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Pre-Construction Noise Monitoring

Mandurah Estuary Bridge Duplication

Reference: 23017811-02 Draft

Prepared for:
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Date	Rev	Description	Author	Verified
24-Oct-23	0	Issued to Client	Terry George	-

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1. INTRODUCTION

It is proposed to duplicate the Mandurah Estuary Bridge in order to ease congestion in the approach to the Mandurah Estuary and reduce travel times. The project will deliver a safe, more efficient and reliable transport link for motorists, with the inclusion of a four-metre wide shared path improving access for riders and walkers. The general project locality is shown in *Figure 1-1*.

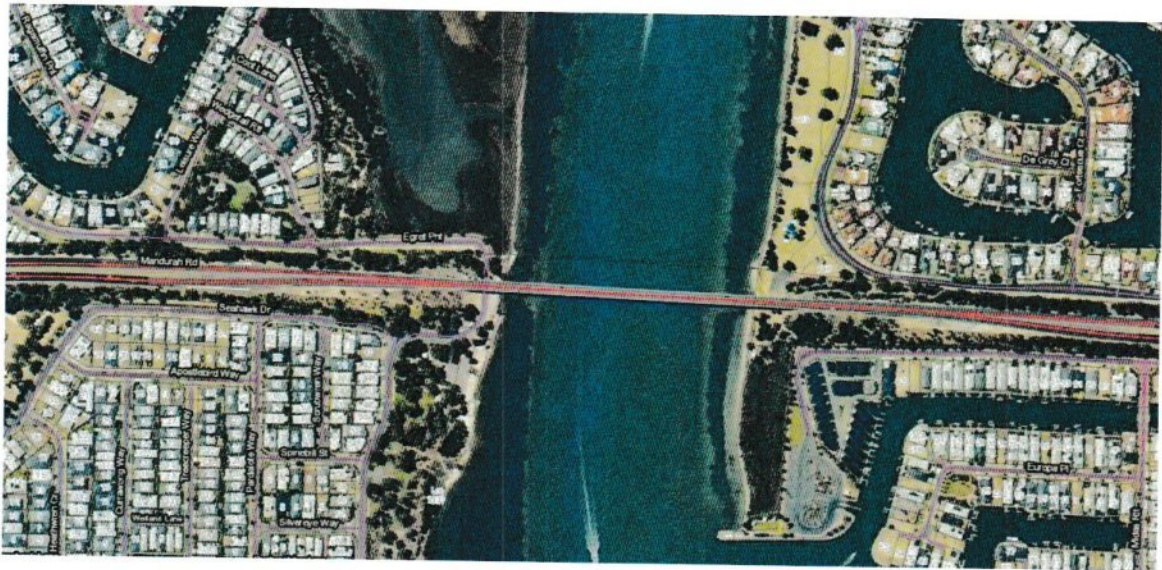


Figure 1-1: Road Project Locality

This report presents the results of noise monitoring undertaken at four (4) locations within the Study Area, prior to the construction of the road upgrade.

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

2. METHODOLOGY

Noise monitoring was undertaken at four (4) locations, in order to:

- Quantify the existing noise levels; and
- Determine the differences between different acoustic parameters ($L_{Aeq(Day)}$ and $L_{Aeq(Night)}$).

The instruments used were Acoustic Research Laboratories (ARL) noise data loggers, with the microphone located approximately 1.4 metres above ground level and 1-metre from the most exposed façade. The exception is 117 Waterlily Drive where the microphone was around 1.6 metres above ground level due to a boat parked near the noise monitoring location.

The loggers recorded various acoustic parameters, with the L_{A1} , L_{A10} , L_{Aeq} and L_{A90} values reported. These loggers 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 holds current laboratory calibration certificates for the loggers.

Table 2-1 provides details at each monitoring location with Figure 2-1 providing their general location. Note at the request of the resident, the logger at 16 Nutbush Court was to be collected on the Thursday.

Table 2-1: Noise Logging Details

Location	Serial No.	Set-up Date	Collection Date
1. 117 Waterlily Drive, Dudley Park	15-301-468	Tuesday, 10 October 2023	Tuesday, 17 October 2023
2. 78 Seahawk Drive, Erskine	16-707-041	Tuesday, 10 October 2023	Tuesday, 17 October 2023
3. 21 Egret Point, Halls Head	16-004-041	Tuesday, 10 October 2023	Tuesday, 17 October 2023
4. 40 Waterside Drive, Dudley Park	8780F4	Tuesday, 10 October 2023	Tuesday, 17 October 2023

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 weather station. This data was compared against the Main Roads WA specifications for measurement conditions and comments provided.

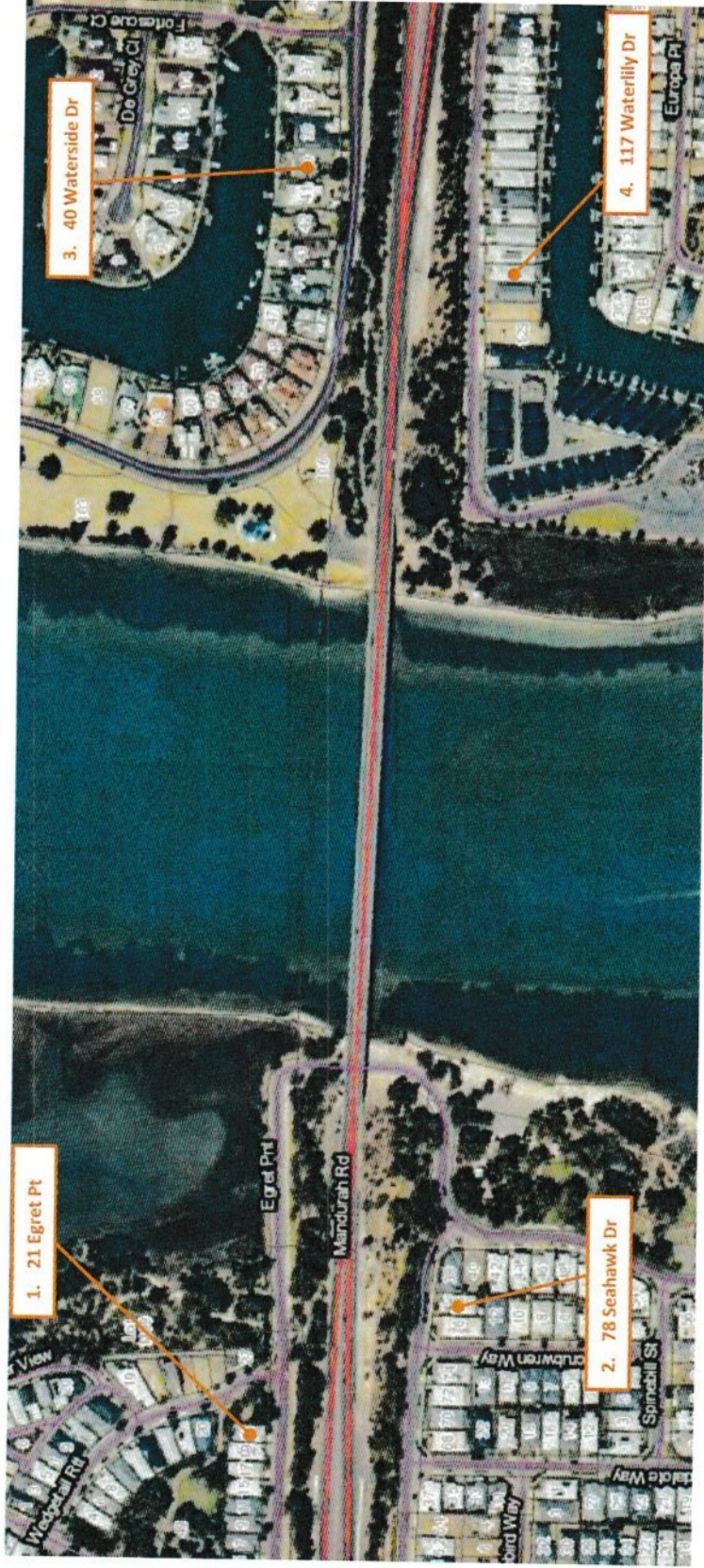


Figure 2-1: Noise Monitoring Locations

3. RESULTS

The results from the noise monitoring are summarised in *Table 3-1*. Full details of the results are presented in *Appendix A*.

Table 3-1: Average Weekday Noise Measurement Results, dB

Location	L _{A10,18hour}	L _{Aeq,24hour}	L _{Aeq(Day)}	L _{Aeq(Night)}
1. 117 Waterlily Drive, Dudley Park	59.7	57.3	58.6	52.8
2. 78 Seahawk Drive, Erskine	60.4	57.8	59.0	53.1
3. 21 Egret Point, Halls Head	65.4	62.4	63.7	57.3
4. 40 Waterside Drive, Dudley Park	62.3	59.7	61.1	53.7

Appendix A – Noise Monitoring Data Sheets

Table A-1: Measured Levels at 117 Waterlily Drive, Dudley Park

Date	Parameter			
	L _{A10,18hour} , dB	L _{Aeq,24hour} , dB	L _{Aeq(Day)} , dB	L _{Aeq(Night)} , dB
Wednesday, 11 October 2023	58.2	55.9	57.3	50.6
Thursday, 12 October 2023	60.4	58.2	59.4	53.8
Friday, 13 October 2023	60.4	57.9	59.0	53.9
Monday, 16 October 2023	62.2	60.4	61.6	56.1
Average	60.3	58.1	59.3	53.6



Traffic Noise Measurement Data

Item	Details
<i>LOCATION</i>	
Project	Mandurah Estuary Bridge Duplication
Street address	117 Waterlily Drive
Locality	Dudley Park
Occupier	
Dates	10 October to 17 October 2023
Category	Main Roads to provide this information
<i>SITE</i>	
Distance from the microphone to the kerb	52m
Height of the road in relation to the ground	+2m
Road surface type	Chip Seal
Speed zone	70 km/hr
Absorbing ground	70%
Angle of view	90
Road gradient	Incline
Traffic flow	16,908 EB / 18,113 WB
Heavy vehicles	10.1 EB / 9.2 WB%
House-Road orientation.	North
Carriageways & lanes.	1 cwy, 3 lanes
<i>COMMENT</i>	
Comment	Microphone located 1-metre from front façade Microphone height 1.6m above house floor level. Small boat located in front of logger
<i>REFERENCES</i>	
AMG Z50 E/N	Main Roads to provide this information
Road name	Mandurah Road
EXCEL file	117 Waterlily S1
Raw data file	117 Waterlily Sta
<i>EQUIPMENT</i>	
Analyser number	15-301-468
Microphone number	15-301-468
Calibrator number	34634284
Calibrator values	93.6 / 93.6
Operator	Lloyd George Acoustics Pty Ltd - Hao Tran
<i>WEATHER</i>	
Wind	Wind analysis based at Perth Metro 11 Oct 2023 - Wind negative. Moderate Speeds. 12 Oct 2023 - Wind negative. Moderate Speeds. 13 Oct 2023 - Wind mostly negative. Light to Moderate Speeds. 16 Oct 2023 - Wind mostly positive. Light to Strong Speeds.

Hourly Noise Level Data
117 Waterlily Drive

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
11-Oct-23	1:00	54.9	49.6	46.0	34.9	0.0	140	13.0
11-Oct-23	2:00	54.7	45.9	43.5	32.4	0.0	140	18.4
11-Oct-23	3:00	55.6	49.3	44.8	29.1	0.0	150	14.8
11-Oct-23	4:00	54.9	50.1	45.6	30.2	0.0	150	7.6
11-Oct-23	5:00	60.2	57.0	53.3	41.2	0.0	150	11.2
11-Oct-23	6:00	63.0	58.9	56.2	50.2	0.0	150	11.2
11-Oct-23	7:00	65.8	61.1	58.2	51.5	0.0	160	16.6
11-Oct-23	8:00	64.3	60.7	57.9	52.8	0.0	150	14.8
11-Oct-23	9:00	65.5	59.9	58.4	52.6	0.0	150	18.4
11-Oct-23	10:00	64.4	58.3	56.2	50.4	0.0	160	14.8
11-Oct-23	11:00	66.0	57.9	56.7	49.2	0.0	150	16.6
11-Oct-23	12:00	65.6	57.8	55.7	46.5	0.0	170	16.6
11-Oct-23	13:00	64.5	58.0	55.7	48.5	0.0	190	11.2
11-Oct-23	14:00	66.8	58.7	57.1	49.9	0.0	190	13.0
11-Oct-23	15:00	65.9	59.6	57.6	50.7	0.0	210	16.6
11-Oct-23	16:00	67.2	60.6	59.4	53.3	0.0	210	18.4
11-Oct-23	17:00	64.7	60.8	59.2	51.7	0.0	200	20.5
11-Oct-23	18:00	65.2	60.9	58.8	53.9	0.0	190	20.5
11-Oct-23	19:00	67.0	60.0	58.2	51.4	0.0	190	18.4
11-Oct-23	20:00	61.3	58.0	54.8	47.0	0.0	190	14.8
11-Oct-23	21:00	59.8	56.5	53.1	43.9	0.0	180	13.0
11-Oct-23	22:00	62.1	56.0	53.2	42.8	0.0	150	13.0
11-Oct-23	23:00	57.9	52.5	50.4	35.6	0.0	160	14.8
11-Oct-23	0:00	56.3	50.9	46.9	33.9	0.0	150	16.6
12-Oct-23	1:00	57.6	51.2	47.4	32.3	0.0	150	14.8
12-Oct-23	2:00	58.9	51.4	47.5	31.9	0.0	130	16.6
12-Oct-23	3:00	58.7	52.3	47.6	32.5	0.0	120	18.4
12-Oct-23	4:00	60.0	55.0	50.7	35.5	0.0	120	13.0
12-Oct-23	5:00	64.5	60.6	56.9	43.0	0.0	120	13.0
12-Oct-23	6:00	65.6	62.7	60.0	54.0	0.0	120	13.0
12-Oct-23	7:00	66.3	63.6	61.3	56.0	0.0	130	13.0
12-Oct-23	8:00	68.6	65.5	63.0	58.2	0.0	120	16.6
12-Oct-23	9:00	67.8	64.5	62.2	57.5	0.0	120	13.0
12-Oct-23	10:00	67.9	62.6	60.2	55.1	0.0	110	16.6
12-Oct-23	11:00	64.6	60.9	58.6	54.2	0.0	90	11.2
12-Oct-23	12:00	65.5	60.8	58.4	51.7	0.0	110	13.0
12-Oct-23	13:00	66.7	62.3	59.3	50.5	0.0	110	11.2
12-Oct-23	14:00	66.6	60.5	58.1	51.1	0.0	90	11.2
12-Oct-23	15:00	66.0	60.6	58.2	52.1	0.0	130	3.6
12-Oct-23	16:00	64.4	61.0	58.7	53.3	0.0	140	13.0
12-Oct-23	17:00	66.9	62.0	60.3	54.6	0.0	210	14.8
12-Oct-23	18:00	65.6	62.4	60.0	53.8	0.0	200	13.0
12-Oct-23	19:00	63.7	60.4	57.7	50.0	0.0	200	18.4
12-Oct-23	20:00	63.0	59.0	55.9	47.5	0.0	180	18.4
12-Oct-23	21:00	62.9	58.3	54.6	45.9	0.0	170	13.0
12-Oct-23	22:00	60.9	56.5	53.2	43.3	0.0	170	14.8
12-Oct-23	23:00	58.9	53.6	49.5	35.8	0.0	160	13.0
12-Oct-23	0:00	58.5	52.7	48.8	34.1	0.0	170	13.0

Hourly Noise Level Data
117 Waterlily Drive

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
13-Oct-23	1:00	57.1	51.6	47.2	33.0	0.0	160	13.0
13-Oct-23	2:00	56.9	50.3	45.6	31.7	0.0	140	13.0
13-Oct-23	3:00	58.9	50.6	47.6	31.4	0.0	120	14.8
13-Oct-23	4:00	58.9	54.4	49.6	34.5	0.0	130	13.0
13-Oct-23	5:00	62.1	59.3	55.6	41.9	0.0	120	9.4
13-Oct-23	6:00	65.8	62.4	59.7	53.3	0.0	120	7.6
13-Oct-23	7:00	66.8	63.0	60.4	54.1	0.0	130	5.4
13-Oct-23	8:00	66.7	63.1	60.6	57.6	0.0	100	11.2
13-Oct-23	9:00	66.5	63.2	60.8	56.7	0.0	110	11.2
13-Oct-23	10:00	67.3	63.1	60.8	56.1	0.0	80	7.6
13-Oct-23	11:00	68.4	62.6	60.3	55.4	0.0	50	7.6
13-Oct-23	12:00	67.8	62.1	60.1	53.0	0.0	20	11.2
13-Oct-23	13:00	66.3	60.8	58.5	51.2	0.0	10	5.4
13-Oct-23	14:00	65.5	60.6	58.4	51.7	0.0	260	9.4
13-Oct-23	15:00	63.8	59.1	56.7	50.4	0.0	130	9.4
13-Oct-23	16:00	67.4	60.6	59.2	51.5	0.0	160	7.6
13-Oct-23	17:00	67.5	61.3	59.5	52.1	0.0	170	11.2
13-Oct-23	18:00	65.0	61.3	58.8	51.6	0.0	190	13.0
13-Oct-23	19:00	64.5	61.0	58.1	51.5	0.0	190	11.2
13-Oct-23	20:00	63.4	59.6	56.5	46.4	0.0	180	11.2
13-Oct-23	21:00	61.2	57.8	54.5	44.7	0.0	170	13.0
13-Oct-23	22:00	61.4	57.0	53.6	42.9	0.0	160	11.2
13-Oct-23	23:00	61.8	56.5	53.2	39.5	0.0	170	13.0
13-Oct-23	0:00	63.3	55.0	53.2	38.0	0.0	160	13.0
16-Oct-23	1:00	61.5	54.3	50.1	35.5	0.0	90	16.6
16-Oct-23	2:00	60.2	49.6	48.2	37.6	0.0	90	14.8
16-Oct-23	3:00	60.1	52.3	48.5	34.9	0.0	70	16.6
16-Oct-23	4:00	63.0	57.4	53.3	38.1	0.0	70	20.5
16-Oct-23	5:00	65.7	62.8	58.9	46.6	0.0	70	16.6
16-Oct-23	6:00	68.3	64.6	62.1	55.8	0.0	70	11.2
16-Oct-23	7:00	69.0	65.2	63.1	57.8	0.0	60	7.6
16-Oct-23	8:00	71.2	66.9	65.2	60.6	0.0	50	16.6
16-Oct-23	9:00	71.1	66.8	64.7	60.8	0.0	50	24.1
16-Oct-23	10:00	73.1	65.6	63.6	59.1	0.0	30	22.3
16-Oct-23	11:00	72.4	65.3	63.3	57.1	0.0	30	20.5
16-Oct-23	12:00	67.4	63.8	61.1	56.1	0.0	30	11.2
16-Oct-23	13:00	67.6	62.6	60.9	54.0	0.0	10	11.2
16-Oct-23	14:00	67.1	61.7	59.7	52.3	0.0	310	11.2
16-Oct-23	15:00	67.5	63.5	61.5	55.2	0.0	300	7.6
16-Oct-23	16:00	67.9	63.1	61.1	56.9	0.0	290	9.4
16-Oct-23	17:00	67.2	62.5	60.5	54.7	0.0	280	7.6
16-Oct-23	18:00	66.5	62.1	60.3	51.6	0.0	240	5.4
16-Oct-23	19:00	65.7	61.6	58.9	51.7	0.0	230	3.6
16-Oct-23	20:00	63.5	60.1	56.9	48.1	0.0	170	5.4
16-Oct-23	21:00	62.7	58.4	55.7	46.9	0.0	150	7.6
16-Oct-23	22:00	61.1	57.3	53.6	43.1	0.0	170	7.6
16-Oct-23	23:00	62.0	57.8	53.5	37.4	0.0	160	7.6
16-Oct-23	0:00	61.7	55.8	51.7	33.2	0.0	120	7.6

Noise Logging Chart 117 Waterlily Drive, Dudley Park

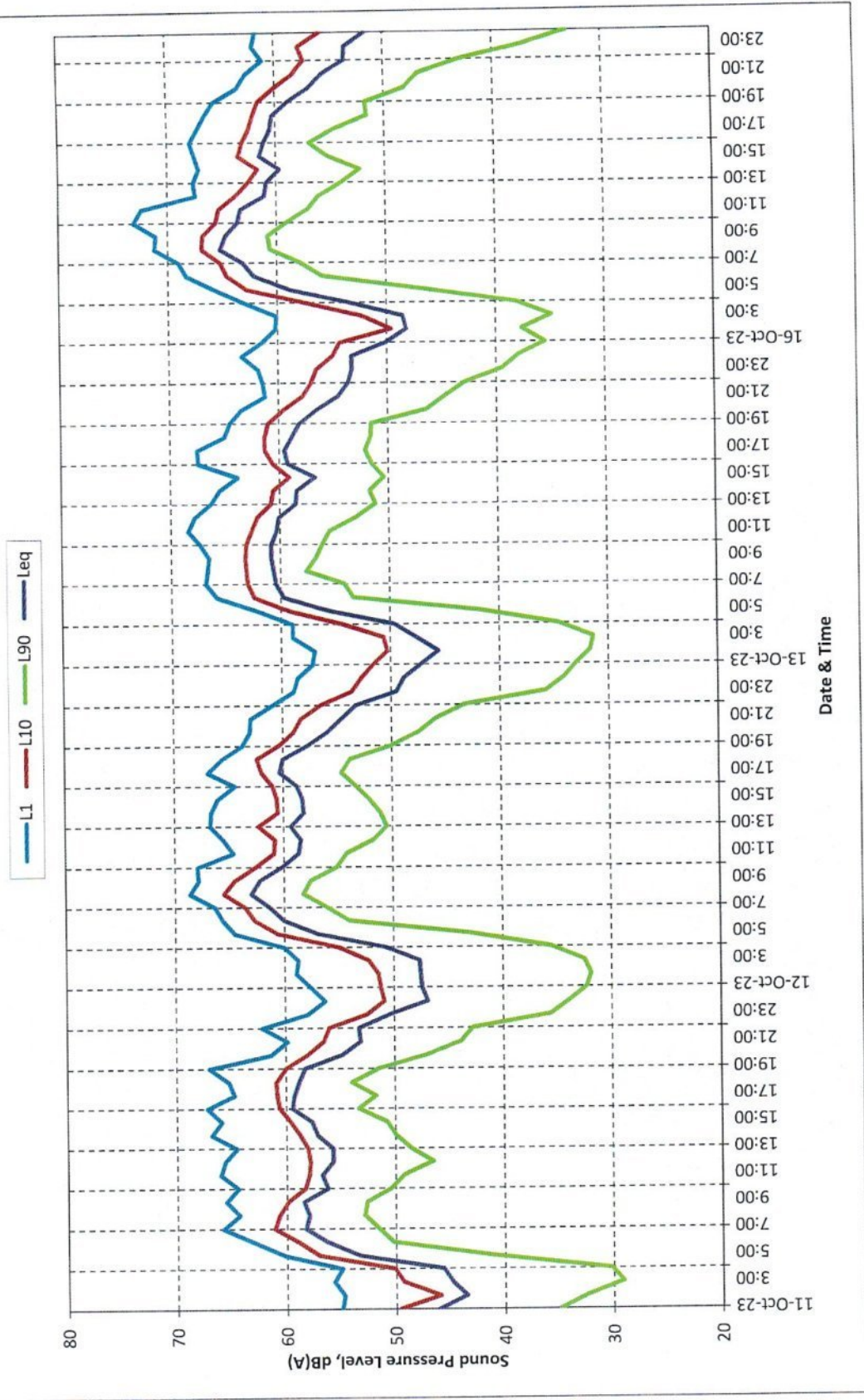
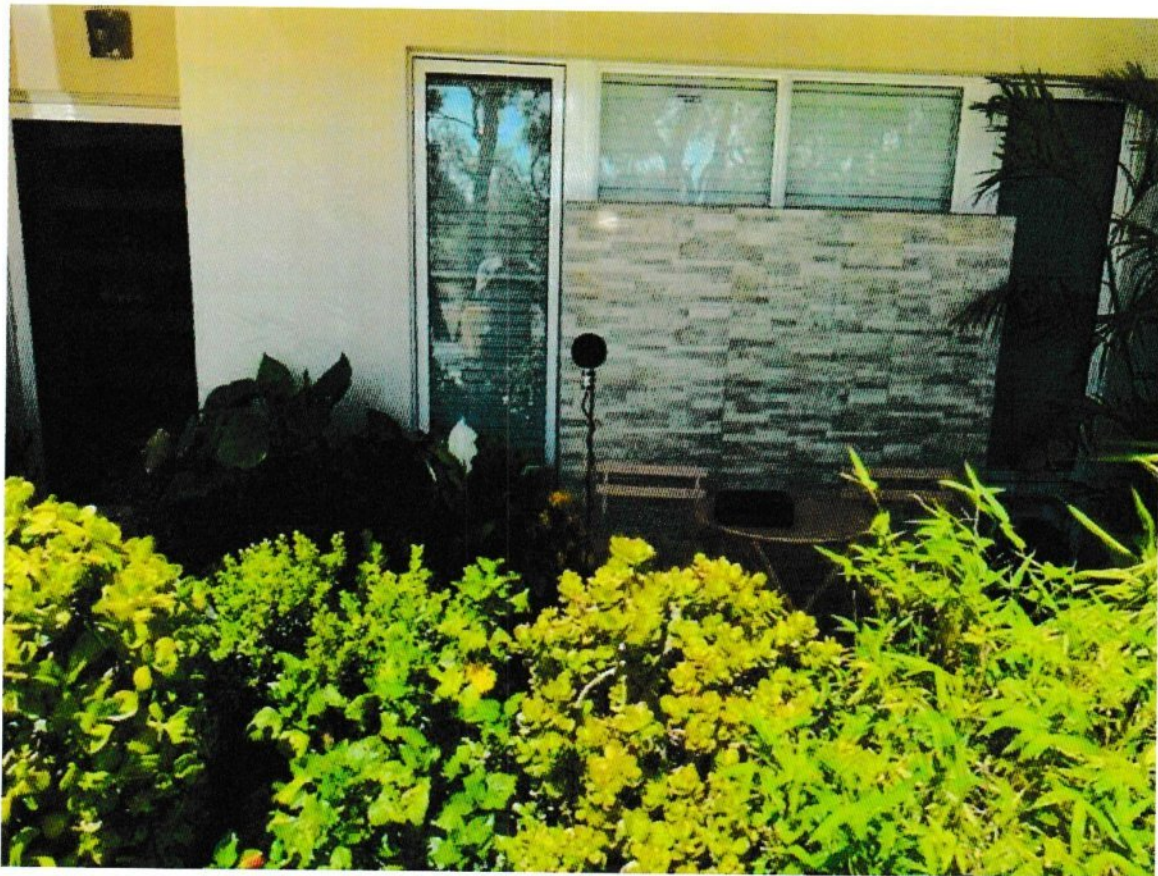


Table A-2: Measured Levels at 78 Seahawk Drive, Erskine

Date	Parameter			
	$L_{A10,18\text{hour}}$, dB	$L_{Aeq,24\text{hour}}$, dB	$L_{Aeq(\text{Day})}$, dB	$L_{Aeq(\text{Night})}$, dB
Wednesday, 11 October 2023	59.1	56.6	57.9	51.4
Thursday, 12 October 2023	60.5	57.8	59.1	53.1
Friday, 13 October 2023	60.6	57.7	58.9	53.4
Monday, 16 October 2023	61.4	59.0	60.2	54.5
Average	60.4	57.8	59.0	53.1



Traffic Noise Measurement Data

Item	Details
<i>LOCATION</i>	
Project	Mandurah Estuary Bridge Duplication
Street address	78 Seahawk Drive
Locality	Erskine
Occupier	
Dates	10 October to 17 October 2023
Category	<i>Main Roads to provide this information</i>
<i>SITE</i>	
Distance from the microphone to the kerb	56m
Height of the road in relation to the ground	+3m
Road surface type	Chip Seal
Speed zone	70 km/hr
Absorbing ground	70%
Angle of view	90
Road gradient	Decline
Traffic flow	17,316 EB / 18,231 WB
Heavy vehicles	9.5 EB / 11.5 WB%
House-Road orientation.	North
Carriageways & lanes.	2 cwy, 3 lanes
<i>COMMENT</i>	
Comment	Microphone located 1-metre from front façade Microphone height 1.4m above house floor level.
<i>REFERENCES</i>	
AMG Z50 E/N	<i>Main Roads to provide this information</i>
Road name	<i>Mandurah Road</i>
EXCEL file	78 Seahawk S1
Raw data file	78 Seahawk_Sta
<i>EQUIPMENT</i>	
Analyser number	16-707-041
Microphone number	16-707-041
Calibrator number	34634284
Calibrator values	93.9 / 93.8
Operator	Lloyd George Acoustics Pty Ltd - Hao Tran
<i>WEATHER</i>	
Wind	Wind analysis based at Perth Metro 11 Oct 2023 - Wind negative. Moderate Speeds. 12 Oct 2023 - Wind negative. Moderate Speeds. 13 Oct 2023 - Wind mostly negative. Light to Moderate Speeds. 16 Oct 2023 - Wind mostly positive. Light to Strong Speeds.

Hourly Noise Level Data
78 Seahawk Drive

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
11-Oct-23	1:00	55.9	51.1	47.3	37.9	0.0	140	13.0
11-Oct-23	2:00	54.7	46.8	44.0	33.2	0.0	140	18.4
11-Oct-23	3:00	56.7	50.3	45.9	30.6	0.0	150	14.8
11-Oct-23	4:00	60.5	52.1	49.4	33.5	0.0	150	7.6
11-Oct-23	5:00	61.8	57.3	54.0	42.0	0.0	150	11.2
11-Oct-23	6:00	64.0	59.1	56.6	50.1	0.0	150	11.2
11-Oct-23	7:00	65.7	61.3	58.3	51.5	0.0	160	16.6
11-Oct-23	8:00	65.5	61.4	58.7	53.4	0.0	150	14.8
11-Oct-23	9:00	65.3	61.2	58.4	52.2	0.0	150	18.4
11-Oct-23	10:00	64.4	60.3	57.5	51.0	0.0	160	14.8
11-Oct-23	11:00	65.6	60.0	57.5	51.3	0.0	150	16.6
11-Oct-23	12:00	64.8	59.5	57.1	50.4	0.0	170	16.6
11-Oct-23	13:00	64.4	59.4	58.1	50.9	0.0	190	11.2
11-Oct-23	14:00	64.2	60.3	57.9	51.9	0.0	190	13.0
11-Oct-23	15:00	64.6	59.5	57.6	52.3	0.0	210	16.6
11-Oct-23	16:00	67.3	60.9	59.5	53.1	0.0	210	18.4
11-Oct-23	17:00	67.1	60.9	59.6	54.9	0.0	200	20.5
11-Oct-23	18:00	65.4	61.4	59.3	53.8	0.0	190	20.5
11-Oct-23	19:00	63.2	60.4	57.7	51.8	0.0	190	18.4
11-Oct-23	20:00	63.4	58.9	56.8	49.1	0.0	190	14.8
11-Oct-23	21:00	60.5	57.3	54.7	45.0	0.0	180	13.0
11-Oct-23	22:00	61.1	56.8	54.1	44.6	0.0	150	13.0
11-Oct-23	23:00	58.2	53.3	51.4	41.4	0.0	160	14.8
11-Oct-23	0:00	58.0	51.8	47.9	35.2	0.0	150	16.6
12-Oct-23	1:00	56.9	51.7	47.4	35.1	0.0	150	14.8
12-Oct-23	2:00	57.8	51.0	46.8	33.0	0.0	130	16.6
12-Oct-23	3:00	58.8	52.9	48.4	33.9	0.0	120	18.4
12-Oct-23	4:00	59.4	54.3	50.0	35.5	0.0	120	13.0
12-Oct-23	5:00	64.6	59.6	56.3	42.7	0.0	120	13.0
12-Oct-23	6:00	65.5	61.5	58.8	52.2	0.0	120	13.0
12-Oct-23	7:00	65.0	62.6	59.8	54.0	0.0	130	13.0
12-Oct-23	8:00	66.4	64.4	60.6	56.7	0.0	120	16.6
12-Oct-23	9:00	67.7	63.9	61.4	56.1	0.0	120	13.0
12-Oct-23	10:00	66.5	63.0	60.4	54.8	0.0	110	16.6
12-Oct-23	11:00	65.6	62.4	59.7	53.1	0.0	90	11.2
12-Oct-23	12:00	68.4	62.7	61.0	53.9	0.0	110	13.0
12-Oct-23	13:00	66.3	62.4	60.0	52.7	0.0	110	11.2
12-Oct-23	14:00	64.4	60.9	58.4	51.9	0.0	90	11.2
12-Oct-23	15:00	64.6	61.1	58.4	52.3	0.0	130	3.6
12-Oct-23	16:00	65.3	60.2	58.2	52.4	0.0	140	13.0
12-Oct-23	17:00	65.6	61.3	59.3	52.6	0.0	210	14.8
12-Oct-23	18:00	64.9	61.9	58.4	53.6	0.0	200	13.0
12-Oct-23	19:00	64.1	59.9	57.5	50.9	0.0	200	18.4
12-Oct-23	20:00	62.2	59.0	55.9	46.7	0.0	180	18.4
12-Oct-23	21:00	63.9	58.7	55.8	46.4	0.0	170	13.0
12-Oct-23	22:00	60.8	56.9	53.3	42.6	0.0	170	14.8
12-Oct-23	23:00	58.8	54.1	50.0	39.1	0.0	160	13.0
12-Oct-23	0:00	59.3	53.2	49.2	36.0	0.0	170	13.0

Hourly Noise Level Data
78 Seahawk Drive

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
13-Oct-23	1:00	58.0	52.6	47.8	33.9	0.0	160	13.0
13-Oct-23	2:00	57.2	49.5	45.4	32.2	0.0	140	13.0
13-Oct-23	3:00	57.0	50.4	47.1	32.3	0.0	120	14.8
13-Oct-23	4:00	58.2	53.5	48.7	34.9	0.0	130	13.0
13-Oct-23	5:00	65.1	60.2	56.9	43.2	0.0	120	9.4
13-Oct-23	6:00	65.0	61.2	58.4	51.3	0.0	120	7.6
13-Oct-23	7:00	66.0	62.5	59.6	52.6	0.0	130	5.4
13-Oct-23	8:00	67.2	63.8	60.9	55.7	0.0	100	11.2
13-Oct-23	9:00	66.1	63.5	60.7	55.6	0.0	110	11.2
13-Oct-23	10:00	66.2	63.5	60.8	54.6	0.0	80	7.6
13-Oct-23	11:00	66.6	63.1	60.4	54.5	0.0	50	7.6
13-Oct-23	12:00	67.3	62.8	60.7	55.2	0.0	20	11.2
13-Oct-23	13:00	65.0	61.6	59.1	53.9	0.0	10	5.4
13-Oct-23	14:00	65.6	61.1	58.5	52.6	0.0	260	9.4
13-Oct-23	15:00	63.3	59.3	56.9	51.0	0.0	130	9.4
13-Oct-23	16:00	64.5	61.6	57.8	52.0	0.0	160	7.6
13-Oct-23	17:00	65.6	60.8	58.6	53.0	0.0	170	11.2
13-Oct-23	18:00	64.4	60.7	58.2	51.1	0.0	190	13.0
13-Oct-23	19:00	64.7	60.9	58.1	50.7	0.0	190	11.2
13-Oct-23	20:00	63.1	59.3	57.4	46.8	0.0	180	11.2
13-Oct-23	21:00	61.5	58.1	54.7	45.8	0.0	170	13.0
13-Oct-23	22:00	61.1	57.0	54.2	44.7	0.0	160	11.2
13-Oct-23	23:00	60.4	56.2	52.5	41.9	0.0	170	13.0
13-Oct-23	0:00	60.6	55.4	52.3	38.6	0.0	160	13.0
16-Oct-23	1:00	59.2	53.0	49.3	41.3	0.0	90	16.6
16-Oct-23	2:00	58.5	51.6	48.9	40.1	0.0	90	14.8
16-Oct-23	3:00	58.3	51.1	47.2	35.1	0.0	70	16.6
16-Oct-23	4:00	61.1	56.1	52.2	39.4	0.0	70	20.5
16-Oct-23	5:00	64.3	60.9	57.5	49.5	0.0	70	16.6
16-Oct-23	6:00	66.5	62.5	60.1	53.8	0.0	70	11.2
16-Oct-23	7:00	66.1	63.3	60.8	56.1	0.0	60	7.6
16-Oct-23	8:00	68.2	64.7	62.6	57.5	0.0	50	16.6
16-Oct-23	9:00	68.9	64.8	62.4	57.6	0.0	50	24.1
16-Oct-23	10:00	68.9	63.7	61.7	56.4	0.0	30	22.3
16-Oct-23	11:00	67.6	63.2	61.2	56.7	0.0	30	20.5
16-Oct-23	12:00	66.3	62.7	60.7	54.0	0.0	30	11.2
16-Oct-23	13:00	66.1	62.4	59.9	54.5	0.0	10	11.2
16-Oct-23	14:00	64.9	61.7	58.8	51.9	0.0	310	11.2
16-Oct-23	15:00	67.5	62.3	60.2	53.9	0.0	300	7.6
16-Oct-23	16:00	65.6	62.5	60.1	52.8	0.0	290	9.4
16-Oct-23	17:00	65.9	62.7	60.4	54.4	0.0	280	7.6
16-Oct-23	18:00	65.4	62.9	60.5	54.0	0.0	240	5.4
16-Oct-23	19:00	64.6	61.6	59.0	52.9	0.0	230	3.6
16-Oct-23	20:00	63.8	60.2	57.4	51.1	0.0	170	5.4
16-Oct-23	21:00	62.1	57.9	55.4	46.8	0.0	150	7.6
16-Oct-23	22:00	60.6	57.0	53.2	42.5	0.0	170	7.6
16-Oct-23	23:00	60.7	56.4	52.3	39.5	0.0	160	7.6
16-Oct-23	0:00	60.4	55.1	50.8	36.8	0.0	120	7.6

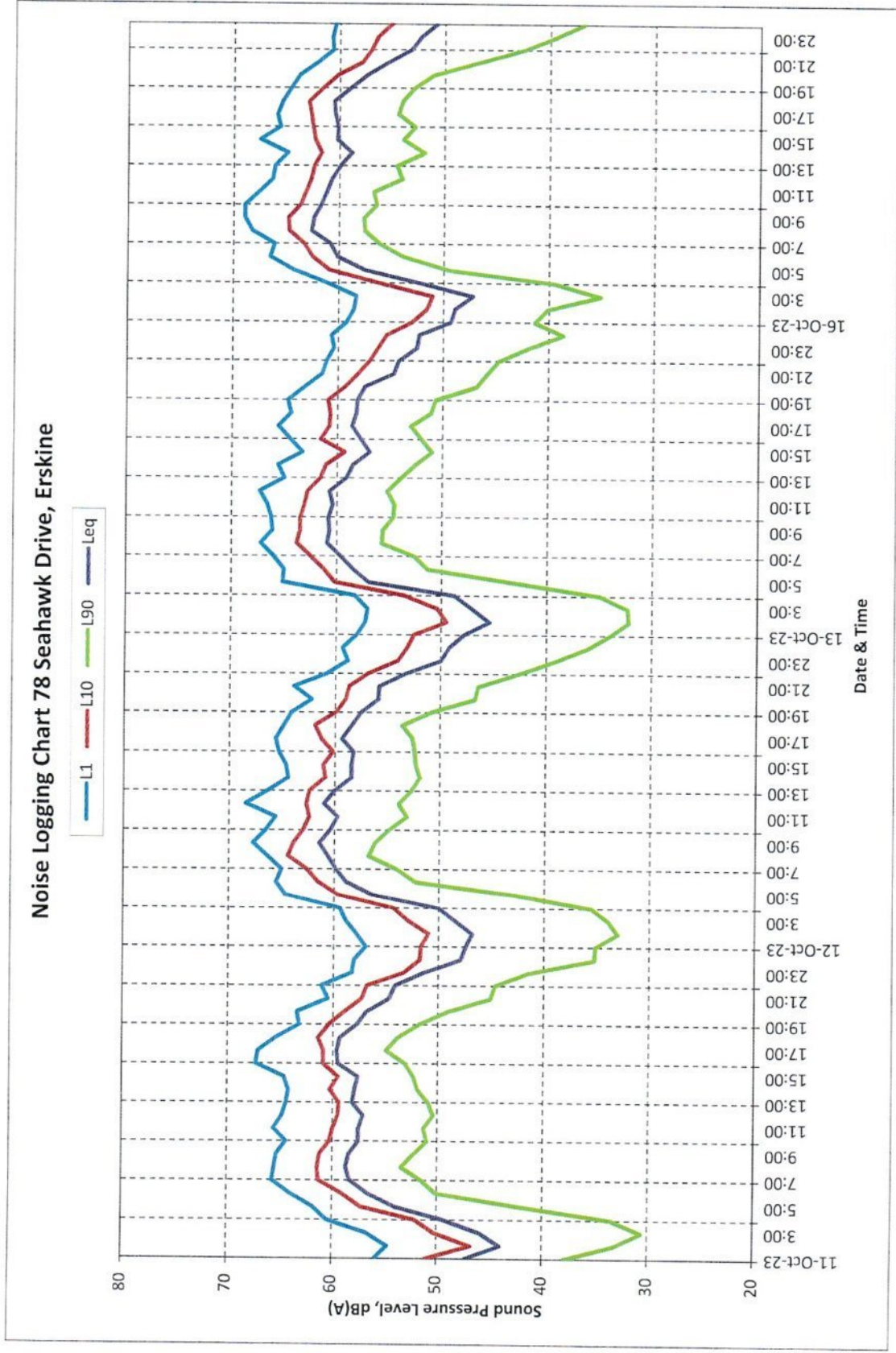


Table A-3: Measured Levels at 21 Egret Point Halls Head

Date	Parameter			
	L _{A10,18hour} , dB	L _{Aeq,24hour} , dB	L _{Aeq(Day)} , dB	L _{Aeq(Night)} , dB
Wednesday, 11 October 2023	66.1	63.3	64.7	57.9
Thursday, 12 October 2023	65.7	62.9	64.2	57.4
Friday, 13 October 2023	65.7	62.4	63.7	57.6
Monday, 16 October 2023	64.3	61.0	62.3	56.5
Average	65.4	62.4	63.7	57.3



Traffic Noise Measurement Data

Item	Details
LOCATION	
Project	Mandurah Estuary Bridge Duplication
Street address	21 Egret Point
Locality	Halls Head
Occupier	
Dates	10 October to 17 October 2023
Category	<i>Main Roads to provide this information</i>
SITE	
Distance from the microphone to the kerb	40m
Height of the road in relation to the ground	+2m
Road surface type	Chip Seal
Speed zone	70 km/hr
Absorbing ground	70%
Angle of view	90
Road gradient	Incline
Traffic flow	17,316 EB / 18,231 WB
Heavy vehicles	9.5 EB / 11.5 WB%
House-Road orientation.	South
Carriageways & lanes.	2 cwy, 3 lanes
COMMENT	
Comment	Microphone located 1-metre from front façade Microphone height 1.4m above house floor level.
REFERENCES	
AMG Z50 E/N	<i>Main Roads to provide this information</i>
Road name	<i>Mandurah Road</i>
EXCEL file	21 Egret S1
Raw data file	21 Egret Sta
EQUIPMENT	
Analyser number	16-004-041
Microphone number	16-004-041
Calibrator number	34634284
Calibrator values	93.7 / 93.4
Operator	Lloyd George Acoustics Pty Ltd - Hao Tran
WEATHER	
Wind	Wind analysis based at Perth Metro 11 Oct 2023 - Wind positive. Moderate Speeds. 12 Oct 2023 - Wind positive. Moderate Speeds. 13 Oct 2023 - Wind mostly positive. Light to Moderate Speeds. 16 Oct 2023 - Wind mostly negative. Light to Strong Speeds.

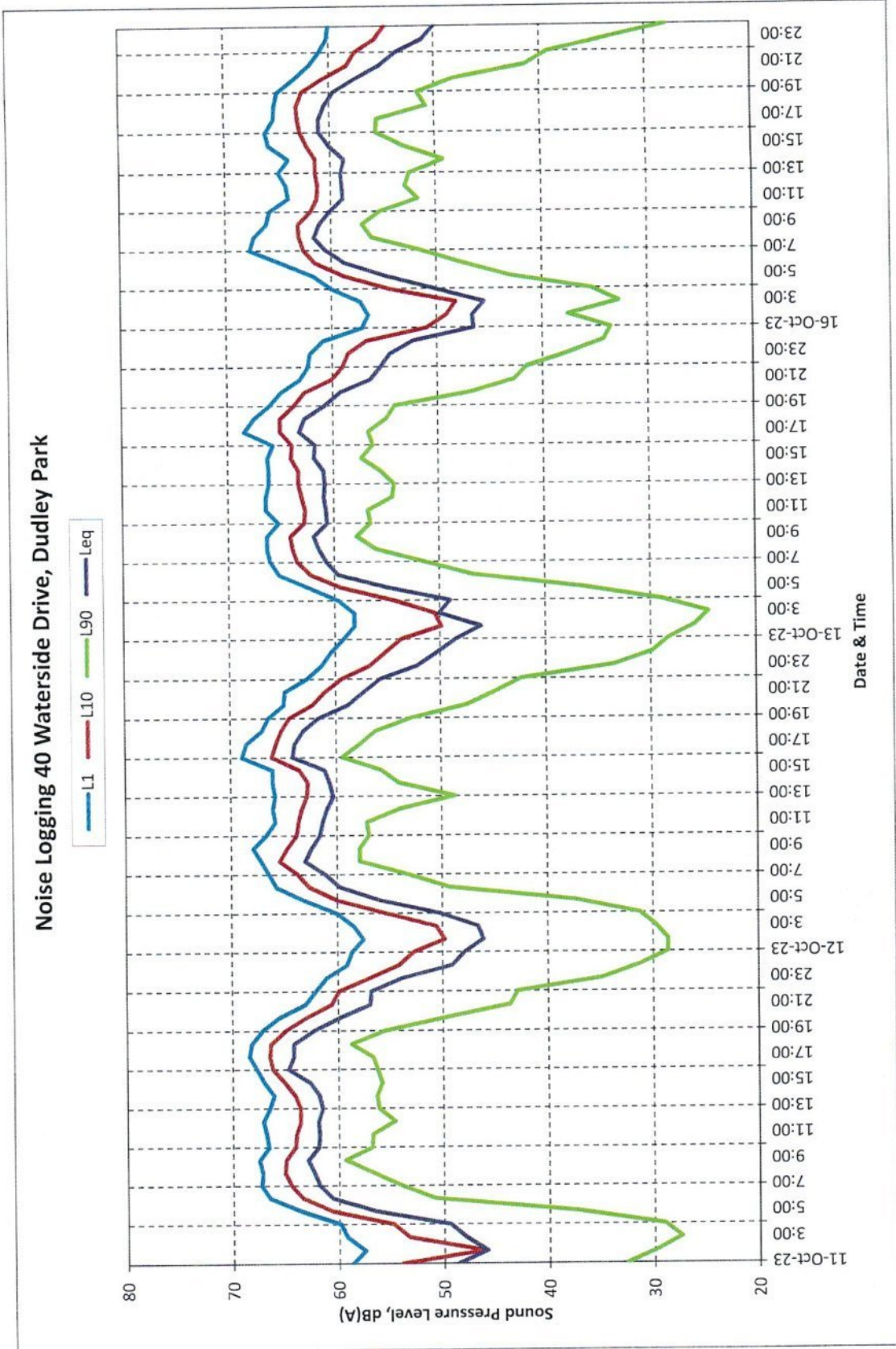
Hourly Noise Level Data

21 Egret Point

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
11-Oct-23	1:00	61.7	56.9	52.1	39.1	0.0	140	13.0
11-Oct-23	2:00	60.7	51.9	49.4	36.2	0.0	140	18.4
11-Oct-23	3:00	62.0	56.2	51.5	33.4	0.0	150	14.8
11-Oct-23	4:00	63.6	58.2	54.0	36.1	0.0	150	7.6
11-Oct-23	5:00	67.0	63.7	59.9	47.0	0.0	150	11.2
11-Oct-23	6:00	71.7	66.7	63.9	55.8	0.0	150	11.2
11-Oct-23	7:00	71.5	67.3	64.6	57.6	0.0	160	16.6
11-Oct-23	8:00	71.6	68.4	65.3	59.8	0.0	150	14.8
11-Oct-23	9:00	72.0	68.6	65.7	60.0	0.0	150	18.4
11-Oct-23	10:00	71.2	67.8	64.9	58.9	0.0	160	14.8
11-Oct-23	11:00	71.7	67.5	65.4	58.5	0.0	150	16.6
11-Oct-23	12:00	71.7	67.0	64.9	57.9	0.0	170	16.6
11-Oct-23	13:00	72.1	67.1	64.5	58.3	0.0	190	11.2
11-Oct-23	14:00	71.0	66.6	63.9	58.2	0.0	190	13.0
11-Oct-23	15:00	71.5	67.5	64.7	58.5	0.0	210	16.6
11-Oct-23	16:00	73.7	68.7	66.6	59.5	0.0	210	18.4
11-Oct-23	17:00	71.9	68.2	65.8	59.9	0.0	200	20.5
11-Oct-23	18:00	71.8	68.2	65.7	59.7	0.0	190	20.5
11-Oct-23	19:00	71.3	67.3	64.5	56.7	0.0	190	18.4
11-Oct-23	20:00	70.0	65.7	62.5	53.0	0.0	190	14.8
11-Oct-23	21:00	68.7	63.6	60.6	50.3	0.0	180	13.0
11-Oct-23	22:00	68.6	63.2	60.1	47.5	0.0	150	13.0
11-Oct-23	23:00	66.0	60.1	57.9	42.0	0.0	160	14.8
11-Oct-23	0:00	63.8	57.8	53.5	36.5	0.0	150	16.6
12-Oct-23	1:00	61.2	56.6	51.4	34.0	0.0	150	14.8
12-Oct-23	2:00	61.3	55.0	50.5	32.5	0.0	130	16.6
12-Oct-23	3:00	62.5	55.9	51.3	34.0	0.0	120	18.4
12-Oct-23	4:00	64.0	58.7	54.4	35.7	0.0	120	13.0
12-Oct-23	5:00	67.5	63.2	59.6	44.3	0.0	120	13.0
12-Oct-23	6:00	70.8	66.2	63.4	55.0	0.0	120	13.0
12-Oct-23	7:00	71.0	66.9	64.3	57.0	0.0	130	13.0
12-Oct-23	8:00	72.1	68.5	65.5	59.5	0.0	120	16.6
12-Oct-23	9:00	72.3	68.4	66.0	58.8	0.0	120	13.0
12-Oct-23	10:00	71.7	67.6	64.8	58.4	0.0	110	16.6
12-Oct-23	11:00	71.0	67.0	64.6	58.3	0.0	90	11.2
12-Oct-23	12:00	70.7	66.4	64.4	57.6	0.0	110	13.0
12-Oct-23	13:00	71.3	66.4	63.6	56.7	0.0	110	11.2
12-Oct-23	14:00	70.8	66.0	63.6	57.4	0.0	90	11.2
12-Oct-23	15:00	71.3	66.7	63.9	57.8	0.0	130	3.6
12-Oct-23	16:00	71.8	67.8	65.2	59.1	0.0	140	13.0
12-Oct-23	17:00	72.0	68.1	65.5	58.8	0.0	210	14.8
12-Oct-23	18:00	71.3	67.3	65.0	58.9	0.0	200	13.0
12-Oct-23	19:00	70.7	66.4	63.7	56.6	0.0	200	18.4
12-Oct-23	20:00	69.8	64.9	61.8	52.0	0.0	180	18.4
12-Oct-23	21:00	70.0	64.1	61.4	51.4	0.0	170	13.0
12-Oct-23	22:00	66.2	62.1	58.9	48.2	0.0	170	14.8
12-Oct-23	23:00	64.9	59.5	55.6	38.5	0.0	160	13.0
12-Oct-23	0:00	63.8	58.2	53.8	35.7	0.0	170	13.0

Hourly Noise Level Data
21 Egret Point

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
13-Oct-23	1:00	62.8	57.2	52.9	31.6	0.0	160	13.0
13-Oct-23	2:00	61.1	54.1	49.6	28.3	0.0	140	13.0
13-Oct-23	3:00	61.0	54.7	53.5	27.8	0.0	120	14.8
13-Oct-23	4:00	62.7	57.7	52.9	32.3	0.0	130	13.0
13-Oct-23	5:00	66.5	62.6	58.8	43.8	0.0	120	9.4
13-Oct-23	6:00	70.6	65.4	62.7	54.1	0.0	120	7.6
13-Oct-23	7:00	71.4	66.7	64.0	56.1	0.0	130	5.4
13-Oct-23	8:00	71.6	68.2	65.0	58.8	0.0	100	11.2
13-Oct-23	9:00	71.3	68.0	64.8	59.3	0.0	110	11.2
13-Oct-23	10:00	70.8	67.8	64.1	57.4	0.0	80	7.6
13-Oct-23	11:00	70.3	66.3	63.4	57.6	0.0	50	7.6
13-Oct-23	12:00	71.5	66.5	63.7	58.0	0.0	20	11.2
13-Oct-23	13:00	70.1	66.0	63.2	57.7	0.0	10	5.4
13-Oct-23	14:00	70.7	66.2	63.7	58.1	0.0	260	9.4
13-Oct-23	15:00	70.9	66.7	64.0	58.3	0.0	130	9.4
13-Oct-23	16:00	71.2	66.9	64.8	58.4	0.0	160	7.6
13-Oct-23	17:00	72.0	67.2	65.3	59.5	0.0	170	11.2
13-Oct-23	18:00	70.9	67.2	64.5	57.5	0.0	190	13.0
13-Oct-23	19:00	70.7	66.2	63.4	55.4	0.0	190	11.2
13-Oct-23	20:00	70.3	64.9	61.8	51.1	0.0	180	11.2
13-Oct-23	21:00	67.5	63.2	59.9	49.9	0.0	170	13.0
13-Oct-23	22:00	68.0	62.3	59.5	47.5	0.0	160	11.2
13-Oct-23	23:00	68.1	61.7	58.6	46.0	0.0	170	13.0
13-Oct-23	0:00	65.8	59.8	57.2	41.1	0.0	160	13.0
16-Oct-23	1:00	60.2	54.9	50.2	36.2	0.0	90	16.6
16-Oct-23	2:00	59.6	50.9	48.7	37.1	0.0	90	14.8
16-Oct-23	3:00	60.8	53.9	49.6	33.6	0.0	70	16.6
16-Oct-23	4:00	63.5	58.2	54.0	37.0	0.0	70	20.5
16-Oct-23	5:00	66.2	62.1	58.6	47.6	0.0	70	16.6
16-Oct-23	6:00	70.6	64.7	62.1	53.8	0.0	70	11.2
16-Oct-23	7:00	70.7	65.6	63.0	55.6	0.0	60	7.6
16-Oct-23	8:00	71.1	67.5	63.4	58.0	0.0	50	16.6
16-Oct-23	9:00	71.5	67.1	63.8	57.6	0.0	50	24.1
16-Oct-23	10:00	70.8	67.3	63.2	57.4	0.0	30	22.3
16-Oct-23	11:00	70.1	65.8	62.6	56.8	0.0	30	20.5
16-Oct-23	12:00	70.0	64.5	61.9	55.3	0.0	30	11.2
16-Oct-23	13:00	70.0	64.3	61.6	54.9	0.0	10	11.2
16-Oct-23	14:00	69.6	64.1	61.4	53.0	0.0	310	11.2
16-Oct-23	15:00	70.3	65.6	62.7	55.9	0.0	300	7.6
16-Oct-23	16:00	70.4	65.8	62.9	54.9	0.0	290	9.4
16-Oct-23	17:00	70.6	66.1	63.4	57.3	0.0	280	7.6
16-Oct-23	18:00	69.7	65.8	63.1	56.2	0.0	240	5.4
16-Oct-23	19:00	69.4	64.9	62.2	54.7	0.0	230	3.6
16-Oct-23	20:00	68.3	63.2	60.3	52.1	0.0	170	5.4
16-Oct-23	21:00	67.8	61.6	58.7	48.3	0.0	150	7.6
16-Oct-23	22:00	66.7	60.6	57.5	45.4	0.0	170	7.6
16-Oct-23	23:00	64.3	58.9	56.2	38.4	0.0	160	7.6
16-Oct-23	0:00	64.2	58.1	54.1	34.6	0.0	120	7.6



Hourly Noise Level Data
40 Waterside Drive

Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
13-Oct-23	1:00	59.2	53.7	48.5	28.3	0.0	160	13.0
13-Oct-23	2:00	58.1	49.9	46.1	25.8	0.0	140	13.0
13-Oct-23	3:00	58.1	50.5	50.1	24.5	0.0	120	14.8
13-Oct-23	4:00	59.6	54.4	49.0	28.9	0.0	130	13.0
13-Oct-23	5:00	62.4	59.3	54.9	36.4	0.0	120	9.4
13-Oct-23	6:00	65.2	62.2	59.6	46.8	0.0	120	7.6
13-Oct-23	7:00	66.0	63.5	60.7	51.4	0.0	130	5.4
13-Oct-23	8:00	66.3	63.9	61.4	56.0	0.0	100	11.2
13-Oct-23	9:00	66.3	64.1	61.9	57.8	0.0	110	11.2
13-Oct-23	10:00	65.2	62.8	60.6	56.5	0.0	80	7.6
13-Oct-23	11:00	66.4	62.7	60.7	56.7	0.0	50	7.6
13-Oct-23	12:00	66.4	63.0	60.9	54.4	0.0	20	11.2
13-Oct-23	13:00	66.1	63.3	60.8	54.2	0.0	10	5.4
13-Oct-23	14:00	66.1	63.3	60.9	55.5	0.0	260	9.4
13-Oct-23	15:00	66.2	64.0	61.8	57.3	0.0	130	9.4
13-Oct-23	16:00	65.7	63.9	61.7	56.2	0.0	160	7.6
13-Oct-23	17:00	68.4	65.0	63.2	56.6	0.0	170	11.2
13-Oct-23	18:00	67.5	65.0	62.7	54.9	0.0	190	13.0
13-Oct-23	19:00	66.0	63.7	60.8	54.1	0.0	190	11.2
13-Oct-23	20:00	64.9	62.7	59.3	46.9	0.0	180	11.2
13-Oct-23	21:00	63.1	60.1	56.4	42.7	0.0	170	13.0
13-Oct-23	22:00	62.3	59.0	55.4	41.5	0.0	160	11.2
13-Oct-23	23:00	62.1	58.5	54.5	37.6	0.0	170	13.0
13-Oct-23	0:00	60.9	56.7	52.3	34.2	0.0	160	13.0
16-Oct-23	1:00	57.1	51.0	46.5	33.5	0.0	90	16.6
16-Oct-23	2:00	56.5	49.1	46.6	37.5	0.0	90	14.8
16-Oct-23	3:00	57.2	48.2	45.5	32.7	0.0	70	16.6
16-Oct-23	4:00	60.0	54.5	50.1	35.3	0.0	70	20.5
16-Oct-23	5:00	61.7	58.8	54.8	43.0	0.0	70	16.6
16-Oct-23	6:00	64.7	61.5	58.7	47.5	0.0	70	11.2
16-Oct-23	7:00	67.7	62.6	60.5	51.5	0.0	60	7.6
16-Oct-23	8:00	67.3	63.0	61.6	56.1	0.0	50	16.6
16-Oct-23	9:00	66.1	63.1	61.1	57.0	0.0	50	24.1
16-Oct-23	10:00	65.8	61.9	60.1	55.3	0.0	30	22.3
16-Oct-23	11:00	64.0	61.3	58.8	51.7	0.0	30	20.5
16-Oct-23	12:00	64.2	61.2	58.9	52.9	0.0	30	11.2
16-Oct-23	13:00	64.9	61.4	59.0	52.5	0.0	10	11.2
16-Oct-23	14:00	64.0	61.4	58.7	49.3	0.0	310	11.2
16-Oct-23	15:00	65.8	62.2	60.1	53.1	0.0	300	7.6
16-Oct-23	16:00	66.1	62.8	61.0	55.6	0.0	290	9.4
16-Oct-23	17:00	65.3	63.0	61.0	55.5	0.0	280	7.6
16-Oct-23	18:00	65.2	63.1	60.5	50.8	0.0	240	5.4
16-Oct-23	19:00	64.9	62.6	59.6	51.6	0.0	230	3.6
16-Oct-23	20:00	63.3	60.6	57.5	48.2	0.0	170	5.4
16-Oct-23	21:00	61.9	58.3	55.2	41.4	0.0	150	7.6
16-Oct-23	22:00	60.9	57.5	53.6	39.2	0.0	170	7.6
16-Oct-23	23:00	60.2	55.6	51.1	33.6	0.0	160	7.6
16-Oct-23	0:00	60.0	54.7	50.0	28.0	0.0	120	7.6

Hourly Noise Level Data

40 Waterside Drive

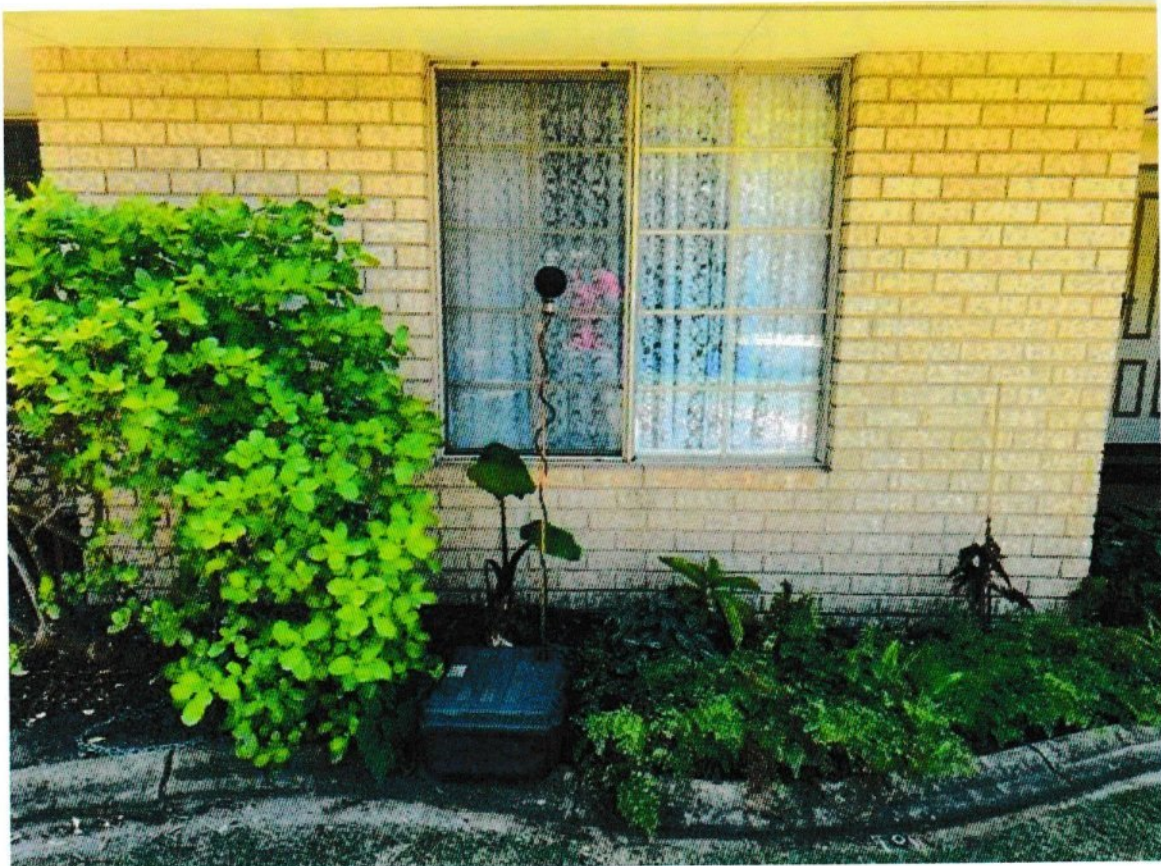
Date	Time	L1	L10	Leq	L90	Rain mm	Wind degrees	Wind km/h
11-Oct-23	1:00	58.7	54.0	48.6	32.6	0.0	140	13.0
11-Oct-23	2:00	57.5	46.1	45.9	29.8	0.0	140	18.4
11-Oct-23	3:00	59.2	53.3	47.9	27.4	0.0	150	14.8
11-Oct-23	4:00	59.8	54.8	49.4	29.0	0.0	150	7.6
11-Oct-23	5:00	63.5	60.6	56.4	37.2	0.0	150	11.2
11-Oct-23	6:00	66.5	63.4	60.6	50.9	0.0	150	11.2
11-Oct-23	7:00	67.3	64.5	61.8	54.0	0.0	160	16.6
11-Oct-23	8:00	67.2	65.1	62.3	56.6	0.0	150	14.8
11-Oct-23	9:00	67.5	65.0	62.9	59.3	0.0	150	18.4
11-Oct-23	10:00	66.6	64.1	61.9	56.8	0.0	160	14.8
11-Oct-23	11:00	66.8	64.0	61.8	56.7	0.0	150	16.6
11-Oct-23	12:00	67.1	63.6	61.9	54.6	0.0	170	16.6
11-Oct-23	13:00	66.5	63.6	61.5	56.1	0.0	190	11.2
11-Oct-23	14:00	66.1	64.1	61.8	56.3	0.0	190	13.0
11-Oct-23	15:00	67.0	65.1	62.7	55.8	0.0	210	16.6
11-Oct-23	16:00	67.7	66.2	64.7	56.3	0.0	210	18.4
11-Oct-23	17:00	68.4	66.5	64.2	56.7	0.0	200	20.5
11-Oct-23	18:00	68.2	66.4	64.2	58.7	0.0	190	20.5
11-Oct-23	19:00	67.2	65.0	62.3	55.5	0.0	190	18.4
11-Oct-23	20:00	65.6	63.0	59.8	49.7	0.0	190	14.8
11-Oct-23	21:00	63.1	60.6	56.9	43.6	0.0	180	13.0
11-Oct-23	22:00	62.1	59.9	56.8	42.9	0.0	150	13.0
11-Oct-23	23:00	61.1	57.0	53.9	34.8	0.0	160	14.8
11-Oct-23	0:00	59.1	54.2	49.1	31.3	0.0	150	16.6
12-Oct-23	1:00	58.6	52.8	47.9	28.6	0.0	150	14.8
12-Oct-23	2:00	57.5	49.8	46.1	28.6	0.0	130	16.6
12-Oct-23	3:00	58.4	50.6	46.6	29.7	0.0	120	18.4
12-Oct-23	4:00	60.0	55.3	50.2	31.2	0.0	120	13.0
12-Oct-23	5:00	63.1	60.0	55.9	37.3	0.0	120	13.0
12-Oct-23	6:00	65.7	62.6	59.7	49.3	0.0	120	13.0
12-Oct-23	7:00	66.4	63.7	61.1	53.2	0.0	130	13.0
12-Oct-23	8:00	67.2	65.4	63.0	57.8	0.0	120	16.6
12-Oct-23	9:00	67.9	64.7	62.4	57.8	0.0	120	13.0
12-Oct-23	10:00	66.7	63.8	61.6	56.9	0.0	110	16.6
12-Oct-23	11:00	65.8	63.6	61.3	57.1	0.0	90	11.2
12-Oct-23	12:00	66.0	63.3	60.9	54.0	0.0	110	13.0
12-Oct-23	13:00	65.8	62.8	60.3	48.7	0.0	110	11.2
12-Oct-23	14:00	66.0	62.7	60.6	54.0	0.0	90	11.2
12-Oct-23	15:00	66.0	63.5	61.1	55.7	0.0	130	3.6
12-Oct-23	16:00	68.9	66.1	64.1	59.4	0.0	140	13.0
12-Oct-23	17:00	68.5	65.7	63.9	57.7	0.0	210	14.8
12-Oct-23	18:00	67.0	65.2	63.1	56.2	0.0	200	13.0
12-Oct-23	19:00	66.4	64.4	61.6	52.8	0.0	200	18.4
12-Oct-23	20:00	64.9	62.2	58.8	47.5	0.0	180	18.4
12-Oct-23	21:00	64.8	61.0	57.3	44.8	0.0	170	13.0
12-Oct-23	22:00	62.7	59.4	55.7	42.3	0.0	170	14.8
12-Oct-23	23:00	61.3	56.7	52.2	33.5	0.0	160	13.0
12-Oct-23	0:00	60.4	55.2	50.3	29.8	0.0	170	13.0

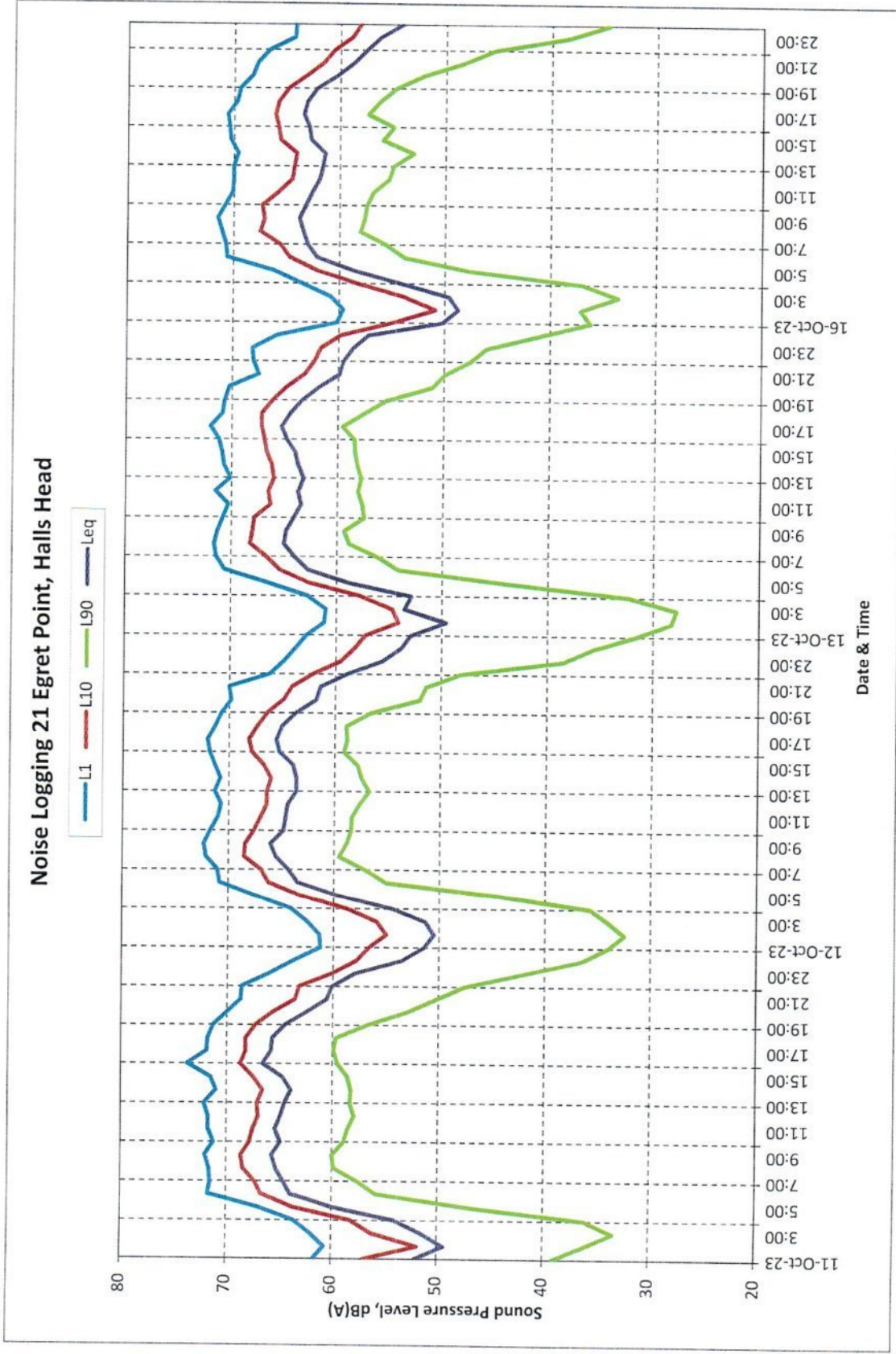
Traffic Noise Measurement Data

Item	Details
<i>LOCATION</i>	
Project	Mandurah Estuary Bridge Duplication
Street address	40 Waterside Drive
Locality	Dudley Park
Occupier	
Dates	10 October to 17 October 2023
Category	Main Roads to provide this information
<i>SITE</i>	
Distance from the microphone to the kerb	52m
Height of the road in relation to the ground	+2m
Road surface type	Chip Seal
Speed zone	70 km/hr
Absorbing ground	50%
Angle of view	70
Road gradient	Decline
Traffic flow	16,908 EB / 18,113 WB
Heavy vehicles	10.1 EB / 9.2 WB%
House-Road orientation.	South
Carriageways & lanes.	2 cwy, 3 lanes
<i>COMMENT</i>	
Comment	Microphone located 1-metre from front façade Microphone height 1.4m above house floor level.
<i>REFERENCES</i>	
AMG Z50 E/N	Main Roads to provide this information
Road name	Mandurah Road
EXCEL file	40 Waterside S1
Raw data file	40 Waterside Sta
<i>EQUIPMENT</i>	
Analyser number	8780F4
Microphone number	8780F4
Calibrator number	34634284
Calibrator values	93.8 / 93.7
Operator	Lloyd George Acoustics Pty Ltd - Hao Tran
<i>WEATHER</i>	
Wind	Wind analysis based at Perth Metro 11 Oct 2023 - Wind positive. Moderate Speeds. 12 Oct 2023 - Wind positive. Moderate Speeds. 13 Oct 2023 - Wind mostly positive. Light to Moderate Speeds. 14 Oct 2023 - Wind mostly negative. Light to Strong Speeds.

Table A-4: Measured Levels at 40 Waterside Drive, Dudley Park

Date	Parameter			
	L _{A10,18hour} , dB	L _{Aeq,24hour} , dB	L _{Aeq(Day)} , dB	L _{Aeq(Night)} , dB
Wednesday, 11 October 2023	63.2	60.8	62.2	54.3
Thursday, 12 October 2023	62.7	60.1	61.5	53.6
Friday, 13 October 2023	62.5	59.6	60.9	53.9
Monday, 16 October 2023	60.9	58.3	59.6	52.7
Average	62.3	59.7	61.1	53.7





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 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_{A1}**

The L_{A1} level is the A-weighted noise level exceeded for 1 percent of the measurement period and is considered to represent the average of the maximum noise levels measured.

- **L_{A10}**

The L_{A10} level is the A-weighted noise level exceeded for 10 percent of the measurement period and is considered to represent the “intrusive” noise level.

- **L_{Aeq}**

The equivalent steady state A-weighted sound level (“equal energy”) in decibels which, in a specified time period, contains the same acoustic energy as the time-varying level during the same period. It is considered to represent the “average” noise level. The L_1 level represents the noise level exceeded for 1 percent of the measurement period and is considered to represent the average of the maximum noise levels measured.

- **L_{A90}**

The L_{A90} level is the A-weighted noise level exceeded for 90 percent of the measurement period and is considered to represent the “background” noise level.

- **$L_{A10,18hour}$**

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

- **$L_{Aeq,24hour}$**

The $L_{Aeq,24hour}$ level is the logarithmic average of the L_{Aeq} levels for a full day.

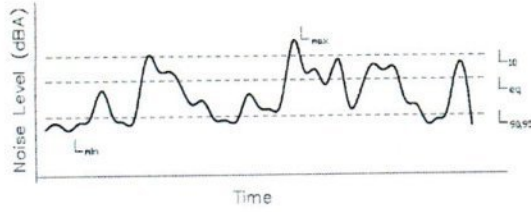
- **$L_{Aeq(Day)}$**

The $L_{Aeq(Day)}$ level is the logarithmic average of the L_{Aeq} levels from 6.00am to 10.00pm.

- **$L_{Aeq(Night)}$**

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

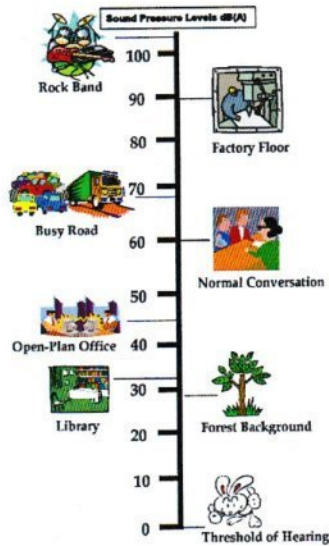
- Chart of Noise Level Descriptors



- Austroads Vehicle Class

VEHICLE CLASSIFICATION SYSTEM AUSTROADS		
CLASS	CLASS VEHICLES	
1	SCIP: 2000cc engine and 2000kg GVW maximum	
2	SCIP: 2000cc engine, 2000kg GVW maximum	
HEAVY VEHICLES		
3	TRUCKS: 2000cc engine, 2000kg GVW maximum	
4	TRUCKS: 2000cc engine, 2000kg GVW maximum	
5	TRUCKS: 2000cc engine, 2000kg GVW maximum	
6	TRUCKS: 2000cc engine, 2000kg GVW maximum	
7	TRUCKS: 2000cc engine, 2000kg GVW maximum	
8	TRUCKS: 2000cc engine, 2000kg GVW maximum	
9	TRUCKS: 2000cc engine, 2000kg GVW maximum	
SPECIAL PURPOSE VEHICLES		
10	TRUCKS: 2000cc engine, 2000kg GVW maximum	
11	TRUCKS: 2000cc engine, 2000kg GVW maximum	
12	TRUCKS: 2000cc engine, 2000kg GVW maximum	

- Typical Noise Levels



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 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_{10}**

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

- **L_{eq}**

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

- **$L_{A10,18hour}$**

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

- **$L_{Aeq,24hour}$**

The $L_{Aeq,24hour}$ level is the logarithmic average of the L_{Aeq} levels for a full day.

- **$L_{Aeq(Day)}$**

The $L_{Aeq(Day)}$ level is the logarithmic average of the L_{Aeq} levels from 6.00am to 10.00pm.

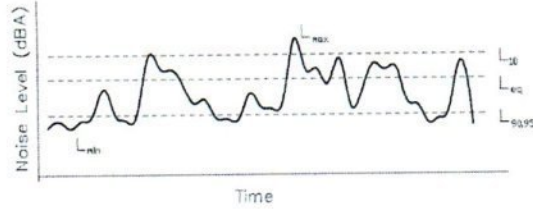
- **$L_{Aeq(Night)}$**

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

- **Noise-sensitive land use and/or development**

Land-uses or development occupied or designed for occupation or use for residential purposes (including dwellings, residential buildings or short-stay accommodation), caravan park, camping ground, educational establishment, child care premises, hospital, nursing home, corrective institution or place of worship.

- Chart of Noise Level Descriptors



- Austrroads Vehicle Class

VEHICLE CLASSIFICATION SYSTEM	
AUSTRROADS	
CLASS	LIGHT VEHICLES
1	BIKE Car, Van, Minivan, and Other Light Motor Vehicle
2	HOV1, TOWNER Tandem Container Trailer
HEAVY VEHICLES	
3	TWO AXLE TRUCK OR BUS 7.5 tonnes
4	THREE AXLE TRUCK OR BUS 7.5 tonnes to 10.5 tonnes
5	FOUR AXLE TRUCK OR BUS 7.5 tonnes to 10.5 tonnes
6	FIVE AXLE ARTICULATED 7.5 tonnes to 10.5 tonnes
7	SIX AXLE ARTICULATED 7.5 tonnes to 10.5 tonnes
8	SEVEN AXLE ARTICULATED 7.5 tonnes to 10.5 tonnes
9	EIGHT AXLE ARTICULATED 7.5 tonnes to 10.5 tonnes
LONG VEHICLES AND SPECIAL PURPOSE	
10	VEHICLE WITH VEHICULAR BODY AND TRAILER 7.5 tonnes to 10.5 tonnes
11	VEHICLE WITH TRAILER 7.5 tonnes to 10.5 tonnes
12	TRAILER ONLY 7.5 tonnes to 10.5 tonnes

- Typical Noise Levels

