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To:	Dynamic Planning and Developments Pty Ltd	**From:**	[redacted]
Attention:	[redacted]	**Date:**	22 March 2022
Email:	[redacted]	**Pages:**	1
Our Ref:	21106751-02		
Re:	Noise Modelling Query Re: Extractive Industry Licence Application - Lot 901 (150) Flynn Drive		

[redacted]

In response to the email query from City of Wanneroo dated 17 March 2022 Lloyd George Acoustics (LGA) makes the following response:

LGA understands that sand extraction works located to the northern section of Lot 901 involve the use of excavators, wheeled loaders, dozers and involves general truck movements/loading. There is no requirement for rock breakers or other high noise emitting equipment required due to the nature of sand extraction. The noise modelling focused on the dominant noise sources on the southern section of the lot, which are located closest to the noise sensitive receivers. These distant northern located noise sources associated with the sand extraction have negligible effect on the noise levels at receivers. The crushing and screening activities are the dominant audible noise at the southern boundary of the lot.

We trust the above is satisfactory. Should you require further information, please do not hesitate in contacting us.

Regards,

[redacted]

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Environmental Noise Assessment

150 Flynn Drive, Neerabup

Reference: 21106751-01

Prepared for:
Carramar Resources Industries

Report: 21106751-01

Lloyd George Acoustics Pty Ltd

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Date:	Rev	Description	Prepared By	Verified
08-Mar-22	0	Issued to Client	[redacted]	[redacted]

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A Terminology

1 INTRODUCTION

Lloyd George Acoustics (LGA) was engaged to assess the noise emissions from the Carramar Resources Industries (CRI) site located at 150 Flynn Drive in Neerabup, as part of their 5 year renewal of Extractive Industries License with the City of Wanneroo licence application. LGA previously carried out an acoustic assessment (*Report # 16103769-0, dated 2nd March 2017)* of the operation as part of licence application L8928/2015/1 from the Department of Environment Regulation (DER) which focused specifically to the screening and crushing activities occurring on site and condition 1.2.8 required CRI to:

a) investigate and report on the extent and nature of the noise emissions from the premises during normal operating conditions;

b) identify where improvements are required, and if required, prepare a plan to abate the noise to meet the prescribed standard;

c) implement the improvement plan where required by part (b) of this Condition; and

d) monitor the effectiveness of the implementation of the plan.

This report will reassess the current noise emissions and assess if the noise mitigation measures recommended previously are in place. The dominant noise mitigation measure proposed was to ensure a minimum 4 m high bund to the south and south east of plant, located no more than 10 metres from the crushing/screening plant.

The site is located north of Flynn Drive with the closest noise sensitive receivers now located to the southeast at Tropicbird Drive, in the new Banksia Grove residential area – refer *Figure 1-1*. The crushing and screening operations only occur Monday to Saturday between 7am and 5pm.

Figure 1-1 Project Locality (GoogleEarth aerial)

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

2 CRITERIA

Environmental noise in Western Australia is governed by the *Environmental Protection Act 1986*, through the *Environmental Protection (Noise) Regulations 1997* (the Regulations).

Regulation 7 defines the prescribed standard for noise emissions as follows:

"7. (1) Noise emitted from any premises or public place when received at other premises –

(a) Must not cause or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind; and

(b) Must be free of –

i. tonality;

ii. impulsiveness; and

iii. modulation,

when assessed under regulation 9"

A "…noise emission is taken to significantly contribute to a level of noise if the noise emission … exceeds a value which is 5 dB below the assigned level…"

Tonality, impulsiveness and modulation are defined in Regulation 9. Noise is to be taken to be free of these characteristics if:

(a) The characteristics cannot be reasonably and practicably removed by techniques other than attenuating the overall level of noise emission; and

(b) The noise emission complies with the standard prescribed under regulation 7 after the adjustments of *Table 2-1* are made to the noise emission as measured at the point of reception.

Table 2-1 Adjustments Where Characteristics Cannot Be Removed

Where Noise Emission is Not Music			Where Noise Emission is Music	
Tonality	Modulation	Impulsiveness	No Impulsiveness	Impulsiveness
+ 5 dB	+ 5 dB	+ 10 dB	+ 10 dB	+ 15 dB

Note: The above are cumulative to a maximum of 15dB.

The baseline assigned levels (prescribed standards) are specified in Regulation 8 and are shown in *Table 2-2*.

Table 2-2 Baseline Assigned Noise Levels

Premises Receiving	Time Of Day	Assigned Level (dB)

Noise		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area[1]	0700 to 1900 hours Monday to Saturday (Day)	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sunday and public holidays (Sunday)	40 + influencing factor	50 + influencing factor	65 + influencing factor
	1900 to 2200 hours all days (Evening)	40 + influencing factor	50 + influencing factor	55 + influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	35 + influencing factor	45 + influencing factor	55 + influencing factor
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial	All hours	60	75	80
Industrial	All hours	65	80	90

1. ***highly sensitive area*** means that area (if any) of noise sensitive premises comprising —
   (a) a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
   (b) any other part of the premises within 15 metres of that building or that part of the building.

The influencing factor, applicable at the noise sensitive premises has been calculated as 1 dB, as shown in *Table 2-3*. The transport factor has been calculated as 0 dB, due to Flynn Drive being not considered a major or secondary road.

Table 2-3 Influencing Factor Calculation

Description	Within 100 metre Radius	Within 450 metre Radius	Total
Industrial Land	0 %	7 %	0.7 dB
Commercial Land	0 %	0 %	0 dB
Transport Factor			**0 dB**
Total			**1 dB**

Table 2-4 shows the assigned noise levels including the influencing factor and transport factor at the receiving locations.

Table 2-4 Assigned Noise Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area[1]	0700 to 1900 hours Monday to Saturday (Day)	46	56	66
	0900 to 1900 hours Sunday and public holidays (Sunday)	41	51	66
	1900 to 2200 hours all days (Evening)	41	51	56
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	36	46	56
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Industrial	All hours	65	80	90

1. ***highly sensitive area*** means that area (if any) of noise sensitive premises comprising —
   (a) a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
   (b) any other part of the premises within 15 metres of that building or that part of the building.

It must be noted the assigned noise levels above apply outside the receiving premises and at a point at least 3 metres away from any substantial reflecting surfaces.

It is further noted the assigned noise levels are statistical levels and therefore the period over which they are determined is important. The Regulations define the Representative Assessment Period (RAP) as *a period of time of not less than 15 minutes, and not exceeding 4 hours*, which is determined by an *inspector* or *authorised person* to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission. An *inspector* or *authorised person* is a person appointed under Sections 87 & 88 of the *Environmental Protection Act 1986* and include Local Government Environmental Health Officers and Officers from the Department of Environment Regulation. Acoustic consultants or other environmental consultants are not appointed as an *inspector* or *authorised person*. Therefore, whilst this assessment is based on a 4 hour RAP, which is assumed to be appropriate given the nature of the operations, this is to be used for guidance only.

It is also noted that under regulation 3, certain types of noise emission do not have to comply with the Regulations. In the case of this assessment these are:

(a) noise emissions from the propulsion and braking systems of motor vehicles operating on a road;

(g) noise emissions –

a. from a device for warning pedestrians installed at a pedestrian crossing on a road; or

b. from a device for warning of the passage of a train installed at a level crossing; or

c. from a safety warning device fitted to a building as a requirement of the Building Code as defined in the *Building Regulations 2012* regulation 3; or

d. for the purpose of giving a warning required under the *Mines Safety and Inspection Regulations 1995* regulation 8.26,

if every reasonable and practicable measure has been taken to reduce the effect of the noise emission consistent with providing an audible warning to people;

(h) noise emissions from –

a. a reversing alarm fitted to a motor vehicle, mobile plant, or mining or earthmoving equipment; or

b. a startup or movement alarm fitted to plant,

if

c. it is a requirement under another written law that such an alarm be fitted; and

d. it is not practicable to fit an alarm that complies with the written law under which it is required to be fitted and emits noise that complies with these Regulations;

It is considered that reversing alarms fitted to commercial vehicles and mobile plant e.g. HV trucks or loaders, are not exempt under the Regulations since they are not specifically required to have one fitted under another written law. The commonly used fixed noise output tonal reversing alarms also known as 'reversing beeper' emit, by their very nature, tonal and modulating noise at high levels. As such, this type of reversing alarm generally cannot comply with the Regulations even at distant receivers.

If deemed to be required, an alternative reversing alarm type should be considered. Such alternative, which can more readily comply with the Regulations, include alarms emitting a broadband signal in-lieu of a tonal 'beep'.

3 METHODOLOGY

3.1 Site Measurements

Measurements were undertaken on site to characterise the noise levels from the various pieces of plant operating on site during crushing and screening operations. These included:

- Trucks entering and exiting the site at the weighbridge;
- Sandvik QI 240 impact crusher;
- Terex Finlay 893 screening plant;
- Sandvik QA 451 triple deck doublescreen;
- Komatsu HM 350 haul truck; and
- Front end loader Komatsu WA 470.

All sources sound levels used in this assessment are presented in *Section 3.2.4*.

Under the Regulations, there are certain requirements that must be satisfied when undertaking measurements and are defined in Regulations 19, 20, 22 and 23 and Schedule 4. In undertaking the measurements, these have been satisfied, specifically noting the following:

- The sound level meter used was:
    - Norsonic 132 (S/N:1322896Bruel & Kjaer Type 2260 Investigator (S/N: 2311736);
- The noise data loggers used were:
    - ARL Type Ngara (S/N: 87803A) (located in the pit area); and
    - ARL Type Ngara (S/N: 8780F4) (located near southern boundary).
- All equipment holds current laboratory certificates of calibration that are available upon request. The equipment was also field calibrated before and after and found to be within +/- 0.5 dB.
- Each microphone was fitted with a standard wind screen.
- The microphones were at least 1.2 metres above ground level and at least 3.0 metres from reflecting facades (other than the ground plane).

Attended measurements were also conducted on 22 December 2021 between 10.05 am and 12.35pm.

Background noise could not be directly measured using an SLM, as the noise source could not be turned off. As such, measurements were recorded with a noise logger located close to the mobile plant where using an automatic noise data logger (ARL Ngara) at the pit location between 16th December 2022 and 22nd December 2022. An additional noise logger was also located towards the boundary fence of site. The sample period was set to 15-minutes and various percentile data recorded.

A photo of the installed noise logger locations for the pit area and near southern boundary are presented as *Figure 3-1* and *Figure 3-2*, with a photo of noise measurements at the weighbridge presented as *Figure 3-3*. The current noise bunds located at the pit area in proximity to the crushing and screening mobile plant are presented as *Figure 3-4* and *Figure 3-5*.

Figure 3-1 Noise Monitoring Logger At Pit Area

Figure 3-2 Noise Monitoring Logger Near Southern Boundary

Figure 3-3 Noise Monitoring Logger Weigh Bridge

Figure 3-4 Plant With Surrounding Stock Pile Noise Bunds

Figure 3-5 Stockpile Acting As a Noise Bund

3.2 Noise Modelling

Computer modelling was then used to predict noise levels at the southern noise sensitive receivers. The advantage of modelling is that it is not affected by background noise sources and can provide the noise level for various weather conditions and operating scenarios if necessary.

The software used for the previous model was *SoundPLAN 7.4* with the CONCAWE algorithms selected. This same model was adjusted and remodelled with the newer data and locations of plant. These algorithms have been selected as they include the influence of wind and atmospheric stability. Input data required in the model are:

- Meteorological Information;
- Topographical data;
- Ground Absorption; and
- Source sound power levels.

3.2.1 Meteorological Information

Meteorological information utilised is provided in *Table 3-1* and is considered to represent worst-case conditions for noise propagation. At wind speeds greater than those shown, sound propagation may be further enhanced, however background noise from the wind itself and from local vegetation is likely to be elevated and dominate the ambient noise levels.

Table 3-1 Modelling Meteorological Conditions

Parameter	Day (0700-1900)
Temperature (^{o}C)	20
Humidity (%)	50
Wind Speed (m/s)	4
Wind Direction*	All
Pasquil Stability Factor	E

* Note that the modelling package used allows for all wind directions to be modelled simultaneously.

It is generally considered that compliance with the assigned noise levels needs to be demonstrated for 98% of the time, during the day and night periods, for the month of the year in which the worst-case weather conditions prevail. In most cases, the above conditions occur for more than 2% of the time and therefore must be satisfied.

3.2.2 Topographical Data Inclusive of Noise Bund

Topographical data was based on that publicly available from *GoogleEarth* in the form of spot heights, noting the topography is relatively flat around the slight and gently sloping up heading south. There was an approximately 4 metre high bund installed to the south and east of the crushing and screening equipment, which has been included in the modelling.

3.2.3 Ground Absorption

Ground absorption varies from a value of 0 to 1, with 0 being for an acoustically reflective ground (e.g. water or bitumen) and 1 for acoustically absorbent ground (e.g. grass). In this instance, a value of 0.2 has been used for the screening and crushing area (i.e. compacted ground) and 1 for the surroundings (i.e. sandy soil with scrubs).

3.2.4 Source Sound Levels

The sound power levels used in the modelling are provided in *Table 3-2*.

Table 3-2 Source Sound Power Levels

Description	Octave Band Centre Frequency (Hz)								Overall dB(A)
	31.5	63	125	250	500	1k	2k	4k	
Sandvik QI 240 impact crusher	113	118	115	110	108	106	104	100	**111**
Terex Finlay 893 screening plant	-	113	108	105	105	103	100	97	**108**
Sandvik QA 451 triple deck doublescreen	-	105	107	106	108	107	105	103	**112**
Komatsu HM 350 haul truck	-	101	109	104	104	99	95	91	**105**

Description	Octave Band Centre Frequency (Hz)								Overall dB(A)
	31.5	63	125	250	500	1k	2k	4k	
Front end loader WA470	-	98	106	108	105	102	100	95	**108**
Trucks on access road	-	101	96	92	91	88	83	79	**93**

With regards to the above, please note the following:

- All mobile plant (e.g. loader and trucks) were modelled as point sources 2 metres above local ground;
- All fixed plant (e.g. impact crusher and screens) were modelled as a point source 2m above local ground level;
- Source levels are based on the previous and current site specific measurements of the equipment specified; and,
- All levels represent L_{10} noise levels.

4 RESULTS

4.1 Noise Monitoring

The results of the noise monitoring demonstrated that the mobile plant was only operational on the 2nd day of monitoring, which was confirmed by Carramar Resources. A review of the data allowed for the four most active consecutive plant/loudest hours to be utilised and allow for calibration of the noise modelling. This is seen as a conservative approach. The results of these four hours are summarised below in *Table 4-1*. Detailed measurement results for the whole period are provided as *Figure 4-1 and Figure 4-2.*

Table 4-1 Measured Average Noise Levels For Most Active 4 hours

Location	Date/Time	4 Hour Average Noise Level, dB			
		$L_{A1,4hour}$	$L_{A10,4hour}$	$L_{Aeq,4hour}$	$L_{A90,4hour}$
1. Pit Area	17-Dec-2021 9.00 am to 12.00 pm	80.9	78.5	76.7	90.1
2. Near Southern Boundary		69.5	61.8	58.9	77.1

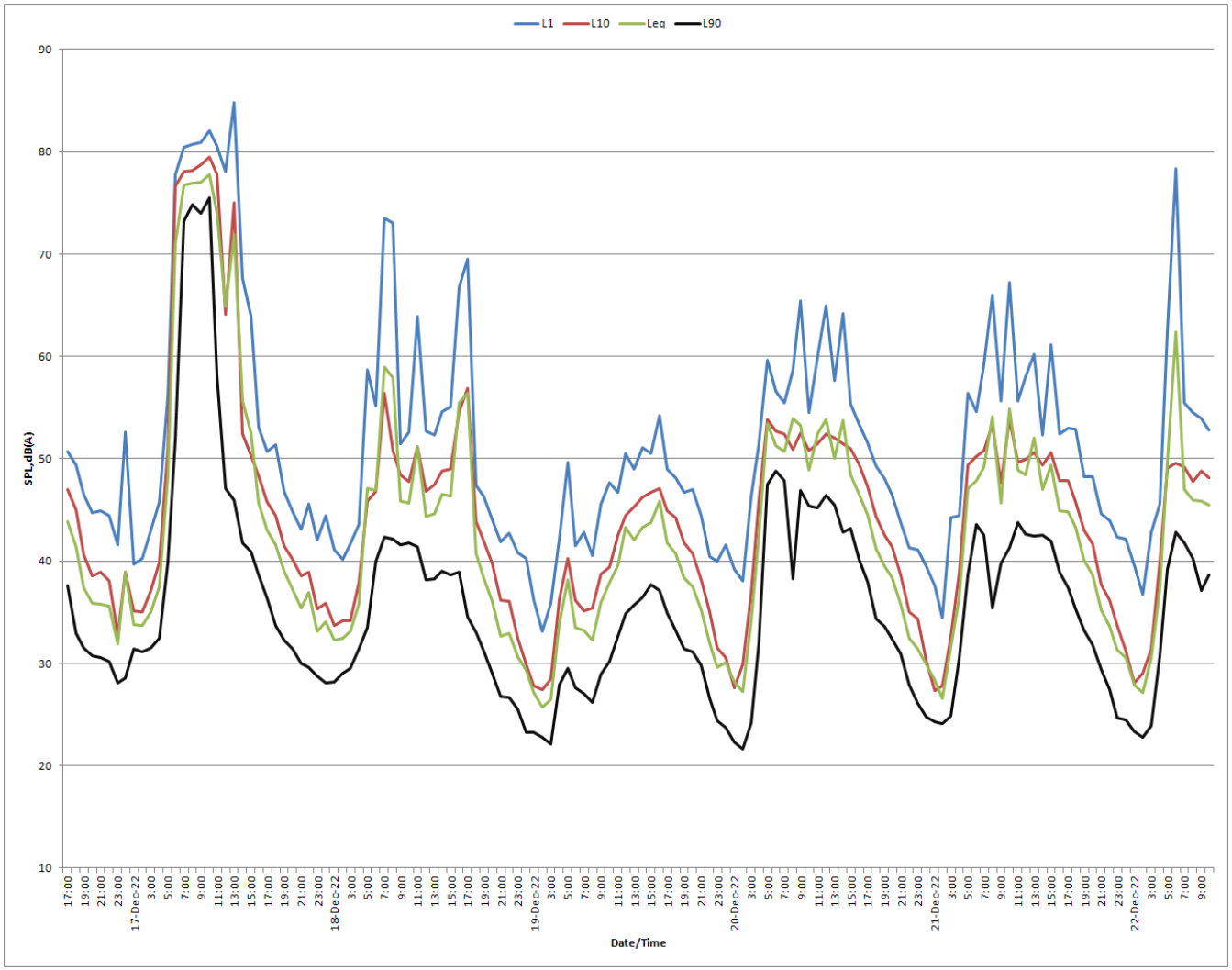


Figure 4-1 Noise Monitoring Results At Pit Area

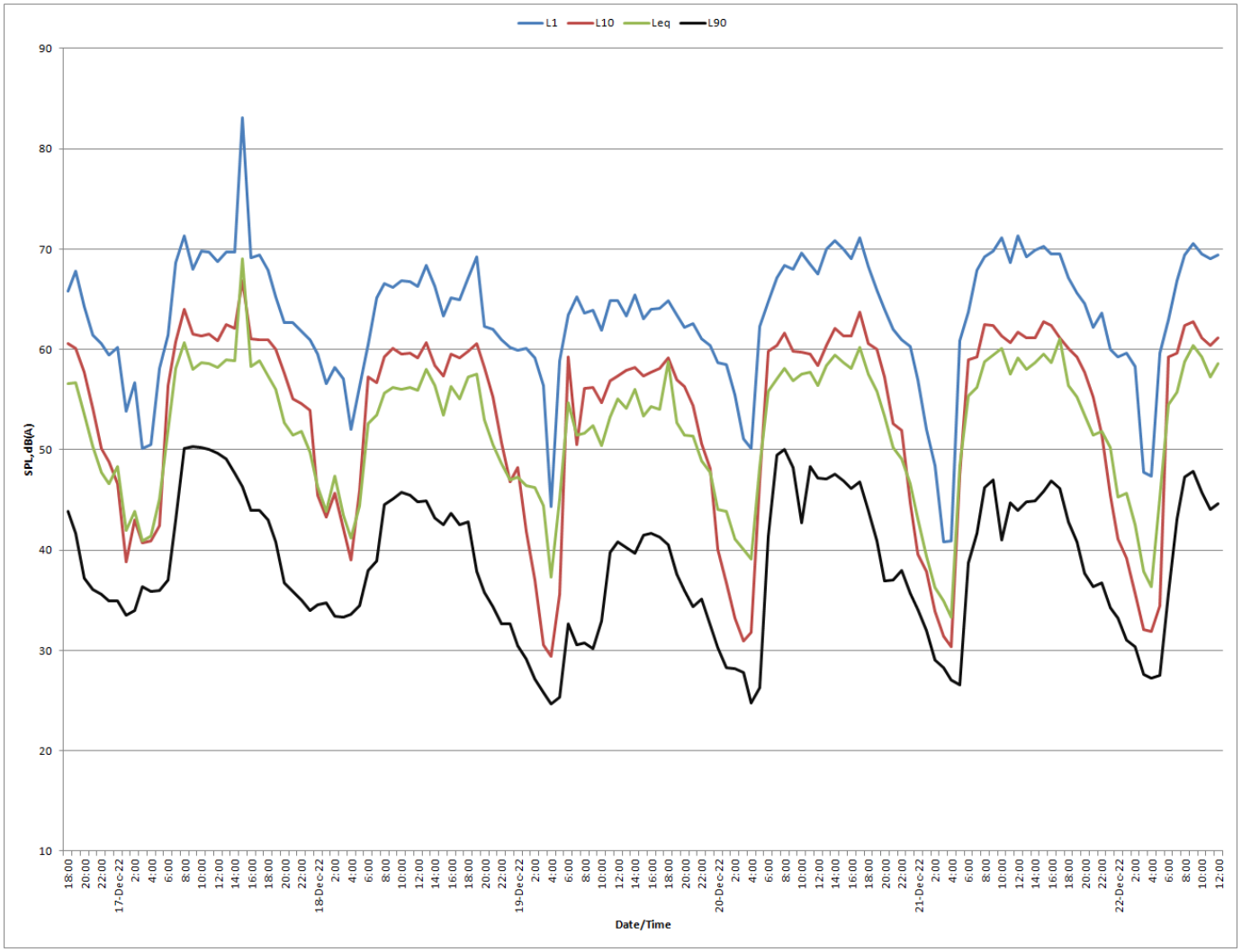


Figure 4-2 Noise Monitoring Results Near Southern Boundary

4.2 Noise Modelling

The noise levels were predicted for a normal crushing and screening operations which include the following plant operating simultaneously:

- 1x Finlay screen feeding impact crusher;
- 1x Sandvik impact crusher QI 240;
- 1x Sandvik doublescreen QA 451;
- 1x Komatsu HM350 haul truck (travelling around site);
- 1x Front end loader WA470 feeding the screen; and
- 2x trucks on access road near entrance.

It was noted on site that some stockpiles are located on site however; they were located on the northern side of the plant and were therefore not included in the noise model.

The results of the noise modelling for the above is summarised in *Table 4-2*. *Figure 4-3* also shows the predicted noise levels as contours map at ground level as well as the location of each receiver.

Table 4-2 Predicted Noise Levels

Reference	Receiver	Predicted Noise Level, dB L_{A10}	Main Sources
A	Hyden Road	46	Crushing & Screening Plant
B	Lancewood Street	44	Crushing & Screening Plant
C	Mystery Road	45	Crushing & Screening Plant
D	Tropicbird Drive	46	Crushing & Screening Plant

It is noted the above are noise levels predicted for the daytime worst-case meteorological conditions. Based on the noise modelling, the main sources of noise at each receiver are crushing and screening mobile plant.

Carramar Resources Industries - Normal Operations
150 Flynn Drive, Neerabup

Figure 4-3

Noise Levels
dB L_{A10}

= 41
= 46
= 51
= 56

Signs and symbols

Noise Source
Receiver
Noise Bund

8/03/2022

Length Scale 1:4128
0 20 40 80 120 m

5 ASSESSMENT

The operations are Monday to Saturday daytime only and therefore the applicable assigned noise level is 46 dB L_{A10}.

Given the source to receiver distances are of the order of 500 metres, the fact Flynn Drive carries around 34% heavy vehicles (Main Roads traffic count 2021/2022 west of Old Yanchep Road) and the scheduling of the operations, it was considered that annoying characteristics from the crushing operations will not be present at any of the sensitive receivers.

Based on the model predictions and the above, for worst-case meteorological conditions the site is deemed to be compliant during daytime operation at the Banksia Grove dwellings to the south and to the southeast at Tropicbird Drive new dwellings development.

Appendix A

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.

Sound Power Level (L_w)
Under normal conditions, a given sound source will radiate the same amount of energy, irrespective of its surroundings, being the sound power level. This is similar to a 1kW electric heater always radiating 1kW of heat. The sound power level of a noise source cannot be directly measured using a sound level meter but is calculated based on measured sound pressure levels at known distances. Noise modelling incorporates source sound power levels as part of the input data.

Sound Pressure Level (L_p)
The sound pressure level of a noise source is dependent upon its surroundings, being influenced by distance, ground absorption, topography, meteorological conditions etc and is what the human ear actually hears. Using the electric heater analogy above, the heat will vary depending upon where the heater is located, just as the sound pressure level will vary depending on the surroundings. Noise modelling predicts the sound pressure level from the sound power levels taking into account ground absorption, barrier effects, distance etc.

L_{ASlow}
This is the noise level in decibels, obtained using the A frequency weighting and the S (Slow) time weighting as specified in IEC 61672-1:2002. Unless assessing modulation, all measurements use the slow time weighting characteristic.

L_{AFast}
This is the noise level in decibels, obtained using the A frequency weighting and the F (Fast) time weighting as specified in IEC 61672-1:2002. This is used when assessing the presence of modulation only.

L_{APeak}
This is the greatest absolute instantaneous sound pressure in decibels using the A frequency weighting as specified in IEC 61672-1:2002.

L_{Amax}
An L_{Amax} level is the maximum A-weighted noise level during a particular measurement.

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

L_{A10}
An L_{A10} level is the A-weighted noise level which is 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.

L_{A90}
An L_{A90} level is the A-weighted noise level which is exceeded for 90 percent of the measurement period and is considered to represent the "*background*" noise level.

One-Third-Octave Band
Means a band of frequencies spanning one-third of an octave and having a centre frequency between 25 Hz and 20 000 Hz inclusive.

L_{Amax} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded at any time.

L_{A1} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded for more than 1% of the representative assessment period.

L_{A10} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded for more than 10% of the representative assessment period.

Tonal Noise
A tonal noise source can be described as a source that has a distinctive noise emission in one or more frequencies. An example would be whining or droning. The quantitative definition of tonality is:

the presence in the noise emission of tonal characteristics where the difference between -

(a) the A-weighted sound pressure level in any one-third octave band; and

(b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A\ Slow}$ levels.

This is relatively common in most noise sources.

Modulating Noise

A modulating source is regular, cyclic and audible and is present for at least 10% of the measurement period. The quantitative definition of modulation is:

a variation in the emission of noise that —

(a) is more than 3 dB $L_{A\ Fast}$ or is more than 3 dB $L_{A\ Fast}$ in any one-third octave band;

(b) is present for at least 10% of the representative.

Impulsive Noise

An impulsive noise source has a short-term banging, clunking or explosive sound. The quantitative definition of impulsiveness is:

a variation in the emission of a noise where the difference between $L_{A\ peak}$ and $L_{A\ Max\ slow}$ is more than 15 dB when determined for a single representative event;

Major Road

Is a road with an estimated average daily traffic count of more than 15,000 vehicles.

Secondary / Minor Road

Is a road with an estimated average daily traffic count of between 6,000 and 15,000 vehicles.

Influencing Factor (IF)

$$= \frac{1}{10}(\%\ \text{Type A}_{100} + \%\ \text{Type A}_{450}) + \frac{1}{20}(\%\ \text{Type B}_{100} + \%\ \text{Type B}_{450})$$

where:

$\%\ \text{Type A}_{100}$ = the percentage of industrial land within a 100m radius of the premises receiving the noise

$\%\ \text{Type A}_{450}$ = the percentage of industrial land within a 450m radius of the premises receiving the noise

$\%\ \text{Type B}_{100}$ = the percentage of commercial land within a 100m radius of the premises receiving the noise

$\%\ \text{Type B}_{450}$ = the percentage of commercial land within a 450m radius of the premises receiving the noise

+ Traffic Factor (maximum of 6 dB)

= 2 for each secondary road within 100m

= 2 for each major road within 450m

= 6 for each major road within 100m

Representative Assessment Period

Means a period of time not less than 15 minutes, and not exceeding four hours, determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission.

Background Noise

Background noise or residual noise is the noise level from sources other than the source of concern. When measuring environmental noise, residual sound is often a problem. One reason is that regulations often require that the noise from different types of sources be dealt with separately. This separation, e.g. of traffic noise from industrial noise, is often difficult to accomplish in practice. Another reason is that the measurements are normally carried out outdoors. Wind-induced noise, directly on the microphone and indirectly on trees, buildings, etc., may also affect the result. The character of these noise sources can make it difficult or even impossible to carry out any corrections.

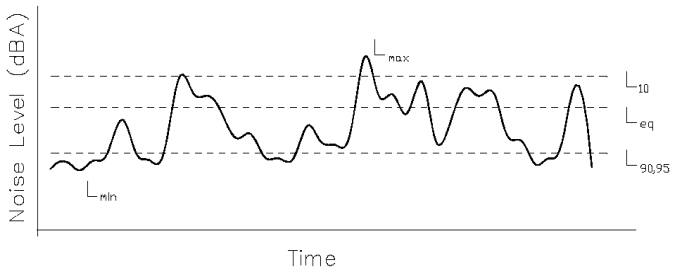
Ambient Noise

Means the level of noise from all sources, including background noise from near and far and the source of interest.

Specific Noise

Relates to the component of the ambient noise that is of interest. This can be referred to as the noise of concern or the noise of interest.

Chart of Noise Level Descriptors



Typical Noise Levels