Appendix 8

Noise and Blasting Assessment

(Total No. of pages including blank pages = 50)

Note: A colour copy of this Appendix is available on the Project CD

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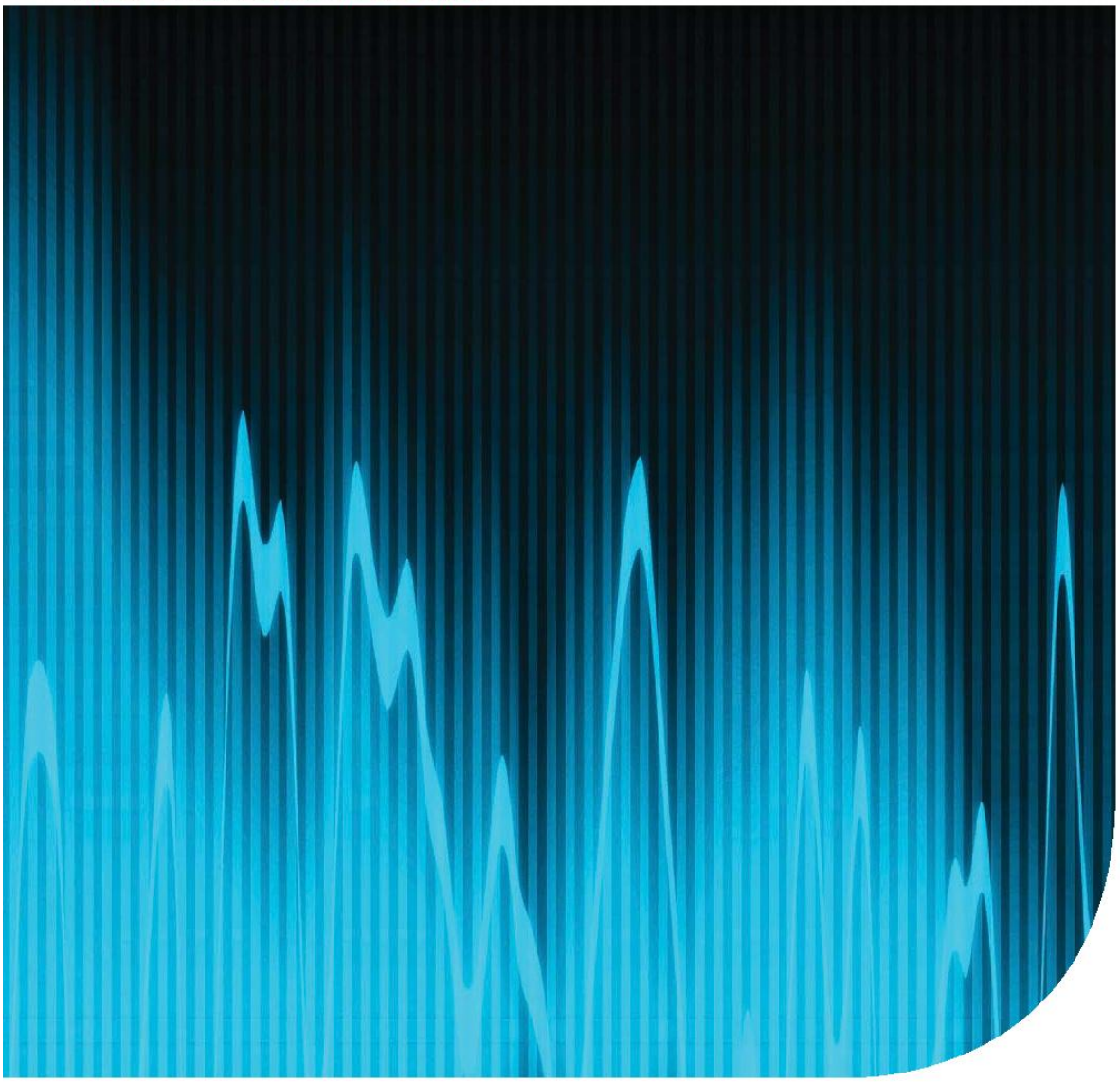
Avoca Tank Project

Noise impact assessment

Prepared for Tritton Resources Pty Ltd | 15 July 2014



Planning + Environment + Acoustics

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Avoca Tank Project

Noise impact assessment

Prepared for Tritton Resources Pty Ltd | 15 July 2014

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Avoca Tank Project

Final

Report H13121RP1|Prepared for Tritton Resources Pty Ltd|15 July 2014

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Abbreviation or term	Definition
ABL	The assessment background level (ABL) is defined in the INP as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L_{90} statistical noise levels.
ANZECC	Australian and New Zealand Environment Conservation Council
Tritton	Tritton Resources Pty Ltd (the Applicant)
Day period[1]	Monday–Saturday: 7am to 6pm, on Sundays and public holidays: 8am to 6pm.
dB(A)	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
DGRs	Director General Requirements
DP&I	Department of Planning and Infrastructure
EIS	Environmental Impact Statement
EMM	EMGA Mitchell McLennan Pty Limited
EP&A Act	*Environmental and Planning Assessment Act 1979* (NSW)
Evening period[1]	Monday–Saturday: 6pm to 10pm, on Sundays and public holidays: 6pm to 10pm.
ICNG	Interim Construction Noise Guideline
INP	Industrial Noise Policy
L_1	The noise level exceeded for 1% of the time.
L_{10}	The noise level which is exceeded 10% of the time. It is roughly equivalent to the average of maximum noise level.
L_{90}	The noise level that is exceeded 90% of the time. Commonly referred to as the background noise level.
L_{eq}	The energy average noise from a source. This is the equivalent continuous sound pressure level over a given period. The $L_{eq(15min)}$ descriptor refers to an L_{eq} noise level measured over a 15-minute period.
L_{max}	The maximum sound pressure level received during a measuring interval.
Night period[1]	Monday–Saturday: 10pm to 7 am, on Sundays and public holidays: 10 pm to 8am.
EPA	The NSW Environment Protection Authority (formerly the Environment Protection Authority and the Department of Environment, Climate Change and Water).
PSNL	The project-specific noise levels (PSNL) are criteria for a particular industrial noise source or industry. The PSNL is the lower of either the intrusive criteria or amenity criteria.
RBL	The rating background level (RBL) is an overall single value background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the average background levels.
RNP	Road Noise Policy
Sound power level (Lw)	A measure of the total power radiated by a source. The sound power of a source is a fundamental property of the source and is independent of the surrounding environment.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.
The Proposal	The Avoca Tank Project
Vibration	A motion that can be measured in terms of its displacement, velocity or acceleration. The common unit for velocity is millimetres per second (mm/s).

Notes: 1. Excludes road traffic noise where Day: 7 am to 10 pm; Night: 10 pm to 7 am.

1 Introduction

EMGA Mitchell McLennan Pty Limited (EMM) has been engaged by RW Corkery & Co Pty Ltd (RW Corkery) to complete a Noise Impact Assessment (NIA) for the proposed Avoca Tank Project (the Proposal) to be developed and operated by Tritton Resources Pty Ltd (Tritton).

The Proposal is a greenfield site located 2km north of Tritton's existing Girilambone Copper Mine and 24km northeast of its Tritton Copper Mine, approximately 7km northwest of the village of Girilambone and 55 km north-west of Nyngan in central NSW (see Figure 1.1), where an underground mine would be developed and provide ore to the existing processing plant currently in use at the Tritton Copper Mine.

1.1 Director-General's requirements

A summary of the Director-General's requirements (DGRs) and relevant agency assessment requirements pertaining to noise from the Proposal are summarised in Table 1.1. The table also shows their relevance to the assessment, comments/justification for their inclusion or exclusion in the assessment and where they have been addressed in this report.

Table 1.1 DGRs for assessment of noise impacts

Authority/agency	Requirements	Assessed	Comments	Relevant report section
Environment Protection Authority (EPA)	**The proposal**			
	Identify all noise sources from the development (including both construction and operation phases). Detail all potentially noisy activities including ancillary activities such as transport of goods and raw materials.	√	Provided	4.2, 4.3 and 5.5
	Specify the times of operation for all phases of the development and for all noise producing activities.	√	Provided	1.3.4
	For projects with a significant potential traffic noise impact provide details of road alignment and land use along the proposed road and measurement locations - diagrams should be to a scale sufficient to delineate individual residential blocks.	X	Traffic noise impact not significant	5.5.2
	The location			
	Identify any noise sensitive locations likely to be affected by activities at the site, such as residential properties, schools, churches, and hospitals. Typically the location of any noise sensitive locations in relation to the site should be included on a map of the locality.	√	Provided	2.1
	Identify the land use zoning of the site and the immediate vicinity and the potentially affected areas.	√	Provided	2.1
	The environmental issues - describe baseline conditions			
	Determine the existing background (L90) and ambient (Leq) noise levels in accordance with the *NSW Industrial Noise Policy*.	X	Default INP RBL of 30 dB	2.3
	Determine the existing road traffic noise levels in accordance with the NSW Environmental Criteria for Road Traffic Noise, where road traffic noise impacts may occur.	√	Provided	5.5

Table 1.1 DGRs for assessment of noise impacts

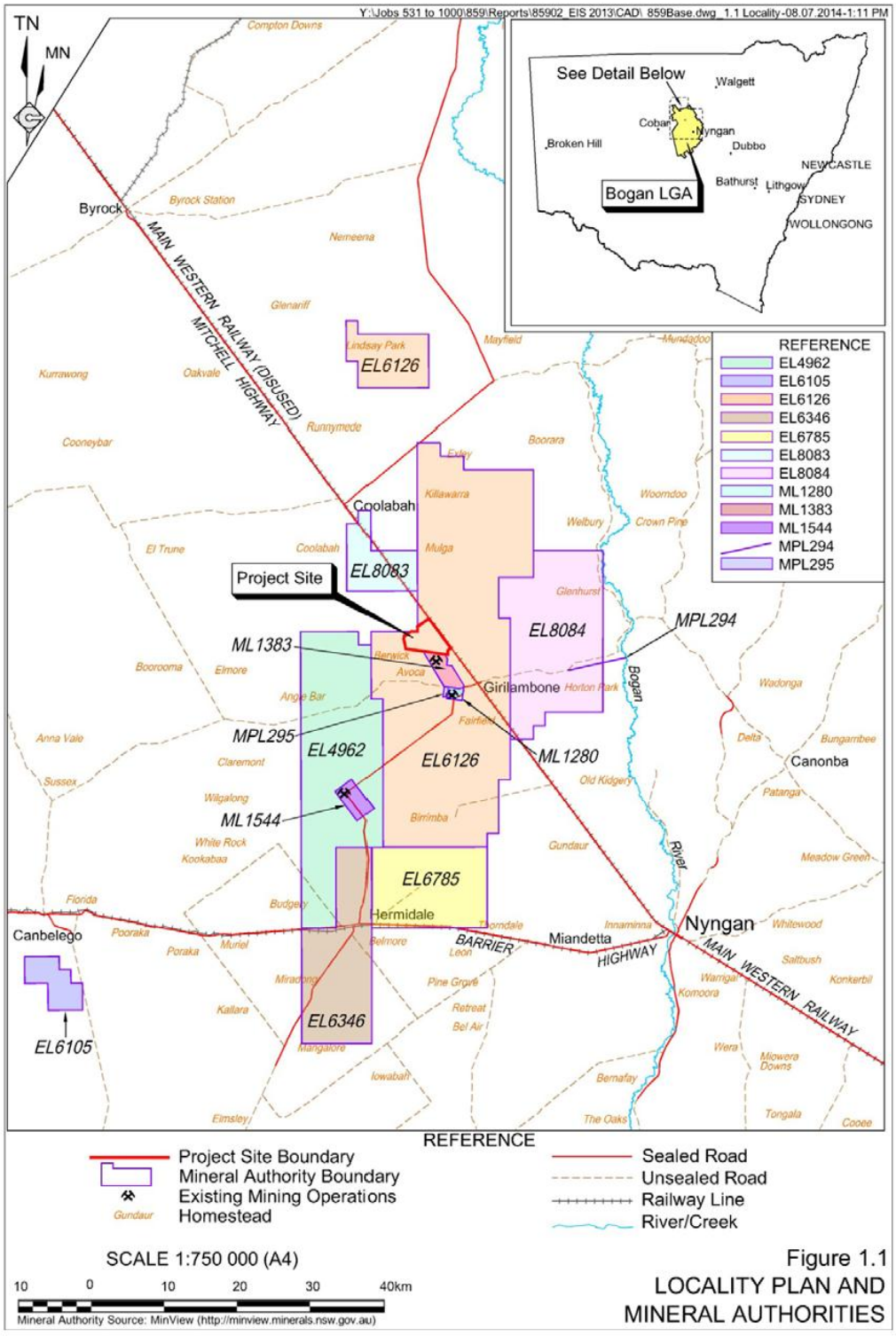
Authority/agency	Requirements	Assessed	Comments	Relevant report section
Environment Protection Authority (EPA)	The noise impact assessment report should provide details of all monitoring of existing ambient noise levels.	X	No ambient monitoring	2.3
	Assess impacts			
	Determine the project specific noise levels for the site. For each identified potentially affected receiver, this should include:			
	a) determination of the intrusive criterion for each identified potentially affected receiver.	√	Provided	3.1.2
	b) selection and justification of the appropriate amenity category for each identified potentially affected receiver.	√	Provided	3.1.3
	c) determination of the amenity criterion for each receiver.	√	Provided	3.1.3
	d) determination of the appropriate sleep disturbance limit.	√	Provided	3.4
	Maximum noise levels during night-time period (10 pm-7 am) should be assessed to analyse possible affects on sleep. Where L1(1 min) noise levels from the site are less than 15 dB above the background L90 noise level, sleep disturbance impacts are unlikely. Where this is not the case, further analysis is required. Additional guidance is provided in Appendix B of the *NSW Environmental Criteria for Road Traffic Noise*.	√	Provided	5.3
	Determine expected noise level and noise character (eg tonality, impulsiveness, vibration, etc) likely to be generated from noise sources during:			
	a) site establishment.	√	Provided	5.4.1
	b) operational phases.	√	Provided	5.1
	c) transport including traffic noise generated by the Proposal.	√	Provided	5.5
	Note: The noise impact assessment report should include noise source data for each source in 1/1 or 1/3 octave band frequencies including methods for references used to determine noise source levels. Noise source levels and characteristics can be sourced from direct measurement of similar activities or from literature (if full references are provided).	√	Provided	Appendix A
	Determine the noise levels likely to be received at the most sensitive locations (these may vary for different activities at each phase of the development). Potential impacts should be determined for any identified significant adverse meteorological conditions. Predicted noise levels under calm conditions may also aid in quantifying the extent of impact where this is 'not the most adverse condition.	√	Provided	Chapter 5
	The noise impact assessment report should include:			
	a) a plan showing the assumed location of each noise source for each prediction scenario.	√	Provided	Figure 4.1

Table 1.1 DGRs for assessment of noise impacts

Authority/agency	Requirements	Assessed	Comments	Relevant report section
Environment Protection Authority (EPA)	b) a list of the number and type of noise sources used in each prediction scenario to simulate all potential significant operating conditions on the site.	√	Provided	4.2.1, 4.3.2
	c) any assumptions made in the predictions in terms of source heights, directivity effects, shielding from topography, buildings or barriers, etc.	√	Provided	Chapter 4
	d) methods used to predict noise impacts including identification of any noise models used. Where modelling approaches other than the use of the ENM or Sound Plan computer models are adopted, the approach should be appropriately justified and validated.	√	Provided	4.1
	e) an assessment of appropriate weather conditions for the noise predictions including reference to any weather data used to justify the assumed conditions.	√	Provided	4.2
	f) the predicted noise impacts from each noise source as well as the combined noise level for each prediction scenario under any identified significant adverse weather conditions as well as calm conditions where appropriate.	√	Provided	5.1
	g) for developments where a significant level of noise impact is likely to occur, noise contours for the key prediction scenarios should be derived.	X	No significant level of noise impact	5.1
	h) an assessment of the need to include modification factors as detailed in Section 4 of the *NSW Industrial Noise Policy*:	√	Provided	5.1
	Discuss the findings from the predictive modelling and, where relevant noise criteria have not been met, recommend additional mitigation measures.	√	All noise criteria met	5.1-5.4
	The noise impact assessment report should include details of any mitigation proposed including the attenuation that will be achieved and the revised noise impact predictions following mitigation.	X	All noise criteria met	5.1-5.4
	Where relevant noise/vibration criteria cannot be met after application of all feasible and cost effective mitigation measures the residual level of noise impact needs to be quantified by identifying:	X	All noise criteria met	5.1-5.4
	For the assessment of existing and future traffic noise, details of data for the road should be included such as assumed traffic volume; percentage heavy vehicles by time of day; and details of the calculation process. These details should be consistent with any traffic study carried out in the EIS.	√	Provided	5.5
Environment Protection Authority (EPA)	Where blasting is intended an assessment in accordance with the Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration (ANZECC, 1990) should be undertaken. Blast design details should be included ie	√	Provided	5.4.2

Table 1.1 DGRs for assessment of noise impacts

Authority/agency	Requirements	Assessed	Comments	Relevant report section
	bench height, burden spacing, spacing burden ratio, blast hole diameter, inclination and spacing, type of explosive, maximum instantaneous charge, initiation, blast block size, blast frequency.			
	Describe management and mitigation measures			
	Determine the most appropriate noise mitigation measures and expected noise reduction including both noise controls and management of impacts for both construction and operational noise. This will include selecting quiet equipment and construction methods, noise barriers or acoustic screens, location of stockpiles, temporary offices, compounds and vehicle routes, scheduling of activities, etc.	X	All noise criteria met	5.1-5.4
	For traffic noise impacts, provide a description of the ameliorative measures considered (if required), reasons for inclusion or exclusion, and procedures for calculation of noise levels including ameliorative measures. Also include, where necessary, a discussion of any potential problems associated with the proposed ameliorative measures, such as overshadowing effects from barriers. Appropriate ameliorative measures may include:	X	Road traffic noise criteria met	5.1-5.4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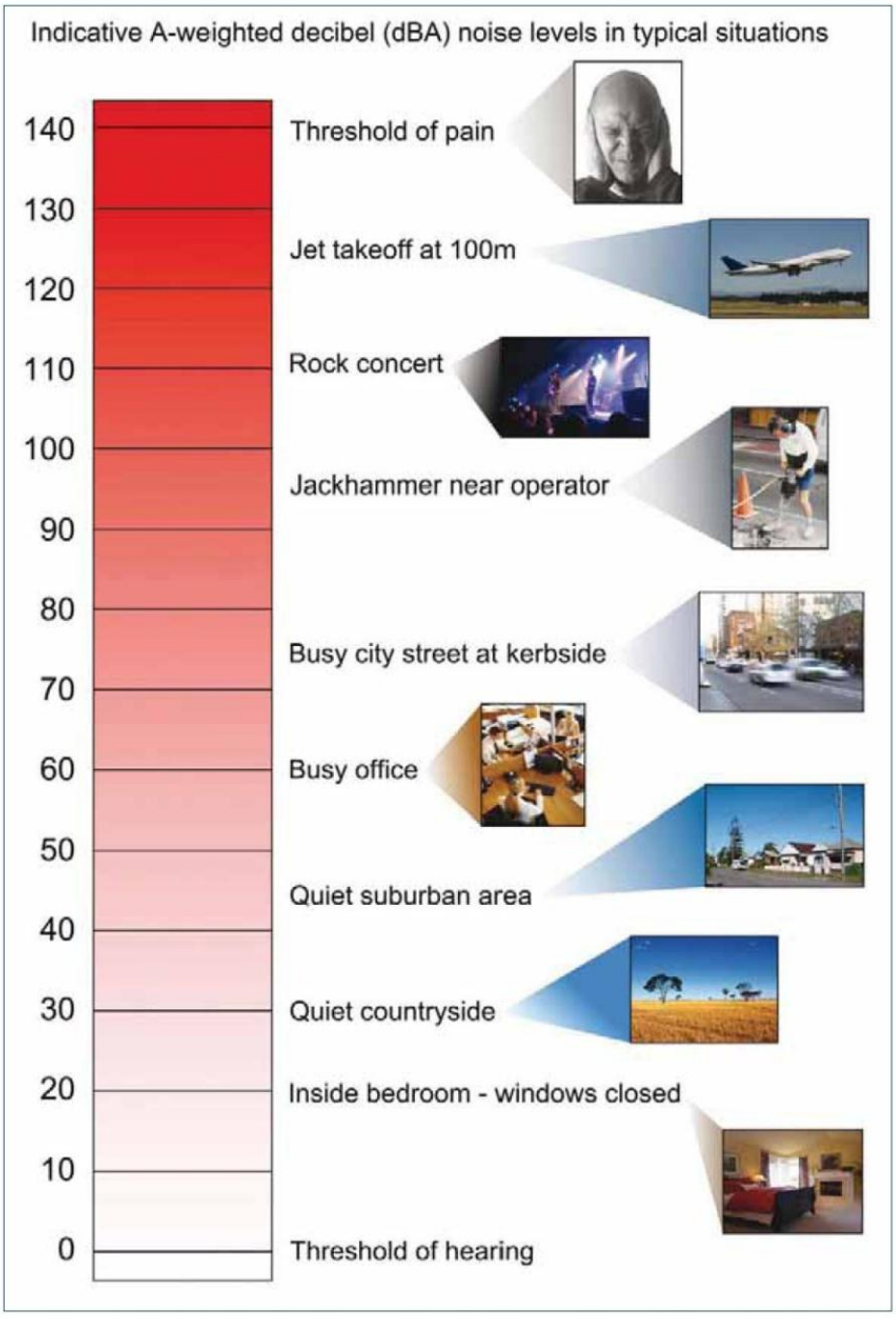
TN
MN
See Detail Below
Walgett
Coban
Nyngan
Broken Hill
Dubbo
NEWCASTLE
Bathurst
Lithgow
SYDNEY
Bogan LGA
WOLLONGONG
Compton Downs
Byrock
Byrock Station
Nemeena
MAIN WESTERN RAILWAY (DISUSED)
MITCHELL HIGHWAY
Glenariff
Lindsay Park
EL6126
Mayfield
Myndadoo
Kurrawong
Oakvale
Runnymede
Cooneybar
Boorara
Exley
Killawarra
Coolabah
Woomdoo
Welbury
Crown Pine
El Trune
Mulga
EL8083
Project Site
Glenhurst
EL8084
MPL294
ML1383
Berwick
Avoca
Girilambone
Horton Park
Boorooma
Elmore
Angle Bar
Fairfield
Bogan
Wadonga
MPL295
EL4962
EL6126
ML1280
Anna Vale
Claremont
Delta
Bungambee
Canonba
Sussex
Old Kidgery
Patanga
Wilgalong
ML1544
Birrimba
White Rock
Kookabaa
Gundaur
River
Meadow Green
EL6785
Florida
Budgery
Hermidale
Canbelego
Pooraka
Muriel
Belmore
Leon
BARRIER
HIGHWAY
Miandetta
Innamincka
Nyngan
Whitewood
MAIN WESTERN RAILWAY
Saltbush
Konkerbil
Warrigal
Komoora
Miradora
Pine Grove
Kallara
Retreat
Bel Air
EL6346
EL6105
Mangalore
Wera
Miowera Downs
Iowabah
Bernafay
Elmsley
The Oaks
Tongala
Cooee
REFERENCE
EL4962
EL6105
EL6126
EL6346
EL6785
EL8083
EL8084
ML1280
ML1383
ML1544
MPL294
MPL295
REFERENCE
Project Site Boundary
Mineral Authority Boundary
Existing Mining Operations
Homestead
Sealed Road
Unsealed Road
Railway Line
River/Creek
SCALE 1:750 000 (A4)
10 0 10 20 30 40km
Mineral Authority Source: MinView (http://minview.minerals.nsw.gov.au)
Figure 1.1
LOCALITY PLAN AND
MINERAL AUTHORITIES

1.2 Common noise levels

Examples of common noise levels are provided in Figure 1.2.



Source : NSW Road Noise Policy (DECCW, 2011)

Figure 1.2 Common noise levels

It is useful to have an appreciation of decibels, the unit of noise measurement. Table 1.2 gives some practical indication of what an average person perceives about changes in noise levels.

Table 1.2 Perceived change in noise

Change in sound level (dB)	Perceived change in noise
3	just perceptible
5	noticeable difference
10	twice (or half) as loud
15	large change
20	four times as loud (or quarter) as loud

1.3 Description of the proposal

1.3.1 Proposal overview and application area

The Proposal comprises an underground mining operation and would extract up to a maximum of 368,000 tonnes per annum, with all the ore transported by road to Tritton Copper Mine's existing processing plant. The land on which the proposed underground mine and associated infrastructure would be established is collectively referred to as the Project Site.

The Proposal can be divided into two distinct phases, being the site establishment and construction phase and the operational phase. It is envisaged that the site establishment and construction phase would take up to 12 weeks with the overall life of the Proposal projected at 6 years following construction. The following provides an overview of the activities to be undertaken during these two phases.

1.3.2 Project site establishment and construction

The following provides a list of principal site establishment and construction phase components and activities to be undertaken as part of the Proposal (and illustrated on Figure 1.3):

- Construction of a box cut and underground portal;
- Construction of a Run-of-Mine (ROM) pad;
- Construction of a Waste Rock Emplacement (WRE);
- Construction of a sediment basin and associated drainage channels;
- Construction of two leachate management ponds and a mine water management pond;
- Construction of a ventilation fan and emergency access shaft;
- Extension of the existing infrastructure from the Girilambone Copper Mine (ie site access road, water pipeline and transmission lines).
- Extraction of approximately 1.3Mt of waste rock and ore from the underground operations;
- A conventional method of transportation is proposed using haul trucks to haul the ore from the underground operations to the ROM Pad were road registered trucks (road trains) transporting the ore to the existing Tritton Copper Mine for processing.

The maximum development footprint on the Project Site would be approximately 33.6 ha. It should be noted that this does not included the Project Site Access Road. The size of each disturbance areas associated with the Project Site is as follows:

- BoxCut Portal and Decline – 1.2 ha;
- WRE and Leachate Management Pond – 4.4 ha;
- ROM Pad and Leachate Management Pond – 1.1 ha;
- Mine Water Management Pond - 0.3 ha;
- Workshop, Office and Carpark Area - 1.0 ha;
- Laydown Area - 0.7 ha;
- Sedimentation Pond - 0.5 ha; and
- Fuel Store and Refuelling Bay - 0.2 ha.

1.3.3 Product dispatch

Once the ore has been extracted and hauled to the ROM pad, it would be loaded onto Tritton's fleet of two road registered road trains (52t net capacity) and transported to the existing processing plant at the Tritton Copper Mine for processing. The ore would be transported to the Tritton Copper Mine on internal haul roads and the public Yarrandale Road, which connects Girilambone Copper Mine and Tritton Copper Mine.

Table 1.3 shows the anticipated number of daily road trains movements associated with the transportation of ore at a maximum mining rate of approximately 368 000t per annum.

Table 1.3 Daily road train movements

Road transport	Transport route	Loaded	Empty / return	Total
Road trains	Internal access roads and Yarrandale Road	40	40	80

1.3.4 Workforce and operating hours

The proposed site establishment and construction phase workforce would average between 10 and 12 people per day shift. No night time (10:00pm – 7:00am) construction operations are proposed.

The proposed operational workforce is estimated to employ between 25 and 30 people over two shifts over a 24 hour period.

Project Site establishment and construction phase is expected to generally occur between 7 am and 10 pm, seven days per week. However, inaudible construction activities may be undertaken outside these hours (eg electrical installation work).

Mining operations would be undertaken 24 hours per day, seven days per week. It should be noted that this includes the transport of material from the Project Site to Tritton Copper mine for processing.

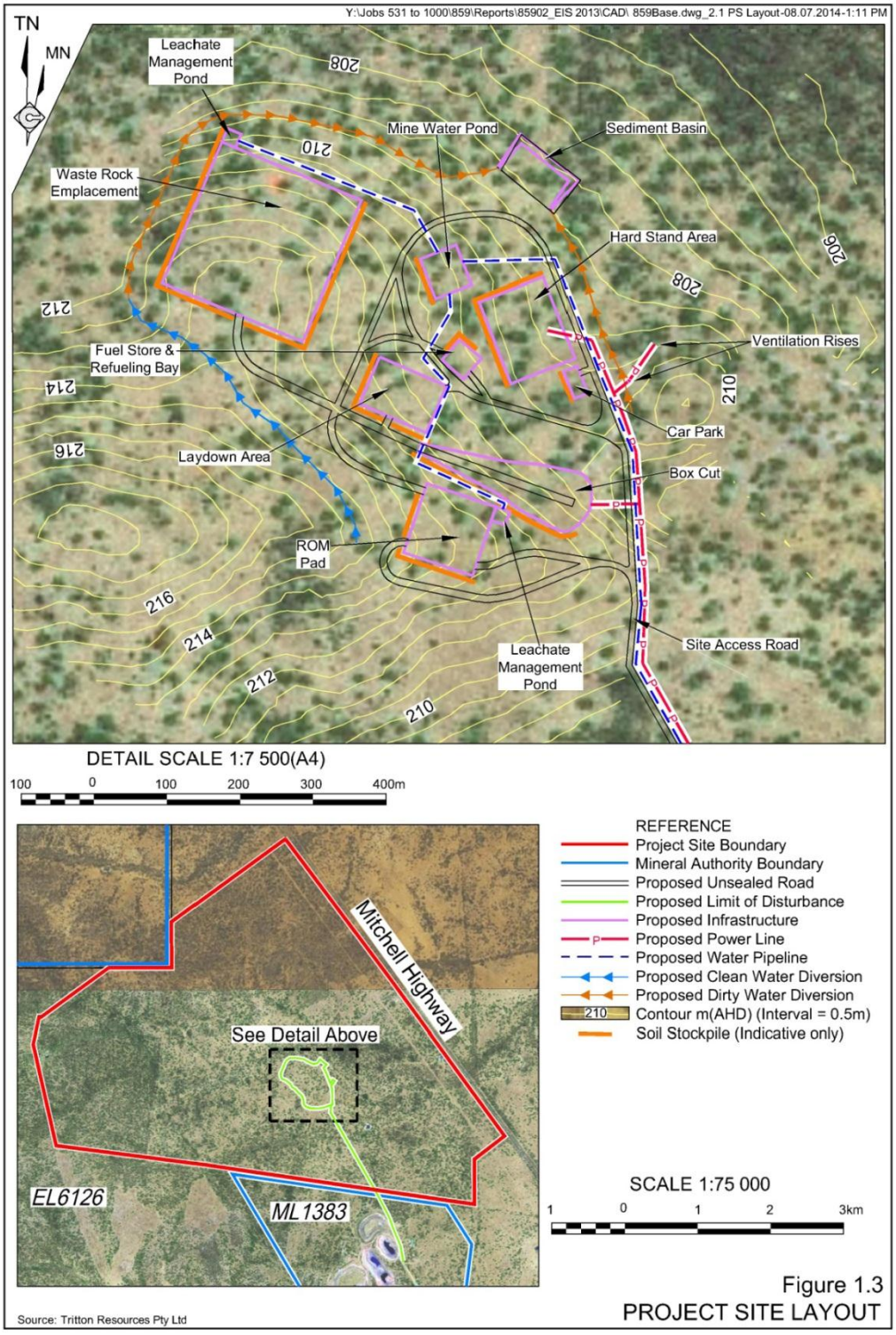


Figure 1.3
PROJECT SITE LAYOUT

2 Existing environment

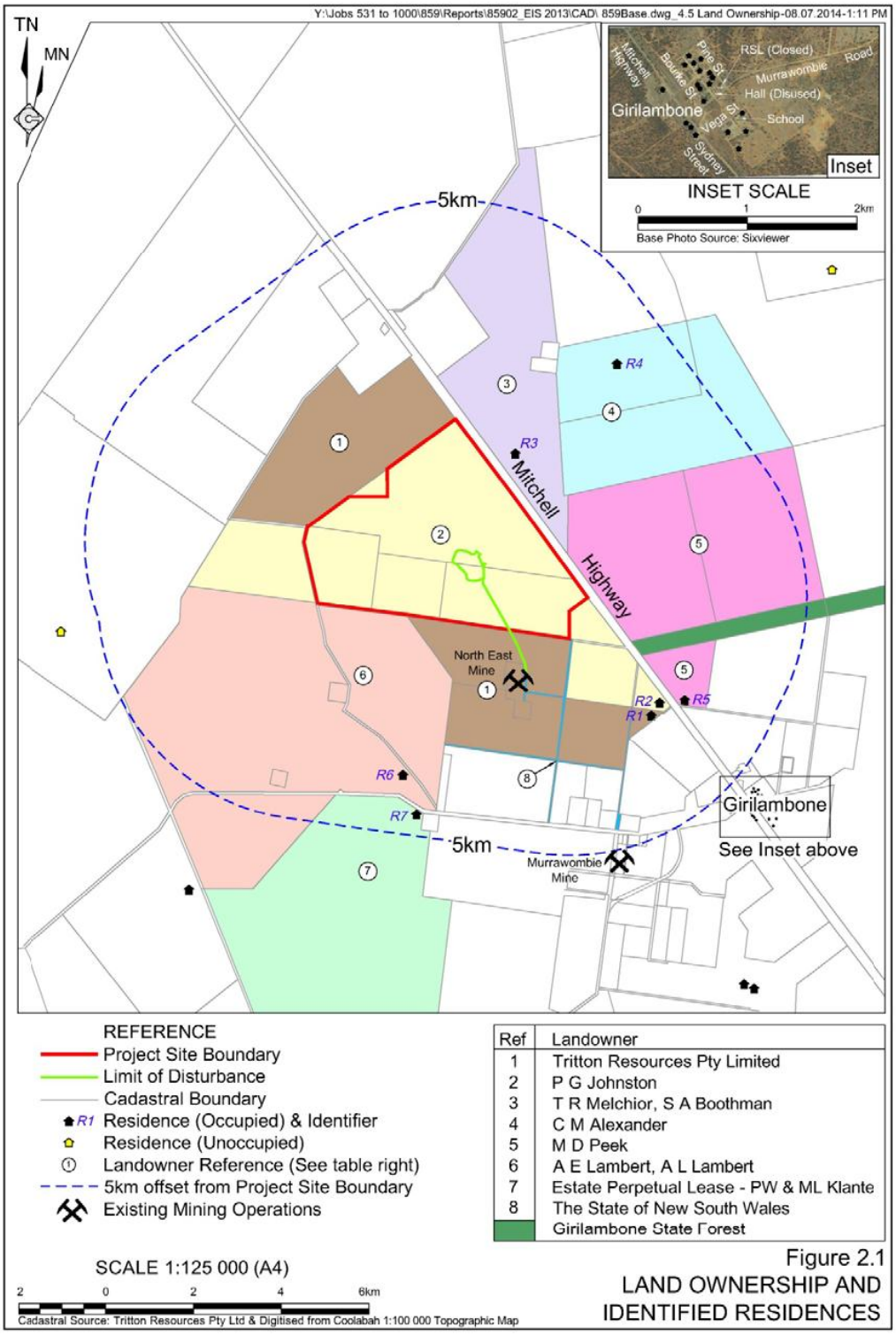
2.1 Sensitive residences

Several residences surrounding the Proposal have the potential to be impacted by Project Site noise. Table 2.1 presents the nearest sensitive residences surrounding the Project Site. It should be noted that the Girilambone village is located approximately 7km southeast from the Project Site (nearest noise source) and Project Site noise is anticipated to have no impact on the village.

Table 2.1 Residences and MGA coordinates

Residences	Description	Easting	Northing	Distance to project site (km) (closest disturbance)
R1	Private residence	488604	6545101	5.0
R2	Private residence	488804	6545250	5.0
R3	Private residence	485502	6550984	2.4
R4	Private residence	487827	6553240	5.3
R6	Private residence	489237	6545308	5.5
R7	Private residence	482857	6543708	5.6

Figure 2.1 provides a locality plan identifying land ownership and the identified residences surrounding the Project Site.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TN
MN
Inset
INSET SCALE
0 1 2km
Base Photo Source: Sixviewer
RSL (Closed)
Murrawombie Road
Hall (Disused)
School
Girilambone
Mitchell Highway
Bourke St
Pine St
Vega St
Sydney Street
5km
R1
R2
R3
R4
R5
R6
R7
Mitchell Highway
North East Mine
Murrawombie Mine
Girilambone
See Inset above
REFERENCE
Project Site Boundary
Limit of Disturbance
Cadastral Boundary
R1 Residence (Occupied) & Identifier
Residence (Unoccupied)
Landowner Reference (See table right)
5km offset from Project Site Boundary
Existing Mining Operations
Ref | Landowner
1 | Tritton Resources Pty Limited
2 | P G Johnston
3 | T R Melchior, S A Boothman
4 | C M Alexander
5 | M D Peek
6 | A E Lambert, A L Lambert
7 | Estate Perpetual Lease - PW & ML Klante
8 | The State of New South Wales
Girilambone State Forest
SCALE 1:125 000 (A4)
2 0 2 4 6km
Cadastral Source: Tritton Resources Pty Ltd & Digitised from Coolabah 1:100 000 Topographic Map
Figure 2.1
LAND OWNERSHIP AND IDENTIFIED RESIDENCES

2.2 Residences adjacent to transport routes

During the operational phase, road traffic noise associated with the transport of ore between the Project Site and Tritton Copper Mine has the potential to generate elevated noise levels at three identified residences along Yarrandale Road. The nearest residence identified by Tritton as 'Tiverton' is located approximately 700 m from the road as shown within Inset 2 of Figure 2.1.

During the site establishment and construction phase, construction deliveries and employee movements are expected to occur from Nyngan (50%) via the Mitchell Highway, and Cobar (50%) via the Barrier Highway and Yarrandale Road. It should be noted that these activities are anticipated to have no impact on residences on Yarrandale Road. However, residences located along the Barrier Highway and Mitchell Highway could be potentially impacted by noise associated with these movements, as they are situated closer to the road.

2.3 Noise environment

In the absence of noise logging data, the default INP background noise level of 30 dB(A) was adopted for all residences surrounding the Project Site in accordance with Section 3.1 of the INP. Table 2.2 presents the adopted rating background levels (RBL) for all residences surrounding the Project Site.

Table 2.2 Adopted project rating background levels (RBL)

Residence	Time period	RBL, dB(A)
All residences	Day	30
	Evening	30
	Night	30

3 Noise criteria

3.1 Operational noise

3.1.1 Overview

Industrial sites in NSW are regulated by the Department of Planning and Infrastructure (DP&I) or the NSW Environment Protection Authority (EPA) and usually have a set of conditions for operations that include noise limits. These limits are normally derived from operational noise criteria that apply at sensitive residences. They are based on guidelines stipulated in the *Industrial Noise Policy* (INP) (EPA 2000) or noise levels that can be achieved at a specific site following the application of all reasonable and feasible noise mitigation.

The INP provides guidelines for assessing industrial facilities which have been adopted for this assessment. It states the following with respect to the criteria:

> *'They are not mandatory, and an application for a noise producing development is not determined purely on the basis of compliance or otherwise with the noise criteria. Numerous other factors need to be taken into account in the determination. These factors include economic consequences, other environmental effects and the social worth of the development.'*

Assessment criteria depend on the existing amenity of areas potentially affected by a proposed development. Assessment criteria for sensitive residences near industry are based on the following objectives:

- Protection of the community from excessive intrusive noise; and
- Preservation of amenity for specific land uses.

To ensure these objectives are met, the EPA provides two separate criteria: namely the intrusiveness criteria and the amenity criteria. A fundamental difference between the intrusiveness and the amenity criteria is the time period they relate to:

- Intrusiveness criteria — apply over 15 minutes in any assessment period; and
- Amenity criteria — apply to the entire assessment period (day, evening and night).

3.1.2 Intrusiveness

The intrusiveness criteria require that $L_{eq(15\text{-}min)}$ noise levels from a newly introduced source during the day, evening and night do not exceed the existing rating background level (RBL) by more than 5 dB. This is expressed as: $L_{eq(15\text{-}min)} \leq RBL + 5 - K$

where $L_{eq(15\text{-}min)}$ is the L_{eq} noise level from the source (ie Project Site), measured over a 15 minute period and K is a series of adjustments for various noise characteristics.

Table 3.1 presents the base intrusive criteria for the Proposal.

Table 3.1 Base intrusive criteria

Residence	Time period	RBL, dB(A)	Intrusive criteria dB(A), $L_{eq(15\text{-}min)}$
All residences	Day	30	35
	Evening	30	35
	Night	30	35

3.1.3 Amenity

The amenity assessment is based on noise criteria specific to the land use. The criteria relate only to industrial noise and exclude non-related site noise, including road or rail noise. Where measured existing industrial noise approaches the base amenity criteria, it needs to be demonstrated that noise levels from new industries would not be an additional contributor to existing industrial noise.

Residences potentially affected by the Proposal are covered by the EPA's rural amenity category. The base amenity criteria for all residences are given in Table 3.2.

Table 3.2 Base amenity criteria

Residence	Indicative area	Time period	Recommended noise level dB(A), $L_{eq,period}$	
			Acceptable	Maximum
All residences	Rural	Day	50	55
		Evening	45	50
		Night	40	45

Source: INP (EPA, 2000)

3.1.4 Project specific noise level

The project-specific noise level (PSNL) is the lower of the calculated intrusive or amenity criteria. The intrusive criteria are therefore adopted as the PSNL for the Proposal. The PSNL are presented in Table 3.3.

Table 3.3 Project specific noise levels (PSNL)

Residence	Time period	RBL dB(A)	Intrusive criteria dB(A), $L_{eq(15min)}$
All residences	Day	30	35
	Evening	30	35
	Night	30	35

3.2 Low frequency noise

Section 4 of the INP provides guidelines for applying 'modifying factor' adjustments to account for low frequency noise emissions. The INP states that where there is a difference of 15 decibels or more between 'C' weighted and 'A' weighted levels, then a correction factor of 5 dB is applicable. Section 4.2 of this report provides an assessment of low frequency noise for the Proposal.

3.3 Cumulative noise criteria

To limit continuing increases in industrial noise within a particular area, combined industrial noise should not exceed the amenity criteria levels specified in Table 2.1 from Section 2.2 of the INP. Girilambone Copper Mine is situated approximately 7 km south-east of the Project Site and has the potential to impact residences R1, R2, R5, R6 and R7. Therefore, cumulative operational noise has been considered for these residences and compared against the INP's acceptable and recommended maximum amenity criteria levels. This assessment has adopted the rural type amenity criteria for all residences (Refer to Table 3.2).

3.4 Sleep disturbance

The most important potential impact of intermittent noise that needs to be considered is disturbing the sleep of nearby residents. The EPA provides guidance on assessing sleep disturbance for industrial sites. The EPA nominates that a screening criteria of background noise level (L_{90}) plus 15 dB shall apply to maximum noise events from the site which are to be calculated at one metre from the bedroom facade at the nearest residential properties. Where noise levels have been calculated above the screening criteria, additional analysis should be undertaken, referencing guidance on maximum noise levels and sleep disturbance listed in the RNP (EPA, 2011). This guidance states:

- Maximum internal noise levels below 50 to 55dB(A) are unlikely to wake sleeping occupants; and
- One or two noise events per night, with maximum internal noise levels of 65-70 dB(A), are not likely to affect the health and well being of occupant's significantly.

It is commonly accepted by acoustic practitioners and regulatory bodies that even with a partially open window, internal noise levels are 10dB lower than external noise levels. Therefore, external noise levels in the order of 60-65 dB(A) calculated at the facade of a residence are unlikely to cause sleep disturbance affects at worst case (ie with windows open). Similarly, the World Health Organisation (WHO, 1999) suggest that levels below 45 dB(A) inside homes are unlikely to wake sleeping occupants.

The descriptors L_{max} and L_1 may be considered interchangeable which is accepted by EPA.

If noise levels over the screening criteria were identified, then additional analysis would consider factors such as:

- How often the events would occur;
- The time the events would occur (between 10 pm and 7 am); and
- Whether there are times of day when there is a clear change in the noise environment.

Based on a RBL of 30 dB(A), the NIA has adopted a sleep disturbance criterion of 45 dB(A) L_{max} for all residences.

3.5 Noise and vibration criteria for infrastructure construction

3.5.1 Noise criteria for infrastructure construction

Construction noise is generally assessed in accordance with the *Interim Construction Noise Guideline*(ICNG), (EPA 2009). Section 2.2 of the ICNG recommends the following standard hours for construction activities:

- Monday to Friday 7:00am to 6:00pm;
- Saturday 8:00am to 1:00pm; and
- no construction work is to take place on Sundays or public holidays.

The ICNG recommends that noise levels at residences as a result of construction activities during standard working hours are limited to an $L_{eq(15\text{-}min)}$ of RBL+10 dB(A) with a highly noise-affected maximum of 75 dB(A). Furthermore, it is recommended that outside of these standard hours, noise at residences is to be limited to an $L_{eq(15\text{-}min)}$ of RBL+5 dB(A), and only where out-of-hours works can be strongly justified.

Noise associated with construction activities for mining or extractive industries are often assessed as operational noise, as emissions from plant and associated equipment are similar. Therefore construction activities for the site establishment and construction phase of the Proposal have been assessed using the same criteria as for operational activities, that is RBL+5 dB(A). The hours of operation for the site establishment and construction phase are between 7:00am and 10:00pm.

3.5.2 Vibration criteria for infrastructure construction

In the absence of an Australian Standard for structural effects from construction vibration, the construction vibration assessment has referenced German Standard DIN 4150-3 1999 "*Structural Vibration Part 3: Effects of Vibration on Structures*".

3.6 Blasting

The Proposal includes blasting for the construction of a box cut and underground portal during the site establishment and construction phase. It should be noted that blasting would also be used to extract the ore and waste rock from underground during the operational phase. The limits adopted by EPA for blasting are provided in the Australian and New Zealand Environment Conservation Council (ANZECC) guidelines *Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration* (ANZECC 1990).

The blasting limits address two main effects of blasting:

- Airblast noise overpressure; and
- Ground vibration.

3.6.1 Airblast

The recommended maximum vibration level for airblast is 115 dB linear peak. The vibration level of 115 dB may be exceeded on up to 5% of the total number of blasts over 12months. However, the level should not exceed 120 dB linear peak at any time. A summary of airblast limits are provided in Table 3.4.

Table 3.4 Airblast overpressure

Airblast overpressure level dB(L_{peak})	Allowable exceedance
115	5% of the total number of blasts over 12 months
120	0%

3.6.2 Ground vibration

Peak particle velocity (PPV) from ground vibration should not exceed 5 mm/s for more than 5% of the total number of blasts over 12 months. However, the maximum level should not exceed 10 mm/s at any time. A summary of ground vibration limits are provided in Table 3.5.

Table 3.5 Ground vibration limits

PPV (mm/s)	Allowable exceedance
5	5% of the total number of blasts over 12 months
10	0%

3.7 Road traffic

3.7.1 Assessment criteria

The road traffic noise assessment has been conducted in accordance with the NSW EPA's *Road Noise Policy* (RNP) (EPA 2011).

The freeway/arterial/sub-arterial road type was adopted for the Mitchell Highway and Barrier Highway, whereas the local road type was adopted for Yarrandale Road. Table 3.6 presents the road noise assessment criteria reproduced from Table 3 of the RNP relevant to this road type.

Table 3.6 Road traffic noise assessment criteria for residential land uses

Road category	Type of project/development	Assessment criteria, dB(A)	
		Day (7 am to 10 pm)	Night (10 pm to 7 am)
Freeway/arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing freeway/arterial/sub-arterial roads generated by land use developments.	$L_{eq(15\text{-}hr)}$ 60 (external)	$L_{eq(9\text{-}hr)}$ 55 (external)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments.	$L_{eq(15\text{-}hr)}$ 55 (external)	$L_{eq(9\text{-}hr)}$ 50 (external)

Additionally, the RNP states where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to 2 dB, which is generally accepted as the threshold of perceptibility to a change in noise level.

3.7.2 Relative increase criteria

In addition to meeting the assessment criteria, any significant increase in total traffic noise at residences must be considered. Residences experiencing increases in total traffic noise levels above those presented in Table 3.7 should be considered for mitigation. It should be noted that the relative increase criterion does not apply to local roads, as per Section 2.4 of the RNP.

Table 3.7 Relative increase criteria for residential land uses

Road category	Type of project/development	Total traffic noise level increase - dB(A)	
		Day (7 am to 10 pm)	Night (10 pm to 7 am)
Freeway/arterial/sub-arterial roads and transit ways	New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road.	Existing traffic $L_{eq(15\text{-}hr)}$+12 dB (external)	Existing traffic $L_{eq(9\text{-}hr)}$+ 12 dB (external)

4 Noise modelling methodology and parameters

4.1 Overview

This section presents the methods and base parameters used to model noise emissions from the Proposal, including the effect of applicable meteorological conditions. The assessment was conducted in accordance with the NSW INP.

Noise modelling was based on three-dimensional digitised ground contours of the surrounding land and mine plans of the Project Site. The plans represent snapshots, with equipment placed at various locations and heights, representing realistic 'worst-case' operating scenarios for the site establishment and construction stage and operational stage of the Proposal.

Noise predictions were carried out using Brüel and Kjær Predictor Version 8.14 noise prediction software. 'Predictor' calculates total noise levels at residences from the concurrent operation of multiple noise sources. The model considers factors such as:

- The lateral and vertical location of plant;
- Source-to-residence distances;
- Ground effects;
- Atmospheric absorption;
- Topography of the mine and surrounding area; and
- Applicable meteorological conditions.

4.2 Meteorology

Noise propagation over distance can be significantly affected by the prevailing weather conditions. Of most interest are source to residence winds, the presence of temperature inversions and drainage flow effects, as these conditions can enhance received noise levels. To account for these phenomena, the INP specifies meteorological analysis procedures to determine the prevalent weather conditions that enhance noise propagation in a particular area, with a view to determining whether they can be described as a feature of the Proposal area.

4.2.1 Wind

Wind has the potential to increase noise impacts at a residence when it is relatively light and stable and blows from the direction of the noise source. As the strength of the wind increases the noise produced by the wind usually obscures noise from most industrial and transport sources.

The INP requires that winds at or below 3m/s with an occurrence greater than 30 per cent of the time be assessed. In the absence of historical meteorological data for the area, worst case wind conditions was adopted for each residence, that is 3 m/s wind speed from the direction of the noise source.

4.2.2 Temperature inversions

During temperature gradient conditions (eg temperature inversions), noise levels at residences may increase or decrease compared with noise during calm conditions. This change is due to refraction caused by the varying speed of sound with increasing height above ground. The noise level received increases under temperature inversion conditions. The INP states that the assessment of the impact of temperature inversions be confined to the night-time noise assessment period.

In the absence of historical meteorological data for the area, the default inversion parameter for 'F' class stability was considered in the NIA. However, the INP suggests that for areas classed as arid/semi-arid (ie areas with <500 mm average rainfall), 'G' class stability should also be assessed. Therefore the 'G' class stability inversion parameter has been adopted.

4.2.3 Drainage flow winds

Drainage flow winds are applicable only when a development is at higher altitude than a residence with no intervening topography. Drainage flow winds were considered applicable for the Project Site and therefore a 1 m/s drainage flow has been included in the model combined with a G class stability inversion. This has the potential to increase noise levels further at the residences. The exceptions are residences R6 and R7 due to intervening topography between the site and these residences. Therefore drainage flow was only included in the noise model for residences R1 to R5.

4.3 Operational noise modelling

4.3.1 Modelled sound power levels

The results presented assume the maximum number of plant and equipment are operating simultaneously and at full power. In practice, such operating scenarios would rarely occur. The noise predictions are therefore conservative.

The plans used for modelling are considered representative of the operational stage over the life of the Proposal. The noise model was configured to predict the total L_{eq} noise levels from all operational activities at the nearest residences. All operational activities are proposed to occur 24 hours, seven days per week. It should be noted that blasting is not included in the noise model and is assessed separately.

Table 4.1 summarises the acoustically significant noise sources and associated sound power levels for the Proposal. Appendix A provides indicative plant and equipment model details and total single octave sound power levels.

Table 4.1 Plant sound power levels - operational phase

Description	Reference	Units	Lw, $L_{eq(15\text{-}min)}$, dB(A)
Grader - Cat 14H	5	1	104
Haul truck - 50 t	3	2	111
Road train	6	2	102
Front-end loader (FEL) - Cat 998	7	1	108
Generator - 800KVa	8	2	113
Ventilation fan - 500 kW/1.5 kPa	9	1	104

4.3.2 Low frequency analysis for operational plant items

Another consideration in assessing operational noise is the potential of 'low' frequency content. The INP recommends a 5 dB penalty if sources are perceived to exhibit low frequency noise at residences, defined by received dB(C) noise being 15 dB or more than received dB(A) noise levels. Results in Section 5.1 (Table 5.1) include a modifying factor of 5 dB for low frequency associated with the operation of the ventilation fan. It should be noted that the ventilation fan to be used by Tritton is unlikely to contain low frequency components, although it has been assumed in this assessment.

4.4 Construction noise modelling

4.4.1 Overview

It is expected that the site establishment and construction phase would take between 6 and 12 weeks to complete. All construction activities were assessed against the operational noise criteria (ie background + 5 dB(A)). Construction noise modelling assumed that all construction activities would occur at the same time, and all plant items would be running at full power. It should be noted that blasting is not included in the noise model and is assessed separately.

4.4.2 Construction plant sound power levels

Table 4.2 summarises noise sources and associated sound power levels for typical plant used in the construction phase of the Proposal. Appendix A provides indicative plant and equipment model details and single octave sound power levels.

Table 4.2 Plant sound power levels - construction

Description	Reference	Units	Lw, $L_{eq(15\text{-}min)}$, dB(A)
Blast drill rig	1	1	115
Excavator	2	1	107
Haul truck - 50 t	3	2	111
Bulldozer	4	1	111
Grader	5	1	104

Figure 4.1 provides the location of plant items for the site establishment and construction phase and the operation phase.

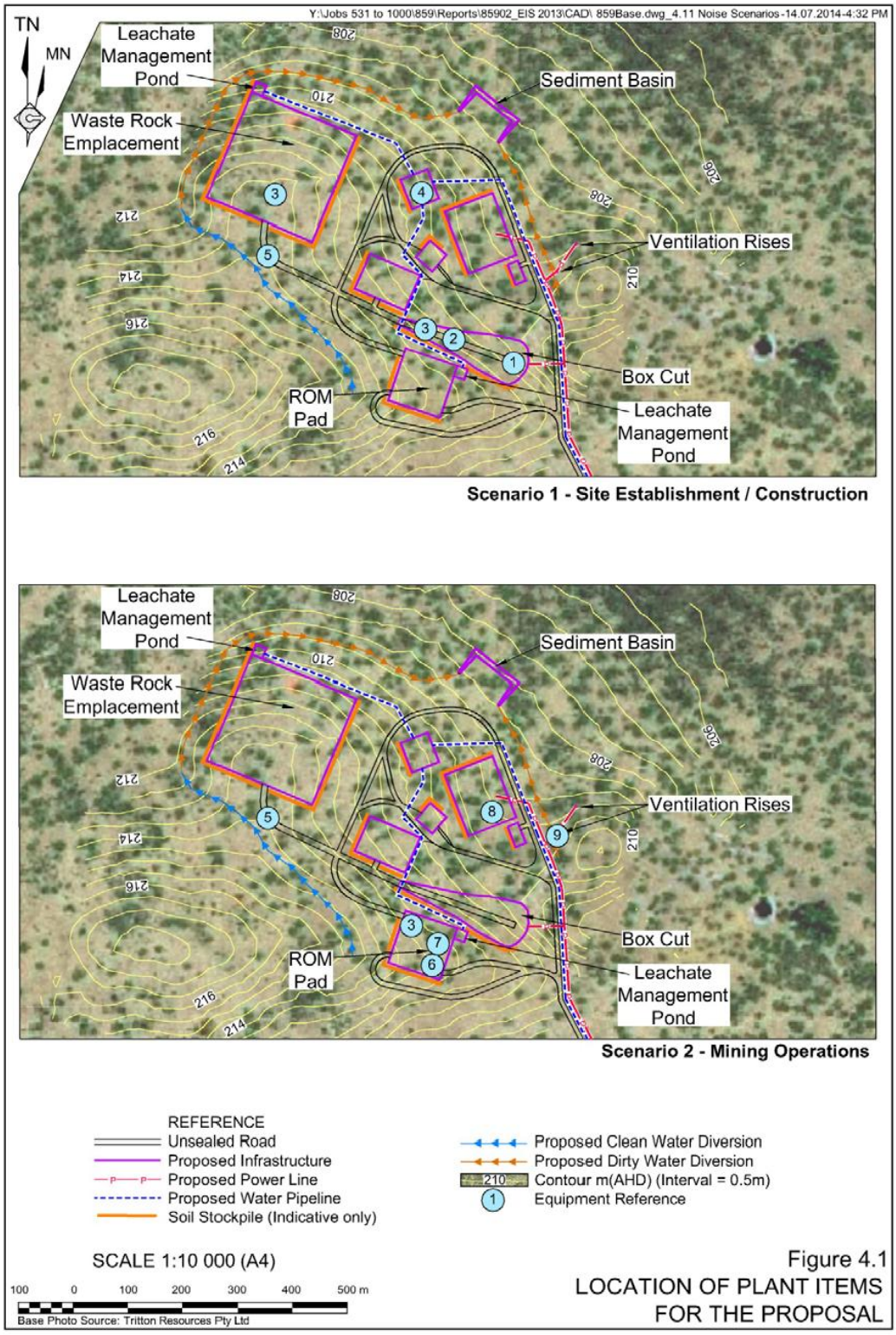

Figure 4.1
LOCATION OF PLANT ITEMS FOR THE PROPOSAL

5 Noise impact assessment results

5.1 Operations noise modelling results

The predicted noise levels for each assessed meteorological condition are provided in Table 5.1 for privately owned residences. It should be noted that following a low frequency analysis of plant items, predicted noise levels from operational activities have been adjusted to include a 5 dB penalty factor for potential low frequency noise component associated with the operation of the ventilation fan.

Noise results are presented according to the following meteorological scenarios:

- Day: calm, wind 3 m/s from source to residence; and
- Night: calm, wind 3 m/s from source to residence, G class stability inversion (with 1 m/s drainage flow applied for R1 to R5).

Table 5.1 Predicted operational noise levels - dB(A), $L_{eq(15\text{-}min)}$

ID	PSNL[1]	Day		Night		
		Calm[2]	Wind[3]	Calm[2]	Wind[3]	Inversion
R1	35	<35	<35	<35	<35	<35[4]
R2	35	<35	<35	<35	<35	<35[4]
R3	35	<35	<35	<35	<35	<35[4]
R4	35	<35	<35	<35	<35	<35[4]
R5	35	<35	<35	<35	<35	<35[4]
R6	35	<35	<35	<35	<35	<35
R7	35	<35	<35	<35	<35	<35

Notes: *1.PSNL for all assessment periods.*
2. Calm: no wind or temperature gradient.
3. Winds: 3 m/s from source to residence.
4. Including 1 m/s drainage flow from source to residence.
5. All results include modification factor correction (+5 dB(A)) due to low frequency noise from ventilation fan.

The predicted noise levels show that all residences would experience noise levels below the operational criteria for all assessment periods.

5.2 Cumulative noise

Following a review of noise emissions from the Proposal predicted noise levels at residences R1, R2, R5, R6 and R7 are acoustically insignificant, therefore levels received at residences from Girilambone Copper Mine would not increase. It should be noted that this assessment assumes that Girilambone Copper Mine noise emissions satisfy criteria at these residences, which has been consistent with Girilambone Copper Mine's annual reporting within its Annual Environmental Management Report.

5.3 Sleep disturbance assessment

People asleep in their homes may be disturbed by intermittent noises. The likely source on the Project Site that has the potential to generate significant L_{max} events is associated with loading of road trains by the Front end loader (FEL) at the ROM pad.

The maximum sound power level of a typical road truck being loaded by a FEL has previously been measured to be 124 dB(A)L_{max}. Predicted L_{max} noise levels from a road train being loaded by a FEL at residences were based on the typical position used when loading a road train at the ROM pad. Predictions were based on a single event, rather than the simultaneous operation of a number of plant items, because of the low probability of more than one maximum noise event occurring concurrently.

Maximum noise levels at privately owned residences were modelled for the same meteorological conditions as for the operational scenario and are presented in Table 5.2.

Table 5.2 Predicted maximum noise from intermittent sources at all residences - dB(A), L_{max}

Residence ID	L_{max} criterion, dB(A)	Day		Night		
		Calm[1]	Wind[2]	Calm[1]	Wind[2]	Inversion
R1	45	<35	<35	<35	<35	<35[3]
R2	45	<35	<35	<35	<35	<35[3]
R3	45	<35	<35	<35	<35	<35[3]
R4	45	<35	<35	<35	<35	<35[3]
R5	45	<35	<35	<35	<35	<35[3]
R6	45	<35	<35	<35	<35	<35
R7	45	<35	<35	<35	<35	<35

Notes: *1. Calm: no wind or temperature gradient.*
2. Winds: 3 m/s from source to residence.
3. Including 1 m/s drainage flow from source to residence.

Noise modelling identified that L_{max} noise levels associated with road train loading operations satisfy the sleep disturbance criteria at all nearest residences.

5.4 Construction

5.4.1 Construction noise and vibration

The noise model was configured to predict the total L_{eq} noise levels from all construction activities at surrounding residences for applicable meteorological conditions identified in Section 4.1.

The predicted noise levels from the construction activities are presented in Table 5.3. The levels represent the noise levels during construction activities over a 15 minute assessment period.

Table 5.3 Predicted construction noise levels - dB(A), Leq(15-min)

Residence ID	Construction criteria	Calm[1]	Wind[2]	Inversion (night only)
R1	35	<35	<35	<35[3]
R2	35	<35	<35	<35[3]
R3	35	<35	<35	<35[3]
R4	35	<35	<35	<35[3]
R5	35	<35	<35	<35[3]
R6	35	<35	<35	<35
R7	35	<35	<35	<35

The results show that noise generated by construction activities satisfy the relevant criteria at the nearest residences.

Vibration from construction activities, including surface infrastructure construction and material deliveries, is not expected to be significant and would satisfy the relevant criteria at all residences.

5.4.2 Blasting

Blast design will be managed by site personnel, and hence corresponding airblast overpressure and ground vibration can be controlled. Blast overpressure and vibration results have been calculated using the method given in the *AS2187-2: Explosives – Storage and use Part 2: Use of explosives, 2006 and ICI Explosives Blasting Guide*, as applicable to blasting in hard rock. This formula has been shown to be conservative in calculating overpressure and vibration.

The relevant formulae are as follows:

PVS = $K (R/Q^{0.5})^{-1.6}$

dB = $164.2 - 24(\log_{10} R - 0.33 \log_{10} Q)$

Where,

PVS = peak vector sum ground vibration level (mm/s)

dB = peak airblast level (dB Linear)

K = factor applied according to blasting type

R = distance between charge and residence (m)

Q = charge mass per delay (kg) or maximum instantaneous charge (MIC)

It should be noted that a K factor of 5000 (heavily confined blasting) was used to calculate levels associated with blasting during the extraction process.

This assessment provides a maximum instantaneous charge (MIC) where blast limits would be satisfied at the nearest residence R3 for each phase of the Proposal. Table 5.4 provides the MIC where blasting derived overpressure and vibration levels would satisfy the relevant criteria.

Table 5.4 Maximum MIC to satisfy ANZECC criteria at R3

Proposal phase	Activity	Distance from blast to privately owned residence R3 (m)	Max MIC (kg)	Derived overpressure (dB(L)peak)	Derived vibration PPV (mm/s)
Construction	Box cut and portal	2,400	1,000	107	5
Operational	Extraction process	2,400	1,000	107	5
		Criteria		115	5

The blast overpressure and vibration calculations identify that the use of a maximum MIC of 1,000 kg or less would results in compliance with the ANZECC blasting criteria at the nearest residence R3 during the construction of the box cut and underground portal, and for the extraction of ore and waste rock material during the operational phase. It should be noted that Tritton would not require as much MIC to complete each activity. Therefore, it is predicted that blast overpressure and vibration levels would satisfy ANZECC blasting limits at all privately owned residences.

Notwithstanding, the proposed MIC blast patterns should be designed specifically to meet the relevant criteria at the closest residence.

5.5 Road traffic noise

5.5.1 Road traffic scenarios

Residences potentially impacted by noise associated with the transport of ROM between the Project Site and Tritton Copper Mine during the operation phase include those located along Yarrandale Road. The nearest residence identified as 'Tiverton' is located approximately 700 m from the road as shown on Figure 2.2. It is assumed that 40 road trains loads (80 road train movements) of ore would be transported daily from the Project Site to Tritton Copper Mine, via Yarrandale Road. This is equivalent to 3.3 road train movements per hour over a 24 hour period.

It is also assumed that 30 employees (60 light vehicle (LV) movements) would be travelling daily during the operation phase from the Girilambone village and local surrounds (ie travelling through Girilambone) and return from the Project Site. The nearest residence in Girilambone is located 15 m away from the Mitchell Highway. It is assumed that light vehicle movements would be during shift change and would occur in the space of one hour.

Residences within the Girilambone village may also be affected by road traffic noise associated with construction deliveries during the site establishment and construction phase. It is assumed that there would be two construction deliveries per day, one delivery (two heavy vehicle (HV) movements) from Cobar via the Barrier Highway and Yarrandale Road, and one delivery (two HV movements) from Nyngan via the Mitchell Highway. It is anticipated that these movements would occur in the space of one hour past the nearest residences situated 15 m from the road. It should be noted that construction deliveries would be restricted to the day period only (7:00am to 10:00pm).

During the site establishment and construction phase, 12 employees (24 LV movements) from Girilambone and local surrounds (i.e. travelling from or through Girilambone) would travel to and from the Project Site daily.

Table 5.5 provides the road traffic scenarios and daily vehicle movements associated with each phase of the Proposal.

Table 5.5 Road traffic scenarios and daily vehicle movements associated with the proposal

Proposal phase	Road traffic scenario	Residence area	Road	Distance to road (m)	HV movements1	LV movements1
Operation	Road train ROM transport	Yarrandale Road	Yarrandale Road	700	3.3 (road trains)	n/a[2]
Operation	Employee (shift change)	Girilambone village	Mitchell Highway	15	n/a[2]	60
Site establishment	HV deliveries (from Nyngan) and employee movements	Mitchell Highway	Mitchell Highway	15	2[3]	6[3]
Site establishment	HV deliveries (from Cobar)	Barrier Highway	Barrier Highway	15	2[3]	6[3]

Notes: *1. Vehicle movements are assumed to occur within the space of one hour.*
2. No Proposal related traffic movement is expected for this vehicle type.
3. No Proposal related traffic movement is expected during the night-time period.

5.5.2 Road traffic noise results

The Calculation of Road Traffic Noise (CORTN) (UK Department of Transport, 1988) method was used to predict the L_{eq} noise levels at the closest residences for additional traffic travelling along Yarrandale Road, the Mitchell Highway and the Barrier Highway. CORTN, which was developed by the UK Department of Transport, considers traffic flow volume, average speed, percentage of heavy vehicles and road gradient to establish noise source strength, and includes attenuation due to distance, ground, atmospheric absorption and screening from buildings or barriers.

i Yarrandale Road

Existing road traffic noise data for Yarrandale Road were obtained from the "*Road Train Noise Assessment*" prepared by Bridges Acoustics in October 2013 for Tritton's Girilambone Mine. Existing road traffic noise level was calculated to be 46.6 dB(A) at the nearest residence 'Tiverton' located 700 m away from the road, inclusive of Girilambone Mine trucks (3.3 road train movements per hour). The assessment results included a5 dB correction factor to account for enhancing effects associated with winds and temperature inversion. Noise levels generated by Girilambone Mine were calculated to be 39.8 dB(A) at 'Tiverton'. The proposed truck flow for Girilambone Mine is identical to the Proposal's (Refer to Table 5.5), therefore for consistency, has been adopted for this Proposal.

To account for the proposed Girilambone Mines' transport operations (increase from 3.3 movements per hour to 14 movements per hour currently submitted for adequacy), this assessment will assume two scenarios for future traffic movements. These include:

1. Existing road traffic noise level (including Girilambone Mines' current transport operations) combined with road traffic noise level associated with the Proposal; and

2. Future ambient road traffic noise level (assuming a modification of Girilambone Mines' current transport operations is approved) combined with road traffic noise level associated with the Proposal.

The results of the traffic noise levels for these two scenarios are presented in Table 5.6.

Table 5.6 Operational road traffic noise levels at the nearest residence for Yarrandale road

Scenario	Road section	Distance to nearest residence (m)	Assessment criteria	Existing traffic noise including Girilambone Mine	Proposal related traffic noise	Future combined traffic noise	Difference between existing and future combined
			Day $L_{eq(15\text{-}hour)}$, dB(A)				
1	Yarrandale Rd	700	55	46.6[1]	39.8	47.4	0.8
2	Yarrandale Rd	700	55	48.8[2]	39.8	49.3	0.5
			Night $L_{eq(9\text{-}hour)}$, dB(A)				
1	Yarrandale Rd	700	50	46.6[1]	39.8	47.4	0.8
2	Yarrandale Rd	700	50	48.8[2]	39.8	49.3	0.5

Notes: 1. Includes Girilambone Mines' current transport operations.
2. Includes modification of Girilambone Mines' current transport operations.

The predicted road traffic noise levels satisfy the RNP criteria at all residences on Yarrandale Road for each scenario.

ii Mitchell Highway and Barrier Highway

Existing noise levels for the Mitchell Highway and the Barrier Highway were calculated using traffic data obtained from the RTA's "*Traffic volume data for Western Region 2002*" (RTA 2003).It should be noted that this assessment assumes that all movements from this document are light vehicles.

The results of the traffic noise calculations for each route are presented in Table 5.7 for the closest privately owned residences for the day and night assessment periods.

Table 5.7 Operational road traffic noise levels at the nearest residences for the Mitchell Highway and the Barrier Highway

Proposal phase	Road section	Distance to nearest residence (m)	Assessment criteria	Existing traffic noise including Girilambone Mine	Calculated Proposal related traffic noise	Future combined traffic noise	Difference between existing and future combined
			Day $L_{eq(15\text{-}hour)}$, dB(A)				
Operations	Mitchell Hwy	15	60	48.1	53.9	54.9	6.8
Site establishment	Mitchell Hwy	15	60	49.5	48.7	53.7	4.2
Site establishment	Barrier Hwy	15	60	51.4	48.7	54.6	3.2
			Night $L_{eq(9\text{-}hour)}$, dB(A)				

Table 5.7 Operational road traffic noise levels at the nearest residences for the Mitchell Highway and the Barrier Highway

Proposal phase	Road section	Distance to nearest residence (m)	Assessment criteria	Existing traffic noise including Girilambone Mine	Calculated Proposal related traffic noise	Future combined traffic noise	Difference between existing and future combined
			Day $L_{eq(15\text{-hour})}$, dB(A)				
Operations	Mitchell Hwy	15	55	47.6	53.9	54.8	7.2
Site establishment[1]	Mitchell Hwy	15	55	n/a	n/a	n/a	n/a
Site establishment[1]	Barrier Hwy	15	55	n/a	n/a	n/a	n/a

Notes: 1. No Proposal related traffic movement is expected during the night-time period.

The predicted road traffic noise levels satisfy the RNP criteria at all residences situated along the Barrier Highway and the Mitchell Highway. The differences between the existing and future combined noise levels are also below the relative increase criteria listed in Table 3.7.

6 Conclusion

The noise impact assessment demonstrates that predicted noise levels satisfy the operational criteria at all assessed residences and for all assessed meteorological conditions during both the site establishment and construction and operational stages.

Sleep disturbance impact from maximum noise level events has been assessed and predicted levels are expected to satisfy the relevant criteria at all private residences.

Road traffic noise associated with the Proposal, during either the establishment phase or the operational phase, is predicted to comply with relevant goals for all residences.

Blast overpressure and vibration calculations identify that the MIC required to construct the box cut and underground portal, and to extract material from underground reserves, would satisfy ANZECC blasting limits at all residences at a maximum MIC of 1000kg. It is understood that Tritton is committed to design blasting events specifically to meet the relevant ANZECC guidelines at nearby residences.

References

Australian and New Zealand Environment Council (ANZECC) 1990, *Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration.*

Australian Standards 2006, AS2187-2: *Explosives – Storage and use Part 2: Use of explosives.*

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New South Wales Roads and Traffic Authority (NSW RTA) 2001, *Noise Management Manual.*

NSW Department of Environment, Climate Change and Water (DECCW) (now EPA) 2011,*Road Noise Policy*.

NSW Department of Environment and Conservation (DEC) 2006, *Assessing Vibration: A Technical Guideline.*

Road and Traffic Authority New South Wales, 2003, *Traffic and Volume Data for Western Region 2002.*

World Health Organisation (WHO), 1999, *Guidelines for Community Noise.*

Appendix A

Sound power levels and single octave frequencies for all plant items

Table A.1 Sound power levels and single octave frequencies for all plant items

Plant item	Sound power level - single octave (dB(Z)) frequency (Hz)								Total	
	63	125	250	500	1K	2K	4 k	8K	dB(Z)	dB(A)
Construction										
Blast drill rig	109	114	118	112	109	108	101	93	121	115
Excavator	107	108	107	104	101	100	94	86	114	107
Haul truck	111	115	114	108	105	103	96	87	120	111
Bulldozer	116	116	107	107	107	104	96	86	120	111
Grader	101	105	106	100	99	96	89	82	112	104
Operation										
Grader	101	105	106	100	99	96	89	82	112	104
Underground haul truck	106	118	115	108	100	97	93	82	121	111
Road train	115	111	99	92	93	96	91	86	117	102
FEL	123	110	108	107	107	104	99	91	125	111
Generator	101	112	115	111	107	103	97	88	118	113
Ventilation fan	116	116	107	98	93	91	88	81	121	104

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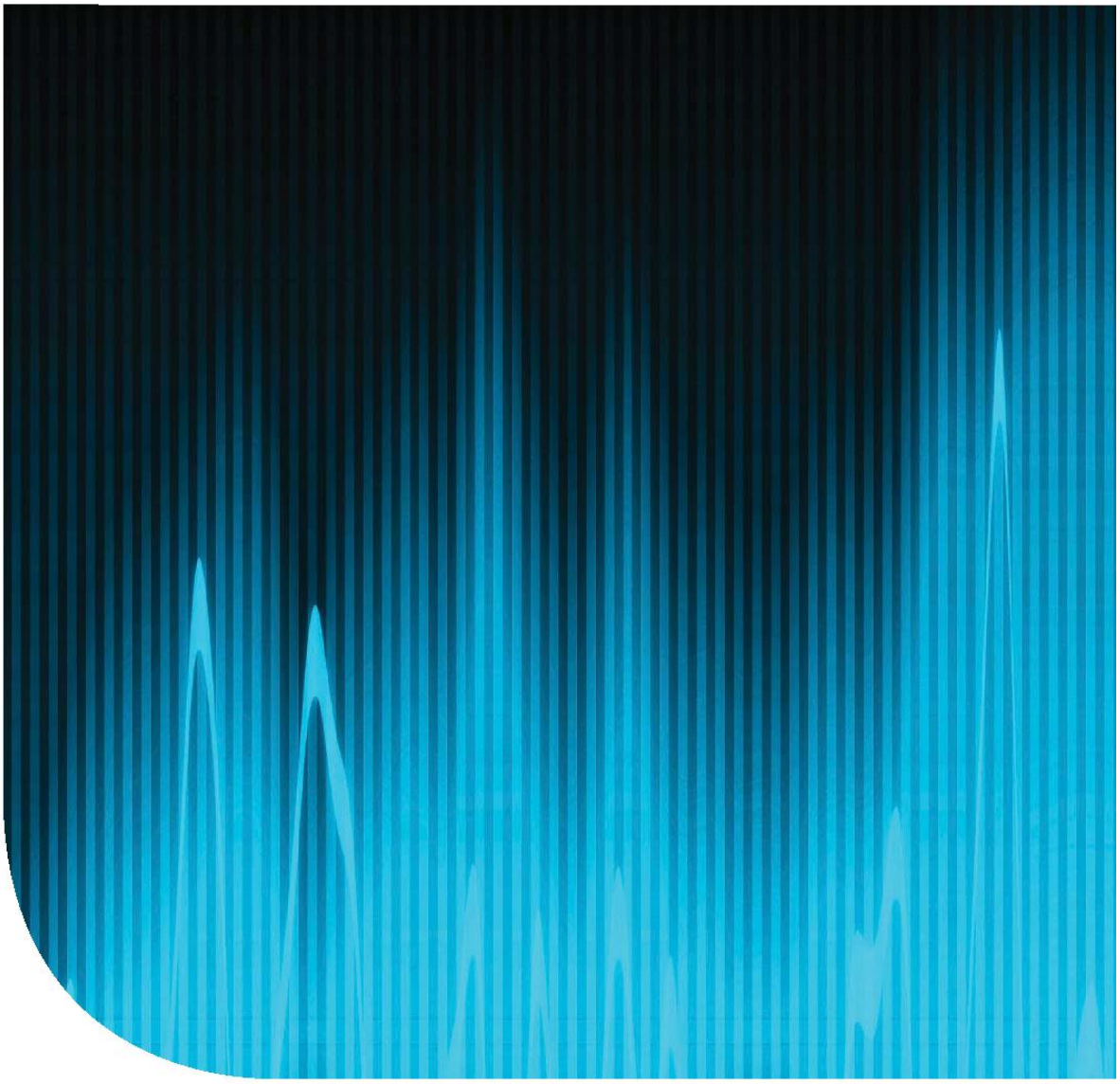

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