BARALABA SOUTH

Baralaba South Project

Environmental Impact Statement

CHAPTER 12

Noise and Vibration

arc ENVIRONMENTAL SOLUTIONS

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12 Noise and Vibration

This chapter describes the assessment of potential noise, vibration and blasting impacts on the existing acoustic values with specific regard to receptors and infrastructure surrounding the Project.

Noise and vibration impact assessments were conducted for the Project by AARC and Simpson Engineering Group (SEG) and are presented as Appendix N, Noise and Vibration Impact Assessment, and Appendix O, Noise Assessment of Product Coal Road Haulage.

12.1 Environmental objectives and performance outcomes

This chapter has been prepared to assist DES in carrying out the environmental objective assessment in respect of the following environmental objective prescribed in Schedule 8, Part 3, Division 1 of the EP Regulation:

- The [Project] will be operated in a way that protects the environmental values of the acoustic environment.

The detailed assessment presented in this chapter and in the Noise and Vibration Impact Assessment (Appendix N) demonstrate that the Project will achieve performance outcomes for the environmental objective, outlined above, in satisfaction of Schedule 8, Part 3, Division 1 of the EP Regulation. Specifically, and in accordance with Schedule 8, Part 2, section 2, the Project will achieve Item 2 of the Noise performance outcomes because the Project will be operated in a way that ensures that:

> *The release of sound to the environment from the [Project is] managed so that adverse effects on environmental values, including health and wellbeing and sensitive ecosystems, are prevented or minimised.*

12.1.1. Noise assessment terminology

Schedule 2 of the Environmental Protection (Noise) Policy 2019 (Qld) (EPP [Noise]) provides a dictionary of terms relating to acoustics. For a full glossary of terms used in this chapter, refer to Appendix N, Noise and Vibration Impact Assessment Glossary of Terms. An overview of terms essential to the technical interpretation of noise in this chapter is provided below, including the indicators used to measure, model and assess the impacts of noise.

dB(A) means decibels measured on the 'A' frequency weighting network, a weighting that simulates the response of the human ear, which is more sensitive to mid to high frequency sounds and relatively less sensitive to low frequency sounds. It may also be expressed as dBA without the bracketed A. This is the measurement unit in which noise levels are typically expressed.

dB(Z) means the noise level with a zero frequency weighting applied to it over the frequency range of 10 Hz to 20 kHz. It is effectively the same as the dB, dB(L) or dB(Lin) weighted level for the assessment of mine noise.

$L_{Aeq,adj,T}$ means an A-weighted sound pressure level of a continuous steady sound, adjusted for tonal character, that within a measurement period of duration 'T' has the same mean square sound pressure of a sound that varies with time. The monitored L_{Aeq} noise levels include all sources of noise within the local environment. The predicted L_{Aeq} noise levels only include the calculated mining noise contribution.

$L_{Aeq,adj,15min}$ means an A-weighted sound pressure level of a continuous steady sound, adjusted for tonal character over a measurement period of 15 minutes.

dB(Lin Peak) means the peak noise level in linear (un-weighted) decibels (dB). This terms is used to quantify airblast levels from mine blasting.

Daytime means the period after 7 am on a day to 6 pm on the day.

Evening means the period after 6 pm on a day to 10 pm on the day.

Night-time means the period after 10 pm on a day to 7 am on the next day.

12.1.2. Acoustic quality objectives

In Queensland, environmental noise is regulated in accordance with the EPP (Noise) which is subordinate legislation under the EP Act. This policy identifies environmental values to be enhanced or protected, states acoustic quality objectives, and provides a framework for making decisions about the acoustic environment. A number of other relevant Queensland guidelines support this framework.

12.1.2.1 EPP (Noise)

The EPP (Noise) contains a range of acoustic quality objectives for a range of receptors. The objectives are in the form of noise levels, and are defined for various periods of the day, and use a number of acoustic parameters.

Schedule 1 of the EPP (Noise) includes the following acoustic quality objectives to be met at residential dwellings:

- Outdoors
  - Daytime and Evening: 50 dB(A) $L_{Aeq,adj,1hr}$, 55 dB(A) $L_{A10,adj,1hr}$ and 65 dB(A) $L_{A1,adj,1hr}$
- Indoors
  - Daytime and Evening: 35 dB(A) $L_{Aeq,adj,1hr}$, 40 dB(A) $L_{A10,adj,1hr}$ and 45 dB(A) $L_{A1,adj,1hr}$
  - Night: 30 dB(A) $L_{Aeq,adj,1hr}$, 35 dB(A) $L_{A10,adj,1hr}$ and 40 dB(A) $L_{A1,adj,1hr}$

It is preferable not to apply noise criteria at a sensitive receptor based on indoor noise limits, and hence, equivalent outdoor noise limits can be determined based on the typical noise reduction from noise outside a residence to inside a residence.

The EPP (Noise) already includes limits for outdoors, as shown above, but compliance with those outdoor limits will not necessarily result in compliance with the indoor noise limits, as they assume a noise difference of 15 to 20 dB(A) which is generally not achieved with open windows at a residence.

Noise reductions for the façade of a timber dwelling with open windows are typically reported as 5 to 10 dB(A). The DES 'Noise and vibration—EIS information guideline 2022' recommends to *"use an outdoor to indoor attenuation value of 7dB, which is appropriate for typical Queensland buildings with open windows".* Therefore, the above indoor noise limits can be recalculated as outdoor noise limits as per Table 12.1.

Table 12.1: Calculated outdoor acoustic quality objectives for residences

Sensitive receptor	**Time of day**	**Acoustic quality objectives (measured at the receptor) dB(A)**		
		$L_{Aeq,adj,1hour}$	**$L_{A10,adj,1hour}$**	**$L_{A1,adj,1hour}$**
Residences (outdoors)	Daytime and evening	42	47	52
	Night-time	37	42	47

12.1.2.2 Background creep

The current version of the EPP (Noise) does not contain criteria for background creep but outlines that background creep should be prevented or minimised to the extent that is reasonable to do so. In accordance with the 'Noise measurement manual' background creep has been considered in relation to cumulative impacts.

12.1.2.3 Low frequency noise

The Project will generate low frequency noise. A noise limit for low frequency noise accounts for occurrences of low frequency noise in quiet environments, where high frequencies of noise are reduced and are therefore unable to mask low frequency noise, resulting in an unbalanced frequency spectrum.

A low frequency noise limit is typically not a critical noise limit for this type of project.

12.1.2.4 Operational noise criteria

Mobile equipment and fixed plant used for the mining activity will generate operational noise. It is proposed to adopt a mix of the noise limits conditioned for Baralaba North in Table 12 of Appendix N, Noise and Vibration Impact Assessment, and the EPP (Noise) derived limits in Table 12.1, with the exceptions that:

- the night-time limit is reduced from 37 dB(A) $L_{Aeq,adj,T}$ down to 35 dB(A) $L_{Aeq,adj,T}$ as per the Baralaba North EA;
- the day and evening limit is reduced from 42 dB(A) $L_{Aeq,adj,T}$ down to 40 dB(A) $L_{Aeq,adj,T}$ as per the Baralaba North EA; and
- the measurement period 'T' is reduced from 1 hour to 15 minutes.

These changes are to make the criteria more consistent with noise criteria adopted at other mine sites and determined in recent legal case decisions.

Table 12.2 summarises the adopted noise criteria for the Project.

Table 12.2: Noise limits adopted for the Project

Noise level dB(A) measured as:	All days		
	Day (7am to 6pm)	Evening (6pm to 10pm)	Night (10pm to 7am)
Sensitive Place			
$L_{Aeq,adj,15min}$	40	40	35
$L_{A1,adj,15min}$	52	52	47
Commercial Place			
$L_{Aeq,adj,15min}$	47	47	42

In addition to the limits in Table 12.2, the low frequency objective adopted for the Project is 55 dB(Z) and a difference of greater than 15 dB between the higher Z-weighted overall noise level and the A-weighted overall noise level.

12.1.2.5 Blasting

There are two types of acoustic impact associated with blasting, including airblast overpressure and ground vibration. Airblast overpressure is the measurable effect of a blast of air pressure, including the energy generated that is below the level of human hearing and is reported in linear decibels (dB(Lin Peak)). Ground vibration is the measurable movement of the ground surface caused by a blast and is measured in mm/s.

The guidelines 'Model Mining Conditions' (DES, 2017) and 'Noise and Vibration from Blasting' (DEHP, 2016c) provide acoustic criteria relating to noise and vibration from mine blasting.

The ground vibration and airblast overpressure associated with blasting may have impacts on nearby receptors. AARC (refer Appendix N, Noise and Vibration Impact Assessment) recommended a set of safe vibration limits which have been adopted for the Project.

The ground vibrations and airblast overpressure associated with blasting may have impacts on nearby Benleith Water Scheme infrastructure, including buried pipelines and two storage tanks on Mount Ramsay. Richard and Moore (2008) recommended a set of safe vibration limits which have been adopted for the assessment of impacts to this infrastructure. The Australian Standard on the use of explosives (AS2187.2-2006) provides guideline values for unreinforced or lightweight infrastructure which have also been adopted for the Project.

The airblast overpressure and ground vibration criteria adopted for the Project are detailed in Table 12.3.

Table 12.3: Airblast overpressure and ground vibration limits adopted for the Project

Blasting noise and vibration limits	**Sensitive place and commercial place criteria**	
	Monday to Friday 7 am to 6 pm; **Saturday, Sunday and Public Holidays 9 am to 6 pm**	**Other times**
Airblast overpressure	115 dB (Linear peak) for 9 out of 10 consecutive blasts and not greater than 120 dB (Linear peak) at any time	No blasting
Ground vibration	5 mm/second peak particle velocity for 9 out of 10 consecutive blasts and not greater than 10 mm/second peak particle velocity at any time	No blasting

12.1.2.6 Quarry route

Queensland DTMR is responsible for setting noise limits from road traffic on public roads in Queensland. Currently, there are no noise level goals for assessing noise from a traffic producing development; however, DTMR outlines guidelines for noise levels along existing roads. A review of potentially applicable road traffic noise goals is provided in Appendix O, Noise Assessment of Product Coal Road Haulage (SEG, 2023).

The DTMR 'Traffic Noise Management Code of Practice', Transport and Main Roads November (2013) outlines that a change in noise level less than 3 dB change in loudness is difficult for most people to detect. The Project's primary noise level goal is not to exceed a 3 dB change in traffic noise levels.

Under circumstances where changes to noise traffic levels exceeds 3 dB, or there is a high percentage of heavy vehicles (greater than 20%) at night, the New South Wales Environmental Protection Agency's day and night goals at dwellings will be adopted. Acoustic quality objectives for the haul route are as follows: 55 dB(A) $L_{Aeq,adj,1hr}$ during the day and 50 dB(A) $L_{Aeq,adj,1hr}$ during the night.

12.2 Existing environment

12.2.1. Local topography and climate

Climate and local topography can influence noise levels experienced in the surrounding environment. The closest weather station with continuous monitoring of wind is the Baralaba Mine weather station. Meteorological data from the Baralaba Mine weather station for the period 1 January 2015 to 31 December 2015 has been analysed by Trinity (Appendix L, Air Quality and Greenhouse Gas Assessment). A windrose of wind monitoring data shows a higher proportion of calm conditions and winds from the south-south-east (refer Figure 12.1). Local climate parameters are further described in section 2.3 in Chapter 2, Project Description.

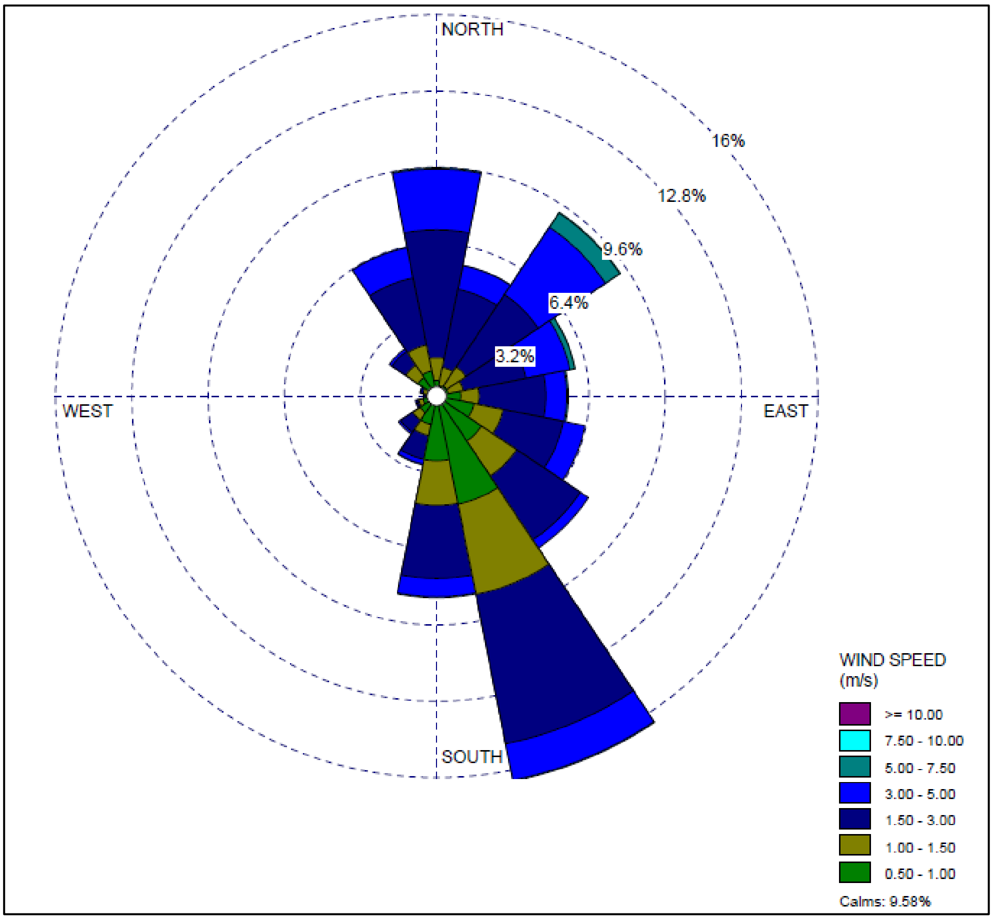

Figure 12.1: Windrose: Baralaba Mine weather station data

Atmospheric stability can also affect noise dispersion and is used as an input for noise impact modelling. Six classes of atmospheric stability are commonly identified using the Pasquill-Turner Scheme as follows:

- Class A: Extremely unstable conditions, clear skies, warmer temperatures;
- Class B: Moderately unstable conditions, clear skies, daytime temperatures;
- Class C: Slightly unstable conditions, moderate winds, slightly overcast and daytime temperatures;
- Class D: Neutral conditions, cloudy overcast, moderate winds during either day or night-time;
- Class E: Slightly stable conditions, overcast skies and night-time cooler temperatures; and
- Class F: Moderately stable conditions, clear skies, very cold night temperatures.

Daytime conditions range from neutral to unstable as a result of solar heating of the ground inducing atmospheric mixing, and night-time conditions at the Project are predominantly stable but range from stable to neutral (Figure 12.2).

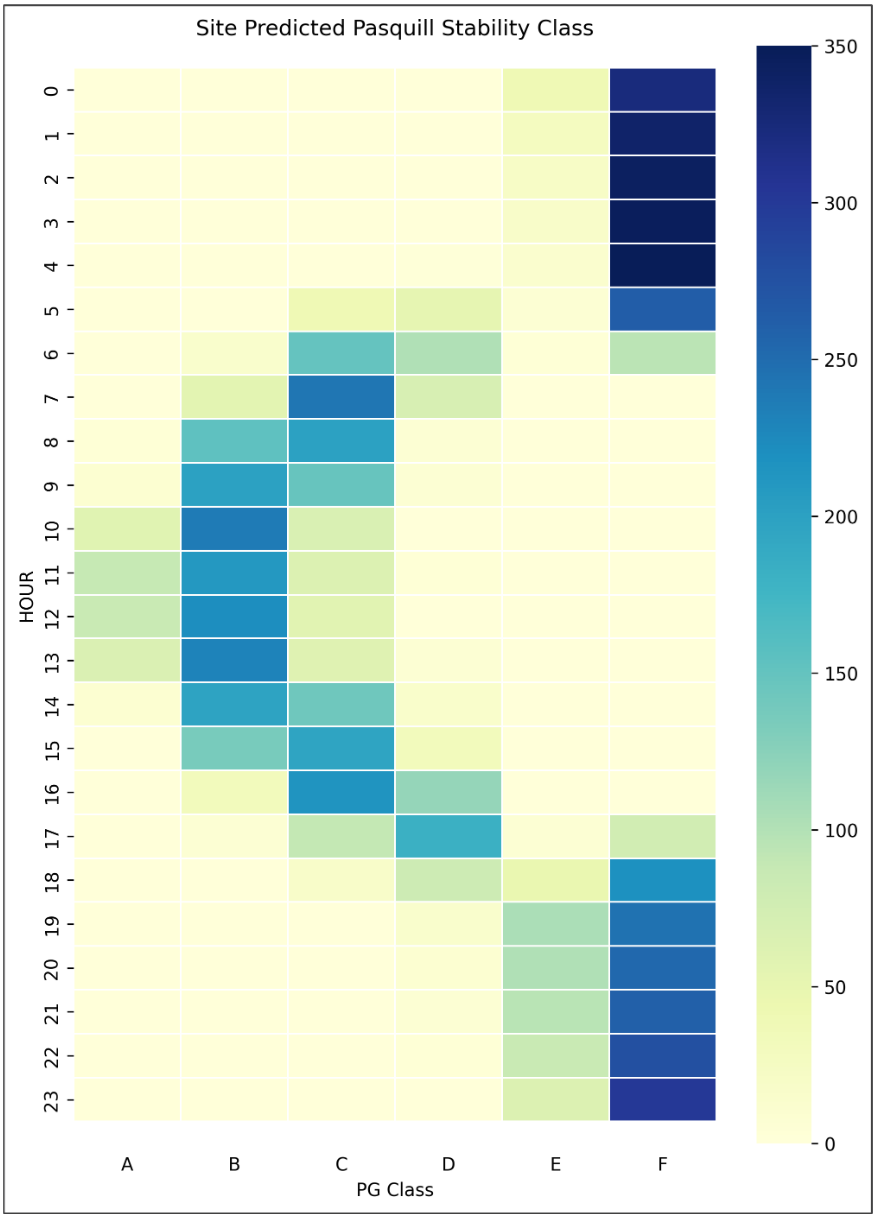

Figure 12.2: *Stacked proportions of stability classes by time of day*

Local to the Project, there are two distinct topographical profiles present including the lower Dawson River floodplain to the west of the Project and the higher landform to the east of the site approaching Mount Ramsay (Figure 12.3). Ground elevations across the site range between 75 mAHD and 110 mAHD, with the Project best described as predominantly flat with only slight undulations. At approximately 430 mAHD, Mount Ramsay, located approximately 1.2 km to the east of the MLA boundary, is a key topographical feature in the region and influences wind speed and direction in the immediate area. Winds flow around Mount Ramsay and wind speeds are generally lower immediately upwind compared to downwind where wind speeds are generally higher.

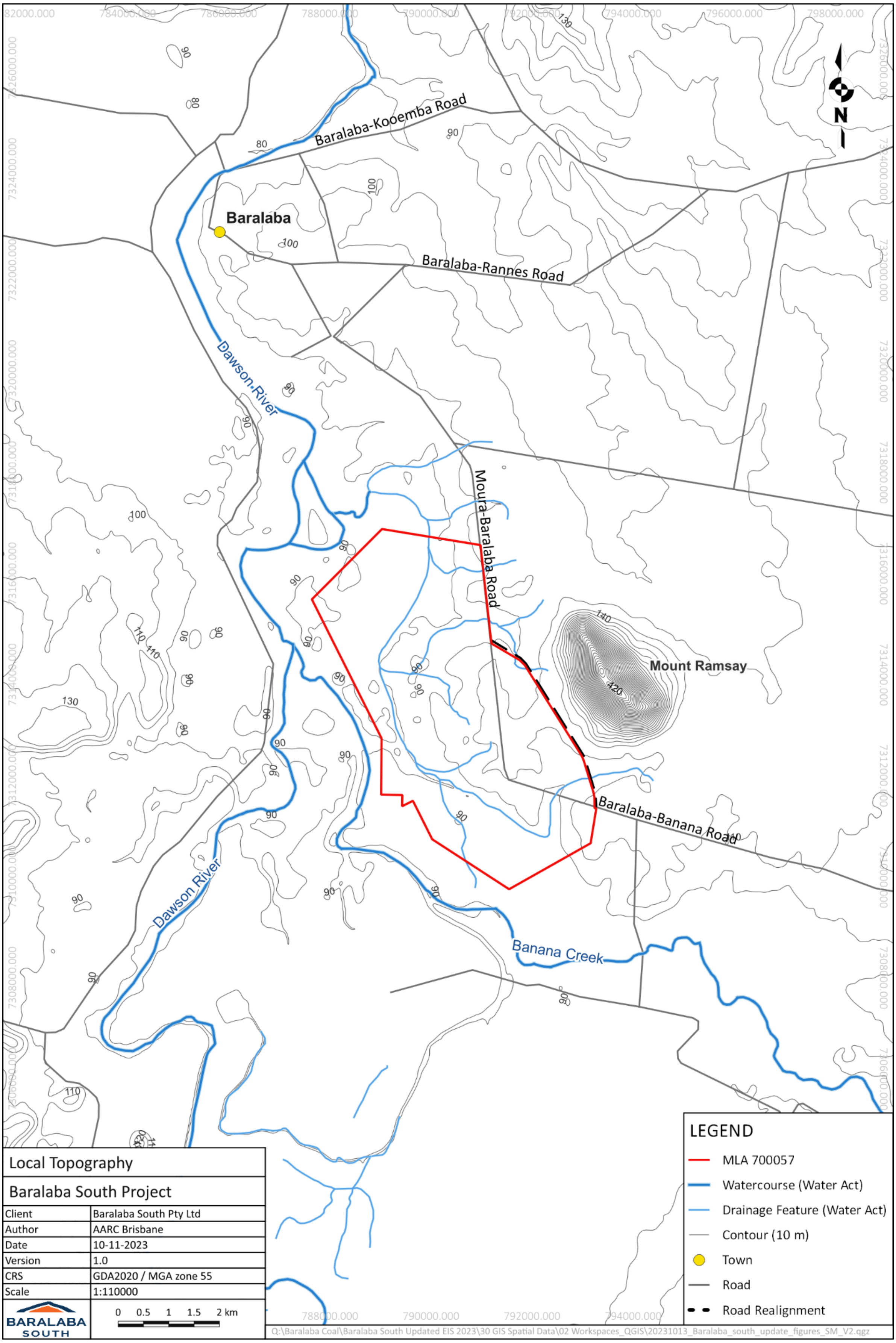

Figure 12.3: *Local topography*

12.2.2. Mining lease area

12.2.2.1 Sensitive receptors

A total of 21 receptors have been identified within a 7 km radius of the Project MLA and are presented in Table 12.4 and Figure 12.4. The receptors are the nearest to the Project in their respective directions and have the potential to be impacted by the Project. Compliance at these receptors will result in compliance at other receptors located further from the Project.

Four receptors (1, 2, 3 and 14) are located within the mining lease boundary and are therefore not considered sensitive receptors. Of these, two receptors (1 and 2) are currently owned by Wonbindi Coal, a parent company of Baralaba Coal Company, and two receptors (3 and 14) are owned by a private landholder. The proponent must agree compensation and reach agreement with receptors within the MLA before it can be granted. Where appropriate and where agreed to by the landholders, such agreements will involve the relocation of the receptors to avoid impacts.

The next nearest receptor outside the mining lease is Receptor 9 located to the north at approximately 0.9 km from the proposed mining activity. Receptor 9 is located on a parcel of land that underlies the MLA and will require a compensation agreement. It is considered part of the Mount Ramsay/McLaughlins agreement that will be required to address Receptors 3 and 14, which are located within the MLA. Regardless, Receptor 9 is considered as a sensitive receptor for noise assessment purposes.

12.2.2.2 Background noise

A baseline noise monitoring study was presented by ASK Consulting Engineers in 2021 (Trinity Consultants Pty Ltd) and the results have been included in Appendix N, Noise and Vibration Impact Assessment to determine the existing background noise levels within the vicinity of the Project.

Existing sources of noise were measured and observed in conjunction with attended noise monitoring on 11 and 12 July 2018, and unattended monitoring of daily noise levels over the period of 11 to 24 July 2018. Monitoring was conducted with field and laboratory calibrated Norsonic 140 and Larson Davis LD831 Type 1 sound level meters. Noise measurements were undertaken over 15-minute periods.

The existing background noise environment surrounding the Project was characterised by quiet ambient noise levels predominately influenced by natural sources (e.g. birds, wind in trees), farm-related sources (e.g. farm machinery, livestock, dogs) and community-related noise (e.g. passing traffic).

The existing background noise levels in the vicinity of the Project were measured using noise loggers deployed at locations near Receptors 20 (Location A), 3 (Location B) and 9 (Location C). Representative rating background noise levels were calculated using the lowest tenth percentile method in accordance with the DES guideline on 'Planning for Noise Control' (DES, 2022) and are presented in Table 12.5.

Overall, the measurement results indicate the areas are very quiet, as is typical of a rural environment. The noise monitoring was conducted in winter (July) when insect noise levels are relatively low. During warmer months, the noise from insects will be louder. Background noise levels can also increase when wind speeds increase, but this could occur at various times of the year. Further detail regarding the baseline noise monitoring assessment, including monitoring locations and ambient noise levels recorded at each of the unattended and attended noise monitoring sites, is presented in Appendix N, Noise and Vibration Impact Assessment.

Table 12.4: List of receptors within 5 km of the Project MLA

ID	Property	Name / address	Real property description	Approximate distance to proposed activities (km)	Easting (GDA94 Z55)	Northing (GDA94 Z55)
1	'Broadmeadow'	Moura-Baralaba Rd	11/FN153	Within the MLA	791210	7312217
2	'Broadmeadow'	Moura-Baralaba Rd	11/FN153	Within the MLA	791130	7312026
3	'Mount Ramsay'	Moura-Baralaba Rd	26/FN153	Within the MLA	792701	7310779
4	'Belvedere'	Bindaree-Harcourt Rd	35/FN141	4.8 south-west	789817	7306551
5	'Tingle Hill'	Moura-Baralaba Rd	141/FN137	4.5 north-west	788105	7320494
6	'Alberta Vale'	Alberta Rd, Alberta	5/RP856832	4.1 north-west	786668	7318708
7	'Riverside'	Alberta Rd, Alberta	3/RP856832	6.1 north-west	785609	7320451
8	'Lucerne Park'	Baralaba-Rannes Rd, Baralaba	110/FN103	5.9 north-west	786247	7320822
9	'Mount Ramsay'	Moura-Baralaba Rd	1/RP801031	0.9 north	790694	7317563
10	'Murrindindi'	Remfreys Rd	126/FN148	3.2 north-east	793686	7318245
11	'Nonda'	Moura-Baralaba Rd	102/SP107139	2.9 north	790328	7319625
12	'Brahmleigh'	Baralaba-Rannes Rd	80/SP131479	4.9 north	790405	7321578
13	'Woodlands'	Remfreys Rd	133/FN143	3.1 east	794051	7317045
14	'Mount Ramsay'	Moura-Baralaba Rd	135/FN143	Within the MLA	791300	7314361
15	'Alberta'	Alberta Rd, Alberta	6/KM50	5.2 west	784262	7314555
16	'Riverland'	Harcourt-Baralaba Rd	4/FN514	3.2 south-west	787625	7310449
17	'Bauhinia Park'	Baralaba-Banana Rd	28/FN154	4.1 south-east	796940	7309124
18	'Airedale'	Baralaba-Banana Rd	30/FN154	4.5 south-east	797418	7309218
19	'Alberta Vale'	Alberta Rd, Alberta	5/RP856832	4.5 north-west	786010	7318462
20	'Harcourt'	Harcourt-Baralaba Rd	12/FN514	3.5 south-west	788702	7308881
21	'Harcourt'	Harcourt-Baralaba Rd	12/FN514	6.0 south-west	785139	7309128

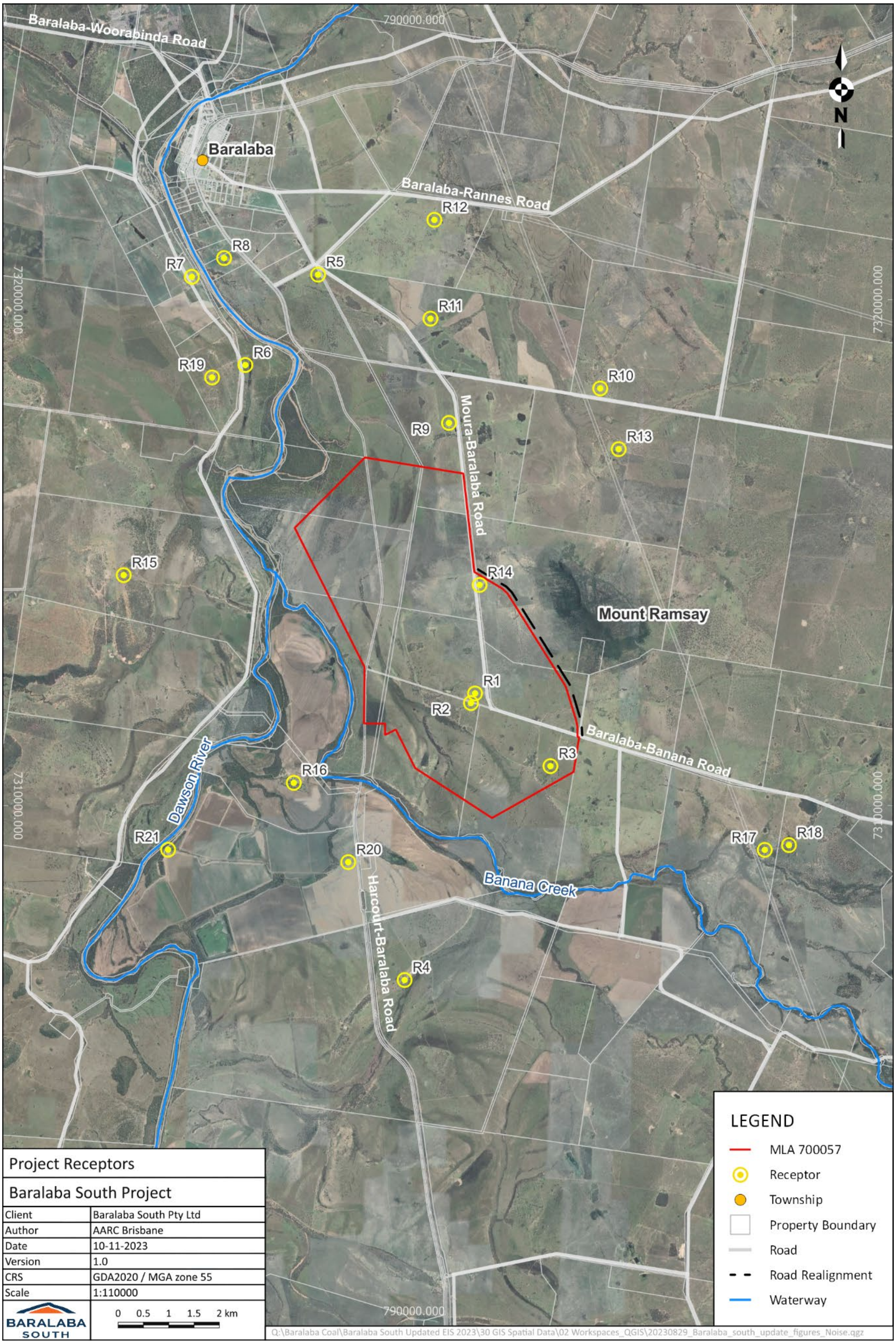

Figure 12.4: Project receptors—mining operations

Table 12.5: Rating background noise levels

Monitoring location	Background noise level L_{90} dB(A)		
	Location A	Location B	Location C
Day (7am to 6 pm)	21	20	23
Evening (6 pm to 10 pm)	18	16	18
Night (10 pm to 7 am)	18	16	18

12.2.3. Haul route to train load-out facility

12.2.3.1 Sensitive receptors

The Project haul route (Moura-Baralaba Road) is a public road which currently passes through the Project site. A component of the Project is the realignment of the intersection portion of the Moura-Baralaba Road. After the realignment of Moura-Baralaba Road, the haul route will pass to the east of the Project and continue in a southerly direction, approximately 40 km, towards the rail load-out facility. Seven residential sensitive receptors (dwellings) have been identified as falling within approximately 300 m of the Project's haul route, as shown in Table 12.6.

Table 12.6: Dwellings identified within 300 m of the haul route

SR ID	Approximate distance and direction from Haul Route
Dwelling 1	140 m north
Dwelling 2	180 m north-east
Dwelling 3	330 m north-east
Dwelling 4	110 m north-east
Dwelling 5	140 m north-east
Dwelling 6	190 m south-west
Dwelling 7	190 m north-east

12.2.3.2 Background noise

A baseline noise monitoring study was undertaken by SEG to determine baseline background noise levels prior to the commencement of the Project (Appendix O, Noise Assessment of Product Coal Road Haulage). Monitoring was carried out in accordance with the DES Queensland 'Noise measurement manual' and 'AS 1055.1 Acoustics–Description and measurement of environmental noise', Parts 1 and 2 (Standards Australia, 1997b). Attended noise measurements were recorded of road trucks transporting coal on 20 June 2019 at a location south of the Project on a warm, sunny day without significant wind. Noise measurements of the maximum noise level (L_{Amax}) at 30 m for vehicles travelling at 100 km/hr were recorded, and values were calibrated for a chip seal road surface in consideration with the 'Transport Noise Management Code of Practice' (DTMR, 2013).

Existing vehicular noise levels along the haul route have been summarised by vehicle type in Table 12.7.

Table 12.7: Summary of existing vehicular noise along the haul route

Vehicles	Maximum noise level at 30 metres, L_{Amax} dB(A)		
	Average	Minimum	Maximum
Mine quad Unladen	80.1	79.9	80.5
Mine quad laden	81.2	80.6	82.4
Non-mine vehicles			
Truck	76.6	—	—
Light truck	71.8	69.5	73.4
4WD	70.3	64.1	76.0
4WD & Caravan	72.4	—	—
Campervan	66.9	—	—
Cars	68.4	65.2	72.3

12.3 Potential impacts

12.3.1. Operational noise

12.3.1.1 Noise modelling

Noise modelling has been carried out by AARC using the industry standard desktop modelling program, SoundPLAN (version 8.2), by which they developed a three-dimensional digital terrain noise model of the Project and the surrounding area. The model allows for the incorporation of the mine and local topography, noise levels and locations of equipment, distance attenuation, ground and air absorption, natural and artificial barriers, and meteorological effects.

Noise source data that was input into the modelling was obtained from multiple sources including the AARC database of sound power levels at other coal mines using similar equipment and relevant data from similar mine projects and online investigation. The mining equipment included in the modelling was chosen to closely reflect the anticipated mining fleet. The modelled noise levels include noise reduction packages for onsite haul trucks and D11T dozers.

A list of modelled octave band noise source sound power levels can be found in Table 17 of Appendix N, Noise and Vibration Impact Assessment.

Potential noise impacts have been assessed for the Years 1, 3 and 11. Due to the proximity of Year 1 WRE activities to Receptor 9 to the north, two versions of Scenario 1 were modelled, with Scenario 1a aiming for compliance at all sensitive receptors except Receptor 9, and Scenario 1b aiming for compliance at all sensitive receptors including Receptor 9. Therefore, the noise assessment has considered the following four scenarios:

- Scenario 1a: Year 1 mine site layout and equipment numbers;
- Scenario 1b: Year 1 mine site layout with reduced equipment numbers;
- Scenario 2: Year 3 mine site layout and equipment numbers; and
- Scenario 3: Year 11 mine site layout and equipment numbers.

These scenarios have been selected to represent a range of mine noise levels associated with operations over the entire mine life, including during the construction, commissioning, operation and closure phases, and represent the years likely to produce the most severe noise impacts (worst-case scenario). Modelling of the four scenarios included information regarding mine ground elevations, equipment numbers and equipment locations for each mining scenario. To assist with achieving noise limits, mitigation measures for each scenario have been included as discussed in Appendix N, Noise and Vibration Impact Assessment.

Detailed assessment methodology and information regarding the noise emission sources (plant and equipment), assigned noise emission levels, noise metrics and rates of production used for this assessment are provided in Appendix N, Noise and Vibration Impact Assessment.

The propagation of noise in the outdoor environment can be influenced by the local meteorological conditions. Air temperature, humidity, wind speed, wind direction and stability of the atmosphere can all influence noise, either in isolation or as a combined weather condition. The SoundPLAN model used by AARC, Appendix N, Noise and Vibration Impact Assessment, predicts noise levels under neutral and adverse meteorological conditions, including Pasquill Stability Class, temperature, wind speed and relative humidity. The noise modelling considers the following meteorological conditions:

- Neutral conditions are most likely to occur during the day and are referred to as ‘day-neutral’ conditions.
- Adverse conditions can occur during the day with increased wind speed, referred to as ‘day-adverse’ and at night with a temperature inversion, referred to as ‘night-adverse’.

Further detail on the meteorological conditions included into the SoundPLAN model are detailed in Appendix N, Noise and Vibration Impact Assessment.

12.3.1.2 Noise Modelling results

The predicted noise levels at nearby sensitive receptors are presented in Table 12.8. Compliance is not assessed at Receptors 1, 2, 3 and 14 as they are located on the MLA and are therefore not considered sensitive receptors. These properties will be directly affected by the mine and will therefore need to be acquired by the mine.

A-weighted noise levels are compliant for Scenario 1a (Year 1) except at Receptor 9. When a compensation agreement is completed with Receptor 9, such that it is no longer considered a sensitive receptor, it would be compliant to operate under the limited constraints of Scenario 1a. If an agreement was not made with Receptor 9, the mine noise emissions would be compliant when operating under the more significant constraints of Scenario 1b. No exceedances are predicted at the location of any sensitive receptors outside of the Project boundary for Scenario 2 (Year 3) and Scenario 3 (Year 11).

The predicted noise levels under night-adverse conditions for the scenarios 1a, 1b, 2 and 3 are shown graphically as noise contours in Figure 12.5 through Figure 12.8. Noise contours under day-adverse conditions are presented in Appendix N, Noise and Vibration Impact Assessment.

12.3.1.3 Low frequency noise modelling

An assessment of low frequency noise emissions has been included in accordance with the 55 dB(Z) target, as used at Baralaba North. If the predicted external noise level exceeds 55 dB(Z) and the difference between the un-weighted (or Z-weighted) and A-weighted noise levels exceeds 15 dB, then the noise is considered to have unacceptable low frequency content. Refer to Appendix N, Noise and Vibration Impact Assessment, for detailed assessment methodology.

12.3.1.4 Low frequency noise modelling results

The predicted low frequency noise levels at nearby sensitive receptors are presented in Table 12.9. The predicted low frequency noise from the Project complies with the low frequency goals at all sensitive receptors across all scenarios.

12.3.1.5 Upset conditions

Potential upset conditions and their impact on noise and vibration emissions have been considered (Appendix N, Noise and Vibration Impact Assessment). Upset conditions may arise due to equipment malfunctioning, severe weather conditions or strong winds.

Malfunctioning equipment has the potential to result in a minor increase in the predicted noise level for that piece of equipment; however, the cumulative impact on the whole site is predicted to be minor. Through mitigation and management strategies, including the removal of the equipment from operation and regular maintenance, adverse impacts are not predicted.

Severe weather conditions may result in a reduction or halting of mining activity to reduce or stop. This would result in lower noise emission levels.

Strong winds blowing away from the mine would have a lowering effect on sensitive receptors. However, strong winds blowing from the direction of the mine towards sensitive receivers could increase the mining noise levels. However, in both cases the likely increase in the background noise levels would significantly mask any such mining noises, and the noise modelling in this report considers the worst-case scenario of low to moderate wind speeds.

Through the proposed mitigation and management strategies, upset conditions are unlikely pose a risk of additional noise impact and further assessment of such cases is not considered to be warranted.

Table 12.8: Predicted A-weighted noise levels

Receptor	Predicted A-weighted noise levels																							
	Scenario 1a: Year 1						Scenario 1b: Year 1						Scenario 2: Year 3						Scenario 3: Year 11					
	Noise Level $L_{Aeq,adj,15min}$ dB(A)			Exceedance of 40 dB(A) day and 35 dB(A) night noise limits			Noise Level $L_{Aeq,adj,15min}$ dB(A)			Exceedance of 40 dB(A) day and 35 dB(A) night noise limits			Noise Level $L_{Aeq,adj,15min}$ dB(A)			Exceedance of 40 dB(A) day and 35 dB(A) night noise limits			Noise Level $L_{Aeq,adj,15min}$ dB(A)			Exceedance of 40 dB(A) day and 35 dB(A) night noise limits		
Met' condition	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse
1 (MLA[1])	45	50	51	NA	NA	NA	45	49	50	NA	NA	NA	45	49	50	NA	NA	NA	65	65	69	NA	NA	NA
2 (MLA[1])	43	48	49	NA	NA	NA	43	46	48	NA	NA	NA	43	48	49	NA	NA	NA	55	58	58	NA	NA	NA
3 (MLA[1])	37	43	44	NA	NA	NA	37	42	44	NA	NA	NA	37	42	44	NA	NA	NA	39	44	44	NA	NA	NA
4	21	26	27	nil	nil	nil	21	25	25	nil	nil	nil	20	26	27	nil	nil	nil	21	27	24	nil	nil	nil
5	24	30	28	nil	nil	nil	24	27	24	nil	nil	nil	19	25	26	nil	nil	nil	15	21	18	nil	nil	nil
6	27	32	30	nil	nil	nil	27	30	27	nil	nil	nil	22	28	29	nil	nil	nil	17	22	19	nil	nil	nil
7	22	27	25	nil	nil	nil	22	25	22	nil	nil	nil	18	24	24	nil	nil	nil	13	19	16	nil	nil	nil
8	22	27	25	nil	nil	nil	22	25	22	nil	nil	nil	18	24	24	nil	nil	nil	13	19	16	nil	nil	nil
9[2]	39	44	40	Nil	42	52	39	40	35	nil	nil	nil	29	36	35	nil	nil	nil	23	28	28	nil	nil	nil
10	25	32	29	nil	nil	nil	25	27	25	nil	nil	nil	26	32	33	nil	nil	nil	18	24	18	nil	nil	nil
11	28	34	33	nil	nil	nil	28	31	28	nil	nil	nil	23	29	30	nil	nil	nil	18	23	22	nil	nil	nil
12	22	28	26	nil	nil	nil	22	25	22	nil	nil	nil	19	25	25	nil	nil	nil	14	20	18	nil	nil	nil

Receptor	Predicted A-weighted noise levels																							
	Scenario 1a: Year 1						Scenario 1b: Year 1						Scenario 2: Year 3						Scenario 3: Year 11					
	Noise Level $L_{Aeq,adj,15min}$ dB(A)			Exceedance of 40 dB(A) day and 35 dB(A) night noise limits			Noise Level $L_{Aeq,adj,15min}$ dB(A)			Exceedance of 40 dB(A) day and 35 dB(A) night noise limits			Noise Level $L_{Aeq,adj,15min}$ dB(A)			Exceedance of 40 dB(A) day and 35 dB(A) night noise limits			Noise Level $L_{Aeq,adj,15min}$ dB(A)			Exceedance of 40 dB(A) day and 35 dB(A) night noise limits		
Met' condition	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse
13	27	34	30	nil	nil	nil	27	29	26	nil	nil	nil	28	33	34	nil	nil	nil	18	24	15	nil	nil	nil
14 (MLA[1])	50	55	52	NA	NA	NA	50	51	48	NA	NA	NA	51	55	56	NA	NA	NA	41	45	39	NA	NA	NA
15	24	30	28	nil	nil	nil	24	27	25	nil	nil	nil	22	27	28	nil	nil	nil	20	26	24	nil	nil	nil
16	30	35	34	nil	nil	nil	30	32	32	nil	nil	nil	29	34	35	nil	nil	nil	28	34	32	nil	nil	nil
17	21	27	27	nil	nil	nil	21	26	27	nil	nil	nil	21	27	28	nil	nil	nil	21	27	26	nil	nil	nil
18	21	26	26	nil	nil	nil	21	25	26	nil	nil	nil	20	26	27	nil	nil	nil	20	26	25	nil	nil	nil
19	26	31	29	nil	nil	nil	26	29	26	nil	nil	nil	22	28	28	nil	nil	nil	16	22	19	nil	nil	nil
20	26	31	32	nil	nil	nil	26	30	31	nil	nil	nil	27	32	33	nil	nil	nil	27	33	31	nil	nil	nil
21	22	27	26	nil	nil	nil	22	25	24	nil	nil	nil	21	27	27	nil	nil	nil	19	25	23	nil	nil	nil

Note: 1 – Receptors labelled as (MLA) are located within the MLA boundaries and therefore are to be acquired, and are not assessed to the proposed noise limits.
2 – Noise levels at Receptor 9 are reduced to compliance in Year 1 with equipment reductions in Scenario 1b.

Table 12.9: Predicted un-weighted (low frequency) noise levels

Receptor	Predicted un-weighted noise levels																								
	Scenario 1a: Year 1						Scenario 1b: Year 1						Scenario 2: Year 3						Scenario 3: Year 11					
	Noise Level $L_{eq,adj,15min}$ dB(Z)			Exceedance of 55 dB(Z) noise limit			Noise Level $L_{eq,adj,15min}$ dB(Z)			Exceedance of 55 dB(Z) noise limit			Noise Level $L_{eq,adj,15min}$ dB(Z)			Exceedance of 55 dB(Z) noise limit			Noise Level $L_{eq,adj,15min}$ dB(Z)			Exceedance of 55 dB(Z) noise limit		
Met' condition	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse
1 (MLA[1])	59	62	62	NA	NA	NA	58	61	61	NA	NA	NA	60	62	62	NA	NA	NA	74	75	78	NA	NA	NA
2 (MLA[1])	57	60	60	NA	NA	NA	56	59	59	NA	NA	NA	58	61	61	NA	NA	NA	69	70	71	NA	NA	NA
3 (MLA[1])	53	56	56	NA	NA	NA	53	56	56	NA	NA	NA	53	55	56	NA	NA	NA	54	57	56	NA	NA	NA
4	39	43	43	nil	nil	nil	37	41	41	nil	nil	nil	38	42	43	nil	nil	nil	38	42	40	nil	nil	nil
5	41	45	43	nil	nil	nil	38	42	40	nil	nil	nil	37	41	42	nil	nil	nil	33	37	36	nil	nil	nil
6	44	48	45	nil	nil	nil	41	45	42	nil	nil	nil	39	43	44	nil	nil	nil	34	39	37	nil	nil	nil
7	39	44	41	nil	nil	nil	37	41	39	nil	nil	nil	36	40	41	nil	nil	nil	31	36	34	nil	nil	nil
8	39	44	41	nil	nil	nil	37	41	38	nil	nil	nil	36	40	41	nil	nil	nil	31	36	34	nil	nil	nil
9[2]	51	54	52	nil	nil	nil	48	51	48	nil	nil	nil	45	48	48	nil	nil	nil	40	43	42	nil	nil	nil
10	42	45	43	nil	nil	nil	38	42	39	nil	nil	nil	43	46	46	nil	nil	nil	36	40	36	nil	nil	nil
11	44	48	46	nil	nil	nil	41	45	43	nil	nil	nil	40	44	44	nil	nil	nil	35	39	38	nil	nil	nil
12	40	44	41	nil	nil	nil	37	41	38	nil	nil	nil	36	41	41	nil	nil	nil	32	36	36	nil	nil	nil
13	44	47	45	nil	nil	nil	40	43	40	nil	nil	nil	44	47	47	nil	nil	nil	33	37	30	nil	nil	nil

Receptor	Predicted un-weighted noise levels																							
	Scenario 1a: Year 1						Scenario 1b: Year 1						Scenario 2: Year 3						Scenario 3: Year 11					
	Noise Level $L_{eq,adj,15min}$ dB(Z)			Exceedance of 55 dB(Z) noise limit			Noise Level $L_{eq,adj,15min}$ dB(Z)			Exceedance of 55 dB(Z) noise limit			Noise Level $L_{eq,adj,15min}$ dB(Z)			Exceedance of 55 dB(Z) noise limit			Noise Level $L_{eq,adj,15min}$ dB(Z)			Exceedance of 55 dB(Z) noise limit		
Met' condition	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse	Day-neutral	Day-Adverse	Night-Adverse
14 (MLA[1])	63	66	63	NA	NA	NA	60	62	59	NA	NA	NA	64	66	67	NA	NA	NA	50	53	49	NA	NA	NA
15	42	46	43	nil	nil	nil	39	43	41	nil	nil	nil	39	43	44	nil	nil	nil	38	42	41	nil	nil	nil
16	47	50	48	nil	nil	nil	43	46	46	nil	nil	nil	46	49	49	nil	nil	nil	44	48	45	nil	nil	nil
17	39	43	43	nil	nil	nil	39	42	42	nil	nil	nil	39	43	43	nil	nil	nil	39	43	42	nil	nil	nil
18	39	43	42	nil	nil	nil	38	41	41	nil	nil	nil	38	42	43	nil	nil	nil	38	42	41	nil	nil	nil
19	43	47	44	nil	nil	nil	40	44	41	nil	nil	nil	39	43	44	nil	nil	nil	34	38	36	nil	nil	nil
20	43	47	47	nil	nil	nil	41	45	45	nil	nil	nil	45	48	48	nil	nil	nil	44	47	45	nil	nil	nil
21	39	43	41	nil	nil	nil	36	40	39	nil	nil	nil	38	43	42	nil	nil	nil	36	40	39	nil	nil	nil

Note: 1 – Receptors labelled as (MLA) are located within the MLA boundaries and therefore are to be acquired, and are not assessed to the proposed noise limits.
2 – Low frequency noise levels at Receptor 9 are compliant in all four scenarios.

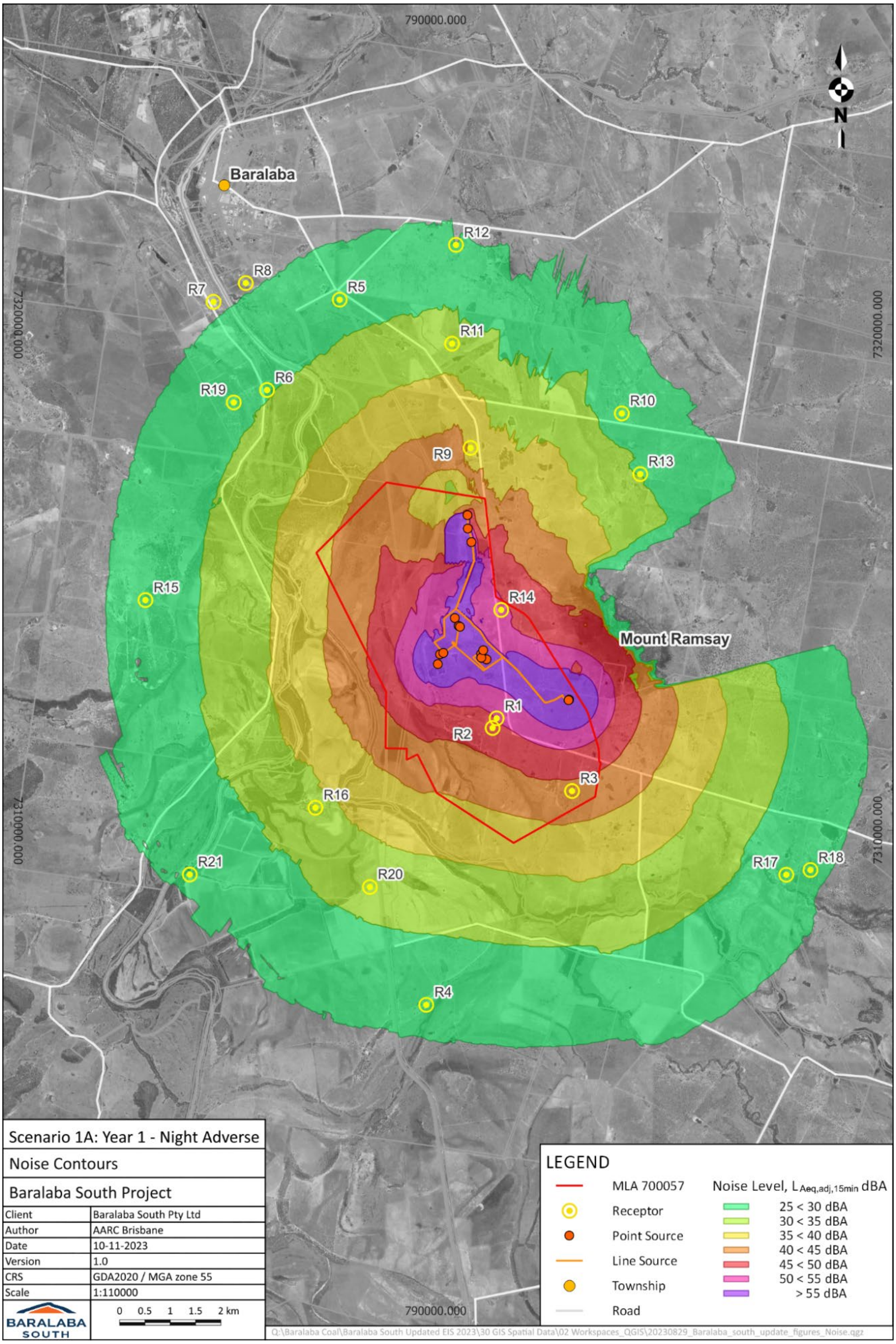

Figure 12.5: Noise contours – Scenario 1a: Year 1 (night-adverse)

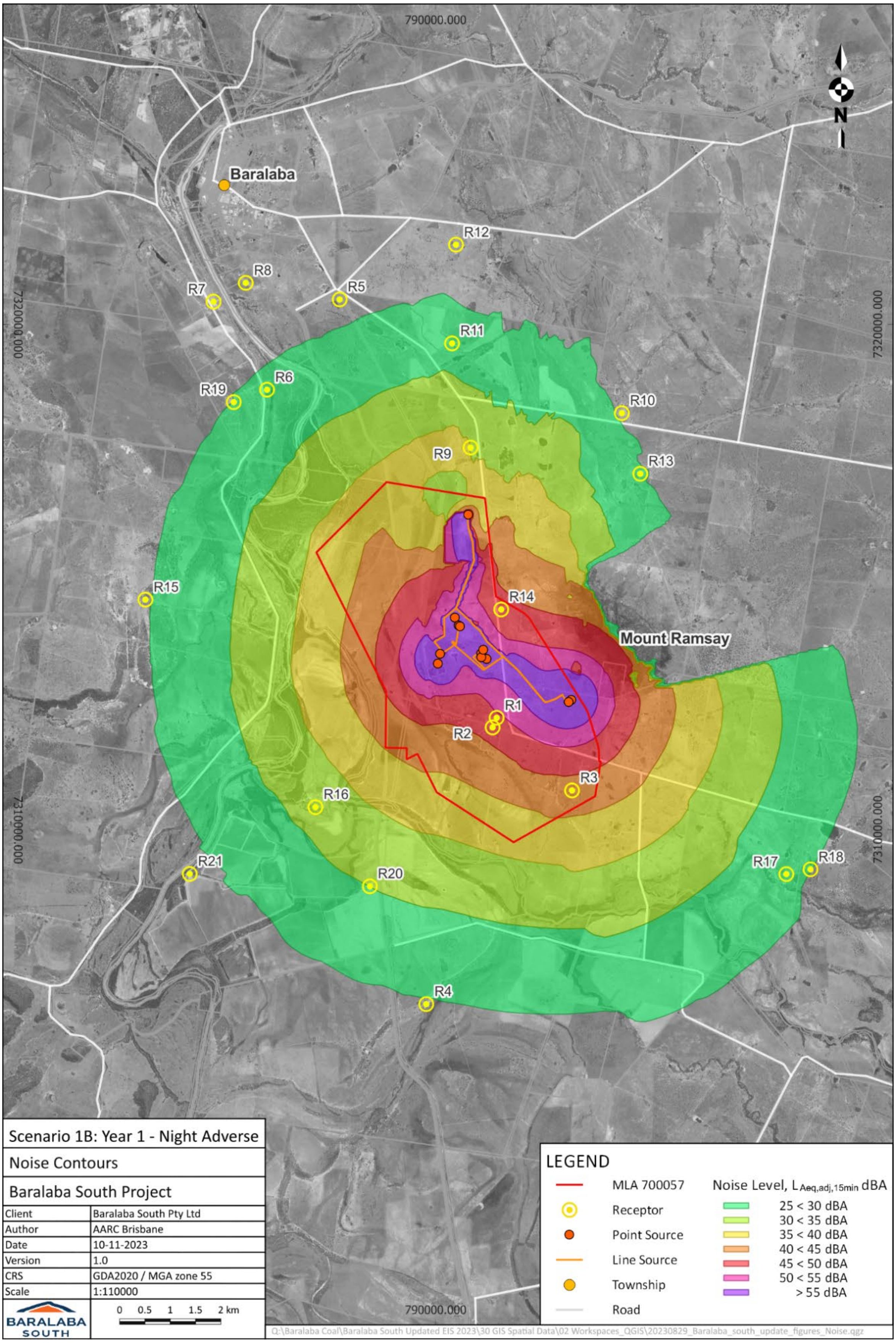

Figure 12.6: Noise contours – Scenario 1b: Year 1 (night-adverse)

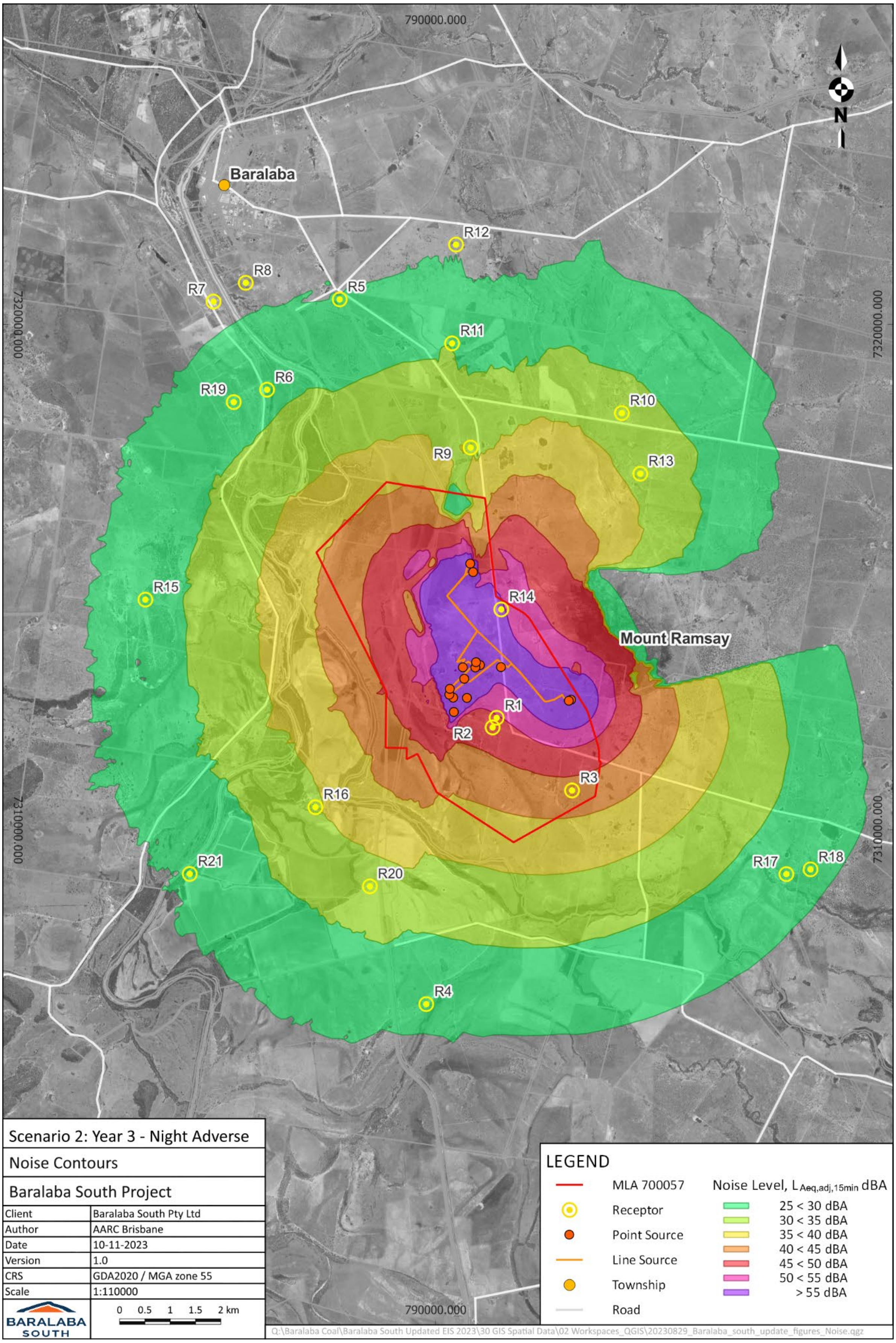

Figure 12.7: Noise contours – Scenario 2: Year 3 (night-adverse)

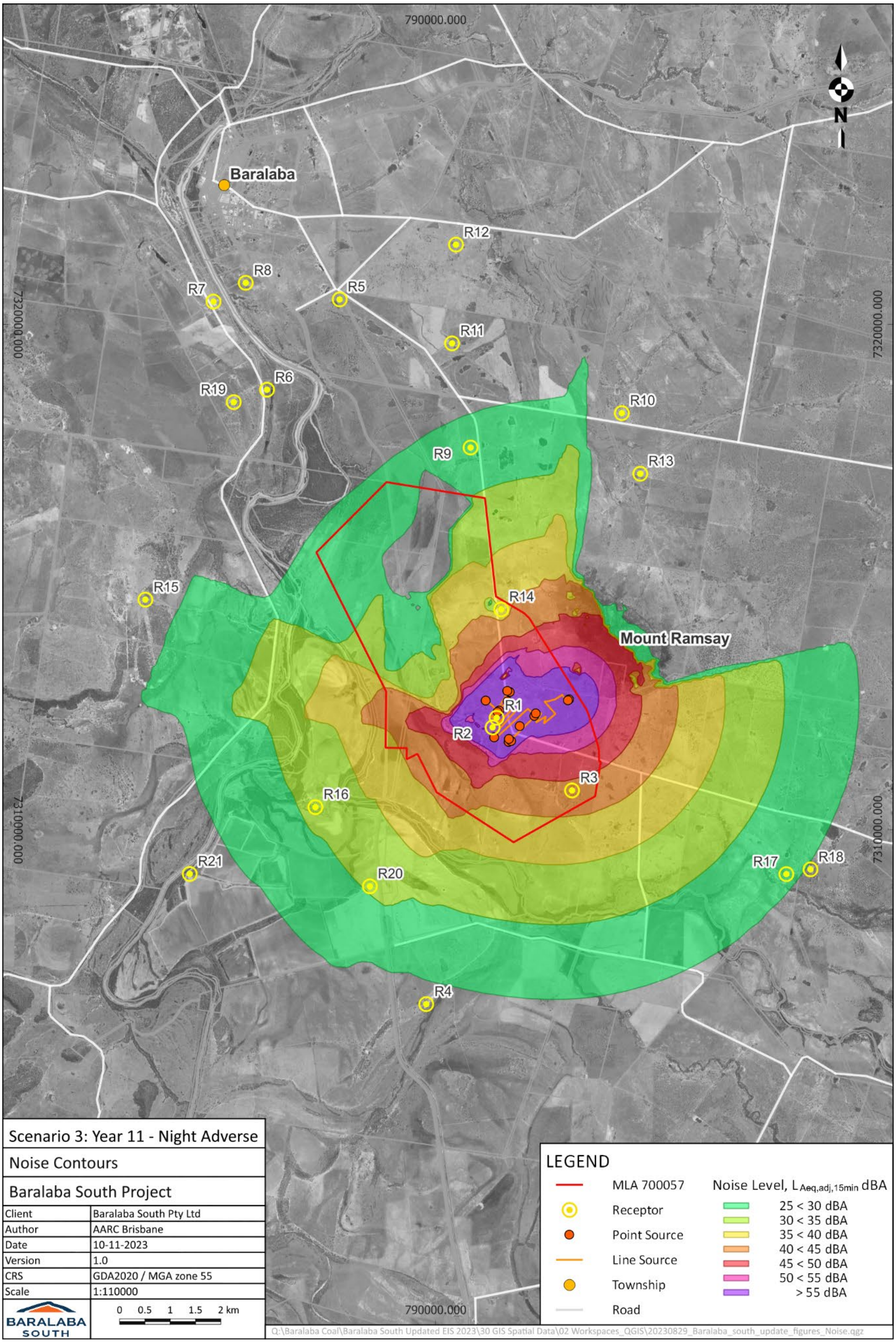

Figure 12.8: Noise contours – Scenario 3: Year 11 (night-adverse)

12.3.2. Blasting

12.3.2.1 Blasting modelling

Ground vibration and airblast overpressure levels caused by blasting activities have been predicted based on the formulas and methodology of 'AS 2187.2 Explosives–Storage Transport and Use–Use of Explosive' and other formulae which predicts the peak particle velocity in mm/s and the airblast overpressure (peak pressure) in dB(Lin Peak). Existing vibration levels are considered to be negligible except at locations in close proximity to roads or items of fixed plant. The blasting assessment model incorporates predicted overpressure and vibration levels at sensitive receptors using a 1,072 kg maximum instantaneous charge based on blast details provided to AARC.

Further detail regarding blasting model inputs, including formulas and criteria, are outlined in Appendix N, Noise and Vibration Impact Assessment.

12.3.2.2 Blasting results

The blasting assessment in Appendix N, Noise and Vibration Impact Assessment predicts that ground vibration will not exceed the objective of 5 mm/s at distances greater than 1 km. The airblast overpressure assessment predicts that airblast levels will meet the Project objective of 115 dB(Lin Peak) at distances between 0.4 km and 3.5 km, and airblast levels of 120 dB(Lin Peak) are predicted between 0.3 km and 2.4 km. The nearest receptors are approximately 3 km from the blasting and therefore airblast levels compliant with the 115 dB(Lin Peak) limit are expected based on the airblast calculations. However, monitoring results from initial blasts should be used to determine site conditions to allow for more accurate airblast calculations.

Blast design and management of blast initiation will ensure the Project objectives are met at all receptors.

The Benleith Water Scheme infrastructure is shown on Figure 12.9. The closest section of pipeline is made of 1¼ inch polyethylene plastic and is located approximately 0.5 km from the ML (shown on the inset in Figure 12.9). The closest section of the scheme's asbestos cement (AC) pipeline is approximately 100 m from the proposed open cut pit.

While Richards and Moore (2008) provide a general recommendation of 100 mm/s for 'buried communication cables and pipelines', they further suggest that a 'safe' level of vibration for buried pipes is 10% of the yield strength of the pipe material, as well as being dependent on soil type within which the pipeline is laid; with clay considered the most sensitive ground type. Given the Project conditions, a maximum peak particle velocity (PPV) of 34 mm/s is recommended for PVC pipes in clay and a maximum PPV of 35 mm/s is recommended for AC pipes in clay. For the distances to the respective pipeline types, the ground vibration levels are well below these 'safe' recommended values.

Two water storage tanks on Mount Ramsay for the Benleith Water Scheme are located approximately 1 km from the proposed open cut pit. At this distance, deflection from blasts at the mine are predicted to be low. Ground vibration is predicted to be between 1.1 mm/s and 3.4 mm/s at 1 km from the Project which is below the Project's objective of 5 mm/s.

The water storage tanks on Mount Ramsay are also susceptible to potential impacts from airblast overpressure. The predicted airblast overpressure at distances greater than 1.5 km is 113 dB(Lin Peak). Section J5.3 of AS 2187.2 indicates that damage to infrastructure, even of a cosmetic nature, does not occur at airblast levels below 133 dB(Lin Peak).

Impacts from ground vibrations and airblast is not likely to have impacts on the Benleith Water Scheme. However, refer to 12.4.4 regarding potential mitigation/make-good measures to be implemented.

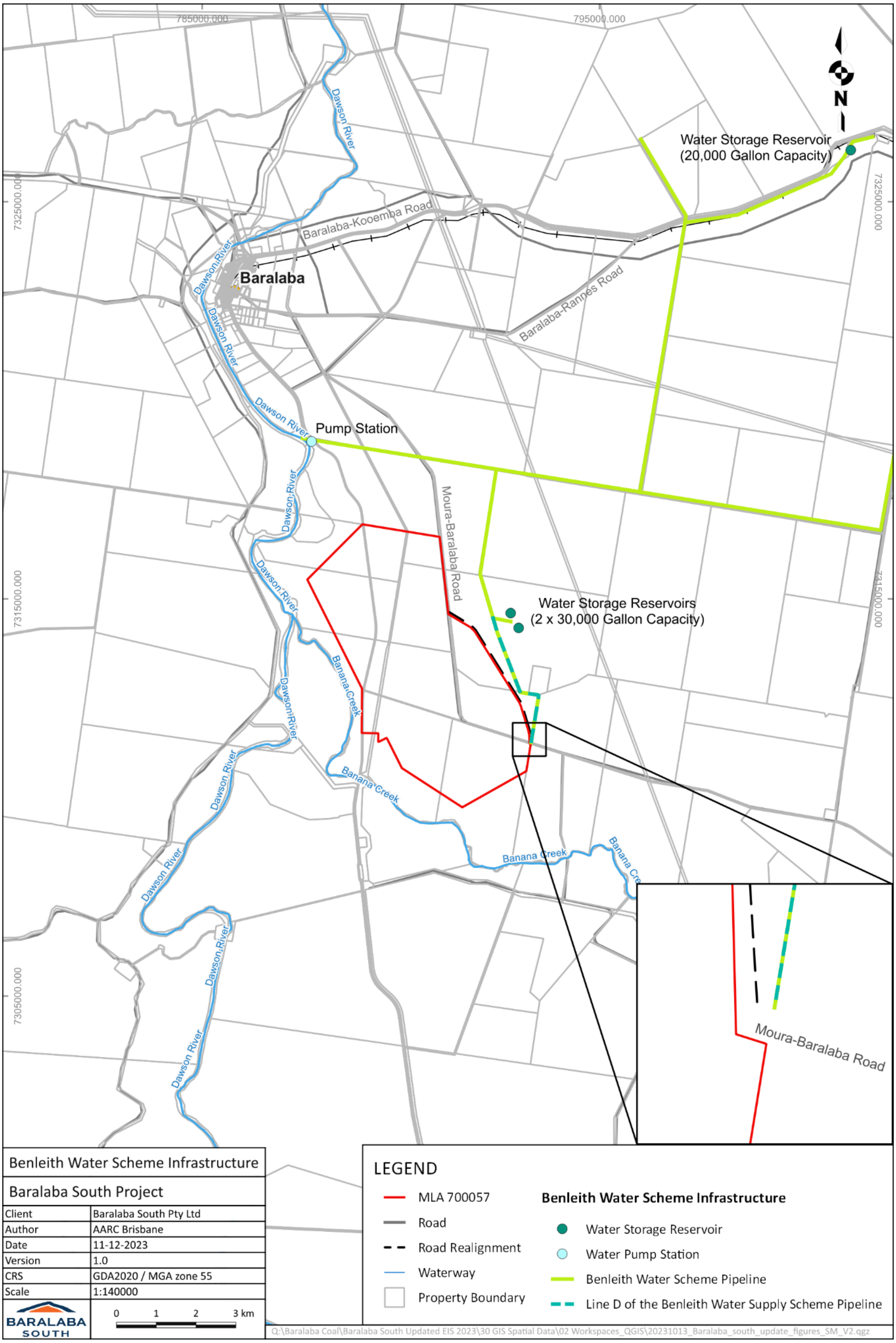

Figure 12.9: Benleith Water Scheme infrastructure in the vicinity of the Project

12.3.3. Haul route

12.3.3.1 Noise modelling

Predicted noise from the haul route has been estimated using the PEN3D modelling software, which allows for the incorporation of speed limits and the number of vehicles travelling along the route. Data from the Traffic Assessment (Appendix P) on peak hour traffic flow has been considered in the modelling scenario. Product coal haulage intensity along the haul route is likely to vary over the mining life. Noise modelling has been undertaken to represent a worst-case scenario. As Baralaba South mine ramps up production, Baralaba North will be ramping down and then ceasing production. The maximum ROM transport is predicted to be 2.5 Mtpa from both mines combined for the years 2030 and 2031. The ROM quantity will reduce below 2.0 Mtpa after the closure of Baralaba North.

Further details regarding haul route modelling methodology are outlined in Appendix O, Noise Assessment of Product Coal Road Haulage.

12.3.3.2 Modelling results

The changes in noise levels due to haulage operations at and around Baralaba North and also the Project under peak operating conditions is predicted to comply with the objective of less than a 3 dB(A) noise increase at all sensitive receptors.

At road speeds of 100 km/hr, six dwellings are predicted to have noise levels of 48–52 dB(A). Dwelling 4 (the closest dwelling to the haul route) is predicted to have the highest predicted noise level of 53 dB(A).

Noise modelling scenarios capture the worst-case traffic scenario, including both Baralaba North and the Project simultaneously operating at peak production. Noise levels are predicted to be within the Queensland DTMR guideline; therefore, additional noise mitigation measures along the haul route are not required.

12.3.4. Train load-out facility

The mine TLO is an existing facility located 2 km east of Moura and approximately 40 km south of the mine. The Project will result in an increased amount of coal transported via the rail load-out, and therefore an increased number of trains will use the facility. However, there is not proposed to be any significant changes to the operational hours, train types, mobile equipment or fixed equipment at the TLO.

The proposed increase in train numbers will result in additional periods of noise emissions; however, based on worst-case 1-hour noise levels the level of the noise occurring during these additional periods will not increase above the current noise emission levels.

12.3.5. Cumulative noise

The Project is located approximately 11 km south of Baralaba North and some 23 km north-west of Dawson Mine. Cumulative noise impacts from Baralaba North are unlikely, as the northern most receptors of the Project (5, 7, 8 and 12) are predicted to have night noise levels at least 7 dB(A) below the Project's night-time objective of 35 dB(A), and the contribution of Baralaba North at these receptors is likely to be lower given the increased distance and similar mine size. Receptors that are closer to the north of the Project (6, 11 and 19) are predicted to have noise levels closer to the night noise objective; however, they are a sufficient distance from Baralaba North in the opposite direction, and adverse wind conditions cannot occur at both mines simultaneously. It is understood that the Baralaba North plans to continue to mine in a northerly direction, increasing the distance between the mines by the time peak production is reached at the Project. It is considered unlikely that cumulative noise impacts from both mines will occur. Further, it is noted that Baralaba North will be winding down as the Project ramps up, such that the overlap is only for a few years, with neither mine at full operation.

Dawson Mine is located further away from the Project than Baralaba North, some 23 km to the south-east. It is unlikely that adverse wind conditions creating upset conditions will occur simultaneously at both the Project site receptors and Dawson Mine. Therefore, cumulative noise impacts are unlikely.

Cumulative impacts of public traffic growth along the haul route have been assessed in the Traffic Assessment (Appendix P). Council development planning in the Baralaba region indicates no significant new developments in the near future and, as such, no cumulative noise impacts from regional developments are predicted.

12.4 Mitigation measures, management and monitoring

The management hierarchy for noise as set out in the EPP (Noise) requires that for an activity involving noise that affects, or may affect, an environmental value to the extent that it is reasonable to do so, noise management must be dealt with in the following order of preference:

1) avoid the noise (e.g. locating an industrial activity in an area that is not near a sensitive receptor);
2) minimise the noise in the following order:
    a) orientate an activity to minimise the noise (e.g. facing the part of an activity that makes noise away from a sensitive receptor); then
    b) use the best available technology to minimise the noise;
3) manage the noise (e.g. use heavy machinery only during business hours).

12.4.1. Operational noise mitigation measures

The potential requirements for noise mitigation at this time are based solely on noise modelling for the Project. The Project will monitor and verify noise levels before considering the implementation of mitigation measures discussed. Noise and vibration management and mitigation measures are proposed for the Project and will include the following:

- there will be implementation of proactive and reactive noise control measures as required to ensure compliance with applicable noise limits at the nearest receptors;
- if required, mining operations will be modified by reducing the intensity of particular operations or relocating particular operations in adverse conditions;
- carrying out of routine maintenance of mining equipment will be undertaken;
- installing attenuation measures for haul trucks and D11T Dozers as required to ensure compliance with objectives over the mine life;
- if noise monitoring indicates exceedances at receptors under adverse meteorological conditions, mobile plant items operating in the vicinity of receptors that have predicted noise levels close to the Project's objective (12.3.1.2) could be treated with sound suppression equipment as required to achieve compliance with the relevant noise criteria; and
- If required, further noise mitigation strategies will include the construction of additional bund walls. Bunds will be of sufficient height and in a location which provides a high-level of shielding to the loudest equipment (e.g. haul trucks, dozers, excavators, loaders).

Under neutral meteorological conditions, no additional mitigation measures are required in the three modelled scenarios.

12.4.2. Operational noise monitoring

Predicted night-time noise levels are close to the Project's objective at some receptors in the Year 1 and Year 3 modelled scenarios. A noise monitoring program will be developed and implemented to conduct occasional noise validation monitoring at receptors of interest and monitoring on a complaint basis. The noise monitoring program will include the following:

- monitoring of atmospheric conditions at the Project, including those of temperature, relative humidity, wind speed and wind direction;
- continuous performance noise monitoring at the worst affected sensitive receptors to the north and to the south of the mine. This monitoring will advise on requirements to reduce noise levels in real-time at the mine;
- attended noise monitoring conducted on a six-monthly basis at sites most affected by the mine operations. This monitoring will be used to confirm compliance with EA noise limits; and
- all noise monitoring will be conducted in accordance with relevant acoustic guidelines and standards, such as the latest versions of AS 1055 (2018a) and the 'Noise measurement manual' (DES, 2020c).

12.4.3. Blasting monitoring program

Blasting performance criteria for the Project has been met at all receptors outside the MLA. The Project will develop a blast monitoring program to monitor the airblast overpressure and blast vibration levels during all blast events to ensure blasting criteria are met at all sensitive receptors. The proposed blast monitoring program will consider the following:

- predicted vibration levels will be calculated prior to each blast, and the quantity of the explosives designed to be initiated simultaneously will be modified as required (i.e. reduced to ensure blast performance criteria are met at all sensitive receptors);
- blast monitors should be set up at the nearest receptor/s to monitor airblast and vibration during blasts.
- mitigation measures will be in place as required;
- a record of blast designs will be kept; and
- a record of environmental observations before and after blasting will be maintained.

Blast exclusion zones will be established during all blasts in accordance with relevant industry standards.

12.4.4. Noise and Blast Management Plan

A Noise and Blasting Management Plan will be prepared and detail the management, mitigation and monitoring (auditing) measures that will be implemented for the control of noise, vibration and blasting during mining activities. The proposed Noise and Blast Management Plan will include the following:

- roles and responsibilities for employees for the implementation of the plan;
- relevant limits and criteria for noise, vibration and blast overpressure and blast vibration;
- identification of sensitive receptors;
- activities with potential to generate noise, vibration and blast emissions;
- noise and blast mitigation and management measures;
- noise and blast monitoring programs (12.4.2 and 12.4.3);
- review and auditing of environmental performance;
- management and reporting of incidents, complaints and non-compliances; and

- additional remedial actions for noise control in the event of complaints being received, exceedances of criteria being recorded or other trigger levels being breached (e.g. management of mining equipment locations, such as operating at a lower elevation or shielded area at night).

With the proposed noise management measures in place, including proactive and reactive noise control measures that are considered good practice or best practice, it is reasonable to expect that the noise objectives will be met during the operation of the Project. Given the flexibility and robustness of the proposed mitigation measures, this will be the case even with additional noise generating activities in the region (e.g. new or expanded mining operations).

Although not anticipated, in the unlikely event that monitoring and investigations confirm that blasting at the Project has impacted on Benleith Water Scheme infrastructure (and is not due to natural or other factors), mitigation measures will be implemented. Potential make-good measures may include replacement of the affected infrastructure as required. In those circumstances, Baralaba South will ensure there is adequate consultation with the Benleith Water Board to develop a proposal for appropriate make-good measures.

12.4.5. Haul route

Noise modelling along the haul route has predicted no significant noise impacts at receptors. Occasional monitoring of noise levels is proposed along the haul route to validate findings of the noise model during early operations.

12.4.6. Local landholder agreements

Modelling determined that under all meteorological conditions, only receptors within the MLA (i.e. Receptors 1, 2, 3 and 14) are predicted to exceed noise criteria. The proponent is required to agree compensation and reach agreement with these receptors before the ML may be granted. Where appropriate and where requested by the landholders, such agreements will involve the relocation of the receptors before operations commence. The proponent is also expected to reach a compensation agreement with Receptor 9, as the property partially underlies the MLA and is considered part of the Mount Ramsay/McLaughlin agreement that will be required for Receptors 3 and 14. Agreement with Receptor 9 will minimise constraints on operations and allow operation under Scenario 1a.

In the event that noise impacts cannot be adequately managed to meet the applicable Project noise criteria by noise mitigation measures (including the installation of receptor side mitigation (e.g. air conditioners and glazed windows to allow for closed windows) and adaptive operation noise management at receptors or where the cost of implementing these measures is not considered to be reasonable), Baralaba South Pty Ltd will seek to negotiate an agreement with the affected landholder/s.