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**Part 4**  
**Acoustic Setting**  
**Assessment**  
for the  
**Howlong Sand and Gravel**  
**Expansion Project**

State Significant Development 17\_8804

*Prepared by*  
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## **Howlong Sand and Gravel Quarry Proposed Increased Extraction Rate**

### **Acoustic Setting Assessment**

# **1. Executive Summary**

This report is an assessment of the acoustic environment surrounding the existing alluvial sand and gravel quarry at 4343 Riverina Highway, Howlong. Data collected on existing noise levels and an understanding of the proposed ongoing operations have been used to establish Project Specific Trigger Levels for assessment. A range of mitigation measures including ongoing monitoring are recommended. Key mitigating measures for the operation is that Quarry operations are proposed for daytime periods only (7:00am to 5:00pm).

Vehicle loading and product dispatch is proposed over extended hours and may occur between 7:00am and 10:00pm Monday to Friday and from 7:00am to 12:00pm on Saturdays. Data was also collected to assess the existing road traffic acoustic environment.

This assessment of the acoustic setting has been prepared to support predictive modelling of road traffic noise generation and operational noise generation for the proposed ongoing operation of the Quarry. Modelling has been prepared by Octave Acoustics with the results provided in that report indicating compliance with assessment criteria established in this report.

The following mitigation measures are required to achieve compliance with the Noise Policy for Industry:

- Inclusion of a levee bank (to approximately 2.5m height) along the north edge of Stage 2 as per the Octave Acoustics Technical Memorandum.
- A compliance check in the form of attended noise measurements every 6 months after the start date of the proposed increased operations for a period of two years after which time monitoring would occur annually.

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## 2. Introduction

Audiometric and Acoustic Services has been commissioned by Fraser Earthmoving Construction (FEC) to perform an assessment of the existing acoustic setting in the vicinity of the Howlong Sand and Gravel Quarry (the Quarry) which would inform further modelling assessment of predicted noise generation for the proposed ongoing extraction and processing activities at the Quarry (the Project). A range of design and mitigation measures are recommended for the operation and would be necessary where these measures have been included in predictive modelling. Overall, this assessment and the predictive modelling have been undertaken to assess predicted noise emissions from the project site that may be received by the residential community and consider the possible acoustic impact of the proposed increase in production.

### Background Review

The survey incorporated the following activities.

- On-site noise level measurements of plant and equipment currently used for processing at close proximity and at a distance.
- Ambient noise measurements off site to determine the typical existing noise levels.
- Measured environmental noise levels were compared with the criteria levels established in accordance with the NSW Noise Policy for Industry (EPA, 2017).
- Measurement of existing traffic noise to be compared with the proposed increase in quarry-related traffic in accordance with the NSW Road Noise Policy.

A physical assessment of the site was carried out on 1<sup>st</sup> of March, 2018. Subsequently a noise logger was set up for duration of 5 full 24 hour days, being collected by the client and returned on Wednesday 7<sup>th</sup> of March, 2018. An additional logger was set up between 2<sup>nd</sup> July 2019 and 9 July 2019 for a full 7 days of background level logging.

### Noise and Vibration Assessment

The Project will not have any significant vibration generating components and thus the potential for vibration impacts is negligible.

A Noise Impact Assessment (NIA) was undertaken for the Project in accordance with the requirements of the NSW Noise Policy for Industry (EPA 2017). The assessment undertaken for the Project includes:

- Analysis and discussion of the existing noise environment in the proposed Project area and surrounds;
- Predictive assessment (modelling) of the operational noise emissions for the proposed Project – prepared by Octave Acoustics;
- Predictive assessment (modelling) of the change in traffic noise that would be generated by the Project – prepared by Octave Acoustics;

- Assessment of the predicted impact of the proposed Project on surrounding sensitive receivers – prepared by Octave Acoustics;
- Assessment of any cumulative impacts associated with the proposed Project and other significant local noise sources – prepared by Octave Acoustics; and
- Recommendations relating to noise monitoring, mitigation and management.

The client has requested the following be addressed as a required in the Secretary's Environmental Assessment Requirements for the Project.

An Assessment of Noise – including:

- a detailed assessment of the likely construction, operational and off-site transport noise impacts of the development in accordance with the Interim Construction Noise Guideline, NSW Noise Policy for Industry and the NSW Road Noise Policy respectively, and having regard to the Voluntary Land Acquisition and Mitigation Policy;
- if a claim is made for specific construction noise criteria for certain activities, then this claim must be justified and accompanied by an assessment of the likely construction noise impacts of these activities under the Interim Construction Noise Guideline;
- reasonable and feasible mitigation measures to minimise noise emissions; and
- monitoring and management measures, in particular real-time and attended noise monitoring;



### 3. Project Summary

The ongoing operations would involve the free-dig extraction of sand and gravel material, which would then be processed to meet client specifications, before despatch to a final destination. Figure 1 presents the locality of the Quarry Site.

Figure 2 presents the proposed Quarry Site layout and Figure 3 presents a photo of the existing processing equipment. The following provides a summary of the key components of the Project for which development consent is being sought.

- Ongoing extraction of sand and gravel resource across four stages of development, commencing in the existing disturbed areas and progressively expanding to new areas in later stages.
- Production of no more than 300,000 tonnes per annum (tpa).
- Ongoing use of screening equipment and wash plant to process raw materials to meet client specifications. Occasional use of mobile crushing plant (once or twice per year) to provide primary shaping of the resource before screening.
- Ongoing transportation of material from the Quarry, via Howlong, to various destinations. Transportation would be limited to a maximum of 40 laden loads per day.
- Progressive emplacement of overburden or fine materials in completed pits and rehabilitation areas.
- Land previously disturbed within 100m of the Murray River would be regenerated.
- Progressive and final rehabilitation of the Quarry to develop a landform suitable for native vegetation conservation and as a wetland.
- Ongoing operation for a period of 30 years and associated employment of eight to ten personnel. Transportation operations would be contracted, or trucks and drivers would be supplied by clients.

The proposed hours of operation are presented in Table 1.

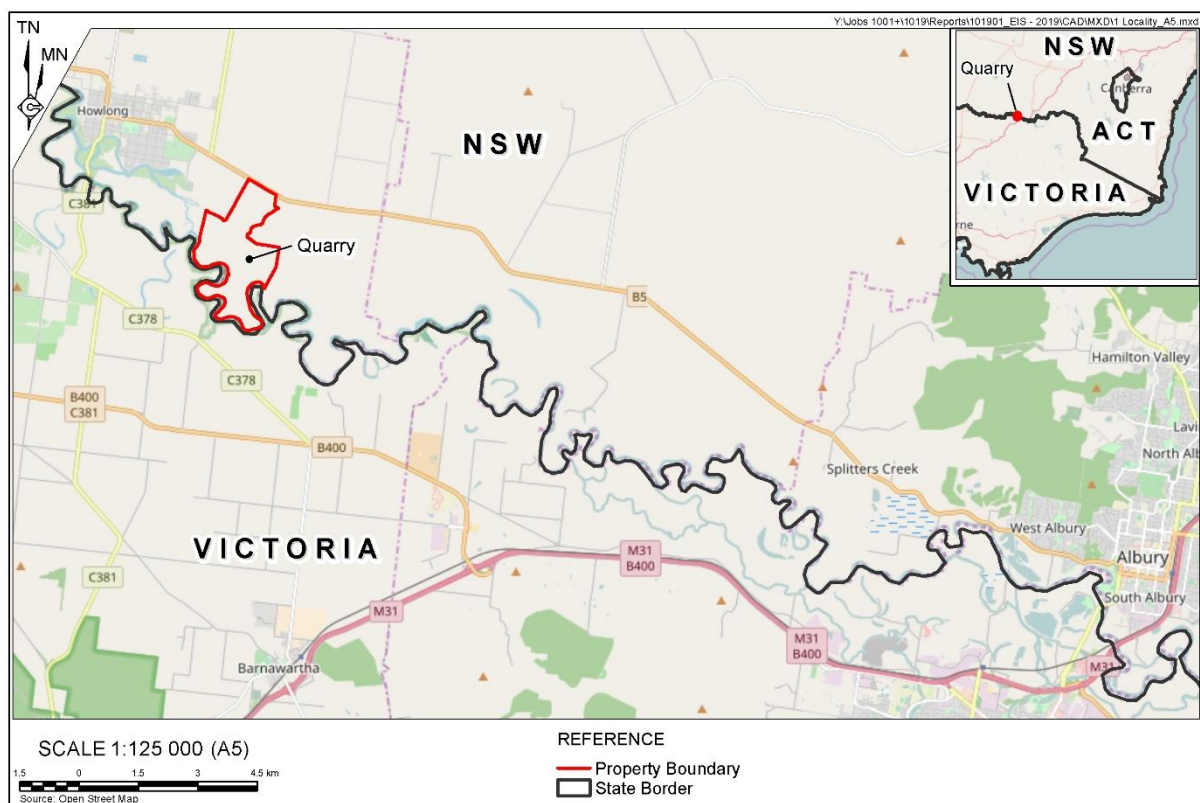
**Table 1 Proposed Hours of Operation**

Activity	Proposed Hours
Extraction, Processing and Stockpiling	7:00am to 5:00pm - Monday to Saturday  No operation on Sundays or public holidays
Sales and Product Despatch*	7:00am to 10:00pm - Monday to Friday  7:00am to 12:00pm - Saturday

	No operation on Sundays or public holidays
Maintenance	Monday to Sunday - 24hrs
<p>* Trucks may arrive at the Quarry from 6:30am as is current practice.</p> <p>Source: Fraser Earthmoving and Construction</p>	

It is our understanding that the staging of the works is structured so that it increases the distance between the works and the nearest residence where possible. A dedicated processing and stockpiling area would be used to store screening equipment and stockpiles, consistent with the existing operation. All screening works are completed in this area. Extraction within Stage 1 and Stage 2 has commenced under existing approved operations. Stage 3 has been disturbed under existing operations but not extracted. The proposed Stage 4 areas would expand total surface disturbance.

The client has stated that the current machinery and plant will not increase in number, though the frequency of use and loading of additional transport trucks will increase. Specifically, in order to increase the rate of production from 30,000 to 300,000 tonnes per annum of sand and gravel, the frequency of operation on site will increase rather than increasing the numbers of noise emitting equipment.



**Figure 1** Locality map (Source: RWC 2020)



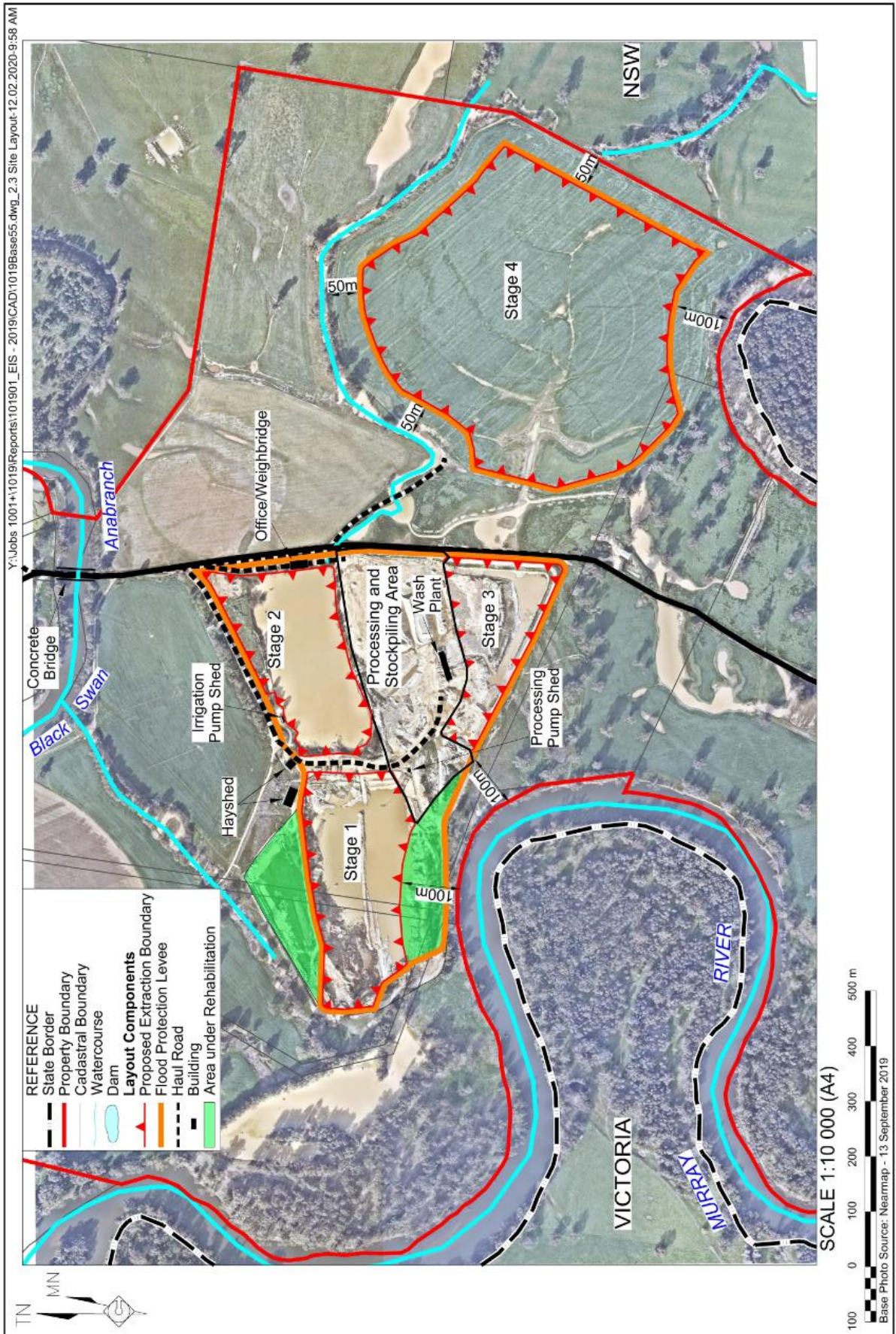


Figure 2 Proposed Quarry Site Layout (Source RWC 2020)



**Figure 3** Processing and Grading Site (Source RWC 2020)



## 4. Relevant Noise Guidelines and Policies

### 4.1 Noise Policy for Industry

The NSW EPA's Noise Policy for Industry (2017) applies to the proposed Project. The intention of the Policy is to set an acceptable and reasonable noise limit for industry in NSW to ensure nearby residents are protected from unreasonable noise and provided with a suitable ambience by setting project noise trigger levels.

Project noise trigger levels for a project are set by using the lower (most stringent) value of two different noise levels, the intrusive noise level and the project amenity noise level. A review of these criteria is presented in Section 5.2.

The quarry has been operating for more than 50 years and there is currently no industry of significance nearby that would contribute to the overall soundscape. Currently there is only general agricultural and livestock activities located nearby and at 4343 Riverina Highway.

It should be noted that the Interim Construction Noise Guideline, specifically does not apply to Quarries as follows:

- “Noise from industrial sources (for example, factories, quarrying, mining, and including construction associated with quarrying and mining) – this is assessed under the NSW Industrial Noise Policy (EPA 2000)”

There are no specific construction activities proposed for the Project, as the operation would rely on existing infrastructure. Therefore, construction activities have not been specifically assessed for the Project.

The ‘time periods’ applied in the Noise Policy for Industry are presented in Table 2. It is noted that the majority of operational activities would occur in the daytime period with extraction and processing operations restricted to the hours of 7:00am to 5:00pm. Loading and product dispatch would occur between 7:00am and 10:00pm and therefore occur in the daytime and evening periods. Vehicles may arrive at the Quarry from 6:30am with this activity assessed within the night time period. There would be no other operational activities during the night time period.

**Table 2 EPA Time Periods for Noise Policy for Industry (2017)**

Period	Time
Day	7 am–6 pm
Evening	6 pm–10 pm
Night	10 pm–7 am

## 4.2 NSW Road Noise Policy

The NSW Road Noise Policy (DECCW, 2011) will apply to vehicles once they leave the site. While on the site they are considered under the NSW, EPA's Noise Policy for Industry (2017).

The Road Noise Policy recommends comparing sound levels as an  $L_{Aeq}$  across all time periods with nonbinding attention paid to sleep disturbance during the Night Period.

Both Riverina Highway and Sturt Street are Arterial Roads overseen by the State.

The following criteria are taken from Table 3, Section 2.3.1, of the NSW Road Noise Policy. Point 3 is most applicable in this case.

**Table 3 Road Traffic Noise Assessment Criteria for Residential Land Uses**

Road category	Type of project/land use	Assessment criteria – dB(A)	
		Day (7 a.m.–10 p.m.)	Night (10 p.m.–7 a.m.)
Freeway/ arterial/ sub-arterial roads	1. Existing residences affected by noise from new freeway/arterial/sub-arterial road corridors	$L_{Aeq}$ , (15 hour) 55 (external)	$L_{Aeq}$ , (9 hour) 50 (external)
	2. Existing residences affected by noise from redevelopment of existing freeway/arterial/sub-arterial roads	$L_{Aeq}$ , (15 hour) 60 (external)	$L_{Aeq}$ , (9 hour) 55 (external)
	3. Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments		

## 5. Background Noise Monitoring

A series of noise loggers were set up across the Quarry Site, at intermediate locations and at a derived point to represent the nearest residence.

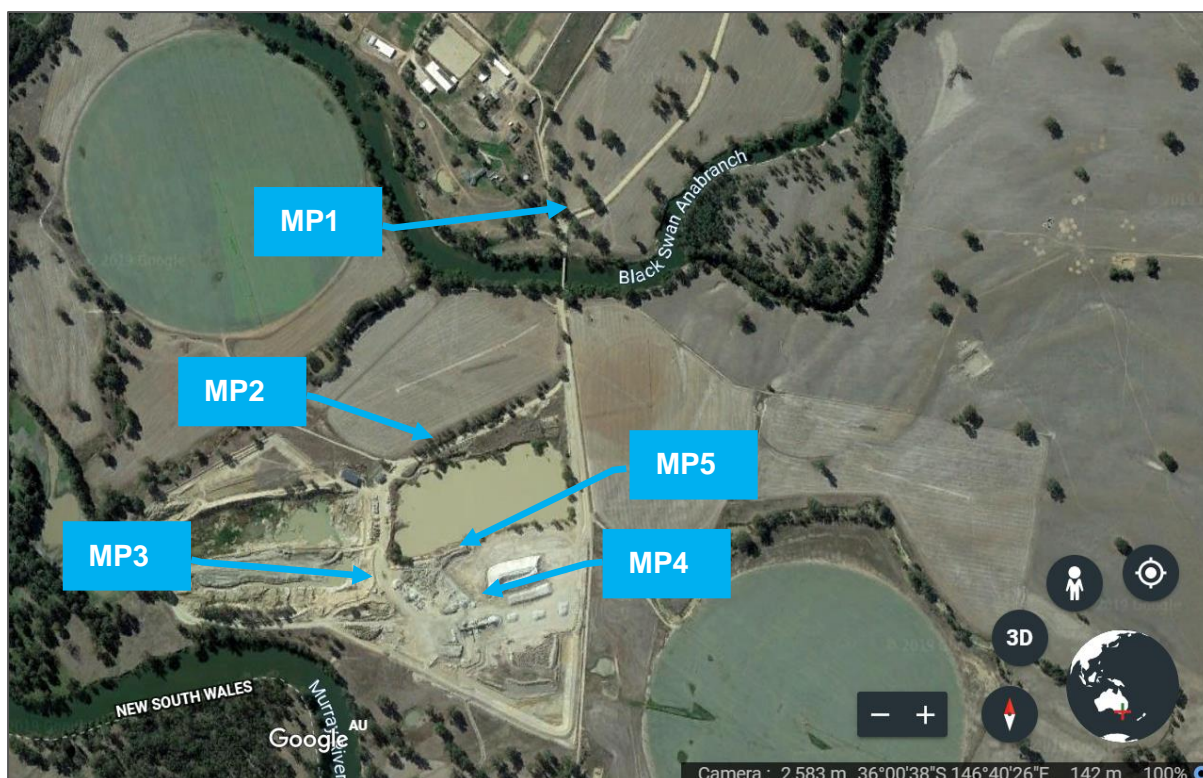
Environmental noise logging applied for assessment was undertaken from 2<sup>nd</sup> July 2019 until the 10<sup>th</sup> July 2019 to provide a full 7 days of background level data. Appendix C presents the meteorological conditions during the measurement period.

Weather was cool with minimal wind and little to no precipitation for the measurement period. Wind was noted to be primarily from the south. On four occasions where the wind exceeded 5 m/sec the measured data has been removed from the data set as per the Policy requirements.

Environmental noise logging of the background level undertaken in March 2018 has not been used for assessment as it was not considered representative of the setting during operating periods for the Quarry.

The nearest residence at 4343 Riverina Highway is currently affected by noise from wildlife, farming activities and some intermittent noise from traffic on the Riverina Highway. Observations during the site visits show that noise from the quarry is not audible above the background level at the dividing fence line of 4343 Riverina Highway with the current operations.

Access to the nearest residence at 4343 Riverina Highway was not available. A Derived Point has been used as per Measurement Point 1 (MP1). As the Quarry has been in operation since the 1960's, any existing noise is taken to be part of the local soundscape however comparison of data between the measurement points show the  $L_{A90}$  at the background measurement locations not to be significantly affected by current operations.



**Figure 4 Measurement Points (MP)**

Background noise logging was undertaken at MP1 as per the figure above. The  $L_{A90}$  data has been filtered due to weather and operating hours where required as per the Policy. No extraneous noise has been found to affect the  $L_{A90}$ .

The Assessment Background Level ( $L_{A90}$ ) data is as follows using the 10<sup>th</sup> percentile method:

**Table 4 Assessment Background Level (ABL) 2<sup>nd</sup> July 2019 until the 10<sup>th</sup> July 2019**

Day, Date	EPA Period	10th Percentile $L_{A90}$ (dB)
8/07/2019	Day	36
8/07/2019	Evening	35
8/07/2019	Night	36
7/07/2019	Day	-
7/07/2019	Evening	-
7/07/2019	Night	-



6/07/2019	Day	33
6/07/2019	Evening	34
6/07/2019	Night	35
5/07/2019	Day	32
5/07/2019	Evening	36
5/07/2019	Night	38
4/07/2019	Day	33
4/07/2019	Evening	36
4/07/2019	Night	36
3/07/2019	Day	34
3/07/2019	Evening	37
3/07/2019	Night	39
2/07/2019 and 9/7/2019	Day	32
2/07/2019	Evening	32
2/07/2019	Night	32

\*Note the 7/7/2019 was a Sunday. Sunday is not included in the proposed operating hours.

The Rating Background Level ( $L_{A90}$ ) assumed for the assessment is presented in Table 4.

**Table 5 Rating Background Level (RBL) 2<sup>nd</sup> July 2019 until the 10<sup>th</sup> July 2019**

Period	Median $L_{A90}$ (dB)
Day Background Level	35 (33*)
Evening Background Level	35
Night Background Level	36

\*Note the minimum assumed RBL for daytime in the Noise Policy for Industry is 35dB(A). However, records indicate a median noise level of 33dB(A). The more stringent RBL (35dB(A)) has been assumed for assessment.

Table 5 shows consistently low noise levels for the measurement period, as is to be expected from a quiet country environment. Noise levels during the night period were measured at higher levels than the day and evening periods. Both the evening and night period are observed to be higher than the daytime period. It is assumed that this was caused by local birdlife and insects during the evening and early morning. Note that measurements during the nighttime are only from 6:30am until 7:00am as per operating hours leading to less available data for filtering by the 10<sup>th</sup> percentile.

The site has been attended multiple times during the measurement periods and found the acoustic environment to be consistent.

## 6. Project Specific Noise Triggers

### 6.1 Project Intrusiveness Noise Levels

Table 6 presents the Project Intrusiveness Noise Levels derived from the RBLs presented in Table 5. In accordance with the Noise Policy for Industry, the Project Intrusiveness Noise Level is the RBL plus 5dB. It is noted that the RBL has been adjusted to match the median daytime levels to ensure that the assessment remains conservative for these periods. Therefore, the Project Intrusiveness Noise Level used for assessment is lower (i.e. more conservative). This is expected to be more in keeping with the community's expectations for assessment.

**Table 6 Project Intrusiveness Noise Levels**

Period	RBL (dB(A))	Project Intrusiveness Noise Levels ( $L_{Aeq,15min}$ dB(A))
Day Background Level	35	40
Evening Background Level	35	38*
Night Background Level	36	38*

\*Project intrusive noise levels for the evening and night period have been set to equal the day and evening periods as a night level greater than the day or evening is unlikely to meet the community's expectations.

### 6.2 Amenity Noise Levels

The residential area at 4343 Riverina Highway is zoned RU1 Primary Production. The noise in the area is dominated by natural sounds. The land zoning, the subjective assessment of the acoustic environment in the area, and the acquired background noise levels would support a rural residential land-use category with reference to Table 2.3 in the Noise Policy for Industry.

**Table 7 Amenity Noise Levels**

Period	Typical Existing Background Levels for Rural Residential ( $L_{A90}$ (dB))	Amenity Noise Level ( $L_{A90}$ (dB))	Project Amenity Noise Level
Day RBL	40	50	45 $L_{Aeq,15min}$ (50-5)
Evening RBL	35	45	40 $L_{Aeq,15min}$ (45-5)
Night RBL	30	40	35 $L_{Aeq,15min}$ (40-5)

### 6.3 Project Noise Trigger Levels

The Project Noise Trigger Level is the more stringent of the amenity and intrusive noise levels and are presented in Table 8.

**Table 8 Project Noise Trigger Levels**

Period	Intrusive Noise Level	Project Amenity Noise Level	Project Noise Trigger Levels
Day	40	45 $L_{Aeq,15min}$	40
Evening	38	40 $L_{Aeq,15min}$	38
Night	38	35 $L_{Aeq,15min}$	35

### 6.4 Noise Enhancing Weather Conditions

The current source location and the receiver are some 700 m apart with bodies of water between the two. There is a mild possibility for temperature inversion during cooler evening and night time periods. However, as extraction operations would only occur during the daytime and evening periods, temperature inversions have not been considered for assessment.

As the receiver could at times be downwind from the source, there stands reason for downward propagation from wind to be considered.

Historical data from the Bureau of Meteorology depicts wind to be primarily blowing across the site from West to East. This would not cause downward propagation at the nearest receiver however the noise modeling used as part of the assessment considers receivers to be downwind.

### 6.5 Measurement of Current Works

Measurement of current works was undertaken on Thursday 1<sup>st</sup> of March 2018 from 15:01 until 15:44 hrs at MP3 and 15:54 until 16:09 hrs at MP4. The measurements included all equipment running typical operations and truck passes.

The following equipment was noted to be operating on site:

- McCloskey 620 Sandstorm
- McCloskey 5x20 Screen
- 1x Komatsu WA420 loader
- 1 Komatsu 500 Loader

- 1 CAT 980 Loader
- 2x Generators
- B-Double trailered transport truck
- 3 x Hitachi AH400 Dump Truck
- 1x Hitachi ZAXIS 250 Excavator
- 1 x Hitachi ZAXIS 650 Excavator
- Small excavator
- Water Truck
- >6 Utes

The results were as follows:

**Table 9 Measurement of typical works 1/3/2018**

	Approximate Distance (m)	L <sub>AFmax</sub>	L <sub>AFmin</sub>	L <sub>Aeq</sub>
<b>MP3</b>	60	79.5	51.9	64.6
<b>MP4</b>	1	91.1	75.7	87.4

\*All units in dB(A)

The noise source/s is/are found to be very uniform across the 1/3 Octave band as shown in Table 10 . No adjustments for tonality, characteristic, duration, impulse or the like are necessary.

**Table 10 Measurement of Works at MP3**

Octave Band Hz	63	125	250	500	1k	2k	4k	8k
1/3 Octave Band L <sub>Aeq</sub>	45	48	48	52	55	54	47	33

The above sound levels have been used to confirm modeling parameters (see noise modelling assessment prepared by Octave Acoustics AA722ME-01i03 Technical Memorandum (r4) (7 November 2019).

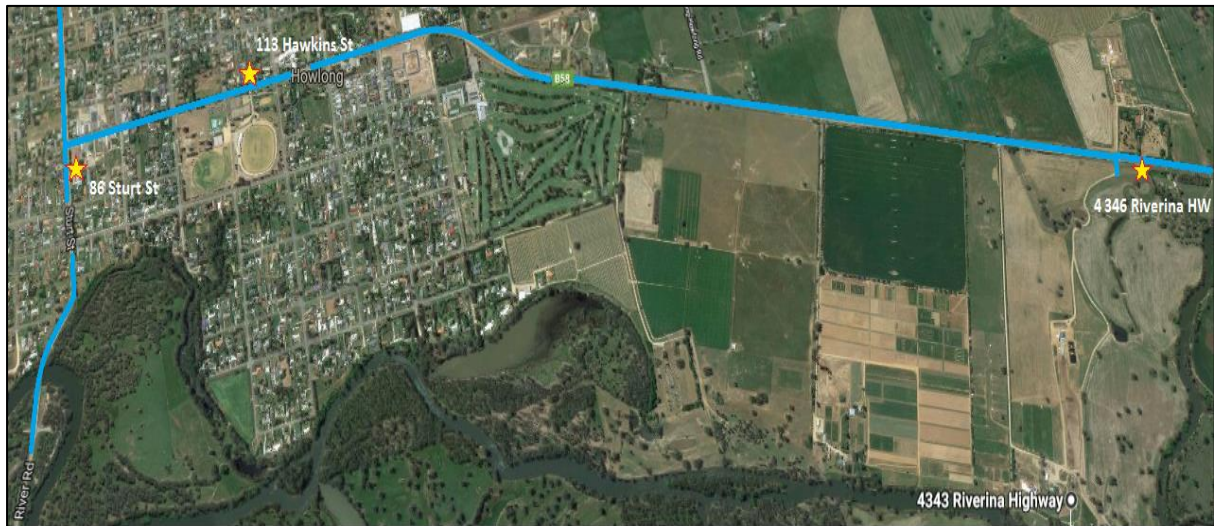
## **7 Noise Modelling Outcomes**

Octave Acoustics has undertaken predictive modelling for the Project and concluded that predicted noise generation would remain within the assumed Project Noise Trigger Levels (Table 8) as per the Noise Policy.NSW Noise Policy for Industry (2017).

## 8. Traffic Noise Analysis

### 8.1 Measurement of Current Traffic Noise

Measurement of current traffic noise was undertaken from Thursday the 1<sup>st</sup> of March 2018 until the morning of Wednesday 7<sup>th</sup> March 2018. The measurement points were at 3464 Riverina Highway, 113 Hawkins Street and 86 Sturt Street as per Figure 5 and Figure 6 below:



**Figure 5 Location of Traffic Noise Measurement Points (Source: Google Earth)**

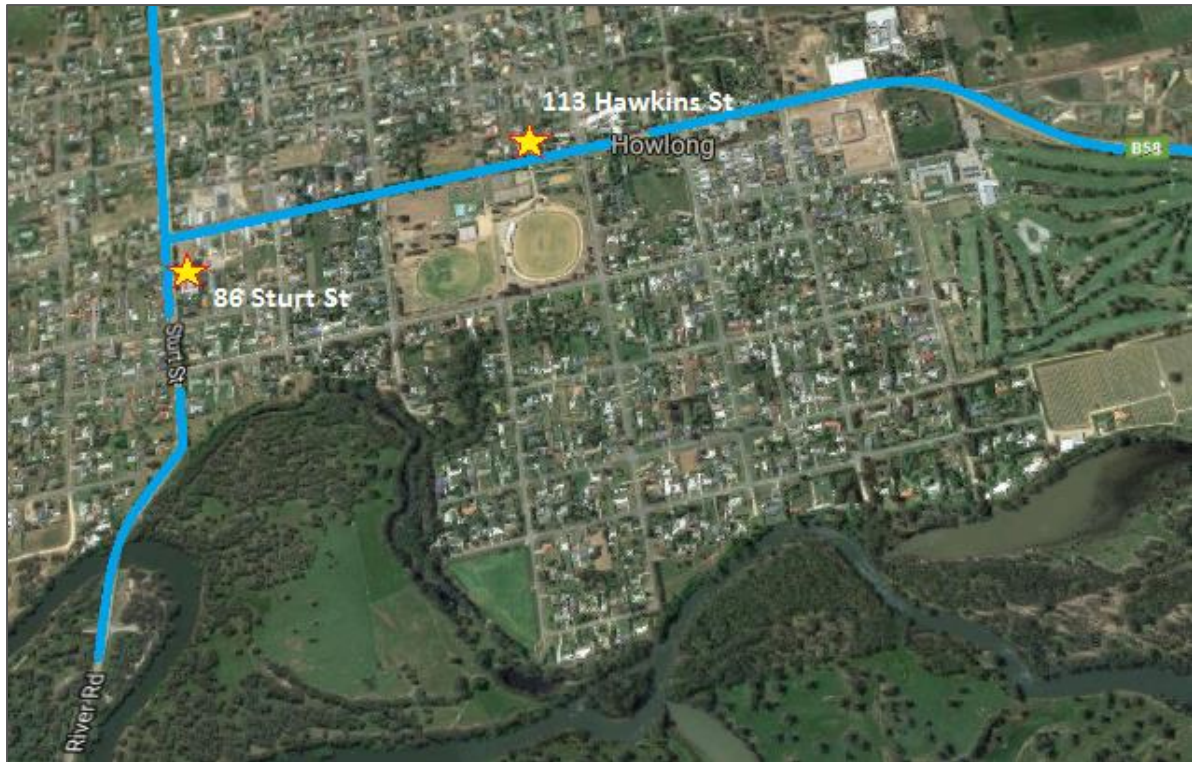
Trucks are proposed to continue leaving the quarry site and travel along the Riverina Highway and either turn left or right at the Sturt Street intersection. Some may leave to the east but we have been informed that it will be minimal unless there was a major project to the north east. There is no permitted access for trucks into Albury from the Riverina Highway to the east of the Quarry.

The proposed route is primarily flat with minimal 90° turns, no traffic lights, but with one main intersection located at the crossing of Sturt Street and the Riverina Highway.

The aim of the location of two of the measurement points is to measure trucks accelerating and winding up through the gears at 86 Sturt Street and 4346 Riverina Highway (Wyseworth Farm).

One of the loggers was fixed to the veranda awning post of 113 Hawkins Street. No façade adjustment is needed as there are reflective surfaces within 1m. The 113 Hawkins Street logger captured traffic noise levels when vehicles were at a constant speed.

It should be noted that engine braking is prohibited within Howlong and sign posted as such entering from River Road. Existing truck noise was not noted by the undersigned to be aurally significant while on site at the intersection of Sturt and Hawkins Streets.



**Figure 6 Location of Traffic Noise Measurement Points in Howlong (Source: Google Earth)**

Again, weather was warm with minimal wind and little to no precipitation for the measurement period. Wind was noted to be primarily from the south, however it does not appear to have been over 15 km/h.

The Policy prescribes the following time Periods for analysis:

$L_{Aeq}$  (15hr) Day/Evening 7 a.m–10 p.m.

$L_{Aeq}$  (9hr) Night 10 p.m–7 a.m

$L_{Aeq}$  (1hr) All times

### **8.1.1 Traffic Noise at Façade of 113 Hawkins Street Howlong**

Current Traffic noise at 113 Hawkins Street, Howlong is below the prescribed Policy Levels of 60dB(A) for the Day Period and 55dB(A) for the Night Period as per Point 3 of Table 3, Section 2.3.1, of the NSW Road Noise Policy.

The results of the long term traffic noise measurements present the following levels as per Table 11, Table 12 and Table 13.

The results collected at 113 Hawkins Street are as follows:



**Table 11 Traffic Noise at Facade of 113 Hawkins Street**

Day, Date	Period	L <sub>max</sub> dB(A)	L <sub>10</sub> dB(A)	L <sub>eq</sub> dB(A)
1/3/18 Thursday	Night	68	55	51
2/3/18 Friday	Day/Evening		56	53
2/3/18 Friday	Night	70	53	58
3/3/18 Saturday	Day/Evening		56	53
3/3/18 Saturday	Night	69	48	53
4/3/18 Sunday	Day/Evening		56	53
4/3/18 Sunday	Night	68	48	50
5/3/18 Monday	Day/Evening		54	52
5/3/18 Monday	Night	71	50	52
6/3/18 Tuesday	Day/Evening		56	54
6/3/18 Tuesday	Night	71	50	54
Average L <sub>max</sub>		70		
Average L <sub>Aeq (15hr)</sub> Day/Evening				54
Average L <sub>Aeq (9hr)</sub> Night				53

Section 5.4 of the Policy states: “Studies by the *Environmental Health Standing Committee* or enHealth Council (2004) and the guidelines published by the World Health Organisation (1999) were reviewed and analysed in terms of the guidance on noise exposure and sleep disturbance.

The enHealth report states that:

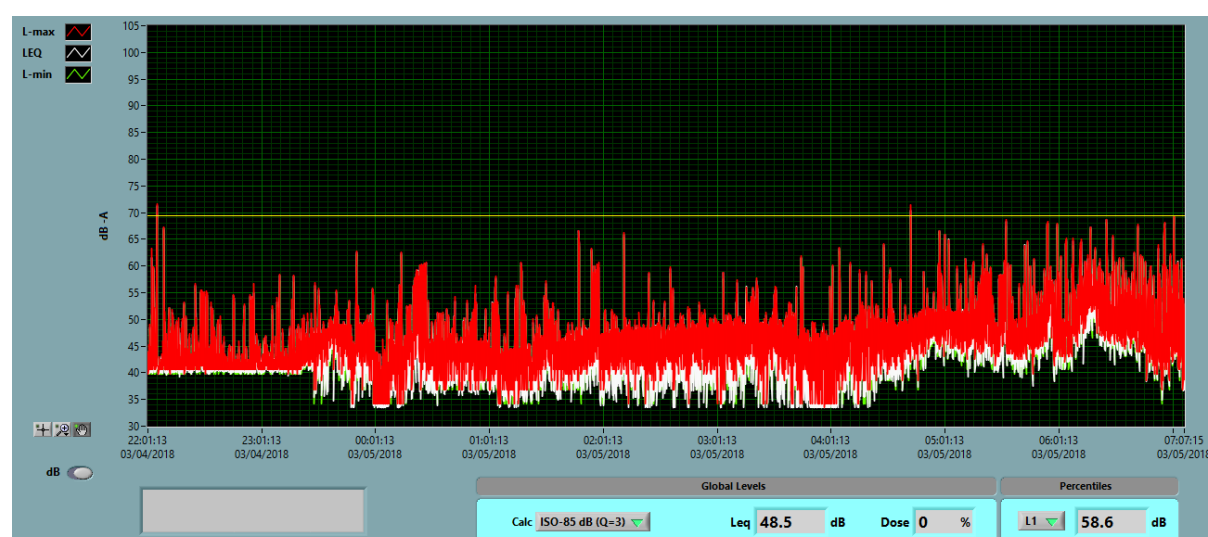
‘as a rule for planning for short-term or transient noise events, for good sleep over 8 hours the indoor sound pressure level measured as a maximum instantaneous value should not exceed approximately 45 dB(A) LA, (Max) more than 10 or 15 times per night’.

No trucks are permitted to leave the Quarry after 10pm and truck loading and dispatch would not commence until 7:00am. Trucks may start arriving at the Quarry from 6:30am, However we are advised that it is not anticipated that more than 3 trucks would arrive at the Quarry between 6:30am and 7am daily. Therefore, it is highly unlikely that proposed truck movements during the night period would cause transient noise levels above  $L_{Amax} = 45$  dB internally to increase by more than 10 to 15 times per night to justify any sleep disturbance criterion.

Normally 3-4 mm single glazing will achieve a weighted sound reduction  $R_w = 24$ . A typical external lightweight façade will achieve an  $R_w > 40$ . As glazing is primarily the weakest point of the external building envelope, the external limit for the façade will be  $24+45 = 69$  dB(A).

Analysis of a typical Night Period below shows only 3 events over 69 dB(A) at the façade of 113 Hawkins Street, Howlong as per Figure 9 below.

Again, no reason was identified for concern regarding more than 10 to 15 instantaneous sound pressure level recordings to justify any negative effect apropos sleep disturbance criterion.



**Figure 7 Sound Levels at the Façade of 133 Hawkins Street**

### 8.1.2 Traffic Noise at Façade of 86 Sturt Street, Howlong

Levels measured at the nonresidential building of 86 Sturt Street on the night of Thursday 1<sup>st</sup> March 2018 have been adjusted to represent effective noise levels at the dwelling of 89 Sturt Street including attenuation with distance and a façade correction.

**Table 12 Adjusted Levels of Traffic Noise at Street of 89 Sturt Street**

Day, Date	Location	Period	$L_{max}$ dB(A)	$L_{10}$ dB(A)	$L_{Aeq}$ dB(A)
1/3/2018 - 2/3/2018	# 86	Night	82	54	56

1/3/2018 - 2/3/2018 (Adjusted)	# 89	Night	66	38	40
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Analysis of a typical Night Period from 22:00 – 23:00 1/3/2018 and 6:30am – 7am 2/3/2018, presents no events over the calculated threshold for sleep disturbance at the façade of 86 Sturt Street, Howlong.

Again, this firm has no concern regarding more than 10 to 15 instantaneous sound pressure level measurements to justify any negative effect apropos sleep disturbance criterion.

### 8.1.3 Traffic Noise at Wyseworth Farm at 3464 Riverina Highway Howlong

With greater than 100m from the road side to the Wyseworth Farm at 3464 Riverina Highway the sound level from any  $L_{Amax}$  generated by a truck pass would be well below the proposed thresholds of 69 dB(A) at the façade of the dwelling.

**Table 13 Levels of Traffic Noise at Wyseworth Farm**

Day, Date	Period	$L_{max}$ dB(A)	$L_{10}$ dB(A)	$L_{eq}$ dB(A)
1/3/2018 - 2/3/2018	Night	83	64	63
1/3/2018 - 2/3/2018 (Adjusted)	Night	63	44	43

## 8.2 Conclusion of Traffic Noise Measurement Points

The Road Noise Policy sets proposed levels for the  $L_{Aeq}$  (“average” noise level in layman’s terms) for the differing time periods as well as recommending attention be paid to sleep disturbance criterion and hourly  $L_{Aeq}$  levels.

Octave Acoustics has performed a traffic noise modeling assessment regarding the existing and proposed traffic noise received by residents.  $L_{Aeq}$  levels have been found to be compliant with the Policy.

All data collected has been analyzed and found there to be no significant concern for the  $L_{max}$  noise levels from increase in truck passes along the proposed routes regarding sleep deprivation.

## **9. Mitigation Measures**

### **9.1 General Overview**

There is adequate scope for good design to be incorporated into the proposed extraction and associated works. Any increase in distance between the source and the receiver as proposed, will only increase the compliance margin.

A 2.5 m levee has been modelled by Octave Acoustics to the north of the Stage 2 extraction area. This levee would act as an acoustic barrier to sources near to the barrier such as the excavator located in Stage 2.

Although the calculated effective sound level of an excavator is below the trigger levels, care should be taken regarding possible risk of exceeding the limit during excavation of Stage 1 and 2.

Note that any replacement vehicles (e.g. excavators) should be checked prior to purchase to ensure the sound power rating does not exceed that of the existing machinery. Particular care is advised if replacement machinery is purchased second hand.

It is worthy of note that truck and vehicle noise is applicable to the site when it originates from the site. Once the truck passes over the boundary the source is considered to be part of normal traffic, so once on the road and starting to wind up through the gears it not part of the plant noise.

Although truck passes have been calculated to not reach the proposed threshold for sleep disturbance it would be wise to keep them to a minimum during the night period as a prudent work practice, where practicable.

### **9.2 Recommended Practice**

Should potential issues arise, noise management practices should be put in place. These may include the following:

- Inform potentially noise-affected neighbours about the nature of construction stages and noise reduction measures.
- Give notice as early as possible for periods of noisier works. Describe the activities and how long they are expected to take. Keep affected neighbours informed of progress.
- Appoint a principal contact person for community queries.
- Provide 24-hour contact details through letters and site signage. Record complaints and follow a complaint response procedure suitable to the scale of works.
- Within normal working hours, where it is reasonable to do so:
  - Schedule noisy activities for less sensitive times, (for example, delaying the task to the later morning or afternoon)

- The weekend/evening work hours in the schedule (including Saturday afternoon or Sunday) are more sensitive times and should have noise considerations consistent with quieter work.

## **10. Reassurance of Anticipated Acoustic Environment**

The anticipated future noise levels generated by the site will result in minimal change. However, it is recommended that the anticipated outcome be verified once the quarry expansion is operating at or close to the proposed levels. This may be achieved through attended noise monitoring with an initial frequency of every six months considered appropriate. This frequency may be reduced to annually after two years should actual noise levels be consistent with or less than those predicted. Verification should include measurements at the nearest sensitive receptors or a suitable derived position if access is not achievable.

Vibration monitoring is not recommended at the nearest noise sensitive receivers for general excavation with a distance of >500m between the source and the receiver unless blasting is to be used. In this case blasting is not being undertaken and therefore no vibration monitoring is recommended.

## 11. Conclusion

The current source location of the processing area and the nearest receiver are some 700m apart. It is unlikely that there would be any adverse effect on residents from 4343 Riverina Highway regarding noise from the proposed increase in production up to 300,000 tonnes per annum. As compliance is calculated at the nearest noise sensitive receiver, with assumed contributions of adverse meteorological conditions, compliance is also assumed at other more distant residences or businesses.

Calculations show the proposed plant and works to be under the Noise Policy for Industry (2017) limits for all periods. While this may be the case, best practice measures to limit noise generation and propagation are recommended. The proposed levee banks would provide noise attenuation in all directions.

All data collected and analysed regarding traffic noise, found there to be no significant concern for the noise levels from increase in truck passes along the proposed routes regarding the  $L_{Aeq}$  or the sleep disturbance criteria.

Please feel free to contact us should any additional detail be required. This applies to any other parties that have legitimate access to this report.

Yours faithfully



Scott Henderson

BEnv, DipDes A.A.S

Proofread by Svetimir Ristic (BEng, Env), Acoustic Consultant

## Appendix A Definitions of Terminology

Sound Pressure Level:

The root-mean-square values of the pressure fluctuations above and below atmospheric pressure caused by the passage of a sound wave, usually expressed in deci Bels (re 20  $\mu$  Pa)

decibel:

Unit usually used to define sound pressure level relative to a reference pressure.

$$dB = 20 \log_{10} \left( \frac{P}{P_{ref}} \right)$$

(A):

Reference to particular weighting network within a Sound Level Meter which modifies the linear response. 'A' weighting is designed to approximate the response of the human ear.

(C):

Reference to a weighting network within a Sound Level Meter. Modifies the Linear response only slightly on the lower frequency range.

Rw

Weighted Sound Reduction Index. A single figure rating of the acoustic attenuation of materials either singly or as multiples.

L<sub>10</sub>

The noise level exceeded for 10% of a measurement period. Often used as a measurement of occasional interruptive noise, such as traffic.

L<sub>A1018hr</sub>

The 18 hour Traffic Noise average. Arithmetic average of the A weighted L<sub>10</sub> sound levels from 0600hrs to 0000hrs.

L<sub>90</sub>

The noise level exceeded for 90% of a measurement period. Commonly accepted as the natural Background Noise Level.

Leq:

Equivalent Continuous Sound Level. This is calculated on the basis of average of the Sound Pressure Level (acoustic energy) over a period of time and is expressed in deci Bels.

LAeq:

The 'A' weighted Equivalent Continuous Sound Level.

LAeq8hr

The equivalent of 8 hours exposure to an LAeq of 85dB. The actual exposure period may be longer or shorter than 8 hours.

Slow - S:

Dynamic characteristics of a Sound Level Meter which employs a time saving averaging constant of 1 second.

Fast - F:

Dynamic characteristic - time averaging constant is 125m sec.

Impulse - Imp:

Dynamic characteristic - time averaging constant is 33m sec.

Peak - Pk:

Dynamic characteristic - time averaging constant is 1m sec.



## **Appendix B**

## **Equipment Used**

### **Convergence**

Noise Logger - Type 2 (Red)

Serial No. CFFWDtUYc983oJngZ0rxtD

### **Convergence**

Noise Logger – NSRT MK2 Type 1 (Red Circle)

Serial No. CvtUDvWa0%UVKplAQ2LxPD

### **Convergence**

Noise Logger – NSRT MK2 Type 1

Serial No. AvB0ptUa89c9ALFC6+rxFD

### **Convergence**

Sound Sentry RT (Gr)

Serial No. CFJWLvWaW18dAhtiY8BxHD

### **Convergence**

Noise Logger – NSRT MK2 Type 1

Serial No. CNv0B1USeVU9CpHi48h5ID

### **Convergence**

Windshields

Calibration checked against the Quest Calibrator

### **Quest**

Calibrator

Serial No. J.1060008

NATA Laboratory calibration due 13<sup>th</sup> November 2019

### **SVAN 957**

Type 1 Sound Analyser

Serial No. 14578

### **SVAN**

Windshield

NATA Laboratory calibration due 13<sup>th</sup> November 2020

### **Bruel & Kjaer**

4230 Acoustic Calibrator

Serial No. 1441408

NATA Laboratory calibration due 13<sup>th</sup> September 2020

## Appendix C Meteorological Conditions

### Rutherglen, Victoria July 2019 Daily Weather Observations

Most observations taken from Rutherglen, pressure and cloud taken from Albury Airport.

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9 am					3 pm						
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C					km/h	local	°C	%	g <sup>th</sup>		km/h	hPa	°C	%	g <sup>th</sup>		km/h	hPa
1	Mo	1.0	11.5	0			NE	17	10:16	6.1	99		E	9		11.0	70		NNE	6	
2	Tu	-0.5	12.8	0			NE	20	10:08	5.0	99		E	6		11.8	72		NE	7	
3	We	1.2	14.9	0			WSW	15	13:50	7.0	99		NE	4		14.6	62		SW	9	
4	Th	0.5	17.2	0			ENE	17	13:10	4.7	99		Calm			16.6	54		NE	7	
5	Fr	1.6	18.0	0			NNE	15	14:42	7.5	99		Calm			17.0	51		NNE	9	
6	Sa	1.8	17.0	0.2			E	28	10:51	8.2	99		Calm			16.3	60		ENE	13	
7	Su	4.9	14.6	0			ENE	26	12:50	11.3	72		E	13		14.1	73		ENE	11	
8	Mo	11.1	14.6	11.8			WSW	30	13:09	11.4	99		W	13		14.2	72		WSW	13	
9	Tu	4.2	13.4	0.2			W	24	13:43	8.4	100		Calm			12.9	73		WNW	11	
10	We	4.6	13.6	0.2			NE	44	22:01	8.7	96		NE	9		13.2	68		N	15	
11	Th	6.2	12.2	2.2			W	50	00:51	7.7	90		NW	13		12.1	72		NW	20	
12	Fr	7.6		4.2						9.9	99		NNW	13							
Statistics for the first 12 days of July 2019																					
Mean		3.7	14.5							8.0	95			6		14.0	66			11	
Lowest		-0.5	11.5	0						4.7	72		Calm			11.0	51		NNE	6	
Highest		11.1	18.0	11.8			W	50		11.4	100		#	13		17.0	73		NW	20	
Total				18.8																	

IDCJDW3071.201907 Prepared at 23:36 UTC on Thursday 11 July 2019

#### Source of data

Temperature, humidity, wind and rainfall observations are from Rutherglen Research {station 082039}.  
Pressure and cloud observations are from Albury Airport {station 072146}.