acouras CONSULTANCY

Raymond Terrace Parklands

251 Adelaide Street Raymond Terrace

Noise Assessment for Proposal to Rehabilitate Disused Mine for Recreational Use

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1 Introduction

The following report has been prepared by Acouras Consultancy on behalf of Raymond Terrace Parklands to assess the potential for noise impact associated with remediation of the vacant mine located at 251 Adelaide Street Raymond Terrace for future recreational use.

The vacant site is surrounded by existing residential buildings to the north and south west. Commercial and industrial sites are located to the east and south of the development. The site location is shown in Figure 1.

Figure 1 – Site Location, Nearest Residents and Noise Logger Position

2 Noise Criteria

The following standards and guidelines are applicable to this project:

- NSW EPA "Noise Policy for Industry" (NPI).
- NSW EPA Road Noise Policy (RNP).
- NSW EPA "Interim Construction Noise Guideline" (ICNG).
- Australian Standard 2436:2010: "Guide to noise and vibration control on construction, demolition and maintenance sites".
- Australian standard AS 1055.1-1997: Acoustics – Description and measurement of environmental noise - General procedures.

2.1 Construction Noise Criteria

The NSW EPA "Interim Construction Noise Guideline" (ICNG) provides guidance on noise limits from construction sites. Table 1 is an extract from the EPA guideline.

When assessing short-term construction works, best management practices should be implemented to reduce any impact as far as practically possible.

Table 1 – Noise at Residences Using Quantitative Assessment

Time of Day	Management Level $L_{Aeq\ (15min)}$*	How to Apply
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq\ (15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

* Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5m above ground level. If the property boundary is more than 30m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

2.2 Noise Survey and Project Specific Limits

An unattended noise survey was carried out at the site to measure the background and ambient noise levels. Nose monitoring was conducted between Tuesday 7th to Tuesday 14th August 2018. The monitor was positioned as shown in Figure 1. Measurements were conducted using the following equipment:

- SVAN 977 Type 1 Real time Analyser/Noise Logger. Serial No. 34135.
- SVAN SV30A Type 1 Sound Level Calibrator. Serial No. 31830.

Noise monitoring was conducted in general accordance with Australian standard AS 1055.1-1997: Acoustics-Description and measurement of environmental noise-General procedures. The noise analyser was calibrated immediately before and after measurements were taken with no discernible differences between these two recorded levels. The sound analyser is Type 1 and complies with Australian standard AS1259.2: 1990.

During the monitoring period any adverse weather condition have been excluded. The noise logger results are presented in Appendix C.

2.2.1 EPA Project Noise Limits

Table 2 presents a summary of the measured background noise level and the allowable intrusive noise limit for this project in accordance with the EPA "Noise Policy for Industry" (NPI). The amenity criteria are based on a suburban receiver.

Table 2—EPA NPI Noise Limits, dBA

Time Period	Existing Noise Levels		NSW EPA NPI			Project Noise Trigger Level $L_{eq(15min)}$
	L_{eq} (period)	RBL	Recommended ANL	Project ANL[1] $L_{eq(15min)}$	Intrusiveness Criteria, $L_{eq(15min)}$	
Day	50	45	55	53	50	**50**
Evening	51	45	45	43	50	**43**
Night	48	39	40	38	44	**38**

The design and selection of the mechanical equipment required to service the proposed development will be required to achieve the EPA NPI noise limits as presented in the table above.

[1] 2. Project ANL is recommended ANL minus 5 dB(A) and plus 3 dB(A), to convert from a period level to a 15-minute level.

2.3 Construction Noise Limits

Table 3presents a summary of the measured background noise level and the noise management level for this project in accordance with EPA's ICNG.

Table 3 — EPA Construction Noise Management Level, dBA

Receiver	Time Period	Existing Noise Levels		Management Level
		$L_{eq\ (period)}$	RBL	$L_{Aeq\ (15min)}$*
Residential	Mon-Fri: 07.00-18.00	50	45	55 (Highly noise affected 75 dBA)
	Sat: 08.00-13.00	47	44	54
Neighbouring industrial premises	When in use	n/a	n/a	75
Offices, retail outlets.	When in use	n/a	n/a	70

During the monitoring period any adverse weather condition have been excluded.

2.4 Traffic Noise Generation

The development of the childcare centre has the potential to generate increased traffic noise along Beattie Street will be assessed in accordance with the NSW EPA Road Noise Policy (RNP). Table 4 sets out the assessment criteria for residences to be applied to particular types of project, road category and land use.

Table 4— Road traffic noise assessment criteria for residential land uses

Road Category	Type of project/land use	Assessment Criteria - dBA	
		Day (7am-10pm)	Night (10pm-7am)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq, (1\ hour)}$ 55 (external)	$L_{Aeq, (1\ hour)}$ 50 (external)

For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'.

3 Construction Noise Assessment

This is an assessment for the proposed remediation of the vacant site located at 251 Adelaide Street Raymond Terrace. The site was a former open cut sand mine that is now closed and is flooded with surface stormwater and some groundwater intrusion.

The proposal is for the excavated mine to be filled to surrounding ground level with Golf Course to be development on the site.

3.1 Nearest Receivers

The nearest residents and commercial/industrial receivers are located at (refer to Figure 1):

- R1 – Residents located to the north-west on the opposite side of Adelaide Street. The receivers are more than 100m from the site boundary.
- R2 – Residential properties to the north along Meredith Crescent, between 100 to 300m from the site boundary.
- R3 – Residents located to the south-west on the opposite side of Adelaide Street. The receivers are more than 200 from the site boundary.

The other surrounding sites that are immediately adjacent to the development site are various commercial and industrial facilities.

3.2 Noise Assessment for Proposal to Rehabilitate Disused Mine for Recreational Use

The following is the proposed stages of work to occur on site:

1. Filling of flooded mine with gravel, sand/clay and rock to above the groundwater level. Typical equipment would include:
    a. Fifty (50) tippers and dogs entering the site and existing the site per day 5 1/2 days per week not public holidays.
    b. Bulldozer and excavator.
2. Compacting of driveways with some minor earthworks at the stormwater drainage lines at the western side of the site:
    a. Profile compactor.
    b. Track loader.
3. Site levelling:
    a. Two (2) D9 track type tractor.
    b. 30T Excavator.

Noise modelling has been completed to predict the potential construction noise activity. Noise modelling software CadnaA (version 4.5.149) and the CONCAWE method for predicting noise propagation has been used for the assessment. To quantify potential worst-case scenario, noise enhancing metrological parameters have been assessed in the model include having the source to receiver maximum wind of 3m/s and a temperature inversion of 3°/100m.

The predicted noise levels in Table 5 allow for acoustic mitigation measure (such topography, vegetation, air absorption) and operating time correction. Also, not all equipment is expected operate simultaneously.

Table 5 – Phase 2 – Typical Noise Level of Construction Equipment (no mitigation)

Stage	Description of Noise Source[2]	# of Sources	SPL @ 10m	Predicted Noise level at Receiver, $L_{eq(15min)}$ dBA		
				R1	R2	R3
1	Excavator	1	79	36-41	27-32	26-31
	Bulldozer	1	80	35-40	27-32	28-33
	Tipper trucks	1	89	33-38	23-28	25-30
	Cumulative	**-**	**-**	**40-45**	**31-36**	**31-36**
2	Track Loader (30T)	1	75	17-22	inaudible	inaudible
	Compactor	1	80	18-23	inaudible	inaudible
	Cumulative	**-**	**-**	**25-30**	**inaudible**	**inaudible**
3	Track Tractor	1	80	32-37	22-27	23-28
	Track Loader (30T)	1	75	24-29	inaudible	inaudible
	Cumulative	**-**	**-**	**36-41**	**26-31**	**27-32**

Based on the above predictions, construction noise level during all stages of the work would comply with the EPA ICNG.

[2] Table A1 in Australian Standard 2436:2010 and Department for Environment, Food and Rural Affairs (DEFRA UK).

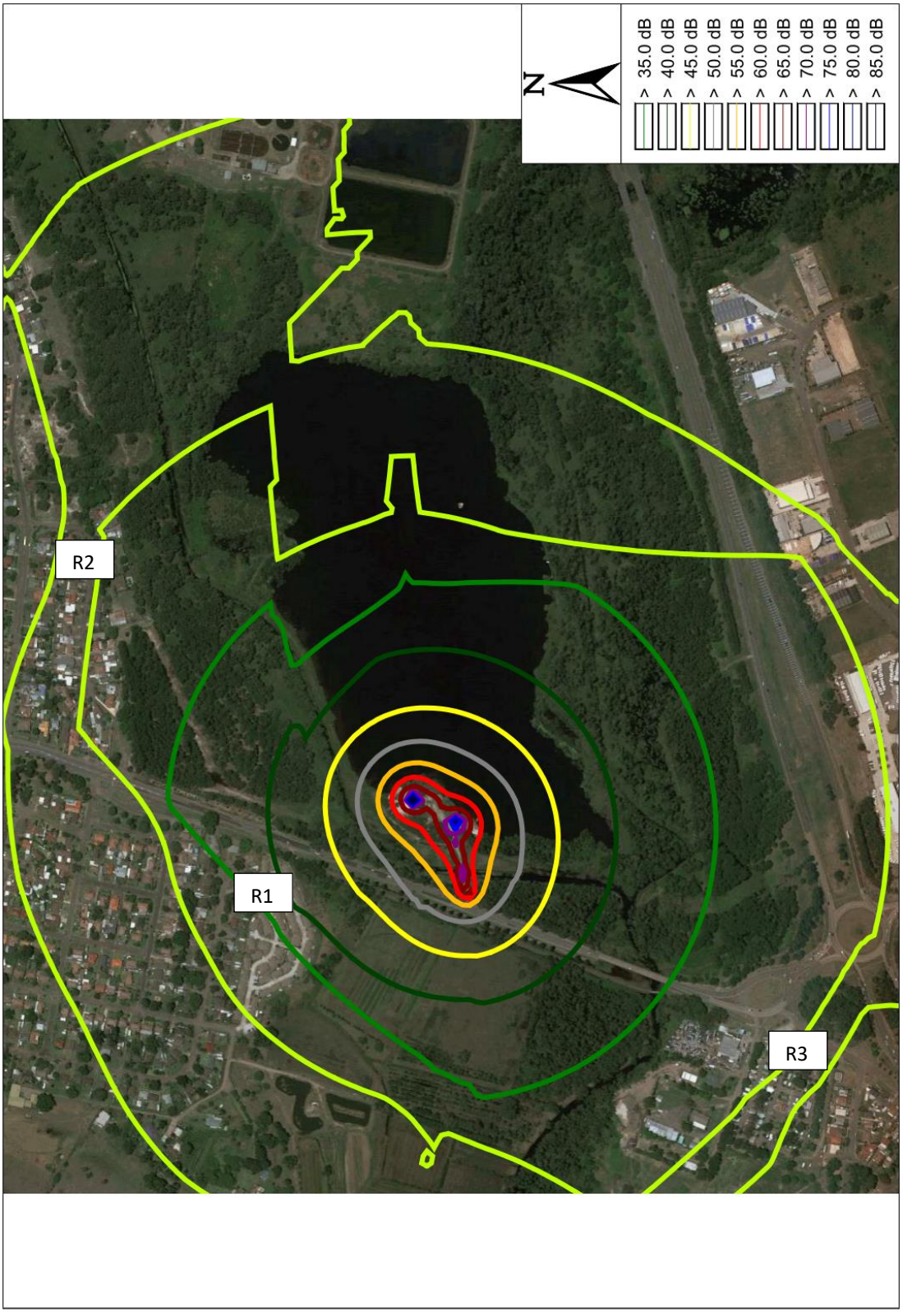


Figure 2 –Stage 1 Noise Model of Construction Activity

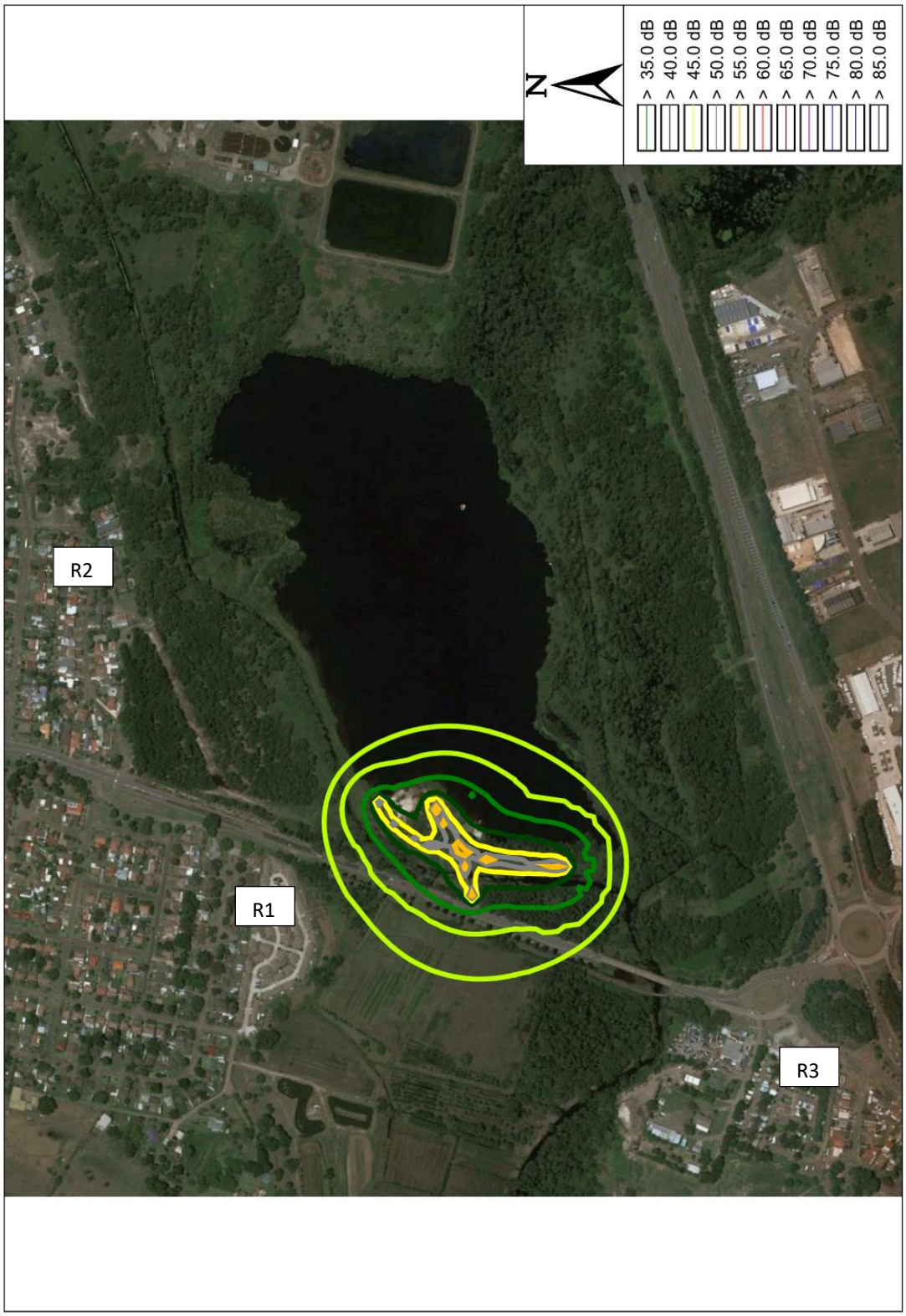


Figure 3 –Stage 2 Noise Model of Construction Activity

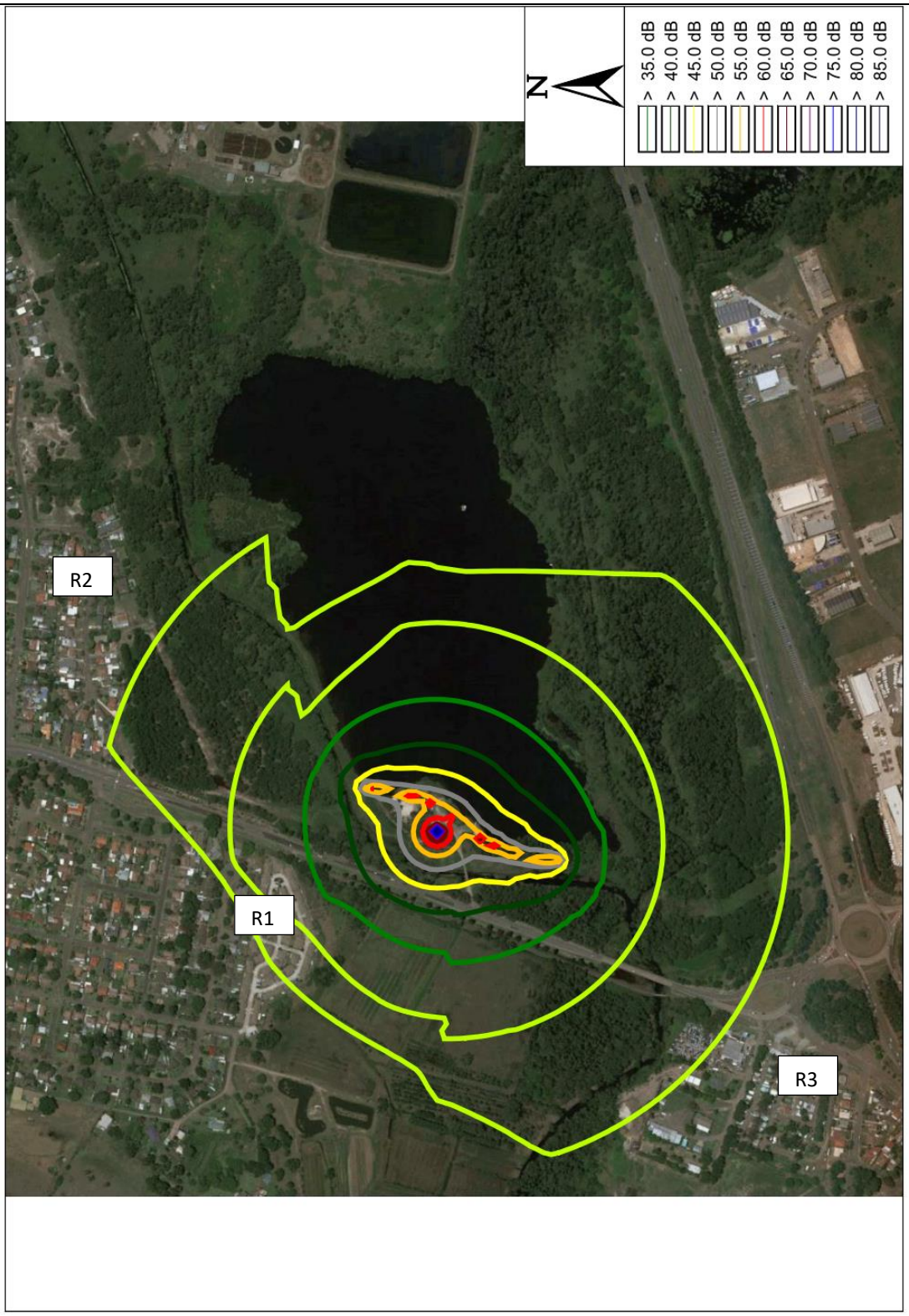


Figure 4 –Stage 3 Noise Model of Construction Activity

4 Conclusion

An acoustic assessment of the proposed development has been carried out in accordance with the requirements of the EPA "Interim Construction Noise Guideline" (ICNG).

An environmental noise survey of the site has been conducted and the noise limiting criteria for construction activity noise based on the EPA ICNG. The limits are presented in Table 3.

Noise management level for construction activity noise has been determined based on the on the EPA ICNG. The predicted noise detailed in Section 3.2 from various construction stages are expected to comply with the EPA managerial noise limits.

Appendix A – Acoustic Terminology

Decibel, dB: A dimensionless unit which denotes the ratio between two quantities that are proportional to power, energy or intensity. One of these quantities is a designated reference by which all other quantities of identical units are divided. The sound pressure level in decibels is equal to 10 times the logarithm (to the base 10) of the ratio between the pressure squared divided by the reference pressure squared. The reference pressure used in acoustics is 20 micro Pascals.

A-WEIGHTING: A measure of sound pressure level designed to reflect the response of the human ear, which does not respond equally to all frequencies. To describe sound in a manner representative of the human ear's response it is necessary to reduce the effects of the low and high frequencies with respect to medium frequencies. The resultant sound level is said to be A-weighted, and the units are in decibels (dBA). The A-weighted sound level is also called the noise level.

Sound Pressure Level, L p (dB), of a sound: 20 times the logarithm to the base 10 of the ratio of the r.m.s. sound pressure to the reference sound pressure of 20 micro Pascals. Sound pressure level is measured using a microphone and a sound level meter, and varies with distance from the source and the environment.

Ambient Noise/Sound: All noise level present in a given environment, usually being a composite of sounds from many sources far and near. Traffic, HVAC, masking sound or even low-level background music can contribute to ambient level of noise or sound.

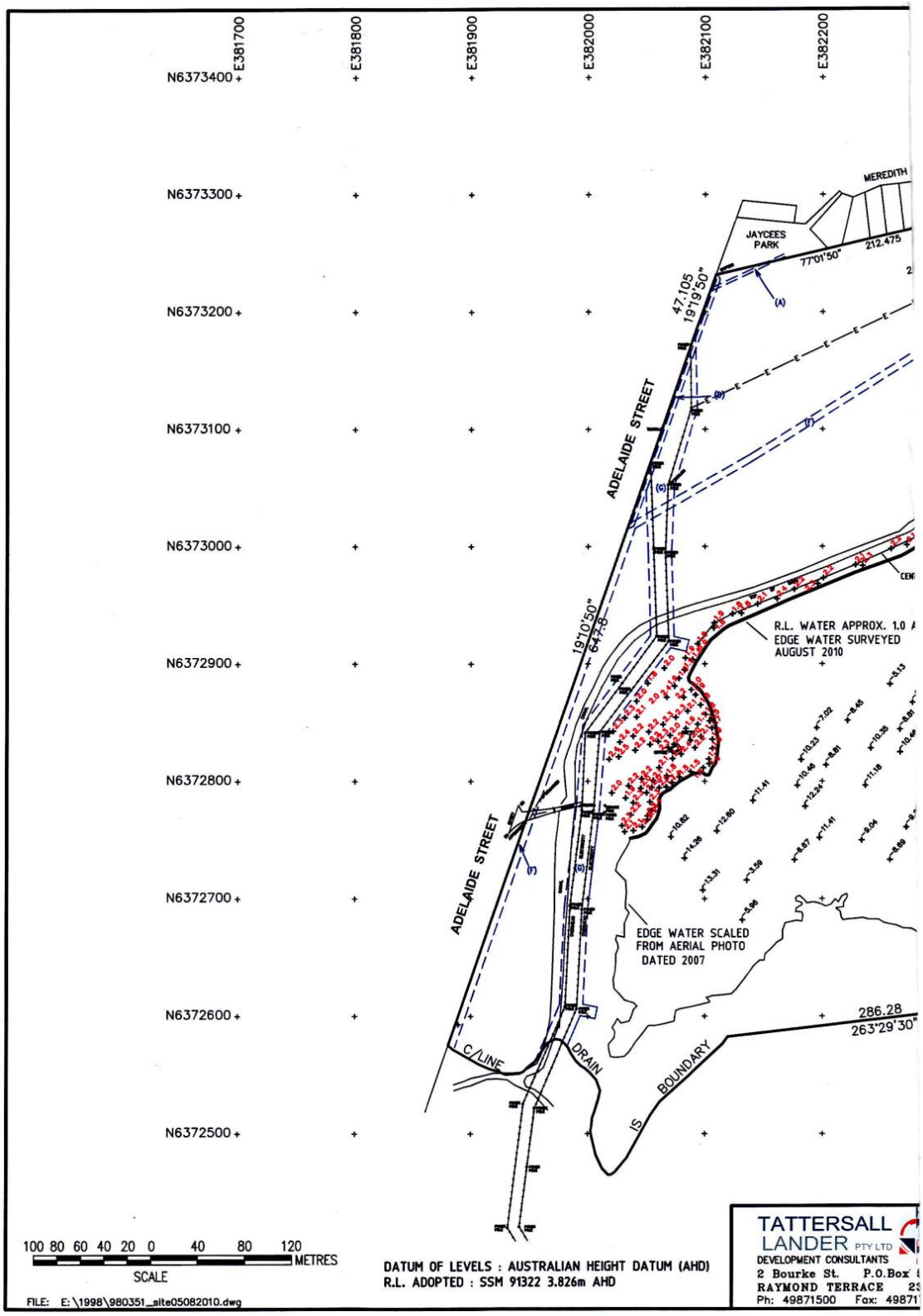
Percentile Level - L 90 , L 10 , etc: A statistical measurement giving the sound pressure level which is exceeded for the given percentile of an observation period, e.g. L 90 is the level which is exceeded for 90% of a measurement period. L 90 is commonly referred to as the "background" sound level.

Background Noise (L 90): The sum total of all unwanted residual noise generated from all direct and reflected sound sources in a space that can represent an interface to, or interfere with good listening and speech intelligibility.

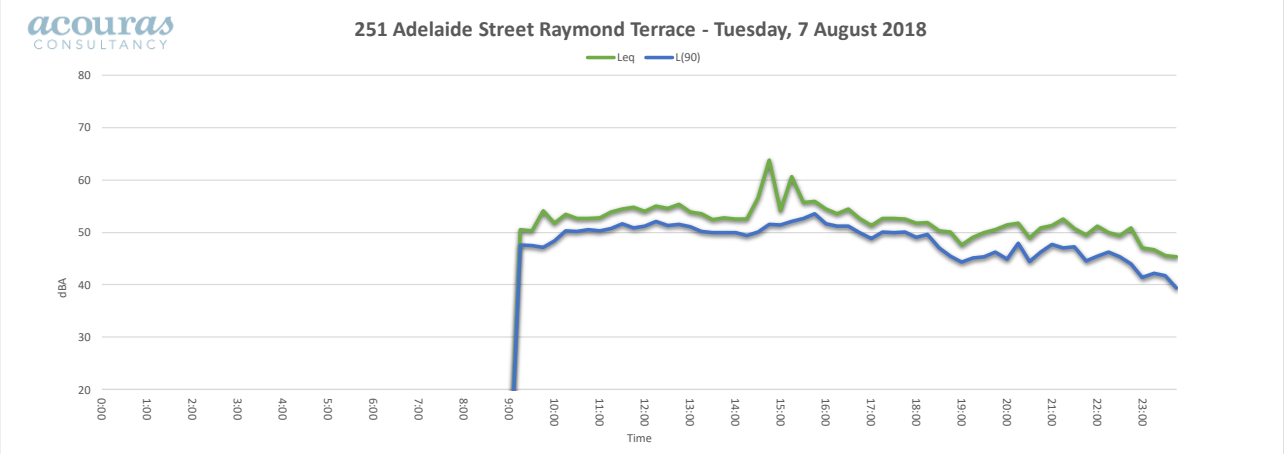
Rating Background Level – RBL: Method for determining the existing background noise level which involves calculating the tenth percentile from the L A90 measurements. This value gives the Assessment Background Noise Level (ABL). Rating Background Level is the median of the overall ABL.

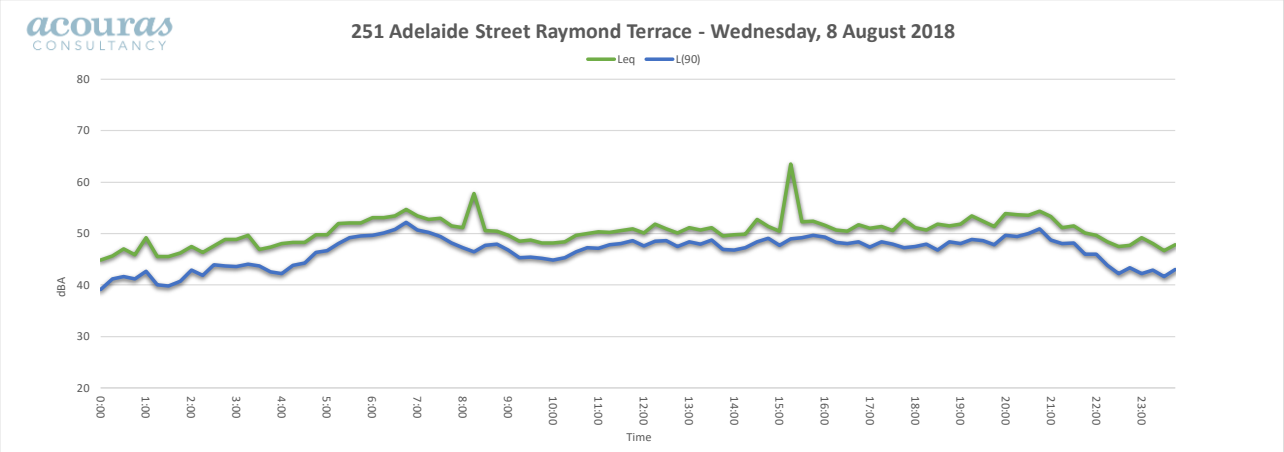
L AEQ,T : Equivalent continuous A-weighted sound pressure level. The value of the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval T, has the same A-weighted sound energy as the actual time-varying sound.

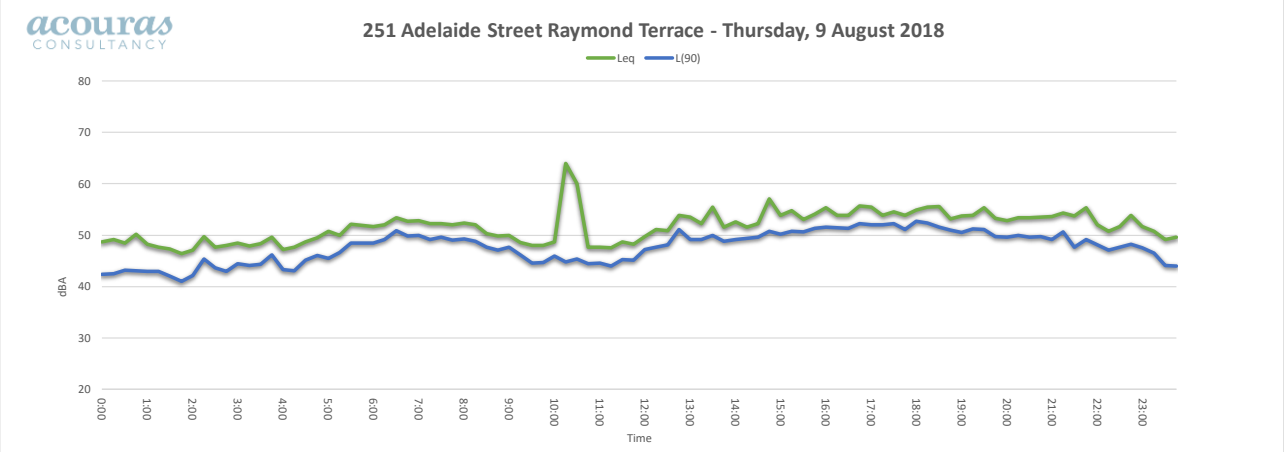
Appendix B – Site Drawing

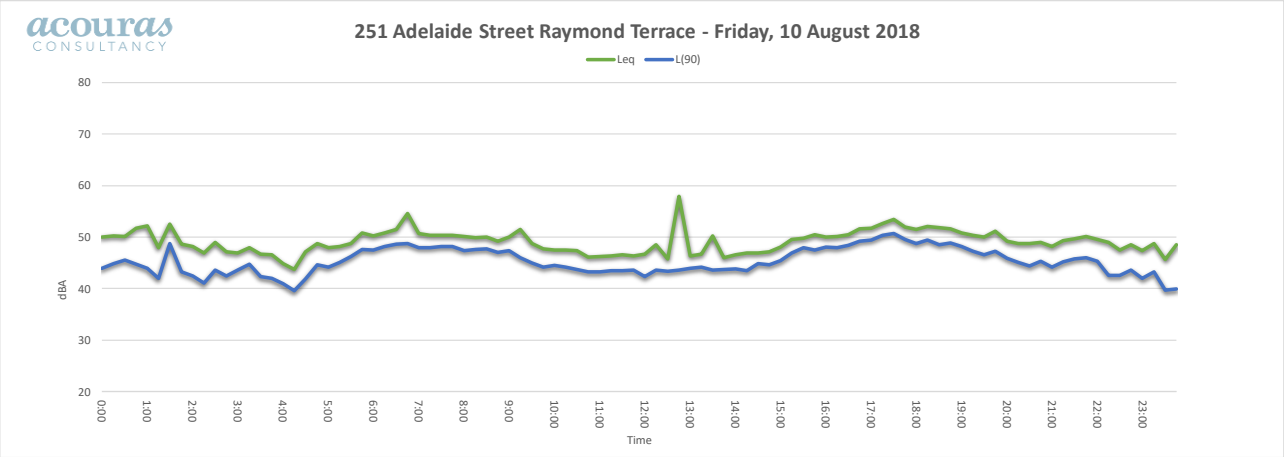


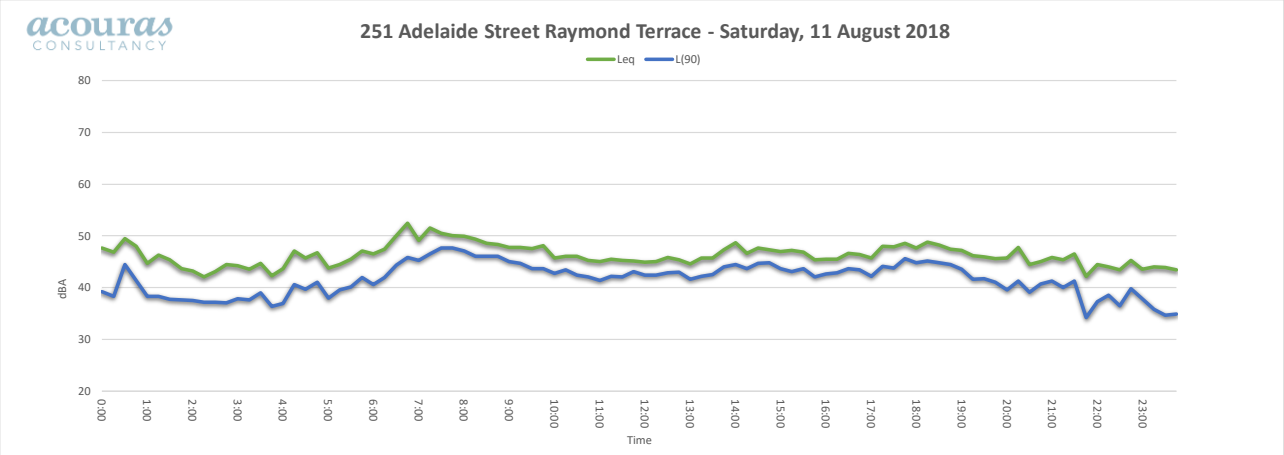
Appendix C – Noise Logger Results

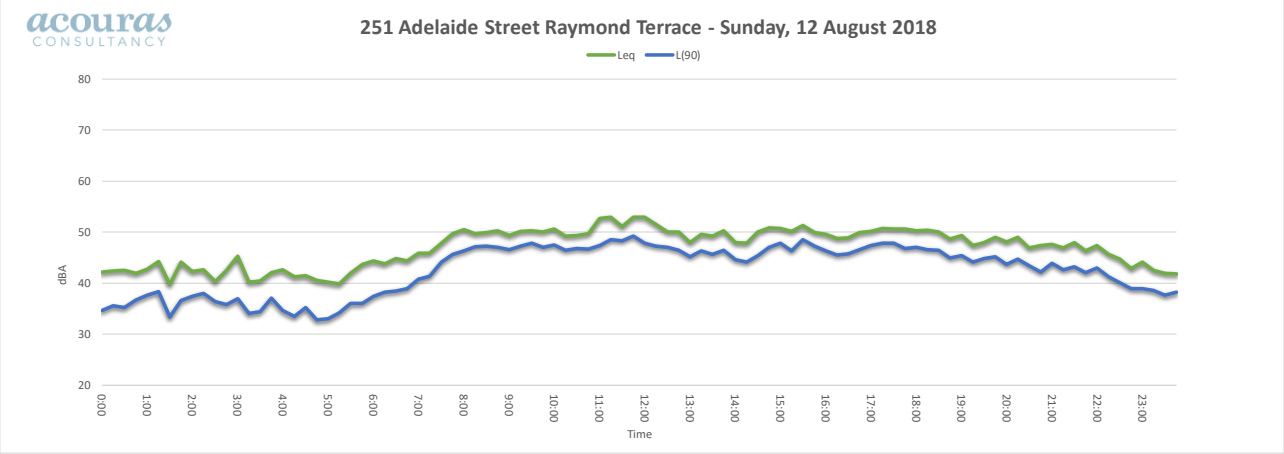







acouras CONSULTANCY
251 Adelaide Street Raymond Terrace - Friday, 10 August 2018
Leq
L(90)
dBA
Time


acouras CONSULTANCY
251 Adelaide Street Raymond Terrace - Saturday, 11 August 2018
Leq
L(90)
dBA
Time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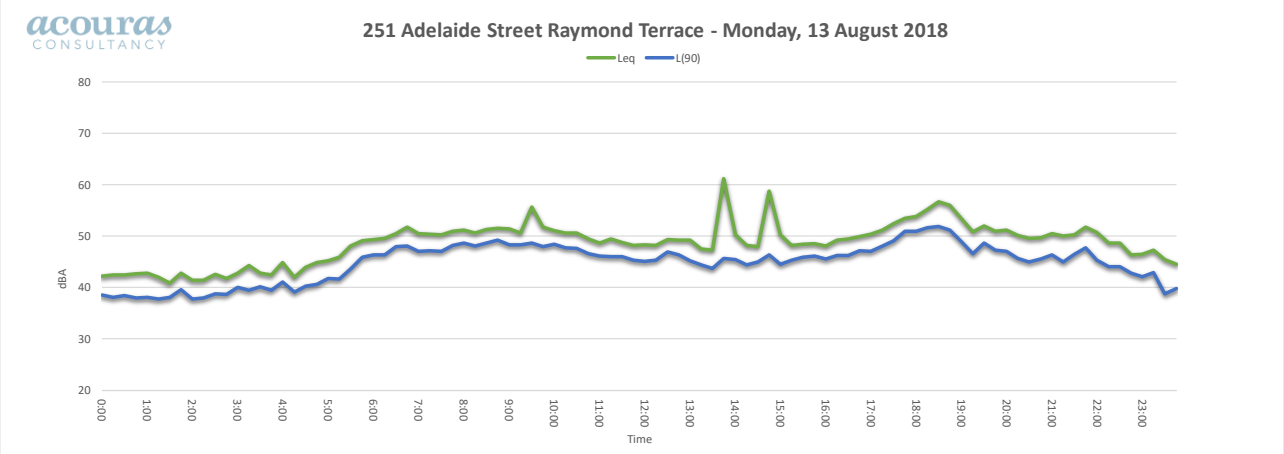
251 Adelaide Street Raymond Terrace - Sunday, 12 August 2018
Leq
L(90)
dBA
Time


acouras CONSULTANCY
251 Adelaide Street Raymond Terrace - Monday, 13 August 2018
Leq
L(90)
80
70
60
50
40
30
20
dBA
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
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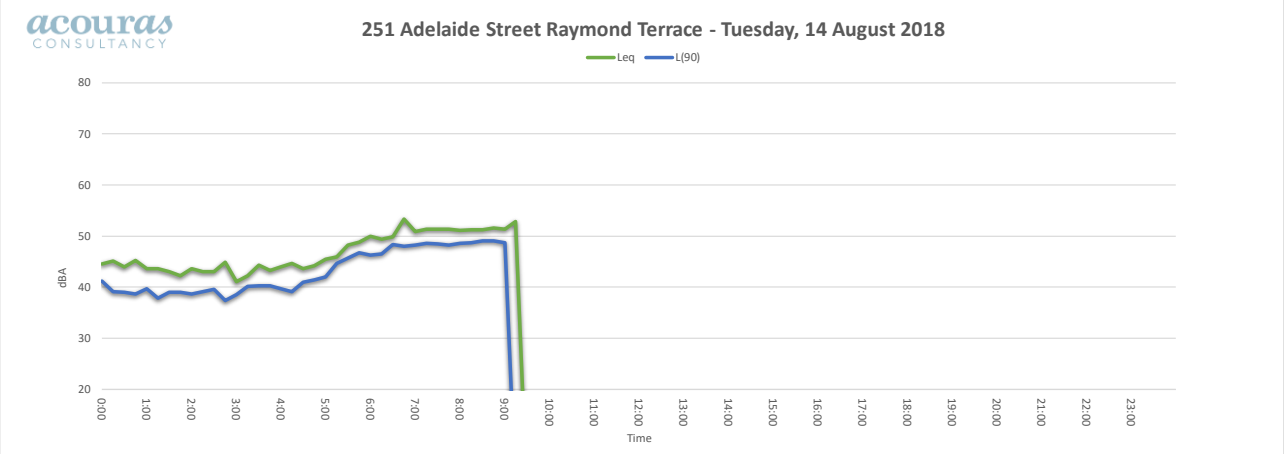
23:00
Time


acouras CONSULTANCY
251 Adelaide Street Raymond Terrace - Tuesday, 14 August 2018
Leq
L(90)
80
70
60
50
40
30
20
dBA
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
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Appendix D – Construction Equipment Noise Levels

Table D-1 — Typical Sound Pressure Level of Construction Equipment

Description	Sound Pressure Level L_{pA} (mid point) at 10m
Backhoe with auger	78
Bulldozer	80
Crane (mobile)	76
Excavator	79
Forklift	78
Front end loader	85
Grader	82
Hand tools (electric)	74
Hand tools (pneumatic)	88
Truck (>20 tonne)	79
Truck (dump)	89
Generator (Diesel)	71
Roller (vibratory)	80