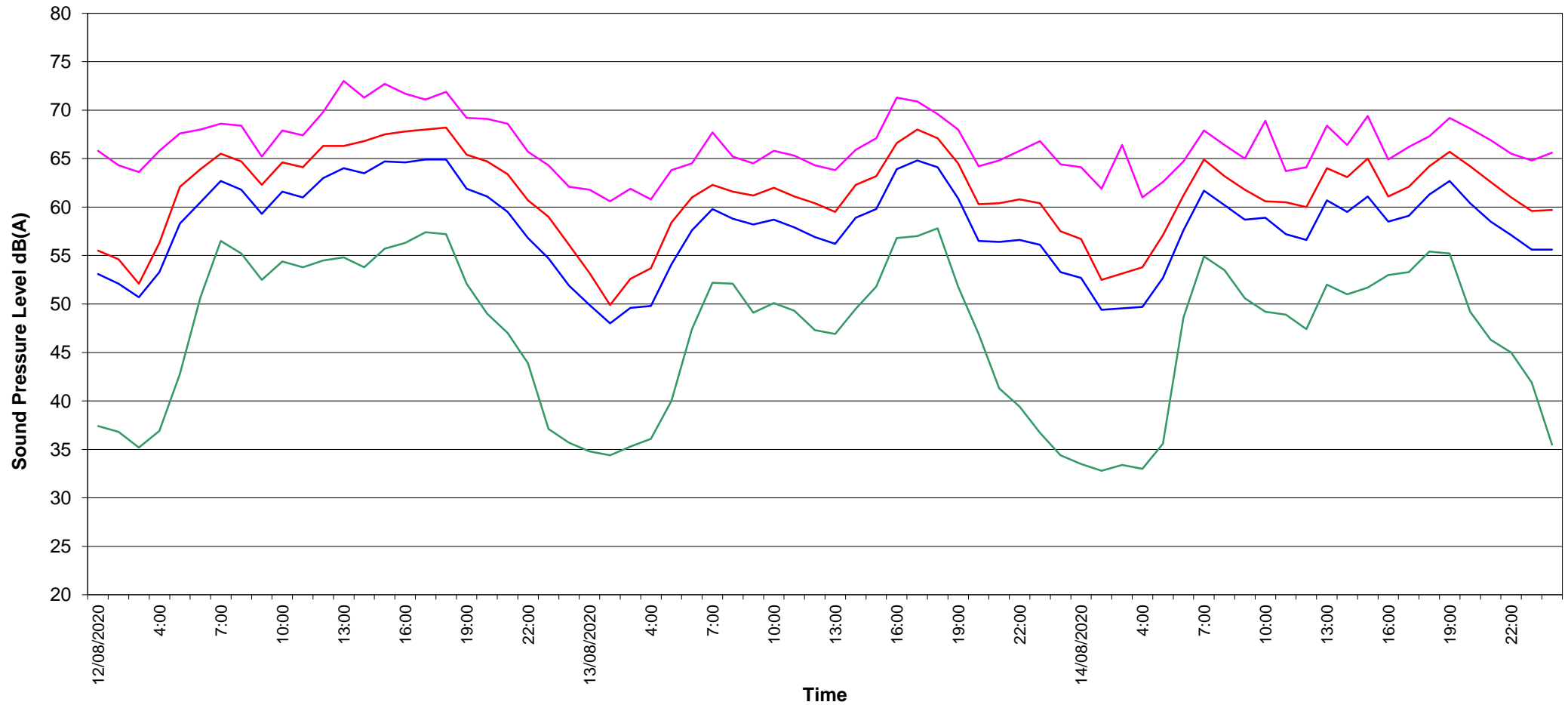
Logger Position – Strachan Road, Bullsbrook

Traffic Noise Measurement Data

Item	Details
LOCATION	
Project	Northlink Stage 3 Northern Section
Street address	Strachan Road, Bullsbrook
Locality	Bullsbrook
Occupier	
Dates	11 to 14 August July 2020
Category	Main Roads to provide this information
SITE	
Distance from microphone to kerb	85 Metres
Height of the road in relation to the ground	+1m
Road surface type	Main Roads to provide this information
Speed zone	110 km/h
Absorbing ground	100%
Angle of view	180 deg
Road gradient	Level
Traffic flow	Main Roads to provide this information
Heavy vehicles	Main Roads to provide this information
House-Road orientation.	West
Carriageways & lanes.	2, 4
COMMENT	
Comment	Microphone 1.4m above ground level Microphone 1.0m from front facade of house (under verandah) small open carport to south of receiver
REFERENCES	
AMG Z50 E/N	Main Roads to provide this information
Road name	Tonkin Highway
EXCEL file	Strachan.xls
Raw data file	Strachan_Sta.csv
EQUIPMENT	
Analyser number	87803A
Microphone number	87803A
Calibrator number	2292775
Calibrator values	94.2, 94.1
Operator	Lloyd George Acoustics Pty Ltd - Matt Moyle
WEATHER	
Wind	11/8/20 - High winds and rain - measurement excluded

Traffic Noise Measurements - Strachan Rd, Bullsbrook 12 to 14 August 2020

L1 L10 Leq L90



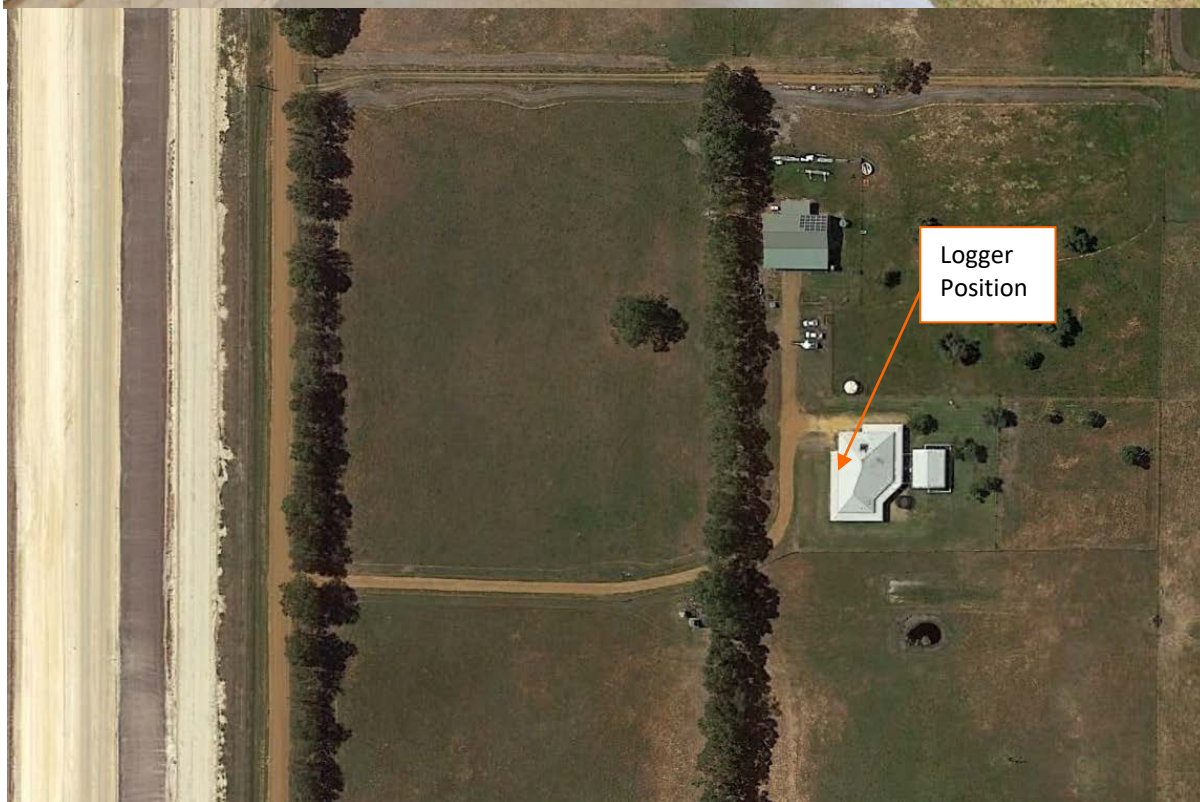
		Hourly Noise Level Data						
		Strachan Road, Bullsbrook						
Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
11/08/2020	1	67.7	55.6	54.7	40.4	0	250	18
11/08/2020	2	69.6	56.2	56.1	39.3	0.2	260	24
11/08/2020	3	68.0	56.6	55.3	37.6	0.2	250	24
11/08/2020	4	70.3	60.5	57.6	38.8	0	240	21
11/08/2020	5	70.8	64.4	60.2	40.3	0	250	18
11/08/2020	6	72.7	68.1	64.3	50.2	0	240	17
11/08/2020	7	73.2	69.7	66.5	58.8	0.6	230	24
11/08/2020	8	73.8	70.2	67.1	59.3	0.4	240	18
11/08/2020	9	72.4	69.0	65.6	57.6	0	250	21
11/08/2020	10	73.0	69.4	65.9	57.5	0	240	17
11/08/2020	11	73.9	70.2	66.6	56.9	0	210	30
11/08/2020	12	74.3	70.0	66.7	56.6	0	220	28
11/08/2020	13	72.9	69.6	66.0	56.8	0	210	34
11/08/2020	14	73.3	69.1	65.7	56.2	0.4	240	31
11/08/2020	15	74.3	69.9	66.5	56.5	0	250	30
11/08/2020	16	71.9	68.5	65.3	57.2	0	240	28
11/08/2020	17	71.0	67.9	65.1	58.7	0	250	15
11/08/2020	18	73.4	69.4	66.1	57.3	0.6	220	21
11/08/2020	19	68.8	64.6	61.0	51.4	0	270	15
11/08/2020	20	69.2	64.3	60.3	47.5	0	280	5
11/08/2020	21	66.6	62.0	58.0	44.4	0	140	8
11/08/2020	22	65.0	58.9	54.9	42.4	0	140	11
11/08/2020	23	64.7	57.6	53.5	38.5	0.4	0	0
11/08/2020	0	66.0	58.4	54.5	37.9	0.2	0	0
12/08/2020	1	65.8	55.5	53.1	37.4	0	0	0
12/08/2020	2	64.3	54.6	52.1	36.8	0	260	11
12/08/2020	3	63.6	52.1	50.7	35.2	0	190	5
12/08/2020	4	65.8	56.3	53.3	36.9	0	0	0
12/08/2020	5	67.6	62.1	58.3	42.8	0	310	5
12/08/2020	6	68.0	63.9	60.5	50.7	0	0	0
12/08/2020	7	68.6	65.5	62.7	56.5	0	0	0
12/08/2020	8	68.4	64.7	61.8	55.2	0.2	0	0
12/08/2020	9	65.2	62.3	59.3	52.5	0	350	8
12/08/2020	10	67.9	64.6	61.6	54.4	0	0	0
12/08/2020	11	67.4	64.1	61.0	53.8	0	170	11
12/08/2020	12	69.8	66.3	63.0	54.5	0	190	15
12/08/2020	13	73.0	66.3	64.0	54.8	0	190	21
12/08/2020	14	71.3	66.8	63.5	53.8	0	210	17
12/08/2020	15	72.7	67.5	64.7	55.7	0	190	17
12/08/2020	16	71.7	67.8	64.6	56.3	0	190	21
12/08/2020	17	71.1	68.0	64.9	57.4	0	170	17
12/08/2020	18	71.9	68.2	64.9	57.2	0	180	18
12/08/2020	19	69.2	65.4	61.9	52.1	0	180	15
12/08/2020	20	69.1	64.7	61.1	49.0	0	160	13
12/08/2020	21	68.6	63.4	59.5	47.0	0	240	8
12/08/2020	22	65.7	60.7	56.8	43.9	0	10	4
12/08/2020	23	64.3	59.0	54.7	37.1	0	10	11
12/08/2020	0	62.1	56.1	51.9	35.7	0	360	8

			Hourly Noise Level Data					
			Strachan Road, Bullsbrook					
Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
13/08/2020	1	61.8	53.2	49.9	34.8	0	360	8
13/08/2020	2	60.6	49.9	48.0	34.4	0	20	9
13/08/2020	3	61.9	52.6	49.6	35.3	0	10	8
13/08/2020	4	60.8	53.7	49.8	36.1	0	10	5
13/08/2020	5	63.8	58.4	54.1	40.0	0	50	5
13/08/2020	6	64.5	61.0	57.6	47.4	0	0	0
13/08/2020	7	67.7	62.3	59.8	52.2	0	0	0
13/08/2020	8	65.2	61.6	58.8	52.1	0	360	5
13/08/2020	9	64.5	61.2	58.2	49.1	0	30	9
13/08/2020	10	65.8	62.0	58.7	50.1	0	340	9
13/08/2020	11	65.3	61.1	57.9	49.3	0	310	9
13/08/2020	12	64.3	60.4	56.9	47.3	0	330	9
13/08/2020	13	63.8	59.5	56.2	46.9	0	270	5
13/08/2020	14	65.9	62.3	58.9	49.5	0	310	11
13/08/2020	15	67.1	63.2	59.8	51.8	0	320	18
13/08/2020	16	71.3	66.6	63.9	56.8	0	0	0
13/08/2020	17	70.9	68.0	64.8	57.0	0	170	9
13/08/2020	18	69.6	67.1	64.1	57.8	0	250	17
13/08/2020	19	68.0	64.5	60.9	51.8	0	190	13
13/08/2020	20	64.2	60.3	56.5	46.9	0	160	11
13/08/2020	21	64.8	60.4	56.4	41.3	0.2	60	11
13/08/2020	22	65.8	60.8	56.6	39.4	0	50	4
13/08/2020	23	66.8	60.4	56.1	36.7	0	60	4
13/08/2020	0	64.4	57.5	53.3	34.4	0	60	8
14/08/2020	1	64.1	56.7	52.7	33.5	0	0	0
14/08/2020	2	61.9	52.5	49.4	32.8	0	30	5
14/08/2020	3	66.4	53.2	49.6	33.4	0	360	9
14/08/2020	4	61.0	53.8	49.7	33.0	0	80	8
14/08/2020	5	62.6	57.1	52.7	35.6	0	40	9
14/08/2020	6	64.7	61.2	57.6	48.6	0	50	2
14/08/2020	7	67.9	64.9	61.7	54.9	0	10	5
14/08/2020	8	66.4	63.2	60.2	53.5	0	210	8
14/08/2020	9	65.0	61.8	58.7	50.6	0	90	9
14/08/2020	10	68.9	60.6	58.9	49.2	0	360	4
14/08/2020	11	63.7	60.5	57.2	48.9	0	340	17
14/08/2020	12	64.1	60.0	56.6	47.4	0	360	9
14/08/2020	13	68.4	64.0	60.7	52.0	0	330	13
14/08/2020	14	66.4	63.1	59.5	51.0	0.4	320	18
14/08/2020	15	69.4	65.0	61.1	51.7	0	340	11
14/08/2020	16	64.9	61.1	58.5	53.0	2.4	350	13
14/08/2020	17	66.2	62.1	59.1	53.3	0.8	340	13
14/08/2020	18	67.3	64.2	61.3	55.4	0.2	340	5
14/08/2020	19	69.2	65.7	62.7	55.2	0	30	5
14/08/2020	20	68.1	64.2	60.4	49.2	0	50	9
14/08/2020	21	66.9	62.6	58.5	46.3	0	50	11
14/08/2020	22	65.5	61.0	57.1	45.0	0	40	5
14/08/2020	23	64.8	59.6	55.6	41.9	0	50	13
14/08/2020	0	65.6	59.7	55.6	35.5	0	10	5

Table A5—Noise Measurement Summary at Raphael Road, Bullsbrook

Date	L_{A10,18hour} dB	L_{Aeq,24hour} dB	L_{Aeq(Day)} dB	L_{Aeq(Night)} dB
11/08/20	63.8	61.4	62.7	56.6
12/08/20	62.2	59.1	60.3	53.9
13/08/20	60.1	56.7	57.7	53.6
14/08/20	61.5	57.9	58.9	55.0
Average	61	58	59	54

*Highlighted rows indicate days where weather/traffic conditions were not suitable (excluded from average)



Logger Position – Raphael Road, Bullsbrook

Traffic Noise Measurement Data

Item	Details
LOCATION	
Project	Northlink Stage 3 Northern Section
Street address	Raphael Road, Bullsbrook
Locality	Bullsbrook
Occupier	
Dates	11 to 14 August 2020
Category	<i>Main Roads to provide this information</i>
SITE	
Distance from microphone to kerb	190 Metres
Height of the road in relation to the ground	+1m
Road surface type	<i>Main Roads to provide this information</i>
Speed zone	110 km/h
Absorbing ground	100%
Angle of view	180 deg
Road gradient	level
Traffic flow	<i>Main Roads to provide this information</i>
Heavy vehicles	<i>Main Roads to provide this information</i>
House-Road orientation.	West
Carriageways & lanes.	2, 4
COMMENT	
Comment	Microphone 1.4m above ground level, on slab Microphone 1.0m from west facade of house (under verandah)
REFERENCES	
AMG Z50 E/N	<i>Main Roads to provide this information</i>
Road name	Tonkin Highway
EXCEL file	Raphael.xls
Raw data file	Raphael_Sta.csv
EQUIPMENT	
Analyser number	16-707-041
Microphone number	16-707-041
Calibrator number	2292775
Calibrator values	94, 93.9
Operator	Lloyd George Acoustics Pty Ltd - Matt Moyle
WEATHER	
Wind	11/8/20 - High winds and rain - measurement excluded

Traffic Noise Measurements - Raphael, Bullsbrook 12 to 14 August 2020

L1 L10 Leq L90



Hourly Noise Level Data								
Raphael Road, Bullsbrook								
Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
11/08/2020	1	64.1	56.2	52.5	38.3	0	250	18
11/08/2020	2	65.2	56.2	53.3	39.1	0.2	260	24
11/08/2020	3	65.2	57.1	53.3	33.8	0.2	250	24
11/08/2020	4	66.3	60.1	55.5	38.6	0	240	21
11/08/2020	5	67.1	62.4	58.3	40.2	0	250	18
11/08/2020	6	69.2	65.8	62.3	53.5	0	240	17
11/08/2020	7	69.8	66.9	64.1	58.9	0.6	230	24
11/08/2020	8	70.2	67.1	64.4	59.5	0.4	240	18
11/08/2020	9	69.3	65.9	62.7	56.6	0	250	21
11/08/2020	10	70.7	66.9	63.6	56.5	0	240	17
11/08/2020	11	70.9	67.5	64.4	57.8	0	210	30
11/08/2020	12	71.5	67.3	64.8	57.6	0	220	28
11/08/2020	13	70.7	66.9	63.5	56.0	0	210	34
11/08/2020	14	70.1	66.2	62.9	56.0	0.4	240	31
11/08/2020	15	71.2	67.3	64.9	57.6	0	250	30
11/08/2020	16	68.7	65.0	62.6	56.1	0	240	28
11/08/2020	17	67.6	63.9	61.3	56.3	0	250	15
11/08/2020	18	69.9	66.1	63.0	56.5	0.6	220	21
11/08/2020	19	64.0	61.6	58.4	52.4	0	270	15
11/08/2020	20	64.8	61.5	57.7	46.3	0	280	5
11/08/2020	21	63.3	59.6	55.5	43.5	0	140	8
11/08/2020	22	61.0	56.7	52.3	42.9	0	140	11
11/08/2020	23	60.9	55.5	51.1	35.4	0.4	0	0
11/08/2020	0	62.2	56.7	51.9	31.3	0.2	0	0
12/08/2020	1	61.3	53.2	49.2	31.3	0	0	0
12/08/2020	2	59.8	52.7	48.6	30.0	0	260	11
12/08/2020	3	59.6	52.1	48.2	29.5	0	190	5
12/08/2020	4	60.6	54.1	50.0	32.8	0	0	0
12/08/2020	5	62.7	58.4	54.7	43.7	0	310	5
12/08/2020	6	63.6	60.9	57.8	51.4	0	0	0
12/08/2020	7	66.1	63.2	60.5	55.2	0	0	0
12/08/2020	8	70.3	64.1	62.4	55.5	0.2	0	0
12/08/2020	9	78.2	60.4	64.0	51.3	0	350	8
12/08/2020	10	63.2	60.2	57.0	51.4	0	0	0
12/08/2020	11	63.6	60.0	57.3	50.2	0	170	11
12/08/2020	12	66.2	61.7	58.8	52.7	0	190	15
12/08/2020	13	72.4	61.6	58.9	52.1	0	190	21
12/08/2020	14	66.3	62.2	59.0	51.9	0	210	17
12/08/2020	15	72.3	63.2	62.0	53.6	0	190	17
12/08/2020	16	65.9	63.0	59.9	53.9	0	190	21
12/08/2020	17	66.8	63.7	60.9	55.4	0	170	17
12/08/2020	18	67.2	64.0	61.1	55.7	0	180	18
12/08/2020	19	65.5	62.5	59.1	51.2	0	180	15
12/08/2020	20	66.5	62.5	59.0	48.3	0	160	13
12/08/2020	21	69.0	64.7	60.9	48.2	0	240	8
12/08/2020	22	66.4	62.3	58.3	42.4	0	10	4
12/08/2020	23	65.0	61.1	56.3	32.0	0	10	11
12/08/2020	0	65.5	59.4	55.0	33.3	0	360	8
13/08/2020	1	60.9	55.8	50.8	30.1	0	360	8

			Hourly Noise Level Data					
			Raphael Road, Bullsbrook					
Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
13/08/2020	2	60.3	53.5	48.9	30.3	0	20	9
13/08/2020	3	60.2	55.3	50.1	33.5	0	10	8
13/08/2020	4	59.4	53.8	49.4	34.9	0	10	5
13/08/2020	5	60.2	56.1	52.4	39.4	0	50	5
13/08/2020	6	62.7	60.1	56.9	50.4	0	0	0
13/08/2020	7	62.7	59.9	57.2	52.2	0	0	0
13/08/2020	8	64.4	59.5	57.6	52.4	0	360	5
13/08/2020	9	62.0	58.4	56.7	50.1	0	30	9
13/08/2020	10	62.6	59.0	55.7	49.7	0	340	9
13/08/2020	11	61.6	58.1	55.0	48.8	0	310	9
13/08/2020	12	60.8	57.6	54.1	47.4	0	330	9
13/08/2020	13	61.5	57.3	54.4	48.5	0	270	5
13/08/2020	14	64.1	60.8	58.0	52.6	0	310	11
13/08/2020	15	63.8	60.4	57.5	52.0	0	320	18
13/08/2020	16	68.7	61.5	60.7	53.7	0	0	0
13/08/2020	17	66.0	62.8	60.6	56.4	0	170	9
13/08/2020	18	65.7	63.0	60.3	55.7	0	250	17
13/08/2020	19	65.3	61.4	58.1	51.4	0	190	13
13/08/2020	20	62.4	58.8	54.9	44.3	0	160	11
13/08/2020	21	64.3	61.0	57.7	43.7	0.2	60	11
13/08/2020	22	65.7	61.1	57.2	37.2	0	50	4
13/08/2020	23	65.9	61.6	57.0	34.9	0	60	4
13/08/2020	0	64.1	59.0	54.3	33.1	0	60	8
14/08/2020	1	66.5	59.8	55.0	30.2	0	0	0
14/08/2020	2	65.8	57.0	53.2	28.1	0	30	5
14/08/2020	3	66.7	59.7	55.2	29.7	0	360	9
14/08/2020	4	63.2	57.1	52.3	30.6	0	80	8
14/08/2020	5	60.0	55.9	52.0	36.8	0	40	9
14/08/2020	6	61.8	58.9	55.9	50.2	0	50	2
14/08/2020	7	67.0	64.3	61.4	55.7	0	10	5
14/08/2020	8	62.1	59.4	56.8	52.4	0	210	8
14/08/2020	9	78.6	59.4	56.3	50.6	0	90	9
14/08/2020	10	63.0	58.8	55.7	49.2	0	360	4
14/08/2020	11	62.9	59.9	56.7	49.7	0	340	17
14/08/2020	12	62.7	58.4	55.2	48.2	0	360	9
14/08/2020	13	66.6	59.7	56.5	53.9	0	330	13
14/08/2020	14	63.6	60.9	57.8	52.3	0.4	320	18
14/08/2020	15	72.9	66.5	62.3	51.0	0	340	11
14/08/2020	16	66.7	61.8	59.1	54.1	2.4	350	13
14/08/2020	17	67.4	63.2	59.5	53.8	0.8	340	13
14/08/2020	18	66.3	62.0	59.8	54.3	0.2	340	5
14/08/2020	19	65.5	63.0	60.0	54.6	0	30	5
14/08/2020	20	65.9	62.9	59.8	52.0	0	50	9
14/08/2020	21	65.7	62.8	58.9	49.2	0	50	11
14/08/2020	22	66.2	62.4	58.8	46.6	0	40	5
14/08/2020	23	64.4	60.7	56.6	41.9	0	50	13
14/08/2020	0	65.7	61.7	56.9	35.9	0	10	5

Table A6—Noise Measurement Summary at Raphael Road, Bullsbrook

Date	L_{A10,18hour} dB	L_{Aeq,24hour} dB	L_{Aeq(Day)} dB	L_{Aeq(Night)} dB
11/08/20	60.3	59.3	60.6	53.5
12/08/20	58.0	55.5	56.3	53.3
13/08/20	58.4	55.8	56.7	53.3
14/08/20	60.3	57.5	58.6	53.7
Average	59	56	57	53

*Highlighted rows indicate days where weather/traffic conditions were not suitable (excluded from average)

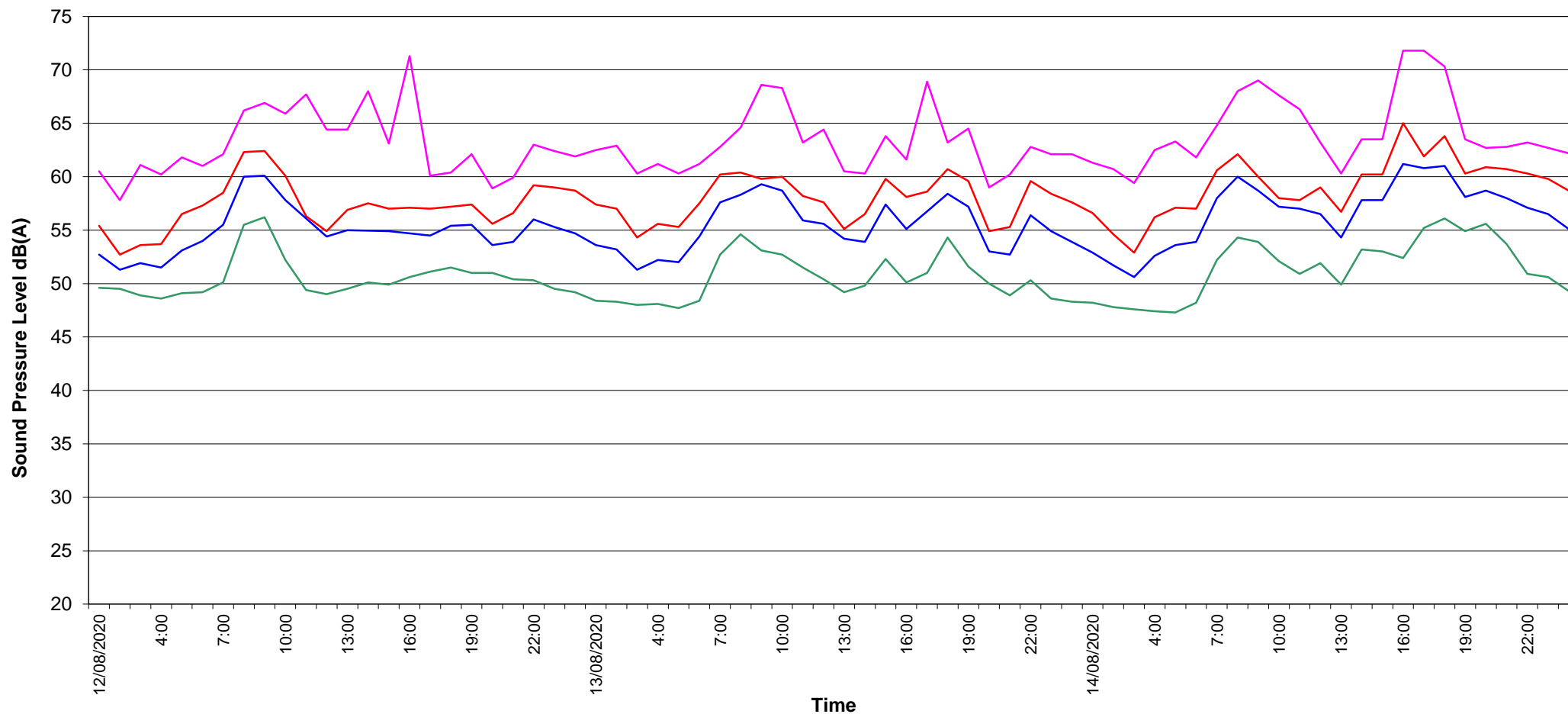
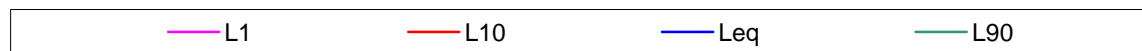


Logger Position – Raphael Road, Bullsbrook

Traffic Noise Measurement Data

Item	Details
LOCATION	
Project	Northlink Stage 3 Northern Section
Street address	Raphael Road, Bullsbrook
Locality	Bullsbrook
Occupier	
Dates	11 to 14 Aug 2020
Category	<i>Main Roads to provide this information</i>
SITE	
Distance from microphone to kerb	230 Metres
Height of the road in relation to the ground	+1m
Road surface type	<i>Main Roads to provide this information</i>
Speed zone	110 km/h
Absorbing ground	100%
Angle of view	150 deg
Road gradient	Level
Traffic flow	<i>Main Roads to provide this information</i>
Heavy vehicles	<i>Main Roads to provide this information</i>
House-Road orientation.	West
Carriageways & lanes.	2, 4
COMMENT	
Comment	Microphone 1.4m above ground level, on deck Microphone 1.0m from north facade of house (under verandah)
REFERENCES	
AMG Z50 E/N	<i>Main Roads to provide this information</i>
Road name	Tonkin Highway
EXCEL file	Raphael.xls
Raw data file	Raphael_Sta.csv
EQUIPMENT	
Analyser number	16-707-043
Microphone number	16-707-043
Calibrator number	2292775
Calibrator values	93.8, 93.4
Operator	Lloyd George Acoustics Pty Ltd - Matt Moyle
WEATHER	
Wind	11/8/20 - High winds and rain - measurement excluded

Traffic Noise Measurements - Raphael, Bullsbrook 12 to 14 August 2020



			Hourly Noise Level Data					
			Raphael Road, Bullsbrook					
Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
11/08/2020	1	60.3	56.3	53.9	51.6	0	250	18
11/08/2020	2	58.8	54.8	53.2	51.3	0.2	260	24
11/08/2020	3	62.3	56.1	53.9	51.1	0.2	250	24
11/08/2020	4	59.8	55.0	52.8	50.6	0	240	21
11/08/2020	5	60.0	55.4	53.0	50.3	0	250	18
11/08/2020	6	61.0	57.8	54.7	50.4	0	240	17
11/08/2020	7	63.6	60.8	57.9	52.5	0.6	230	24
11/08/2020	8	69.1	63.1	60.9	56.3	0.4	240	18
11/08/2020	9	68.8	63.4	61.5	57.2	0	250	21
11/08/2020	10	67.6	61.9	59.8	54.9	0	240	17
11/08/2020	11	66.5	61.3	59.4	54.9	0	210	30
11/08/2020	12	63.2	60.0	57.8	54.1	0	220	28
11/08/2020	13	69.1	60.8	64.7	54.2	0	210	34
11/08/2020	14	66.4	61.1	58.9	53.9	0.4	240	31
11/08/2020	15	62.5	60.2	57.8	54.2	0	250	30
11/08/2020	16	64.4	60.9	66.8	54.4	0	240	28
11/08/2020	17	63.1	60.4	58.0	54.2	0	250	15
11/08/2020	18	66.9	61.0	58.6	53.3	0.6	220	21
11/08/2020	19	66.3	61.8	59.8	55.4	0	270	15
11/08/2020	20	62.6	60.1	57.5	53.9	0	280	5
11/08/2020	21	63.9	60.4	56.8	51.2	0	140	8
11/08/2020	22	60.9	56.7	54.0	50.6	0	140	11
11/08/2020	23	59.3	54.5	52.5	50.1	0.4	0	0
11/08/2020	0	61.0	57.2	53.8	50.1	0.2	0	0
12/08/2020	1	60.5	55.4	52.7	49.6	0	0	0
12/08/2020	2	57.8	52.7	51.3	49.5	0	260	11
12/08/2020	3	61.1	53.6	51.9	48.9	0	190	5
12/08/2020	4	60.2	53.7	51.5	48.6	0	0	0
12/08/2020	5	61.8	56.5	53.1	49.1	0	310	5
12/08/2020	6	61.0	57.3	54.0	49.2	0	0	0
12/08/2020	7	62.1	58.5	55.5	50.1	0	0	0
12/08/2020	8	66.2	62.3	60.0	55.5	0.2	0	0
12/08/2020	9	66.9	62.4	60.1	56.2	0	350	8
12/08/2020	10	65.9	60.1	57.8	52.2	0	0	0
12/08/2020	11	67.7	56.3	56.1	49.4	0	170	11
12/08/2020	12	64.4	54.9	54.4	49.0	0	190	15
12/08/2020	13	64.4	56.9	55.0	49.5	0	190	21
12/08/2020	14	68.0	57.5	55.0	50.1	0	210	17
12/08/2020	15	63.1	57.0	54.9	49.9	0	190	17
12/08/2020	16	71.3	57.1	54.7	50.6	0	190	21
12/08/2020	17	60.1	57.0	54.5	51.1	0	170	17
12/08/2020	18	60.4	57.2	55.4	51.5	0	180	18
12/08/2020	19	62.1	57.4	55.5	51.0	0	180	15
12/08/2020	20	58.9	55.6	53.6	51.0	0	160	13
12/08/2020	21	59.9	56.6	53.9	50.4	0	240	8
12/08/2020	22	63.0	59.2	56.0	50.3	0	10	4
12/08/2020	23	62.4	59.0	55.3	49.5	0	10	11
12/08/2020	0	61.9	58.7	54.7	49.2	0	360	8

			Hourly Noise Level Data					
			Raphael Road, Bullsbrook					
Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
13/08/2020	1	62.5	57.4	53.6	48.4	0	360	8
13/08/2020	2	62.9	57.0	53.2	48.3	0	20	9
13/08/2020	3	60.3	54.3	51.3	48.0	0	10	8
13/08/2020	4	61.2	55.6	52.2	48.1	0	10	5
13/08/2020	5	60.3	55.3	52.0	47.7	0	50	5
13/08/2020	6	61.2	57.5	54.4	48.4	0	0	0
13/08/2020	7	62.8	60.2	57.6	52.7	0	0	0
13/08/2020	8	64.6	60.4	58.3	54.6	0	360	5
13/08/2020	9	68.6	59.8	59.3	53.1	0	30	9
13/08/2020	10	68.3	60.0	58.7	52.7	0	340	9
13/08/2020	11	63.2	58.2	55.9	51.5	0	310	9
13/08/2020	12	64.4	57.6	55.6	50.4	0	330	9
13/08/2020	13	60.5	55.1	54.2	49.2	0	270	5
13/08/2020	14	60.3	56.5	53.9	49.8	0	310	11
13/08/2020	15	63.8	59.8	57.4	52.3	0	320	18
13/08/2020	16	61.6	58.1	55.1	50.1	0	0	0
13/08/2020	17	68.9	58.6	56.8	51.0	0	170	9
13/08/2020	18	63.2	60.7	58.4	54.3	0	250	17
13/08/2020	19	64.5	59.6	57.2	51.6	0	190	13
13/08/2020	20	59.0	54.9	53.0	50.0	0	160	11
13/08/2020	21	60.2	55.3	52.7	48.9	0.2	60	11
13/08/2020	22	62.8	59.6	56.4	50.3	0	50	4
13/08/2020	23	62.1	58.4	54.9	48.6	0	60	4
13/08/2020	0	62.1	57.6	53.9	48.3	0	60	8
14/08/2020	1	61.3	56.6	52.9	48.2	0	0	0
14/08/2020	2	60.7	54.6	51.7	47.8	0	30	5
14/08/2020	3	59.4	52.9	50.6	47.6	0	360	9
14/08/2020	4	62.5	56.2	52.6	47.4	0	80	8
14/08/2020	5	63.3	57.1	53.6	47.3	0	40	9
14/08/2020	6	61.8	57.0	53.9	48.2	0	50	2
14/08/2020	7	64.8	60.6	58.0	52.2	0	10	5
14/08/2020	8	68.0	62.1	60.0	54.3	0	210	8
14/08/2020	9	69.0	60.0	58.7	53.9	0	90	9
14/08/2020	10	67.6	58.0	57.2	52.1	0	360	4
14/08/2020	11	66.3	57.8	57.0	50.9	0	340	17
14/08/2020	12	63.2	59.0	56.5	51.9	0	360	9
14/08/2020	13	60.3	56.7	54.3	49.9	0	330	13
14/08/2020	14	63.5	60.2	57.8	53.2	0.4	320	18
14/08/2020	15	63.5	60.2	57.8	53.0	0	340	11
14/08/2020	16	71.8	65.0	61.2	52.4	2.4	350	13
14/08/2020	17	71.8	61.9	60.8	55.2	0.8	340	13
14/08/2020	18	70.3	63.8	61.0	56.1	0.2	340	5
14/08/2020	19	63.5	60.3	58.1	54.9	0	30	5
14/08/2020	20	62.7	60.9	58.7	55.6	0	50	9
14/08/2020	21	62.8	60.7	58.0	53.7	0	50	11
14/08/2020	22	63.2	60.3	57.1	50.9	0	40	5
14/08/2020	23	62.7	59.8	56.5	50.6	0	50	13
14/08/2020	0	62.2	58.7	55.1	49.3	0	10	5

Table A7–Noise Measurement Summary at Stock West Road, Bullsbrook

Date	L_{A10,18hour} dB	L_{Aeq,24hour} dB	L_{Aeq(Day)} dB	L_{Aeq(Night)} dB
11/08/20	60.6	58.6	60.2	50.7
12/08/20	57.8	54.5	55.9	48.4
13/08/20	53.8	51.3	52.5	46.8
14/08/20	53.6	50.8	52.0	46.7
Average	55	52	53	47

*Highlighted rows indicate days where weather/traffic conditions were not suitable (excluded from average)



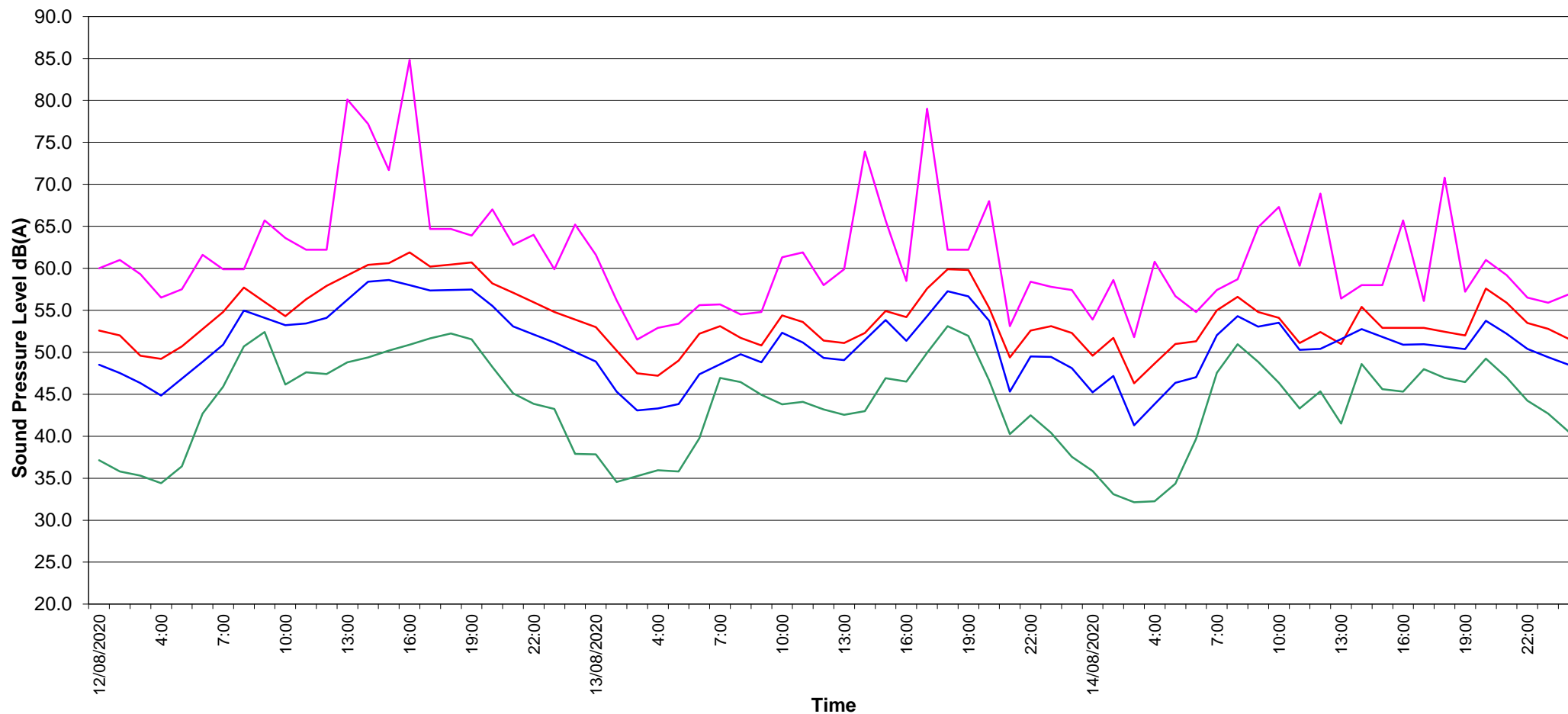
Logger Position – Stock West Road, Bullsbrook

Traffic Noise Measurement Data

Item	Details
LOCATION	
Project	Northlink Stage 3 Northern Section
Street address	Stock West Road
Locality	Bullsbrook
Occupier	
Dates	11 to 14 August 2020
Category	Main Roads to provide this information
SITE	
Distance from microphone to kerb	310m to Tonkin Hwy
Height of the road in relation to the ground	+2m
Road surface type	Main Roads to provide this information
Speed zone	110 km/h
Absorbing ground	100%
Angle of view	180 deg
Road gradient	Level
Traffic flow	Main Roads to provide this information
Heavy vehicles	Main Roads to provide this information
House-Road orientation.	West
Carriageways & lanes.	2, 4
COMMENT	
Comment	Microphone 1.4m above ground level Microphone 1.0m from side facade of house (under carport)
REFERENCES	
AMG Z50 E/N	Main Roads to provide this information
Road name	Tonkin Highway
EXCEL file	StockWrd.xls
Raw data file	StockWrd_Sta.csv
EQUIPMENT	
Analyser number	878115
Microphone number	878115
Calibrator number	2292775
Calibrator values	93.8, 94
Operator	Lloyd George Acoustics Pty Ltd - Matt Moyle
WEATHER	
Wind	11/8/20 - High winds and rain - measurement excluded

Traffic Noise Measurements - Stock W Road, Bullsbrook 12 to 14 August 2020

L1 L10 Leq L90



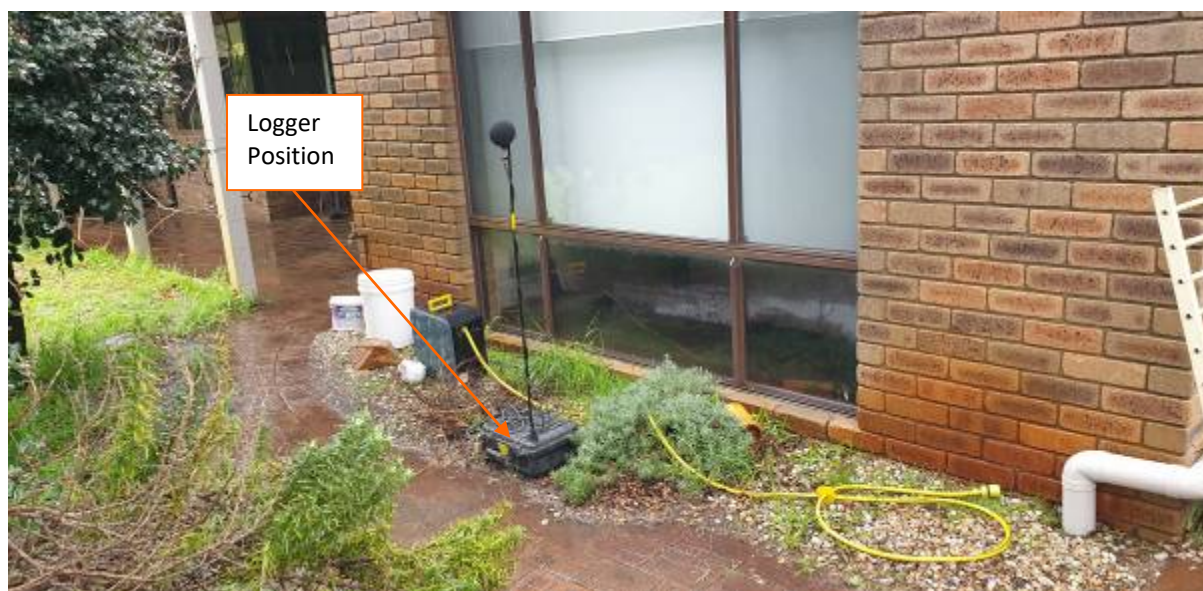
Hourly Noise Level Data								
Stock West Road, Bullsbrook								
Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
11/08/2020	1	61.9	55.8	50.9	39.6	0	250	18
11/08/2020	2	60.3	52.1	47.7	37.4	0.2	260	24
11/08/2020	3	62.1	55.2	49.7	37.9	0.2	250	24
11/08/2020	4	61.6	53.6	49.9	37.5	0	240	21
11/08/2020	5	62.3	56.6	51.8	38.1	0	250	18
11/08/2020	6	64.6	59.9	54.6	43.7	0	240	17
11/08/2020	7	65.4	62.5	57.9	50.6	0.6	230	24
11/08/2020	8	65.2	62.5	59.7	54.7	0.4	240	18
11/08/2020	9	65.7	63.0	60.4	56.2	0	250	21
11/08/2020	10	68.6	62.0	59.7	54.9	0	240	17
11/08/2020	11	65.6	62.0	59.4	54.4	0	210	30
11/08/2020	12	65.6	62.8	60.1	54.6	0	220	28
11/08/2020	13	78.5	62.9	66.2	54.4	0	210	34
11/08/2020	14	67.6	62.9	59.9	54.4	0.4	240	31
11/08/2020	15	73.4	62.2	61.5	54.8	0	250	30
11/08/2020	16	75.6	62.4	62.0	54.3	0	240	28
11/08/2020	17	64.5	61.5	58.9	54.0	0	250	15
11/08/2020	18	65.0	61.6	58.6	53.5	0.6	220	21
11/08/2020	19	64.8	62.6	59.0	53.7	0	270	15
11/08/2020	20	61.3	58.4	53.9	48.1	0	280	5
11/08/2020	21	64.7	60.3	55.2	46.1	0	140	8
11/08/2020	22	60.0	55.2	51.3	43.2	0	140	11
11/08/2020	23	57.0	53.4	48.0	40.4	0.4	0	0
11/08/2020	0	56.3	52.3	47.4	38.0	0.2	0	0
12/08/2020	1	60.0	52.6	48.5	37.2	0	0	0
12/08/2020	2	61.0	52.0	47.5	35.8	0	260	11
12/08/2020	3	59.3	49.6	46.3	35.3	0	190	5
12/08/2020	4	56.5	49.2	44.9	34.4	0	0	0
12/08/2020	5	57.5	50.7	46.9	36.4	0	310	5
12/08/2020	6	61.6	52.8	48.9	42.7	0	0	0
12/08/2020	7	59.9	54.8	50.9	45.9	0	0	0
12/08/2020	8	59.9	57.7	55.0	50.7	0.2	0	0
12/08/2020	9	65.7	56.0	54.1	52.4	0	350	8
12/08/2020	10	63.6	54.3	53.2	46.2	0	0	0
12/08/2020	11	62.2	56.3	53.4	47.6	0	170	11
12/08/2020	12	62.2	57.9	54.1	47.4	0	190	15
12/08/2020	13	80.1	59.2	56.3	48.8	0	190	21
12/08/2020	14	77.2	60.4	58.4	49.4	0	210	17
12/08/2020	15	71.7	60.6	58.6	50.2	0	190	17
12/08/2020	16	84.8	61.9	58.0	50.9	0	190	21
12/08/2020	17	64.7	60.2	57.4	51.7	0	170	17
12/08/2020	18	64.7	60.5	57.4	52.3	0	180	18
12/08/2020	19	63.9	60.7	57.5	51.6	0	180	15
12/08/2020	20	67.0	58.2	55.5	48.3	0	160	13
12/08/2020	21	62.8	57.1	53.1	45.1	0	240	8
12/08/2020	22	64.0	56.0	52.1	43.9	0	10	4
12/08/2020	23	59.9	54.8	51.2	43.3	0	10	11
12/08/2020	0	65.2	53.9	50.0	37.9	0	360	8

Hourly Noise Level Data								
Stock West Road, Bullsbrook								
Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
13/08/2020	1	61.6	53.0	48.9	37.9	0	360	8
13/08/2020	2	56.2	50.2	45.3	34.6	0	20	9
13/08/2020	3	51.5	47.5	43.1	35.3	0	10	8
13/08/2020	4	52.9	47.2	43.3	36.0	0	10	5
13/08/2020	5	53.4	49.0	43.8	35.8	0	50	5
13/08/2020	6	55.6	52.2	47.4	39.8	0	0	0
13/08/2020	7	55.7	53.1	48.6	47.0	0	0	0
13/08/2020	8	54.5	51.7	49.8	46.5	0	360	5
13/08/2020	9	54.8	50.8	48.8	45.0	0	30	9
13/08/2020	10	61.3	54.4	52.3	43.8	0	340	9
13/08/2020	11	61.9	53.6	51.2	44.1	0	310	9
13/08/2020	12	58.0	51.4	49.3	43.2	0	330	9
13/08/2020	13	59.9	51.1	49.1	42.6	0	270	5
13/08/2020	14	73.9	52.3	51.5	43.0	0	310	11
13/08/2020	15	65.7	54.9	53.9	46.9	0	320	18
13/08/2020	16	58.5	54.2	51.4	46.5	0	0	0
13/08/2020	17	79.0	57.6	54.3	50.0	0	170	9
13/08/2020	18	62.2	59.9	57.3	53.1	0	250	17
13/08/2020	19	62.2	59.8	56.7	52.0	0	190	13
13/08/2020	20	68.0	55.3	53.7	46.7	0	160	11
13/08/2020	21	53.1	49.4	45.3	40.3	0.2	60	11
13/08/2020	22	58.4	52.6	49.5	42.5	0	50	4
13/08/2020	23	57.8	53.1	49.5	40.4	0	60	4
13/08/2020	0	57.4	52.3	48.1	37.6	0	60	8
14/08/2020	1	53.9	49.6	45.2	35.9	0	0	0
14/08/2020	2	58.6	51.7	47.2	33.1	0	30	5
14/08/2020	3	51.8	46.3	41.3	32.2	0	360	9
14/08/2020	4	60.8	48.7	43.8	32.3	0	80	8
14/08/2020	5	56.7	51.0	46.4	34.4	0	40	9
14/08/2020	6	54.8	51.3	47.0	39.7	0	50	2
14/08/2020	7	57.4	55.0	52.0	47.6	0	10	5
14/08/2020	8	58.7	56.6	54.3	51.0	0	210	8
14/08/2020	9	64.9	54.8	53.0	48.9	0	90	9
14/08/2020	10	67.3	54.1	53.5	46.4	0	360	4
14/08/2020	11	60.3	51.1	50.3	43.3	0	340	17
14/08/2020	12	68.9	52.4	50.4	45.4	0	360	9
14/08/2020	13	56.4	51.0	51.6	41.5	0	330	13
14/08/2020	14	58.0	55.4	52.8	48.6	0.4	320	18
14/08/2020	15	58.0	52.9	51.8	45.6	0	340	11
14/08/2020	16	65.7	52.9	50.9	45.3	2.4	350	13
14/08/2020	17	56.1	52.9	51.0	48.0	0.8	340	13
14/08/2020	18	70.8	52.5	50.7	47.0	0.2	340	5
14/08/2020	19	57.2	52.0	50.4	46.5	0	30	5
14/08/2020	20	61.0	57.6	53.8	49.3	0	50	9
14/08/2020	21	59.2	55.9	52.2	47.0	0	50	11
14/08/2020	22	56.5	53.5	50.4	44.3	0	40	5
14/08/2020	23	55.9	52.8	49.4	42.7	0	50	13
14/08/2020	0	56.9	51.6	48.5	40.6	0	10	5

Table A8–Noise Measurement Summary at Warbrook Road, Bullsbrook

Date	L_{A10,18hour} dB	L_{Aeq,24hour} dB	L_{Aeq(Day)} dB	L_{Aeq(Night)} dB
11/08/20	57.3	57.9	59.4	49.5
12/08/20	54.7	52.5	53.7	48.0
13/08/20	53.7	52.4	53.2	50.3
14/08/20	55.8	53.1	54.0	50.8
Average	55	53	54	50

*Highlighted rows indicate days where weather/traffic conditions were not suitable (excluded from average)

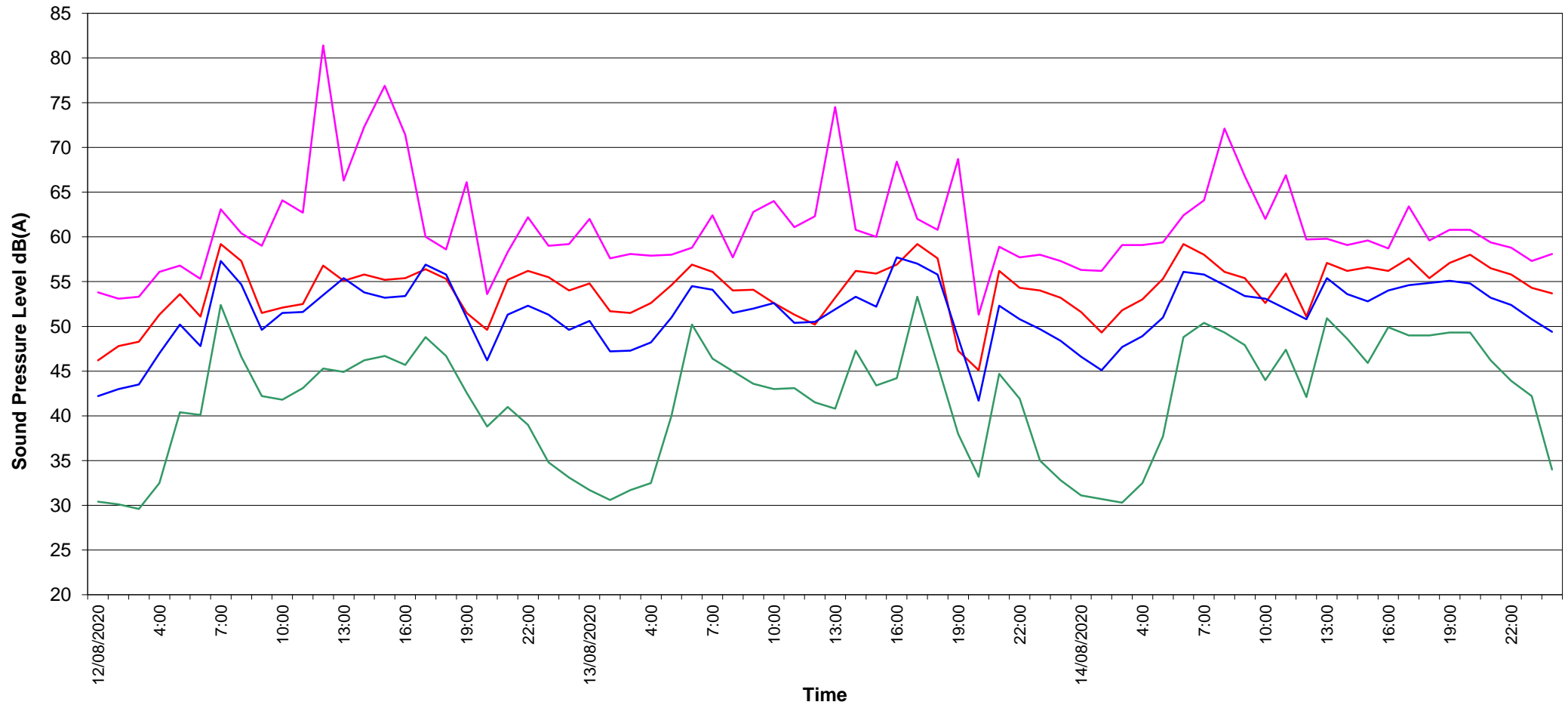


Logger Position – Warbrook Road, Bullsbrook

Traffic Noise Measurement Data

Item	Details
LOCATION	
Project	Northlink Stage 3 Northern Section
Street address	Warbrook Road, Bullsbrook
Locality	Bullsbrook
Occupier	
Dates	11 to 14 August 2020
Category	Main Roads to provide this information
SITE	
Distance from microphone to kerb	~115 Metres
Height of the road in relation to the ground	+1m
Road surface type	Main Roads to provide this information
Speed zone	110 km/h
Absorbing ground	100%
Angle of view	160 deg
Road gradient	Level
Traffic flow	Main Roads to provide this information
Heavy vehicles	Main Roads to provide this information
House-Road orientation.	West
Carriageways & lanes.	2, 4
COMMENT	
Comment	Microphone 1.4m above ground level Microphone 1.0m from front facade of house (nearest room window)
REFERENCES	
AMG Z50 E/N	Main Roads to provide this information
Road name	Tonkin Highway
EXCEL file	Warbrook.xls
Raw data file	Warbrook_Sta.csv
EQUIPMENT	
Analyser number	15-301-468
Microphone number	15-301-468
Calibrator number	2292775
Calibrator values	94, 93.7
Operator	Lloyd George Acoustics Pty Ltd - Matt Moyle
WEATHER	
Wind	11/8/20 - High winds and rain - measurement excluded

Traffic Noise Measurements - Warbrook Road, Bullsbrook 12 to 14 August 2020



			Hourly Noise Level Data					
			Warbrook Road, Bullsbrook					
Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
11/08/2020	1	55.3	49.5	45.5	34.2	0	250	18
11/08/2020	2	56.5	50.3	46.4	35.3	0.2	260	24
11/08/2020	3	56.4	51.1	47.0	38.0	0.2	250	24
11/08/2020	4	56.9	52.4	48.6	38.6	0	240	21
11/08/2020	5	59.1	55.3	51.3	39.2	0	250	18
11/08/2020	6	60.9	57.7	54.7	47.8	0	240	17
11/08/2020	7	63.0	59.9	57.5	53.3	0.6	230	24
11/08/2020	8	64.4	61.8	59.4	55.6	0.4	240	18
11/08/2020	9	63.7	60.0	61.6	53.0	0	250	21
11/08/2020	10	62.2	58.6	59.3	52.0	0	240	17
11/08/2020	11	64.0	59.5	59.2	52.4	0	210	30
11/08/2020	12	69.3	59.5	60.1	52.4	0	220	28
11/08/2020	13	70.0	59.3	63.1	52.2	0	210	34
11/08/2020	14	69.9	59.3	64.6	52.7	0.4	240	31
11/08/2020	15	67.4	59.8	58.1	52.9	0	250	30
11/08/2020	16	62.9	59.7	58.2	53.2	0	240	28
11/08/2020	17	61.5	58.6	56.3	52.2	0	250	15
11/08/2020	18	62.6	60.2	58.3	53.0	0.6	220	21
11/08/2020	19	60.7	57.6	56.2	50.0	0	270	15
11/08/2020	20	63.0	58.4	57.6	40.3	0	280	5
11/08/2020	21	54.2	51.1	47.3	39.6	0	140	8
11/08/2020	22	52.4	48.2	44.0	33.7	0	140	11
11/08/2020	23	55.7	50.3	46.4	33.3	0.4	0	0
11/08/2020	0	55.6	50.0	45.6	31.2	0.2	0	0
12/08/2020	1	53.8	46.2	42.2	30.4	0	0	0
12/08/2020	2	53.1	47.8	43.0	30.1	0	260	11
12/08/2020	3	53.3	48.3	43.5	29.6	0	190	5
12/08/2020	4	56.1	51.3	47.0	32.5	0	0	0
12/08/2020	5	56.8	53.6	50.2	40.4	0	310	5
12/08/2020	6	55.3	51.1	47.8	40.1	0	0	0
12/08/2020	7	63.1	59.2	57.3	52.4	0	0	0
12/08/2020	8	60.4	57.3	54.7	46.6	0.2	0	0
12/08/2020	9	59.0	51.5	49.6	42.2	0	350	8
12/08/2020	10	64.1	52.1	51.5	41.8	0	0	0
12/08/2020	11	62.7	52.5	51.6	43.1	0	170	11
12/08/2020	12	81.4	56.8	53.5	45.3	0	190	15
12/08/2020	13	66.3	55.1	55.4	44.9	0	190	21
12/08/2020	14	72.3	55.8	53.8	46.2	0	210	17
12/08/2020	15	76.9	55.2	53.2	46.7	0	190	17
12/08/2020	16	71.4	55.4	53.4	45.7	0	190	21
12/08/2020	17	60.0	56.4	56.9	48.8	0	170	17
12/08/2020	18	58.6	55.3	55.8	46.7	0	180	18
12/08/2020	19	66.1	51.5	51.0	42.6	0	180	15
12/08/2020	20	53.6	49.6	46.2	38.8	0	160	13
12/08/2020	21	58.3	55.2	51.3	41.0	0	240	8
12/08/2020	22	62.2	56.2	52.3	39.0	0	10	4
12/08/2020	23	59.0	55.5	51.3	34.8	0	10	11
12/08/2020	0	59.2	54.0	49.6	33.1	0	360	8

			Hourly Noise Level Data					
			Warbrook Road, Bullsbrook					
Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
13/08/2020	1	62.0	54.8	50.6	31.7	0	360	8
13/08/2020	2	57.6	51.7	47.2	30.6	0	20	9
13/08/2020	3	58.1	51.5	47.3	31.7	0	10	8
13/08/2020	4	57.9	52.6	48.2	32.5	0	10	5
13/08/2020	5	58.0	54.6	51.0	40.0	0	50	5
13/08/2020	6	58.8	56.9	54.5	50.2	0	0	0
13/08/2020	7	62.4	56.1	54.1	46.4	0	0	0
13/08/2020	8	57.7	54.0	51.5	45.0	0	360	5
13/08/2020	9	62.8	54.1	52.0	43.6	0	30	9
13/08/2020	10	64.0	52.6	52.6	43.0	0	340	9
13/08/2020	11	61.1	51.3	50.4	43.1	0	310	9
13/08/2020	12	62.3	50.2	50.5	41.5	0	330	9
13/08/2020	13	74.5	53.2	51.9	40.8	0	270	5
13/08/2020	14	60.8	56.2	53.3	47.3	0	310	11
13/08/2020	15	60.0	55.9	52.2	43.4	0	320	18
13/08/2020	16	68.4	56.9	57.7	44.2	0	0	0
13/08/2020	17	62.0	59.2	57.0	53.3	0	170	9
13/08/2020	18	60.8	57.6	55.8	45.7	0	250	17
13/08/2020	19	68.7	47.3	48.8	38.0	0	190	13
13/08/2020	20	51.3	45.1	41.7	33.2	0	160	11
13/08/2020	21	58.9	56.2	52.3	44.7	0.2	60	11
13/08/2020	22	57.7	54.3	50.8	41.9	0	50	4
13/08/2020	23	58.0	54.0	49.7	35.0	0	60	4
13/08/2020	0	57.3	53.2	48.4	32.8	0	60	8
14/08/2020	1	56.3	51.6	46.6	31.1	0	0	0
14/08/2020	2	56.2	49.3	45.1	30.7	0	30	5
14/08/2020	3	59.1	51.8	47.7	30.3	0	360	9
14/08/2020	4	59.1	53.0	48.9	32.5	0	80	8
14/08/2020	5	59.4	55.3	51.0	37.7	0	40	9
14/08/2020	6	62.4	59.2	56.1	48.8	0	50	2
14/08/2020	7	64.1	58.0	55.8	50.4	0	10	5
14/08/2020	8	72.1	56.1	54.6	49.3	0	210	8
14/08/2020	9	66.8	55.4	53.4	47.9	0	90	9
14/08/2020	10	62.0	52.6	53.1	44.0	0	360	4
14/08/2020	11	66.9	55.9	52.0	47.4	0	340	17
14/08/2020	12	59.7	51.1	50.8	42.1	0	360	9
14/08/2020	13	59.8	57.1	55.4	50.9	0	330	13
14/08/2020	14	59.1	56.2	53.6	48.6	0.4	320	18
14/08/2020	15	59.6	56.6	52.8	45.9	0	340	11
14/08/2020	16	58.7	56.2	54.0	49.9	2.4	350	13
14/08/2020	17	63.4	57.6	54.6	49.0	0.8	340	13
14/08/2020	18	59.6	55.4	54.9	49.0	0.2	340	5
14/08/2020	19	60.8	57.1	55.1	49.3	0	30	5
14/08/2020	20	60.8	58.0	54.8	49.3	0	50	9
14/08/2020	21	59.4	56.5	53.2	46.2	0	50	11
14/08/2020	22	58.8	55.8	52.4	43.9	0	40	5
14/08/2020	23	57.3	54.3	50.8	42.2	0	50	13
14/08/2020	0	58.1	53.7	49.4	34.0	0	10	5

Appendix B

Terminology

The following is an explanation of the terminology used throughout this report.

Decibel (dB)

The decibel is the unit that describes the sound pressure and sound power levels of a noise source. It is a logarithmic scale referenced to the threshold of hearing.

A-Weighting

An A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. This weighting reflects the fact that the human ear is not as sensitive to lower frequencies as it is to higher frequencies. An A-weighted sound level is described as L_A dB.

L_1

An L_1 level is the noise level which is exceeded for 1 per cent of the measurement period and is considered to represent the average of the maximum noise levels measured.

L_{10}

An L_{10} level is the noise level which is exceeded for 10 per cent of the measurement period and is considered to represent the “intrusive” noise level.

L_{90}

An L_{90} level is the noise level which is exceeded for 90 per cent of the measurement period and is considered to represent the “background” noise level.

L_{eq}

The L_{eq} level represents the average noise energy during a measurement period.

$L_{A10,18hour}$

The $L_{A10,18hour}$ level is the arithmetic average of the hourly L_{A10} levels between 6.00 am and midnight. The *CoRTN* algorithms were developed to calculate this parameter.

$L_{Aeq,24hour}$

The $L_{Aeq,24hour}$ level is the logarithmic average of the hourly L_{Aeq} levels for a full day (from midnight to midnight).

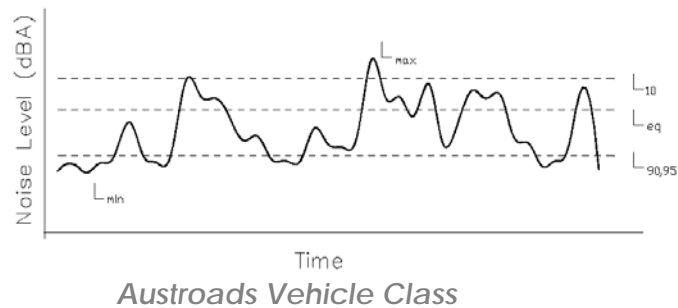
$L_{Aeq,8hour} / L_{Aeq} (Night)$

The $L_{Aeq} (Night)$ level is the logarithmic average of the hourly L_{Aeq} levels from 10.00 pm to 6.00 am on the same day.

$L_{Aeq,16hour} / L_{Aeq} (Day)$

The $L_{Aeq} (Day)$ level is the logarithmic average of the hourly L_{Aeq} levels from 6.00 am to 10.00 pm on the same day. This value is typically 1-3 dB less than the $L_{A10,18hour}$.

Chart of Noise Level Descriptors



AUSTROADS Vehicle Classification System					
Level 1 Length Description	Level 2 Axles and Axle Groups	Level 3 Vehicle Type	AUSTROADS Classification		
Type	Axles	Groups	Class	Parameters	Typical Configuration
Short up to 6.5m	1 or 2	Short	1	d(1) < 3.2m and axles = 2	
		Short - Towing	2	groups = 3 d(1) < 2.7m, d(2) < 3.2m d(2) < 2.7m and axles = 3, 4 or 5	
Medium 6.5m to 14.5m	3, 4 or 5	Two Axle Truck or Bus	3	d(1) > 3.2m and axles = 2	
		Three Axle Truck or Bus	4	axles = 3 and groups = 2	
		Four Axle Truck	5	axles = 3 and groups = 2	
Long 14.5m to 19.5m	> 5	Three Axle Articulated	6	d(1) > 3.2m, axles = 3 and groups = 3	
		Four Axle Articulated	7	d(2) > 2.7m or d(1) > 2.7m or d(1) > 3.2m axles = 4 and groups = 2	
		Five Axle Articulated	8	d(2) > 2.7m or d(1) > 2.7m or d(1) > 3.2m axles = 5 and groups = 2	
		Six Axle Articulated	9	axles = 6 and groups = 2 or axles = 5 and groups = 3	
Medium Combination 17.5m to 35.5m	> 5	8 Double B Double, or Heavy Truck and Trailer	10	groups = 4 and axles = 6	
		Double Road Train	11	groups = 5 or 6 and axles = 6	
Large Combination Over 35.5m	> 5	Triple Road Train	12	groups = 6 and axles = 6	

Definitions:
Group: Axle groups, where adjacent axles are less than 2.7m apart
Groups: Number of axle groups
Axles: Number of axles (maximum axle spacing of 10.0m)

d(1): Distance between first and second axle
d(2): Distance between second and third axle

Typical Noise Levels

