Appendix D

Noise and vibration impact assessment

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Clarence Colliery - Modification 11

Noise and Vibration Impact Assessment

Prepared for Centennial Coal Company Limited

December 2025

Clarence Colliery - Modification 11

Noise and Vibration Impact Assessment

Centennial Coal Company Limited

E250102 RP2

December 2025

Version	Date	Prepared by	Reviewed by	Comments
1	15 August 2025	Lucas Adamson	Philip Towler	Draft
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Approved by

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15 December 2025

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Executive Summary

Clarence Colliery is an underground coal mining operation within the Western Coalfield of New South Wales (NSW) approximately 10 kilometres (km) east of Lithgow in the Lithgow local government area (LGA). Clarence Colliery extracts coal from the Katoomba Seam and has the facilities on-site to wash run-of-mine (ROM) coal in order to maximise coal quality.

Clarence Colliery is seeking a modification (Mod 11) to Development Approval (DA) 504-00 under section 4.55(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to extend the life of mining at Clarence Colliery from 31 December 2026 for a further five years until 31 December 2031, including all truck movements currently approved to 31 December 2026.

No further changes are proposed to operations approved under DA 504-00. This includes no changes to mining methods, annual coal extraction rates, coal processing and handling activities, surface infrastructure, hours of operation, workforce numbers, or product coal transportation by rail and road.

This noise and vibration impact assessment (NVIA) has been prepared to accompany the modification report. It assesses the noise and vibration impacts of the proposed modification on existing noise-sensitive receivers in the surrounding area.

Project noise trigger levels (PNTLs) were established based on the results of ambient noise monitoring undertaken by EMM Consulting Pty Limited (EMM) in June 2025 to enable an assessment of operational noise emissions in accordance with the *Noise Policy for Industry* (NPfI) (EPA 2017).

Annual noise monitoring results indicate that evening and night-time noise levels attributed to Clarence Colliery have exceeded the applicable noise criteria a total of three times in the past 12 years at monitoring location M1. EMM understands that within the last 12 years there has only been one complaint received in relation to noise emissions from Clarence Colliery. In April 2017, a complaint was received regarding ‘a low hum’ from the Clarence Colliery ventilation facility.

It is of note that the operational noise modelling does not include train loading or rail operations (i.e. a train on the Clarence Colliery rail loop), given the proposed modification does not involve any changes in this regard. This approach has been adopted to clearly demonstrate that there will be no change in overall site noise emissions resulting from the modification. Noise levels at the nearest residences during train operations on the rail loop are expected to remain consistent with those presented in the Mod 6 NVIA (EMM 2020).

Operational noise modelling predicts instances of negligible exceedances at the nearest residences, although these can be wholly attributed to the existing operations at Clarence Colliery. The proposed modification is not predicted to result in a change to overall site noise emissions.

Night-time maximum noise level events are not expected to change as a result of the modification, given that no changes to existing operations are proposed.

Predicted maximum noise levels (excluding a train on the rail loop) will remain below the maximum sleep disturbance screening criteria.

Given that there have been no noise-related complaints over the past 12 years and modification does not involve any changes to on-site operations, timing, or noise emissions, the existing noise criteria, mitigation and management measures are anticipated to remain appropriate for the five-year extension term of the development consent.

Centennial will continue to manage noise emissions from Clarence Colliery in accordance with the existing *Western Region - Noise Management Plan* (NMP). As outlined in Chapter 7, all feasible and reasonable mitigation measures will be considered. The NMP will be updated, as required, following determination of the proposed modification.

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1 Introduction

1.1 Background

1.1.1 Overview

Clarence Colliery is an underground coal mine within the Western Coalfield of New South Wales (NSW) approximately 10 kilometres (km) east of Lithgow in the Lithgow City Local Government Area (LGA) (Figure 1.1). The mine has been in operation since 1979. Clarence Colliery is managed by Clarence Colliery Pty Ltd, a wholly owned subsidiary of Centennial Coal Company Limited (Centennial).

Clarence Colliery produces high quality, low ash thermal coal for domestic customers, including Vales Point Power Station (VPPS), Mt Piper Power Station (MPPS), and export customers. It is approved to extract up to 3 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal and mine this coal using bord and pillar mining methods with both first workings and partial extraction methods (second workings), until 31 December 2026.

Mining operations at Clarence Colliery are supported by a range of surface infrastructure at Clarence Colliery pit top, which includes coal handling, coal processing and coal rail transportation infrastructure, water management infrastructure and administrative buildings.

1.1.2 Development consents

Clarence Colliery operates under three separate development consents:

- IRM.GE.76 – a development consent issued in 1976 by the then Blaxland Shire Council (now Lithgow City Council (LCC)) for the construction of surface facilities
- DA 174/93 – a development consent issued in 1994 by LCC for the extension of underground coal mining predominately within Consolidated Coal Lease 705, surface reject emplacement areas (REAs) and water management and ancillary structures
- DA 504-00 – State significant development (SSD) consent issued in 2005 by the then Minister for Planning, to expand into Mining Lease (ML) 1583. DA 504-00 has been modified ten times since it was granted.

1.2 Overview of the proposed modification

Centennial is seeking to modify DA 504-00 under section 4.55(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to modify the following conditions in Schedule 2 of DA 504-00:

- Condition 5 to extend the life of mining from 31 December 2026 for a further five years to 31 December 2031
- Condition 7AA to align the transport of coal by road with the proposed extension of the life of mining, thus allowing for the transport of up to 300,000 tonnes (t) of coal by road until 31 December 2031.

All other activities approved under DA 504-00 would remain as approved.

1.3 Site description

Clarence Colliery's holding boundary (Figure 1.2) is the existing development consent boundary applicable to DA 504-00. Surface facilities at Clarence Colliery are on Crown land and free-hold land north of Chifley Road (a continuation of Bells Line of Road) and the Main Western Rail Line. A spur rail line connects the surface facilities to the Main Western Rail Line (Figure 1.2). Road access to Clarence Colliery is directly from Clarence Colliery Road.

Clarence Colliery is bordered by the Blue Mountains National Park to the east and Gardens of Stone State Conservation Area (SCA) (previously Newnes State Forest) to the north and west. The residential areas of Newnes Junction and Clarence Village are 900 metres (m) south-east and 1.5 km south-west of Clarence Colliery, respectively (Figure 1.2). A number of extractive industries are in close proximity, including Heidelberg Materials Quarry and Clarence Sand Quarry to the west and the disused Rocla Quarry to the south-east (Figure 1.2). The proposed Newnes Kaolin Project is to the south (Figure 1.2).

A layout of the Clarence Colliery surface facilities can be seen in Figure 1.3. There are six sensitive receivers within 1 km of Clarence Colliery's surface facilities. These, along with site compliance and unattended noise monitoring locations, are shown in Figure 2.1 and are referred to as the assessment locations.

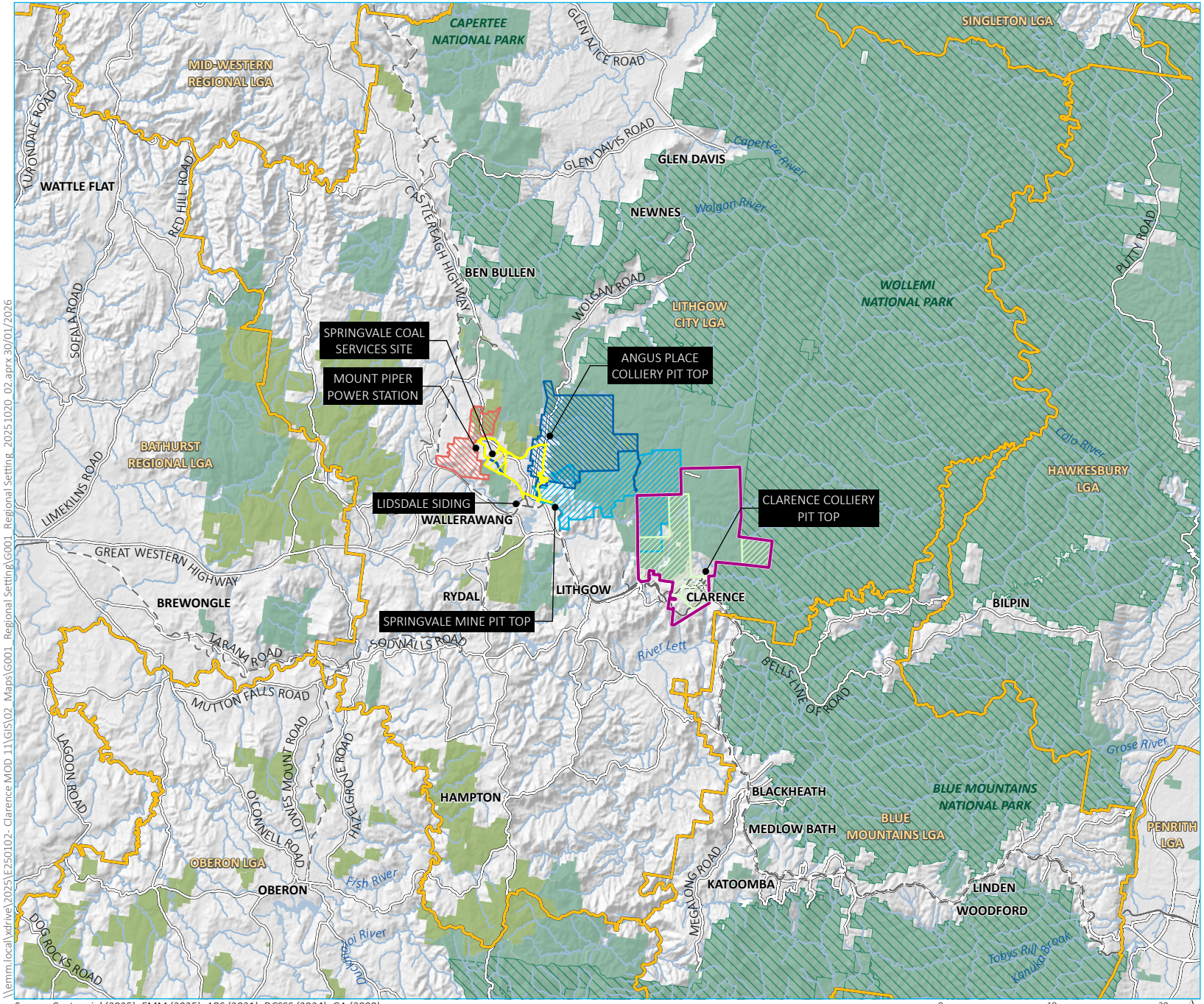
1.4 Assessment guidelines and requirements

This noise and vibration impact assessment (NVIA) has been prepared to accompany the modification report and assesses the noise and vibration impacts of the proposed modification on existing noise-sensitive receivers in the surrounding area.

This NVIA has been completed with reference to the following guidelines and policies:

- NSW Environment Protection Authority (EPA) 2017, *Noise Policy for Industry* (NPfI)
- NSW Department of Environment Climate Change and Water (DECCW) 2011, *Road Noise Policy* (RNP) and associated application notes
- NSW Government 2018, *Voluntary Land Acquisition and Mitigation Policy* (VLAMP).

A number of technical terms have been utilised throughout this report for the discussion of noise and vibration. These are explained in the Glossary.



KEY

- Clarence Colliery Holdings Area
- DA504-00 consent boundary
- Angus Place
- Ivanhoe
- Springvale
- Western Coal Services

Existing environment

- Rail line
- Major road
- Named watercourse
- Named waterbody
- Greater Blue Mountains World Heritage Area
- NPWS reserve
- State forest
- Local government area

Source: Centennial (2025); EMM (2025); ABS (2021); DCSSS (2024); GA (2009)

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Regional context

Clarence Colliery- Modification 11
Noise and Vibration Impact Assessment
Figure 1.1

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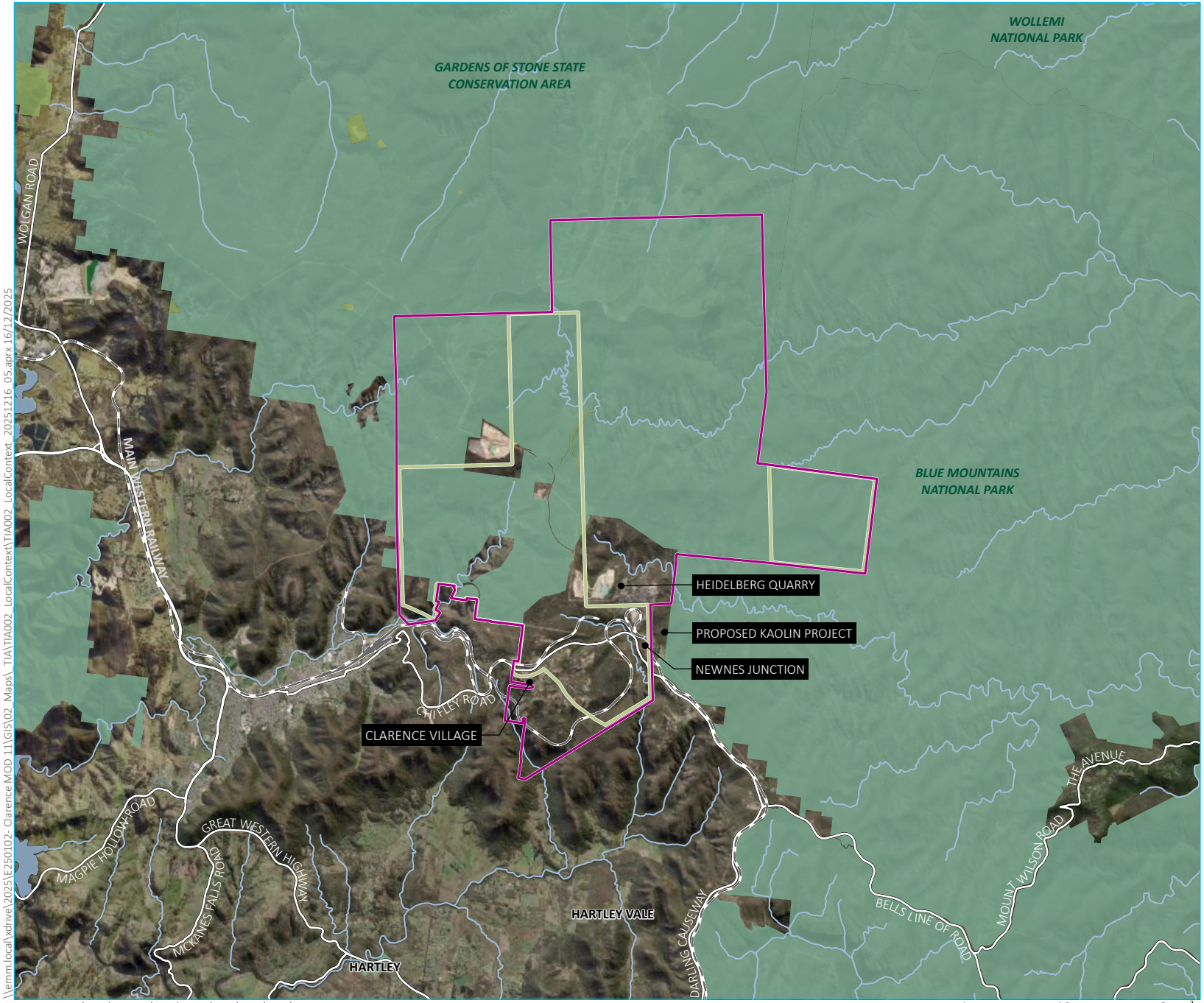

KEY

- Clarence Colliery Holdings Area
- DA504-00 consent boundary

Existing environment

- Rail line
- Major road
- Named watercourse
- Named waterbody
- NPWS reserve
- State forest

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Source: EMM (2025); DCSSS (2024); ESRI (2025); GA (2009)

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GDA2020 MGA Zone 56

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Local context

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Noise and Vibration Impact Assessment
Figure 1.2

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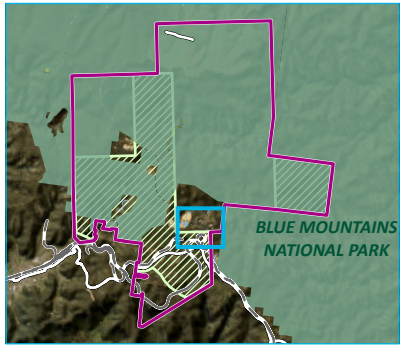

KEY

- Clarence Colliery Holdings Area
- DA504-00 consent boundary
- Compliance noise monitoring location

Existing environment

- Rail line
- Named watercourse
- Waterbody

Source: EMM (2025); DCSSS (2024); ESRI (2025); GA (2009); MetroMap (2025)

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Existing surface facilities

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Noise and Vibration Impact Assessment
Figure 1.3

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2 Assessment methodology

2.1 Applying the NPfI to existing sites

The NPfI provides a methodology for the assessment of noise from existing industrial sites. The NPfI acknowledges that some industrial sites were designed for higher allowable noise emissions than those outlined in current NSW noise policy and may have been in existence before neighbouring noise-sensitive developments. The range of mitigation options available for such sites can be limited or costly.

Section 6.1 of the NPfI states that:

> The project noise trigger levels should not be applied as mandatory noise limits. The project noise trigger level is the level used to assess noise impact and drive the process of assessing all feasible and reasonable control measures.

Where noise emissions from the existing site exceed the project noise trigger levels (PNTLs) as defined in the NPfI, the relevant regulatory authorities and proponent will determine achievable noise limits for the site through negotiation and discussion with relevant stakeholders as required.

The process for applying the NPfI to existing sites is outlined in section 6.1.1 of the NPfI and is summarised as follows as applicable to the modified project:

1. Undertake an initial evaluation, including whether approvals/licences include noise limits and whether they are being met.
2. Establish relevant PNTLs, in accordance with the NPfI, to establish a benchmark level to assess the need to consider noise mitigation.
3. Measure/predict the noise levels produced by the source in question, having regard to meteorological effects such as wind and temperature inversions.
4. Compare the measured/predicted noise level with the PNTLs.
5. Where the PNTLs are exceeded, assess feasible and reasonable noise mitigation strategies.
6. Develop and refine achievable noise limits that will become long-term noise goals for the site. This may involve interaction between the regulator and proponent as well as consultation with the community. Regulators and operators need to consider the technical practicalities and cost of noise reduction measures, and how long it will take to implement these measures, along with the environmental consequences of exceeding the PNTLs.
7. Monitor compliance with the agreed noise limits, and review and amend the noise performance of the site as required.

2.2 Assessment locations

The nearest noise and vibration sensitive receivers (herein referred to as assessment locations) are described in Table 2.1 and shown in Figure 2.1. The numbering of these assessment locations is consistent with that utilised in DA 504-00 except for:

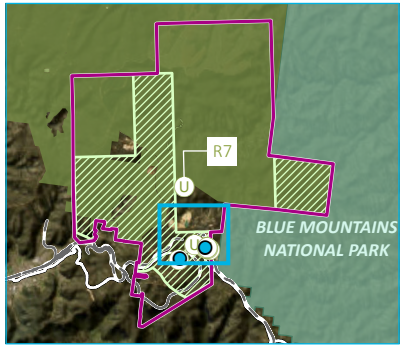
- R8, which is representative of the nearest residences within Clarence Village
- R9, which is an existing dwelling near R2.

Table 2.1 Assessment locations

Assessment location	Type	Address	Coordinates (MGA 2020 – Zone 56H)	
			Easting	Northing
R1[1]	Residential	12 Sandham Road, Dargan	244554	6292906
R2[2]	Residential	567 Sandham Road, Dargan	244447	6292992
R3[2]	Residential	588-602 Sandham Road, Dargan	244391	6293035
R4[1]	Residential	601 Sandham Road, Clarence	244373	6292994
R5[1]	Residential	Sandham Road, Clarence	244335	6293026
R6	Residential	590 Chifley Road, Dargan	243842	6293147
R7	Passive recreation area	Gardens of Stone State Conservation Area (previously Newnes State Forest)	243358	6295836
R8	Residential	122 Kerma Crescent, Clarence	243115	6292469
R9[2]	Residential	576 Sandham Road, Clarence	244433	6293003

Notes: 1. There is currently no dwelling at this location.

2. This receiver currently has a negotiated agreement in place with Clarence Colliery and, as such, noise criteria does not apply at this location.



KEY

- Clarence Colliery Holdings Area
- DA504-00 consent boundary
- Assessment location
- Noise monitoring location

Existing environment

- Rail line
- Major road
- NPWS reserve
- State conservation area
- Named watercourse

Note: R4 and R5 residences were lost in 2019 bushfires

Noise monitoring and assessment locations

Clarence Colliery- Modification 11
Noise and Vibration Impact Assessment
Figure 2.1

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Source: EMM (2025); DCSSS (2024); ESRI (2025); GA (2009)

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2.3 Operational noise limits - NPfI

Noise from industrial sites or processes in NSW is regulated by the local council, DPHI and/or the EPA and usually have a licence and/or development consent conditions stipulating noise limits. These limits are normally derived from operational noise levels applied at assessment locations. They are based on EPA guidelines (i.e. NPfI) or noise levels that can be achieved at a specific site following the application of all reasonable and feasible noise mitigation measures.

The reaction to noise is highly subjective. Hence, it is not possible to adopt noise levels that will guarantee that no one will experience an impact. Adherence with the PNTLs should not be interpreted to mean that industrial noise will be inaudible, or that all members of the community will find the noise acceptable. The PNTLs for industry provide a benchmark for assessing a proposed or existing industrial development.

Both the increase in noise level above background levels (i.e. the intrusiveness of a source) as well as the absolute level of noise are important factors in how a community will respond to noise from industrial sources. To ensure both of these factors are considered, the EPA provides two separate noise trigger levels: intrusiveness and amenity. The fundamental difference being intrusiveness noise levels apply over 15 minutes in any period (day, evening or night), whereas the amenity noise levels apply to the entire assessment period (day, evening or night).

2.3.1 Assessing intrusiveness

The intrusive noise trigger levels require that $L_{Aeq,15minute}$ noise levels from the site during the relevant operational periods (i.e. day, evening and night) do not exceed the rating background level (RBL) by more than 5 decibels (dB). The NPfI recommends that the intrusive noise trigger level for evening be set at no greater than the intrusive noise level for daytime and that the intrusive noise level for night-time should be no greater than the intrusive noise level for day or evening. Intrusive noise trigger levels are applicable at residential assessment locations only.

A long-term, unattended ambient noise survey was undertaken during June 2025 to establish background noise levels at neighbouring noise sensitive receivers.

2.3.2 Assessing amenity

The amenity assessment is based on noise targets specific to land use and associated activities. The targets relate only to industrial-type noise and do not include road, rail and/or community noise. Where the measured existing industrial noise approaches the recommended amenity noise level, it needs to be demonstrated that noise levels from new industry will not contribute to existing industrial noise such that amenity noise levels are exceeded.

To ensure that total industrial noise levels remain within the recommended amenity noise levels for an area, the project amenity noise level for the subject development is the recommended amenity noise level (outlined in Table 2.2 of the NPfI) minus 5 dB.

Residences have been categorised in the NPfI rural amenity category as per the definition provided in the NPfI:

> An area with an acoustical environment that is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels.

Gardens of Stone SCA (R7) has been assessed as a passive recreation area.

An extract from the NPfI that relates to the amenity noise levels relevant to the proposed modification is given in Table 2.2.

Table 2.2 Amenity noise levels - Recommended L_{Aeq} noise levels from all industrial noise sources

Receiver type	Noise amenity area	Time of day[1]	Recommended $L_{Aeq,period}$ noise level (dB)[2]
Residence	Rural	Day	50
		Evening	45
		Night	40
Area specifically reserved for passive recreation	All	When in use	48

Notes: 1. Daytime: 7:00 am to 6:00 pm; Evening: 6:00 pm to 10:00 pm; Night-time: 10:00 pm to 7:00 am. On Sundays and Public Holidays, Daytime: 8:00 am to 6:00 pm; Evening: 6:00 pm to 10:00 pm; Night-time: 10:00 pm to 8:00 am.

2. The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

2.3.3 Project noise trigger levels

PNTLs are the lower of the derived intrusiveness and amenity levels.

It is commonly acknowledged and accepted amongst regulators and industry that average noise levels are typically 3 dB higher over a 15-minute worst case assessment period when compared to an entire day (11 hour), evening (4 hour) and night (9 hour) assessment period. This is outlined in the NPfI and has been used in this assessment to standardise the time periods for the intrusive and amenity noise levels.

2.3.4 Modifying factors

i Low frequency noise

Fact sheet C of the NPfI (EPA 2017) provides guidelines for applying modifying factor corrections to account for low frequency noise emissions. The NPfI specifies that a difference of 15 dB or more between site 'C-weighted' and site 'A-weighted' noise emission levels identifies the potential for an unbalanced spectrum and potential increased annoyance.

Where a difference of 15 dB or more between site 'C-weighted' and site 'A-weighted' noise emission levels is identified, the one-third octave noise levels recorded should be compared to the values in Table C2 of the NPfI (EPA 2017), which has been reproduced in Table 2.3.

Table 2.3 One-third octave low-frequency noise thresholds ($L_{Zeq,15minute}$)

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

The following modifying factor correction is to be applied where the site 'C-weighted' and site 'A-weighted' noise emission level is 15 dB or more and:

- where any of the one-third octave noise levels in Table 2.3 are exceeded by up to and including 5 dB and cannot be mitigated, a 2 dB positive adjustment to measured/predicted A-weighted levels applies for the evening/night period; or

- where any of the one-third octave noise levels in Table 2.3 are exceeded by more than 5 dB and cannot be mitigated, a 5 dB positive adjustment to measured/predicted A-weighted levels applies for the evening/night period and a 2 dB positive adjustment applies for the daytime period.

ii Tonality

Tonal noise is defined in the NPfI as noise containing a prominent frequency and characterised by a definite pitch. Examples of tonal noise sources include ventilation fans, reversing beepers or alarms. Fact sheet C of the NPfI provides guidelines for applying modifying factor corrections to account for tonal noise emissions.

The NPfI specifies that a 5 dB positive adjustment to measured or predicted A-weighted levels applies if the level of one-third octave band centre frequency (measured using unweighted or Z-weighted weighting) exceeds the level of the adjacent band on both sides by:

- 5 dB or more if the centre frequency of the band containing the tone is in the range 500 to 10,000 Hz; or
- 8 dB or more if the centre frequency of the band containing the tone is in the range 160 to 400 Hz; or
- 15 dB or more if the centre frequency of the band containing the tone is in the range 25 to 125 Hz.

iii Intermittent noise

The NPfI specifies that a 5 dB positive adjustment is to be applied to measured or predicted A-weighted levels if the noise heard at the receiver varies by more than 5 dB and the intermittent nature of the noise is clearly audible. The modifying factor correction for intermittent noise is to be applied during the night-time only.

2.3.5 Sleep disturbance

The difficulty in establishing an absolute noise level criterion that would correlate to an acceptable level of sleep disturbance is acknowledged by relevant governing authorities.

The NPfI suggests that a detailed maximum noise level event assessment should be undertaken where night-time noise levels at a residential location exceed:

- $L_{Aeq,15minute}$ 40 dB or the prevailing RBL plus 5 dB (whichever is the greater); and/or
- L_{Amax} 52 dB or the prevailing RBL plus 15 dB (whichever is the greater).

The NPfI also references guidance regarding potential for sleep disturbance provided in RNP (DECCW 2011). The RNP calls upon a number of studies that have been conducted into the effect of maximum noise levels on sleep. The RNP provides the following conclusions from the research on sleep disturbance:

- maximum internal noise levels (L_{Amax}) below 50 to 55 dB are unlikely to awaken people from sleep; and
- one or two noise events per night, with maximum internal noise levels (L_{Amax}) of 65 to 70 dB, are not likely to affect health and wellbeing significantly.

It is commonly accepted by acoustic practitioners and regulatory bodies that a facade including a partially open window will reduce external noise levels by 10 dB. Therefore, external noise levels in the order of 60 to 65 dB calculated at the facade of a residence is unlikely to awaken people according to the RNP.

If noise levels over the NPfI screening levels are identified, then additional analysis would consider factors such as 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 extent of impacts on sleep include:

- how often high noise events will occur
- the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject development
- whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods)
- current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.

2.4 Voluntary Land Acquisition and Mitigation Policy

Consent authorities are required to consider the *Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extractive Industry Developments* (VLAMP) (DPE 2018) when assessing and determining development applications and modification applications for SSD mining developments. Page 17 of the VLAMP states the following regarding the application of voluntary mitigation and voluntary land acquisition:

> A consent authority can apply voluntary mitigation and voluntary land acquisition rights to reduce:
>
> - operational noise impacts of a development on privately owned land; and
> - rail noise impacts of a development on privately owned land near a non-network rail line (private rail line), that is on, or exclusively servicing and industrial site (see Appendix 3 of the RING);
>
> But not:
>
> - construction noise impacts, as these impacts are shorter term and can be controlled;
> - noise impacts on the public road or rail network; or
> - modifications of existing developments with legacy noise issues, where the modification would have beneficial or negligible noise impacts[13].
>
> [13]Noise issues for existing premises may be addressed through site-specific pollution reduction programs under the Protection of the Environment Operations Act 1997.

Of most interest is the last point above relating to the relative noise impact of the proposed operation compared to the existing development. As this report shows, the noise emissions from the proposed modification are predicted to be the same when compared to existing operational noise emissions at all assessment locations.

2.5 Operational vibration

Vibration from operational activity is not expected to change as a result of the proposed modification when compared to that currently approved. Thus, a detailed assessment of vibration impacts has not been included in this NVIA.

2.6 Rail noise

A spur rail line connects Clarence Colliery's surface facilities to the Main Western rail line. Clarence Colliery has approval to transport coal via rail, which can take place 24 hours per day, seven days per week.

It is of note that the noise limits outlined in Schedule 3 Condition 15 of DA 504-00 and Condition L5 of Environment Protection Licence (EPL) 726 (refer Section 3.1) do not apply to noise generated from train loading and rail operations associated with Clarence Colliery.

A detailed assessment of off-site rail noise impacts has not been included as part of this assessment.

3 Existing noise

3.1 Existing noise criteria

Noise criteria for Clarence Colliery are provided in Schedule 3 Condition 15 of DA 504-00 and Condition L5 of EPL 726. Noise limits are consistent between these two documents and are summarised in Table 3.1. These limits apply to noise generated from Clarence Colliery excluding train loading and rail operations.

Table 3.1 Clarence Colliery noise criteria

Location	$L_{Aeq,15minute}$ dB		
	Day	Evening	Night
Any residence on privately owned land	38	36	35

3.2 Existing noise emissions

Noise compliance monitoring occurs during day, evening and night-time periods on an annual basis at one location (M1), which is located to the north of the residences on Sandham Road and south of the rail loop (refer Figure 2.1).

A summary of the annual noise monitoring results, as provided in noise compliance reports and Clarence Colliery's Annual Reviews, for the period between 2013 and 2024 is shown in Table 3.2, together with the noise criteria that has been applied for this location.

Table 3.2 Summary of annual compliance and additional noise monitoring results – Location M1

Period	Estimated Clarence Colliery noise level, $L_{Aeq,15minute}$ (dB)														
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Highest	Log average	Noise criteria
Day	38	37	36	33	IA	35	IA	<30	35	38	35	30	38	35	38
Evening	34	34	**45**	33	30	30	IA	<30	<33	<33	32	27	45	36	36
Night	35	34	**45**	35	**42**	IA	35	35	32	<35	33	30	45	38	35

Notes: IA = inaudible.

Annual noise monitoring results indicate that evening and night-time noise levels attributed to Clarence Colliery have, on occasion, exceeded the applicable noise criteria at monitoring location M1 on one occasion in 2017 in the evening period and two occasions during the night period in 2015 and 2017.

The major contributor to the elevated noise levels measured during the evening and night-time 2015 surveys was identified to be tonal reversing alarms on mobile equipment operating on the stockpiles.

The major contributor to the elevated noise levels measured during the 2017 night-time survey was identified to be general mining noise from conveyors and the rotary breaker.

The applicability of modifying factors has been determined in accordance with the methodology provided in the NPfI (from 2017 onwards). Modifying factors due to intermittent, tonal or low frequency noise were found to be not applicable during these surveys. Hence, these modifying factors have not been applied to predicted noise emissions from Clarence Colliery for the purpose of this NVIA.

It is of note that the noise limits outlined in Schedule 3 Condition 15 of DA 504-00 and Condition L5 of EPL 726 (refer Section 3.1) do not apply to noise generated from train loading and rail operations associated with Clarence Colliery.

Predicted noise levels received at residences from train loading and rail operations has previously been outlined in *Clarence Colliery - Modification 6 Noise and Vibration Impact Assessment* (EMM 2020). This modification does not propose any changes to train loading or rail operations at Clarence Colliery.

3.3 Noise and vibration complaints history

EMM understands that within the last 12 years there has only been one complaint received in relation to noise emissions from Clarence Colliery. In April 2017, a complaint was received regarding 'a low hum' from the Clarence Colliery ventilation facility.

4 Existing acoustic environment

To establish ambient and background noise levels, unattended noise monitoring was completed by EMM at two locations surrounding Clarence Colliery (Figure 2.1) in accordance with the NPfI.

The noise loggers were in place from 18 June to 3 July 2025 and were programmed to record statistical noise level indices continuously in 15-minute intervals. Calibration of each noise logger was checked prior to and following unattended noise monitoring. The equipment carried appropriate and current NATA calibration certificates. Weather data for the unattended noise monitoring period was obtained from the on-site automatic weather station. The wind speed and rainfall data were used to exclude noise data during periods of any rainfall and/or wind speeds in excess of 5 metres per second (m/s) (approximately 9 knots) in accordance with the methodology provided in the NPfI.

The locations of the noise loggers are shown on Figure 2.1. A summary of the background and ambient noise monitoring results is provided in Table 4.1. Detailed graphs of the data obtained by EMM are provided in Annexure A.

Table 4.1 Summary of existing measured background and ambient noise levels

Monitoring location	Period[1]	RBL[2], dB	$L_{Aeq, period}$ noise level[3], dB
NM1 – Sandham Road, Clarence	Day	<35	48
	Evening	<30	49
	Night	<30	50
NM2 – Kerma Crescent, Clarence	Day	<35	46
	Evening	<30	47
	Night	<30	47

Notes: 1. Day: 7:00 am to 6:00 pm Monday to Saturday; 8:00 am to 6:00 pm Sundays and public holidays; Evening: 6:00 pm to 10:00 pm; Night: 10:00 pm to 7:00 am.

2. The RBL is an NPfI term and is used represent the background noise level.

3. The energy averaged noise level over the measurement period and representative of general ambient noise.

Based on observations whilst on-site, the main contributors to overall ambient noise levels are as follows:

- NM1 – natural sounds, local and distant traffic noise
- NM2 – natural sounds, local and distant traffic noise.

5 Operational noise targets

5.1 Project noise trigger levels

5.1.1 Intrusiveness

The intrusiveness targets require that $L_{Aeq,15minute}$ noise levels from sites during the relevant operational periods (i.e. day, evening and night) do not exceed the relevant RBL by more than 5 dB.

The RBLs utilised for determination of the intrusiveness target are based on either the background noise monitoring results presented in Chapter 4 or on the minimum RBLs as provided in the NPfI. The project intrusive noise levels are presented in Table 5.1.

Table 5.1 Intrusive noise levels

Assessment location (representative noise monitoring location)	Adopted RBL (dB)			Project intrusive noise level, $L_{Aeq,15minute}$ (dB)		
	Day[1]	Evening[1]	Night[1]	Day	Evening	Night
R1 (NM1)	35	30	30	40	35	35
R2[3]	N/A	N/A	N/A	N/A	N/A	N/A
R3[3]	N/A	N/A	N/A	N/A	N/A	N/A
R4 (NM1)	35	30	30	40	35	35
R5 (NM1)	35	30	30	40	35	35
R6 (NM1)	35	30	30	40	35	35
R7 (N/A)	Intrusive noise levels not applicable at passive recreation areas.					
R8 (NM2)	35	30	30	40	35	35
R9[3]	N/A	N/A	N/A	N/A	N/A	N/A

Notes: 1. Day: 7:00 am to 6:00 pm Monday to Saturday; 8:00 am to 6:00 pm Sundays and public holidays; Evening: 6:00 pm to 10:00 pm; Night: 10:00 pm to 7:00 am.

2. N/A: Noise agreement.

3. This receiver currently has a negotiated agreement in place with Clarence Colliery and, as such, noise criteria does not apply at this location.

5.1.2 Amenity

The assessment of amenity is based on noise targets specific to the land use. It is possible, due to the proximity of the existing industrial facilities, that the assessment locations could be classified as “suburban” in accordance with the NPfI definition (i.e. an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry). Given the relatively low background levels measured in the area, a conservative approach has been taken and assessment locations have been categorised in the NPfI (EPA 2017) rural amenity category (i.e. an area with an acoustical environment that is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels). This will have negligible impact on the PNTLs determined for the Clarence Colliery as intrusiveness noise levels are the limiting criteria.

So that total industrial noise levels remain within the recommended amenity noise levels for an area, the project amenity noise levels for Clarence Colliery are the recommended amenity noise level (outlined in Table 2.2 of the NPfI) minus 5 dB. This accounts for the potential cumulative industrial noise levels in the area.

As described earlier, a 3 dB adjustment is adopted for 15-minute worst case period noise levels from Clarence Colliery for the entire day (11 hour), evening (4 hour) and night (9 hour) assessment periods. This assumption is outlined in the NPfI and has been used in this assessment to standardise the time periods for the intrusive and amenity noise levels.

The corresponding recommended amenity noise levels for all assessment locations are given in Table 5.2.

Table 5.2 Project amenity noise levels

Assessment location	Receiver type	Indicative area	Project amenity noise level ($L_{Aeq,15minute}$) (dB)		
			Day[1]	Evening[1]	Night[1]
R1, R4-R6, R8	Residential	Rural	48	43	38
R7	Passive Recreation	All	48	48	48

Notes: 1. Day: 7:00 am to 6:00 pm Monday to Saturday; 8:00 am to 6:00 pm Sundays and public holidays; Evening: 6:00 pm to 10:00 pm; Night: 10:00 pm to 7:00 am.

5.1.3 Project noise trigger levels

The PNTLs are the more stringent of either the project intrusive or amenity noise levels and are shown in Table 5.3.

Table 5.3 Project noise trigger levels, $L_{Aeq,15minute}$ dB

Assessment location	Intrusive noise level			Amenity noise level			PNTL		
	Day[1]	Evening[1]	Night[1]	Day[1]	Evening[1]	Night[1]	Day[1]	Evening[1]	Night[1]
R1	40	35	35	48	43	38	40	35	35
R2[3]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
R3[3]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
R4	40	35	35	48	43	38	40	35	35
R5	40	35	35	48	43	38	40	35	35
R6	40	35	35	48	43	38	40	35	35
R7	N/A	N/A	N/A	48	48	48	48	48	48
R8	40	35	35	48	43	38	40	35	35
R9[3]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes: 1. Day: 7:00 am to 6:00 pm Monday to Saturday; 8:00 am to 6:00 pm Sundays and public holidays; Evening: 6:00 pm to 10:00 pm; Night: 10:00 pm to 7:00 am.

2. N/A: Noise agreement.

3. This receiver currently has a negotiated agreement in place with Clarence Colliery and, as such, noise criteria does not apply at this location.

5.2 Sleep disturbance

Based on the guidance in the NPfI, Table 5.4 provides the sleep disturbance screening levels for the residential assessment locations.

Table 5.4 Sleep disturbance screening levels for residential assessment locations

Assessment location	Adopted RBL (dB)	Sleep disturbance screening levels (dB)	
		$L_{Aeq,15minute}$	L_{Amax}
R1	30	40	52
R2[1]	N/A	N/A	N/A
R3[1]	N/A	N/A	N/A
R4	30	40	52
R5	30	40	52
R6	30	40	52
R7	Sleep disturbance is not applicable at passive recreation area		
R8	30	40	52
R9[1]	N/A	N/A	N/A

Notes: 1. This receiver currently has a negotiated agreement in place with Clarence Colliery and, as such, noise criteria does not apply at this location.

Reference has also been made to the conclusions presented in the RNP regarding assessment of the potential for sleep disturbance.

5.3 Road traffic noise

No changes are proposed to Clarence Colliery transport operations as part of Mod 11. Therefore, no assessment of road traffic noise has been completed and the road traffic noise assessment conducted as part of Mod 10 remains relevant.

6 Operational noise assessment

6.1 Overview

This chapter presents the methods and base parameters used to model noise emissions from Clarence Colliery's existing operations including the effects of noise-enhancing meteorological conditions. It is noted that the proposed modification will not introduce new sources of noise to the site.

Noise modelling was based on three-dimensional digitised ground contours of Clarence Colliery, surrounding land and surface infrastructure. The operational noise model represents a snapshot of typical operations, with equipment placed at various locations and heights, representing a realistic operational scenario.

Quantitative noise modelling was completed using DMGR iNoise noise prediction software incorporating the ISO 9613 '*Acoustics – Attenuation of sound during propagation outdoors'* algorithm. The ISO 9613 algorithm, as implemented in the iNoise prediction software, is widely recognised by the EPA for modelling and assessing large-scale projects. iNoise calculates total noise levels at assessment locations from concurrent operation of multiple noise sources. The model considers factors such as the lateral and vertical location of plant, source-to-receiver distances, ground effects, atmospheric absorption, topography of the surface facilities area and surrounds and applicable meteorological conditions.

6.2 Meteorology

During certain weather conditions, noise may increase or decrease compared with noise during calm conditions. This is due to refraction caused by the varying speed of sound with increasing height above the ground that occurs during winds or where air temperature changes with height.

A simple yet conservative approach has been selected for the consideration of potentially noise-enhancing weather conditions with reference to Fact Sheet D of the NPfI. Noise emissions from Clarence Colliery have been predicted for noise-enhancing conditions. This provides a conservative approach since the noise emissions predicted under noise-enhancing conditions are expected to represent the upper range of noise emissions from Clarence Colliery.

6.3 Plant and equipment

The operational noise model considered a representative snapshot of surface operations at Clarence Colliery with equipment placed at locations representing a realistic operational scenario. Adopted locations of plant and equipment are shown in Annexure B.

Acoustically significant fixed and mobile equipment items considered in the noise model are provided for expected day, evening and night operations in Table 6.1. Most of the sound power data were obtained from noise measurements of existing activities at Clarence Colliery. Where this was not possible, sound power data has been obtained from previous noise studies undertaken at Clarence Colliery or an EMM database of similar plant and equipment.

A train on the Clarence Colliery rail loop has not been included in the operational noise modelling, as the proposed modification does not involve any changes to train loading or rail operations. Further, existing Clarence Colliery noise limits (refer Section 3.1) do not apply to noise generated from train loading and rail operations. This approach has been adopted to more clearly demonstrate that there will be no change in overall site noise emissions resulting from the modification. Noise levels at the nearest residences during train operations on the rail loop are expected to remain consistent with those presented in the Mod 6 NVIA (EMM 2020).

Table 6.1 Acoustically significant plant and equipment for noise modelling

Item (quantity/location)	Quantity per 15-minute period	Sound power level per item (dBA)	Operating during this period		
			Day	Evening	Night
ROM coal conveyor transfer house[2]	1	106	✓	✓	✓
Conveyor drift drive house[2]	1	104	✓	✓	✓
Banana screen[1]	1	107	✓	✓	✓
CHPP[1]	1	113	✓	✓	✓
Breaker sizing plant[1]	1	110	✓	✓	✓
Breaker[1]	1	112	✓	✓	✓
Conveyor[4]		69/m	✓	✓	✓
Road truck (domestic coal haulage)[4]	2	103	✓	✓	✗
Haul truck (REA3 to washed coal stockpile)[1]	1	112	✓	✗	✗
Dozer (REA5, ROM and washed coal stockpiles)[4]	2	110	✓	✗	✗
Front end loader (secondary product coal stockpile)[1]	1	114	✓	✓	✓
Excavator (REA3)[3]	1	105	✓	✗	✗
Water cart (all haulage routes)[1]	1	103	✓	✓	✗
Vent fans[3]	1	111	✓	✓	✓
Water treatment plant[4]	1	98	✓	✓	✓
Excavator (REA6)[3]	1	105	✓	✗	✗
Haul truck (REA6 to ROM pad)[1]	1	108	✓	✗	✗
SW transfer house[1]	1	103	✓	✓	✓
Washed Coal transfer house[1]	1	109	✓	✓	✓
ROM transfer house[1]	1	105	✓	✓	✓

Notes: 1. Sourced from *Clarence Colliery Sound Power Level Testing 2024* by SLR.
2. Measured at Clarence Colliery by EMM in December 2018.
3. Sourced from previous study measurements at Clarence Colliery.
4. Sourced from EMM database.

6.4 Noise model validation

Noise from existing operations at Clarence Colliery was modelled and compared to the results of historical operator-attended noise surveys as reported in the annual monitoring reports. This comparison is summarised in Table 6.2.

Table 6.2 Predicted $L_{Aeq,15minute}$ night-time noise levels compared to results of historical noise monitoring

Location	Measured range of noise emissions (dB)	Log average of measured noise emissions (dB)	Predicted (including noise enhancing weather conditions) (dB)
M1	30–45	38	44 (excluding a train on the rail loop)

The predicted noise levels, with the adoption of noise-enhancing weather conditions, are approximately at the top end of the measured range and within 1 dB of the highest measured level over the last eleven years monitored (2013 to 2024). The operational noise model is therefore considered conservative and appropriate for the purpose of determining noise impacts from Clarence Colliery.

The results of historical operator-attended noise compliance surveys have identified that modifying factors are typically not applicable to noise emissions from Clarence Colliery. Hence, modifying factors have not been applied here to noise predictions.

6.5 Operational noise assessment

Predicted noise levels associated with the proposed modification are presented in Table 6.3 for all assessment locations. Those predicted to be above the PNTLs are shown in **bold** text. Noise-enhancing weather conditions have been considered and the highest predicted noise level is presented for each period. Cells are shaded within Table 6.3 to indicate the predicted level compared to PNTLs as follows:

- green cells: Clarence Colliery noise levels predicted to be less than or equal to 2 dB above PNTL
- yellow cells: Clarence Colliery noise levels predicted to be 3 to 5 dB above PNTL
- red cells: Clarence Colliery noise levels predicted to be more than 5 dB above PNTL.

Indicative noise contours for existing noise levels and the proposed modification under noise-enhancing weather conditions are provided in Annexure C.

Table 6.3 Predicted $L_{Aeq,15minute}$ operational noise levels

Assessment location	Period[1]	Predicted existing noise level (excluding train) (dB)	Predicted future noise level (excluding train) (dB)	PNTL $L_{Aeq,15minute}$ (dB)	Current PA/EPL noise limits, $L_{Aeq,15minute}$ (dB)
		Noise-enhancing conditions	Noise-enhancing conditions		
R1	Day	38	38	40	38
	Evening	**36**	**36**	35	36
	Night	**36**	**36**	35	35
R2[2]	Day	39	39	N/A	N/A
	Evening	38	38	N/A	N/A
	Night	37	37	N/A	N/A
R3[2]	Day	41	41	N/A	N/A
	Evening	39	39	N/A	N/A
	Night	39	39	N/A	N/A
R4	Day	38	38	40	38
	Evening	**36**	**36**	35	36
	Night	**36**	**36**	35	35
R5	Day	38	38	40	38
	Evening	**36**	**36**	35	36
	Night	**36**	**36**	35	35
R6	Day	37	37	40	38
	Evening	35	35	35	36
	Night	34	34	35	35
R7	Day	37	37	48	N/A
	Evening	37	37	48	N/A
	Night	37	37	48	N/A
R8	Day	35	35	40	38
	Evening	34	34	35	36
	Night	34	34	35	35
R9[2]	Day	40	40	N/A	N/A
	Evening	39	39	N/A	N/A
	Night	39	39	N/A	N/A

Notes: 1. Day: 7:00 am to 6:00 pm Monday to Saturday; 8:00 am to 6:00 pm Sundays and public holidays; Evening: 6:00 pm to 10:00 pm; Night: 10:00 pm to 7:00 am.
2. This receiver currently has a negotiated agreement in place with Clarence Colliery and, as such, noise criteria does not apply at this location.

Operational noise modelling predicts several negligible exceedances (less than 2 dB above the relevant PNTL) at the nearest residences; these can be wholly attributed to the existing operations at Clarence Colliery (as outlined in the Mod 6 NVIA (EMM 2020)).

Although this modification is predicted to result in no change to noise levels received at the nearest residences, for completeness, an assessment of reasonable and feasible mitigation has been undertaken (Chapter 7).

Centennial will continue to implement existing noise mitigation and management measures as provided in the *Western Region - Noise Management Plan* (NMP) (Centennial 2021).

Given that there has only been one noise-related complaint (associated with a 'low hum' from the Clarence Colliery ventilation facility) over the past 12 years and the proposed five-year extension to the development consent does not involve any changes to site operations, timing, or noise emissions, the existing noise criteria and management measures associated with operational noise are anticipated to remain appropriate.

6.6 Sleep disturbance

Consideration has been given to likely maximum noise level events at the nearest residential assessment locations. It is noted that Clarence Colliery's operations will not change as a result of the proposed modification when compared to existing operations and, hence, maximum noise levels are expected to remain the same as those currently experienced.

It is noted that DA 504-00 and EPL 726 do not currently contain maximum noise limits relevant to Clarence Colliery and, as such, existing maximum noise emission levels have not been assessed as part of annual noise compliance surveys.

Maximum noise level events at Clarence Colliery are typically associated with train or dozer operations. A typical maximum sound power level of L_{Amax} 125 dB has been adopted for all such events and is based on EMM's measurements of similar activities. These events represent the likely highest maximum noise level events from Clarence Colliery.

Predicted maximum noise levels, for both existing operations and the proposed modification, are presented in Table 6.4 for all assessment locations.

Table 6.4 Predicted L_{Amax} noise levels and sleep disturbance assessment

Assessment location	Predicted existing night-time noise level (excluding train)		Predicted modification night-time noise level (excluding train)		Sleep disturbance screening levels	
	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
R1	36	38	36	38	40	52
R2[1]	37	41	37	41	N/A	N/A
R3[1]	39	42	39	42	N/A	N/A
R4	36	39	36	39	40	52
R5	36	38	36	38	40	52
R6	34	37	34	37	40	52
R7	Sleep disturbance is not assessed at this receiver type					
R8	34	40	34	40	40	52
R9[1]	39	41	39	41	N/A	N/A

Notes: 1. This receiver currently has a negotiated agreement in place with Clarence Colliery and, as such, noise criteria does not apply at this location.

The site's night-time maximum noise level events are not anticipated to change as a result of the modification.

Predicted maximum noise levels (excluding a train on the rail loop) are predicted to be below the relevant L_{Amax} sleep disturbance screening level at all assessment locations.

Given that there has only been one noise-related complaint (associated with a 'low hum' from the Clarence Colliery ventilation facility) over the past 12 years and the proposed five-year extension to the development consent does not involve any changes to site operations, timing, or noise emissions, the existing noise criteria and management measures associated with sleep disturbance are anticipated to remain appropriate.

7 Noise mitigation, management and monitoring

7.1 Existing noise mitigation and management measures

Noise emissions from Clarence Colliery will continue to be managed in accordance with the existing NMP.

The NMP outlines the noise mitigation and management measures common to all of Centennial's operations within the western region, where applicable, as well as those specific to Clarence Colliery. Relevant measures include:

- modifying the location of trains idling while being loaded or waiting to enter the network to minimise off-site noise impacts at sensitive receivers, where feasible
- use of a combination of partial and fully enclosed conveyors and conveyor drives
- regular inspection of conveyor idlers and prompt replacement of damaged or highly worn idlers during maintenance
- regular maintenance of mobile plant and equipment in accordance with the manufacturer's specifications to ensure optimal operating conditions
- installation of frequency modulated reversing alarms or 'quackers' on mobile plant
- switching off vehicles and plant when not in use
- operating mobile plant in a quiet, efficient manner and regular training of operators
- selecting low noise plant for operation on-site
- install acoustic enclosures around processing plants and seal all unnecessary openings
- regular inspections and maintenance of haul road surfaces
- limiting truck speeds on private haul roads.

A number of measures are implemented to proactively plan and manage noise emissions from Centennial's western region operations. Measures implemented by Centennial include:

- a region-wide monitoring rationalisation for real-time noise monitoring to provide more informative data and enable more timely response to elevated noise levels off-site
- procurement of quieter equipment
- regularly reviewing of monitoring and management measures and updating as applicable
- impact assessments of future modifications and extensions.

7.2 Feasible and reasonable assessment of additional mitigation

Section 3.1 of the NPfI describes the approach to be adopted in determining feasible and reasonable mitigation measures:

> A noise mitigation measure is feasible if it can be engineered and is practical to build and implement, given project constraints such as safety and maintenance requirements.
>
> Selecting reasonable measures from those that are feasible involves judging whether the overall noise benefits outweigh the overall adverse social, economic and environmental effects, including the cost of the mitigation measure.

Consideration of the feasibility and reasonableness of additional noise mitigation measures has been undertaken with reference to the guidance provided in section 3.4 of the NPfI. The NPfI also provides the following guidance on the application of noise mitigation to existing premises:

> The range of noise reduction strategies for existing situations is generally more limited than those available for new development at the planning stage. For example, spatial separation between the source and receiver is not an option for existing situations. The initial focus for existing sites should be operational procedures and prioritising noise-control measures that provide the greatest benefits to residents at least cost.

The main operational noise sources at Clarence Colliery contributing to off-site noise levels are trains on the rail loop (when present), rail loading activities (when occurring) and mobile equipment operating on the stockpiles. Mitigation options targeting these noise sources have been considered.

A summary of the mitigation options considered is provided in Table 7.1.

Mitigation strategies have been considered in the following hierarchical approach:

1. Control of noise at the source.
2. Once feasible and reasonable controls at the source are exhausted, controlling transmission of noise.
3. Once source and transmission feasible and reasonable controls are exhausted, considering mitigation measures at the noise sensitive receivers.

Table 7.1 Mitigation decision-making matrix

Mitigation option	Feasible?	Reasonable?	Justification for adopting / disregarding and expected noise benefit
At-source controls			
Mitigation/attenuation of plant and equipment	Yes	No	As the noise received at the residences above PNTLs comprises contributions from multiple on-site sources, the mitigation or attenuation of any individual item of plant or equipment would be unlikely to result in a meaningful reduction in the overall noise levels at these residences.
Control transmission of noise			
Noise barrier near rail loop	No	No	Due to topography in the area and the relative location of the rail line to the nearest residences, installation of a noise barrier would have limited acoustic benefit. Further, the cost-benefit of such a measure is very low given the limited number of receivers that would benefit.

Mitigation option	Feasible?	Reasonable?	Justification for adopting / disregarding and expected noise benefit
Mitigation at the receiver			
Receiver mitigation/negotiated agreements.	Yes	Yes	There has only been one complaint regarding noise from Clarence Colliery within the last 12 years. The proposed modification will not result in changes to noise emissions when compared to existing emissions for approved operations at all assessment locations. Centennial will continue to consult with those receivers identified as experiencing mine noise emissions above PNTLs. Residences will be invited to meet with Centennial representatives to discuss the scope of the proposed modification and provide the findings of this NVIA. The type of mitigation measures that could be implemented at the residences and/or the nature of any agreement between Centennial and the landowner will depend on the outcomes of relevant negotiations. Once finalised, a copy of any negotiated agreement will be provided to DPHI (where required).

Based on the information in Table 7.1, it is understood that Centennial has commenced and will continue to pursue consultation and negotiated agreements with landowners identified as experiencing mine noise emissions above PNTLs.

8 Conclusion

EMM has prepared this NVIA to accompany a modification report for a proposed modification to DA 504-00 (MOD 11). The proposed modification is for a five-year extension of time. A quantitative assessment of noise emissions associated with the operation of Clarence Colliery has been undertaken. The assessment included ambient noise monitoring, establishment of PNTLs and noise modelling which has shown that the proposed modification is predicted to result in no change to existing operational noise emissions.

It is of note that the operational noise modelling does not include train loading or rail operations (i.e. a train on the Clarence Colliery rail loop), given the proposed modification does not involve any changes in this regard. This approach has been adopted to clearly demonstrate that there will be no change in overall site noise emissions resulting from the modification. Noise levels at the nearest residences during train operations on the rail loop are expected to remain consistent with those presented in the Mod 6 NVIA (EMM 2020).

Operational noise modelling predicts instances of negligible exceedances (less than or equal to 2 dB above PNTL) at the nearest residences, although these can be wholly attributed to the existing operations at Clarence Colliery. The proposed modification is predicted to result in no change to overall site noise emissions.

Night-time maximum noise level events are not expected to change as a result of the modification, given that no changes to existing operations are proposed.

Given that there has only been one noise-related complaint (associated with a 'low hum' from the Clarence Colliery ventilation facility) over the past 12 years, no road traffic noise impacts are anticipated under the RNP and modification does not involve any changes to on-site operations, timing, or noise emissions, the existing noise criteria, mitigation and management measures are anticipated to remain appropriate for the five-year extension term of the development consent.

Centennial will continue to manage noise emissions from Clarence Colliery in accordance with the existing NMP. As outlined in Chapter 7, all feasible and reasonable mitigation measures will be considered. The NMP will be updated, as required, following determination of the proposed modification.

Glossary

Several technical terms are discussed in this report. These are explained in Table G.1.

Table G.1 Project and technical terms

Term	Meaning
ABL	The assessment background level (ABL) is defined in the INP as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L90 statistical noise levels.
Amenity noise criteria	The amenity noise criteria relate to existing industrial noise. Where industrial noise approaches base amenity noise criteria, then noise levels from new industries need to demonstrate that they will not be an additional contributor to existing industrial noise. See Section 2.3.2 for more detail.
Day period	Monday-Saturday: 7:00 am to 6:00 pm; Sundays and public holidays: 8:00 am to 6:00 pm.
dBA	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.
dBC	Noise is measured in units called decibels (dB). There are several scales for describing noise, with the 'C-weighted' scale typically used to assess low frequency noise.
Evening period	Monday-Sunday and public holidays: 6.00 pm to 10.00 pm
Intrusive noise criteria	The intrusive noise criteria refers to noise that intrudes above the background level by more than 5 dB. The intrusiveness criterion is described in detail in Section 2.3.1.
L_{A1}	The noise level exceeded for 1% of the time.
L_{A10}	The noise level which is exceeded 10% of the time. It is roughly equivalent to the average of maximum noise level.
L_{A90}	The noise level that is exceeded 90% of the time. Commonly referred to as the background noise level.
L_{Aeq}	The energy average noise from a source. This is the equivalent continuous sound pressure level over a given period. The $L_{Aeq,15minute}$ descriptor refers to a L_{Aeq} noise level measured over a 15-minute period.
L_{Amax}	The maximum sound pressure level received during a measuring interval.
Night period	Monday-Saturday: 10:00 pm to 7:00 am; Sundays and public holidays: 10:00 pm to 8:00 am.
Project area	The area required to access and build project infrastructure, including surface and tunnel components of the Project
PNTL	The project-noise trigger level (PNTL) is criteria for a particular industrial noise source or industry. The PSNL is the lower of either the intrusive noise criteria or amenity noise criteria.
RBL	The rating background level (RBL) is an overall single value background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the average background levels.
Sound power level (L_W)	A measure of the total power radiated by a source. The sound power of a source is a fundamental property of the source and is independent of the surrounding environment.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.

Common noise levels

It is useful to have an appreciation of the decibel (dB), the unit of noise measurement. Table G.2 gives an indication as to how an average person perceives changes in noise level in the environment. Examples of common noise levels are provided in Figure G.1.

Table G.2 Perceived change in noise

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

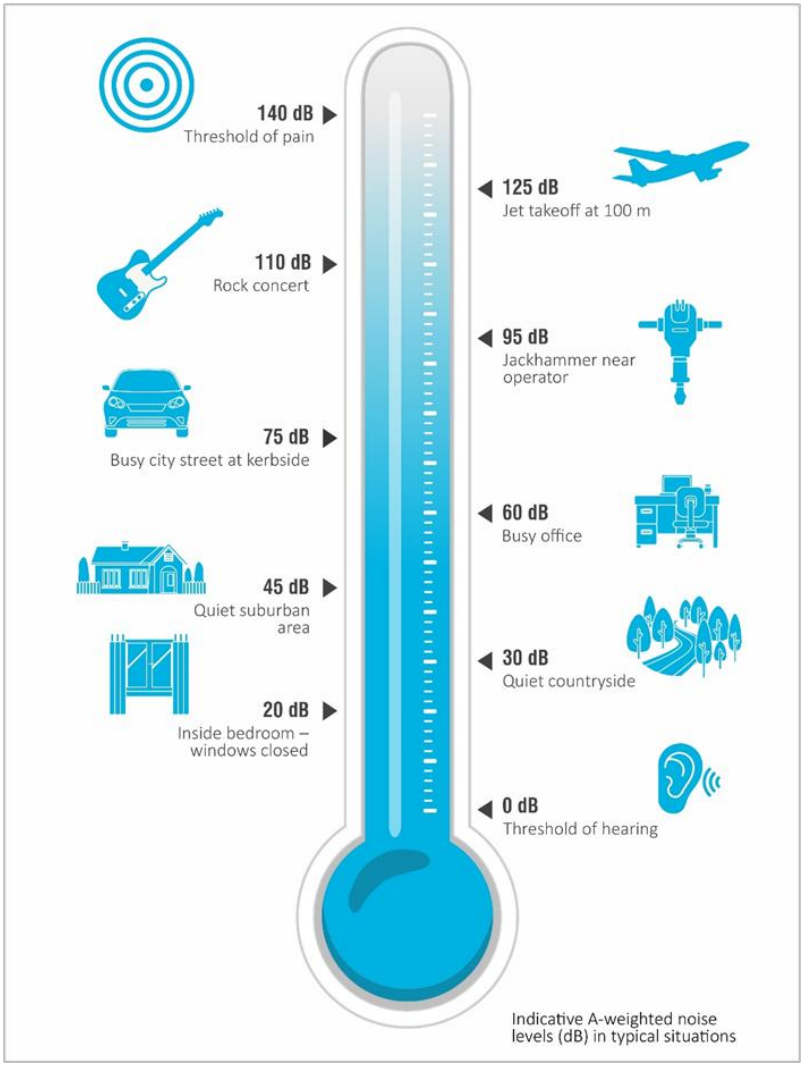


Figure G.1 Common noise levels

References

Centennial Coal 2021, *Western Region - Noise Management Plan* (NMP).

Department of Environment, Food and Rural Affairs (DEFRA) 2005, *Update of Noise Database for Prediction of Noise on Construction and Open Sites*

EMM Consulting (EMM) 2020, *Clarence Colliery - Modification 6 Noise and Vibration Impact Assessment*.

EMM Consulting (EMM) 2025, *Clarence Colliery - Mod 11 Traffic Impact Assessment*.

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

NSW Environment Protection Authority (EPA) 2017, *Noise Policy for Industry*.

NSW Government 2018, *Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extractive Industry Developments*.

Annexure A

Unattended noise monitoring data

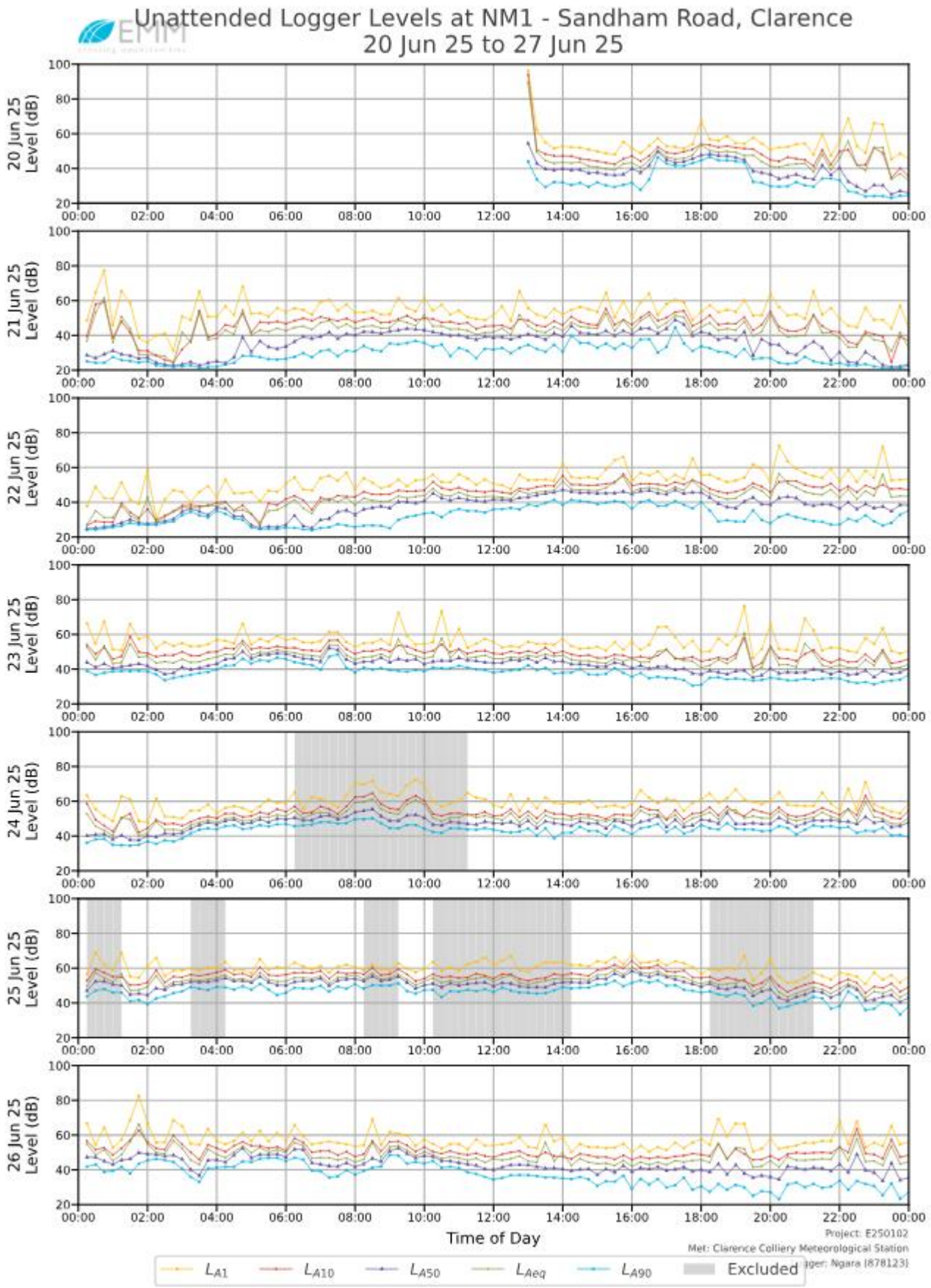
EMM
creating opportunities

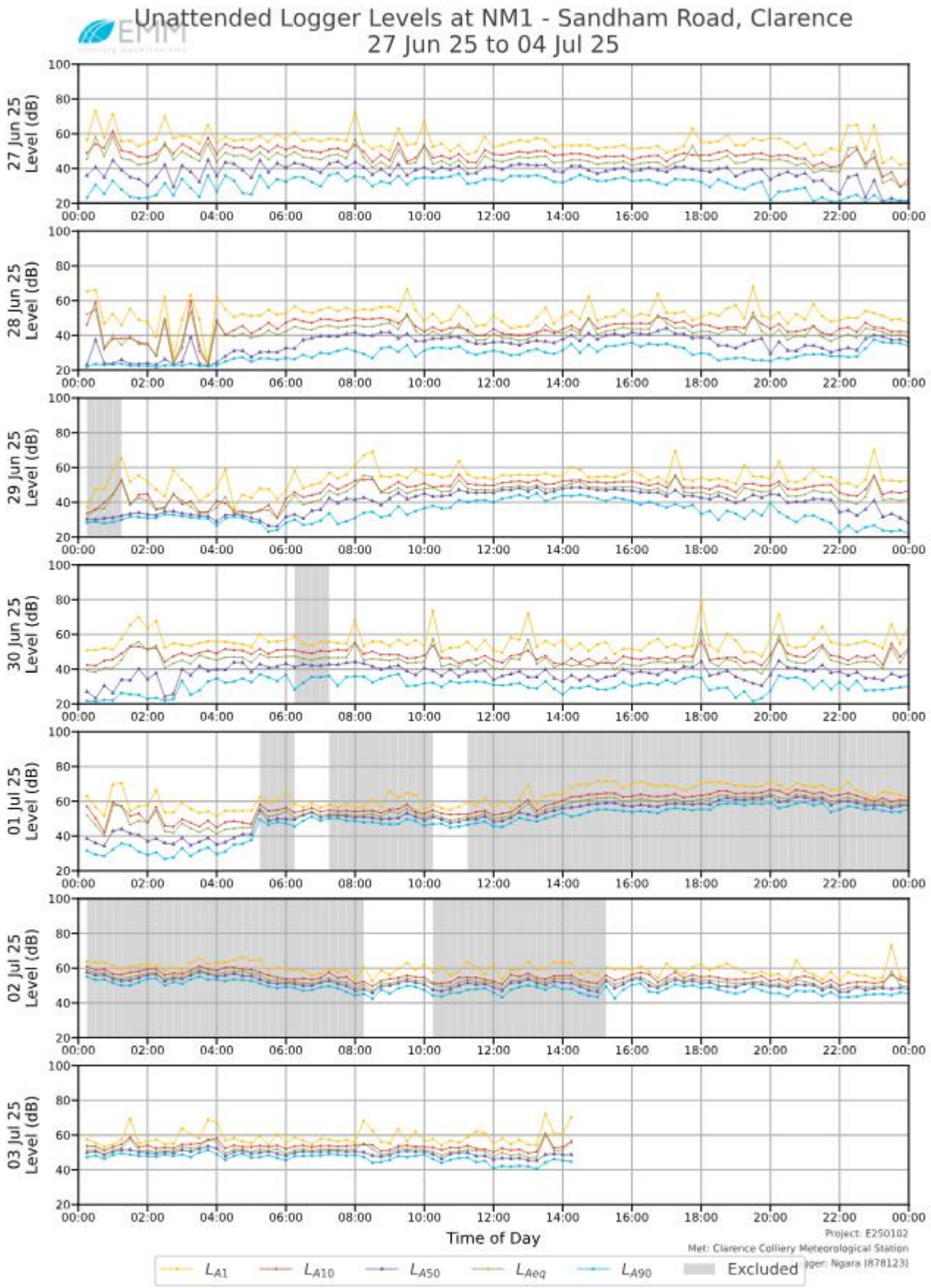
A.1 NM1 – Sandham Road, Clarence

Table A.1 Summary of daily noise logging results – NM1

Date	RBL (Day)	RBL (Evening)	RBL (Night)	$L_{Aeq,11hour}$, dB (Day)	$L_{Aeq,4hour}$, dB (Evening)	$L_{Aeq,9hour}$, dB (Night)
Monday, 20-06-25	0	30	22	0	46	50
Tuesday, 21-06-25	30	24	23	47	46	38
Wednesday, 22-06-25	31	27	29	47	48	49
Thursday, 23-06-25	35	34	33	49	51	48
Friday, 24-06-25	0	43	0	0	52	0
Saturday, 25-06-25	0	0	36	0	0	54
Sunday, 26-06-25	31	25	23	48	49	51
Monday, 27-06-25	32	21	21	47	44	46
Tuesday, 28-06-25	29	26	27	45	44	43
Wednesday, 29-06-25	34	28	22	49	46	48
Thursday, 30-06-25	29	23	28	50	49	50
Friday, 01-07-25	0	0	0	0	0	0
Saturday, 02-07-25	0	44	45	0	51	52
Sunday, 03-07-25	0	0	0	0	0	0
Overall	**31**	**27**	**27**	**48**	**49**	**50**

Notes: "0" indicates periods with too few valid samples due to weather or logger operation.


Unattended Logger Levels at NM1 - Sandham Road, Clarence
20 Jun 25 to 27 Jun 25
20 Jun 25 Level (dB)
21 Jun 25 Level (dB)
22 Jun 25 Level (dB)
23 Jun 25 Level (dB)
24 Jun 25 Level (dB)
25 Jun 25 Level (dB)
26 Jun 25 Level (dB)
Time of Day
Project: E250102
Met: Clarence Colliery Meteorological Station
LA1
LA10
LA50
LAeq
LA90
Excluded

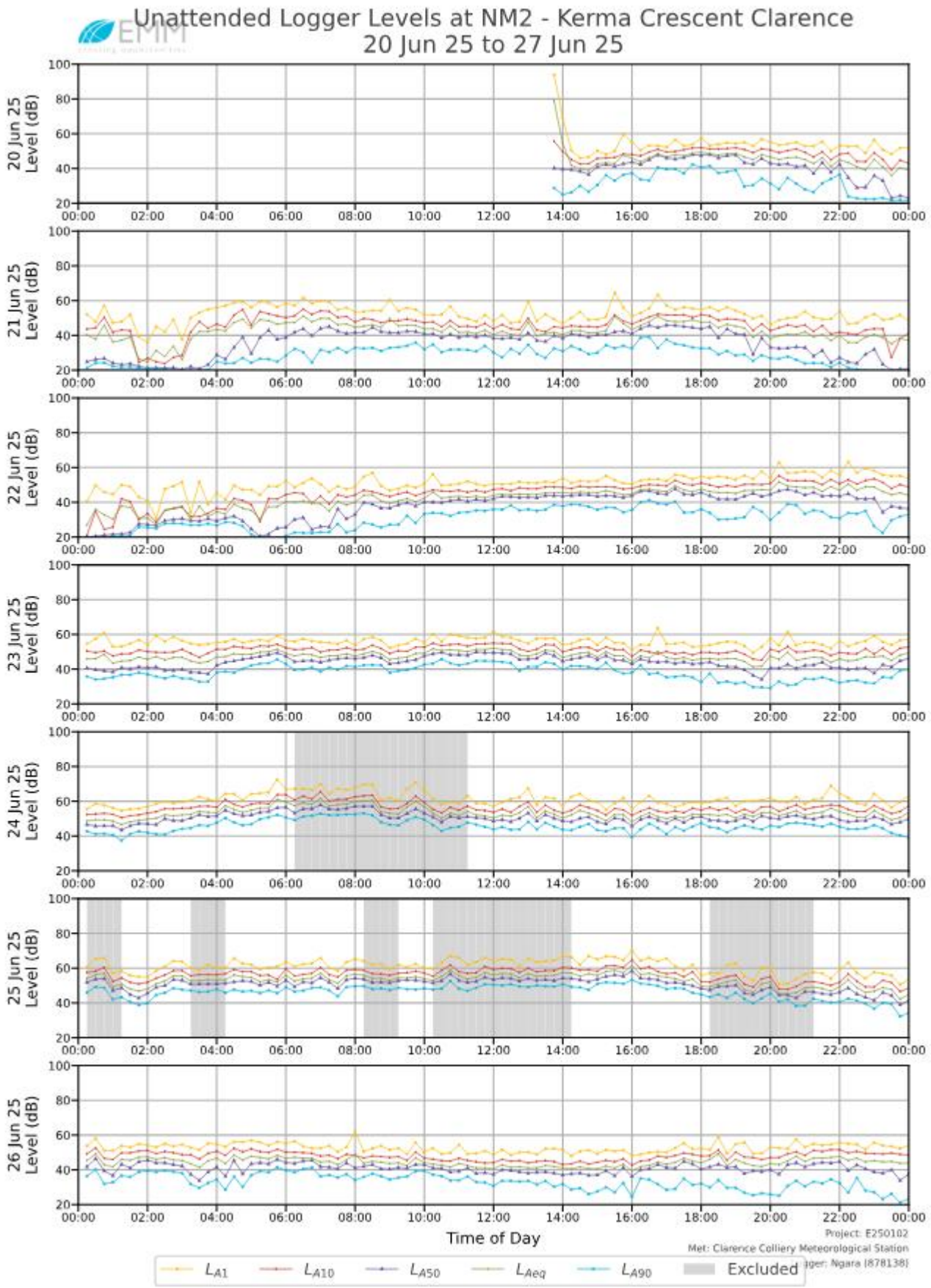

Unattended Logger Levels at NM1 - Sandham Road, Clarence
27 Jun 25 to 04 Jul 25
27 Jun 25 Level (dB)
28 Jun 25 Level (dB)
29 Jun 25 Level (dB)
30 Jun 25 Level (dB)
01 Jul 25 Level (dB)
02 Jul 25 Level (dB)
03 Jul 25 Level (dB)
Time of Day
Project: E250102
Met: Clarence Colliery Meteorological Station
LA1
LA10
LA50
LAeq
LA90
Excluded

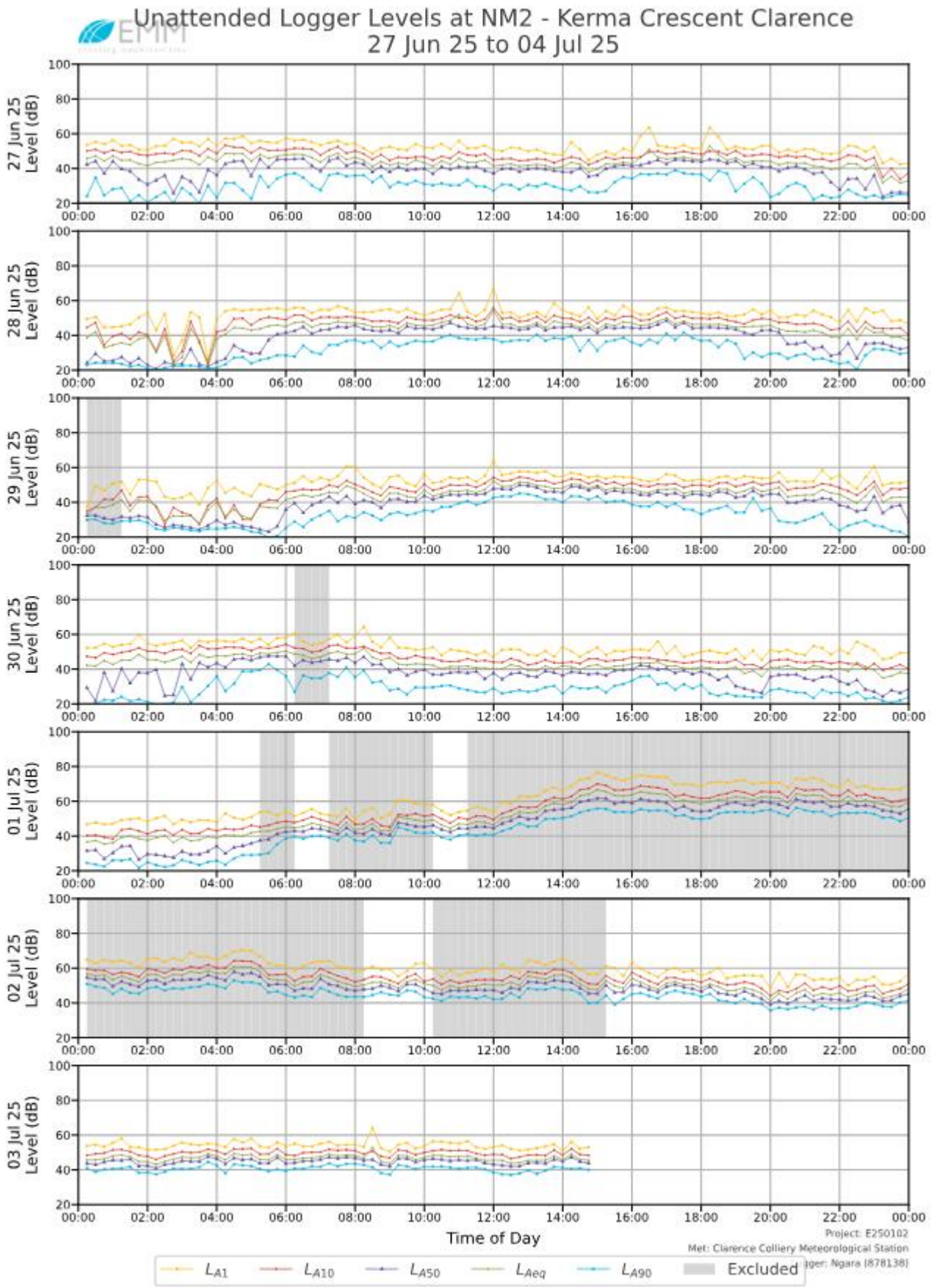
A.2 NM2 – Kerma Crescent, Clarence

Table A.2 Summary of daily noise logging results – NM2

Date	RBL (Day)	RBL (Evening)	RBL (Night)	$L_{Aeq,11hour}$, dB (Day)	$L_{Aeq,4hour}$, dB (Evening)	$L_{Aeq,9hour}$, dB (Night)
Monday, 20-06-25	0	28	20	0	47	45
Tuesday, 21-06-25	30	24	20	46	43	37
Wednesday, 22-06-25	28	30	32	45	48	47
Thursday, 23-06-25	36	30	34	49	46	53
Friday, 24-06-25	0	44	0	0	53	0
Saturday, 25-06-25	0	0	32	0	0	47
Sunday, 26-06-25	28	25	21	43	46	46
Monday, 27-06-25	27	23	21	44	45	42
Tuesday, 28-06-25	34	25	23	47	44	42
Wednesday, 29-06-25	33	27	20	48	46	46
Thursday, 30-06-25	27	24	22	44	40	41
Friday, 01-07-25	0	0	0	0	0	0
Saturday, 02-07-25	0	36	38	0	47	47
Sunday, 03-07-25	0	0	0	0	0	0
Overall	**29**	**27**	**22**	**46**	**47**	**47**

Notes: "0" indicates periods with too few valid samples due to weather or logger operation.

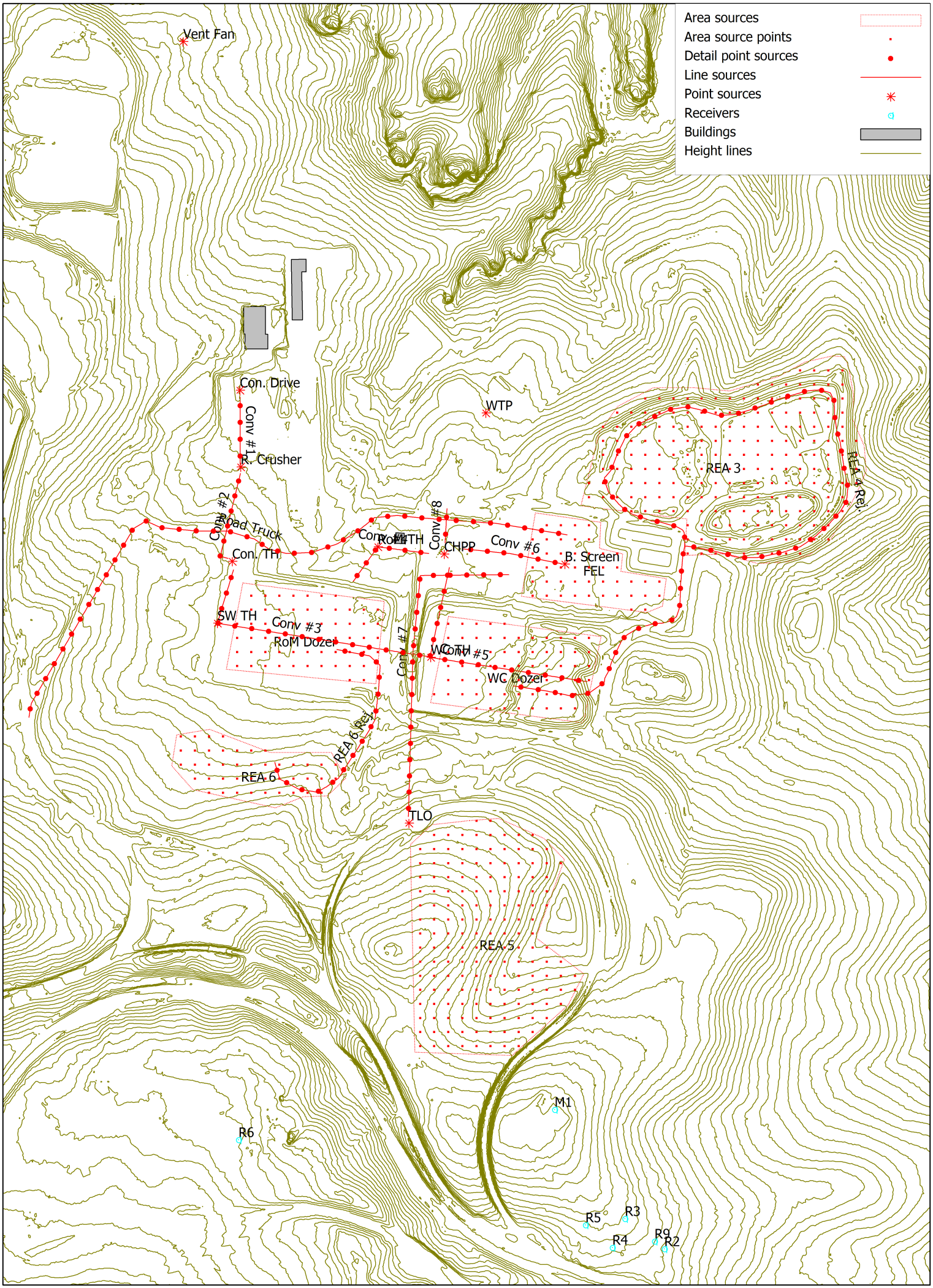

Unattended Logger Levels at NM2 - Kerma Crescent Clarence
20 Jun 25 to 27 Jun 25
20 Jun 25 Level (dB)
21 Jun 25 Level (dB)
22 Jun 25 Level (dB)
23 Jun 25 Level (dB)
24 Jun 25 Level (dB)
25 Jun 25 Level (dB)
26 Jun 25 Level (dB)
Time of Day
Project: E250102
Met: Clarence Colliery Meteorological Station
LA1
LA10
LA50
LAeq
LA90
Excluded


Unattended Logger Levels at NM2 - Kerma Crescent Clarence
27 Jun 25 to 04 Jul 25
27 Jun 25 Level (dB)
28 Jun 25 Level (dB)
29 Jun 25 Level (dB)
30 Jun 25 Level (dB)
01 Jul 25 Level (dB)
02 Jul 25 Level (dB)
03 Jul 25 Level (dB)
Time of Day
Project: E250102
Met: Clarence Colliery Meteorological Station
Logger: Ngara (878138)
LA1
LA10
LA50
LAeq
LA90
Excluded

Annexure B

Modelled noise source locations

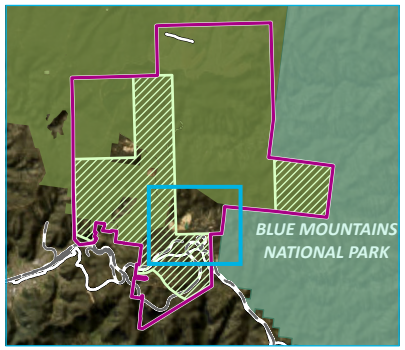
EMM
creating opportunities


Area sources
Area source points
Detail point sources
Line sources
Point sources
Receivers
Buildings
Height lines
Vent Fan
Con. Drive
Conv #1
R. Crusher
Conv #2
Road Truck
Con. TH
WTP
REA 3
REA 4 Rej.
Conv #8
RoM TH
CHPP
Conv #6
B. Screen
FEL
SW TH
Conv #3
RoM Dozer
Conv #7
WC TH #5
WC Dozer
REA 6 Rej.
REA 6
TLO
REA 5
M1
R6
R5
R3
R4
R2

Annexure C

Operational noise contours

EMM
creating opportunities



KEY

- Clarence Colliery Holdings Area
- DA504-00 consent boundary
- Unattended assessment location
- Noise monitoring location

Noise contours (day- no train)

- 40 dB
- 45 dB
- 50 dB
- 55 dB

Existing environment

- Rail line
- Major road
- Named watercourse
- NPWS reserve
- State conservation area
- State forest

Note: R4 and R5 residences were lost in 2019 bushfires

Operational noise contours – day (excluding train)

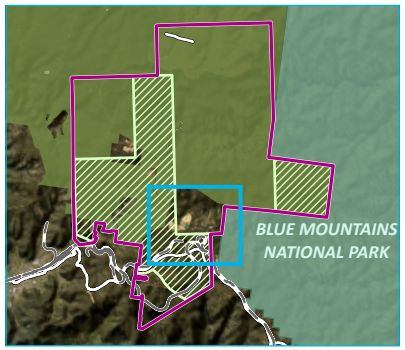
Clarence Colliery- Modification 11
Noise and Vibration Impact Assessment
Figure C.1

EMM creating opportunities

Source: EMM (2025); DCSSS (2024); ESRI (2025); GA (2009)

0 0.5 1 km
GDA2020 MGA Zone 56
N

\\emm.local\xdrive\2025\E250102- Clarence MOD 11\GIS\02_Maps_NVIA\NVIA003_OperationalNoiseContours_Day\NVIA003_OperationalNoiseContours_Day_20251216_03.aprx 17/12/2025



KEY

- Clarence Colliery Holdings Area
- DA504-00 consent boundary
- Unattended assessment location
- Noise monitoring location

Noise contours (evening/night- no train)

- 40 dB
- 45 dB
- 50 dB
- 55 dB

Existing environment

- Rail line
- Major road
- Named watercourse
- NPWS reserve
- State conservation area
- State forest

Note: R4 and R5 residences were lost in 2019 bushfires

Source: EMM (2025); DCSSS (2024); ESRI (2025); GA (2009)

0 0.5 1 km

GDA2020 MGA Zone 56

N

Operational noise contours – evening/night (excluding train)

Clarence Colliery- Modification 11
Noise and Vibration Impact Assessment
Figure C.2

EMM creating opportunities

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