16 Noise and vibration

16.1 Assessment objectives

The DGRs for the Cobbora Coal Project that relate specifically to noise and blasting are:

Noise, Vibration and Blasting – including a quantitative assessment of potential:

- construction, operational and off-site transport noise impacts;
- blasting impacts on people, livestock and property;
- reasonable and feasible mitigation measures (including assessment of restricted night time operations), including evidence that there are no such measures available other than those proposed; and
- monitoring and management measures, in particular real-time, attended noise monitoring and predictive meteorological forecasting.

16.2 Assessment method

The noise and vibration assessment for the Project has been prepared by EMGA Mitchell McLennan Pty Ltd (Appendix N) and the results are summarised in this chapter. The assessment was in accordance with the following regulations, methods and guidance documents as specified in the DGRs:

- *NSW Industrial Noise Policy* (EPA 2000);
- *Road Noise Policy* (EPA 2011);
- *Interim Guideline for Assessment of Noise from Rail Infrastructure Projects (EPA and DoP 2007);*
- *Assessing Vibration: A Technical Guideline* (EPA 2006); and
- *Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration* (ANZECC 1990).

The following regulations and guidance documents not specified in the DGRs were also used in the noise assessment:

- *The Interim Construction Noise Guideline* (DECC 2009).

16.2.1 Noise and vibration assessment criteria

i Operational noise

The EPA provides guidelines for assessing operational noise generated by industrial facilities, including mines, in its *Industrial Noise Policy* (INP) (EPA 2000). Assessment criteria depend on the existing amenity of areas potentially affected by a proposed development.

Two criteria are prescribed by the EPA, an intrusiveness criteria and an amenity criteria.

The INP requires that both the intrusiveness and amenity criteria are satisfied. However, the more limiting of the two becomes the project specific noise level (PSNL) or operational criteria. For privately owned residences, the intrusiveness criteria is based on the rating background level (RBL), a minimum RBL of 30 dB(A) has been used for this assessment. The intrusive criteria are the more limiting of the two that must be met at private residences, forming the PSNL shown in Table 16.1.

Table 16.1 Intrusive criteria

Location	Time period	Rating background level (RBL), dB(A)	Intrusive criteria dB(A), $L_{eq,15\text{-}min}$ (PSNL)
Residential properties	Day (7.00 am to 6.00 pm)	30	35
	Evening (6.00 pm to 10.00 pm)	30	35
	Night (10.00 pm to 7.00 am)	30	35

Source: INP (EPA 2000)

The INP also identifies two zones of land affected by noise from industrial operations. These are a noise management zone and a noise affectation zone. The noise management zone is where noise exceeds the PSNL by 1 dB to 5 dB. The noise affectation zone is where noise levels exceed the PSNL by more than 5 dB. For the purposes of this assessment, where noise levels exceed the PSNL by more than 5 dB, this zone is referred to as the noise acquisition zone.

ii Vacant lands

An acquisition zone for vacant lands has been considered where more than 25% of a property is affected by an $L_{eq(15\text{-}min)}$ of greater than 40 dB(A) for day, evening and night periods.

iii Low frequency noise

The INP provides guidelines for applying 'modifying factor' adjustments to account for low frequency noise emissions. Where there is a difference of 15 dB or more between 'C' weighted and 'A' weighted noise levels, then a modifying factor correction of 5 dB is applicable.

Industry accepted practice suggests that low frequency noise is not likely to result in impacts unless received levels are above 60 dB(C). Therefore, a 60 dB(C) criterion has been adopted for the assessment of low frequency noise.

iv Cumulative noise

Cumulative noise emissions from multiple industrial sources may impact on the acoustic amenity of communities. There are no existing significant industrial sources near the Project, therefore cumulative operational noise has not been considered in this assessment.

v Sleep disturbance

Intermittent noises can disturb the sleep of nearby residents. Sleep disturbance screening criteria are provided in the INP application notes, which recommend the maximum noise level from a source should not exceed the existing background noise level by more than 15 dB. This criterion applies at the nearest bedroom facade of private residences to the site. For the purpose of this assessment, the descriptors used to determine potential sleep disturbance are the L_1 or L_{max} noise metrics.

This assessment has adopted a sleep disturbance screening criterion of 45 dB(A) L_{max} for all private residences, based on an RBL of 30 dB(A).

Where screening tests identify noise events above 45 dB(A) L_{max}, further investigation is needed to quantify the extent of impacts, including the level of exceedence above the criterion, the duration and the number of events (INP Application Notes 2008).

vi Construction noise

The *Interim Construction Noise Guideline* (ICNG) (DECC 2009) provides guidance on assessing noise and vibration from construction. The ICNG recommends the following standard hours for construction where noise from these activities is audible at residential premises:

- Monday to Friday 7.00 am to 6.00 pm;
- Saturday 8.00 am to 1.00 pm; and
- no construction work on Sundays or public holidays.

The ICNG provides methods to assess construction noise emission. A quantitative assessment requires noise emission predictions from construction activities at the nearest private residences, while a qualitative assessment is a simplified approach that relies more on noise management strategies.

In accordance with the ICNG, this study has adopted a quantitative assessment approach suited to construction projects that last longer than three weeks.

The Project specific construction noise criteria for recommended standard hours, based on an RBL of 30 dB(A), is 40 dB(A) $L_{eq(15\text{-}min)}$ at privately owned residences.

vii Road noise

The principle guidance used to assess the impact of road traffic noise on private residences is in the *Road Noise Policy* (RNP) (EPA 2011).

The Golden Highway and the Spring Ridge Road diversion will be used to access the Project. The nearest residence to the diversion road is over 2 km away while there are closer residences to the Golden Highway. Therefore, the road traffic noise assessment is based on the potential impacts from the Golden Highway which is classified as a freeway/arterial/sub-arterial road type in accordance with the RNP. The road noise assessment criterion for private residences is presented in Table 16.2.

Table 16.2 Road traffic noise assessment criteria for residential land use

Road category	Type of project/development	Assessment criteria, dB(A)	
		Day (07.00 am to 10.00 pm)	**Night (10.00 pm to 07.00 am)**
Freeway/arterial/sub-arterial roads	Existing residences affected by additional traffic on existing freeway/arterial/sub-arterial roads generated by land use developments.	$L_{eq(15\text{-}hr)}$ 60 (external)	$L_{eq(9\text{-}hr)}$ 55 (external)

Note: Reproduced from Table 3 of the RNP.

Additionally, the RNP states that where the existing road traffic noise levels exceed the criteria in Table 16.2, any additional increase in total traffic noise level (ie existing and future) should be limited to 2 dB. Furthermore, where the existing road traffic noise level is below the criteria (see Table 16.2) and the Project increment causes significant increase to the total traffic noise level, the noise criteria presented in Table 16.3 must be considered.

Table 16.3 Relative increase criteria for residential land use

Road Category	Type of project/development	Total traffic noise level increase, dB(A)	
		Day (07.00 am to 10.00 pm)	Night (10.00 pm to 07.00 am)
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 $L_{eq(15\text{-}hr)}$+12 dB (external)	Existing traffic $L_{eq(9\text{-}hr)}$+12 dB (external)

viii Off-site rail noise

Off-site rail operations noise (ie movements on the main or public line) is assessed separately from on-site rail noise. Off-site rail operations noise has been assessed using the *Interim Guideline for Assessment of Noise from Rail Infrastructure Projects* (IGANRIP) (EPA and DP&I 2007). IGANRIP noise trigger levels relevant to the Project are provided in Table 16.4.

While not strictly applicable to developments that generate rail traffic, the IGANRIP is nominated in the DGRs for this Project.

Table 16.4 Airborne rail traffic noise trigger levels for residential land use

Type of development	Noise trigger levels dB(A)		
	Day (7.00 am to 10.00 pm)	Night (10.00 pm to 7.00 am)	Comment
Redevelopment of existing railway	Development increases existing rail noise levels and resulting rail noise levels exceed:		These numbers represent external levels of noise that trigger the need for an assessment of the potential noise impacts from a rail infrastructure project.
	65 $L_{eq(15\text{-}hr)}$	60 $L_{eq(9\text{-}hr)}$	
	85 L_{max}	85 L_{max}	
			An 'increase' in existing rail noise levels is taken to be an increase of 2 B(A) or more in L_{eq} in any hour or an increase of 3 dB(A) or more in L_{max}[1]

Note: 1. the trigger levels presented in this table should be read with the technical notes of Tables 1 and 2 of the IGANRIP.

ARTC's EPL 3142 also provides rail noise emission criteria that are applicable to trains transporting coal from the Project. These are consistent with the IGANRIP trigger levels. Condition L6.1.1 of the EPL is reproduced below:

'L6.1.1 General Noise Limits:

It is an objective of this Licence to progressively reduce noise levels to the goals of 65 dB(A) L_{eq}(15-hr), (day time from 7.00 am–10.00 pm), 60 dB(A) L_{eq}(9-hr), (night time from 10.00 pm–7.00 am) and 85dB(A) Lmax (24 hr) pass-by noise, at one metre from the façade of affected residential properties through the implementation of the Pollution Reduction Programs.'

ix Vibration

a. Human response

The blasting limits adopted by the EPA are provided in the ANZECC guidelines *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZECC 1990). The blasting limits address airblast noise overpressure and ground vibration, the two main effects of blasting. A summary of blast limits is provided in Table 16.5.

Table 16.5 Airblast overpressure and ground vibration limits

Description	Criteria	Allowable exceedence
Airblast	115 dBL(peak)	5% of the total number of blasts over 12 months
(Overpressure level)	120 dBL(peak)	0%
Ground vibration	5 mm/s	5% of the total number of blasts over 12 months
(Peak particle velocity)	10 mm/s	0%

Source: ANZECC (1990)

b. Heritage structures

Overpressure from blasting may cause damage to some building elements such as windows if levels are sufficiently high. The Australian Standard AS2187.2 – 2006 Explosives – Storage and Use Part 2 Use of Explosives (Appendix J) states that:

> From Australian and overseas research, damage (even of a cosmetic nature) has not been found to occur at airblast levels below 133dBL [emphasis added].

Vibration associated with blasting will be the limiting parameter for this assessment and where vibration criteria are met, the airblast criterion will be satisfied. Therefore, the airblast criteria were not considered further in the assessment.

For assessment of damage to buildings from blast ground vibration, AS2187.2 – 2006 provides frequency based criteria, derived from British Standard 7385-2 and United States Bureau of Mines Standard RI 8507. These criteria are less stringent than the human comfort levels of 5 mm/s provided in the ANZECC guidelines (see Table 16.5).

The guide values from AS2187.2 – 2006 for transient vibration that have potential to result in minimal risk of cosmetic damage to residential and industrial buildings are presented in Table 16.6 and Figure 16.1.

Table 16.6 Transient vibration guide values for cosmetic damage

Description	Criteria line	Building type	Peak component particle velocity in frequency range of predominant pulse	
			4 Hz to 15 Hz	15 Hz and above
Cosmetic damage caused by blasting ground vibration	1	Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
	2	Unreinforced or light framed structures. Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

The criterion on Line 2 for residential buildings is suitable for heritage receptors. The frequency range of blast vibration is normally between 2 Hz to 40 Hz in soil and 10 Hz to 100 Hz in rock.

16.2.2 Meteorology

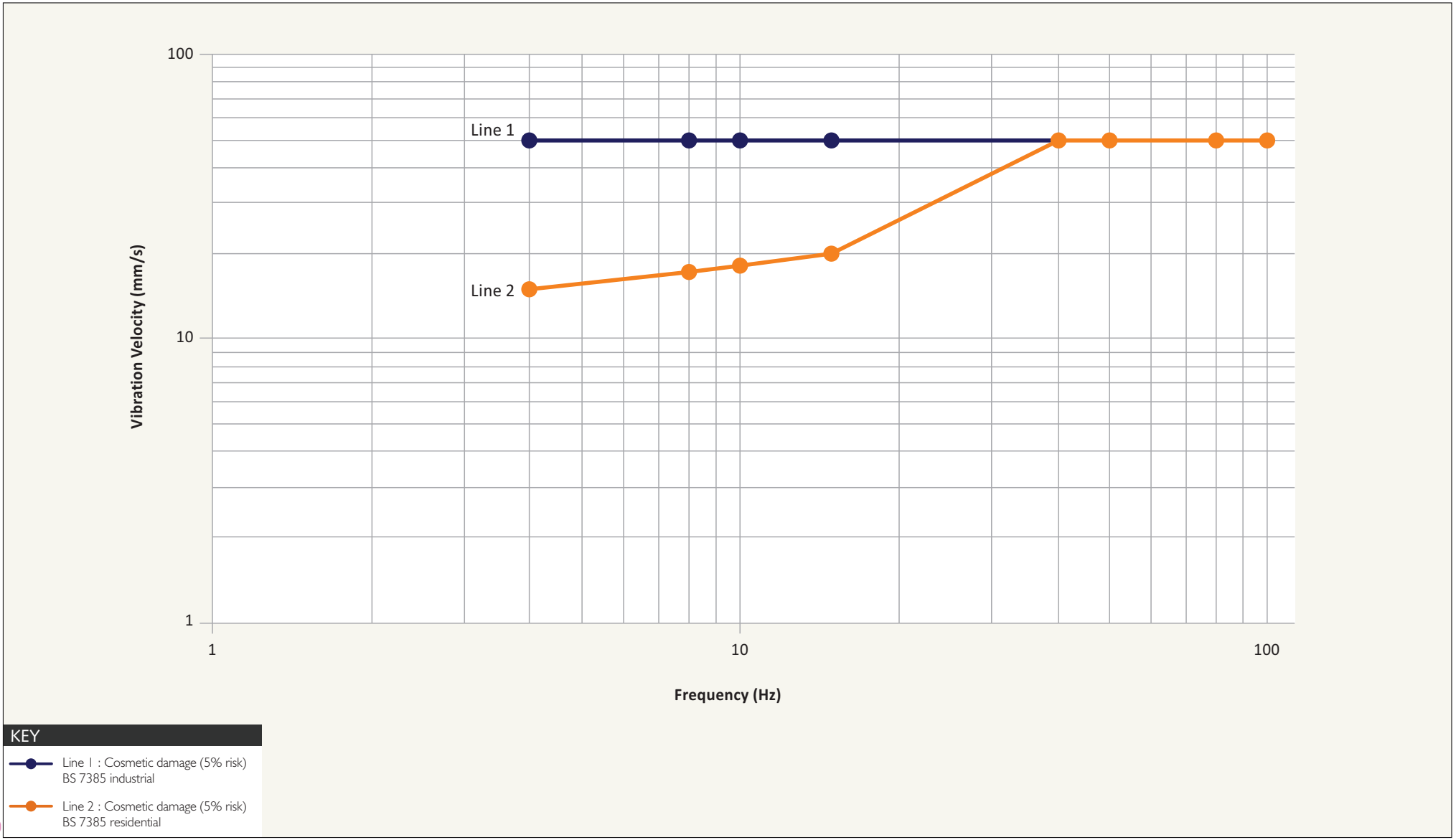
During certain wind conditions, mining noise levels at private residences may increase or decrease compared with noise during calm conditions. This is due to refraction caused by the varying speed of sound with increasing height above ground. The received noise level increases when the wind blows from the source to the receiver and, conversely, decreases when the wind blows from the receiver to the source. Temperature inversions (where atmospheric temperature increases with altitude) typically occur during night-time in the winter months and can also increase mine noise levels at surrounding private residences.

The INP provides a procedure for identifying prevailing wind and temperature inversion meteorological conditions at a site (referred to as a 'feature' of the area) to be used when assessing noise levels against the criteria.

Weather data were obtained from the CHC on-site meteorological station and analysed in accordance with INP methods. Temperature inversion data were not available and the INP default parameters for 'F' and 'G' class inversions have been adopted. This provides a worst case and, therefore conservative assessment approach. The four meteorological scenarios provided in Table 16.7 were considered in the assessment.

Table 16.7 Relevant site-specific meteorological parameters

Assessment condition	Temperature	Wind speed/direction	Relative humidity
Calm	10°C	Not applicable	90%
Prevailing winds	10°C	2.3 m/s/WSW (247.5°)	90%
'F' class temperature inversion	10°C	Not applicable	90%
'G' class temperature inversion	10°C	Not applicable	90%



Vibration Guide Values to Prevent Cosmetic Damage

Cobbora Coal Project - Environmental Assessment

Figure 16.1

Drainage flow winds (ie localised cold air travelling in a direction of decreasing altitude) can occur during temperature inversion conditions. The increase of noise levels caused by a drainage flow wind needs consideration if a development is at a higher altitude to surrounding private residences.

The potential for drainage flow winds to occur in the PAA has been analysed. Mine noise sources will either be at a lower elevation than nearby private residences or there is intervening topography present between the noise sources and nearby private residences. Therefore, drainage flow winds were not considered in the assessment.

16.2.3 Modelling

i Operations noise

The prediction of noise from the Project used ISO 9613 and CONCAWE algorithms in Brüel and Kjær Predictor Version 8.11 noise prediction software.

Noise modelling was based on three-dimensional digitised ground contours for the surrounding land, mine pits and overburden emplacement areas for five mine plan stages, Years 1, 2, 8, 16 and 20, which represent the range of potential impacts over the life of the mine. The mine plans contain plant and equipment placed at various locations and heights, representing realistic operating conditions. The model assumed all plant and equipment to be operating simultaneously and at full duty, which in practice is unlikely to occur, or to occur infrequently. Therefore, noise predictions are conservative. Noise predictions were conducted during calm and prevailing meteorological conditions described in Table 16.7.

Noise from mining operations has been predicted for privately owned and CHC-owned residences surrounding the Project, along with Dapper church, which is situated to the south-west of the Project. A total of 190 residences have been identified within the potential noise catchment for the Project and are detailed in Table 3.3 of the noise assessment report (refer Appendix N) and shown graphically in Figure 16.2.

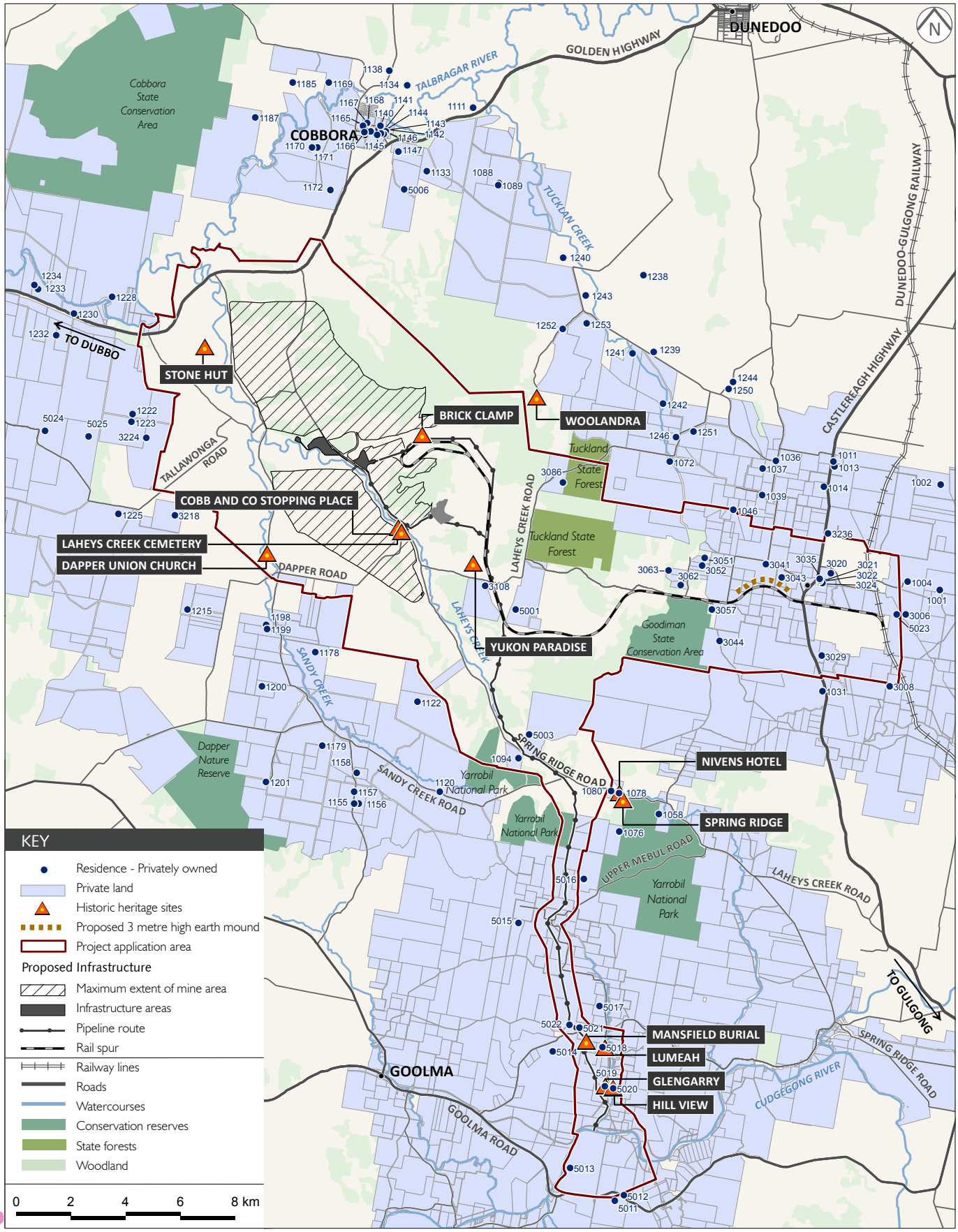
ii Construction noise

Noise modelling was undertaken to predict construction noise levels at private residences from the Project. A combined scenario assuming the simultaneous construction of the water pipeline, power easement and railway was modelled to quantify potential impacts. The results of the construction assessment are considered conservative.

iii Road traffic noise

a. Operations

Road traffic noise levels from the Project were calculated using the Calculation of Road Traffic Noise (CORTN) (UK Department of Transport) methods for the daytime and night-time. The daytime assessment considered three shift changes (189 cars in total), mine management, technical and administration staff (some 23 cars each way) and 42 truck deliveries with 30% of all daytime traffic movements assumed to be heavy vehicles. The night-time assessment considered one shift change (63 cars in total) and 42 truck deliveries with 30% of all night-time traffic movements assumed to be heavy vehicles.



Residential and Heritage Assessment Locations

Cobbora Coal Project - Environmental Assessment

Figure 16.2

b. Construction

During construction, the Project will generate vehicle traffic movements from the construction workforce and site visitors. These are expected to occur mainly during daytime. Road traffic noise levels from the Project's construction were calculated using Calculation of Road Traffic Noise (CORTN) (UK Department of Transport) methods for the daytime.

iv Vibration

CHC will actively manage the blast design to control airblast overpressure and ground vibration. Blast overpressure and vibration results have been calculated using the method given in the AS2187-2: Explosives – Storage and use Part 2: Use of explosives, 2006 and ICI Explosives Blasting Guide, as applicable to blasting in hard rock.

Blast overpressure and ground vibration were calculated at several heritage assessment locations surrounding the Project and are detailed in Table 16.8.

Table 16.8 Heritage receptor assessment locations

Item name	Closest approximate distance[3] to mine blasting	Item coordinates[1]	Item ownership
Laheys Creek cemetery	<300 m	713907E, 6436331N	CHC
Dapper Union church[2]	<1000 m	709108E, 6435394N	Trustees
Potential Cobb and Co stopping place	<200 m	714027E, 6436186N	CHC
Stone hut	<1000 m	706834E, 6442945N	CHC
Brick clamp	<500 m	714784E, 6439734N	CHC
Mansfield burial	<17 km	720780E 6417546N	Private
Nivens hotel	<10 km	721984E, 6426630N	Private
Yukon Paradise	<2 km	716640E, 6435038N	CHC
Spring Ridge	<10 km	722121E, 6426384N	CHC
Glengarry	<20 km	721468E, 6417316N	Private
Lumeah	<17 km	721461E, 6417316N	Private
Hill View	<20 km	721760E, 6415847N	Private
Woolandra	<3 km	718971E, 6441108N	CHC

Notes: *1. All coordinates are presented as Map Grid Australia (GDA 1996), Zone 55.*

2. Dapper Union church is under the care of trustees originally from the local area.

3. Distances based on year 20 mine scenarios.

16.3 Existing environment

16.3.1 Noise

The acoustic environment surrounding the PAA is characterised by moderate to low background noise levels during day, evening and night, corresponding with typical rural settings. Accordingly, the default 30 dB(A) (L_{90}) INP minimum background noise level was adopted for the assessment. There are no existing significant industrial sources near proposed Project activities.

16.4 Environmental management

A noise and vibration management plan will be prepared to detail management measures to minimise the emission from the site. This plan will include adaptive management measures with real-time noise monitoring (see Section 16.6). The main management measures are described below.

16.4.1 Operations

The assessment of the Project under the INP will establish noise monitoring and management procedures at the mine in accordance with contemporary standards. Project-related mitigation measures that were considered are:

- infrastructure has been centralised to minimise off-site effects;
- CHC will use coal stockpiles to attenuate noise emissions, especially around the coal processing plant;
- CHC is committed to managing noise emissions to all private residences identified to fall within the noise management zone (between 35 dB(A) and ≤40 dB(A)) and acquiring private residences identified to be above acquisition levels (>40 dB(A)). These landowners will be provided with the opportunity for upfront acquisition;
- amenity agreements have been made, or are in progress, with several landowners who wish to remain in the area;
- CHC will mitigate noise along the rail spur with acoustic barriers to achieve EPA criteria at two privately-owned homes where the owners do not want to sell or enter into amenity agreements;
- CHC will provide acoustic treatments to residences that are above the 45 dB(A)L_{max} sleep disturbance criterion, especially in areas where barriers would not be a reasonable or feasible option. The level of noise mitigation will be determined on a case by case basis taking into account such aspects as dwelling orientation, distance to railway and the building materials of each structure;
- management plans will include measures to reduce noise during unusual wind or weather conditions;
- CHC will fit equipment with contemporary noise suppression measures; and
- CHC will conduct regular compliance noise monitoring, which will provide input to adaptive management strategies.

CHC will also commit to best practice operational noise management and mitigation controls on a day-by-day basis as follows:

- movement of trucks on ridgelines and exposed haul routes will be restricted where their noise can propagate over a wide area, especially at night. This means restricting night-time movement of spoil to areas shielded by barriers or mounds, and reserving large-scale spoil movement for daytime;
- noisy equipment use will be scheduled at the least-sensitive time of day;

- noisy equipment will be behind structures that act as barriers; or will be at the greatest distance from noise-sensitive areas; or will be orientated so that noise emissions are directed away from noise sensitive areas;
- where there are several noisy pieces of equipment, operations will be scheduled so they are used separately rather than concurrently;
- equipment will be well maintained;
- 'quiet' practices will be used when operating equipment, for example, idling trucks will be positioned in appropriate areas;
- staff-education programs will be run on the effects of noise and the use of quiet work practices;
- reversing alarms on heavy equipment will be adjusted to make them 'smarter', by limiting the acoustic range to the immediate danger area and using broadband audible alarms; and
- efficient muffler design will be adopted for all equipment.

16.4.2 Construction

A construction noise and vibration management plan will be prepared to detail management measures to minimise emission from the site. The main management measures are described below:

- regular reinforcement (such as at toolbox talks) of the need to minimise noise and vibration will be used;
- noisy activities will be regularly identified and improvement techniques adopted;
- the use of portable radios, public address systems or other methods of site communication will be avoided where they may unnecessarily disturb nearby residents;
- the use of equipment that generates impulsive noise will be avoided where possible;
- need for vehicle reversing will be minimised, for example, by arranging for one-way site traffic routes;
- broadband audible alarms will be used on vehicles and elevating work platforms;
- the movement of materials and plant and unnecessary metal-on-metal contact will be minimised;
- quieter plant and equipment will be chosen based on the best power and size to most efficiently perform the required tasks;
- plant and equipment with low vibration generation characteristics will be selected;
- plant and equipment will be operated in the quietest and most efficient manner;
- the distance between noisy activities and noise-sensitive land uses will be maximised;
- purpose-built noise barriers, acoustic sheds and enclosures will be installed where required;
- deliveries and access to the site will be planned so they occur quietly and efficiently;

- contract conditions will include penalties for non-compliance with reasonable instructions by the Principal to minimise noise or arrange suitable scheduling;
- noisy equipment will be behind structures that act as barriers; or will be at the greatest distance from noise-sensitive areas; or will be orientated so noise emissions are directed away from noise sensitive areas; and
- equipment will be regularly maintained.

16.4.3 Off-site rail

Mitigation measures to minimise off-site rail noise impacts include the following:

- noise mitigation will be offered where IGANRIP and EPL noise trigger levels will be exceeded. The appropriate level of noise mitigation will be determined and applied case-by-case and may involve measures such as architectural treatments and providing mechanical ventilation for privately owned residences;
- CHC will consider noise management and mitigation options such as scheduling to minimise train movements during the more sensitive night periods;
- CHC will work with ARTC and affected residents to assess and mitigate any significant impacts along the Tallawang to Ulan section of the railway; and
- rail noise impacts will continue to be managed along the entire rail transport route according to ARTC and RailCorp Environment Protection Licences.

16.4.4 Vibration

Mitigation measures to minimise vibration emissions during blasting will include the following:

- dilapidation audits will be conducted at neighbouring properties most likely to be affected by blast overpressure and vibration;
- blast design will be actively managed by CHC, and hence corresponding airblast overpressure and ground vibration will be controlled;
- where practicable blast overpressure and vibration impacts on livestock will be minimised by relocating livestock within 1 km of the blast area before a blast begins;
- initial blasts will be monitored intensively at nearby infrastructure, heritage receptors or private residences to assess the response of the ground to blasting. This will allow the calibration of blast vibration calculations so that later blasts can be sized and designed to minimise off-site impacts;
- a schedule of blasts will be distributed to privately owned residences as required. The schedule will notify landowners and residents as to the time and location of blasts and road closures. Telephone contact with those residents within 5 km of the blasting area will be made before blasting; and
- the noise and vibration management plan will detail blast monitoring requirements for the site.

16.5 Impacts

16.5.1 Operations noise

The predicted noise levels at private and CHC-owned residences for all meteorological conditions are provided in Table 4.1 of Appendix N. The modelling results are shown graphically as noise contours for maximum impact meteorological condition (ie 'G' class temperature inversion) for each representative stage of mining (refer to Figure 16.3 to Figure 16.7).

Private residences predicted to be within the noise management zone or within the noise affectation zone (see Section 16.2.1), during maximum impact meteorological conditions are presented in Table 16.9.

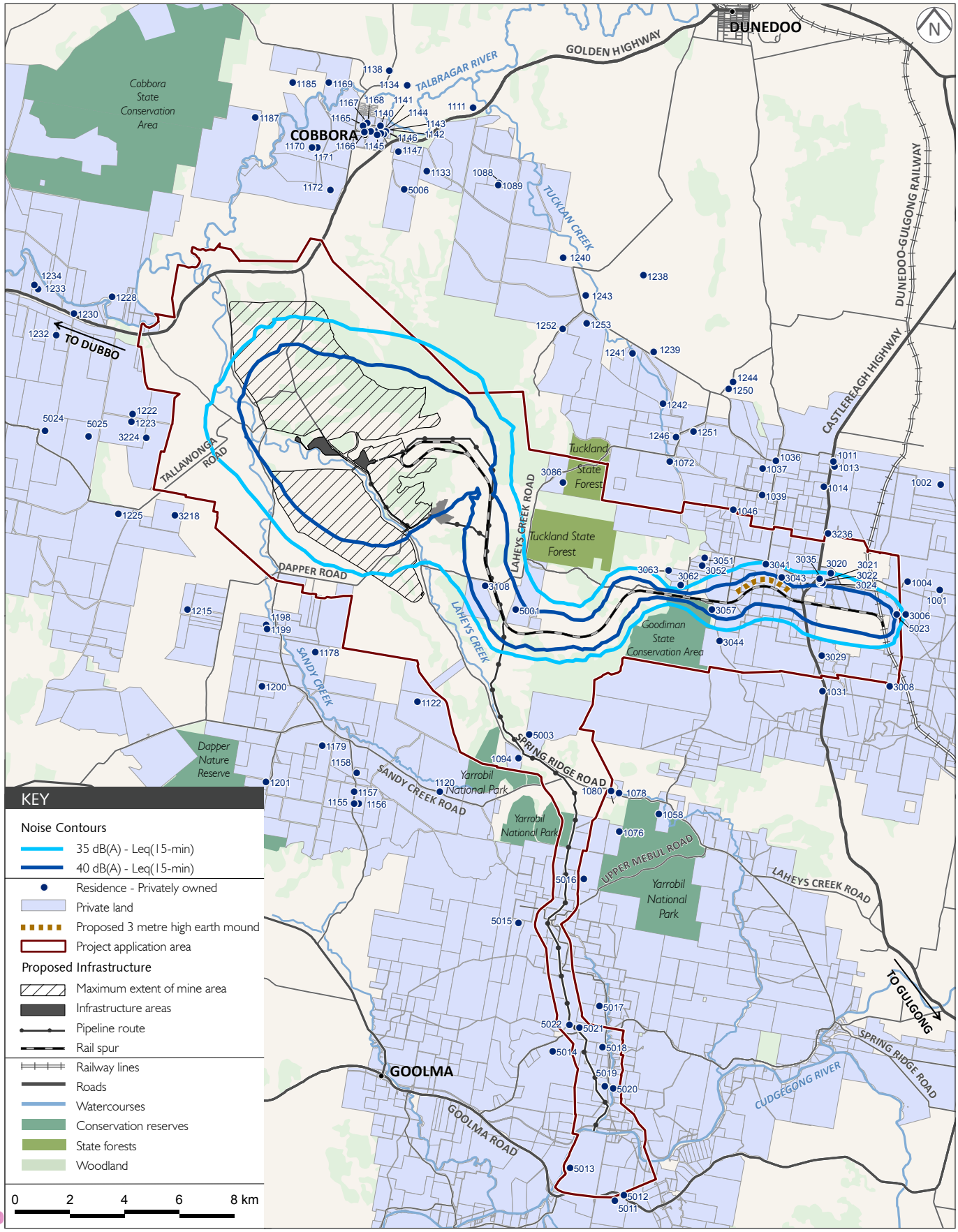
Table 16.9 Private residences above noise management zone and noise affectation zone criteria during maximum impact meteorological conditions

Noise management zone (>35 dB(A) to ≤40 dB(A))	Noise affectation zone (>40 dB(A))
Any year	Any year
1178	3057
3021	3108
3022	5001
3024	
3035	
3041	
3043	
5023	

Note: Excludes duplicated private residences from each stage. Residences owned by CHC have been excluded from this summary

The modelling results indicate that during all assessment periods, for all stages of the mine life, eight of the 125 identified privately owned residences are predicted to experience noise levels above the operational criteria (ie within the noise management zone) and three private residences are predicted to experience noise levels above the likely acquisition criteria (ie within the noise affectation zone) during maximum impact meteorological conditions. The predicted mine noise levels for Dapper Union church are below 35 dB(A) which satisfies the relevant INP criteria.

Sections of the Year 16 and Year 20 mine plans were modified in August 2012 to reduce the sizes of voids and out-of-pit emplacements in the final landform. The disturbance footprint is unchanged and the modifications do not affect the number or location of the modelled noise sources. Therefore, the modifications will not increase the predicted noise levels.



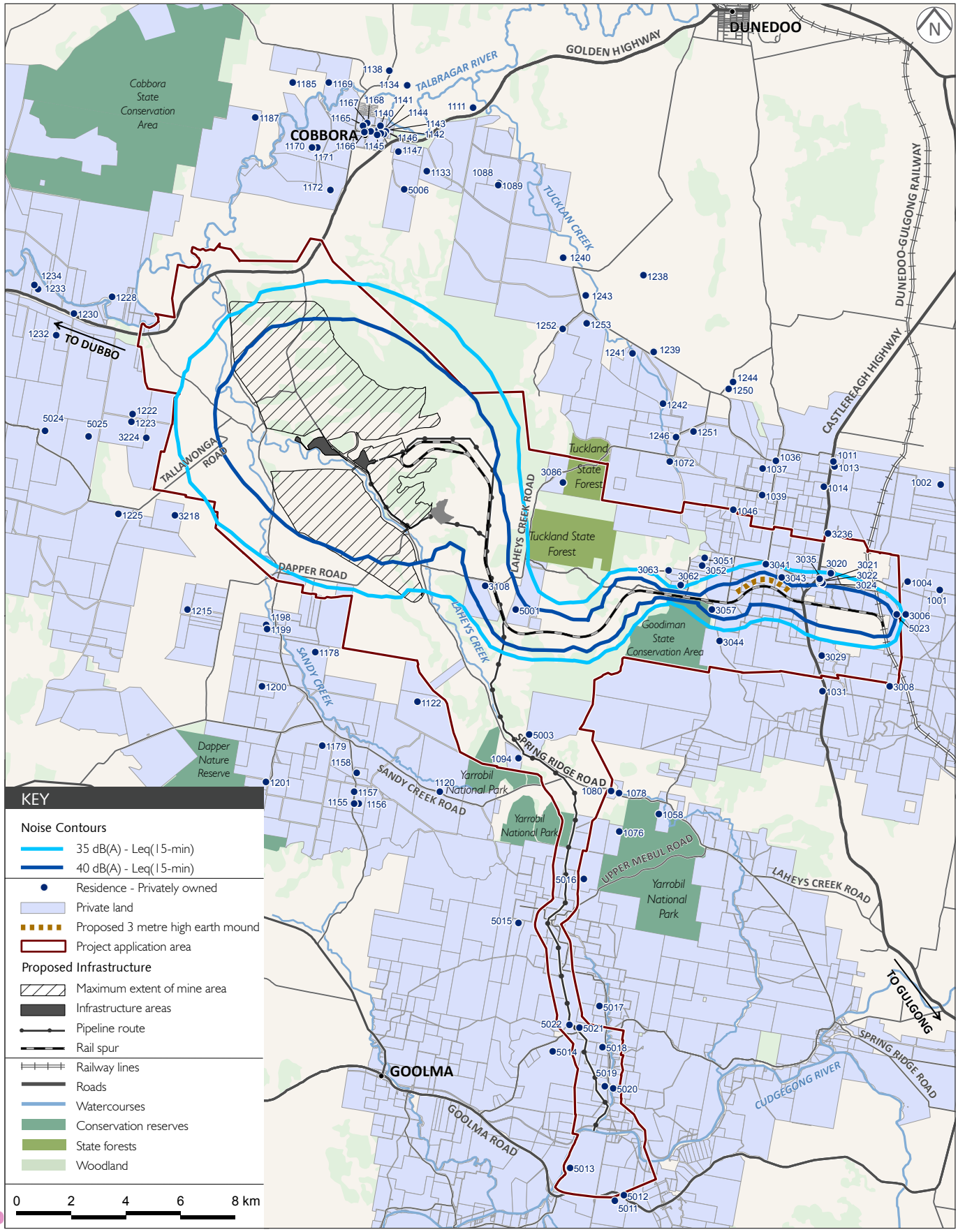
EMM

Cobbora Holding Company Pty Limited

Operational Noise for Maximum Impact Meteorological Conditions - Year 1

Cobbora Coal Project - Environmental Assessment

Figure 16.3



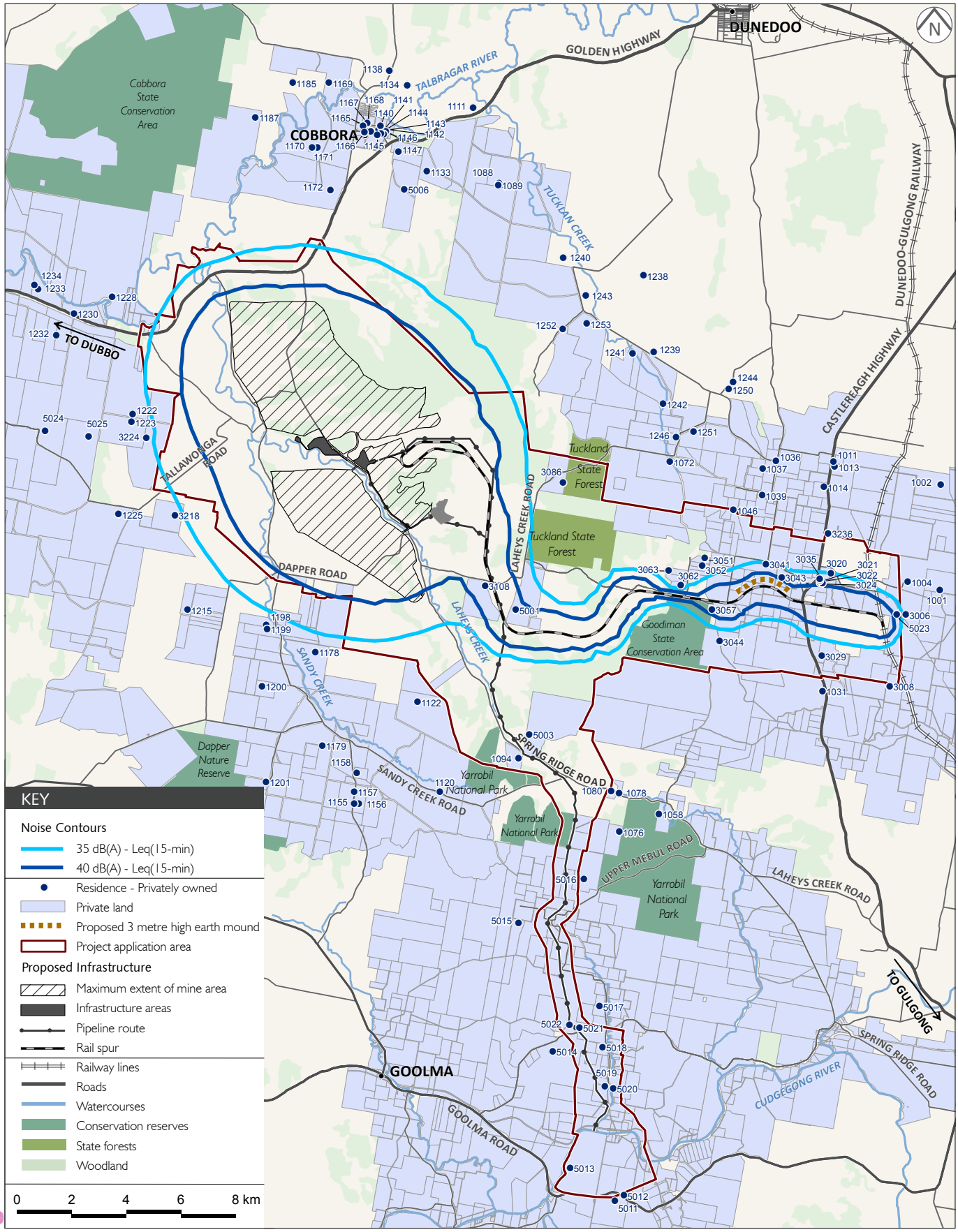
EMM

Cobbora Holding Company Pty Limited

Operational Noise for Maximum Impact Meteorological Conditions - Year 2

Cobbora Coal Project - Environmental Assessment

Figure 16.4



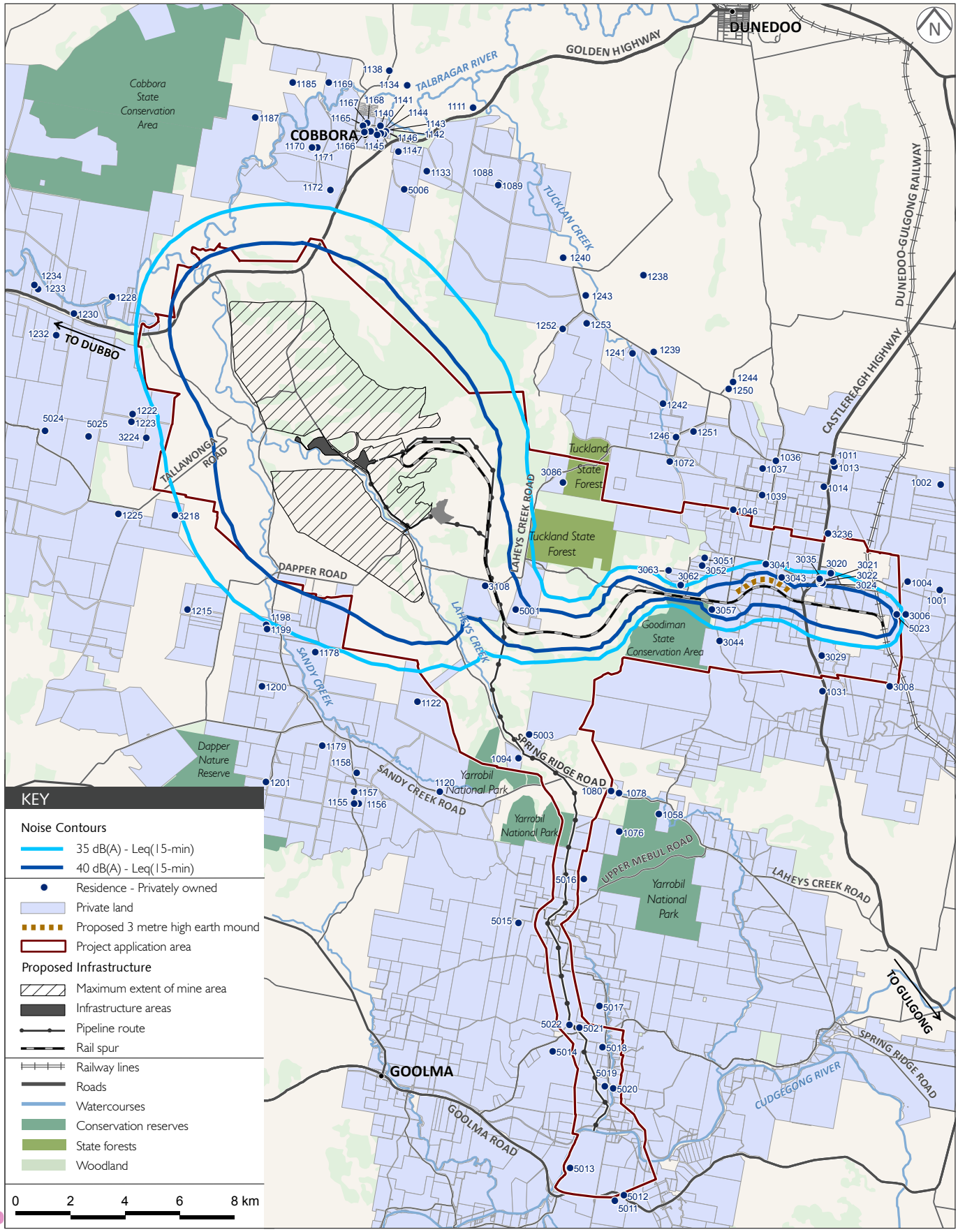
EMM

Cobbora Holding Company Pty Limited

Operational Noise for Maximum Impact Meteorological Conditions - Year 8

Cobbora Coal Project - Environmental Assessment

Figure 16.5



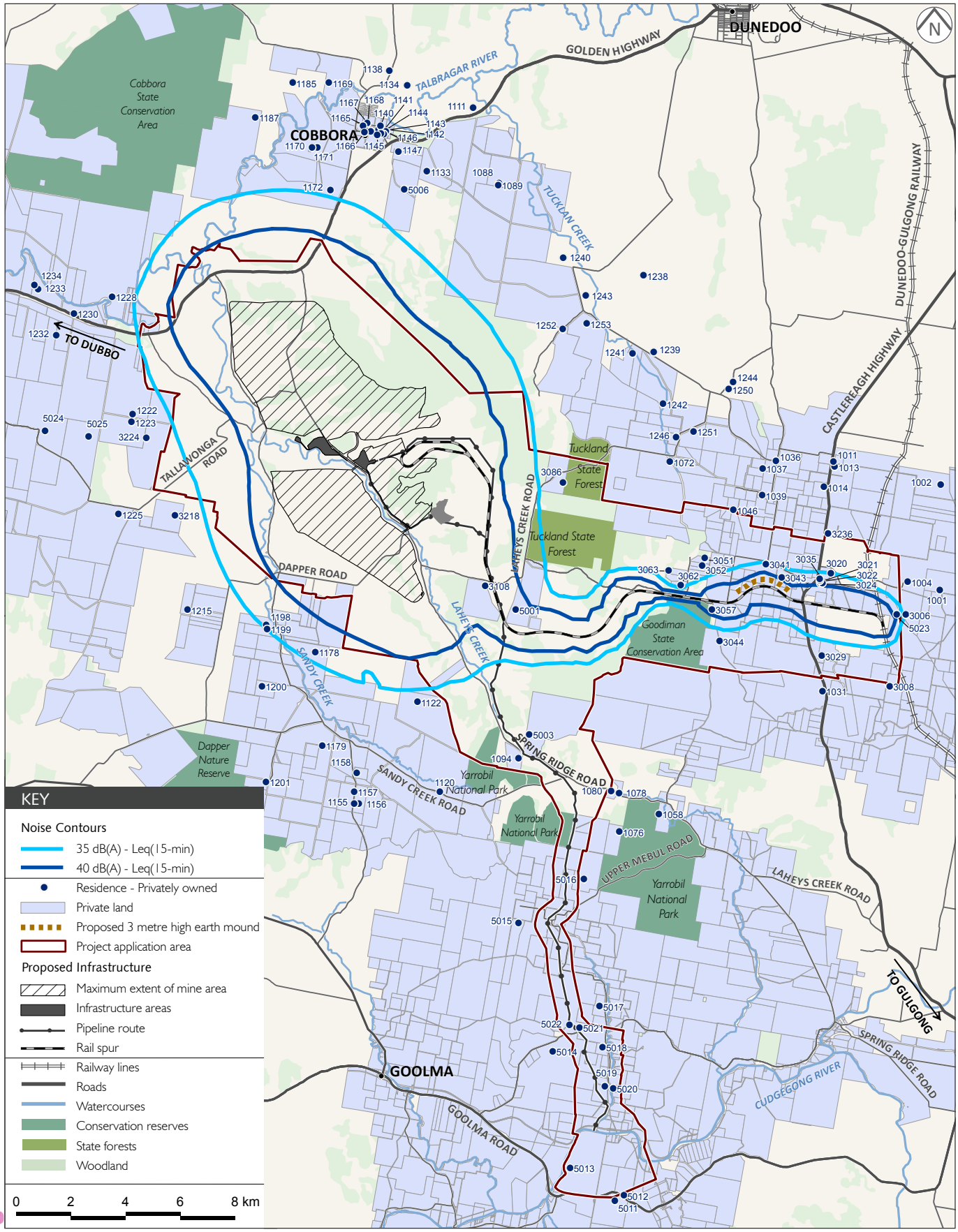
EMM

Cobbora Holding Company Pty Limited

Operational Noise for Maximum Impact Meteorological Conditions - Year 16

Cobbora Coal Project - Environmental Assessment

Figure 16.6



EMM

Cobbora Holding Company Pty Limited

Operational Noise for Maximum Impact
Meteorological Conditions - Year 20

Cobbora Coal Project - Environmental Assessment

Figure 16.7

The noise model for Year 20 was used to rank the noise sources above the PSNL. The results of the model identified that two of the 11 exceedences above the PSNL are directly attributable to mining extraction operations. The remaining nine exceedences were attributable to rail noise emissions along the rail spur. There will be three planned train movements per night (and a maximum of six). Table 16.10 provides a comparison of noise levels for extraction only (ie rail loadout, but no rail spur) against operational noise that includes extraction and rail spur noise. CHC will either acquire these properties or enter into amenity agreements acceptable to the landholders. If agreements cannot be reached, CHC is committed to implementing reasonable and feasible mitigation measures.

Table 16.10 Comparison Year 20 extraction only versus operational (including rail spur) at privately owned receptors during inversion - dB(A), $L_{eq(15\text{-}min)}$

Receptors	Extraction only	Rail spur and extraction
1178	36	36
3021	<30	39
3022	<30	39
3024	<30	39
3035	<30	37
3041	<30	36
3043	<30	39
5023	<30	38
3057	<30	43
3108	39	48
5001	35	44

i Vacant lands

Noise predictions identify that a total of seven land holders own 43 vacant land parcels that are above the acquisition criteria of 40 dB(A) on more than 25% of their land area. A summary of vacant lands in the affectation zone is provided in Table 16.11.

Table 16.11 Summary of privately owned vacant land in the noise affectation zone

Lot/DP number		
2/180421	26/750751	177/750751
5/249194	40/750751	178/750751
1/528668	41/750751	179/750751
2/528668	42/750751	185/750751
1/618310	47/750751	187/750751
1/726827	49/750751	200/750751
2/726827	62/750751	79/750767
13/750751	63/750751	51/754305
14/750751	66/750751	52/754305
15/750751	97/750751	86/754305
18/750751	100/750751	116/754305
22/750751	103/750751	1/754329

Table 16.11 Summary of privately owned vacant land in the noise affectation zone *(Cont'd)*

Lot/DP number		
23/750751	104/750751	2/1122475
24/750751	106/750751	
25/750751	175/750751	

ii Low frequency noise

The low frequency noise assessment used plant and equipment 'C' weighted sound power levels for the Year 20 scenario during maximum impact meteorological conditions. This scenario considers the highest noise emission footprint from the Project. Noise predictions for private residences where the low frequency modifying factor correction was found to apply, remain below the 35 dB(A) PSNL (ie the criterion will be met at all private residences). Furthermore noise level predictions at all private residences remain below the 60 dB(C) low frequency noise criteria.

16.5.2 Sleep disturbance

The L_{max} noise levels during maximum impact meteorological conditions are above the sleep disturbance screening criteria (45 dB(A) L_{max}) at the private residences presented in Table 16.12. In all cases, the noise will be from train movements on the rail spur. Hence, the frequency of events will be limited to the number of rail movements at night (ie up to six train movements during the night time assessment period). However, noise levels will remain below levels that are likely to wake sleeping occupants (ie internal noise levels of 50–55 dB(A) L_{max}).

Table 16.12 Maximum noise from intermittent sources at privately owned residences

Private residence ID	L_{max} criteria, dB(A)	Modelled L_{max} noise level, dB(A)
3021	45	48
3022	45	48
3024	45	47
3035	45	46
3041	45	48
3043	45	50
3062	45	54
5023	45	49

CHC is committed to mitigating potential sleep disturbance noise impacts with measures outlined in Section 16.4.

16.5.3 Construction noise

The results for private residences where noise emissions are predicted to be above the construction noise criteria are presented in Table 16.13.

Table 16.13 Noise levels from construction activities

Private residence ID	Daytime $L_{eq(15\text{-}min)}$ criteria, dB(A)	Modelled $L_{eq(15\text{-}min)}$ noise level, dB(A)	Ownership
1083	40	44	Private residence
1094	40	47	Private residence
3041	40	42	Private residence
3043	40	44	Private residence
5001	40	44	Private residence
5018	40	41	Private residence
5019	40	41	Private residence
5021	40	47	Private residence
5022	40	49	Private residence
5023	40	45	Private residence

Noise levels are predicted to be above the ICNG criteria at 10 privately owned residences which may occur on occasions during the construction period. Management and mitigation strategies provided in Section 16.4 will be implemented to minimise noise impacts at these residences and the surrounding community. For all other private residences, construction noise levels are predicted to comply with the ICNG criteria. The ICNG highly noise affected criteria of 75 dB(A) is predicted to be achieved at all private residences.

16.5.4 Road traffic

i Operations

The closest privately owned residence to a freeway/arterial/sub-arterial road used by Project traffic is 25 m from the Golden Highway, between Medway and Cobbora. The noise levels calculated at this private residence are presented in Table 16.4.

Table 16.14 Operational road traffic noise levels along the Golden Highway

Distance to nearest privately owned residence (m)	Assessment criteria	Existing calculated Golden Highway traffic noise	Calculated additional site traffic noise	Existing + the Project combined total
		Day $L_{eq(15\text{-}hour)}$, dB(A)		
25	60	68	52	68
		Night $L_{eq(9\text{-}hour)}$, dB(A)		
25	55	65	49	65

Note: Existing traffic volumes were obtained from the road transport assessment (Appendix K).

Existing traffic noise levels along the Golden Highway were calculated to be above the day and night criteria. The predicted traffic noise contribution from the Project is negligible in comparison and the total traffic noise level will remain unchanged (ie within 2 dB of the existing traffic noise levels) and will therefore satisfy the RNP criteria.

ii Construction

Construction traffic noise levels at private residences along the Golden Highway are presented in Table 16.15.

Table 16.15 Construction road traffic noise levels along the Golden Highway

Assumed distance to nearest privately owned residence (m)	Assessment criteria	Existing calculated Golden Highway traffic noise	Calculated additional site traffic noise	Existing + the Project combined total
		Day $L_{eq(15\text{-hour})}$, dB(A)		
25	60	68	57	68

Note: Existing traffic volumes were obtained from the road transport assessment (Appendix K).

The predicted construction traffic noise contribution along the Golden Highway will be negligible in comparison to existing noise levels and the total traffic noise level will be unchanged (ie remain within 2 dB of the existing traffic noise level) and will therefore satisfy the RNP criteria.

16.5.5 Off-site rail traffic

The predicted $L_{eq(15\text{-hour})}$, $L_{eq(9\text{-hour})}$ and L_{max} noise levels from existing train movements along the rail line and from train movements as a result of the Project have been assessed for the following sections:

- a comparison of existing movements and future contracted (2021) coal trains along the Dunedoo–Gulgong railway;
- an assessment of future cumulative impacts for the Bylong–Mangoola line; and
- an assessment of future cumulative impacts for the Bengalla–Muswellbrook line.

The numbers of train movements for each scenario are provided in Table 16.16.

Table 16.16 Potential additional Cobbora train movements

Period	Scenario		
	Maximum day movements	Maximum night movements	Planned movements
Day	8	4	7
Night	2	6	3
Total (24 hour)	10	10	10

The emission levels used for the off-site calculations were taken from an EMM measurement database and are considered representative of typical coal trains. The calculations adopted a typical sound exposure level (SEL) of 97 dB(A) at 40 m for coal train passbys, while the L_{max} calculation is based on a typical train noise emission of 82 dB(A) at 30 m from the train line.

16.5.6 Dunedoo–Gulgong

The Dunedoo–Gulgong railway currently has two train movements per week that have the potential to occur during one period. There is potential for between four to eight Cobbora trains to be loaded during the day assessment period (7.00 am to 10.00 pm) and between two to six Cobbora trains to be loaded during the night-time (10.00 pm to 7.00 am) assessment period.

i Noise increases relating to additional maximum train movements

The calculated $L_{eq(15\text{-hour})}$, $L_{eq(9\text{-hour})}$ and L_{max} noise levels from existing train movements and maximum CHC train movements are provided in Table 16.17. It is noted that currently the L_{max} noise level is above the IGANRIP for receptors within 20 m of the railway.

Table 16.17 Existing and potential noise increases relating to additional maximum train movements

Distance[1]	Existing train noise, dB(A)[2]			Cobbora train noise, dB(A)[3]			Total train noise, dB(A)[4]		
(m)	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}
15	57	59	88	63	64	88	64	65	88
20	56	58	86	62	63	86	63	64	86
25	55	57	84	61	62	84	62	63	84
40	53	55	80	59	60	80	60	61	80
50	52	54	78	58	59	78	59	60	78
80	50	52	74	56	57	74	57	58	74
100	49	51	72	55	56	72	56	57	72
140	47	49	69	53	54	69	54	55	69
IGANRIP or EPL3142 Trigger	**65**	**60**	**85**	**65**	**60**	**85**	**65**	**60**	**85**

Notes: *1. Assumed distance to nearest privately owned receptor.*

2. Based on two existing non-CHC train movements for all periods.

3. Based on a maximum of eight CHC train movements during the day and a maximum of six CHC train movements during the night.

3. Based on ten totaltrain movements during the day and eight total train movements during the night (ie existing trains + CHC trains).

The maximum train movement scenario for the Dunedoo–Gulgong line shows that:

- day criteria will be met for all noise receptors at distances 15 m (and greater) from the track;
- night L_{eq} criteria will be met for noise receptors 50 m (and greater) from the track; and
- L_{max} criteria will be met for noise receptors situated 25 m (and greater) from the railway.

ii Noise increases relating to additional planned train movements

The calculated $L_{eq(15\text{-hour})}$, $L_{eq(9\text{-hour})}$ and L_{max} noise levels from existing train movements and planned CHC train movements (seven during the day and three during the night) are provided in Table 16.18.

Table 16.18 Existing and potential noise increases relating to additional planned train movements

Distance[1] (m)	Existing train noise, dB(A)			Proposed Cobbora train noise, dB(A)			Total train noise, dB(A)		
	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}
15	57	59	88	62	61	88	63	63	88
20	56	58	86	61	60	86	62	62	86
25	55	57	84	60	59	84	61	61	84
40	53	55	80	58	57	80	59	59	80
50	52	54	78	57	56	78	58	58	78
80	50	52	74	55	54	74	56	56	74
100	49	51	72	54	53	72	55	55	72
140	47	49	69	53	51	69	53	53	69
IGANRIP or EPL3142 Trigger	**65**	**60**	**85**	**65**	**60**	**85**	**65**	**60**	**85**

Notes *1. Assumed distance to nearest privately owned receptor.*

2. Based on two existing non-CHC train movements for all periods.

3. Based on seven CHC train movements during the day and three CHC train movements during the night.

4. Based on nine total train movements during the day and five total train movements during the night (ie existing trains + CHC trains).

The planned train movement scenario for the Dunedoo–Gulgong line shows that:

- day criteria will be met for all noise receptors at distances 10 m (and greater) from the track;
- night L_{eq} criteria will be met for noise receptors 30 m (and greater) from the track; and
- L_{max} criteria will be met for noise receptors situated 25 m (and greater) from the railway.

16.5.7 Bylong–Mangoola

The latest available train movement data for the Bylong–Mangoola rail line was used to calculate future train movements for CHC and non-CHC trains (Table 16.19).

Table 16.19 Predicted future line coal train movements per day in 2021, Bylong–Mangoola

Line section	Cobbora train movements per day	Coal train movements per day for contracted volume (excluding CHC)
Bylong–Mangoola	10	29

i Noise increases related to additional maximum train movements

The calculated $L_{eq(15\text{-hour})}$, $L_{eq(9\text{-hour})}$ and L_{max} noise levels from proposed maximum CHC train movements along the Bylong–Mangoola line are compared to predicted future train movements for the line based on the projected contracted volumes for 2021 in Table 16.20. It is noted that currently the L_{max} noise level is above the IGANRIP for receptors within 20 m of the railway.

Table 16.20 Existing and potential noise increases relating to additional maximum train movements

Distance[1]	Contracted train noise, dB(A)[2]			Cobbora train noise, dB(A)[3]			Total train noise, dB(A)[4]		
(m)	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}
15	66	66	88	63	64	88	68	68	88
20	65	65	86	62	63	86	67	67	86
25	64	64	84	61	62	84	66	66	84
40	62	62	80	59	60	80	64	64	80
50	61	61	78	58	59	78	63	63	78
80	59	59	74	56	57	74	61	61	74
100	58	58	72	55	56	72	60	60	72
140	57	57	69	53	54	69	58	59	69
IGANRIP or EPL3142 Trigger	**65**	**60**	**85**	**65**	**60**	**85**	**65**	**60**	**85**

Notes *1. Assumed distance to nearest privately owned receptor.*

2. Based on 2021 data for 18 non-CHC contracted train movements during the day and 11 non-CHC contracted train movements during the night.

3. Based on hypothetical eight maximum CHC train movements during the day and six maximum CHC train movements during the night.

4. Based on 26 total train movements during the day and 17 total train movements during the night (ie contracted trains + CHC trains).

The maximum train movement scenario for the Bylong–Mangoola line shows that:

- day criteria will be met for all noise receptors at distances 30 m (and greater) from the track;
- night L_{eq} criteria will be met for noise receptors 100 m (and greater) from the track; and
- L_{max} criteria will be met for noise receptors situated 25 m (and greater) from the railway.

ii Noise increases relating to additional planned train movements

The calculated $L_{eq(15\text{-hour})}$, $L_{eq(9\text{-hour})}$ and L_{max} noise levels from the planned CHC train movements along the Bylong–Mangoola line compared to predicted future CHC train movements for the line based on the projected non-CHC contracted volumes for 2021 are provided in Table 16.21. It is noted that currently the L_{max} noise level is above the IGANRIP for receptors within 20 m of the railway.

Table 16.21 Existing and potential noise increases relating to additional planned train movements

Distance[1]	Contracted train noise, dB(A)[2]			Proposed Cobbora train noise, dB(A)			Total train noise, dB(A)		
(m)	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}
15	66	66	88	62	61	88	67	67	88
20	65	65	86	61	60	86	66	66	86
25	64	64	84	60	59	84	65	65	84
40	62	62	80	58	57	80	63	63	80
50	61	61	78	57	56	78	62	62	78
80	59	59	74	55	54	74	60	60	74
100	58	58	72	54	53	72	59	59	72
140	57	57	69	53	51	69	58	58	69
IGANRIP or EPL3142 Trigger	**65**	**60**	**85**	**65**	**60**	**85**	**65**	**60**	**85**

Notes *1. Assumed distance to nearest privately owned receptor.*

2. Based on 2021 data for 18 non-CHC contracted train movements during the day and 11 non-CHC contracted train movements during the night.

3. Based on seven CHC train movements during the day and three CHC train movements during the night.

4. Based on 25 total train movements during the day and 14 total train movements during the night (ie contracted trains + CHC trains).

The planned train movement scenario for the Bylong–Mangoola line shows that:

- day criteria will be met for all noise receptors at distances 25 m (and greater) from the track;
- night L_{eq} criteria will be met for noise receptors 80 m (and greater) from the track; and
- L_{max} criteria will be met for noise receptors situated 25 m (and greater) from the railway.

16.5.8 Bengalla–Muswellbrook

The latest available train movement data for the Bengalla–Muswellbrook line from the (ARTC 2012) was used to calculate future train movements for CHC and non-CHC trains (Table 16.22).

As for the Bylong–Mangoola line, the daily coal train movements along the Bengalla–Muswellbrook section were calculated (Table 16.22) based on the line operating 365 days per year while they actually operate 319 days year.

Table 16.22 Predicted Future Line Coal Train Movements Per Day in 2021, Bengalla–Muswellbrook

Line section	Cobbora train movements per day	Coal train movements per day for contracted volume (excluding CHC)
Bengalla–Muswellbrook	10	47

i Noise increases related to additional maximum train movements

The calculated $L_{eq(15\text{-hour})}$, $L_{eq(9\text{-hour})}$ and L_{max} noise levels from the maximum CHC train movements along the Bengalla–Muswellbrook line are compared to predicted future train movements for the line based on the projected contracted volumes for 2021 are provided in Table 16.23. It is noted that currently the L_{max} noise level is above the IGANRIP for receptors within 20 m of the railway.

Table 16.23 Existing and potential noise increases relating to additional maximum train movements

Distance[1]	Contracted train noise, dB(A)[2]			Cobbora train noise, dB(A)[3]			Total train noise, dB(A)[4]		
(m)	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}
15	68	68	88	63	64	88	69	69	88
20	67	67	86	62	63	86	68	68	86
25	66	66	84	61	62	84	67	67	84
40	64	64	80	59	60	80	65	65	80
50	63	63	78	58	59	78	64	64	78
80	61	61	74	56	57	74	62	62	74
100	60	60	72	55	56	72	61	61	72
140	59	59	69	53	54	69	60	60	69
IGANRIP or EPL3142 Trigger	**65**	**60**	**85**	**65**	**60**	**85**	**65**	**60**	**85**

Notes *1. Assumed distance to nearest privately owned receptor.*

2. Based on 2021 data for 29 contracted non-CHC train movements during the day and 18 contracted non-CHC train movements during the night.

3. Based on hypothetical eight maximum CHC train movements during the day and six maximum CHC train movements during the night.

4. Based on 37 total train movements during the day and 24 total train movements during the night (ie contracted trains + CHC trains).

The the maximum train movement scenario for the Bengalla–Muswellbrook line shows that:

- day criteria will be met for all noise receptors at distances 40 m (and greater) from the track;
- night L_{eq} criteria will be met for noise receptors 140 m (and greater) from the track; and
- L_{max} criteria will be met for noise receptors situated 25 m (and greater) from the railway.

ii Noise increases relating to additional planned train movements

The calculated $L_{eq(15\text{-hour})}$, $L_{eq(9\text{-hour})}$ and L_{max} noise levels from the planned CHC train movements along the Bengalla–Muswellbrook line are compared to predicted future train movements for the line based on the projected contracted volumes for 2021 in Table 16.24. It is noted that currently the L_{max} noise level is above the IGANRIP for receptors within 20 m of the railway.

Table 16.24 Existing and potential noise increases relating to additional planned train movements

Distance[1]	Contracted train noise, dB(A)[2]			Proposed Cobbora train noise, dB(A)			Total train noise, dB(A)		
(m)	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}	Day, $L_{eq(15\text{-hour})}$	Night, $L_{eq(9\text{-hour})}$	L_{max}
15	68	68	88	62	61	88	69	69	88
20	67	67	86	61	60	86	68	68	86
25	66	66	84	60	59	84	67	67	84
40	64	64	80	58	57	80	65	65	80
50	63	63	78	57	56	78	64	64	78
80	61	61	74	55	54	74	62	62	74
100	60	60	72	54	53	72	61	61	72
140	59	59	69	53	51	69	60	60	69
IGANRIP or EPL3142 Trigger	**65**	**60**	**85**	**65**	**60**	**85**	**65**	**60**	**85**

Notes *1. Assumed distance to nearest privately owned receptor.*

2. Based on 2021 data for 18 contracted train movements during the day and 11 contracted train movements during the night.

3. Based on seven train movements during the day and three train movements during the night.

4. Based on 25 total train movements during the day and 14 total train movements during the night (ie contracted trains + CHC trains).

The planned train movement scenario for the Bengalla–Muswellbrook line shows that:

- day criteria will be met for all noise receptors at distances 40 m (and greater) from the track;
- night L_{eq} criteria will be met for noise receptors 140 m (and greater) from the track; and
- L_{max} criteria will be met for noise receptors situated 25 m (and greater) from the railway.

16.5.9 Blasting

i Private residences

The maximum instantaneous charge (MIC) for blasts will range from 1,500 kg to 3,500 kg. The minimum distance from blasts to privately owned residences that will be required to meet criteria for overpressure and vibration criteria are summarised in Table 16.25.

Table 16.25 Predicted blast overpressure and vibration levels at privately owned residences

MIC (kg)	Overpressure (dB(L)peak)	Vibration PPV (mm/s)	Required minimum distance from blast to privately owned residences (m)
Criteria	115	5	-
1,500	115	2	1,250
3,500	115	2	1,650

It is predicted that a blast with an MIC of up to 1,500 kg that is 1,250 m from a private residence will comply with ANZECC criteria. Similarly, it is predicted that a blast with a MIC of up to 3,500 kg that is 1,650 m from the nearest private residence will comply with these criteria. As there is one privately owned residence within 1,650 m of the mining area (Residence 3177), the lower MIC of 1,500 kg will be adopted when blasting is required within 1,650 m of it. Alternatively, the MIC blast patterns will be designed specifically to meet the relevant ANZECC guidelines at this private residence.

ii Heritage receptors

The minimum distance from blasts to heritage receptors that will be required to meet the structural vibration criteria are summarised in Table 16.26.

Table 16.26 Predicted blast vibration levels for heritage receptors

MIC (kg) range	Heritage assessment criteria (mm/s)	Derived vibration PPV (mm/s)	Required minimum distance from blast to heritage receptors (m)
1,500	10	9.9	450
3,500	10	9.6	700

Blast vibration levels are predicted to satisfy the heritage vibration criteria at all heritage receptors at a distance of greater than 450 m when using an MIC of 1,500 kg and greater than 700 m when using an MIC of 3,500 kg. There are three heritage receptors, including, Laheys Creek cemetery, the Potential Cobb and Co stopping place and Brick clamp (see Chapter 19 'Historic heritage'), within the 700 m minimum distance for blasts with an MIC of 3,500 kg. Of these receptors, only Laheys Creek cemetery contains structures or items (ie grave stones) that are sensitive to blast vibration. Where blasting occurs within 700 m of the cemetery, MIC blast patterns will be designed specifically to meet vibration criteria for heritage structures.

16.5.10 Livestock

There is little literature or evidence of the impacts of noise from blasting on livestock. Where blasting is within 1 km (arbitrary) of known commercial livestock properties, notification will be provided to such livestock operators before blasting and where to relocate livestock before blasting begins.

16.5.11 Noise outcomes

Noise emissions from operations will remain below EPA noise criteria, with the exception of eight private residences which are predicted to experience noise levels above the operational criteria of 35 dB(A) and three private residences are predicted to experience noise levels above the acquisition criteria of 40 dB(A). Two of the 11 exceedences of the PSNL are directly attributable to mining extraction operations, nine exceedences are attributable to the rail spur with six maximum and three planned train movements per night. CHC intends to acquire these properties or to enter into amenity agreements with the property owners. Reasonable and feasible mitigation measures will be implemented if agreements cannot be reached.

The vacant land assessment has identified that seven private land holders own 43 of the vacant land parcels that fall into the acquisition criteria over the life of the Project. CHC has entered into discussions with the seven owners with a view to acquisition.

Train movements on the main railway from Cobbora spur to Ulan will meet the daytime L_{eq} criterion at all receptors. Similarly, the night-time L_{eq} criterion will be met at most receptors with the exception of six that are situated within 30 m of the railway. The L_{max} criterion will be met at nearly all receptors with the exception of two that are within 25 m of the railway. Noise mitigation strategies have been identified for these receptors.

For the Bylong–Mangoola line, the daytime L_{eq} criterion will be met at receptors 25 m (and greater) from the track. The night-time L_{eq} criterion will be met at receptors 80 m (and greater) from the track and L_{max} criterion will be met at all receptors situated 25 m (and greater) from the railway.

For the Bengalla–Muswellbrook line, the daytime L_{eq} criterion will be met at all receptors at distances 40 m (and greater) from the track. The night-time L_{eq} criterion will be met at receptors 140 m (and greater) from the track and the L_{max} criterion will be met at noise receptors situated 25 m (and greater) from the railway.

Following implementation of the noise and vibration mitigation and management measures prescribed in the EA, the Project is not expected to significantly affect surrounding private residences and heritage receptors.

A detailed noise and vibration management plan will be prepared for construction and operation stages of the Project. It will describe all management measures to minimise noise and vibration. This plan will include adaptive management measures with real-time noise and meteorological monitoring.

16.6 Monitoring

16.6.1 Operations

A noise and vibration management plan (NVMP) will specify protocols for routine, regular attended and unattended noise monitoring of the Project, including permanent real-time noise monitoring at selective areas surrounding the site. Proactive and predictive modelling and management, and protocols for managing noise during adverse meteorological conditions will be described.

16.6.2 Construction

A construction noise and vibration management plan (CNVMP) will detail requirements for regular noise and vibration compliance monitoring and reporting.