

GILGANDRA SHIRE COUNCIL

DA 2021/379 ASSESSMENT REPORT

APPENDIX 6

Additional Information Supplied by Applicant

Noise and Vibration Impact Assessment

Berakee Quarry Extension

Prepared for: Umwelt (Australia) Pty Ltd
March 2021
MAC201046-01RP1V2



Document Information

Noise and Vibration Impact Assessment

Berakee Quarry Extension

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Umwelt (Australia) Pty Ltd (Umwelt) on behalf of Regional Hardrock Gilgandra Unit Trust (Regional Hardrock) to prepare a Noise and Vibration Impact Assessment (NVIA) to quantify potential noise emissions associated with the extension to the Berakee Quarry (the 'Quarry').

The NVIA is provided to accompany the Environmental Impact Statement (EIS) being prepared to assess the proposed extension to operations ('the proposal'). The NVIA has been undertaken in accordance with the following policies and guidelines:

- NSW Environment Protection Authority's (EPA's), Noise Policy for Industry (NPI), 2017;
- NSW Department of Environment and Climate Change (DECC), Interim Construction Noise Guideline (ICNG), 2009;
- NSW Department of Environment, Climate Change and Water (DECCW), NSW Road Noise Policy (RNP), 2011;
- Australian Standard AS2187.2-2006 (AS2187.2) – Explosives-Storage and Use Part 2: Use of Explosives; and
- Australian and New Zealand Environment Council (ANZEC), 1990, Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration.

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

1.1 Project Description

MAC understands that Regional Hardrock proposes to extend the extraction area and associated processing and stockpiling area, increase the production rate and extend the life of the Quarry, located on Lot 1 DP1265657, near Collie NSW. The extension is to provide for additional basalt resource (up to 4.7 Mt) and stockpiling requirements (sufficient to hold up to 250,000t of product) to initially satisfy demand generated by the construction of the Inland Rail Project and then by local and regional demand. To achieve these increases, a number of associated changes to activities and infrastructure on the Project Site would be required including additional extraction equipment and changes to processing equipment, truck movements, water usage, blasting frequency and employment.

The Project Site is located approximately 10km southeast of Collie, NSW (see **Figure 1**). The layout of the Project Site is shown in **Figure 2** which identifies the Extraction Area, the Processing Area and the Stockpiling Area, as well as the locations of key infrastructure.

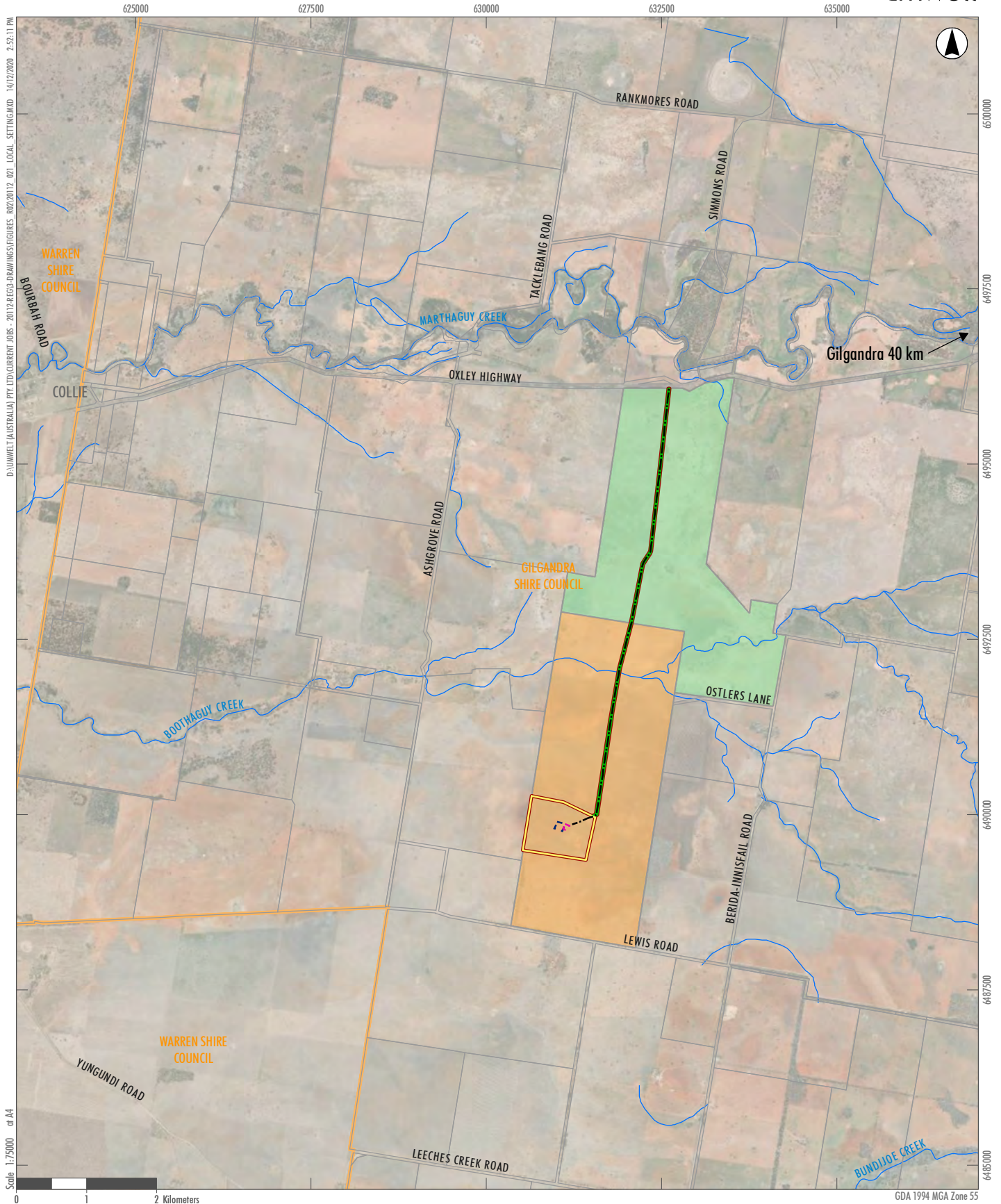
Extraction operations for the Quarry would be undertaken over two stages:

- Stage 1 – extraction of approximately 2.3Mt over 5 years (ie 490,000tpa) to supply hard rock materials to the Inland Rail Project.
- Stage 2 – extraction of 2.4Mt over 20 years (ie 80,000 to 120,000tpa) following completion of the construction of the Inland Rail Project, to supply hard rock products to local and regional markets.

The design criteria for the proposed Extract Area are as follows:

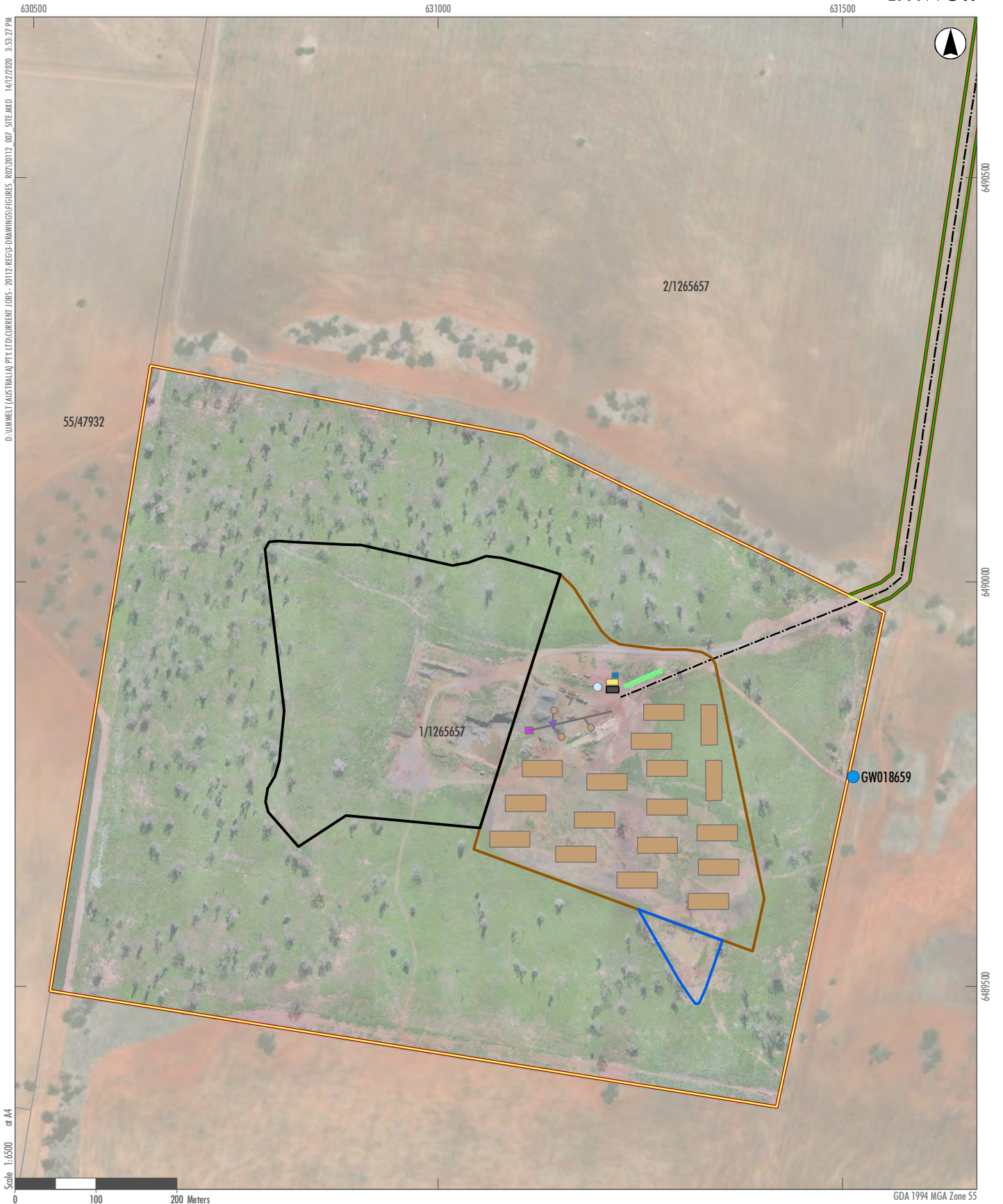
- Maximum Extraction Area Footprint – 8.4ha (based on restriction of depth to 240m AHD as per the current development consent).
- Elevation of final floor – between 240 and 242m AHD.
- Volume – approximately 1,680,000m³.
- Indicative angle of final faces – between 75° and 85°.
- Two final faces of 8m and 10m in height separated by single bench of between 3m and 5m in width.

Processing operations will be undertaken on a campaign basis using a mobile crushing unit which will initially be placed within the existing Crushing and Stockpile Area before being progressively relocated following each blast to adjoin the blasted rock pile (in-pit).



- Legend**
- Project Site
 - Private Haul Road Site
 - Quarry Site
 - Approved Extaction Area
 - Approved Crushing and Stockpile Area
 - Local Government Boundary
 - Berakee Area
 - Wilgaroo Area
 - Haul Road
 - Drainage Line

Figure 1
Local Setting



Legend


















- | | |
|---|--|
|  Project Site |  Stockpile |
|  Private Haul Road Site |  Secondary Cone Crusher |
|  Quarry Site |  Primary Jaw Crusher |
|  Extraction Area |  Conveyor |
|  Stockpile Area |  Car Parking |
|  Sediment Basin |  Haul Road |
|  Crib Room |  Groundwater Bores |
|  Amenities |  Water Tank |
|  Site Office | |

Figure 2
Quarry Site Layout

1.2 Hours of Operation

Table 1 presents the operating hours for the existing quarry. It is noted that the operation hours for the extraction, processing, loading and blasting components of the Project remain unchanged from the existing approved Quarry. The Proponent proposes an extension to transportation hours to meet anticipated demand by allowing for pre-loaded trucks to exit the Quarry between 5am and 6am and for unladen trucks to arrive back to the Quarry between 6pm and 10pm.

Table 1 Hours of Quarry Operation

Activity	Monday to Friday	Saturday	Sunday
Extraction, Processing and Loading ¹	6am – 6pm	6am – 6pm	N/A
Blasting	9am – 3pm	N/A	N/A
Truck Despatch	5am – 10pm	6am – 3pm	N/A

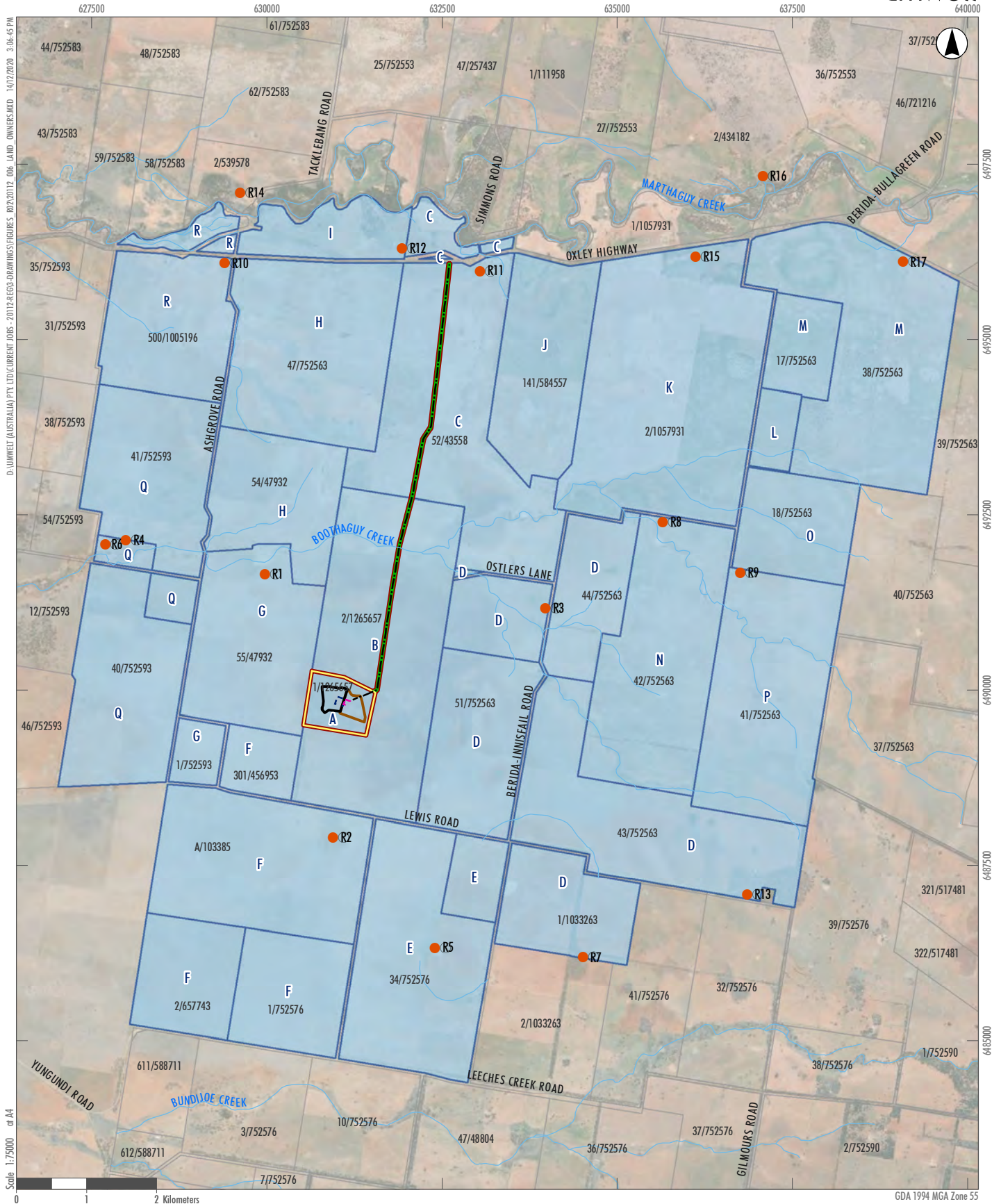
Note 1: Toolbox meetings, pre-start inspections and other activities not involving mobile equipment operations may be undertaken prior to 6am.

1.3 Potentially Sensitive Receivers

From review of aerial imagery and associated project information, the following potentially sensitive receivers have been identified. Receivers in the locality are primarily rural residential. **Table 2** presents a summary of receiver identification, address and MGA(55) coordinates. The location of the receivers are presented visually in **Figure 3**.

Table 2 Receiver Locations

Receivers	Address	MGA55 Coordinates	
		Easting	Northing
R1	467 Ashgrove Road	629973	6491655
R2	196 Lewis Road	630950	6487897
R3	1179 Berida-Innisfail Road	633976	6491163
R4	464 Ashgrove Road	627989	6492143
R5	1326 Berida-Innisfail Road	632401	6486325
R6	464 Ashgrove Road	627697	6492078
R7	1179 Berida-Innisfail Road	634512	6486187
R8	557 Berida-Innisfail Road	635653	6492399
R9	60 Prouts Road	636758	6491673
R10	52 Ashgrove Road	629398	6496093
R11	2661 Oxley Highway	633045	6495980
R12	2770 Oxley Highway	631932	6496305
R13	1179 Berida-Innisfail Road	636855	6487084
R14	200 Tacklebang Road	629623	6497097
R15	2357 Oxley Highway	636122	6496189
R16	2248 Oxley Highway	637078	6497337
R17	2027 Oxley Highway	639077	6496112



- Legend**
- Project Site
 - Private Haul Road Site
 - Quarry Site
 - Proposed Extraction Area
 - Proposed Crushing and Stockpile Area
 - Approved Extraction Area
 - Approved Crushing and Stockpile Area
 - Land Ownership
 - Haul Road
 - Drainage Line
 - Receiver Locations

Figure 3
Land Ownership

1.4 Coverage of Secretary's Environmental Assessment Requirements

The key issues to be addressed, as part of this NVIA are outlined in the Secretary's Environmental Assessment Requirements (SEARs) which are reproduced in **Table 3**.

Table 3 Coverage of SEARs and Other Government Agency Requirements	
Noise and Vibration Assessment Requirement	Reference
Coverage of Secretary's Environmental Assessment Requirements	
Include a quantitative assessment of potential:	
<ul style="list-style-type: none"> Construction and operational noise and off-site transport noise impacts of the development in accordance with the Interim Construction Noise Guideline, NSW Noise Policy for Industry and NSW Road Noise Policy respectively; 	Section 5
<ul style="list-style-type: none"> Reasonable and feasible mitigation measures to minimise noise emissions; and 	Section 6
<ul style="list-style-type: none"> Monitoring and management measures. 	Section 6
Blasting and Vibration – including:	
<ul style="list-style-type: none"> A description of the proposed blasting hours, frequency and methods; and 	Section 1.2 / 4.4
<ul style="list-style-type: none"> An assessment of the likely blasting and vibration impacts of the development having regard to the relevant ANZEC guidelines and paying particular attention to impacts on people, buildings, livestock, infrastructure and significant natural features. 	Section 5.5
Coverage of Issues Identified by Other Government Agencies	
Gilgandra Shire Council (14 September 2020):	
<ul style="list-style-type: none"> The impacts of noise, vibration and blasting will need to be assessed specifically to this site and not solely by reference to other similar sites. Data collected from blasting and crushing operations conducted on this site in relation to the existing quarry approval should be included. 	Section 5
EPA (15 September 2020):	
<ul style="list-style-type: none"> Identify the existing noise environment (including any relevant noise assessment groupings) and identify applicable noise goals in line with relevant guidance/standards. 	Section 1.3 / 2.2 / 3
<ul style="list-style-type: none"> Identify potential noise and vibration sources and impacts during both construction and operational stages and identify best practice mitigation measures (pollution control) and strategies to be incorporated for both stages to minimise noise and vibration emissions/impacts (with proposed timing), including validation monitoring, in line with relevant guidance/standards. 	Section 4 / 5 / 6
<ul style="list-style-type: none"> Propose representative noise monitoring locations for determining compliance with applicable noise goals and where relevant noise goals would be set as representative limits. 	Section 6.2

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2 Noise and Blasting Policy and Guidelines

The following section summarises the relevant policy and guidelines for the proposal.

2.1 Interim Construction Noise Guideline

The assessment and management of noise from construction work is completed with reference to the Interim Construction Noise Guideline (ICNG). The ICNG is specifically aimed at managing noise from construction work regulated by the EPA and is used to assist in setting statutory conditions in licences or other regulatory instruments.

The ICNG sets out procedures to identify and address the impact of construction noise on residences and other sensitive land uses. This section provides a summary of noise objectives that are applicable to the assessment. The ICNG provides two methodologies for the assessment of construction noise emissions:

- Quantitative, which is suited to major construction proposals with typical durations of more than three weeks
- Qualitative, which is suited to short term infrastructure maintenance (for proposals with a typical duration of less than three weeks).

The methodology for a quantitative assessment requires a more complex approach, involving noise emission predictions from construction activities to the relevant assessment locations, whilst the qualitative assessment methodology is a more simplified approach that relies more on noise management strategies.

2.1.1 Standard Hours for Construction

Table 4 summaries the ICNG recommended standard hours for construction works.

Table 4 Recommended Standard Hours for Construction	
Daytime	Construction Hours
Monday to Friday	7am to 6pm
Saturdays	8am to 1pm
Sundays or Public Holidays	No construction

2.1.2 Out of Hours Construction

Works conducted outside of recommended standard hours are considered out of hours work (OOH). The ICNG suggests that any request to vary the hours of construction activities as identified above shall be:

- considered on a case by case basis or activity-specific basis;
- accompanied by details of the nature and need for activities to be undertaken during the varied construction hours; and
- accompanied by written evidence that activities undertaken during the varied construction hours are strongly justified; appropriate consultation with potentially affected receivers and notification of the relevant regulatory authorities has occurred; and all practicable and reasonable mitigation measures will be put in place.

2.1.3 Construction Noise Management Levels

Table 5 reproduces the ICNG management levels for residential receivers. The construction noise management levels are the sum of the management level and relevant rating background level (RBL) for each specific assessment period.

Table 5 Noise Management Levels

Time of Day	Management Level LAeq,15min ¹	How to Apply
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays.	Noise affected RBL + 10dB.	<p>The noise affected level represents the point above which there may be some community reaction to noise.</p> <p>Where the predicted or measured LAeq(15min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level.</p> <p>The proponent should also inform all potentially impacted residents of the nature of work to be carried out, the expected noise levels and duration, as well as contact details.</p>
	Highly noise affected 75dBA.	<p>The highly noise affected level represents the point above which there may be strong community reaction to noise.</p> <p>Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account times identified by the community when they are less sensitive to noise such as before and after school for work near schools, or mid-morning or mid-afternoon for work near residences; and if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.</p>
Outside recommended standard hours.	Noise affected RBL + 5dB.	<p>A strong justification would typically be required for work outside the recommended standard hours.</p> <p>The proponent should apply all feasible and reasonable work practices to meet the noise affected level.</p> <p>Where all feasible and reasonable practices have been applied and noise is more than 5dBA above the noise affected level, the proponent should negotiate with the community.</p> <p>For guidance on negotiating agreements see section 7.2.2.</p>

Note 1: The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the construction noise management levels for noise assessment purposes and is the median of the ABL's.

2.2 Noise Policy for Industry

The EPA released the Noise Policy for Industry (NPI) in October 2017 which provides a process for establishing noise criteria for consents and licenses enabling the EPA to regulate noise emissions from scheduled premises under the Protection of the Environment Operations Act 1997.

The objectives of the NPI are to:

- provide noise criteria that is used to assess the change in both short term and long term noise levels;
- provide a clear and consistent framework for assessing environmental noise impacts from industrial premises and industrial development proposals;
- promote the use of best-practice noise mitigation measures that are feasible and reasonable where potential impacts have been identified; and
- support a process to guide the determination of achievable noise limits for planning approvals and/or licences, considering the matters that must be considered under the relevant legislation (such as the economic and social benefits and impacts of industrial development).

The policy sets out a process for industrial noise management involving the following key steps:

1. Determine the Project Noise Trigger Levels (PNTLs) (ie criteria) for a development. These are the levels (criteria), above which noise management measures are required to be considered. They are derived by considering two factors: shorter-term intrusiveness due to changes in the noise environment; and maintaining the noise amenity of an area.
2. Predict or measure the noise levels produced by the development with regard to the presence of annoying noise characteristics and meteorological effects such as temperature inversions and wind.
3. Compare the predicted or measured noise level with the PNTL, assessing impacts and the need for noise mitigation and management measures.
4. Consider residual noise impacts - that is, where noise levels exceed the PNTLs after the application of feasible and reasonable noise mitigation measures. This may involve balancing economic, social and environmental costs and benefits from the proposed development against the noise impacts, including consultation with the affected community where impacts are expected to be significant.

5. Set statutory compliance levels that reflect the best achievable and agreed noise limits for the development.
6. Monitor and report environmental noise levels from the development.

2.2.1 Project Noise Trigger Levels

The policy sets out the procedure to determine the PNTLs relevant to an industrial development. The PNTL is the lower (ie, the more stringent) of the **Project Intrusiveness Noise Level (PINL)** and **Project Amenity Noise Level (PANL)** determined in accordance with Section 2.3 and Section 2.4 of the NPI.

2.2.2 Project Intrusiveness Noise Level (PINL)

The PINL ($L_{Aeq}(15min)$) is the RBL + 5dB and seeks to limit the degree of change a new noise source introduces to an existing environment. Hence, when assessing intrusiveness, background noise levels need to be measured.

For low noise environments, such as rural environments, minimum assumed RBLs apply within the NPI and can be adopted in lieu of completing background noise measurements. This is considered the most conservative method for establishing noise criteria for a project. These result in minimum intrusiveness noise levels as follows:

- Minimum Day RBL = 35dBA;
- Minimum Evening RBL = 30dBA; and
- Minimum Night RBL = 30dBA.

Due to the rural nature of the locality, the PINLs for the proposal have been determined based on the minimum RBL+5dBA.

2.2.3 Project Amenity Noise Level (PANL)

The PANL is relevant to a specific land use or locality. To limit continuing increases in intrusiveness levels, the ambient noise level within an area from all combined industrial sources should remain below the recommended amenity noise levels specified in Table 2.2 (of the NPI). The NPI defines two categories of amenity noise levels:

- **Amenity Noise Levels (ANL)** – are determined considering all current and future industrial noise within a receiver area; and
- **Project Amenity Noise Level (PANL)** – is the recommended level for a receiver area, specifically focusing on the project being assessed.

Additionally, Section 2.4 of the NPI states: *“to ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a project amenity noise level applies for each new source of industrial noise as follows”:*

PANL for new industrial developments = recommended **ANL** minus 5dBA.

The following exceptions apply when deriving the PANL:

- areas with high traffic noise levels;
- proposed developments in major industrial clusters;
- existing industrial noise and cumulative industrial noise effects; and
- greenfield sites.

Furthermore, where the PANL is applicable and can be satisfied, the assessment of cumulative industrial noise is not required.

The recommended amenity noise levels as per Table 2.2 of the NPI are reproduced in **Table 6**.

Table 6 Amenity Criteria

Receiver Type	Noise Amenity Area	Time of day	Recommended amenity noise level dB LAeq(period)
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks.	See column 4	See column 4	5dB above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
School Classroom	All	Noisiest 1-hour period when in use	35 (internal) 45 (external)
Hospital ward			
- internal	All	Noisiest 1-hour	35
- external	All	Noisiest 1-hour	50
Place of worship			
- internal	All	When in use	40
Passive Recreation	All	When in use	50
Active Recreation	All	When in use	55
Commercial premises	All	When in use	65
Industrial	All	When in use	70

Notes: The recommended amenity noise levels refer only to noise from industrial noise sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated.

Types of receivers are defined as rural residential; suburban residential; urban residential; industrial interface; commercial; industrial – see Table 2.3 and Section 2.7 of the NPI.

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

2.2.4 Maximum Noise Level Assessment

The potential for sleep disturbance from maximum noise level events from a project during the night-time period needs to be considered. The NPI considers sleep disturbance to be both awakenings and disturbance to sleep stages.

Where night-time noise levels from a development/premises at a residential location exceed the following criteria, a detailed maximum noise level event assessment should be undertaken:

- LAeq(15min) 40dB or the prevailing RBL plus 5dBA, whichever is the greater, and/or
- LAmax 52dB or the prevailing RBL plus 15dBA, whichever is the greater.

A detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period.

Other factors that may be important in assessing the impacts on sleep disturbance include:

- how often the events would occur;
- the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the development;
- whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods); and
- current understanding of effects of maximum noise level events at night.

2.3 Road Noise Policy

The road traffic noise criteria are provided in the Department of Environment, Climate Change and Water NSW (DECCW), Road Noise Policy (RNP), 2011. The policy sets out noise criteria that provide for a degree of amenity appropriate for the land use and road category.

For some industries such as mines and extractive industries, that are not served by arterial roads, a principal haulage route may be identified. The RNP indicates that where local authorities identify a 'principal haulage route', the noise criteria for the route should match those for arterial/sub-arterial roads, recognising that they carry a different level and mix of traffic to local roads.

2.4 ANZEC Blasting Guidelines

Noise and vibration levels from blasting are assessable against criteria established in the Australian and New Zealand Environment Council (ANZEC) – Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration. The blasting limits are generally consistent with the guideline levels contained within AS2187:2006 Part 2 – Explosives - Storage and Usage – Part 2. Where compliance is achieved, the risk of human annoyance is minimised.

Furthermore, for damage induced vibration, German Standard DIN 4150 - Part 3: 1999 provides the strictest guideline levels of vibration velocity for evaluating the effects of vibration in structures. Blasting and vibration induced damage criteria relevant to this assessment are presented in detail in **Section 3.4**.

The guidelines recommend that blasting should generally be permitted during the hours of 9am to 5pm Monday to Saturday only. Blasting should not occur on Sundays or Public Holidays. Furthermore, blasting should generally take place no more than once per day.

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3 Assessment Criteria

The following sections summarise the relevant noise and blasting criteria for the proposal.

3.1 Construction Noise Management Levels

Noise Management Levels (NMLs) for construction activities for all residential receivers are 45dB LAeq(15min) (RBL +10dB). Construction activities are planned for standard hours, however the relevant NML standard construction hours and out of hours periods are summarised in **Table 7**.

Table 7 Construction Noise Management Levels			
Location	Assessment Period	RBL dB LA90	NML dB LAeq(15min)
All Residential Receivers	Day (Standard Hours)	35	45 (RBL+10dBA)
	Evening (OOH Period 1)	30	35 (RBL+5dBA)
	Night (OOH Period 2)	30	35 (RBL+5dBA)

3.2 Operational Criteria

3.2.1 Project Intrusiveness Noise Levels

The PINLs for the Project are presented in **Table 8** and have been determined based on the RBL +5dBA.

Table 8 Intrusiveness Noise Levels			
Receiver Type	Period ¹	Adopted RBL ² dB LA90	PINL dB LAeq(15min)
Residential	Morning Shoulder	30	35
	Day	35	40
	Evening	30	35

Note 1: Morning Shoulder – the period from 6am to 7am Monday to Saturday; Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening – the period from 6pm to 10pm.

Note 2: Minimum RBLs adopted.

3.2.2 Project Amenity Noise Levels

The PANLs for residential receivers potentially affected by the Project are presented in **Table 9**.

Table 9 Project Amenity Noise Levels				
Receiver Type	Noise Amenity Area	Assessment Period ¹	Recommended ANL dB LAeq(period) ²	PANL dB LAeq(15min) ³
Residential Receivers	Rural	Morning Shoulder	40	43
		Day	50	53
		Evening	45	48

Note 1: Morning Shoulder – the period from 6am to 7am Monday to Saturday; Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening – the period from 6pm to 10pm.

Note 2: Recommended amenity noise levels as per Table 2.2 of the NPI.

Note 3: Includes a +3dB adjustment to the amenity period level to convert to a 15-minute assessment period as per Section 2.2 of the NPI.

3.2.3 Project Noise Trigger Levels

The PNTLs are the lower of either the PINL or the PANL. **Table 10** presents the derivation of the PNTL in accordance with the methodologies outlined in the NPI.

Table 10 Project Noise Trigger Levels					
Receiver Type	Period	RBL	PINL dB LAeq(15min)	PANL dB LAeq(15min)	PNTL dB LAeq(15min)
Residential	Morning Shoulder	30	35	43	35
	Day	35	40	53	40
	Evening	30	35	48	35

Note 1: Morning Shoulder – the period from 6am to 7am Monday to Saturday; Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening – the period from 6pm to 10pm.

3.2.4 Maximum Noise Assessment Trigger Levels

The maximum noise trigger levels shown in **Table 11** are based on night time RBLs and trigger levels as per Section 2.5 of the NPI. The trigger levels will be applied to transient noise events that have the potential to cause sleep disturbance.

Table 11 Maximum Noise Assessment Trigger Levels			
Residential Receivers			
LAeq(15min)		LAmax	
40dB LAeq(15min) or RBL + 5dB		52dB LAmax or RBL + 15dB	
Trigger	40	Trigger	52
RBL 30+5dB	35	RBL 30+15dB	45
Highest	40	Highest	52

Note: Monday to Saturday; Night 10pm to 7am. On Sundays and Public Holidays; Night 10pm to 8pm.

Note: As per Section 2.5 of the NPI, the highest of the two criteria are adopted as the trigger level.

3.3 Road Traffic Noise Criteria

In accordance with the RNP, this assessment has adopted the 'Freeway/arterial/sub-arterial road' category for the designated inbound and outbound transport routes, consistent with the classification of the haulage route as a 'principal haulage route'. **Table 12** reproduces the road traffic noise assessment criteria relevant for this road type.

Table 12 Road Traffic Noise Assessment Criteria for Residential Land Uses			
Road category	Type of Project/development	Assessment Criteria - dB(A)	
		Day (7am to 10pm)	Night (10pm to 7am)
Freeway/arterial/sub-arterial road	Existing residences affected by additional traffic on existing freeways/sub-arterial/roads	60dB(A)	55dB(A)
	generated by land use developments	LAeq(15hr)	LAeq(9hr)

Note: For road noise assessments, the day period is from 7am to 10pm (ie there is no evening assessment period as there is with operational noise). Night is from 10pm to 7am.

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 2dB, which is generally accepted as the threshold of perceptibility to a change in noise level.

3.3.1 Relative Increase Criteria

In addition to meeting the assessment criteria, any significant increase in total traffic noise at receivers must be considered. Receivers experiencing increases in total traffic noise levels above those presented in **Table 13** due to the addition of project vehicles on the Oxley Highway should be considered for mitigation.

Table 13 Increase Criteria for Residential Land Uses

Road Category	Type of Project/Development	Total Traffic Noise Level Increase, dB(A)	
		Day (7am to 10pm)	Night (10pm to 7am)
Freeway/arterial/sub-arterial roads and transitways	New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road.	Existing traffic LAeq(15hr) +12dB (external)	Existing traffic LAeq(9hr) +12dB (external)

3.4 ANZEC Guideline Blasting Limits

The ANZEC blasting limits for air-blast overpressure and ground vibration are presented in **Table 14**.

Table 14 ANZEC Guideline Blasting Limits

	Overpressure dB (Linear Peak)	Ground Vibration PPV (mm/s)
Recommended Maximum (95% of all blasts)	115	5
Level not to be exceeded	120	10
Long term goal for ground vibration	N/A	2

4 Noise Assessment Methodology

A computer model was developed to quantify the proposal noise emissions to neighbouring receivers for typical construction activities and operations. DGMR (iNoise, Version 2020.0) noise modelling software was used to quantify noise emissions from typical construction activities and operations. iNoise is a new intuitive and quality assured software for industrial noise calculations in the environment. 3D noise modelling is considered industry best practice for assessing noise emissions from projects.

The model incorporated a three-dimensional digital terrain map giving all relevant topographic information used in the modelling process. Additionally, the model uses relevant noise source data, ground type, attenuation from barrier or buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers.

The model calculation method used to predict noise levels was in accordance with ISO 9613-1 'Acoustics - Attenuation of sound during propagation outdoors. Part 1: Calculation of the absorption of sound by the atmosphere' and ISO 9613-2 'Acoustics - Attenuation of sound during propagation outdoors. Part 2: General method of calculation'. The ISO 9613 standard from 1996 is the most used noise prediction method worldwide. Many countries refer to ISO 9613 in their noise legislation. However, the ISO 9613 standard does not contain guidelines for quality assured software implementation, which leads to differences between applications in calculated results. In 2015 this changed with the release of ISO/TR 17534-3. This quality standard gives clear recommendations for interpreting the ISO 9613 method. iNoise fully supports these recommendations. The models and results for the 19 test cases are included in the software.

4.1 Construction Noise Modelling Parameters

A worst-case modelling scenario was adopted in this assessment to represent maximum noise emissions during construction of temporary amenities and formation of the carpark hardstand area. It is noted that there are potentially multiple and varied plant items which may be used in the construction phase of this project. Notwithstanding, the adopted fleet sound power level is considered representative of construction activities for this type of project.

The noise emission levels used in modelling are summarised in **Table 15**.

Table 15 Equipment Sound Power Levels - Construction

Item	LAeq(15min) Sound Power Level (SWL), dBA	Period of Operation
Backhoe (small) (x1)	103	Day Only
Road Truck (x1)	102	Day Only
Grader (x1)	104	Day Only
Hand power tools	97	Day Only
Total Fleet	108	Day Only

4.2 Operational Noise Modelling Parameters

4.2.1 Meteorological Analysis

Noise emissions from industry can be significantly affected by prevailing weather conditions. Wind has the potential to increase noise at a receiver when it is at low velocities and travels from the direction of the noise source. As the strength of the wind increases, the noise produced by the wind will mask the audibility of most industrial sources.

Meteorological conditions that enhance received noise levels include source to receiver winds and the presence of temperature inversions. To account for potential enhancements, the NPI specifies that the source to the receiver wind component speeds up to 3m/s for 30% or more of the time in any seasonal period (ie day, evening or night), is considered to be a feature wind and predictions must incorporate these conditions.

To determine the prevailing conditions for the Quarry, weather data during the period September 2017 to September 2019 was obtained from the Bureau of Meteorology's (BOM) Dubbo Airport (AWS) weather station located approximately 58km south-south-east of the Quarry Site. The data was analysed using the EPA's Noise Enhancement Wind Analysis (NEWA) program in order to determine the frequency of occurrence of winds of speeds up to 3m/s in each season.

Table 16 summarises the results of the wind analysis and includes the dominant wind direction and percentage occurrence during each season for each assessment period. The results of the detailed analysis of meteorological data is presented in **Appendix B**.

Table 16 Seasonal Frequency of Occurrence Wind Speed Intervals

Season	Period ¹	Wind Direction $\pm(45^\circ)$	% Wind Speeds (m/s)
			0.5 to 3 m/s
Summer	Day	NNW	8
	Evening	NE	12
	Night	ESE	14
Autumn	Day	ESE	12
	Evening	ESE	16
	Night	ESE	17
Winter	Day	ESE	12
	Evening	SSW, SW	16
	Night	ESE	21
Spring	Day	ESE	8
	Evening	SSW, SW	12
	Night	ESE	15

Based on the results of this analysis, prevailing winds are not applicable for the assessment and the relevant meteorological conditions adopted are summarised in **Table 17**.

Table 17 Modelled Site Specific Meteorological Parameters

Assessment Condition	Temperature	Wind Speed / Direction	Relative Humidity	Stability Class
Morning Shoulder - Inversion	10°C	2m/s / all directions	90%	F
Day - Calm	20°C	n/a	60%	n/a
Evening - Inversion	15°C	2m/s / all directions	70%	F

Note: Morning Shoulder – the period from 6am to 7am Monday to Saturday; Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening – the period from 6pm to 10pm.

4.2.2 Operational Noise Modelling Scenarios

The extraction operations of the Project would be undertaken over two stages. Stage 1 operations would involve the extraction of approximately 2.3Mt over 5 years (ie 490,000tpa) to supply hard rock material to the Inland Rail Project. During this stage, primary crushing activities would initially occur at the natural land surface before being relocated into the extraction area as the Quarry expands. During Stage 2, quarrying operations would continue down to approximately 240 to 242m AHD and the intensity of extraction would be reduced to approximately 80,000 to 120,000tpa of hard rock products to supply local markets.

To represent the worst-case operational activities, one (1) modelling scenario was adopted to assess operational noise emissions during Stage 1 of the Project. It is considered that where operational noise

emissions for Stage 1 of the Project are demonstrated to achieve the operational noise criteria, noise emissions during Stage 2 operations would also achieve the criteria.

The scenario is summarised below:

- Stripping of soil by bulldozer or excavator to expose the basalt resource. Soil would be spread onto the amenity bund or placed in wind row stockpiles within the Extraction Area footprint;
- The in-situ rock would be fragmented using conventional drill and blast techniques;
- Extracted Quarry material would be transferred direction to a mobile crushing unit (MCU) or to the Run-of-Mine (ROM) stockpile by front-end loader;
- After crushing, the Quarry products would be loaded to haul trucks and distributed to stockpiles within the Stockpile Area; and
- Road trucks would transport the material offsite via the private haul road.

It is noted that the MCU would initially be placed within the existing crushing and stockpiling area before being relocated within the pit to adjoin the blasted rock pile. The MCU in pit locations would be approximately 10m to 15m below the natural land surface level.

4.2.3 Sound Power Levels - Operation

Mobile plant noise emission data used in modelling for this assessment were obtained from the MAC noise database for relevant noise sources that are proposed to be used in the Quarry. The noise emission levels used in modelling are presented in **Appendix C** and summarised in **Table 18**.

Table 18 Equipment Sound Power Levels

Item	dB LAeq(15min) Sound Power Level (SWL)	Period of Operation		
		Day	Evening	Morning Shoulder
Operational Noise Sources				
Drill Rig (x1)	114	✓	x	✓
Bulldozer (x1)	111	✓	x	✓
Excavator (x1)	106	✓	x	✓
Dump Truck (x2)	109	✓	x	✓
Water Truck (x1)	101	✓	x	✓
Mobile Crushing Unit	113	✓	x	✓
Loader (x1) ¹	106	✓	x	✓
Backhoe (x1)	103	✓	x	✓
Road Trucks (70/day)	102	✓	✓	✓
Sleep Disturbance Assessment (LAmax)				
Truck Loading	117	x	x	✓

Note 1: Loader not used during Stage 2 of operations.

4.2.4 Annoying Characteristics

Fact Sheet C of the NPI provides guidelines for applying 'modifying factors' adjustments to account for annoying noise characteristics such as low frequency, tonality, intermittent noise, irregular or noise of short duration. An assessment of annoying characteristics has been undertaken for the project, and is provided in **Appendix D**. It is noted that due to the nature of the Quarry operations, intermittent noise is unlikely to be a feature of the site and has not been considered further.

The analysis of low-frequency noise found that modelled noise levels from all sources exceeded the screening test of C-A weighted noise levels greater or equal to 15dB. Further analysis was undertaken to determine whether noise levels exceeded the threshold in any octave band. The results of the assessment indicated that Z weighted noise levels remained below the relevant thresholds for all octave bands for each receiver location. Hence, no correction for low-frequency noise is applied.

An assessment of tonality was undertaken to identify dominant tones associated with the Quarry. The tonal noise correction applies when the level of an octave band exceeds the level of the adjacent band on either side by at least 5dB. The results of the tonality assessment demonstrates that the Quarry operations do not result in dominant tones. Hence, no correction for tonality is applied.

4.3 Road Noise Assessment Methodology

Extracted material would typically be transported from the proposal using B-Double configuration trucks or similar. Once loaded within the Stockpile Area, trucks would exit the Project Site onto to the private haul road to the Oxley Highway, which traverses portions of the 'Berakee' and 'Wilgaroo' properties under a right of carriageway agreement (see **Figure 1**).

Once at the Oxley Highway, which is a major east west transport route linking the mid north coastal regions to the central western regions of NSW, approximately 95% of heavy vehicle movements would be in an easterly direction.

There are no residential receivers immediately adjacent to the private haul road. The closest offset distances to receivers along the Oxley Highway are approximately 100m within the vicinity of the Quarry and approximately 70m to receivers within the township of Collie.

Maximum dispatch from the Quarry will be up to 35 loads per day (70 movements) and up to a maximum of 10 loads per hour (20 movements). There would be approximately 12 light vehicle movements associated with the proposal per day. Based on annual average daily traffic (AADT) volumes from the TfNSW Traffic Volume Viewer (2009), the Oxley Highway carries approximately 550 vehicles per day with approximately 19% of those classified as heavy vehicles.

The United States (US) Environment Protection Agency's road traffic calculation method was used to predict the LAeq noise levels from proposal related trucks travelling past existing receivers on Ostlers Lane. This method is an internationally accepted theoretical traffic noise prediction model and is ideal for calculating road traffic noise where relatively small traffic flows are encountered.

4.4 Blasting and Vibration Assessment Methodology

4.4.1 Indicative Blast Design

The in-situ rock would be fragmented using drill and blast techniques. The indicative blast design parameters are provided in **Table 19**.

Table 19 Blast Parameters	
Parameter	Value
Blast hole diameter	89mm
Blast hole depth	5.5 to 11m
Blast hole spacing	~3m x 3m
Depth of stemming	1 to 2m
Size of blast	8,000 to 12,000bcm
Area of blast	500 to 1,500m ³
Bulk explosive type/initiation system	ANFO/None
Maximum Instantaneous Change (MIC)	Up to 50kg

4.4.2 Air-Blast Overpressure

Calculation of overpressure has been completed using the following AS2187.2 equation:

$$P = K_a \left(\frac{R}{(Q^{1/3})} \right)^a$$

Where:

P = Pressure, in kilopascals;

Q = Effective explosives charge mass, in kilograms (MIC);

R = Distance from charge, in metres;

K_a = Site constant, a conservative value of 25 was adopted; and

a = Site exponent, a value of -1.45 was adopted.

The conversion of 'P' to unweighted decibels (dBZ) is completed using the following formula:

$$SPL = 10 \times \log \left(\frac{P}{P_0} \right)^2$$

4.4.3 Ground-Borne Vibration

Preliminary estimations for vibration have been completed using the following AS2187.2 equation:

$$V = K_g \left(\frac{R}{(Q^{1/2})} \right)^{-B}$$

Where:

V = ground vibration as vector peak particle velocity, in mm/s;

R = distance between charge and point of measurement, in m;

Q = maximum instantaneous charge (effective charge mass per delay), in kg;

K_g = a constant related to site and rock properties for estimation purposes, a value of 1140 was adopted as per AS2187.2 to predict the 50% chance of exceedance in "average conditions"; and

B = a constant related to site and rock properties for estimation purposes, a value of 1.6 was adopted.

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5 Noise Modelling Results and Discussion

5.1 Construction Phase Noise Results

Predicted noise levels for the construction scenario described in **Section 4.1** are provided in **Table 20**. The results of the analysis show that noise emissions from each of the construction scenarios are predicted to satisfy the relevant noise management levels at all receiver locations.

Table 20 Combined Noise Predictions – Construction Scenarios			
Receiver	Predicted Noise Level dB LAeq(15min)	Day Period NML dB LAeq(15min)	Compliant
R1	<30	45	✓
R2	<30	45	✓
R3	<30	45	✓
R4	<30	45	✓
R5	<30	45	✓
R6	<30	45	✓
R7	<30	45	✓
R8	<30	45	✓
R9	<30	45	✓
R10	<30	45	✓
R11	<30	45	✓
R12	<30	45	✓
R13	<30	45	✓
R14	<30	45	✓
R15	<30	45	✓
R16	<30	45	✓
R17	<30	45	✓

5.2 Operational Noise Results

Predicted Quarry operations include extraction, processing, product loading and transportation. The predicted noise levels at each receiver during calm and prevailing meteorological conditions are provided in **Table 21**. The noise contour maps for the Quarry operations are provided in **Appendix E**.

The results of the predictive modelling show that noise emissions from the Quarry satisfy the PNTL at all residential receivers, for each operational scenario under normal operating conditions. The assessment considered both calm and adverse (F Class inversion) meteorological scenarios.

Table 21 Predicted Operational Noise Levels, dB LAeq(15min)

Receiver	Predicted Noise Level dB LAeq(15min)			PNTL dB LAeq(15min)			Compliant
	Shoulder ¹	Day	Evening ^{1,2}	Shoulder	Day	Evening	
R1	30	<30	<30	35	40	35	✓
R2	33	31	<30	35	40	35	✓
R3	<30	<30	<30	35	40	35	✓
R4	<30	<30	<30	35	40	35	✓
R5	<30	<30	<30	35	40	35	✓
R6	<30	<30	<30	35	40	35	✓
R7	<30	<30	<30	35	40	35	✓
R8	<30	<30	<30	35	40	35	✓
R9	<30	<30	<30	35	40	35	✓
R10	<30	<30	<30	35	40	35	✓
R11	<30	<30	<30	35	40	35	✓
R12	<30	<30	<30	35	40	35	✓
R13	<30	<30	<30	35	40	35	✓
R14	<30	<30	<30	35	40	35	✓
R15	<30	<30	<30	35	40	35	✓
R16	<30	<30	<30	35	40	35	✓
R17	<30	<30	<30	35	40	35	✓

Note: Morning Shoulder – the period from 6am to 7am Monday to Saturday or 6am to 8am Sundays and public holidays; Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays.

Note 1: Assessed during inversion conditions.

Note 2: Trucks returning to Quarry Site during evening only.

5.3 Maximum Noise Level Assessment

In assessing sleep disturbance, a typical L_{Amax} noise source of 117dB was used to represent transient events associated with loading trucks with Quarry products to the assessed residential receivers under F Class stability conditions (ie worst case).

The results of the analysis identify that maximum noise trigger levels will be satisfied for all residential receivers, hence no further assessment or detailed analysis is required. Predicted noise levels from L_{Amax} events are presented in **Table 22**.

Table 22 Predicted Maximum Noise Levels

Receiver	Period	Noise Predictions	Trigger Level
		dB L _{Amax}	dB L _{Amax}
R1	Morning Shoulder	<30	52
R2		<30	52
R3		<30	52
R4		<30	52
R5		<30	52
R6		<30	52
R7		<30	52
R8		<30	52
R9		<30	52
R10		<30	52
R11		<30	52
R12		<30	52
R13		<30	52
R14		<30	52
R15		<30	52
R16		<30	52
R17		<30	52

Note: Morning Shoulder – the period from 6am to 7am Monday to Saturday or 6am to 8am Sundays and public holidays.

5.4 Traffic Noise Results

The results of the traffic noise calculations for operational road traffic are presented in **Table 23** for the closest residential receivers to the Oxley Highway, identified as 1 Coonamble Street and 1840 Oxley Highway, setback approximately 70m and 100m respectively from the carriageway.

Maximum dispatch from the Quarry will be up to 35 loads per day (70 movements) and up to a maximum of 10 loads per hour (20 movements). There would be approximately 12 light vehicle movements associated with the proposal per day. For this assessment, it has been assumed that all vehicles travel along the proposed haul route to the Oxley Highway.

Based on the most recent AADT volumes, the Oxley Highway carries approximately 550 vehicles per day with approximately 19% of those classified as heavy vehicles.

Table 23 Operational Road Traffic Noise Levels – Residential Receivers

Offset Distance (m)	Assessment Criteria ¹	Traffic Noise dB LAeq(period)		Total Change
		Existing Traffic Noise	Existing + Future Quarry Combined	
1 Coonamble Street				
70m	Day 60 dB LAeq(15hr)	35.4	37.1	+1.7
	Night 55 dB LAeq(9hr)	32.6	34.0	+1.4
1840 Oxley Highway				
100m	Day 60 dB LAeq(15hr)	31.8	33.4	+1.6
	Night 55 dB LAeq(9hr)	<30	30.4	+1.5

Note 1: Day 7am to 10pm. Night 10pm to 7am.

The traffic noise contribution from the Quarry is predicted to remain below the relevant day and night assessment criteria for the nearest residential receivers.

5.5 Blasting Results

The Proponent anticipates the requirement for up to 12 blasts per year during Stage 1, and approximately three blast per year during Stage 2.

Blast overpressure and vibration have been calculated to each assessed receiver for the proposal adopting a Maximum Instantaneous Charge (MIC) of up to 50kg. Calculated levels for overpressure and vibration have been compared to the relevant ANZEC criteria and are presented in **Table 24**. Results identify blasts of MICs up to 50kgs would satisfy relevant ANZEC overpressure and vibration criteria.

Notwithstanding, the proposed MIC blast patterns should be completed in conjunction with an appropriate blast monitoring program.

Table 24 Blasting Emissions			
Receiver ID ¹	Distance to Charge	Airblast Overpressure	Ground Vibration
	km	dBZ Peak	mm/s
R1	2.1	102	0.12
R2	1.9	103	0.14
R3	3.2	97	0.06
R4	3.8	94	0.05
R5	3.8	95	0.05
R6	4.0	94	0.04
R7	5.0	91	0.03
R8	5.3	90	0.03
R9	6.0	89	0.02
R10	6.5	88	0.02
R11	6.5	88	0.02
R12	6.5	88	0.02
R13	6.4	88	0.02
R14	7.4	86	0.02
R15	8.1	85	0.01
R16	9.6	83	0.01
R17	10.2	82	0.01

5.5.1 Effects of Vibration on Infrastructure from Blasting

The nearest significant infrastructure to the Quarry is the Oxley Highway approximately 6.3km to the north of the Quarry. Vibration levels at the Oxley Highway are calculated to be below 5mm/s. Hence there are no significant vibration effects from blasting on significant infrastructure.

5.5.2 Effects of Blasting on Animals and Livestock

Blast effects resulting from the Quarry are predicted to be, at worst for overpressure up to 103dBZ, and for vibration up to 0.14mm/s at the nearby residential receiver locations. The calculated blast over pressure and vibration levels are well below the regulatory criteria and considerably lower than other sources of overpressure that horses or livestock are likely to be already subjected to such as lightning strikes which are typically between 120dBZ and 130dBZ¹.

¹ Equine Health Impact Statement – Drayton South Coal Project (2015)

6 Noise Monitoring and Management

6.1 Noise Management Measures

Although it is demonstrated that noise levels are predicted to meet the relevant noise goals and no further mitigation measures are required, to proactively address any potential residual noise impacts, a noise management plan (NMP) may be considered for the Quarry. The NMP will guide, manage, quantify and control noise emissions from the Quarry through the implementation of feasible and reasonable best management practices. These may include:

- Scheduling the use of noisy equipment at the least-sensitive time of day;
- Strictly adhering to the proposed hours of operation;
- Siting noisy equipment behind structures that act as barriers, or at the greatest distance from the noise-sensitive area.
- Keeping equipment well maintained and operating it in a proper and efficient manner.
- Employing 'quiet' practices when operating equipment, for example, positioning idling trucks in appropriate areas.
- Running staff-education programs and regular tool box talks on the effects of noise and the use of quiet work practices.

The NMP may also address the use of best available technology including alternatives to tonal reversing alarms, efficient muffler design, and using enclosures, as well as reducing noise in transmission or at the receiver.

6.2 Noise Monitoring

It is recommended that the NMP includes a provision for attended noise monitoring within the community in response to received complaints, if any. The operator attended noise measurements and recordings would be conducted to quantify noise emissions from the Quarry as well as the overall level of ambient noise.

As per the EPA's Recommended Environmental Assessment Requirements, it is recommended that one (1) round of validation monitoring is undertaken within six (6) months of initiation of operations. Where validation monitoring is undertaken, the survey should be carried out at the nearest residential receiver locations, identified as R1 and R2, and occur under normal operating conditions. The survey should include one (1) 15-minute measurement at each of the nominated receivers during the morning shoulder period (6am to 7am) and day period (7am to 6pm). The noise measurements would occur in accordance with the method outlined below.

When required, the operator shall quantify and characterise the energy equivalent (L_{Aeq}) intrusive noise level from the project over a 15-minute measurement period. In addition, the operator shall quantify and characterise the overall levels of ambient noise over the 15-minute measurement interval. It is recommended that instrumentation used during the monitoring is to be equivalent to a Type 1 meter with 1/3 octave band analysis and have audio recording functionality for post processing source identification. It is noted that 1/3 octave band analysis is required to establish whether modification factors in accordance with the NPI are to be applied.

All acoustic instrumentation used as part of the attended monitoring program must be designed to comply with the requirements of AS IEC 61672.1-2019, Electroacoustics - Sound level meters - Specifications and shall have current calibration certificates. All instrumentation shall be programmed to record statistical noise level indices in 15-minute intervals including L_{Amax} , L_{Amin} and L_{Aeq} .

Instrument calibration shall be checked before and after each measurement survey, with the variation in calibrated levels not exceeding ± 0.5 dBA. The measurement position(s) should be selected considering:

- weather conditions such as rain and wind, insect noise;
- the location and direction of any noise source/s;
- the most sensitive position at the affected receiver; and
- the need to avoid reflecting surfaces (where possible).

7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has conducted a NVIA of potential impacts from the proposal for extension of the Berakee Quarry near Collie, NSW. The assessment has quantified potential construction and operational noise emissions pertaining to extraction, processing, drilling and dispatch via road trucks, as well as blasting noise and vibration emissions.

The results of the NVIA demonstrate that construction and operational noise levels would achieve the relevant ICNG and NPI criteria for all assessment periods at each assessed receiver location.

An assessment of maximum noise levels demonstrated that noise emissions from the proposal are predicted to remain below the EPA trigger levels for sleep disturbance at all receiver locations.

The NVIA demonstrates that the project related road traffic noise levels will meet the objectives of the RNP for the nearest residential receivers to the Oxley Highway.

Airblast overpressure and vibration levels are also predicted to meet the criteria at all assessed receivers for blasts up to 50kg MIC.

Based on the NVIA results, there are no noise or blasting related issues which would prevent the approval of the project. The results of the assessment show compliance with the relevant operational and road noise criteria. Additionally, the results of the assessment demonstrate compliance with the relative EPA and DECCW policies, without ameliorative measures being required.

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Appendix A – Glossary of Terms

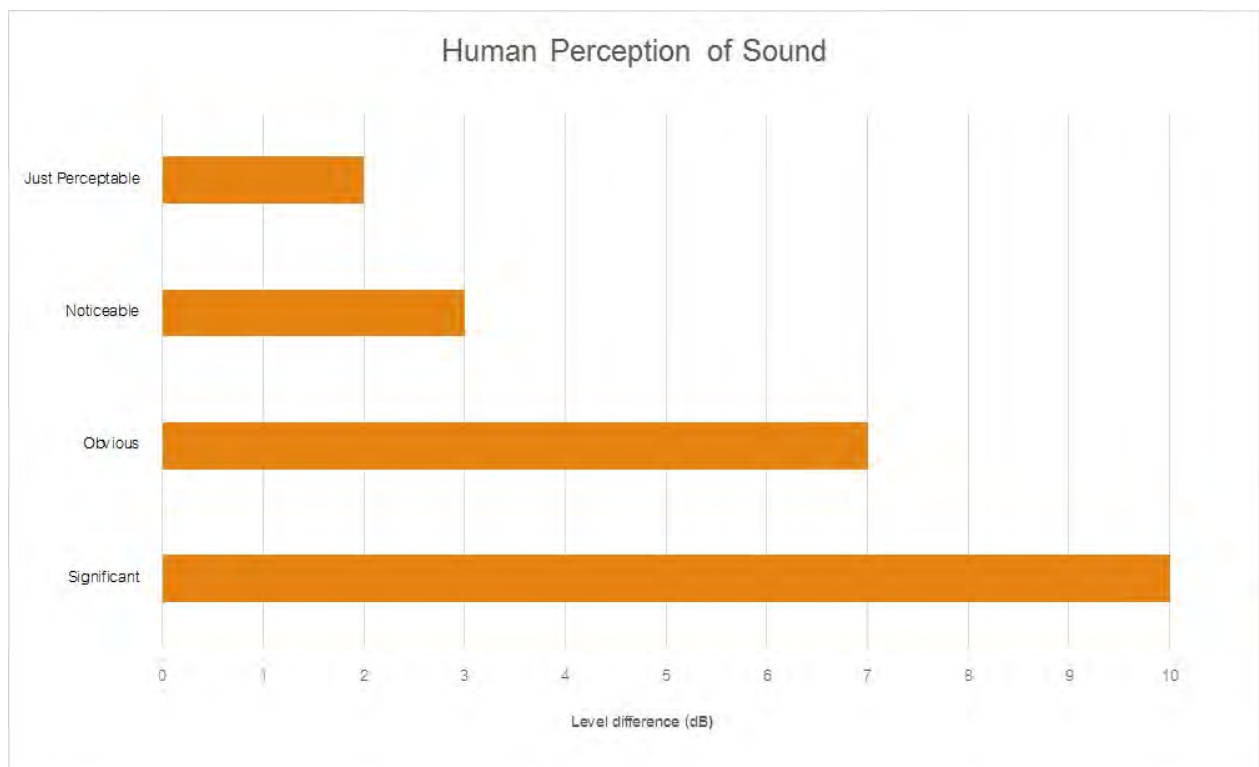
Table A1 provides a number of technical terms have been used in this report.

Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
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. In some cases the overall change in noise level is described in dB rather than dB(A), or dB(Z) which relates to the weighted scale.
dB(Z)	Linear Z-weighted decibels.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAmax	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure 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 ABL's.
Sound power level (LW)	<p>This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by :</p> $= 10 \cdot \log_{10} (W/W_0)$ <p>Where : W is the sound power in watts and W₀ is the sound reference power at 10-12 watts.</p>

Table A2 provides a list of common noise sources and their typical sound level.

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dB(A)	
Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



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Appendix B – NEWA Analysed Meteorology

Table B1 NEWA Analysed Daytime Meteorological Conditions, Dubbo Airport AWS NSW

Direction ± 45°	Season	Day	Direction	Season	Day
		Percentage Occurrence %			Percentage Occurrence %
0	Summer	7	180	Summer	3
0	Autumn	6	180	Autumn	8
0	Winter	6	180	Winter	9
0	Spring	5	180	Spring	6
22.5	Summer	7	202.5	Summer	4
22.5	Autumn	7	202.5	Autumn	6
22.5	Winter	6	202.5	Winter	7
22.5	Spring	6	202.5	Spring	5
45	Summer	6	225	Summer	4
45	Autumn	8	225	Autumn	5
45	Winter	6	225	Winter	6
45	Spring	6	225	Spring	4
67.5	Summer	5	247.5	Summer	4
67.5	Autumn	8	247.5	Autumn	5
67.5	Winter	6	247.5	Winter	7
67.5	Spring	6	247.5	Spring	4
90	Summer	4	270	Summer	5
90	Autumn	9	270	Autumn	4
90	Winter	9	270	Winter	7
90	Spring	7	270	Spring	4
112.5	Summer	5	292.5	Summer	5
112.5	Autumn	12	292.5	Autumn	6
112.5	Winter	12	292.5	Winter	8
112.5	Spring	8	292.5	Spring	5
135	Summer	5	315	Summer	6
135	Autumn	11	315	Autumn	5
135	Winter	11	315	Winter	8
135	Spring	7	315	Spring	5
157.5	Summer	3	337.5	Summer	8
157.5	Autumn	8	337.5	Autumn	7
157.5	Winter	9	337.5	Winter	7
157.5	Spring	5	337.5	Spring	6

Table B2 NEWA Analysed Evening Meteorological Conditions, Dubbo Airport AWS NSW					
Direction ± 45°	Season	Evening	Direction	Season	Evening
		Percentage Occurrence %			Percentage Occurrence %
0	Summer	8	180	Summer	7
0	Autumn	5	180	Autumn	14
0	Winter	7	180	Winter	15
0	Spring	4	180	Spring	11
22.5	Summer	9	202.5	Summer	7
22.5	Autumn	8	202.5	Autumn	13
22.5	Winter	7	202.5	Winter	16
22.5	Spring	6	202.5	Spring	12
45	Summer	12	225	Summer	6
45	Autumn	14	225	Autumn	10
45	Winter	10	225	Winter	16
45	Spring	10	225	Spring	12
67.5	Summer	11	247.5	Summer	6
67.5	Autumn	13	247.5	Autumn	9
67.5	Winter	10	247.5	Winter	14
67.5	Spring	11	247.5	Spring	10
90	Summer	9	270	Summer	5
90	Autumn	14	270	Autumn	5
90	Winter	11	270	Winter	11
90	Spring	10	270	Spring	8
112.5	Summer	10	292.5	Summer	5
112.5	Autumn	16	292.5	Autumn	4
112.5	Winter	13	292.5	Winter	10
112.5	Spring	11	292.5	Spring	6
135	Summer	8	315	Summer	5
135	Autumn	15	315	Autumn	3
135	Winter	12	315	Winter	7
135	Spring	10	315	Spring	4
157.5	Summer	4	337.5	Summer	8
157.5	Autumn	10	337.5	Autumn	4
157.5	Winter	8	337.5	Winter	6
157.5	Spring	6	337.5	Spring	3

Table B3 NEWA Analysed Night time Meteorological Conditions, Dubbo Airport AWS NSW

Direction ± 45°	Season	Night	Direction	Season	Night
		Percentage Occurrence %			Percentage Occurrence %
0	Summer	4	180	Summer	6
0	Autumn	4	180	Autumn	11
0	Winter	5	180	Winter	14
0	Spring	2	180	Spring	11
22.5	Summer	8	202.5	Summer	5
22.5	Autumn	6	202.5	Autumn	7
22.5	Winter	6	202.5	Winter	9
22.5	Spring	4	202.5	Spring	10
45	Summer	13	225	Summer	3
45	Autumn	10	225	Autumn	6
45	Winter	8	225	Winter	6
45	Spring	7	225	Spring	6
67.5	Summer	13	247.5	Summer	3
67.5	Autumn	12	247.5	Autumn	4
67.5	Winter	10	247.5	Winter	6
67.5	Spring	10	247.5	Spring	6
90	Summer	13	270	Summer	2
90	Autumn	14	270	Autumn	4
90	Winter	16	270	Winter	7
90	Spring	12	270	Spring	5
112.5	Summer	14	292.5	Summer	2
112.5	Autumn	17	292.5	Autumn	4
112.5	Winter	21	292.5	Winter	7
112.5	Spring	15	292.5	Spring	4
135	Summer	10	315	Summer	2
135	Autumn	14	315	Autumn	3
135	Winter	19	315	Winter	6
135	Spring	15	315	Spring	4
157.5	Summer	6	337.5	Summer	4
157.5	Autumn	12	337.5	Autumn	4
157.5	Winter	16	337.5	Winter	5
157.5	Spring	11	337.5	Spring	3

Appendix C – Sound Power Data

The noise emission levels used in modelling are summarised in **Table C1**.

Table C-1 Single Octave Equipment Sound Power Levels, dB LAeq(15min) (re10 ⁻¹² W)									
Noise Source/Item	Octave Band Centre Frequency, Hz								Total, dBA
	63	125	250	500	1000	2000	4000	8000	
Mobile Equipment									
Drill Rig	81	103	104	106	109	108	100	92	114
Bulldozer	86	95	99	107	104	102	100	90	111
Excavator	79	99	100	99	100	96	91	82	106
Dump Truck	87	99	96	100	104	102	98	89	109
Water Truck	81	82	89	91	95	97	89	81	101
Mobile Crusher	97	98	98	109	107	106	100	92	113
Loader	79	89	95	100	100	100	92	84	106
Backhoe	76	78	83	89	91	89	88	76	96
Road Trucks	89	95	90	89	93	97	92	85	102
Sleep Disturbance Assessment (LAmax)									
Loading Quarry products into road truck (impact noise)	91	101	107	112	112	112	104	96	117

Appendix D – Annoying Characteristics Assessment

D1 Requirements to Address Annoying Characteristics

Fact Sheet C of the NPI provides guidelines for applying 'modifying factors' adjustments to account for annoying noise characteristics such as low frequency, tonality, intermittent noise, irregular or noise of short duration.

D1.1 Low Frequency Noise

In accordance with Table C1 of the NPI, the low-frequency noise correction applies when the C minus A level is 15dB or more, and:

- Where any of the one-third octave noise levels in Table C2 (reproduced in **Table D-1**) are exceeded by up to and including 5dB and cannot be mitigated, a 2dBA positive adjustment to the measured/predicted A-weighted levels applies for the evening/night period; or
- Where any of the one-third octave noise levels in Table C2 are exceeded by more than 5dB and cannot be mitigated, a 5dBA positive adjustment to measured/predicted A-weighted levels applies for the evening/night period and a 2dBA positive adjustment applies for the daytime period.

Table D-1 One-third octave low-frequency noise thresholds (from Table C2 of NPI)

Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

Noise predictions have been completed to determine the applicability of low frequency modifying factors. The modelled C-A noise levels for receivers nearest to the Quarry (R1, R2 and R3) and the receivers further from the Quarry (R7, R14 and R17) are provided in **Table D-2**.

It is noted that 1/1 octave data has been adopted for the assessment as 1/3 octave data for the project is unavailable. Additionally, results should be considered worst case for the site as concurrent operation of all plant and equipment was assessed. It is also noted that the assessment of low frequency noise by calculation is indicative as the inclusion of one third octaves and frequencies below 63Hz are not 100% compliant with the scope of ISO9613.

Table D-2 Modelled C weighted and A Weighted Single Octave Band Levels, dB LAeq(15min)

Catchment	Receiver ID	Octave Band Centre Frequency, Hz								Total
		Weighting	63	125	250	500	1000	2000	4000	
Near Receivers	R1	A	25.1	22.5	19.5	25.3	23.0	14.5	-22.5	30.7
		C	50.5	38.4	28.1	28.5	23.0	13.1	-24.3	50.8
		Difference (C-A), dB								20.1
	R2	A	28.0	21.5	19.0	24.8	26.9	17.8	-20.7	32.5
		C	53.6	37.7	27.7	28.1	27.1	16.6	-22.3	53.7
		Difference (C-A), dB								21.2
	R3	A	24.4	17.6	13.1	16.8	16.7	3.8	-42.5	26.5
		C	49.8	33.5	21.7	20.0	16.7	2.4	-44.3	49.9
		Difference (C-A), dB								23.4
Far Receivers	R7	A	14.1	11.3	5.7	6.6	-2.1	-25.0	-113	16.8
		C	39.5	27.2	14.3	9.8	-2.1	-26.4	-114	39.7
		Difference (C-A), dB								22.9
	R14	A	9.4	5.4	-6.0	-13.3	-11.0	-21.5	-80.3	11.0
		C	34.8	21.3	2.6	-10.1	-11.0	-22.9	-82.1	35.0
		Difference (C-A), dB								24.0
	R17	A	7.2	2.9	-7.9	-15.3	-30.3	-57.5	-170	8.7
		C	32.6	18.8	0.7	-12.1	-30.3	-58.9	-172	32.8
		Difference (C-A), dB								22.9

Analysis of the noise modelling identifies that with the inclusion of all noise sources, low frequency noise exceeds the screening test difference of C-A=15dB at the receiver locations. Further analysis was therefore undertaken to determine whether any of the 1/3 octave noise levels in Table C2 of the NPI (**Table 1**) are exceeded. It is noted that where data was only available as 1/1 octave, levels in each 1/1 band were divided equally into each 1/3 octave band.

The results of the analysis of low-frequency noise thresholds found that received levels approach the thresholds at receiver R2, however they do not exceed the thresholds in **Table D-1** at any of the receiver locations. Hence, the low-frequency correction is not applied to received noise levels for this assessment.

D1.2 Tonality

In addition to low frequency noise, a review of modifying factors for tonality have been completed. In accordance with Table C1 of the NPI, a correction for tonal noise applies when the level of 1/3 octave band exceeds the level of the adjacent band on both sides by:

- 5dB or more if the centre frequency of the band containing the tone is in the range 500-10,000Hz;
- 8dB or more if the centre frequency of the band containing the tone is in the range 16-400Hz;
or
- 15dB or more if the centre frequency of the band containing the tone is in the range 25-125Hz.

MAC notes that the assessment should be completed with 1/3 octave data, however, only 1/1 octave data was available for the project. **Table D-3**, presents the results of the 1/1 octave data tonality noise test for the project.

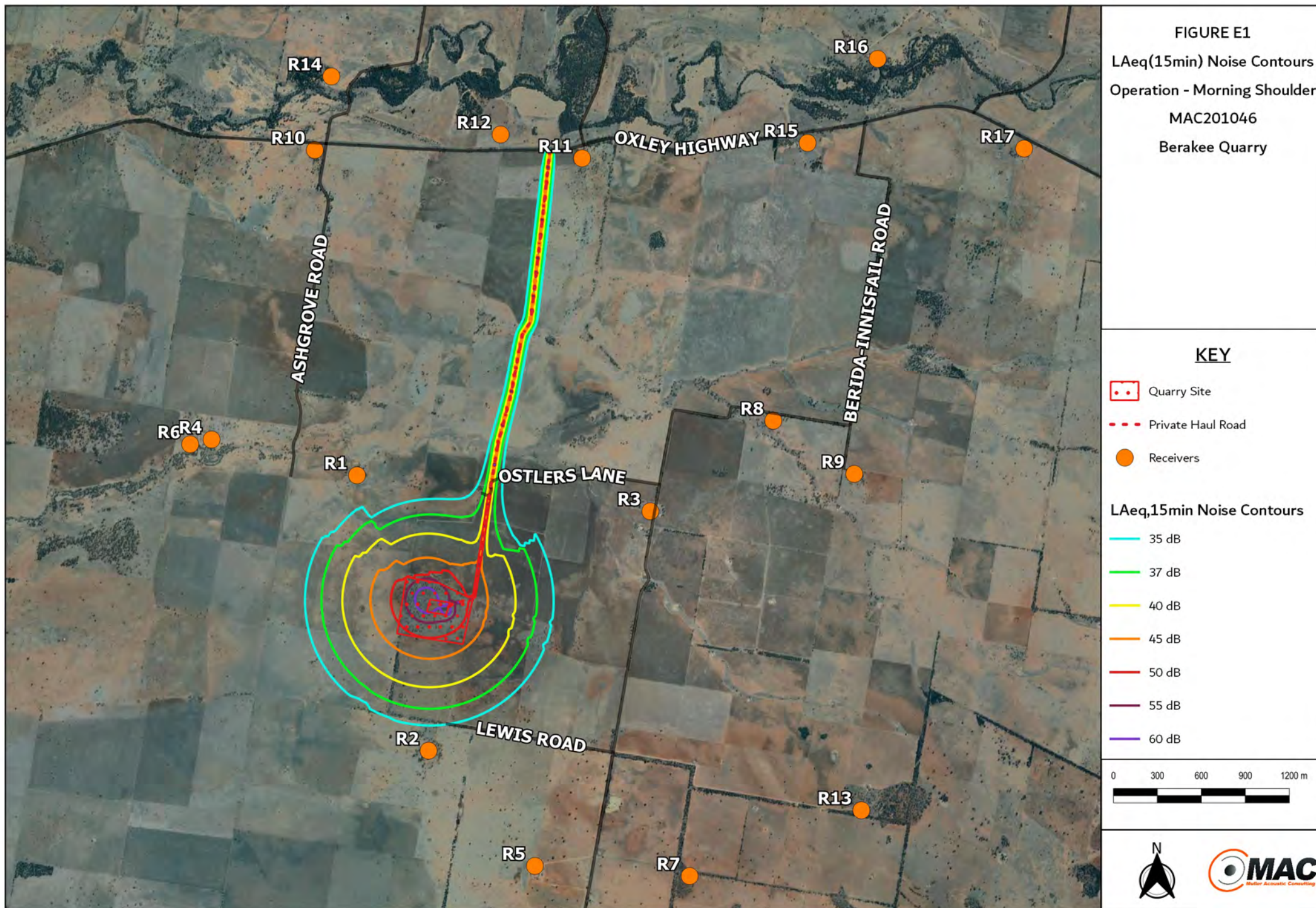
The results of the analysis indicate that there are no dominant tones associated with the project. Hence, a correction for tonality is not required.

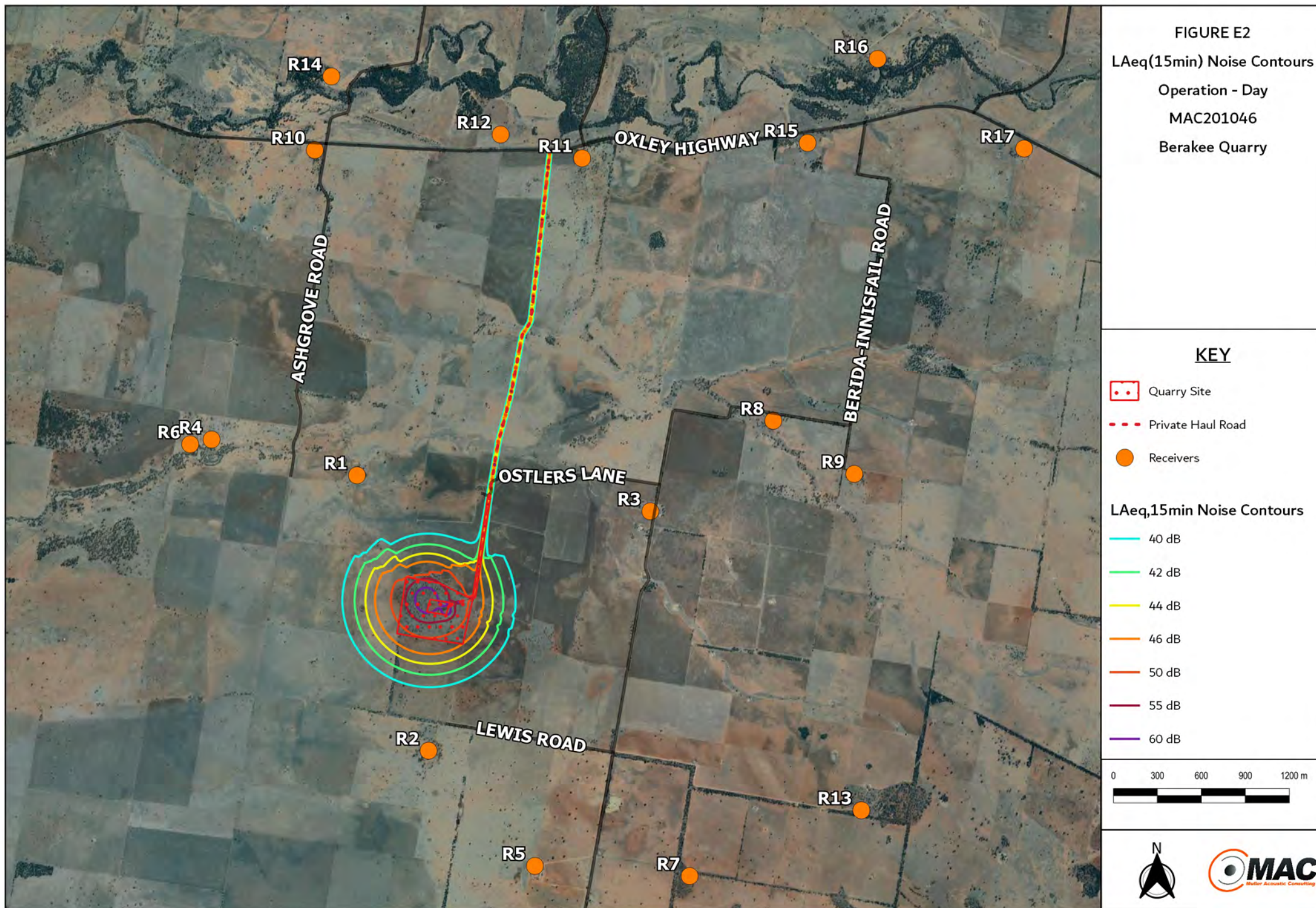
Table D-3 Modelled Z weighted Single Octave Band Levels, dB LAeq(15min)

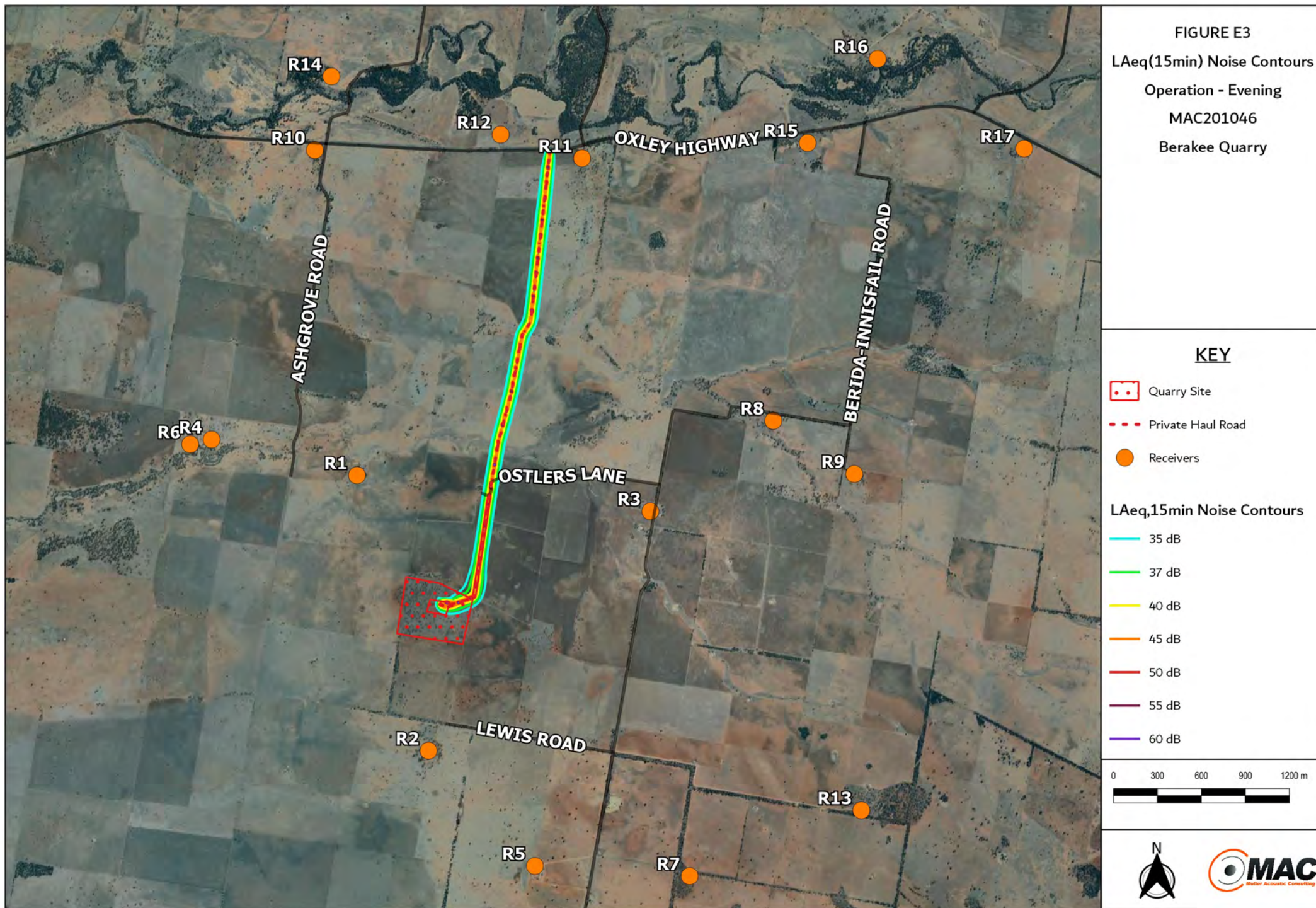
Receiver ID	Octave Band Centre Frequency, Hz								Total
	Weighting	63	125	250	500	1000 ¹	2000 ¹	4000 ¹	
R1	Z	51.3	38.6	28.1	28.5	23.0	13.3	-23.5	51.6
R2	Z	54.2	37.6	27.6	28.0	26.9	16.6	-21.7	54.4
R3	Z	50.6	33.7	21.7	20.0	16.7	2.6	-43.5	50.7
R7	Z	40.3	27.4	14.3	9.8	-2.1	-26.2	-114	40.5
R14	Z	32.5	18.2	-0.4	-12.9	-14.7	-26.5	-85.2	32.7
R17	Z	33.4	19.0	0.7	-12.1	-30.3	-58.7	-171	33.6

Note 1: For octave data for 1kHz and greater, the key difference between the octave bands is associated with atmospheric attenuation and ground absorption and noise mitigation measures (such as partial enclosures of sources, rather than a dominant tonal component from the source at these frequencies.)

Appendix E – Noise Model Contours







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Our Ref: 20112_R04_Ltr_EPA_RTS_1Apr21

1 April 2021

Matthew Corradin
Unit Head
Regulatory Operations Regional
NSW Environment Protection Authority
PO Box 2111
DUBBO NSW 2830

E | central.west@epa.nsw.gov.au

Attn: Joshua Loxley

Dear Josh

Re: Berakee Quarry Extension (DA 2021/379)

A submission from the NSW Environment Protection Authority (EPA), dated 15 March 2021, has been forwarded to the Applicant for the proposed Berakee Quarry Extension by Gilgandra Shire Council. The submission requests further information on the following:

- Proponent details: specifically who is the legal entity making the development application.
- Noise and Vibration: specifically the consideration of annoying noise characteristics, the impact of these on the predicted noise levels at surrounding receivers, and noise impacts along the full extent of the private haul road.
- Water balance: specifically how sufficient water will be made available to support operational and dust suppression activities.

The following information is provided to address the EPA's request.

Proponent Details

The Applicant for DA 2021/379 is Regional Hardrock Gilgandra Unit Trust (ABN: 12 364 872 209).

Noise and Vibration

The EPA's request was forwarded to Muller Acoustic Consulting Pty Ltd (MAC) who have reviewed and revised the Noise and Vibration Impact Assessment in response. Specifically, **Section 4.2.4** and **Appendix D** have been added which specifically address the potential for annoying characteristics of noise generated by

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Quality Outcomes

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Umwelt (Australia) Pty Limited
ABN 18 059 519 041

the proposed quarry extension. Specifically, an analysis of low frequency noise and tonality was completed confirming noise from the Quarry:

- would remain below the Z weighted noise level thresholds at each receiver, and
- would not result in dominant tones.

As a result no correction for low frequency noise or tonality has been applied and there would be no effect on predicted noise levels.

Revised noise modelling which accounted for the transport of Quarry products via the private haul road has been completed. The results of this updated modelling are presented in **Tables 21** and **22**, and **Appendix E**. These results identify a marginal increases at receivers closer to the private haul road, however, with the exception of Receiver R1 all are predicted to remain <30 dB(A). The updated predicted noise level at Receiver R1 is 30 dB(A).

A copy of the updated Noise and Vibration Impact Assessment of MAC is attached (**Attachment 1**).

Water Balance

Following submission of the EIS, the Applicant has negotiated and confirmed with the owner of Lot 2 DP1265657 that water may be harvested from the existing dams on this property and supplied to the Quarry for use.

The water balance for the Quarry has subsequently been updated and rerun to include the harvest of water from these dams. **Figure 1** identifies the landholdings from which water would be harvested, the location of the critical dams and assumed catchment to these.

The critical parameters are as follows.

	Lot 1 DP1265657	Lot 2 DP1265657	Total
Landholding	69 ha	756 ha	825 ha
Maximum Harvestable Right Dam Capacity (MHRDC)			49.5 ML
Dam Capacity			
• Sediment Basin 1	5 ML		22.5 ML
• North Dam		15 ML	
• South Dam		2.5 ML	
Dam Catchment			
• Sediment Basin 1	19 ha		93 ha
• North Dam		45 ha	
• South Dam		29 ha	

It is noted that the combined capacity of the dams on Lots 1 and 2 (22.5 ML) is well below the MHRDC for the two properties of 49.5 ML. **Attachment 2** provides the output of the online MHRDC calculator.

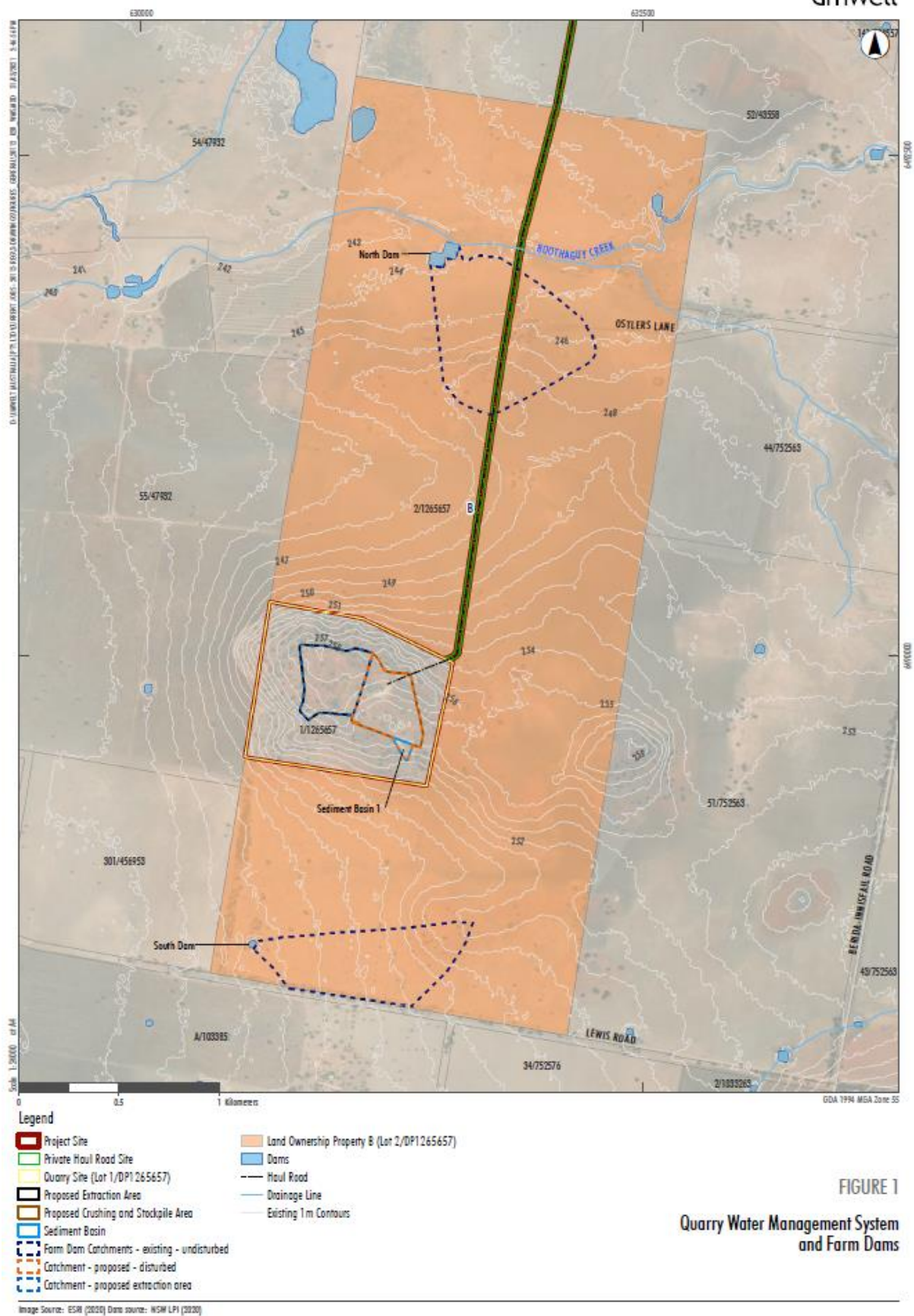


FIGURE 1

Quarry Water Management System
and Farm Dams

The water balance model was updated as follows to account for the increased availability of water.

- The EIS water balance model was utilised for the revised modelling. Details of the EIS water balance model structure, inputs and assumptions are presented in the Project EIS.
- The EIS water balance model was updated to include a “Farm Dams” system with a water storage capacity and catchment equivalent to that of two conjoined dams to the north of the Quarry (identified as North Dam on **Figure 1**) and a dam to the south of the Quarry (identified as South Dam on **Figure 1**).
- The North Dam is estimated to have a capacity of 15 ML¹ and immediate catchment of 45 ha and the South Dam is assumed to have a capacity of 2.5 ML and catchment of 29 ha.
- The model assumes that all water captured in the North Dam and South Dam is available to the Project when there was a shortfall of water in the Sediment Basin 1 and the Pit sump.

The revised model predicts the following.

- The Project will have sufficient water to meet operational suppression demands without imports for the 10th percentile water balance result (i.e. dry conditions).
- The maximum annual volume of water sourced from the “Farm Dams” was predicted to be 14.5 ML which is well below the land holding harvestable right of 49.5 ML/year.
- The maximum water import demand is predicted to be 5.5 ML.
- A sensitivity model run was undertaken with a total catchment of 150 ha and “Farm Dams” capacity of 30 ML (a doubling of available catchment and increase in dam storage capacity of 70 %). The predicted maximum import demand was 3.3 ML indicating that in very dry years little benefit is gained from increasing dam capacity and catchment area.

During very dry years, there may not be sufficient water captured on the two properties to supply demand. Notwithstanding the fact that under the very dry years (10th percentile or lower), elevated dust generation across the landscape is likely to be a feature as ground moisture levels and vegetation cover is reduced, the Applicant makes the following commitments.

- Additional water would be sourced from the existing farm bore (GW011693) which is located at the end of Ostlers Lane and estimated to have a yield of 1 L/s (31.5 ML/year) (RW Corkery & Co Pty Limited)².
- Soil stabilisers would be applied to the haul road surface to limit wheel generated and wind-blown dust.
- Quarry operations, including transport would be limited during periods of low water availability to prevent avoidable dust lift-off from quarry operations and truck movement on the private haul road.
- Additional water would be purchased from off-site sources and delivered to the Quarry Ste by tanker truck.

¹ As advised by the landowner, Colin Kilby – 22 March 2021

² Water Management Plan for the Berakee Quarry, March 2018, Prepared by RW Corkery & Co Pty Limited on behalf of Sandy Creek Family Trust.

We trust this information provides the additional detail requested by the EPA and that the assessment clock' may be recommenced. Please do not hesitate to contact the undersigned on 1300 793 267 should you require clarification or further information.

Yours sincerely

A handwritten signature in blue ink, appearing to be 'A. Irwin'.

Alex Irwin
Principal Environmental Consultant

26 April 2021

Lindsay Mathieson
Director Planning & Environment
Gilgandra Shire Council
PO Box 23
Gilgandra NSW 2827

Gilgandra Shire Council

30 APR 2021

Received Document #

E | lmathieson@gilgandra.nsw.gov.au

Dear Lindsay

RE: Berakee Property Clearing

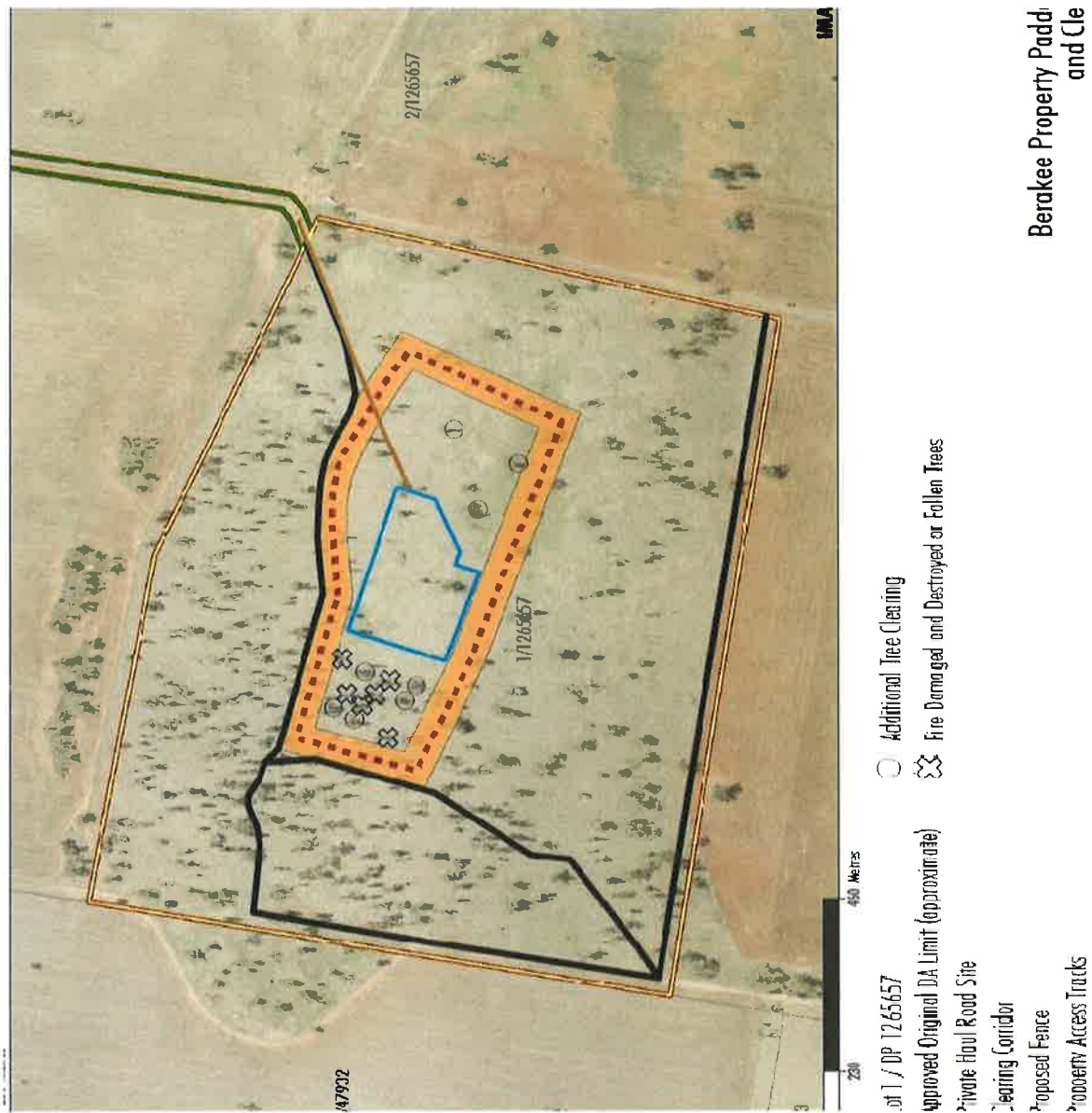
It has been brought to my attention that Gilgandra Shire Council and the Biodiversity Conservation and Science Division (BCS) of the Department of Planning has questioned whether clearing undertaken on the Berakee Quarry over the last few years was undertaken lawfully.

I would like to confirm that clearing undertaken on what is now Lot 1 DP1265657 was completed after consulting with NSW Local Land Service (LLS) and the guidance provided by a senior officer in LLS.

For the record, the following provides a summary of the relevant actions taken on Lot 1.

- 29 January 2018. Berakee Quarry approved as DA 2017/218 on Lot 45 DP752563 (144 Ostlers Lane).
Quarry development and operation commenced in the following months.
- 21 June 2018. DA 2017/218 was modified to allow for haulage by road train along a temporary haulage route to the Warren Shire via Berida Innisfail Road & Leeches Creek Road. Limited haulage of material via this route was undertaken.
- November 2018. With concerns over the potential for cattle and other livestock to enter the Quarry area (the block has been periodically used for grazing and calving of cattle), contact was made with the LLS to confirm what clearing could be undertaken to allow for the installation of a fence and safe sheltering of livestock.
- 13 February 2019. Mr Matthew Lane, Senior Land Services Officer visited and inspected the Berakee property and preferred location of the livestock fencing / yarding. During this inspection, Mr Lane confirmed that:
 - the *Local Land Services Act 2013* allows exemptions for clearing available for landowners
 - the exemptions include rural infrastructure which includes fence lines, roads/tracks, buildings and yards
 - Up to 30m can be cleared to protect this infrastructure from events such as tree fall, bush fire and other damage.

During the visit, an area which had been pegged was shown to Mr Lane who confirmed the clearing of a 30 m corridor to allow for the construction and maintenance of a fence was lawful. The approximate alignment of the pegged fenced line is presented on the next page. The figure also identifies the alignment of proposed tracks to allow for safe transit of farm vehicles across Lot 1.



Confirmation of Mr Lane's visit to the site and advice is provided in an email sent on 14 February 2019 (attached).

Mr Lane also confirmed that a landowner is entitled to clear vegetation where:

- there is an imminent risk to human life or livestock, e.g. where fire or storm damage increases the risk of tree fall,
- as construction timber on the property, or
- for firewood or construction timber on the property.

Mr Lane indicated up four trees per year could be felled for these purposes. The image identifies (approximately) the trees cleared for agricultural purpose in 2019 and 2020. I note The exact location of trees cleared is from memory as a number identified on the image were damaged and felled by a fire across the paddock. Mr lane did confirm on site that the trees could be cleared.

- 2019. Clearing was undertaken in preparation for fencing.

As discussed with Mr Lane on the property, the maximum allowable distance (30m) was chosen as many of the trees on the property have suffered fire or storm damage and are considered to be of imminent risk of falling. Evidence of fire and storm damage to these trees is provided in the accompanying photos. The fire damaged trees are identified (to the best of my ability) of the image above.

The fencing was not immediately completed in 2019 as our energy and finances were devoted to surviving the latter stages of the most recent drought. The destocking of our properties made a grazing block unnecessary at that time. Once the interest of Regional Group in purchasing the Quarry was registered, we postponed the fencing. The cleared material was set aside for fencing or used as firewood.





A further 4 fire and storm damaged trees were removed within an area due east of the Quarry and used as firewood. These trees were considered at risk of falling and dangerous.

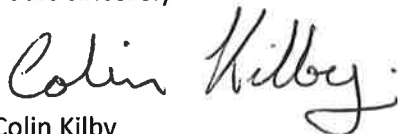
- December 2019. Initial contact with Regional Group made regarding possible purchase of the Quarry.
- Early 2020. An application to sub-divide Lot 45 DP752563 lodged with Council.
- Circa March 2020. A further 4 storm damaged trees on Berakee property were cleared to remove risk of falling and injury to people or livestock.
- 30 April 2020. Sub-division of Lot 45 DP752563 to create two lots were created namely:
 - Lot 1 DP1265657 being approximately 69 hectares and taking in the approved Berakee Quarry, and
 - Lot 2 DP1265657 being approximately 756 ha and taking in the remaining Berakee property.
- 4 June 2020. Lot 1 and the Berakee Quarry sold to Regional Group.

When clearing the trees, effort was made to avoid impacting on the groundcover. An aerial photograph of Lot 1 taken in February 2020 illustrates that groundcover has been retained in those areas where trees have been removed in accordance with the exemptions provided by LLS. I can confirm that the bulk of the groundcover remaining is exotic weed species. Umwelt ecologists confirmed this when surveying the area in February 2020.

In summary, I can state that all trees cleared were either contained in the 30m corridor for the proposed fencing, for property access roads or to remove an imminent risk to human and livestock safety. This clearing was completed after consulting with LLS.

I hope that this settles the matter, however, I am happy to discuss the matter further if required. Furthermore, I am sure both Mr Matt Lane of LLS and Mr Richard Tomkins of Regional Group would make themselves available to discuss their respective roles.

Yours sincerely



Colin Kilby
Sandy Creek Family Trust

From: Matthew Lane [<mailto:matthew.lane@lls.nsw.gov.au>]
Sent: Thursday, 14 February 2019 3:47 PM
To: ckilby@bigpond.com
Subject: Allowable Activities for Agriculture

G'day Col,

Thanks for getting in touch and showing me around your property the other day. As advised on the day, you are able to clear up to 30m in total for rural infrastructure as an allowable activity. Infrastructure can include, but is not limited to the following examples:

- fence lines
- roads / tracks
- contour banks
- irrigation channels
- dams / troughs
- agricultural buildings (sheds, barns etc)
- yards

The maximum allowable distance is 30m, however you must stick to the minimum extent required - that is if you do not need the full 30m then clear what you need up to that distance.

Other examples of allowable activities where native vegetation can be cleared without approval are as followed:

- personal use of firewood
- construction timber for farm buildings or infrastructure (fence posts included)
- trees which pose an imminent risk to safety
- clearing as a result of installing or undertaking environmental works

I have attached a couple of fact sheets that confirm the above. If you have any further questions, or need further clarification on the above then let me know.

Matt

Matthew Lane | Senior Land Services Officer
Sustainable Land Management
Local Land Services
96 Victoria St Dubbo NSW 2830 | PO Box 6082 Dubbo NSW 2830
T: 02 6841 6526 | M: 0458 180 981 | E: matthew.lane@lls.nsw.gov.au
W: www.lls.nsw.gov.au | W: www.landmanagement.nsw.gov.au



**Local Land
Services**

Clearing for rural infrastructure

The Land Management Framework enables clearing for the construction, operation and maintenance of rural infrastructure.

Overview

The *Local Land Services Act 2013* outlines the eligible rural infrastructure and clearing distances in the Western, Central and Coastal Zones for Category 2 - regulated rural land and for Category 2 - vulnerable regulated land and Category 2 - sensitive regulated land.

Rural infrastructure is defined as a building, structure or work that is used for the purposes of , or in connection with, an activity that is being carried out in a regulated rural area of the State but only if the activity does not require development consent under the *Environmental Planning and Assessment Act 1979*.

Clearing undertaken for allowable activities on a landholding must only be carried out by, or on behalf of, the landholder unless specifically stated otherwise. All other required statutory approvals must be obtained before clearing for a work, building or structure.

There are three (3) Allowable Activity Zones in NSW, the Western, Central and Coastal Zones. The maximum clearing distances for allowable activities are different for each zone.

Where land is classed as Category 2 – vulnerable regulated land or Category 2 – regulated sensitive land, allowable activities are limited and reduced maximum clearing distance applies.

Rural infrastructure in the Western and Central Zones

In Western and Central Zones clearing for rural infrastructure includes (but is not limited to):

- fences
- roads and tracks
- irrigation channels and pipelines
- stock or domestic water supply pipelines
- soil conservation earthworks

- cut lines for stock movement
- bore drains or drains to water storages
- telephone lines or cables
- power lines or cables or areas for movement of large machinery
- shearing, machinery, grain, hay or similar sheds
- stock handling facilities
- dams, ground tanks, bores, pumps, tanks and water points
- windmills

Did you know?

- Local Land Services has trained staff in your area ready to discuss how the land management and biodiversity reforms can help you?
- Local Land Services staff can also visit your property to better understand your goals and provide expert tailored advice.

Why not give us a call on 1300 778 080?

Rural infrastructure in the Coastal Zone

In the Coastal Zone clearing for rural infrastructure is permitted for:

- permanent boundary fences
- permanent internal fences
- roads and tracks
- shearing or machinery sheds
- tanks, dams, pipelines, bores, pumps, water points
- stockyards and windmills

Rural infrastructure on small holdings

On small holdings clearing for the following types of rural infrastructure is permitted:

- permanent boundary fences
- permanent internal fences
- roads and tracks
- pipelines, bores, dams, pumps, tanks and water points
- windmills
- stockyards
- buildings other than habitable buildings

Additional infrastructure in the Coastal Zone and small holdings

For landholders in the Coastal Zone and on small holdings Local Land Services may issue a certificate that allows clearing for additional rural infrastructure, provided if this is for a genuine agricultural activity.

Rural infrastructure on vulnerable and sensitive land

On Category 2 - vulnerable regulated land and Category 2 - sensitive regulated land, clearing for the following types of rural infrastructure is permitted:

- permanent boundary fences
- permanent internal or temporary fences
- farm track, if the track is necessary for access and the route of the track minimises clearing

Maximum clearing distances for rural infrastructure

Clearing for rural infrastructure **must** be undertaken to the **minimum** extent necessary to build and maintain rural infrastructure.

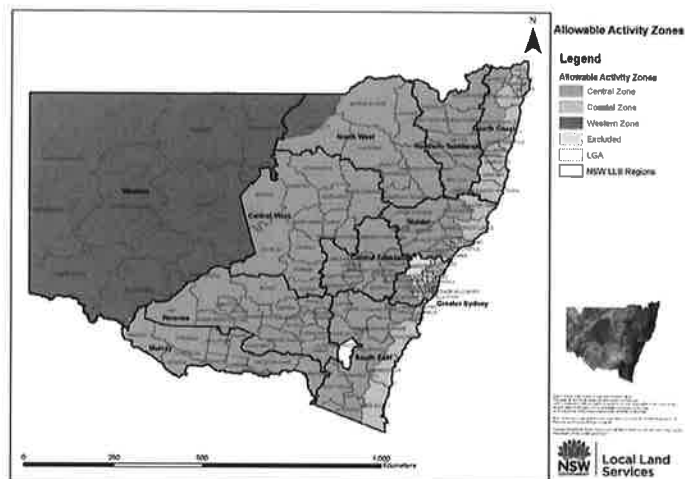
The **maximum** distance of clearing for rural infrastructure in each zone and on small landholding is as follows:

Zone	Clearing distance
Western zone	40 metres
Central zone	30 metres
Coastal zone	15 metres
Small holdings (in any zone)	12 metres
Vulnerable and sensitive regulated land	6 metres

The maximum distances above apply even if part of the clearing has been carried out by an adjoining landholder.

The maximum distance of clearing of native vegetation includes:

1. in the case of linear infrastructure - the total width of clearing authorised for the infrastructure, or
2. in the case of fixed point infrastructure - the maximum distance of clearing that is authorised measured from the perimeter of the infrastructure.



Further information

To find out more about clearing for rural infrastructure or the Native Vegetation reforms and how they affect you, contact Local Land Services on 1300 778 080, email slm.info@lls.nsw.gov.au, www.lls.nsw.gov.au or call in to your nearest Local Land Services office.

Allowable activities for landholders

Allowable activities cover a range of routine land management activities associated with agriculture and other common practices in rural areas. Clearing for allowable activities does not require approval under the *Local Land Services Act 2013*.

Overview

Allowable activities consolidate, simplify and expand on the routine agricultural management activities (RAMAs) that were part of the *Native Vegetation Act 2003*.

Under the new land management framework, greater flexibility and discretion is provided to landholders enabling them to efficiently undertake low risk routine land management activities.

Clearing undertaken for allowable activities on a landholding must only be carried out by, or on behalf of, the landholder unless specifically stated otherwise. All other required statutory approvals must be obtained before clearing for a work, building or structure.

There are three (3) Allowable Activity Zones in NSW, the Western, Central and Coastal Zones. The maximum clearing distances for allowable activities are different for each zone.

Where land is classed as Category 2 – vulnerable regulated land or Category 2 – regulated sensitive land, allowable activities are limited and reduced maximum clearing distance applies.

Allowable activities for landholders

The *Local Land Services Act 2013* supports landholders undertaking day-to-day land management activities associated with agriculture and other common practices in rural areas. Allowable activities enable clearing for the following on Category 2 - regulated land.

Clearing may also be carried out by a person who is acting on behalf of the landholder, such as a contractor or employee.

Imminent risk

Landholders can clear native vegetation considered reasonably necessary to remove or reduce an imminent risk of serious personal injury or damage to property.

Traditional Aboriginal cultural activities

Landholders can clear native vegetation for traditional Aboriginal cultural activities provided the clearing is not for commercial purposes.

Collection of firewood

Landholders can clear native vegetation for firewood for use on the same land or other land owned by the landholder.

However, the clearing must not occur if the firewood could be obtained from other allowable activities or from clearing associated with the Land Management (Native Vegetation) Code. Native vegetation to be cleared must not be a threatened species, or be part of a TEC, or be the habitat of a threatened species.

Construction timber

Landholders can clear native vegetation to obtain timber for the purpose, or for use in, the construction, operation or maintenance of rural infrastructure on the same land.

However, the clearing must not cause land degradation or any processes likely to result in a decline in water quality. The native vegetation to be cleared must not be a threatened species, or be part of a Threatened Ecological Community (TEC), or be the habitat of a threatened species.

In addition, clearing is not allowed if the timber could be obtained from other allowable activities or from clearing under the Land Management (Native Vegetation) Code.

Planted native vegetation

Allows landholders to clear planted native vegetation provided it has not been planted with the assistance of public funds.

Private power lines

Allows clearing that is reasonably necessary for the construction, operation or maintenance of privately owned power lines on private land.

Environmental protection works

Allows clearing of native vegetation for environmental protection works (i.e. works associated with the rehabilitation of land towards a natural state or works to protect land from environmental degradation including re-vegetation, bush regeneration, wetland protection works, erosion protection works, dune restoration).

However, clearing under this allowable activity does not extend to coastal protection works as defined by the *Coastal Protection Act 1979*.

Sustainable grazing

Landholders may clear native vegetation for sustainable grazing provided this clearing does not result in the long-term decline in the structure and composition of native vegetation.

Sustainable grazing also extends to over-sowing or fertilisation of grasslands used for grazing.

Mulga Species for stock fodder on a landholding

Allows clearing of native vegetation (comprising mulga - *acacia aneura*) for stock fodder on the same landholding from which the native vegetation is cleared. Under this allowable activity clearing must:

- not exceed 50% of the total area of mulga on the land holding in any 10 year period,
- cleared mulga remains on the ground where it is cleared or is windrowed along a contour on the landholding,
- clearing does not result in remaining mulga plants being over 20 metres apart, and
- clearing does not cause land degradation or the introduction of non-native vegetation.

However, clearing under this allowable activity is not authorised on small holdings, in the Coastal Zone, on Category 2 - vulnerable regulated land, or within 20 metres of an estuary, wetland or watercourse.

Further information

To find out more about the native vegetation reforms and how they affect you, contact Local Land Services on 1 300 778 080, email slm.info@lls.nsw.gov.au or call in to your nearest Local Land Services office.

Airstrips

Landholders may clear native vegetation for the construction, operation or maintenance of an airstrip provided the clearing is limited to the minimum required to meet civil aviation standards.

Firebreaks

Landholders in the Western Zone may clear native vegetation to a distance of 100 metres where the vegetation is predominantly a mallee species.

Additional considerations

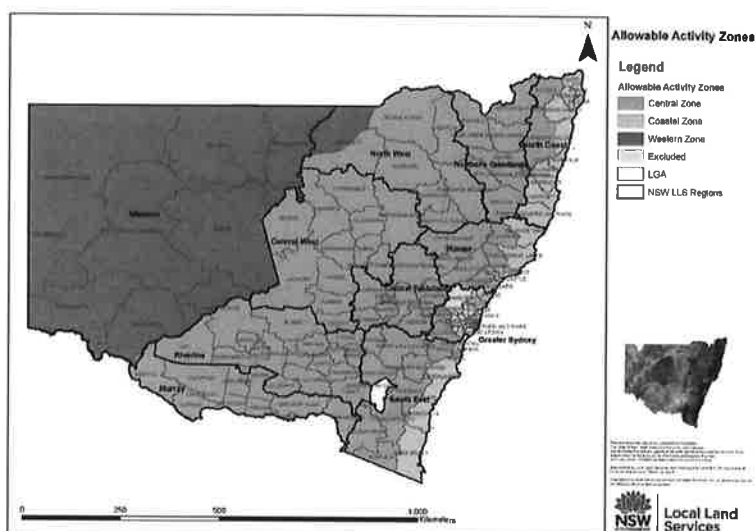
Clearing for an allowable activity should be undertaken to the minimum extent necessary and certain allowable activities, such as Firebreaks and Gravel Pits, are limited or prohibited outside of the Western Zone.

Maximum clearing distances for rural infrastructure

Clearing for rural infrastructure **must** be undertaken to the **minimum** extent necessary to build and maintain rural infrastructure.

The **maximum** distance of clearing for rural infrastructure in each zone and on small landholding is as follows:

Zone	Clearing distance
Western zone	40 metres
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Our Ref: 20112_R04_GSC_RTS_20210506a_itr

6 May 2021

Lindsay Mathieson
Director Planning & Environment
Gilgandra Shire Council
PO Box 23
Gilgandra NSW 2827

E | lmathieson@gilgandra.nsw.gov.au

Dear Lindsay

**Re: Response to Request for Additional Information – DA 2021/379
(Berakee Quarry Extension)**

The following provides, on behalf of Regional Hardrock Gilgandra Unit Trust (the Applicant), a response to the request of Gilgandra Shire Council (Council) for additional information on the proposed Berakee Quarry Extension (DA 2021/379) supplied on 17 March 2021.

For the purpose of clarity, it is noted that development application for the Extension to the Berakee Quarry was initially made to Council on 22 January 2021. On request by Council, the application was lodged via the NSW Planning Portal on 9 February 2021 and referred to the NSW Environment Protection Authority (EPA) as an integrated approval authority. We understand the development application and supporting EIS was also referred to other government agencies and public authorities, namely:

- Biodiversity, Conservation & Science (BCS) division of the Department of Planning, Industry & Environment (DPIE),
- Natural Resource Access Regulator (NRAR) of DPIE,
- Essential Energy (EE),
- Transport of NSW (TfNSW), and
- Mining, Exploration & Geoscience (MEG) within the Department of Regional NSW.

Submissions were received from EPA (in the form of a Stop the Clock request for additional information), MEG, TfNSW, BCS and MEG and provided to the Applicant for review. A public submission counter signed by Timothy and Helen Foran, and Brendon and Gillian Foran was also received and supplied to the Applicant for review.

In accordance with the request for additional information prepared by Council (17 March 2021), this correspondence provides a response to the following matters.

1. Biodiversity Offset Scheme Trigger query of BCS and Council.

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2. Stop the Clock Request for additional information of the EPA relating to:
 - a. Legal entity that is making the application,
 - b. Noise impact assessment, and
 - c. Water security.

We understand that the matters raised in the remaining submissions have been addressed to the satisfaction of Council by the EIS.

Biodiversity Offset Scheme Trigger

BCS have requested further evidence to clarify that vegetation clearing undertaken on Lot 1 DP1265657 was undertaken legally.

We note that Council raised this matter on 14 September 2020 prior to submission of the development application (refer to *Section 4.1.2.2 (Table 4.1)* of the Environmental Impact Statement (EIS)). As noted in *Section 4.1.4* of the EIS, based on consultation with the former landowner and Quarry operator, our understanding at that time, as now, was that any clearing on the property had been undertaken lawfully and in accordance with Part 2 of Schedule 5A of the *Local Land Services Act 2013* (LLS Act).

Umwelt has contacted both the Applicant and former landowner/quarry operator and provides the following in response to the request for additional information.

The **Applicant** confirms the following.

- The Applicant initially approached the former owner of the Berakee Quarry in December 2019 with the intent of expanding their portfolio of regional quarries (principally aimed at supplying the Inland Rail Project).
- Formal negotiations were commenced in early 2020.
- In entering negotiations with the landowner, it was understood the existing quarry was approved as non-designated development and therefore limited in its disturbance footprint to 2 hectares (ha) (excluding a private haul road between the Quarry and Oxley Highway).
- No formal survey to define limits on quarry disturbance was available, with the limits defined by *Figure 2.3* of the original Statement of Environmental Effects (SEE) prepared for the Quarry (RW Corkery, 2017). On inspection of the Quarry, the following was noted.
 - Several stockpiles of quarried material extended to the west of the quarry itself.
 - The land to the immediate west of the Quarry, while retaining a reasonable groundcover, was largely devoid of trees (when compared to the vegetation higher on the 'hill').
- This disturbance was queried with the landowner providing the following information.
 - With respect to the stockpiles, these were temporary and were to be removed. These were subsequently removed prior to our purchase of the Quarry in June 2020.
 - With respect to the tree clearing west of the Quarry, the landowner indicated this had been undertaken following consultation with NSW Local Land Service (LLS) to allow for:
 - the establishment of fencing to prevent livestock accessing the Quarry Site, and
 - clearing of individual trees either to remove imminent risk of these falling or for agricultural/firewood purposes.

- The explanation of the landowner was accepted, and negotiations continued.
- Noting the seasonal requirements for biodiversity field survey, the Applicant engaged Umwelt to undertake field assessment and advice with respect to the vegetation on the property in February 2020.
- At the same time as the biodiversity field survey, aerial photography was commissioned and completed to present an accurate picture of the site at the time of assessment.
- The results of the field survey and aerial photography were used in defining the limits of the proposed quarry extension. This is despite the fact that the better-quality basalt occurs to the west and north of the current extraction area, i.e. where remnant woodland is present. Furthermore, the resource available to the extended quarry (4.7 million tonnes (Mt)) falls below our original objective of 5 Mt. As noted in *Section 3.14* of the EIS, extension to the extraction area to increase the total extractable resource was considered but ultimately rejected in order to reduce our impact on biodiversity.
- Considering this assessment, and not wishing to increase impacts on biodiversity any more than necessary, we used this as an effective perimeter for our extended quarry footprint.
- The Quarry, along with the sub-divided Lot 1 DP1265657, was acquired on 4 June 2020.
- No clearing of trees has been undertaken on the property since formal negotiations commenced with the former landowner in early 2020.

The **former landowner** provided the following information with respect to the vegetation clearing who confirms the following.

- After commencement of operations at the Quarry, contact was made with LLS regarding what clearing could be lawfully undertaken on the Berakee property, in the vicinity of the Quarry, to allow for the installation of a fence to exclude livestock from the Quarry (the block has been periodically used for grazing and calving of cattle).
- On 13 February 2019, Mr Matthew Lane, Senior Land Services Officer visited and inspected the Berakee property and preferred location of the livestock fencing. During this inspection, Mr Lane confirmed that:
 - the *Local Land Services Act 2013* allows exemptions for vegetation clearing for agricultural purposes,
 - the exemptions include rural infrastructure which includes fence lines, roads/tracks, buildings and yards, and
 - Up to 30m can be cleared to protect this infrastructure from events such as tree fall, bush fire and other damage.
- The LLS officer also confirmed that trees can be cleared for the purpose of:
 - Removing an impending risk to safety,
 - For use in rural infrastructure, e.g. fencing, and
 - For firewood.
- During the visit, an area which had been pegged was shown to the LLS officer who confirmed the clearing of a 30 m corridor to allow for the construction and maintenance of a fence was lawful. While the pegs were never surveyed and have since been destroyed (by fire, storms and general wear and tear), the approximate alignment of the pegged fenced line is presented on **Figure A**. The figure also identifies the alignment of proposed tracks to allow for safe transit of farm vehicles across Lot 1 DP126565 and around the Quarry Site.

- The landowner confirms that a number of trees damaged by fire and storm events were cleared to remove a fall hazard. A number of other trees, also damaged, were cleared to provide materials for property fencing and firewood.
- The landowner indicated that plans to install the fencing were postponed in 2019 as the severity of the drought increased and destocking reduced the immediate requirement for the fencing. On commencement of negotiations with the Applicant, plans for the fencing works were further postponed.

We have subsequently reviewed the records of site inspection and correspondence between the landowner and LLS which confirms the consultation was completed as suggested (a copy of correspondence between LLS and the landowner is provided as **Attachment 1**).

We have also been supplied with photographic evidence of fire damage to a number of trees within the area of clearing which supports the landowners reference to 'imminent risk' (see p. 6).

Following consultation with the Applicant and former landowner, and having reviewed the evidence supplied by the former landowner, we remain of the opinion that any clearing was undertaken in accordance with the exemptions provided by Schedule 5A of the *Local Land Services Act 2013*.

Other than to consider seasonal variation and the potential for the presence or identification of specific threatened species¹, the Biodiversity Assessment Methodology (BAM) does not require assessment of the type, extent or condition of vegetation beyond that encountered at the time. That is, the type, extent or condition of vegetation encountered by previous field survey (e.g. OzArk, 2017), while instructive for the purpose of defining the vegetation of the current BAR, does not require consideration in the assessment of current vegetation type, condition or impact.

Following from the above, on the basis that the vegetation of the Berakee property was cleared lawfully, the biodiversity field survey and Biodiversity Assessment Report (BAR) of Umwelt (2020) accurately describes and assesses the condition of the proposed disturbance footprint of the extended quarry. While noting previous biodiversity assessment of the Quarry Site (OzArk, 2017) mapped vegetation on the property as native vegetation, namely: Plant Community Type (PCT) 98 Poplar Box – White Cypress Pine – Wilga – Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion, degradation of vegetation was evident as a result of historic livestock grazing and severe drought conditions. As noted in the BAR which accompanied the EIS (*Appendix 2*), and summarised in *Section 5.6.3* of the EIS, groundcover was dominated by exotic species. In the absence of canopy species, most of which have been affected by fire / storm damage and/or lawful clearing since the survey of OzArk (2017), the vegetation was mapped as non-native vegetation with isolated areas of degraded PCT 98 around the retained mature trees (refer to *Figure 5.7* of the EIS).

Therefore, as the vegetation clearing undertaken by the previous landowner was undertaken lawfully, the assessment of the BAR is valid. The BAR has determined that the area of native vegetation retained within the proposed disturbance area falls below the area threshold of the NSW Biodiversity Offsets Scheme and hence a Biodiversity Development Assessment Report and calculation of biodiversity credits is not required.

¹ Where seasonal variation is anticipated, additional survey may be required to assess the potential for occurrence of specific species, however, this was considered as part of the Biodiversity Assessment Report which accompanies the EIS and considered unnecessary.



Legend

- | | | | | | | | | | |
|--|---|---|--|--|---|--|---|--|--|
| Lot 1 / DP 1265657 | Approved Original DA Limit (approximate) | Private Haul Road Site | Quarry Site | Clearing Corridor | Proposed Fence | Property Access Tracks | Approved Quarry Access Road (approximate) | Additional Tree Clearing | X Fire Damaged and Destroyed or Fallen Trees |
|--|---|---|--|--|---|--|---|--|--|

FIGURE A

**Berakee Property Paddock Fence Line
and Clearing Corridor**



Source: C. Kilby

Photograph 1
Fire Damage to Berakee Property (Quarry stockpiles visible in background)



Source: C. Kilby

Photograph 2
Fire Damage to Berakee Property (Fallen and damaged trees evident)



Source: C. Kilby

Photograph 3
Fire Damage to Berakee Property (Fallen and damaged trees evident)

Legal entity

The Applicant for DA 2021/379 is Regional Hardrock Gilgandra Unit Trust (ABN: 12 364 872 209).

Noise Impact Assessment

The EPA's request was forwarded to Muller Acoustic Consulting Pty Ltd (MAC) who have reviewed and revised the Noise and Vibration Impact Assessment in response. Specifically, *Section 4.2.4* and *Appendix D* of the revised NVIA (which is attached) have been added which specifically address the potential for annoying characteristics of noise generated by the proposed quarry extension. Specifically, an analysis of low frequency noise and tonality was completed confirming noise from the Quarry:

- would remain below the Z weighted noise level thresholds at each receiver, and
- would not result in dominant tones.

As a result no correction for low frequency noise or tonality has been applied and there would be no effect on predicted noise levels.

Revised noise modelling which accounted for the transport of Quarry products via the private haul road has been completed. The results of this updated modelling are presented in *Tables 21* and *22*, and *Appendix E*. These results identify a marginal increases at receivers closer to the private haul road, however, with the exception of Receiver R1 all are predicted to remain <30 dB(A). The updated predicted noise level at Receiver R1 is 30 dB(A).

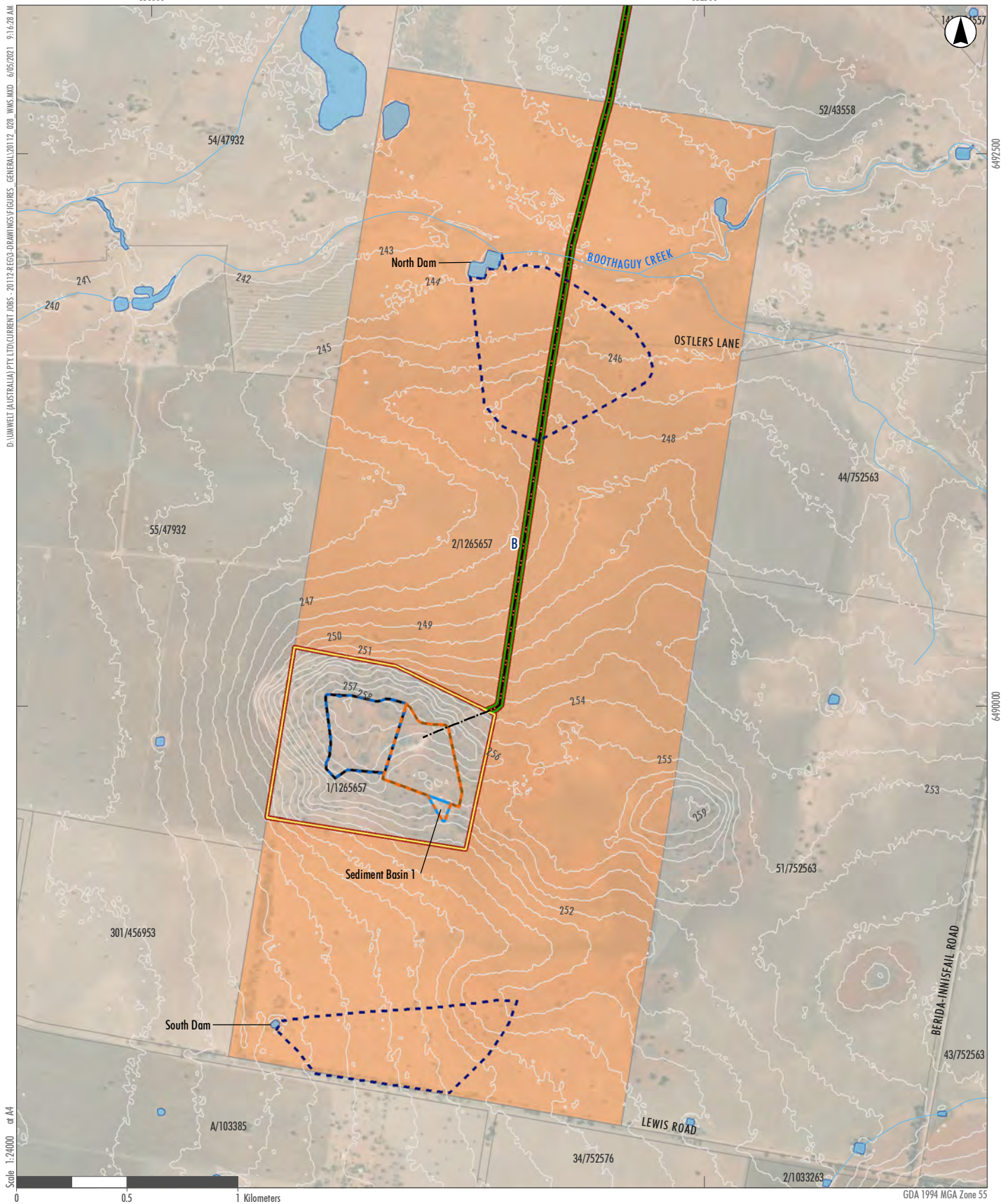
A copy of the updated Noise and Vibration Impact Assessment of MAC is attached (**Attachment 2**).

Water Security

Following submission of the EIS, the Applicant has negotiated and confirmed with the owner of Lot 2 DP1265657 that water may be harvested from the existing dams on this property and supplied to the Quarry for use.

The water balance for the Quarry has subsequently been updated and rerun to include the harvest of water from these dams. **Figure B** identifies the landholdings from which water would be harvested, the location of the critical dams and assumed catchment to these. The critical parameters are as follows.

	Lot 1 DP1265657	Lot 2 DP1265657	Total
Landholding	69 ha	756 ha	825 ha
Maximum Harvestable Right Dam Capacity (MHRDC)			49.5 ML
Dam Capacity			
• Sediment Basin 1	5 ML		22.5 ML
• North Dm		15 ML	
• South Dam		2.5 ML	
Dam Catchment			
• Sediment Basin 1	19 ha		93 ha
• North Dam		45 ha	
• Southern Dam		29 ha	



Legend

- Project Site
- Private Haul Road Site
- Quarry Site (Lot 1/DP1265657)
- Proposed Extraction Area
- Proposed Crushing and Stockpile Area
- Sediment Basin
- Farm Dam Catchments - existing - undisturbed
- Catchment - proposed - disturbed
- Catchment - proposed extraction area
- Land Ownership Property B (Lot 2/DP1265657)
- Dams
- Haul Road
- Drainage Line
- Existing 1m Contours

FIGURE B

Quarry Water Management System and Farm Dams

It is noted that the combined capacity of the dams on Lots 1 and 2 (22.5 ML) is well below the MHRDC for the two properties of 49.5 ML.

The water balance model was updated as follows to account for the increased availability of water.

- The EIS water balance model was utilised for the revised modelling. Details of the EIS water balance model structure, inputs and assumptions are presented in the EIS.
- The EIS water balance model was updated to include a 'Farm Dams' system with water storage capacity and catchment equivalent to that of two conjoined dams to the north of the Quarry (identified as North Dm on **Figure B**) and a dam to the south of the Quarry (identified as South Dam on **Figure B**).
- The North Dam is estimated to have a capacity of 15 ML² and immediate catchment of 45 ha and the south Dam is assumed to have a capacity of 2.5 ML and catchment of 29 ha.
- The model assumes that all water captured in the North Dam and South Dam is available to the Project when there was a shortfall of water in the Sediment Basin 1 and Pit sump.

The updated water balance model predicts that:

- The Project will have sufficient water to meet operational suppression demands without imports for the 10th percentile water balance result (i.e. dry conditions).
- The maximum annual volume of water sourced from the 'Farm Dams' was predicted to be 14.5 ML which is well below the land holding harvestable right of 49.5 ML/year.
- The maximum water import demand is predicted to be 5.5 ML.
- A sensitivity model was undertaken with a total catchment of 150 ha and 'Farm Dams' capacity of 30 ML (a doubling of available catchment and increase in dam storage capacity of 70 %). The predicted maximum import demand was 3.3 ML indicating that in very dry years little benefit is gained from increasing dam capacity and catchment area.

During very dry years, there may not be sufficient water captured on the two properties to supply demand. Notwithstanding the fact that under the very dry years (10th percentile or lower), elevated dust generation across the landscape is likely to be a feature as ground moisture levels and vegetation cover is reduced, the Applicant makes the following commitments.

- Additional water would be sourced from the existing farm bore (GW011693) which is located at the end of Ostlers Land and estimated to have a yield of 1 L/s (31.5 ML/year) (RW Corkery & Co. Pty Limited)³.
- Soil stabilisers would be applied to the haul road surface to limit wheel generated and wind-blown dust.
- Quarry operations, including transport would be limited during periods of low water availability to prevent avoidable dust lift-off from quarry operations and truck movement on the private haul road.

² As advised by the land owner, Colin Kilby – 22 March 2021.

³ Water Management Plan for Berakee Quarry, March 2018, Prepared by RW Corkery & Co Pty Limited on behalf of Sandy Creek Family Trust.

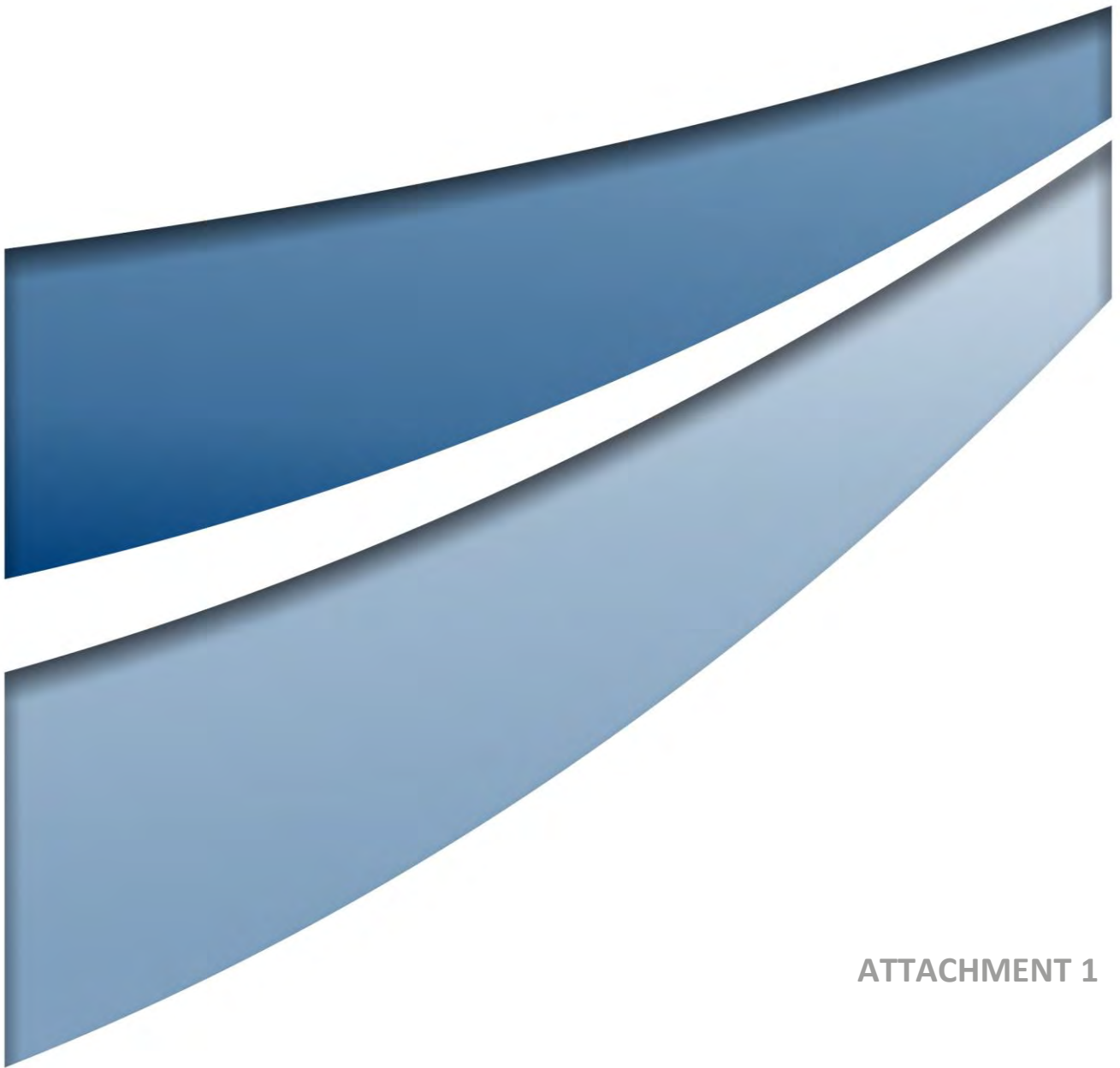
- Additional water would be purchased from off-site sources and delivered to the Quarry Ste by tanker truck.

We trust this information meets with your current requirements. Please do not hesitate to contact the undersigned on 1300 793 267 should you require clarification or further information.

Yours sincerely

A handwritten signature in blue ink, appearing to be 'AI' or similar initials.

Alex Irwin
Principal Environmental Consultant



ATTACHMENT 1

From: Matthew Lane [<mailto:matthew.lane@lls.nsw.gov.au>]
Sent: Thursday, 14 February 2019 3:47 PM
To: ckilby@bigpond.com
Subject: Allowable Activities for Agriculture

G'day Col,

Thanks for getting in touch and showing me around your property the other day. As advised on the day, you are able to clear up to 30m in total for rural infrastructure as an allowable activity. Infrastructure can include, but is not limited to the following examples:

- fence lines
- roads / tracks
- contour banks
- irrigation channels
- dams / troughs
- agricultural buildings (sheds, barns etc)
- yards

The maximum allowable distance is 30m, however you must stick to the minimum extent required - that is if you do not need the full 30m then clear what you need up to that distance.

Other examples of allowable activities where native vegetation can be cleared without approval are as followed:

- personal use of firewood
- construction timber for farm buildings or infrastructure (fence posts included)
- trees which pose an imminent risk to safety
- clearing as a result of installing or undertaking environmental works

I have attached a couple of fact sheets that confirm the above. If you have any further questions, or need further clarification on the above then let me know.

Matt

Matthew Lane | Senior Land Services Officer
Sustainable Land Management
Local Land Services
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**Local Land
Services**

Clearing for rural infrastructure

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Clearing undertaken for allowable activities on a landholding must only be carried out by, or on behalf of, the landholder unless specifically stated otherwise. All other required statutory approvals must be obtained before clearing for a work, building or structure.

There are three (3) Allowable Activity Zones in NSW, the Western, Central and Coastal Zones. The maximum clearing distances for allowable activities are different for each zone.

Where land is classed as Category 2 – vulnerable regulated land or Category 2 – regulated sensitive land, allowable activities are limited and reduced maximum clearing distance applies.

Rural infrastructure in the Western and Central Zones

In Western and Central Zones clearing for rural infrastructure includes (but is not limited to):

- fences
- roads and tracks
- irrigation channels and pipelines
- stock or domestic water supply pipelines
- soil conservation earthworks

- cut lines for stock movement
- bore drains or drains to water storages
- telephone lines or cables
- power lines or cables or areas for movement of large machinery
- shearing, machinery, grain, hay or similar sheds
- stock handling facilities
- dams, ground tanks, bores, pumps, tanks and water points
- windmills

Did you know?

- Local Land Services has trained staff in your area ready to discuss how the land management and biodiversity reforms can help you?
- Local Land Services staff can also visit your property to better understand your goals and provide expert tailored advice.

Why not give us a call on 1300 778 080?

Rural infrastructure in the Coastal Zone

In the Coastal Zone clearing for rural infrastructure is permitted for:

- permanent boundary fences
- permanent internal fences
- roads and tracks
- shearing or machinery sheds
- tanks, dams, pipelines, bores, pumps, water points
- stockyards and windmills

Rural infrastructure on small holdings

On small holdings clearing for the following types of rural infrastructure is permitted:

- permanent boundary fences
- permanent internal fences
- roads and tracks
- pipelines, bores, dams, pumps, tanks and water points
- windmills
- stockyards
- buildings other than habitable buildings

Additional infrastructure in the Coastal Zone and small holdings

For landholders in the Coastal Zone and on small holdings Local Land Services may issue a certificate that allows clearing for additional rural infrastructure, provided if this is for a genuine agricultural activity.

Rural infrastructure on vulnerable and sensitive land

On Category 2 - vulnerable regulated land and Category 2 - sensitive regulated land, clearing for the following types of rural infrastructure is permitted:

- permanent boundary fences
- permanent internal or temporary fences
- farm track, if the track is necessary for access and the route of the track minimises clearing

Maximum clearing distances for rural infrastructure

Clearing for rural infrastructure **must** be undertaken to the **minimum** extent necessary to build and maintain rural infrastructure.

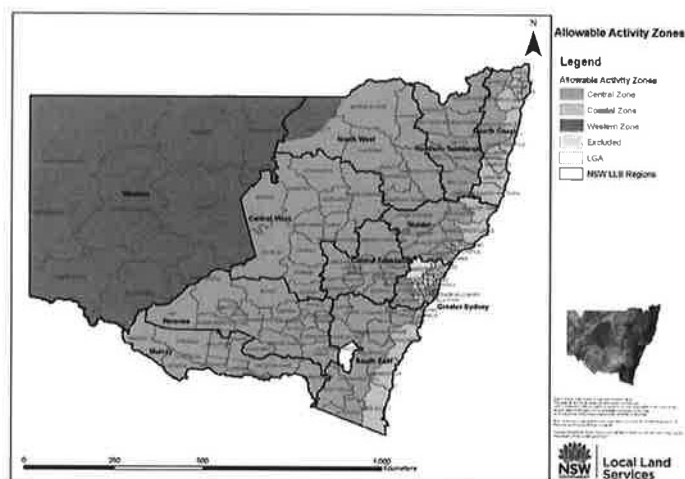
The **maximum** distance of clearing for rural infrastructure in each zone and on small landholding is as follows:

Zone	Clearing distance
Western zone	40 metres
Central zone	30 metres
Coastal zone	15 metres
Small holdings (in any zone)	12 metres
Vulnerable and sensitive regulated land	6 metres

The maximum distances above apply even if part of the clearing has been carried out by an adjoining landholder.

The maximum distance of clearing of native vegetation includes:

1. in the case of linear infrastructure - the total width of clearing authorised for the infrastructure, or
2. in the case of fixed point infrastructure - the maximum distance of clearing that is authorised measured from the perimeter of the infrastructure.



Further information

To find out more about clearing for rural infrastructure or the Native Vegetation reforms and how they affect you, contact Local Land Services on 1300 778 080, email slm.info@lls.nsw.gov.au, www.lls.nsw.gov.au or call in to your nearest Local Land Services office.

Allowable activities for landholders

Allowable activities cover a range of routine land management activities associated with agriculture and other common practices in rural areas. Clearing for allowable activities does not require approval under the *Local Land Services Act 2013*.

Overview

Allowable activities consolidate, simplify and expand on the routine agricultural management activities (RAMAs) that were part of the *Native Vegetation Act 2003*.

Under the new land management framework, greater flexibility and discretion is provided to landholders enabling them to efficiently undertake low risk routine land management activities.

Clearing undertaken for allowable activities on a landholding must only be carried out by, or on behalf of, the landholder unless specifically stated otherwise. All other required statutory approvals must be obtained before clearing for a work, building or structure.

There are three (3) Allowable Activity Zones in NSW, the Western, Central and Coastal Zones. The maximum clearing distances for allowable activities are different for each zone.

Where land is classed as Category 2 – vulnerable regulated land or Category 2 – regulated sensitive land, allowable activities are limited and reduced maximum clearing distance applies.

Allowable activities for landholders

The *Local Land Services Act 2013* supports landholders undertaking day-to-day land management activities associated with agriculture and other common practices in rural areas. Allowable activities enable clearing for the following on Category 2 - regulated land.

Clearing may also be carried out by a person who is acting on behalf of the landholder, such as a contractor or employee.

Imminent risk

Landholders can clear native vegetation considered reasonably necessary to remove or reduce an imminent risk of serious personal injury or damage to property.

Traditional Aboriginal cultural activities

Landholders can clear native vegetation for traditional Aboriginal cultural activities provided the clearing is not for commercial purposes.

Collection of firewood

Landholders can clear native vegetation for firewood for use on the same land or other land owned by the landholder.

However, the clearing must not occur if the firewood could be obtained from other allowable activities or from clearing associated with the Land Management (Native Vegetation) Code. Native vegetation to be cleared must not be a threatened species, or be part of a TEC, or be the habitat of a threatened species.

Construction timber

Landholders can clear native vegetation to obtain timber for the purpose, or for use in, the construction, operation or maintenance of rural infrastructure on the same land.

However, the clearing must not cause land degradation or any processes likely to result in a decline in water quality. The native vegetation to be cleared must not be a threatened species, or be part of a Threatened Ecological Community (TEC), or be the habitat of a threatened species.

In addition, clearing is not allowed if the timber could be obtained from other allowable activities or from clearing under the Land Management (Native Vegetation) Code.

Planted native vegetation

Allows landholders to clear planted native vegetation provided it has not been planted with the assistance of public funds.

Private power lines

Allows clearing that is reasonably necessary for the construction, operation or maintenance of privately owned power lines on private land.

Environmental protection works

Allows clearing of native vegetation for environmental protection works (i.e. works associated with the rehabilitation of land towards a natural state or works to protect land from environmental degradation including re-vegetation, bush regeneration, wetland protection works, erosion protection works, dune restoration).

However, clearing under this allowable activity does not extend to coastal protection works as defined by the *Coastal Protection Act 1979*.

Sustainable grazing

Landholders may clear native vegetation for sustainable grazing provided this clearing does not result in the long-term decline in the structure and composition of native vegetation.

Sustainable grazing also extends to over-sowing or fertilisation of grasslands used for grazing.

Mulga Species for stock fodder on a landholding

Allows clearing of native vegetation (comprising mulga - *acacia aneura*) for stock fodder on the same landholding from which the native vegetation is cleared. Under this allowable activity clearing must:

- not exceed 50% of the total area of mulga on the land holding in any 10 year period,
- cleared mulga remains on the ground where it is cleared or is windrowed along a contour on the landholding,
- clearing does not result in remaining mulga plants being over 20 metres apart, and
- clearing does not cause land degradation or the introduction of non-native vegetation.

However, clearing under this allowable activity is not authorised on small holdings, in the Coastal Zone, on Category 2 - vulnerable regulated land, or within 20 metres of an estuary, wetland or watercourse.

Further information

To find out more about the native vegetation reforms and how they affect you, contact Local Land Services on 1 300 778 080, email slm.info@lls.nsw.gov.au or call in to your nearest Local Land Services office.

Airstrips

Landholders may clear native vegetation for the construction, operation or maintenance of an airstrip provided the clearing is limited to the minimum required to meet civil aviation standards.

Firebreaks

Landholders in the Western Zone may clear native vegetation to a distance of 100 metres where the vegetation is predominantly a mallee species.

Additional considerations

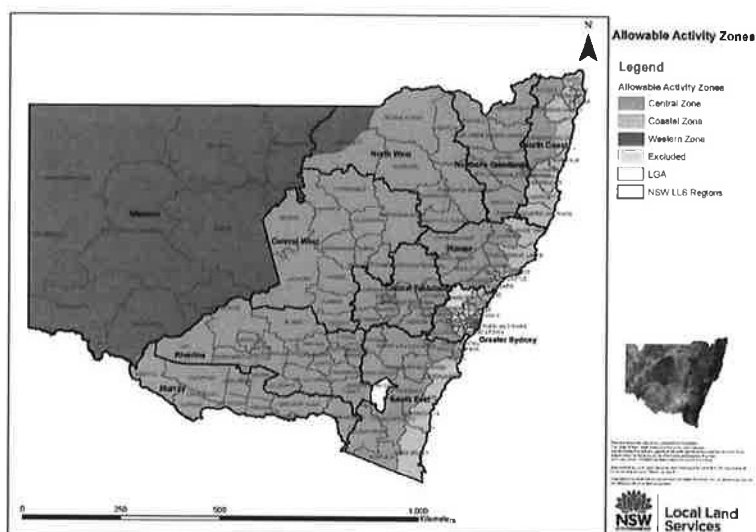
Clearing for an allowable activity should be undertaken to the minimum extent necessary and certain allowable activities, such as Firebreaks and Gravel Pits, are limited or prohibited outside of the Western Zone.

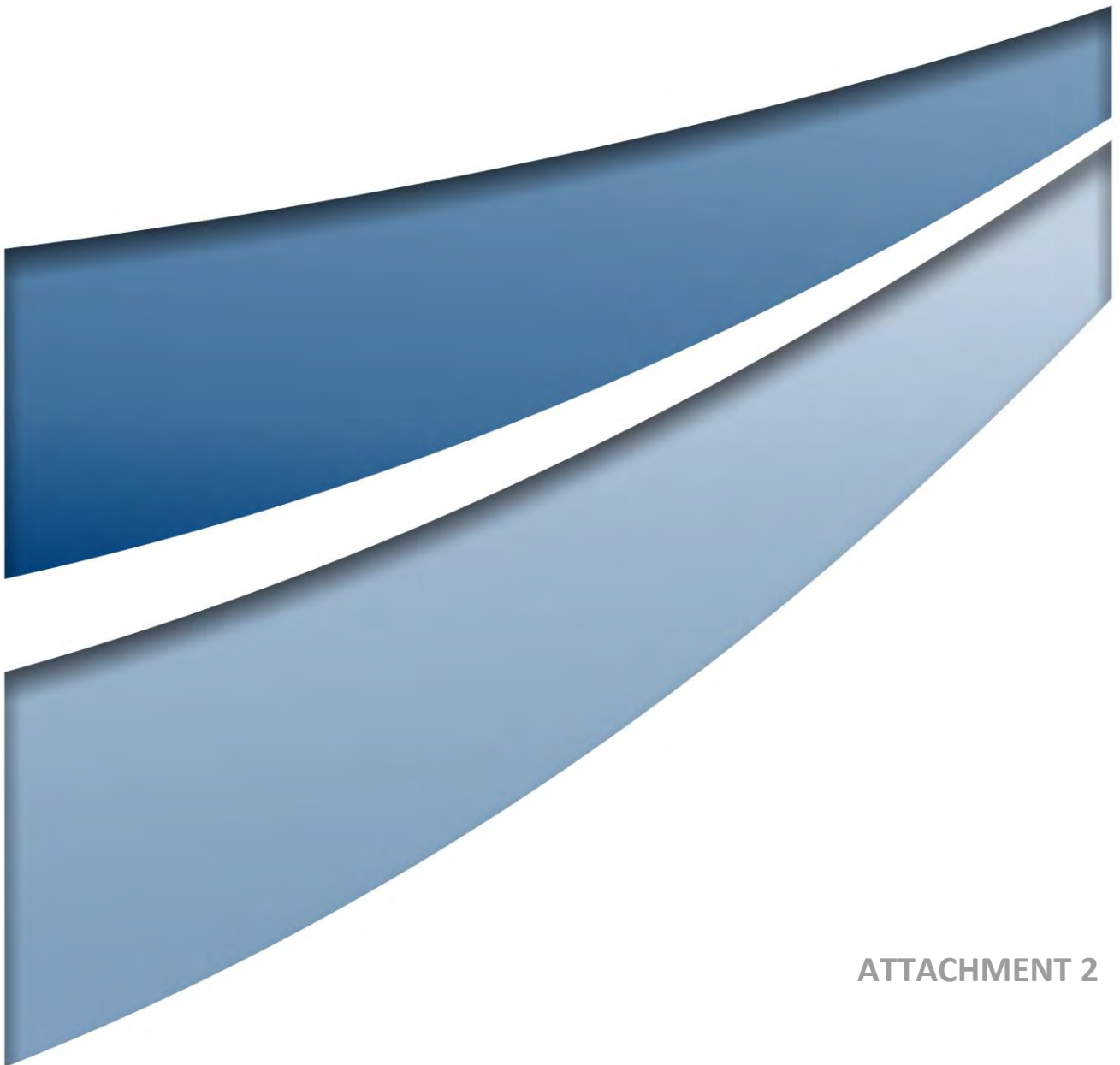
Maximum clearing distances for rural infrastructure

Clearing for rural infrastructure **must** be undertaken to the **minimum** extent necessary to build and maintain rural infrastructure.

The **maximum** distance of clearing for rural infrastructure in each zone and on small landholding is as follows:

Zone	Clearing distance
Western zone	40 metres
Central zone	30 metres
Coastal zone	15 metres
Small holdings (in any zone)	12 metres
Vulnerable and sensitive regulated land	6 metres





ATTACHMENT 2

Noise and Vibration Impact Assessment

Berakee Quarry Extension

Prepared for: Umwelt (Australia) Pty Ltd
March 2021
MAC201046-01RP1V2



Document Information

Noise and Vibration Impact Assessment

Berakee Quarry Extension

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Umwelt (Australia) Pty Ltd (Umwelt) on behalf of Regional Hardrock Gilgandra Unit Trust (Regional Hardrock) to prepare a Noise and Vibration Impact Assessment (NVIA) to quantify potential noise emissions associated with the extension to the Berakee Quarry (the 'Quarry').

The NVIA is provided to accompany the Environmental Impact Statement (EIS) being prepared to assess the proposed extension to operations ('the proposal'). The NVIA has been undertaken in accordance with the following policies and guidelines:

- NSW Environment Protection Authority's (EPA's), Noise Policy for Industry (NPI), 2017;
- NSW Department of Environment and Climate Change (DECC), Interim Construction Noise Guideline (ICNG), 2009;
- NSW Department of Environment, Climate Change and Water (DECCW), NSW Road Noise Policy (RNP), 2011;
- Australian Standard AS2187.2-2006 (AS2187.2) – Explosives-Storage and Use Part 2: Use of Explosives; and
- Australian and New Zealand Environment Council (ANZEC), 1990, Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration.

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

1.1 Project Description

MAC understands that Regional Hardrock proposes to extend the extraction area and associated processing and stockpiling area, increase the production rate and extend the life of the Quarry, located on Lot 1 DP1265657, near Collie NSW. The extension is to provide for additional basalt resource (up to 4.7 Mt) and stockpiling requirements (sufficient to hold up to 250,000t of product) to initially satisfy demand generated by the construction of the Inland Rail Project and then by local and regional demand. To achieve these increases, a number of associated changes to activities and infrastructure on the Project Site would be required including additional extraction equipment and changes to processing equipment, truck movements, water usage, blasting frequency and employment.

The Project Site is located approximately 10km southeast of Collie, NSW (see **Figure 1**). The layout of the Project Site is shown in **Figure 2** which identifies the Extraction Area, the Processing Area and the Stockpiling Area, as well as the locations of key infrastructure.

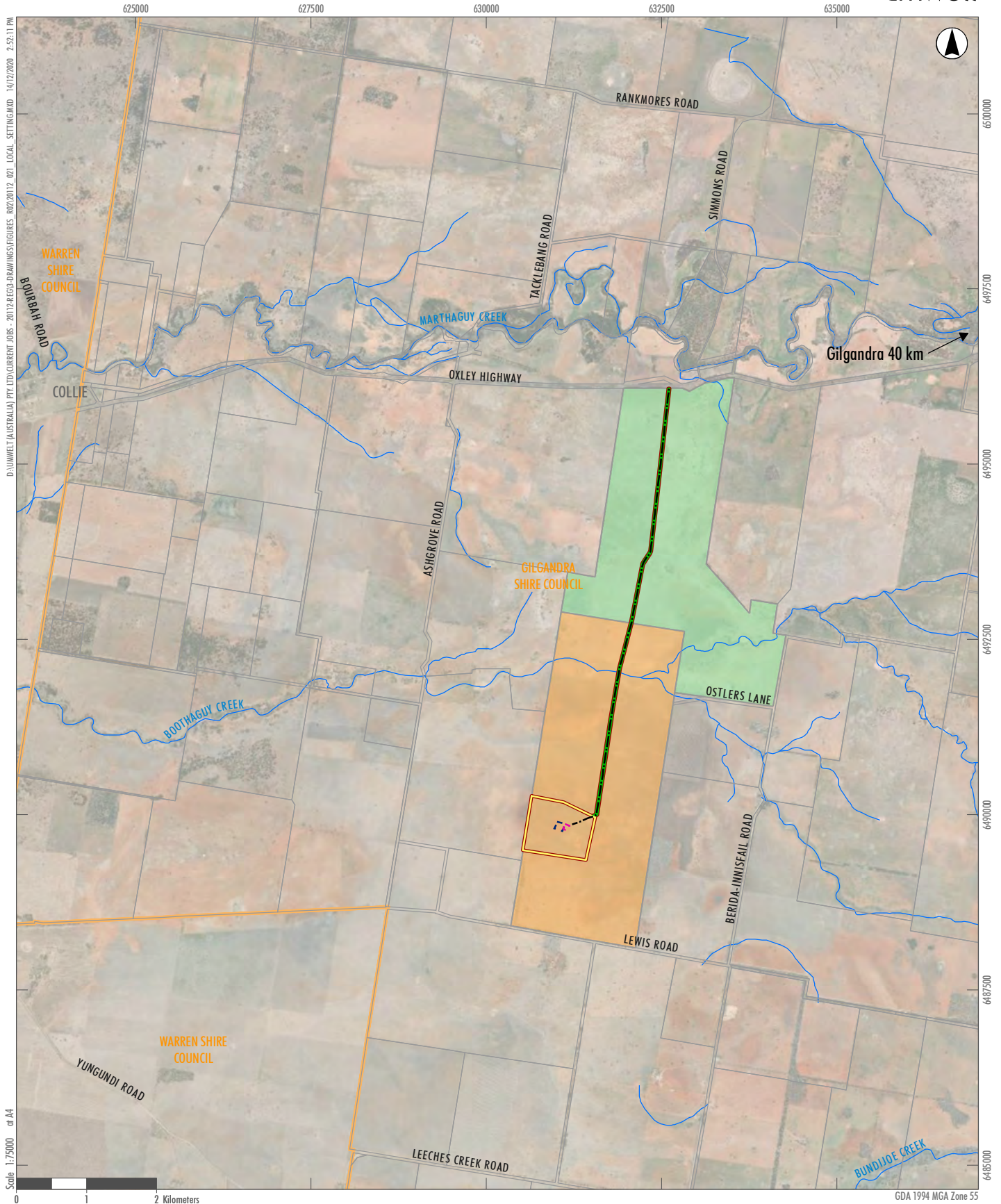
Extraction operations for the Quarry would be undertaken over two stages:

- Stage 1 – extraction of approximately 2.3Mt over 5 years (ie 490,000tpa) to supply hard rock materials to the Inland Rail Project.
- Stage 2 – extraction of 2.4Mt over 20 years (ie 80,000 to 120,000tpa) following completion of the construction of the Inland Rail Project, to supply hard rock products to local and regional markets.

The design criteria for the proposed Extract Area are as follows:

- Maximum Extraction Area Footprint – 8.4ha (based on restriction of depth to 240m AHD as per the current development consent).
- Elevation of final floor – between 240 and 242m AHD.
- Volume – approximately 1,680,000m³.
- Indicative angle of final faces – between 75° and 85°.
- Two final faces of 8m and 10m in height separated by single bench of between 3m and 5m in width.

Processing operations will be undertaken on a campaign basis using a mobile crushing unit which will initially be placed within the existing Crushing and Stockpile Area before being progressively relocated following each blast to adjoin the blasted rock pile (in-pit).



- Legend**
- Project Site
 - Private Haul Road Site
 - Quarry Site
 - Approved Extaction Area
 - Approved Crushing and Stockpile Area
 - Local Government Boundary
 - Berakee Area
 - Wilgaroo Area
 - Haul Road
 - Drainage Line

Figure 1
Local Setting



Legend


















- | | |
|---|--|
|  Project Site |  Stockpile |
|  Private Haul Road Site |  Secondary Cone Crusher |
|  Quarry Site |  Primary Jaw Crusher |
|  Extraction Area |  Conveyor |
|  Stockpile Area |  Car Parking |
|  Sediment Basin |  Haul Road |
|  Crib Room |  Groundwater Bores |
|  Amenities |  Water Tank |
|  Site Office | |

Figure 2
Quarry Site Layout

1.2 Hours of Operation

Table 1 presents the operating hours for the existing quarry. It is noted that the operation hours for the extraction, processing, loading and blasting components of the Project remain unchanged from the existing approved Quarry. The Proponent proposes an extension to transportation hours to meet anticipated demand by allowing for pre-loaded trucks to exit the Quarry between 5am and 6am and for unladen trucks to arrive back to the Quarry between 6pm and 10pm.

Table 1 Hours of Quarry Operation

Activity	Monday to Friday	Saturday	Sunday
Extraction, Processing and Loading ¹	6am – 6pm	6am – 6pm	N/A
Blasting	9am – 3pm	N/A	N/A
Truck Despatch	5am – 10pm	6am – 3pm	N/A

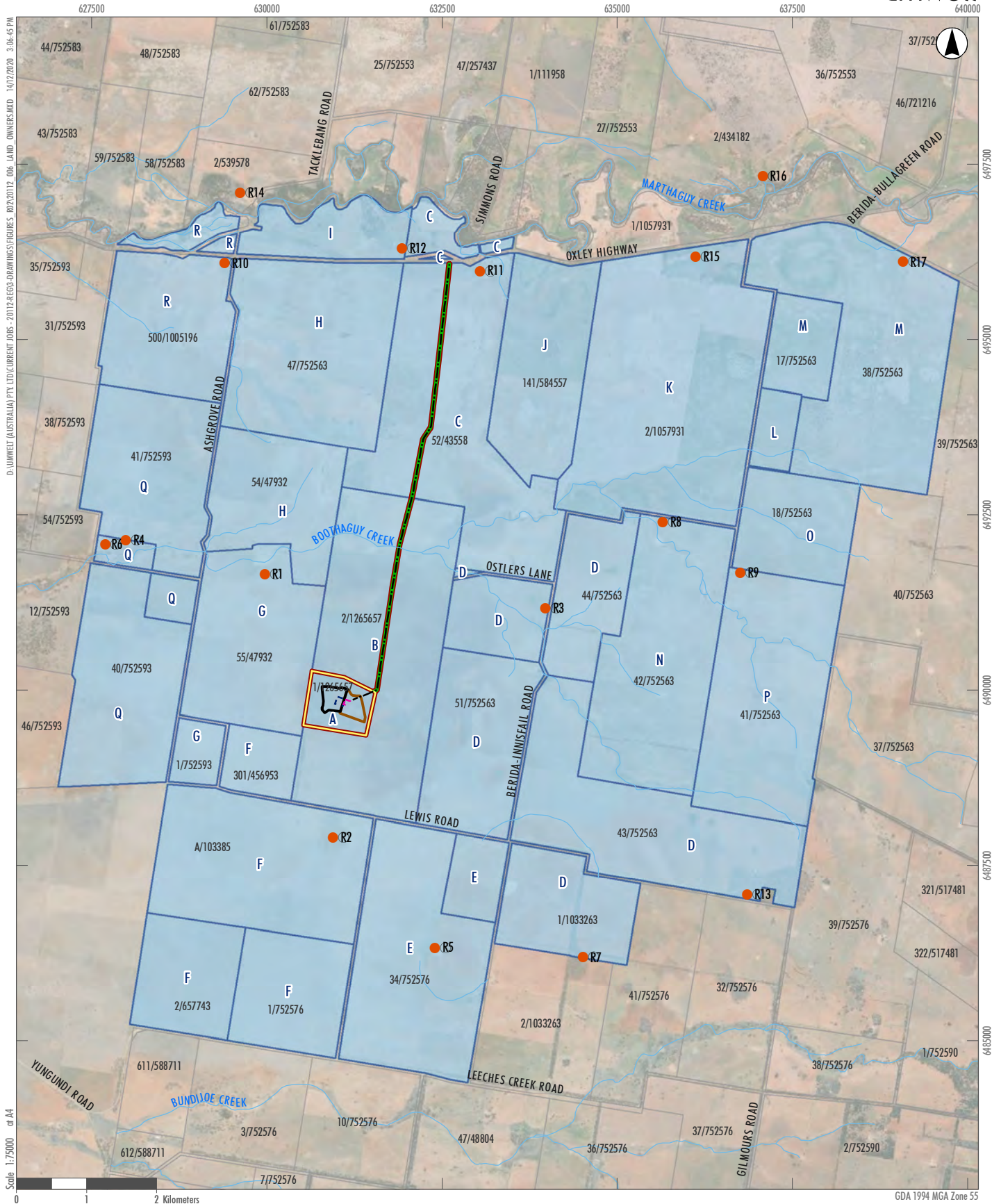
Note 1: Toolbox meetings, pre-start inspections and other activities not involving mobile equipment operations may be undertaken prior to 6am.

1.3 Potentially Sensitive Receivers

From review of aerial imagery and associated project information, the following potentially sensitive receivers have been identified. Receivers in the locality are primarily rural residential. **Table 2** presents a summary of receiver identification, address and MGA(55) coordinates. The location of the receivers are presented visually in **Figure 3**.

Table 2 Receiver Locations

Receivers	Address	MGA55 Coordinates	
		Easting	Northing
R1	467 Ashgrove Road	629973	6491655
R2	196 Lewis Road	630950	6487897
R3	1179 Berida-Innisfail Road	633976	6491163
R4	464 Ashgrove Road	627989	6492143
R5	1326 Berida-Innisfail Road	632401	6486325
R6	464 Ashgrove Road	627697	6492078
R7	1179 Berida-Innisfail Road	634512	6486187
R8	557 Berida-Innisfail Road	635653	6492399
R9	60 Prouts Road	636758	6491673
R10	52 Ashgrove Road	629398	6496093
R11	2661 Oxley Highway	633045	6495980
R12	2770 Oxley Highway	631932	6496305
R13	1179 Berida-Innisfail Road	636855	6487084
R14	200 Tacklebang Road	629623	6497097
R15	2357 Oxley Highway	636122	6496189
R16	2248 Oxley Highway	637078	6497337
R17	2027 Oxley Highway	639077	6496112



- Legend**
- Project Site
 - Private Haul Road Site
 - Quarry Site
 - Proposed Extraction Area
 - Proposed Crushing and Stockpile Area
 - Approved Extraction Area
 - Approved Crushing and Stockpile Area
 - Land Ownership
 - Haul Road
 - Drainage Line
 - Receiver Locations

Figure 3
Land Ownership

1.4 Coverage of Secretary's Environmental Assessment Requirements

The key issues to be addressed, as part of this NVIA are outlined in the Secretary's Environmental Assessment Requirements (SEARs) which are reproduced in **Table 3**.

Table 3 Coverage of SEARs and Other Government Agency Requirements	
Noise and Vibration Assessment Requirement	Reference
Coverage of Secretary's Environmental Assessment Requirements	
Include a quantitative assessment of potential:	
<ul style="list-style-type: none"> Construction and operational noise and off-site transport noise impacts of the development in accordance with the Interim Construction Noise Guideline, NSW Noise Policy for Industry and NSW Road Noise Policy respectively; 	Section 5
<ul style="list-style-type: none"> Reasonable and feasible mitigation measures to minimise noise emissions; and 	Section 6
<ul style="list-style-type: none"> Monitoring and management measures. 	Section 6
Blasting and Vibration – including:	
<ul style="list-style-type: none"> A description of the proposed blasting hours, frequency and methods; and 	Section 1.2 / 4.4
<ul style="list-style-type: none"> An assessment of the likely blasting and vibration impacts of the development having regard to the relevant ANZEC guidelines and paying particular attention to impacts on people, buildings, livestock, infrastructure and significant natural features. 	Section 5.5
Coverage of Issues Identified by Other Government Agencies	
Gilgandra Shire Council (14 September 2020):	
<ul style="list-style-type: none"> The impacts of noise, vibration and blasting will need to be assessed specifically to this site and not solely by reference to other similar sites. Data collected from blasting and crushing operations conducted on this site in relation to the existing quarry approval should be included. 	Section 5
EPA (15 September 2020):	
<ul style="list-style-type: none"> Identify the existing noise environment (including any relevant noise assessment groupings) and identify applicable noise goals in line with relevant guidance/standards. 	Section 1.3 / 2.2 / 3
<ul style="list-style-type: none"> Identify potential noise and vibration sources and impacts during both construction and operational stages and identify best practice mitigation measures (pollution control) and strategies to be incorporated for both stages to minimise noise and vibration emissions/impacts (with proposed timing), including validation monitoring, in line with relevant guidance/standards. 	Section 4 / 5 / 6
<ul style="list-style-type: none"> Propose representative noise monitoring locations for determining compliance with applicable noise goals and where relevant noise goals would be set as representative limits. 	Section 6.2

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2 Noise and Blasting Policy and Guidelines

The following section summarises the relevant policy and guidelines for the proposal.

2.1 Interim Construction Noise Guideline

The assessment and management of noise from construction work is completed with reference to the Interim Construction Noise Guideline (ICNG). The ICNG is specifically aimed at managing noise from construction work regulated by the EPA and is used to assist in setting statutory conditions in licences or other regulatory instruments.

The ICNG sets out procedures to identify and address the impact of construction noise on residences and other sensitive land uses. This section provides a summary of noise objectives that are applicable to the assessment. The ICNG provides two methodologies for the assessment of construction noise emissions:

- Quantitative, which is suited to major construction proposals with typical durations of more than three weeks
- Qualitative, which is suited to short term infrastructure maintenance (for proposals with a typical duration of less than three weeks).

The methodology for a quantitative assessment requires a more complex approach, involving noise emission predictions from construction activities to the relevant assessment locations, whilst the qualitative assessment methodology is a more simplified approach that relies more on noise management strategies.

2.1.1 Standard Hours for Construction

Table 4 summaries the ICNG recommended standard hours for construction works.

Table 4 Recommended Standard Hours for Construction	
Daytime	Construction Hours
Monday to Friday	7am to 6pm
Saturdays	8am to 1pm
Sundays or Public Holidays	No construction

2.1.2 Out of Hours Construction

Works conducted outside of recommended standard hours are considered out of hours work (OOH). The ICNG suggests that any request to vary the hours of construction activities as identified above shall be:

- considered on a case by case basis or activity-specific basis;
- accompanied by details of the nature and need for activities to be undertaken during the varied construction hours; and
- accompanied by written evidence that activities undertaken during the varied construction hours are strongly justified; appropriate consultation with potentially affected receivers and notification of the relevant regulatory authorities has occurred; and all practicable and reasonable mitigation measures will be put in place.

2.1.3 Construction Noise Management Levels

Table 5 reproduces the ICNG management levels for residential receivers. The construction noise management levels are the sum of the management level and relevant rating background level (RBL) for each specific assessment period.

Table 5 Noise Management Levels

Time of Day	Management Level LAeq,15min ¹	How to Apply
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays.	Noise affected RBL + 10dB.	<p>The noise affected level represents the point above which there may be some community reaction to noise.</p> <p>Where the predicted or measured LAeq(15min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level.</p> <p>The proponent should also inform all potentially impacted residents of the nature of work to be carried out, the expected noise levels and duration, as well as contact details.</p>
	Highly noise affected 75dBA.	<p>The highly noise affected level represents the point above which there may be strong community reaction to noise.</p> <p>Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account times identified by the community when they are less sensitive to noise such as before and after school for work near schools, or mid-morning or mid-afternoon for work near residences; and if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.</p>
Outside recommended standard hours.	Noise affected RBL + 5dB.	<p>A strong justification would typically be required for work outside the recommended standard hours.</p> <p>The proponent should apply all feasible and reasonable work practices to meet the noise affected level.</p> <p>Where all feasible and reasonable practices have been applied and noise is more than 5dBA above the noise affected level, the proponent should negotiate with the community.</p> <p>For guidance on negotiating agreements see section 7.2.2.</p>

Note 1: The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the construction noise management levels for noise assessment purposes and is the median of the ABL's.

2.2 Noise Policy for Industry

The EPA released the Noise Policy for Industry (NPI) in October 2017 which provides a process for establishing noise criteria for consents and licenses enabling the EPA to regulate noise emissions from scheduled premises under the Protection of the Environment Operations Act 1997.

The objectives of the NPI are to:

- provide noise criteria that is used to assess the change in both short term and long term noise levels;
- provide a clear and consistent framework for assessing environmental noise impacts from industrial premises and industrial development proposals;
- promote the use of best-practice noise mitigation measures that are feasible and reasonable where potential impacts have been identified; and
- support a process to guide the determination of achievable noise limits for planning approvals and/or licences, considering the matters that must be considered under the relevant legislation (such as the economic and social benefits and impacts of industrial development).

The policy sets out a process for industrial noise management involving the following key steps:

1. Determine the Project Noise Trigger Levels (PNTLs) (ie criteria) for a development. These are the levels (criteria), above which noise management measures are required to be considered. They are derived by considering two factors: shorter-term intrusiveness due to changes in the noise environment; and maintaining the noise amenity of an area.
2. Predict or measure the noise levels produced by the development with regard to the presence of annoying noise characteristics and meteorological effects such as temperature inversions and wind.
3. Compare the predicted or measured noise level with the PNTL, assessing impacts and the need for noise mitigation and management measures.
4. Consider residual noise impacts - that is, where noise levels exceed the PNTLs after the application of feasible and reasonable noise mitigation measures. This may involve balancing economic, social and environmental costs and benefits from the proposed development against the noise impacts, including consultation with the affected community where impacts are expected to be significant.

5. Set statutory compliance levels that reflect the best achievable and agreed noise limits for the development.
6. Monitor and report environmental noise levels from the development.

2.2.1 Project Noise Trigger Levels

The policy sets out the procedure to determine the PNTLs relevant to an industrial development. The PNTL is the lower (ie, the more stringent) of the **Project Intrusiveness Noise Level (PINL)** and **Project Amenity Noise Level (PANL)** determined in accordance with Section 2.3 and Section 2.4 of the NPI.

2.2.2 Project Intrusiveness Noise Level (PINL)

The PINL ($L_{Aeq}(15min)$) is the RBL + 5dB and seeks to limit the degree of change a new noise source introduces to an existing environment. Hence, when assessing intrusiveness, background noise levels need to be measured.

For low noise environments, such as rural environments, minimum assumed RBLs apply within the NPI and can be adopted in lieu of completing background noise measurements. This is considered the most conservative method for establishing noise criteria for a project. These result in minimum intrusiveness noise levels as follows:

- Minimum Day RBL = 35dBA;
- Minimum Evening RBL = 30dBA; and
- Minimum Night RBL = 30dBA.

Due to the rural nature of the locality, the PINLs for the proposal have been determined based on the minimum RBL+5dBA.

2.2.3 Project Amenity Noise Level (PANL)

The PANL is relevant to a specific land use or locality. To limit continuing increases in intrusiveness levels, the ambient noise level within an area from all combined industrial sources should remain below the recommended amenity noise levels specified in Table 2.2 (of the NPI). The NPI defines two categories of amenity noise levels:

- **Amenity Noise Levels (ANL)** – are determined considering all current and future industrial noise within a receiver area; and
- **Project Amenity Noise Level (PANL)** – is the recommended level for a receiver area, specifically focusing on the project being assessed.

Additionally, Section 2.4 of the NPI states: *“to ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a project amenity noise level applies for each new source of industrial noise as follows”:*

PANL for new industrial developments = recommended **ANL** minus 5dBA.

The following exceptions apply when deriving the PANL:

- areas with high traffic noise levels;
- proposed developments in major industrial clusters;
- existing industrial noise and cumulative industrial noise effects; and
- greenfield sites.

Furthermore, where the PANL is applicable and can be satisfied, the assessment of cumulative industrial noise is not required.

The recommended amenity noise levels as per Table 2.2 of the NPI are reproduced in **Table 6**.

Table 6 Amenity Criteria

Receiver Type	Noise Amenity Area	Time of day	Recommended amenity noise level dB LAeq(period)
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks.	See column 4	See column 4	5dB above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
School Classroom	All	Noisiest 1-hour period when in use	35 (internal) 45 (external)
Hospital ward			
- internal	All	Noisiest 1-hour	35
- external	All	Noisiest 1-hour	50
Place of worship			
- internal	All	When in use	40
Passive Recreation	All	When in use	50
Active Recreation	All	When in use	55
Commercial premises	All	When in use	65
Industrial	All	When in use	70

Notes: The recommended amenity noise levels refer only to noise from industrial noise sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated.

Types of receivers are defined as rural residential; suburban residential; urban residential; industrial interface; commercial; industrial – see Table 2.3 and Section 2.7 of the NPI.

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

2.2.4 Maximum Noise Level Assessment

The potential for sleep disturbance from maximum noise level events from a project during the night-time period needs to be considered. The NPI considers sleep disturbance to be both awakenings and disturbance to sleep stages.

Where night-time noise levels from a development/premises at a residential location exceed the following criteria, a detailed maximum noise level event assessment should be undertaken:

- LAeq(15min) 40dB or the prevailing RBL plus 5dBA, whichever is the greater, and/or
- LAmax 52dB or the prevailing RBL plus 15dBA, whichever is the greater.

A detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period.

Other factors that may be important in assessing the impacts on sleep disturbance include:

- how often the events would occur;
- the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the development;
- whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods); and
- current understanding of effects of maximum noise level events at night.

2.3 Road Noise Policy

The road traffic noise criteria are provided in the Department of Environment, Climate Change and Water NSW (DECCW), Road Noise Policy (RNP), 2011. The policy sets out noise criteria that provide for a degree of amenity appropriate for the land use and road category.

For some industries such as mines and extractive industries, that are not served by arterial roads, a principal haulage route may be identified. The RNP indicates that where local authorities identify a 'principal haulage route', the noise criteria for the route should match those for arterial/sub-arterial roads, recognising that they carry a different level and mix of traffic to local roads.

2.4 ANZEC Blasting Guidelines

Noise and vibration levels from blasting are assessable against criteria established in the Australian and New Zealand Environment Council (ANZEC) – Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration. The blasting limits are generally consistent with the guideline levels contained within AS2187:2006 Part 2 – Explosives - Storage and Usage – Part 2. Where compliance is achieved, the risk of human annoyance is minimised.

Furthermore, for damage induced vibration, German Standard DIN 4150 - Part 3: 1999 provides the strictest guideline levels of vibration velocity for evaluating the effects of vibration in structures. Blasting and vibration induced damage criteria relevant to this assessment are presented in detail in **Section 3.4**.

The guidelines recommend that blasting should generally be permitted during the hours of 9am to 5pm Monday to Saturday only. Blasting should not occur on Sundays or Public Holidays. Furthermore, blasting should generally take place no more than once per day.

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3 Assessment Criteria

The following sections summarise the relevant noise and blasting criteria for the proposal.

3.1 Construction Noise Management Levels

Noise Management Levels (NMLs) for construction activities for all residential receivers are 45dB LAeq(15min) (RBL +10dB). Construction activities are planned for standard hours, however the relevant NML standard construction hours and out of hours periods are summarised in **Table 7**.

Table 7 Construction Noise Management Levels			
Location	Assessment Period	RBL dB LA90	NML dB LAeq(15min)
All Residential Receivers	Day (Standard Hours)	35	45 (RBL+10dBA)
	Evening (OOH Period 1)	30	35 (RBL+5dBA)
	Night (OOH Period 2)	30	35 (RBL+5dBA)

3.2 Operational Criteria

3.2.1 Project Intrusiveness Noise Levels

The PINLs for the Project are presented in **Table 8** and have been determined based on the RBL +5dBA.

Table 8 Intrusiveness Noise Levels			
Receiver Type	Period ¹	Adopted RBL ² dB LA90	PINL dB LAeq(15min)
Residential	Morning Shoulder	30	35
	Day	35	40
	Evening	30	35

Note 1: Morning Shoulder – the period from 6am to 7am Monday to Saturday; Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening – the period from 6pm to 10pm.

Note 2: Minimum RBLs adopted.

3.2.2 Project Amenity Noise Levels

The PANLs for residential receivers potentially affected by the Project are presented in **Table 9**.

Table 9 Project Amenity Noise Levels				
Receiver Type	Noise Amenity Area	Assessment Period ¹	Recommended ANL dB LAeq(period) ²	PANL dB LAeq(15min) ³
Residential Receivers	Rural	Morning Shoulder	40	43
		Day	50	53
		Evening	45	48

Note 1: Morning Shoulder – the period from 6am to 7am Monday to Saturday; Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening – the period from 6pm to 10pm.

Note 2: Recommended amenity noise levels as per Table 2.2 of the NPI.

Note 3: Includes a +3dB adjustment to the amenity period level to convert to a 15-minute assessment period as per Section 2.2 of the NPI.

3.2.3 Project Noise Trigger Levels

The PNTLs are the lower of either the PINL or the PANL. **Table 10** presents the derivation of the PNTL in accordance with the methodologies outlined in the NPI.

Table 10 Project Noise Trigger Levels					
Receiver Type	Period	RBL	PINL dB LAeq(15min)	PANL dB LAeq(15min)	PNTL dB LAeq(15min)
Residential	Morning Shoulder	30	35	43	35
	Day	35	40	53	40
	Evening	30	35	48	35

Note 1: Morning Shoulder – the period from 6am to 7am Monday to Saturday; Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening – the period from 6pm to 10pm.

3.2.4 Maximum Noise Assessment Trigger Levels

The maximum noise trigger levels shown in **Table 11** are based on night time RBLs and trigger levels as per Section 2.5 of the NPI. The trigger levels will be applied to transient noise events that have the potential to cause sleep disturbance.

Table 11 Maximum Noise Assessment Trigger Levels			
Residential Receivers			
LAeq(15min)		LAmax	
40dB LAeq(15min) or RBL + 5dB		52dB LAmax or RBL + 15dB	
Trigger	40	Trigger	52
RBL 30+5dB	35	RBL 30+15dB	45
Highest	40	Highest	52

Note: Monday to Saturday; Night 10pm to 7am. On Sundays and Public Holidays; Night 10pm to 8pm.

Note: As per Section 2.5 of the NPI, the highest of the two criteria are adopted as the trigger level.

3.3 Road Traffic Noise Criteria

In accordance with the RNP, this assessment has adopted the 'Freeway/arterial/sub-arterial road' category for the designated inbound and outbound transport routes, consistent with the classification of the haulage route as a 'principal haulage route'. **Table 12** reproduces the road traffic noise assessment criteria relevant for this road type.

Table 12 Road Traffic Noise Assessment Criteria for Residential Land Uses			
Road category	Type of Project/development	Assessment Criteria - dB(A)	
		Day (7am to 10pm)	Night (10pm to 7am)
Freeway/arterial/sub-arterial road	Existing residences affected by additional traffic on existing freeways/sub-arterial/roads	60dB(A)	55dB(A)
	generated by land use developments	LAeq(15hr)	LAeq(9hr)

Note: For road noise assessments, the day period is from 7am to 10pm (ie there is no evening assessment period as there is with operational noise). Night is from 10pm to 7am.

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 2dB, which is generally accepted as the threshold of perceptibility to a change in noise level.

3.3.1 Relative Increase Criteria

In addition to meeting the assessment criteria, any significant increase in total traffic noise at receivers must be considered. Receivers experiencing increases in total traffic noise levels above those presented in **Table 13** due to the addition of project vehicles on the Oxley Highway should be considered for mitigation.

Table 13 Increase Criteria for Residential Land Uses

Road Category	Type of Project/Development	Total Traffic Noise Level Increase, dB(A)	
		Day (7am to 10pm)	Night (10pm to 7am)
Freeway/arterial/sub-arterial roads and transitways	New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road.	Existing traffic LAeq(15hr) +12dB (external)	Existing traffic LAeq(9hr) +12dB (external)

3.4 ANZEC Guideline Blasting Limits

The ANZEC blasting limits for air-blast overpressure and ground vibration are presented in **Table 14**.

Table 14 ANZEC Guideline Blasting Limits

	Overpressure dB (Linear Peak)	Ground Vibration PPV (mm/s)
Recommended Maximum (95% of all blasts)	115	5
Level not to be exceeded	120	10
Long term goal for ground vibration	N/A	2

4 Noise Assessment Methodology

A computer model was developed to quantify the proposal noise emissions to neighbouring receivers for typical construction activities and operations. DGMR (iNoise, Version 2020.0) noise modelling software was used to quantify noise emissions from typical construction activities and operations. iNoise is a new intuitive and quality assured software for industrial noise calculations in the environment. 3D noise modelling is considered industry best practice for assessing noise emissions from projects.

The model incorporated a three-dimensional digital terrain map giving all relevant topographic information used in the modelling process. Additionally, the model uses relevant noise source data, ground type, attenuation from barrier or buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers.

The model calculation method used to predict noise levels was in accordance with ISO 9613-1 'Acoustics - Attenuation of sound during propagation outdoors. Part 1: Calculation of the absorption of sound by the atmosphere' and ISO 9613-2 'Acoustics - Attenuation of sound during propagation outdoors. Part 2: General method of calculation'. The ISO 9613 standard from 1996 is the most used noise prediction method worldwide. Many countries refer to ISO 9613 in their noise legislation. However, the ISO 9613 standard does not contain guidelines for quality assured software implementation, which leads to differences between applications in calculated results. In 2015 this changed with the release of ISO/TR 17534-3. This quality standard gives clear recommendations for interpreting the ISO 9613 method. iNoise fully supports these recommendations. The models and results for the 19 test cases are included in the software.

4.1 Construction Noise Modelling Parameters

A worst-case modelling scenario was adopted in this assessment to represent maximum noise emissions during construction of temporary amenities and formation of the carpark hardstand area. It is noted that there are potentially multiple and varied plant items which may be used in the construction phase of this project. Notwithstanding, the adopted fleet sound power level is considered representative of construction activities for this type of project.

The noise emission levels used in modelling are summarised in **Table 15**.

Table 15 Equipment Sound Power Levels - Construction

Item	LAeq(15min) Sound Power Level (SWL), dBA	Period of Operation
Backhoe (small) (x1)	103	Day Only
Road Truck (x1)	102	Day Only
Grader (x1)	104	Day Only
Hand power tools	97	Day Only
Total Fleet	108	Day Only

4.2 Operational Noise Modelling Parameters

4.2.1 Meteorological Analysis

Noise emissions from industry can be significantly affected by prevailing weather conditions. Wind has the potential to increase noise at a receiver when it is at low velocities and travels from the direction of the noise source. As the strength of the wind increases, the noise produced by the wind will mask the audibility of most industrial sources.

Meteorological conditions that enhance received noise levels include source to receiver winds and the presence of temperature inversions. To account for potential enhancements, the NPI specifies that the source to the receiver wind component speeds up to 3m/s for 30% or more of the time in any seasonal period (ie day, evening or night), is considered to be a feature wind and predictions must incorporate these conditions.

To determine the prevailing conditions for the Quarry, weather data during the period September 2017 to September 2019 was obtained from the Bureau of Meteorology's (BOM) Dubbo Airport (AWS) weather station located approximately 58km south-south-east of the Quarry Site. The data was analysed using the EPA's Noise Enhancement Wind Analysis (NEWA) program in order to determine the frequency of occurrence of winds of speeds up to 3m/s in each season.

Table 16 summarises the results of the wind analysis and includes the dominant wind direction and percentage occurrence during each season for each assessment period. The results of the detailed analysis of meteorological data is presented in **Appendix B**.

Table 16 Seasonal Frequency of Occurrence Wind Speed Intervals

Season	Period ¹	Wind Direction $\pm(45^\circ)$	% Wind Speeds (m/s)
			0.5 to 3 m/s
Summer	Day	NNW	8
	Evening	NE	12
	Night	ESE	14
Autumn	Day	ESE	12
	Evening	ESE	16
	Night	ESE	17
Winter	Day	ESE	12
	Evening	SSW, SW	16
	Night	ESE	21
Spring	Day	ESE	8
	Evening	SSW, SW	12
	Night	ESE	15

Based on the results of this analysis, prevailing winds are not applicable for the assessment and the relevant meteorological conditions adopted are summarised in **Table 17**.

Table 17 Modelled Site Specific Meteorological Parameters

Assessment Condition	Temperature	Wind Speed / Direction	Relative Humidity	Stability Class
Morning Shoulder - Inversion	10°C	2m/s / all directions	90%	F
Day - Calm	20°C	n/a	60%	n/a
Evening - Inversion	15°C	2m/s / all directions	70%	F

Note: Morning Shoulder – the period from 6am to 7am Monday to Saturday; Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening – the period from 6pm to 10pm.

4.2.2 Operational Noise Modelling Scenarios

The extraction operations of the Project would be undertaken over two stages. Stage 1 operations would involve the extraction of approximately 2.3Mt over 5 years (ie 490,000tpa) to supply hard rock material to the Inland Rail Project. During this stage, primary crushing activities would initially occur at the natural land surface before being relocated into the extraction area as the Quarry expands. During Stage 2, quarrying operations would continue down to approximately 240 to 242m AHD and the intensity of extraction would be reduced to approximately 80,000 to 120,000tpa of hard rock products to supply local markets.

To represent the worst-case operational activities, one (1) modelling scenario was adopted to assess operational noise emissions during Stage 1 of the Project. It is considered that where operational noise

emissions for Stage 1 of the Project are demonstrated to achieve the operational noise criteria, noise emissions during Stage 2 operations would also achieve the criteria.

The scenario is summarised below:

- Stripping of soil by bulldozer or excavator to expose the basalt resource. Soil would be spread onto the amenity bund or placed in wind row stockpiles within the Extraction Area footprint;
- The in-situ rock would be fragmented using conventional drill and blast techniques;
- Extracted Quarry material would be transferred direction to a mobile crushing unit (MCU) or to the Run-of-Mine (ROM) stockpile by front-end loader;
- After crushing, the Quarry products would be loaded to haul trucks and distributed to stockpiles within the Stockpile Area; and
- Road trucks would transport the material offsite via the private haul road.

It is noted that the MCU would initially be placed within the existing crushing and stockpiling area before being relocated within the pit to adjoin the blasted rock pile. The MCU in pit locations would be approximately 10m to 15m below the natural land surface level.

4.2.3 Sound Power Levels - Operation

Mobile plant noise emission data used in modelling for this assessment were obtained from the MAC noise database for relevant noise sources that are proposed to be used in the Quarry. The noise emission levels used in modelling are presented in **Appendix C** and summarised in **Table 18**.

Table 18 Equipment Sound Power Levels

Item	dB LAeq(15min) Sound Power Level (SWL)	Period of Operation		
		Day	Evening	Morning Shoulder
Operational Noise Sources				
Drill Rig (x1)	114	✓	x	✓
Bulldozer (x1)	111	✓	x	✓
Excavator (x1)	106	✓	x	✓
Dump Truck (x2)	109	✓	x	✓
Water Truck (x1)	101	✓	x	✓
Mobile Crushing Unit	113	✓	x	✓
Loader (x1) ¹	106	✓	x	✓
Backhoe (x1)	103	✓	x	✓
Road Trucks (70/day)	102	✓	✓	✓
Sleep Disturbance Assessment (LAmax)				
Truck Loading	117	x	x	✓

Note 1: Loader not used during Stage 2 of operations.

4.2.4 Annoying Characteristics

Fact Sheet C of the NPI provides guidelines for applying 'modifying factors' adjustments to account for annoying noise characteristics such as low frequency, tonality, intermittent noise, irregular or noise of short duration. An assessment of annoying characteristics has been undertaken for the project, and is provided in **Appendix D**. It is noted that due to the nature of the Quarry operations, intermittent noise is unlikely to be a feature of the site and has not been considered further.

The analysis of low-frequency noise found that modelled noise levels from all sources exceeded the screening test of C-A weighted noise levels greater or equal to 15dB. Further analysis was undertaken to determine whether noise levels exceeded the threshold in any octave band. The results of the assessment indicated that Z weighted noise levels remained below the relevant thresholds for all octave bands for each receiver location. Hence, no correction for low-frequency noise is applied.

An assessment of tonality was undertaken to identify dominant tones associated with the Quarry. The tonal noise correction applies when the level of an octave band exceeds the level of the adjacent band on either side by at least 5dB. The results of the tonality assessment demonstrates that the Quarry operations do not result in dominant tones. Hence, no correction for tonality is applied.

4.3 Road Noise Assessment Methodology

Extracted material would typically be transported from the proposal using B-Double configuration trucks or similar. Once loaded within the Stockpile Area, trucks would exit the Project Site onto to the private haul road to the Oxley Highway, which traverses portions of the 'Berakee' and 'Wilgaroo' properties under a right of carriageway agreement (see **Figure 1**).

Once at the Oxley Highway, which is a major east west transport route linking the mid north coastal regions to the central western regions of NSW, approximately 95% of heavy vehicle movements would be in an easterly direction.

There are no residential receivers immediately adjacent to the private haul road. The closest offset distances to receivers along the Oxley Highway are approximately 100m within the vicinity of the Quarry and approximately 70m to receivers within the township of Collie.

Maximum dispatch from the Quarry will be up to 35 loads per day (70 movements) and up to a maximum of 10 loads per hour (20 movements). There would be approximately 12 light vehicle movements associated with the proposal per day. Based on annual average daily traffic (AADT) volumes from the TfNSW Traffic Volume Viewer (2009), the Oxley Highway carries approximately 550 vehicles per day with approximately 19% of those classified as heavy vehicles.

The United States (US) Environment Protection Agency's road traffic calculation method was used to predict the LAeq noise levels from proposal related trucks travelling past existing receivers on Ostlers Lane. This method is an internationally accepted theoretical traffic noise prediction model and is ideal for calculating road traffic noise where relatively small traffic flows are encountered.

4.4 Blasting and Vibration Assessment Methodology

4.4.1 Indicative Blast Design

The in-situ rock would be fragmented using drill and blast techniques. The indicative blast design parameters are provided in **Table 19**.

Table 19 Blast Parameters	
Parameter	Value
Blast hole diameter	89mm
Blast hole depth	5.5 to 11m
Blast hole spacing	~3m x 3m
Depth of stemming	1 to 2m
Size of blast	8,000 to 12,000bcm
Area of blast	500 to 1,500m ³
Bulk explosive type/initiation system	ANFO/None
Maximum Instantaneous Charge (MIC)	Up to 50kg

4.4.2 Air-Blast Overpressure

Calculation of overpressure has been completed using the following AS2187.2 equation:

$$P = K_a \left(\frac{R}{(Q^{1/3})} \right)^a$$

Where:

P = Pressure, in kilopascals;

Q = Effective explosives charge mass, in kilograms (MIC);

R = Distance from charge, in metres;

K_a = Site constant, a conservative value of 25 was adopted; and

a = Site exponent, a value of -1.45 was adopted.

The conversion of 'P' to unweighted decibels (dBZ) is completed using the following formula:

$$SPL = 10 \times \log \left(\frac{P}{P_0} \right)^2$$

4.4.3 Ground-Borne Vibration

Preliminary estimations for vibration have been completed using the following AS2187.2 equation:

$$V = K_g \left(\frac{R}{(Q^{1/2})} \right)^{-B}$$

Where:

V = ground vibration as vector peak particle velocity, in mm/s;

R = distance between charge and point of measurement, in m;

Q = maximum instantaneous charge (effective charge mass per delay), in kg;

K_g = a constant related to site and rock properties for estimation purposes, a value of 1140 was adopted as per AS2187.2 to predict the 50% chance of exceedance in "average conditions"; and

B = a constant related to site and rock properties for estimation purposes, a value of 1.6 was adopted.

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5 Noise Modelling Results and Discussion

5.1 Construction Phase Noise Results

Predicted noise levels for the construction scenario described in **Section 4.1** are provided in **Table 20**. The results of the analysis show that noise emissions from each of the construction scenarios are predicted to satisfy the relevant noise management levels at all receiver locations.

Table 20 Combined Noise Predictions – Construction Scenarios			
Receiver	Predicted Noise Level dB LAeq(15min)	Day Period NML dB LAeq(15min)	Compliant
R1	<30	45	✓
R2	<30	45	✓
R3	<30	45	✓
R4	<30	45	✓
R5	<30	45	✓
R6	<30	45	✓
R7	<30	45	✓
R8	<30	45	✓
R9	<30	45	✓
R10	<30	45	✓
R11	<30	45	✓
R12	<30	45	✓
R13	<30	45	✓
R14	<30	45	✓
R15	<30	45	✓
R16	<30	45	✓
R17	<30	45	✓

5.2 Operational Noise Results

Predicted Quarry operations include extraction, processing, product loading and transportation. The predicted noise levels at each receiver during calm and prevailing meteorological conditions are provided in **Table 21**. The noise contour maps for the Quarry operations are provided in **Appendix E**.

The results of the predictive modelling show that noise emissions from the Quarry satisfy the PNTL at all residential receivers, for each operational scenario under normal operating conditions. The assessment considered both calm and adverse (F Class inversion) meteorological scenarios.

Table 21 Predicted Operational Noise Levels, dB LAeq(15min)

Receiver	Predicted Noise Level dB LAeq(15min)			PNTL dB LAeq(15min)			Compliant
	Shoulder ¹	Day	Evening ^{1,2}	Shoulder	Day	Evening	
R1	30	<30	<30	35	40	35	✓
R2	33	31	<30	35	40	35	✓
R3	<30	<30	<30	35	40	35	✓
R4	<30	<30	<30	35	40	35	✓
R5	<30	<30	<30	35	40	35	✓
R6	<30	<30	<30	35	40	35	✓
R7	<30	<30	<30	35	40	35	✓
R8	<30	<30	<30	35	40	35	✓
R9	<30	<30	<30	35	40	35	✓
R10	<30	<30	<30	35	40	35	✓
R11	<30	<30	<30	35	40	35	✓
R12	<30	<30	<30	35	40	35	✓
R13	<30	<30	<30	35	40	35	✓
R14	<30	<30	<30	35	40	35	✓
R15	<30	<30	<30	35	40	35	✓
R16	<30	<30	<30	35	40	35	✓
R17	<30	<30	<30	35	40	35	✓

Note: Morning Shoulder – the period from 6am to 7am Monday to Saturday or 6am to 8am Sundays and public holidays; Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays.

Note 1: Assessed during inversion conditions.

Note 2: Trucks returning to Quarry Site during evening only.

5.3 Maximum Noise Level Assessment

In assessing sleep disturbance, a typical L_{Amax} noise source of 117dB was used to represent transient events associated with loading trucks with Quarry products to the assessed residential receivers under F Class stability conditions (ie worst case).

The results of the analysis identify that maximum noise trigger levels will be satisfied for all residential receivers, hence no further assessment or detailed analysis is required. Predicted noise levels from L_{Amax} events are presented in **Table 22**.

Table 22 Predicted Maximum Noise Levels

Receiver	Period	Noise Predictions	Trigger Level
		dB L _{Amax}	dB L _{Amax}
R1	Morning Shoulder	<30	52
R2		<30	52
R3		<30	52
R4		<30	52
R5		<30	52
R6		<30	52
R7		<30	52
R8		<30	52
R9		<30	52
R10		<30	52
R11		<30	52
R12		<30	52
R13		<30	52
R14		<30	52
R15		<30	52
R16		<30	52
R17		<30	52

Note: Morning Shoulder – the period from 6am to 7am Monday to Saturday or 6am to 8am Sundays and public holidays.

5.4 Traffic Noise Results

The results of the traffic noise calculations for operational road traffic are presented in **Table 23** for the closest residential receivers to the Oxley Highway, identified as 1 Coonamble Street and 1840 Oxley Highway, setback approximately 70m and 100m respectively from the carriageway.

Maximum dispatch from the Quarry will be up to 35 loads per day (70 movements) and up to a maximum of 10 loads per hour (20 movements). There would be approximately 12 light vehicle movements associated with the proposal per day. For this assessment, it has been assumed that all vehicles travel along the proposed haul route to the Oxley Highway.

Based on the most recent AADT volumes, the Oxley Highway carries approximately 550 vehicles per day with approximately 19% of those classified as heavy vehicles.

Table 23 Operational Road Traffic Noise Levels – Residential Receivers

Offset Distance (m)	Assessment Criteria ¹	Traffic Noise dB LAeq(period)		Total Change
		Existing Traffic Noise	Existing + Future Quarry Combined	
1 Coonamble Street				
70m	Day 60 dB LAeq(15hr)	35.4	37.1	+1.7
	Night 55 dB LAeq(9hr)	32.6	34.0	+1.4
1840 Oxley Highway				
100m	Day 60 dB LAeq(15hr)	31.8	33.4	+1.6
	Night 55 dB LAeq(9hr)	<30	30.4	+1.5

Note 1: Day 7am to 10pm. Night 10pm to 7am.

The traffic noise contribution from the Quarry is predicted to remain below the relevant day and night assessment criteria for the nearest residential receivers.

5.5 Blasting Results

The Proponent anticipates the requirement for up to 12 blasts per year during Stage 1, and approximately three blast per year during Stage 2.

Blast overpressure and vibration have been calculated to each assessed receiver for the proposal adopting a Maximum Instantaneous Charge (MIC) of up to 50kg. Calculated levels for overpressure and vibration have been compared to the relevant ANZEC criteria and are presented in **Table 24**. Results identify blasts of MICs up to 50kgs would satisfy relevant ANZEC overpressure and vibration criteria.

Notwithstanding, the proposed MIC blast patterns should be completed in conjunction with an appropriate blast monitoring program.

Table 24 Blasting Emissions			
Receiver ID ¹	Distance to Charge	Airblast Overpressure	Ground Vibration
	km	dBZ Peak	mm/s
R1	2.1	102	0.12
R2	1.9	103	0.14
R3	3.2	97	0.06
R4	3.8	94	0.05
R5	3.8	95	0.05
R6	4.0	94	0.04
R7	5.0	91	0.03
R8	5.3	90	0.03
R9	6.0	89	0.02
R10	6.5	88	0.02
R11	6.5	88	0.02
R12	6.5	88	0.02
R13	6.4	88	0.02
R14	7.4	86	0.02
R15	8.1	85	0.01
R16	9.6	83	0.01
R17	10.2	82	0.01

5.5.1 Effects of Vibration on Infrastructure from Blasting

The nearest significant infrastructure to the Quarry is the Oxley Highway approximately 6.3km to the north of the Quarry. Vibration levels at the Oxley Highway are calculated to be below 5mm/s. Hence there are no significant vibration effects from blasting on significant infrastructure.

5.5.2 Effects of Blasting on Animals and Livestock

Blast effects resulting from the Quarry are predicted to be, at worst for overpressure up to 103dBZ, and for vibration up to 0.14mm/s at the nearby residential receiver locations. The calculated blast over pressure and vibration levels are well below the regulatory criteria and considerably lower than other sources of overpressure that horses or livestock are likely to be already subjected to such as lightning strikes which are typically between 120dBZ and 130dBZ¹.

¹ Equine Health Impact Statement – Drayton South Coal Project (2015)

6 Noise Monitoring and Management

6.1 Noise Management Measures

Although it is demonstrated that noise levels are predicted to meet the relevant noise goals and no further mitigation measures are required, to proactively address any potential residual noise impacts, a noise management plan (NMP) may be considered for the Quarry. The NMP will guide, manage, quantify and control noise emissions from the Quarry through the implementation of feasible and reasonable best management practices. These may include:

- Scheduling the use of noisy equipment at the least-sensitive time of day;
- Strictly adhering to the proposed hours of operation;
- Siting noisy equipment behind structures that act as barriers, or at the greatest distance from the noise-sensitive area.
- Keeping equipment well maintained and operating it in a proper and efficient manner.
- Employing 'quiet' practices when operating equipment, for example, positioning idling trucks in appropriate areas.
- Running staff-education programs and regular tool box talks on the effects of noise and the use of quiet work practices.

The NMP may also address the use of best available technology including alternatives to tonal reversing alarms, efficient muffler design, and using enclosures, as well as reducing noise in transmission or at the receiver.

6.2 Noise Monitoring

It is recommended that the NMP includes a provision for attended noise monitoring within the community in response to received complaints, if any. The operator attended noise measurements and recordings would be conducted to quantify noise emissions from the Quarry as well as the overall level of ambient noise.

As per the EPA's Recommended Environmental Assessment Requirements, it is recommended that one (1) round of validation monitoring is undertaken within six (6) months of initiation of operations. Where validation monitoring is undertaken, the survey should be carried out at the nearest residential receiver locations, identified as R1 and R2, and occur under normal operating conditions. The survey should include one (1) 15-minute measurement at each of the nominated receivers during the morning shoulder period (6am to 7am) and day period (7am to 6pm). The noise measurements would occur in accordance with the method outlined below.

When required, the operator shall quantify and characterise the energy equivalent (L_{Aeq}) intrusive noise level from the project over a 15-minute measurement period. In addition, the operator shall quantify and characterise the overall levels of ambient noise over the 15-minute measurement interval. It is recommended that instrumentation used during the monitoring is to be equivalent to a Type 1 meter with 1/3 octave band analysis and have audio recording functionality for post processing source identification. It is noted that 1/3 octave band analysis is required to establish whether modification factors in accordance with the NPI are to be applied.

All acoustic instrumentation used as part of the attended monitoring program must be designed to comply with the requirements of AS IEC 61672.1-2019, Electroacoustics - Sound level meters - Specifications and shall have current calibration certificates. All instrumentation shall be programmed to record statistical noise level indices in 15-minute intervals including L_{Amax} , L_{Amin} and L_{Aeq} .

Instrument calibration shall be checked before and after each measurement survey, with the variation in calibrated levels not exceeding ± 0.5 dBA. The measurement position(s) should be selected considering:

- weather conditions such as rain and wind, insect noise;
- the location and direction of any noise source/s;
- the most sensitive position at the affected receiver; and
- the need to avoid reflecting surfaces (where possible).

7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has conducted a NVIA of potential impacts from the proposal for extension of the Berakee Quarry near Collie, NSW. The assessment has quantified potential construction and operational noise emissions pertaining to extraction, processing, drilling and dispatch via road trucks, as well as blasting noise and vibration emissions.

The results of the NVIA demonstrate that construction and operational noise levels would achieve the relevant ICNG and NPI criteria for all assessment periods at each assessed receiver location.

An assessment of maximum noise levels demonstrated that noise emissions from the proposal are predicted to remain below the EPA trigger levels for sleep disturbance at all receiver locations.

The NVIA demonstrates that the project related road traffic noise levels will meet the objectives of the RNP for the nearest residential receivers to the Oxley Highway.

Airblast overpressure and vibration levels are also predicted to meet the criteria at all assessed receivers for blasts up to 50kg MIC.

Based on the NVIA results, there are no noise or blasting related issues which would prevent the approval of the project. The results of the assessment show compliance with the relevant operational and road noise criteria. Additionally, the results of the assessment demonstrate compliance with the relative EPA and DECCW policies, without ameliorative measures being required.

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Appendix A – Glossary of Terms

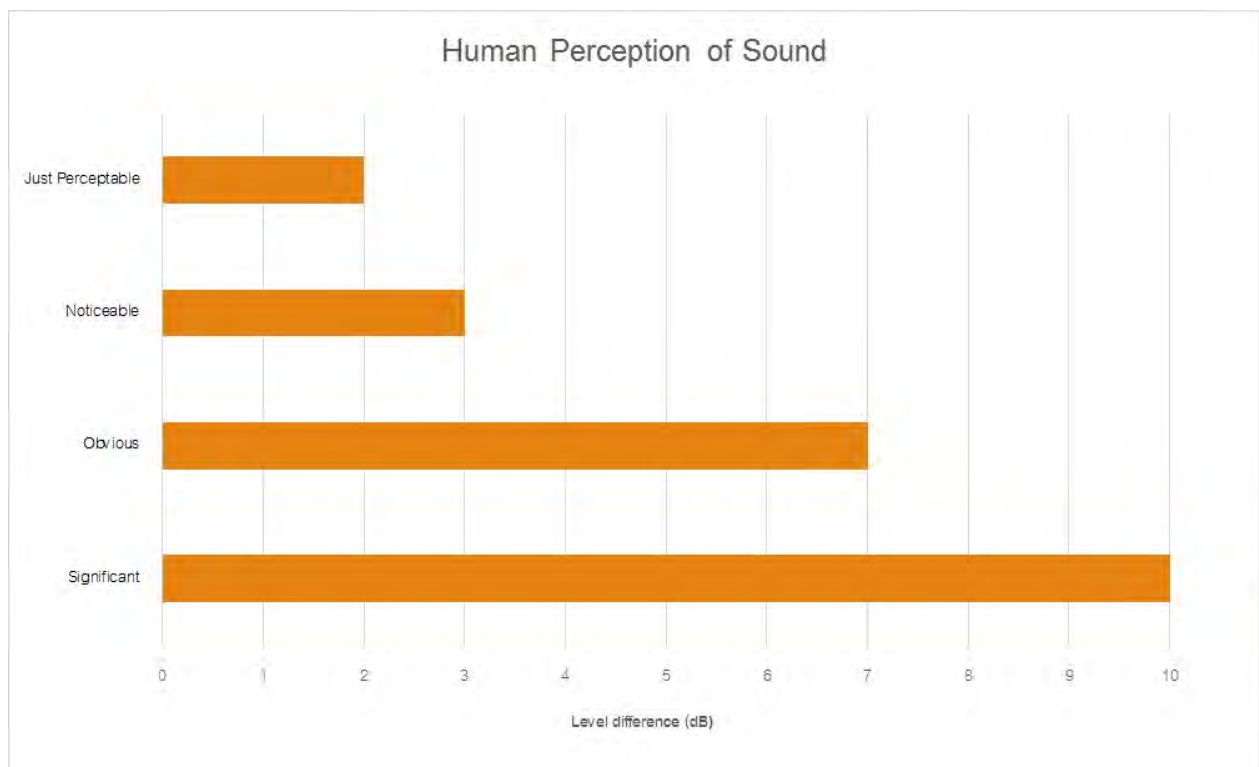
Table A1 provides a number of technical terms have been used in this report.

Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
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. In some cases the overall change in noise level is described in dB rather than dB(A), or dB(Z) which relates to the weighted scale.
dB(Z)	Linear Z-weighted decibels.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAmax	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure 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 ABL's.
Sound power level (LW)	<p>This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by :</p> $= 10 \cdot \log_{10} (W/W_0)$ <p>Where : W is the sound power in watts and W₀ is the sound reference power at 10-12 watts.</p>

Table A2 provides a list of common noise sources and their typical sound level.

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dB(A)	
Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



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Appendix B – NEWA Analysed Meteorology

Table B1 NEWA Analysed Daytime Meteorological Conditions, Dubbo Airport AWS NSW

Direction ± 45°	Season	Day	Direction	Season	Day
		Percentage Occurrence %			Percentage Occurrence %
0	Summer	7	180	Summer	3
0	Autumn	6	180	Autumn	8
0	Winter	6	180	Winter	9
0	Spring	5	180	Spring	6
22.5	Summer	7	202.5	Summer	4
22.5	Autumn	7	202.5	Autumn	6
22.5	Winter	6	202.5	Winter	7
22.5	Spring	6	202.5	Spring	5
45	Summer	6	225	Summer	4
45	Autumn	8	225	Autumn	5
45	Winter	6	225	Winter	6
45	Spring	6	225	Spring	4
67.5	Summer	5	247.5	Summer	4
67.5	Autumn	8	247.5	Autumn	5
67.5	Winter	6	247.5	Winter	7
67.5	Spring	6	247.5	Spring	4
90	Summer	4	270	Summer	5
90	Autumn	9	270	Autumn	4
90	Winter	9	270	Winter	7
90	Spring	7	270	Spring	4
112.5	Summer	5	292.5	Summer	5
112.5	Autumn	12	292.5	Autumn	6
112.5	Winter	12	292.5	Winter	8
112.5	Spring	8	292.5	Spring	5
135	Summer	5	315	Summer	6
135	Autumn	11	315	Autumn	5
135	Winter	11	315	Winter	8
135	Spring	7	315	Spring	5
157.5	Summer	3	337.5	Summer	8
157.5	Autumn	8	337.5	Autumn	7
157.5	Winter	9	337.5	Winter	7
157.5	Spring	5	337.5	Spring	6

Table B2 NEWA Analysed Evening Meteorological Conditions, Dubbo Airport AWS NSW

Direction ± 45°	Season	Evening	Direction	Season	Evening
		Percentage Occurrence %			Percentage Occurrence %
0	Summer	8	180	Summer	7
0	Autumn	5	180	Autumn	14
0	Winter	7	180	Winter	15
0	Spring	4	180	Spring	11
22.5	Summer	9	202.5	Summer	7
22.5	Autumn	8	202.5	Autumn	13
22.5	Winter	7	202.5	Winter	16
22.5	Spring	6	202.5	Spring	12
45	Summer	12	225	Summer	6
45	Autumn	14	225	Autumn	10
45	Winter	10	225	Winter	16
45	Spring	10	225	Spring	12
67.5	Summer	11	247.5	Summer	6
67.5	Autumn	13	247.5	Autumn	9
67.5	Winter	10	247.5	Winter	14
67.5	Spring	11	247.5	Spring	10
90	Summer	9	270	Summer	5
90	Autumn	14	270	Autumn	5
90	Winter	11	270	Winter	11
90	Spring	10	270	Spring	8
112.5	Summer	10	292.5	Summer	5
112.5	Autumn	16	292.5	Autumn	4
112.5	Winter	13	292.5	Winter	10
112.5	Spring	11	292.5	Spring	6
135	Summer	8	315	Summer	5
135	Autumn	15	315	Autumn	3
135	Winter	12	315	Winter	7
135	Spring	10	315	Spring	4
157.5	Summer	4	337.5	Summer	8
157.5	Autumn	10	337.5	Autumn	4
157.5	Winter	8	337.5	Winter	6
157.5	Spring	6	337.5	Spring	3

Table B3 NEWA Analysed Night time Meteorological Conditions, Dubbo Airport AWS NSW

Direction ± 45°	Season	Night	Direction	Season	Night
		Percentage Occurrence %			Percentage Occurrence %
0	Summer	4	180	Summer	6
0	Autumn	4	180	Autumn	11
0	Winter	5	180	Winter	14
0	Spring	2	180	Spring	11
22.5	Summer	8	202.5	Summer	5
22.5	Autumn	6	202.5	Autumn	7
22.5	Winter	6	202.5	Winter	9
22.5	Spring	4	202.5	Spring	10
45	Summer	13	225	Summer	3
45	Autumn	10	225	Autumn	6
45	Winter	8	225	Winter	6
45	Spring	7	225	Spring	6
67.5	Summer	13	247.5	Summer	3
67.5	Autumn	12	247.5	Autumn	4
67.5	Winter	10	247.5	Winter	6
67.5	Spring	10	247.5	Spring	6
90	Summer	13	270	Summer	2
90	Autumn	14	270	Autumn	4
90	Winter	16	270	Winter	7
90	Spring	12	270	Spring	5
112.5	Summer	14	292.5	Summer	2
112.5	Autumn	17	292.5	Autumn	4
112.5	Winter	21	292.5	Winter	7
112.5	Spring	15	292.5	Spring	4
135	Summer	10	315	Summer	2
135	Autumn	14	315	Autumn	3
135	Winter	19	315	Winter	6
135	Spring	15	315	Spring	4
157.5	Summer	6	337.5	Summer	4
157.5	Autumn	12	337.5	Autumn	4
157.5	Winter	16	337.5	Winter	5
157.5	Spring	11	337.5	Spring	3

Appendix C – Sound Power Data

The noise emission levels used in modelling are summarised in **Table C1**.

Table C-1 Single Octave Equipment Sound Power Levels, dB LAeq(15min) (re10 ⁻¹² W)									
Noise Source/Item	Octave Band Centre Frequency, Hz								Total, dBA
	63	125	250	500	1000	2000	4000	8000	
Mobile Equipment									
Drill Rig	81	103	104	106	109	108	100	92	114
Bulldozer	86	95	99	107	104	102	100	90	111
Excavator	79	99	100	99	100	96	91	82	106
Dump Truck	87	99	96	100	104	102	98	89	109
Water Truck	81	82	89	91	95	97	89	81	101
Mobile Crusher	97	98	98	109	107	106	100	92	113
Loader	79	89	95	100	100	100	92	84	106
Backhoe	76	78	83	89	91	89	88	76	96
Road Trucks	89	95	90	89	93	97	92	85	102
Sleep Disturbance Assessment (LAmax)									
Loading Quarry products into road truck (impact noise)	91	101	107	112	112	112	104	96	117

Appendix D – Annoying Characteristics Assessment

D1 Requirements to Address Annoying Characteristics

Fact Sheet C of the NPI provides guidelines for applying 'modifying factors' adjustments to account for annoying noise characteristics such as low frequency, tonality, intermittent noise, irregular or noise of short duration.

D1.1 Low Frequency Noise

In accordance with Table C1 of the NPI, the low-frequency noise correction applies when the C minus A level is 15dB or more, and:

- Where any of the one-third octave noise levels in Table C2 (reproduced in **Table D-1**) are exceeded by up to and including 5dB and cannot be mitigated, a 2dBA positive adjustment to the measured/predicted A-weighted levels applies for the evening/night period; or
- Where any of the one-third octave noise levels in Table C2 are exceeded by more than 5dB and cannot be mitigated, a 5dBA positive adjustment to measured/predicted A-weighted levels applies for the evening/night period and a 2dBA positive adjustment applies for the daytime period.

Table D-1 One-third octave low-frequency noise thresholds (from Table C2 of NPI)

Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

Noise predictions have been completed to determine the applicability of low frequency modifying factors. The modelled C-A noise levels for receivers nearest to the Quarry (R1, R2 and R3) and the receivers further from the Quarry (R7, R14 and R17) are provided in **Table D-2**.

It is noted that 1/1 octave data has been adopted for the assessment as 1/3 octave data for the project is unavailable. Additionally, results should be considered worst case for the site as concurrent operation of all plant and equipment was assessed. It is also noted that the assessment of low frequency noise by calculation is indicative as the inclusion of one third octaves and frequencies below 63Hz are not 100% compliant with the scope of ISO9613.

Table D-2 Modelled C weighted and A Weighted Single Octave Band Levels, dB LAeq(15min)

Catchment	Receiver	Octave Band Centre Frequency, Hz								Total	
	ID	Weighting	63	125	250	500	1000	2000	4000		
Near Receivers	R1	A	25.1	22.5	19.5	25.3	23.0	14.5	-22.5	30.7	
		C	50.5	38.4	28.1	28.5	23.0	13.1	-24.3	50.8	
		Difference (C-A), dB									20.1
	R2	A	28.0	21.5	19.0	24.8	26.9	17.8	-20.7	32.5	
		C	53.6	37.7	27.7	28.1	27.1	16.6	-22.3	53.7	
		Difference (C-A), dB									21.2
	R3	A	24.4	17.6	13.1	16.8	16.7	3.8	-42.5	26.5	
		C	49.8	33.5	21.7	20.0	16.7	2.4	-44.3	49.9	
		Difference (C-A), dB									23.4
	Far Receivers	R7	A	14.1	11.3	5.7	6.6	-2.1	-25.0	-113	16.8
C			39.5	27.2	14.3	9.8	-2.1	-26.4	-114	39.7	
		Difference (C-A), dB									22.9
R14		A	9.4	5.4	-6.0	-13.3	-11.0	-21.5	-80.3	11.0	
		C	34.8	21.3	2.6	-10.1	-11.0	-22.9	-82.1	35.0	
		Difference (C-A), dB									24.0
R17		A	7.2	2.9	-7.9	-15.3	-30.3	-57.5	-170	8.7	
		C	32.6	18.8	0.7	-12.1	-30.3	-58.9	-172	32.8	
		Difference (C-A), dB									22.9

Analysis of the noise modelling identifies that with the inclusion of all noise sources, low frequency noise exceeds the screening test difference of C-A=15dB at the receiver locations. Further analysis was therefore undertaken to determine whether any of the 1/3 octave noise levels in Table C2 of the NPI (**Table 1**) are exceeded. It is noted that where data was only available as 1/1 octave, levels in each 1/1 band were divided equally into each 1/3 octave band.

The results of the analysis of low-frequency noise thresholds found that received levels approach the thresholds at receiver R2, however they do not exceed the thresholds in **Table D-1** at any of the receiver locations. Hence, the low-frequency correction is not applied to received noise levels for this assessment.

D1.2 Tonality

In addition to low frequency noise, a review of modifying factors for tonality have been completed. In accordance with Table C1 of the NPI, a correction for tonal noise applies when the level of 1/3 octave band exceeds the level of the adjacent band on both sides by:

- 5dB or more if the centre frequency of the band containing the tone is in the range 500-10,000Hz;
- 8dB or more if the centre frequency of the band containing the tone is in the range 16-400Hz; or
- 15dB or more if the centre frequency of the band containing the tone is in the range 25-125Hz.

MAC notes that the assessment should be completed with 1/3 octave data, however, only 1/1 octave data was available for the project. **Table D-3**, presents the results of the 1/1 octave data tonality noise test for the project.

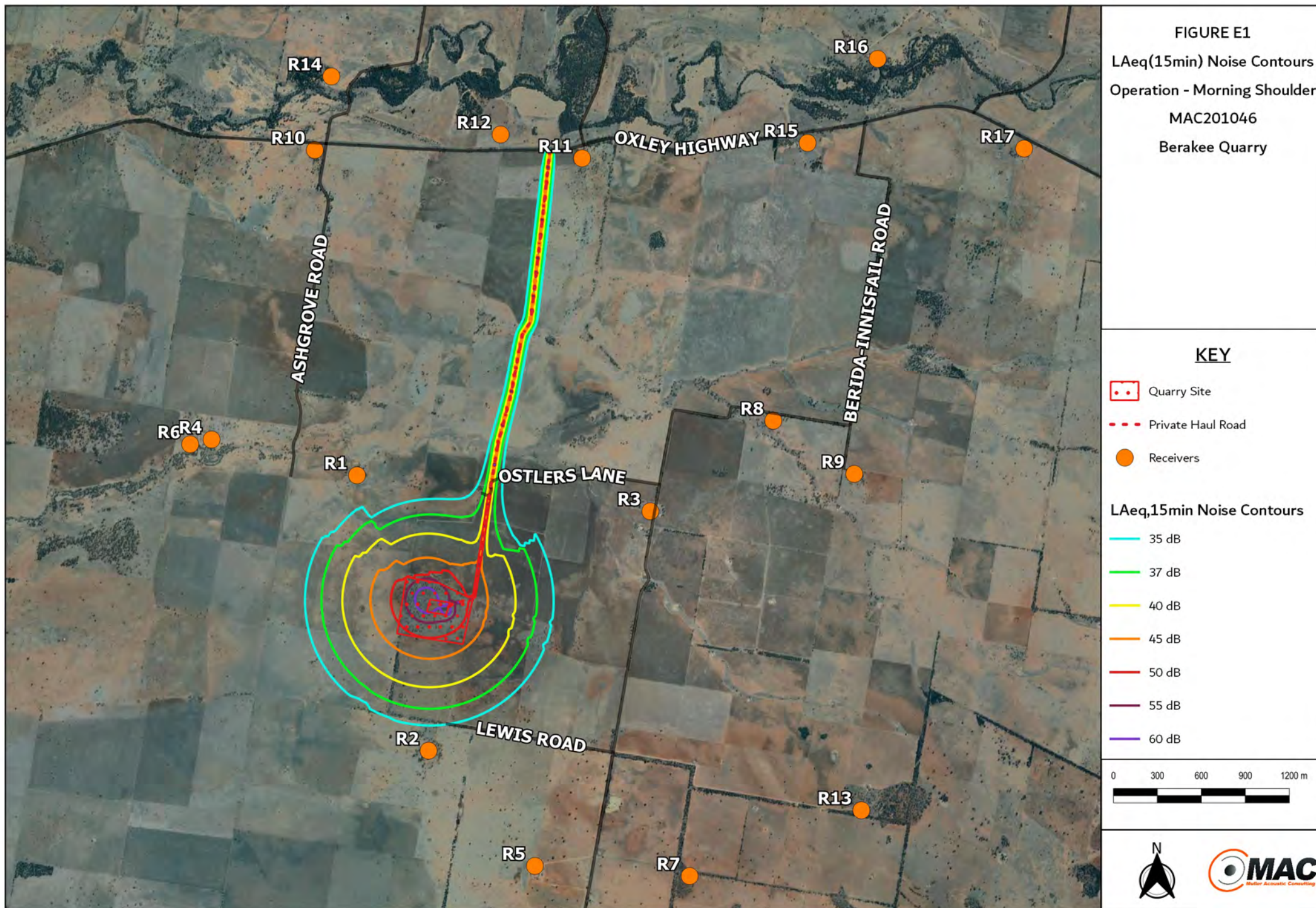
The results of the analysis indicate that there are no dominant tones associated with the project. Hence, a correction for tonality is not required.

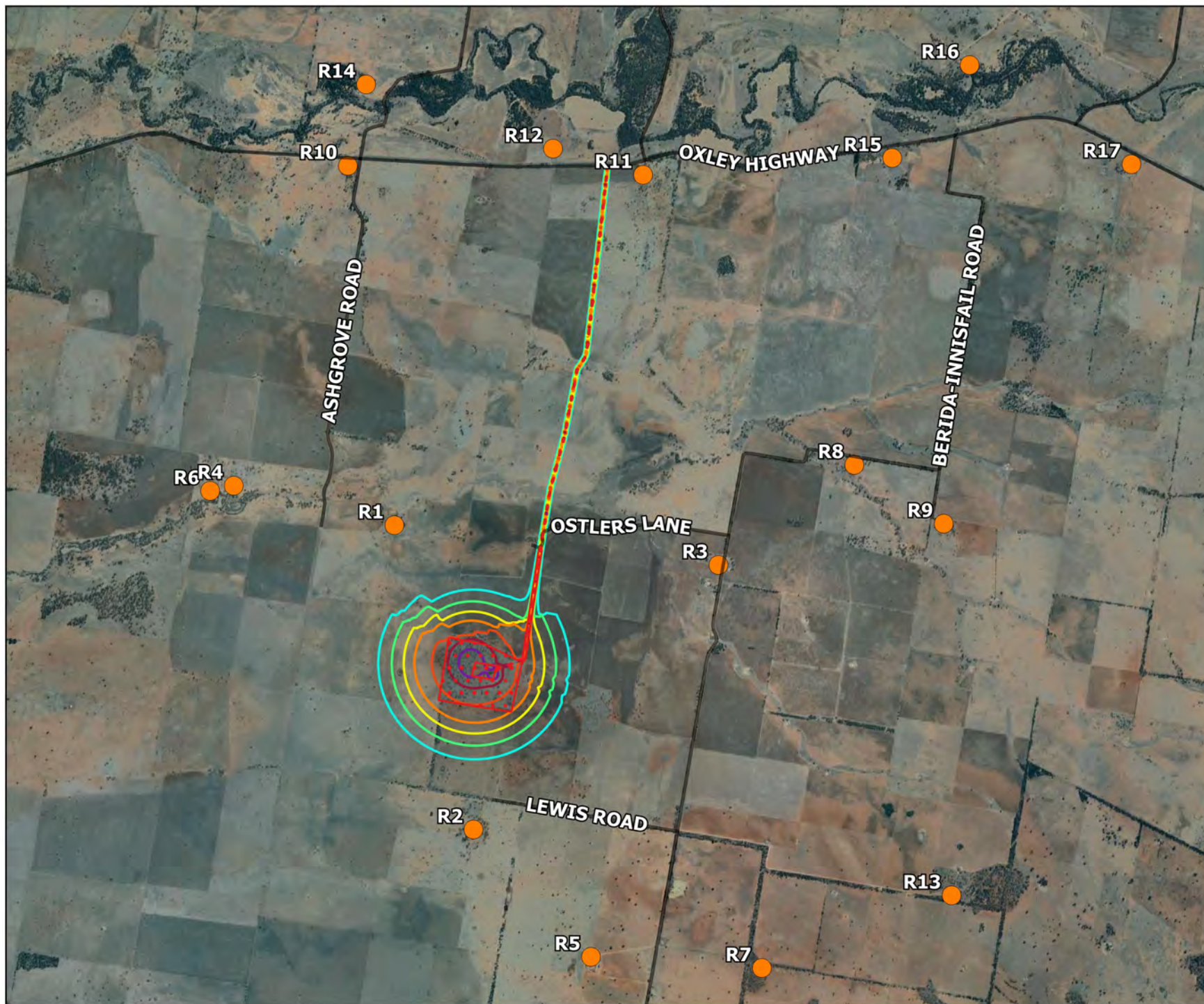
Table D-3 Modelled Z weighted Single Octave Band Levels, dB LAeq(15min)

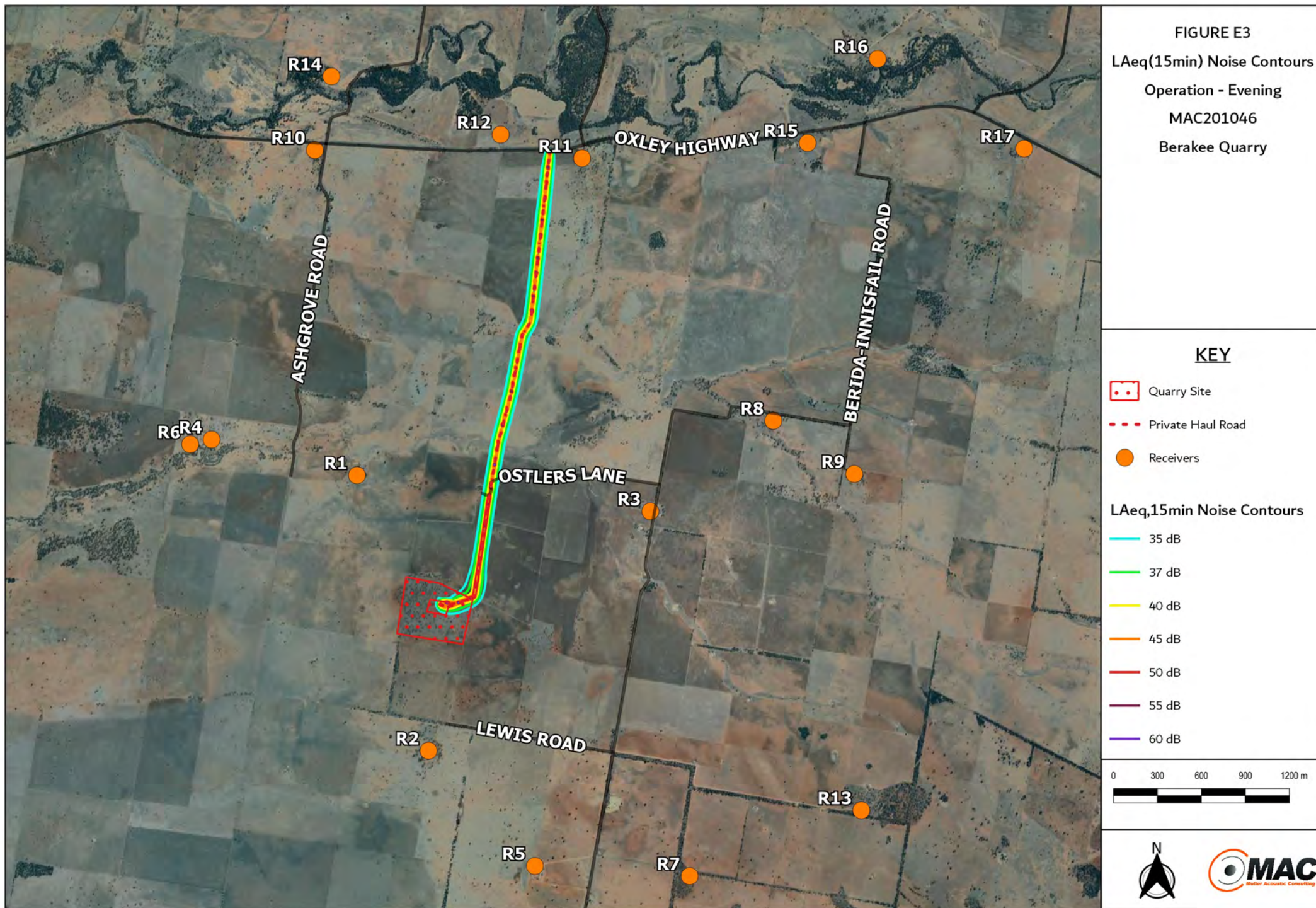
Receiver ID	Octave Band Centre Frequency, Hz								Total
	Weighting	63	125	250	500	1000 ¹	2000 ¹	4000 ¹	
R1	Z	51.3	38.6	28.1	28.5	23.0	13.3	-23.5	51.6
R2	Z	54.2	37.6	27.6	28.0	26.9	16.6	-21.7	54.4
R3	Z	50.6	33.7	21.7	20.0	16.7	2.6	-43.5	50.7
R7	Z	40.3	27.4	14.3	9.8	-2.1	-26.2	-114	40.5
R14	Z	32.5	18.2	-0.4	-12.9	-14.7	-26.5	-85.2	32.7
R17	Z	33.4	19.0	0.7	-12.1	-30.3	-58.7	-171	33.6

Note 1: For octave data for 1kHz and greater, the key difference between the octave bands is associated with atmospheric attenuation and ground absorption and noise mitigation measures (such as partial enclosures of sources, rather than a dominant tonal component from the source at these frequencies.)

Appendix E – Noise Model Contours







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Our Ref: 20112_Ltr_Response to RFI_Berakee Quarry_12Jul21

12 July 2021

Lindsay Mathieson
Director Planning & Environment
P.O. Box 23
Gillandra NSW, 2827

E | Council@gillandra.nsw.gov.au

Dear Lindsay

Re: Response to a CI 54 (of the EP&A Act) Request for Information on DA 2021/379 (Extension to Berakee Quarry)

Your correspondence of 29 June 2021 has been reviewed and the following provides responses to the queries contained therein.

1. Extraction and Processing Stockpile Area

Your correspondence queries the areas of disturbance noting differences in quoted areas in the executive summary and elsewhere in the EIS. Clarification on the respective areas of the Extraction Area, Processing / Stockpiling Area and Quarry Sediment Basin has been sought.

It can be confirmed that the areas of disturbance proposed for the extended quarry comes to a total of 17 ha, delineated as follows.

- Extraction Area: 8.4 ha
- Processing and Stockpiling Area: 7.8 ha
- Sediment Basin: 0.6 ha
- Site Access Road (on Lot 1 and external to the Processing and Stockpiling Area): 0.2 ha

It is noted that the areas were determined from the polygons as identified on **Figure 3.1** of the EIS (which has been updated and is reproduced on the following page).

As identified on **Figure 3.1** (attached), and as discussed with yourself and Mr Mike Sevakis on 24 May 2021, a mature eucalypt which remains within the Processing and Stockpiling Area will be retained along with the surrounding Area of PCT98 shown on **Figure 5.7** of the EIS and **Figure 3.1** of the Biodiversity Assessment Report (BAR)¹. The area of PCT98 reflects an offset of approximately 10 m from the tree trunk.

¹ An area in the disturbance areas identified in the BAR is noted and discussed in response to Council request for information 2.

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Teralba NSW 2284

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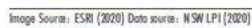


FIGURE 3.1
Quarry Site Layout
(Areas Confirmed)

2. Different Areas of Disturbance

Your correspondence queries the absence of vegetation mapping over the areas nominated as Sediment Basin. The difference between the figures of the EIS depicting the Project Site and those in the Biodiversity Assessment Report (BAR) has also been queried.

No vegetation mapping is included over the area of Sediment Basin as at the time of field survey the area was disturbed for the purpose of a sediment basin. No further disturbance or extension of this area is proposed and as such it was identified as 'Sediment Basin' only. For the purpose of defining this area by vegetation type, it is confirmed as 'exotic/disturbed'. As discussed during the site inspection by yourself and Mr Mike Sevakis on 24 May 2021, mature trees which surround the sediment basin will be retained.

Council's review of the EIS has identified that incorrect figures were used in the version of the BAR appended to the EIS. The figures included in the BAR appended to the EIS show the preliminary polygons used in the preparation of an initial set of figures. It is noted that the final perimeters of the proposed extraction and processing / stockpiling areas (as presented in the EIS) were generated based on the extents of mapped native vegetation (PCT98). As was discussed with yourself and Mr Sevakis on-site on 24 May 2021, the area of disturbance was purposefully designed to restrict disturbance to native vegetation to <1 ha (thereby avoiding the requirement to complete a more detailed Biodiversity Development Assessment Report and provide for biodiversity offsetting). That is, the field survey of the BAR was used to define the boundary of PCT98 / non-native vegetation (depicted in **Figure 2.1**), with the perimeter of disturbance then refined to minimise impacts on PCT98 whilst maximising the area for extraction and processing/stockpiling.

Attached are the correct versions of Figures 1.1, 2.1 and 3.1 which should have been included in the BAR. It is notable that:

- The field survey depicted in Figure 2.1 is of sufficient coverage to accurately map the area of extended Processing/Stockpiling Area to the east and extraction area to the south, and
- The areas of mapped PCT98 are consistent between the figures (with the extraction area boundary consistent between the two in these areas to the north and west).

3. Tree Hollows and Vegetation Information

Your correspondence seeks clarification as to the location of the nominated 24 habitat trees, dates of field survey and status of these. Your correspondence also seeks further detail on the areas of PCT98 mapped against the western perimeter of the proposed extraction area.

Field survey of the Subject Site was completed on one day, 27 February 2020. There was no second date of field survey.

On review and reflection of the BAR, we acknowledge that the description of the location and status of the habitat trees was poorly worded. The 24 habitat trees are identified on both **Figure 5.7** of the EIS and **Figure 3.1** of the BAR and illustrate that at the time of field survey, four of the 24 habitat trees were identified within the proposed disturbance footprint. Where the BAR states that "Within the subject site, only four now remain, ..." this reflects the fact that the disturbance footprint was refined to avoid the remaining 20 habitat trees. Furthermore, and as identified on the amended **Figure 3.1**, HBT7 (one of the four habitat trees identified to be disturbed) will now be retained. That is, of the 24 habitat trees identified, only HBT3, HBT4 and HBT5 will be removed.

As noted in Section 2.2 of the BAR, the site inspection completed by on 27 February 2020 included “a Vegetation Integrity plot with full floristics, rapid vegetation assessments, targeted searches for key threatened species identified through the desktop assessment, and **identification of key fauna habitat features present**”. The field survey included assessment of each of the trees located within the proposed disturbance area, however, on the basis of not being identified as a habitat tree it can be confirmed these did not include hollows or any other key fauna habitat features. While not assessed by pedestrian transect, the presence of the canopy tree species was used, along with reference to previous ecological survey of the property by OzArk (2017), to define the vegetation as PCT98. With respect to the vegetation contained within the mapped patches of PCT98 We can confirm that:

- six poplar box trees (none with key fauna habitat features) occur within the northwestern patch,
- three poplar box trees (none with key fauna habitat features) occur within the southwestern patch, and
- three mature poplar box trees (habitat trees HBT3, HBT4 and HBT5) occur within the two small northern patches.

Groundcover was dominated by exotic species similar to the areas mapped as exotic/disturbed.

4. Traffic Impacts

Your correspondence requests confirmation of truck movements proposed in the EIS.

The proposed 20 truck movements per hour during peak hourly periods did not specify the proportion of laden and 10 unladen truck movements. It is expected this would approximate 10 laden and 10 unladen truck movements during this period, however, could vary by up to 2 movements respectively (up to 12 laden / 8 unladen or 8 laden / 12 unladen).

We trust that the information contained provides all requirements for the development application, however, please do not hesitate to contact the undersigned on 1300 793 267 should you require clarification or further information.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'AI', is positioned above the printed name and title.

Alex Irwin
Principal Environmental Consultant