Noise Impact Assessment

Montrose Quarry

Boral

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Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
1.0	21 November 2024	Benjamin French	Arvind Deivasigamani	Arvind Deivasigamani
0.2	1 May 2024	Benjamin French	Arvind Deivasigamani	Arvind Deivasigamani

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Boral (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

Executive Summary

The purpose of this report is to assess potential noise impacts associated with the expansion of the Montrose quarry (the Project) suitable for submission as part of the Montrose Quarry Work Plan Variation and Planning Permit application.

Evaluation of noise impacts on noise sensitive and natural areas was undertaken in accordance with the requirements of the Environment Protection Act 2017 (EP Act) and subordinate legislation. Evaluation of noise impacts first considered General Environmental Duty (GED) requirements, and once all noise sources had been eliminated or reduced so far as reasonably practicable, residual noise impacts were assessed against established criteria.

Noise impacts from sources controlled by the Regulations were assessed against the Noise Protocol and relevant guidelines. Other noise impacts were assessed against the Environment Reference Standard and relevant guidelines.

The results of the impact found the following key impacts:

- **Operational Impacts:** The noise assessment demonstrates compliance with the Noise Protocol day-time limits throughout the life of the project. Receptors to the north of the Project are relatively unaffected by the expansion activities. Receptors to the south are most impacted by the expansion. Impacts are greatest during the early stages of the expansion, when product is extracted from surface levels. Noise levels will reduce as extraction is undertaken at greater depths.

  The closest natural areas are Dr Ken Leversha Reserve to the east of the Project and Doongalla Forest and Dandenong Ranges to the south. Quarry noise may be occasionally just audible from the southern natural areas, depending on meteorological factors. However it is unlikely to be intrusive above other natural ambient noise sources during the day time. The quarry does not operate at night.

  Dr Ken Leversha Reserve is closer to the quarry and will be particularly affected by activities on the eastern side of the quarry. Impacts are most apparent during the overburden removal from the eastern area. Levels are expected to decrease as extraction is undertaken at lower levels.

As part of the GED requirements, the following reasonably practicable control measures have been proposed, or implemented, to reduce the risk of harm to human health and the environment:

- Enclosed primary and secondary processing plant.
- Noise and visual bund in the southwest corner.
- Slow moving product in Zone 2 to enable less frequent vehicle movements close to sensitive receptors.
- No processing or use of the rotary blast drill prior to 7 am.
- The replacement of the aged heavy vehicle fleet with new late model haul trucks fitted with the latest noise attenuation muffler.
- Equipment shall be regularly maintained, to ensure noise levels do not increase over time. Particular attention should be paid to lubrication, vibration from loose parts, engine maintenance and any acoustic enclosures.
- The replacement of reverse alarms with squawker reversing alarms – these are 5dB quieter than the pure tone alarms.

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Glossary

dB	Decibel. The unit of sound level.
dBA	A-weighted decibel
EPA	Environment Protection Authority Victoria
EP Act	Environment Protection Act 2017
ENL	Effective noise level
Frequency	A measurement rate of the repetition of the sound wave, in Hertz (Hz).
GED	General environmental duty
Hz	Hertz
L_{10}	The noise level exceeded for 10 % of the measurement period
L_{90}	The noise level exceeded for 90 % of the measurement period. This is commonly referred to as the background noise level.
L_{eq}	The equivalent continuous sound level over a given period of time, e.g $L_{eq,\ 1\ hr}$ or $L_{eq,\ 30\ min}$. This is commonly referred to as the average noise level.
LFN	Low frequency noise
Low frequency noise guidelines	Noise Guidelines: Assessing low frequency noise (Publication 1996), June 2021
Low frequency noise threshold levels	Table 3 of the Noise Guidelines: Assessing low frequency noise (Publication 1996), June 2021
One-third octave band	A division of the frequency range that can be used when octave bands does not provide sufficient resolution. Each octave band comprises three one-third octave bands. Noise is measured in one-third octave bands using frequency filters as specified in Australian Standard AS IEC 61260.1:2019 Electroacoustics—Octave band and fractional-octave-band filters
Publication 1826.4 (Noise Protocol)	Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues (EPA, May 2021)
Publication 1996	Noise guideline – Assessing low frequency noise (EPA, June 2021).
SWL	Sound power level
UTM	Universal Transverse Mercator
Z or L frequency weighting	Means the sound pressure level when no frequency weighting is applied, as specified in Australian standard AS IEC 61672.1-2019

1.0 Introduction

Boral is seeking to extend the exiting extraction boundary to increase the life of the Montrose quarry (the Project) by approximately 40 years. The proposed extension will increase the current extraction area by approximately 9.5 hectares and will allow approx. 35 million tonnes of additional stone to be quarried.

The proposal to expand the extraction boundary requires the following statutory approvals:

- An amendment to the Yarra Ranges Planning Scheme and a planning permit under the Planning and Environment Act 1987.
- A Work Authority and Work Plan Variation under the Extractive Industries Development Act 1995 for the extended quarry operations.
- A Works Approval and Licence under the Environment Protection Act 1970 for the increased water discharge volumes associated with the quarry activities.

The purpose of this report is to assess potential noise impacts associated with the expansion of the Project suitable for submission as part of the Montrose Quarry Work Plan Variation project.

The quarry's main approval is Extractive Industry Work Authority 100 (WA100), issued under the Mineral Resources (Sustainable Development) Act 1990.

2.0 Site Location

Boral Montrose is located at 56 Canterbury Road, Montrose, approximately 32 km east of the Melbourne CBD. The quarry undertakes three operations: a quarry, an asphalt production facility and a concrete batch plant.

Canterbury Road is a major arterial road between the eastern suburbs and the regional areas of the Yarra Valley and Yarra Ranges. It carries 38,000 vehicles (two ways - average annual daily traffic), 10% of which are heavy vehicles[1].

Figure 1 Site Location

[1] Data from Department of Transport and Planning, published 16 December 2019

3.0 Existing Environment

3.1 Sensitive Receptors

Noise sensitive areas are defined in the *Environment Protection Regulation 2021* as dwellings, hospital wards, accommodation centres, prisons, tourist establishments, retirement villages, child care centres, kindergartens. The specific location of the noise sensitive area is land within 10 metres of the aforementioned building types and within the same parcel of land as the building. The most affected location within a noise sensitive area is used for the assessment and often called the *sensitive receptor*.

Industry on Canterbury Road is located directly north and west of the quarry, with residences beyond on Cherylnne Cresent and Liverpool Road respectively. Other noise sensitive receptors are located directly east on Ash Grove, the south on Jeanette Maree Court and south east on Sheffield Road.

Receptors representative of clusters of the closest noise sensitive areas were identified are shown in **Figure 2**. **Table 1** summarises the representative receptors locations (UTM coordinates GDA 1994 Zone 55) and the distance to the primary crusher as reference.

Note that whilst there are other adjacent sensitive receivers, assessment to these receivers are deemed representative of their neighbouring receivers in the same direction and similar separation distances.

Table 1 Receptor Details

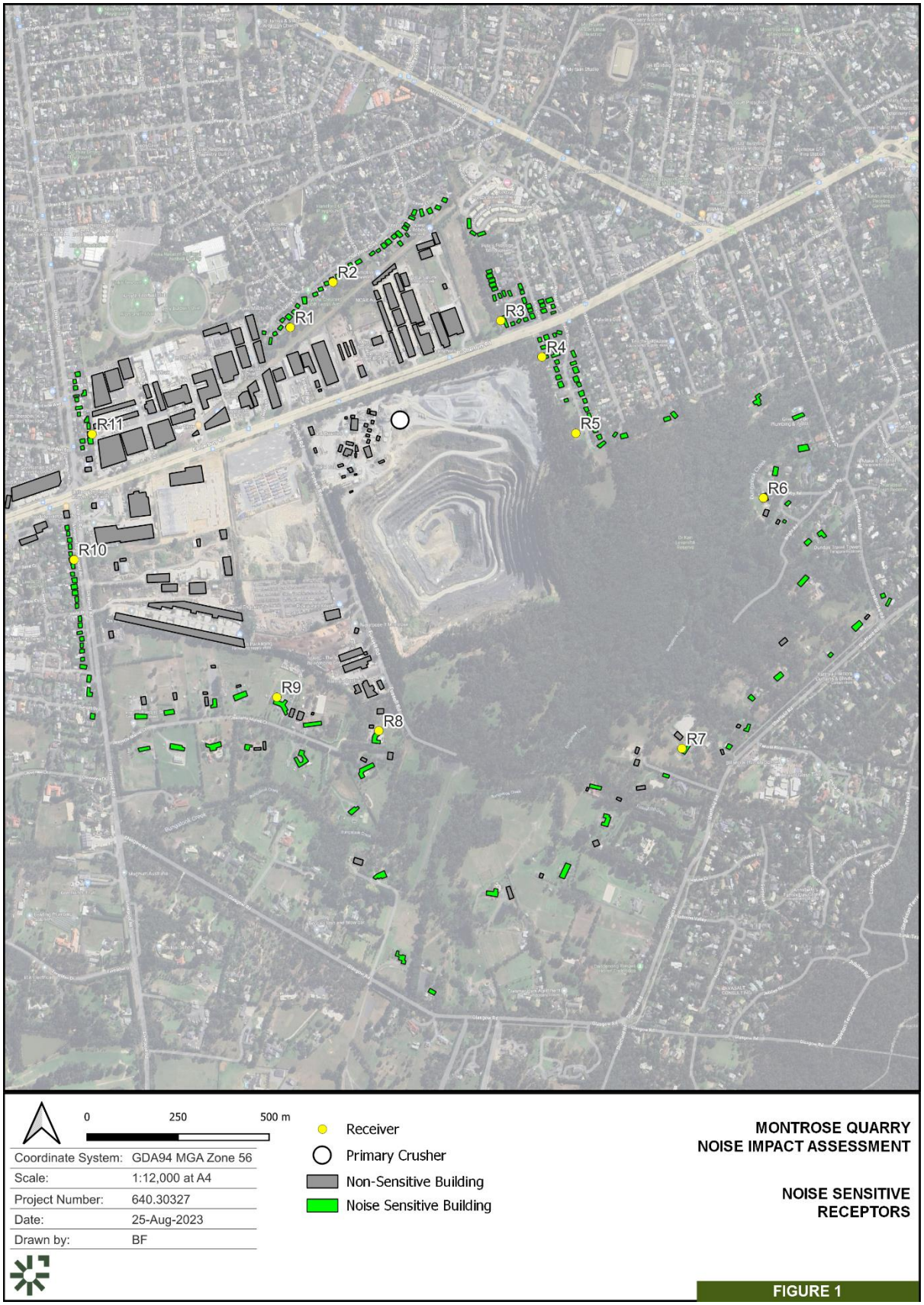
Receptor ID	Address	Land Use Zone	Easting, m	Northing, m	Distance to Primary Crusher, m
R1	5A Landy Court	NRZ3	352439	5813483	400
R2	102 Cherylnne Cres	NRZ3	352557	5813607	420
R3	51 Canterbury Rd	NRZ3	353017	5813502	390
R4	6A Ash Gr	NRZ3	353130	5813402	430
R5	Ash Grove	NRZ3	353223	5813193	480
R6	5 Ruby Rd	LDRZ	353739	5813015	1,020
R7	265 Sheffield Rd	GWAZ1	353515	5812328	1,190
R8	13 Jeanette Maree Ct	GWAZ1	352682	5812377	850
R9	9 Jeanette Maree Ct	GWAZ1	352403	5812468	830
R10	194 Liverpool Rd	GRZ1	351846	5812846	970
R11	163A Liverpool Rd	NRZ3	351895	5813190	850

Land use zones:

- NRZ3: Neighbourhood Residential Zone – Schedule 3
- LDRZ: Low Density Residential Zone
- GWAZ1: Green Wedge A Zone – Schedule 1
- GRZ1: General Residential Zone – Schedule 1

Easting and Northing coordinates with reference to GDA 1994 Zone 55

Figure 2 Sensitive Receptor Locations



3.1.1 Natural Areas

The closest identified natural areas are Dr Ken Leversha Reserve located 130 m east of the Project boundary, the Doongalla Forest and the Dandenong Ranges National Park, both located within 1.5 km of the Project boundary shown in **Figure 3**. Locations of the assessment points are listed in **Table 3**.

Figure 3 Natural Areas

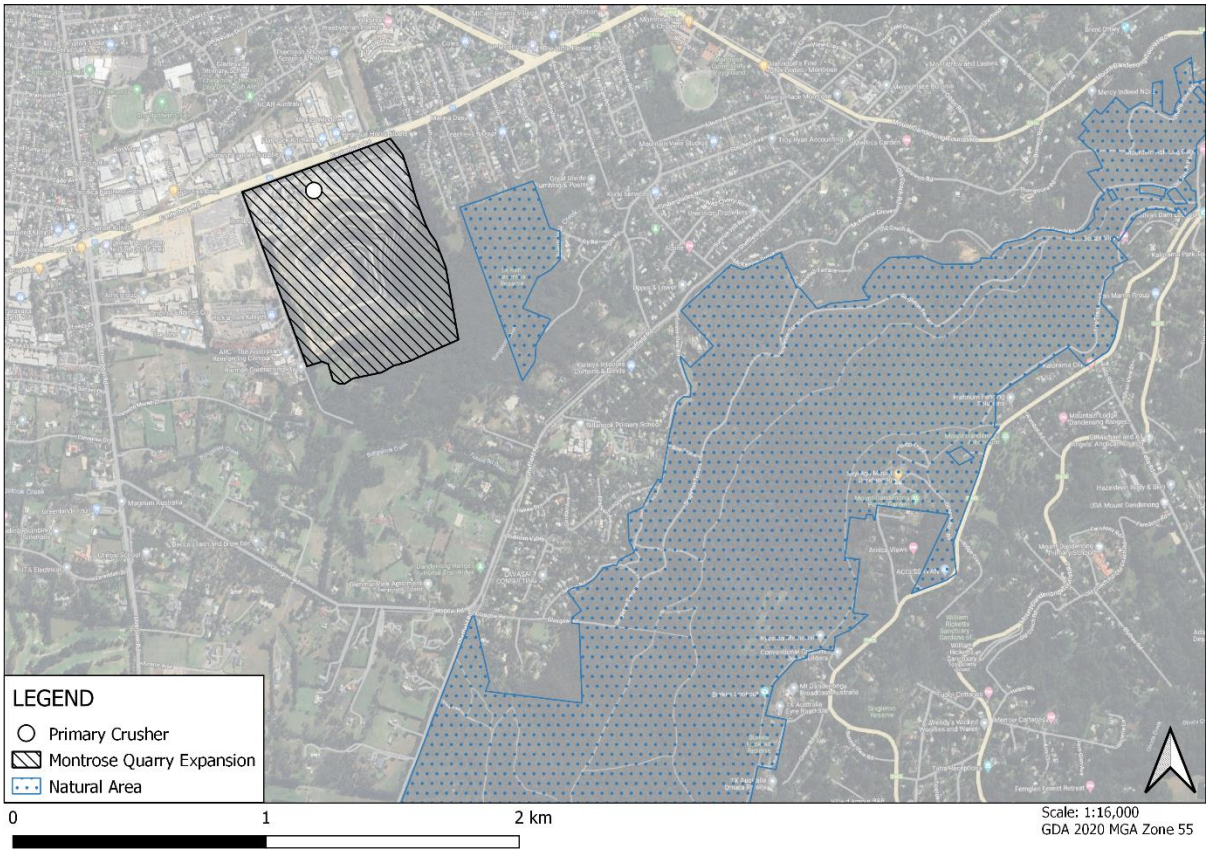


Table 2 Closest Natural Areas

Natural Area	Easting, m	Northing, m	Approx. Distance to Primary Crusher, m
Dr Ken Laversha Reserve	353392	5812991	700
Doongalla Forest	353357	5811458	1890
Dandenong Ranges	354406	5811497	2410

3.2 Ambient Noise Environment

Noise monitoring was conducted by SLR to characterise and quantify the existing noise environment at the project site and surrounding land.

The monitoring was conducted at five locations around the quarry, as shown in **Figure 4**, from Wednesday 23rd February to Wednesday 2nd March 2022 at all locations except for 265 Sheffield Road, where the monitoring was conducted from 2nd to 9th March 2022. At all locations, the monitoring equipment was located externally, at the side of the property closest to the quarry.

Photos of the installed monitoring equipment and detailed results are presented in **Appendix A**.

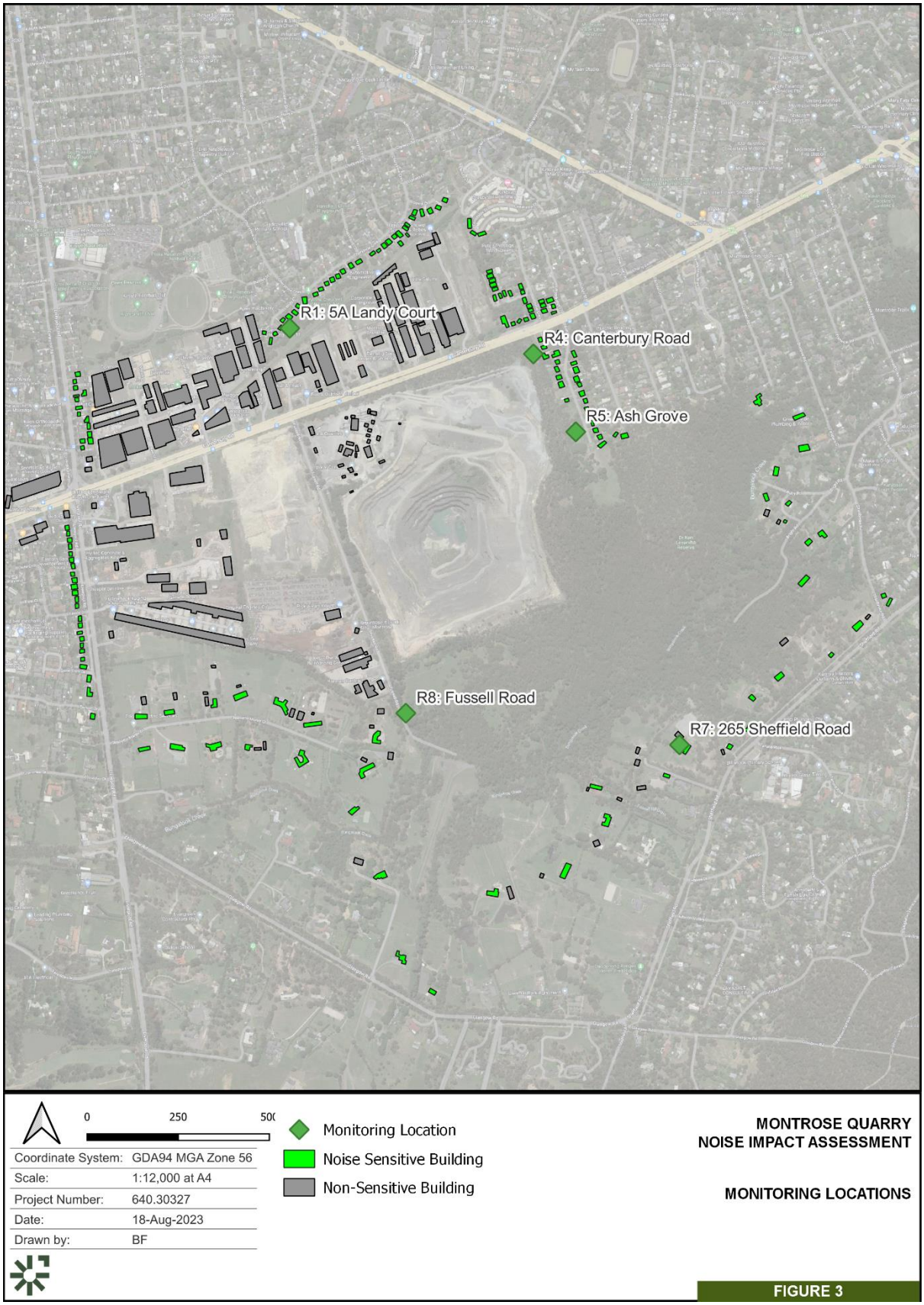
Noise monitoring was conducted in accordance with AS 1055:2018 Acoustics- Description and measurement of environmental noise. The average background noise level was determined in accordance with EPA Victoria Environmental Protection Regulations 2021.

Weather conditions data was obtained from the nearest Bureau of Meteorology weather station at Scoresby (station ID 086104). Monitoring data potentially affected by rain or wind has been excluded from the analysis.

Table 3 Measurement Equipment Details

Receptor ID	Location	Measurement Equipment
R1	5A Landy Court	ARL 316 noise monitor Serial No 16-207-046
R4	Canterbury Road	ARL 316 noise monitor Serial No 16-207-044
R5	Ash Grove	ARL 316 noise monitor Serial No 16-207-045
R7	265 Sheffield Road	ARL 316 noise monitor Serial No 16-203-531
R8	Fussell Road	ARL 316 noise monitor Serial No 16-203-529
All noise monitors carry current calibration certificates.		

Figure 4 Monitoring Locations



3.2.1 Monitoring Results

Table 4 presents the monitoring results summary at each location. Measurement periods adversely affected by weather (rain, high winds) have been excluded from the analysis data set.

Photos of the installed monitoring equipment and detailed daily results are provided in **Appendix A**.

Whilst some of the neighbouring industries may have operated during the noise monitoring, they were not anticipated to have contributed to the L_{90} values established since the minimum of the daily average levels are reported. Moreover, the established L_{90} levels are predominantly considered 'neutral' or 'low' (see **Section 4.2.2**) thereby not materially influencing the noise limits. **Table 5** summarises the noise sources observed during logger deployment and collection.

Table 4 Monitoring Results Summary

Location	L_{90}, dBA			L_{eq}, dBA			L_{10}, dBA			L_{1}, dBA		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
R1	45	41	39	53	55	51	51	53	48	59	59	54
R4	49	44	30	57	55	50	60	58	52	65	63	60
R5	42	36	30	47	55	39	48	47	40	53	54	46
R7	36	34	30	50	50	46	48	47	42	56	53	48
R8	35	35	27	45	43	43	42	44	36	50	50	42

Notes:

L90 levels are determined in accordance with Publication 1997: T*echnical guide: Measuring and analysing industry noise and music noise* the minimum of the arithmetically averaged hourly L90 levels for each daily period.

Leq levels are the logarithmically averaged hourly levels over each daily period.

L10 and L1 levels are the arithmetic average of the daily levels. Daily levels are the arithmetically averaged hourly L10 or L1 levels for each period.

Table 5 Noise Monitoring Notes

Location	Noise Sources
R1	• Traffic on Canterbury Road • Quarry was not audible • Steel work from workshop to the west (grinding) was observed on logger deployment • Minimal difference between day and night background levels suggests a local constant noise source, however nothing was observed during deployment and collection.
R4	• Traffic on Canterbury Road is dominant • Quarry noise was noticeable – however primary crusher is not distinguishable
R5	• Quarry noise is dominant ○ Engine noise, broadband reverse alarms, occasional crashers, primary crusher is audible. • Traffic on Canterbury Road
R7	• Birds • Occasional dog barking

Location	Noise Sources
	• Faint industry noise seemingly from the west, could be some quarry noise coming around the hill between the receiver and quarry.
R8	• Insects and birds • Occasional quarry noise in the form of crashes, engine noise • Occasional noise from the workshop of Fussell Rd • General, indistinguishable industry noise seemingly from a source further west than the quarry, potentially a combination of quarry noise, traffic on Canterbury Rd and industry in Bayswater North/Kilsyth industrial area

4.0 Victorian Regulations

4.1 General Environmental Duty

The General Environmental Duty (GED) is at the centre of the EP Act, and it applies to all Victorians. GED states that a person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste must minimise those risks, so far as reasonably practicable.

The concept of minimising risks of harm to human health and the environment, so far as reasonably practicable, requires the person:

- to eliminate risks of harm to human health and the environment so far as reasonably practicable; and
- if it is not reasonably practicable to eliminate risks of harm to human health and the environment, to reduce those risks so far as reasonably practicable.

Under the Act, harm, in relation to human health or the environment, means an adverse effect on human health or the environment (of whatever degree or duration) and includes:

- an adverse effect on the amenity of a place or premises that unreasonably interferes with or is likely to unreasonably interfere with enjoyment of the place or premises; or
- a change to the condition of the environment to make it offensive to the senses of human beings; or
- anything prescribed to be harm for the purposes of the Act or the regulations.

Harm may arise due to the cumulative effect of harm arising from an activity combined with harm arising from other activities or factors.

To determine what is (or was at a particular time) reasonably practicable in relation to the minimisation of risks of harm to human health and the environment, regard must be had to the following matters:

- the likelihood of those risks eventuating,
- the degree of harm that would result if those risks eventuated,
- what the person concerned knows, or ought reasonably to know, about the harm or risks of harm and any ways of eliminating or reducing those risks,
- the availability and suitability of ways to eliminate or reduce those risks,
- the cost of eliminating or reducing those risks.

In the assessment of noise impacts with reference to GED, consideration must first be given to eliminating risks so far as reasonably practicable, and then to reducing those risks so far as reasonably practicable.

4.2 Noise Assessed under the Regulations Criteria

4.2.1 Environment Protection Act 2017

In Victoria, the Environment Protection Act (EP Act) prescribes that a person must not, from a place or premises that are not residential premises—

- Emit an unreasonable noise; or
- Permit an unreasonable noise to be emitted.

Unreasonable noise means noise that—

- Is unreasonable having regard to the following—
  - Its volume, intensity, or duration
  - Its character.
  - The time, place, and other circumstances in which it is emitted.
  - How often it is emitted.
  - Any prescribed factors, or
- Is prescribed to be unreasonable noise.

For the purposes of the above definition, ‘frequency spectrum’ is a prescribed factor.

The EP Act prescribes that, noise emitted from commercial, industrial and trade premises is prescribed to be aggravated noise if:

- In the case of noise emitted during the day period, the effective noise level exceeds the lower of the following:
  - 75 dBA.
  - the noise limit plus 15 dB,

and

- In the case of noise emitted during the evening period, the effective noise level exceeds the lower of the following:
  - 70 dBA.
  - the noise limit plus 15 dB.

and

- In the case of noise emitted during the night period, the effective noise level exceeds the lower of the following—
  - 65 dBA
  - the noise limit plus 15 dB.

4.2.2 Environment Protection Regulations and Noise Protocol 2021

The Environment Protection Regulations 2021 (Regulations) support the EP Act by providing clarity and further detail for duty holders on how to fulfil their obligations. Regulations are used to deal with matters in detail and may contain their own penalties for breaches.

In Victoria, noise emissions from commercial, industrial and trade premises are not permitted to be unreasonable or aggravated, and are subject to the provisions of the Regulations, and the "Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues", EPA Publication 1826.4 (the "Noise Protocol").

The Noise Protocol presents the methodology for determining the noise limit (maximum allowable level of noise emitted from a premise) when measured in a noise sensitive area. Noise sensitive areas are defined in the Regulations as that part of the land within the boundary of a parcel of land that is within 10 m of the outside of the external walls of a place where people generally sleep (homes, dormitories, hotels, hospitals, correctional facilities etc.), schools (including childcare centres) and tourist establishments in rural areas (campgrounds, caravan parks, etc.).

Noise is assessed over a 30-minute period during which the premises operate. The measured or predicted noise level is adjusted for duration, character (tonality, intermittency and impulsiveness) and measurement position (reflection, indoor) to determine the effective noise level for assessment against the noise limit.

The setting of the noise limits depends on whether the sensitive receivers are within a major urban area, or a rural area. Receivers around the quarry lie within rural areas.

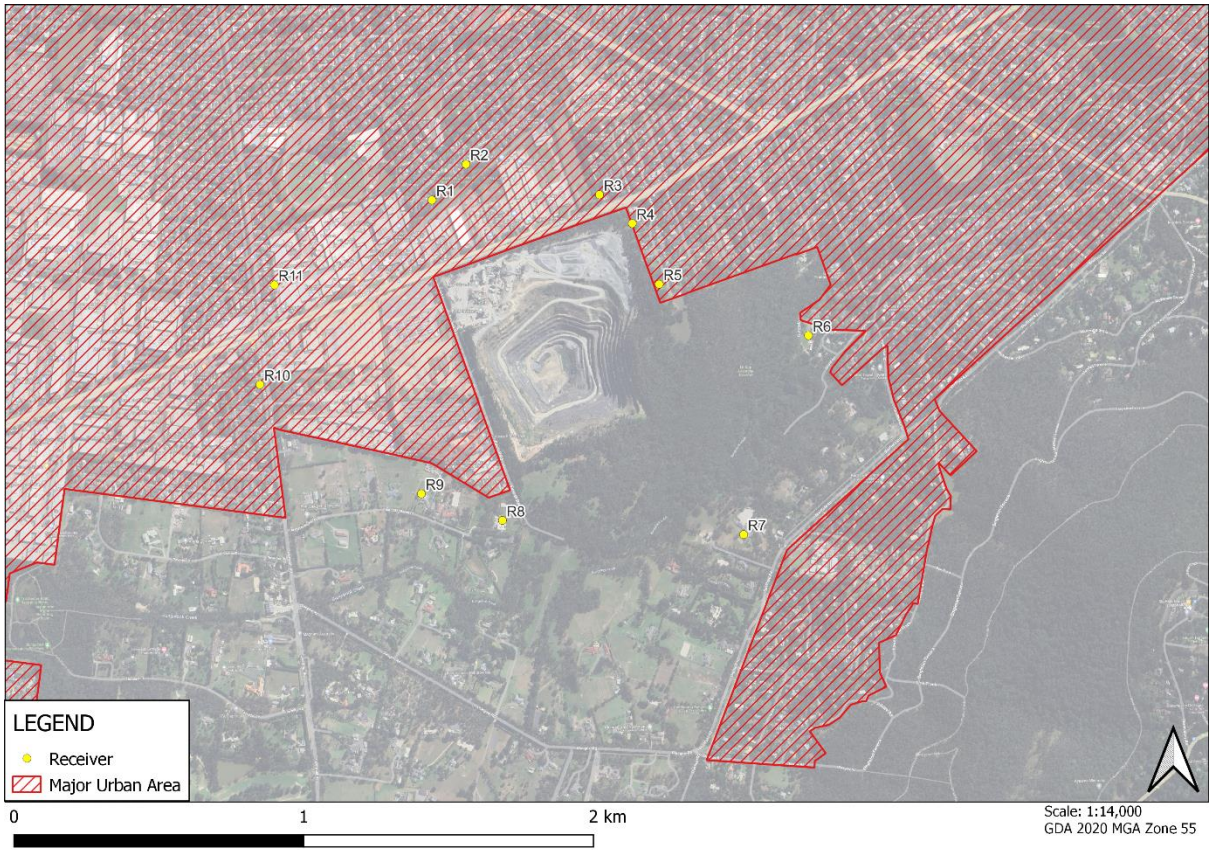
Table 6 presents the assessment periods prescribed by the Regulations.

Table 6 Assessment period definitions (Environment Protection Regulations)

Period	Day	Time
Day	Monday to Saturday (except public holidays)	7 am – 6 pm
Evening	Monday to Saturday Sunday and public holidays	6 pm – 10 pm 7 am – 10 pm
Night	Monday to Sunday	10 pm to 7 am

The setting of the noise limits depends on whether the sensitive receptors are within a major urban area, or a rural area. **Figure 5** defines the major urban area boundary for Montrose. Receptors to the south of the site, R6 through to R9 are located in a Green Wedge A Zone (GWAZ1) and are assessed under the rural area method. All other receptors are assessed under the urban area method.

Figure 5 Major Urban Area



4.3 Noise Limits

Urban Method – Noise Limits

The Noise Protocol noise limits for receivers in an urban environment take into consideration land zoning in the vicinity of the sensitive receiver and the existing background noise environment in the absence of industry noise.

The resulting noise limit is determined from the background level classification, measured background levels and the zoning level. **Table 7** summarises the noise limit calculation methodology for each background level classification and time period.

Table 7 Urban Method Noise Limit Definitions

Background Level Classification	Time Period		
	Day	**Evening**	**Night**
High	Background + 6 dB	Background + 3 dB	Background + 3 dB1
Neutral	Zoning Level	Zoning Level	Zoning Level
Low	0.5*(Zoning Level + Background) + 4.5 dB	0.5*(Zoning Level + Background) + 3 dB	0.5*(Zoning Level + Background) + 3 dB
1: But not greater than 55 dBA			

Rural Method – Noise Limits

The Noise Protocol noise limits for receivers in a rural environment take into consideration both influence of the zoning map categories (and changes in zoning categories), the background noise, and the distance between the zoning boundary and receiver (where different zones apply).

Background Relevant Areas

A background relevant area is defined in the Noise Protocol as a noise sensitive area within a rural area where background levels may be higher than usual. This includes areas where freeway or highway traffic is a significant audible background noise source.

When a background assessment has been conducted, the noise limits are:

a. For the day period, the noise limit is the greater of:
    i. The distance adjusted level or base noise level, or
    ii. The day background level plus 8 dB
b. For the evening period, the noise limit is the greater of:
    i. The distance adjusted level or base noise level, or
    ii. The evening background level plus 5 dB
c. For the night period, the noise limit
    i. Is the greater of –
        1. The distance adjusted or base noise level, or
        2. The night background plus 5 dB
    ii. Must not be greater than 55 dBA.

Noise Limits in Rural Areas for Earth Resources

The noise protocol defines ‘earth resources premises’ as follows:

> *Earth resources premises include sites such as mines and quarries, and ancillary infrastructure (such as evaporation pond facilities, ventilation shafts, tailings dams or pumping stations) located within the site’s approved working area.*

Receptors R6 to R9 are located in a rural area and the quarry is classified as an earth resources premises. The noise limits for the earth resource premises are determined in accordance with Section 2.7 of the Noise Protocol.

The rural receptors are situated within a Green Wedge A (GWAZ1), Clause 35a of the Noise Protocol defines the noise limits for Green Wedge receptors**:**

- Day: 45 dBA
- Evening: 38 dBA
- Night 33 dBA

No distance adjustments are applied to these earth resource levels. These levels may be adjusted if the receptor is in a background relevant area with a background level assessment in accordance with the Noise Protocol.

4.3.1 Project-specific Noise Limits

Noise limits for the urban receptors have been calculated for the for the day, evening and night, based on the relevant background levels and zoning levels, and are detailed in **Table 8** to **Table 12**. **Appendix B** presents the detailed zoning calculations.

A background level assessment was undertaken for the rural receptors to identify adjustments to the earth resource levels, if required.

It is noted that existing background noise levels should be measured in the absence of industry noise. It was also noted during the background survey that the quarry was not audible at Sheffield Road or Landy Court[1]. Although other industry was audible at Landy Court. The quarry was audible at Ash Grove, Canterbury Road and Fussell Road. Since the background level classification is neutral during day periods at Ash Grove and Canterbury Road, i.e. the noise limits are defined by zoning levels a reduction in background levels by up to 2 dB will not affect noise limits.

Table 8 Noise Limits – Landy Court & Cherylnne Crescent

R1 & R2, R10 & R11	Assessment Period		
	Day	Evening	Night
Zoning Levels, dBA	56	50	45
Background noise level, dBA	45	41	39
Background level classification	Neutral	Neutral	Neutral
Noise limit, dBA	**56**	**50**	**45**

Table 9 Noise Limits – Canterbury Road

R3 & R4	Assessment Period		
	Day	Evening	Night
Zoning Levels, dBA	59	53	48
Background noise level, dBA	49	44	30
Background level classification	Neutral	Neutral	Low
Noise limit, dBA	**59**	**53**	**42**

Table 10 Noise Limits – Ash Grove

R5	Assessment Period		
	Day	Evening	Night
Zoning Levels, dBA	53	47	42
Background noise level, dBA	42	36	30
Background level classification	Neutral	Low	Low
Noise limit, dBA	**53**	**45**	**39**

Table 11 Noise Limits – Sheffield Road

R6 & R7 (Rural)	Assessment Period		
	Day	Evening	Night
Earth Resource Level, dBA	45	38	33
Background noise level, dBA	36	34	30
Background level assessment (background + 8/5/5 D/E/N)	44	39	35
Noise limit, dBA	**45**	**39**	**35**

Table 12 Noise Limits – Fussell Road & Jeanette Maree Court

R8 & R9 (Rural)	Assessment Period		
	Day	Evening	Night
Earth Resource Level, dBA	45	38	33
Background noise level, dBA	35	35	27
Background level assessment (background + 8/5/5 D/E/N)	43	40	32
Noise limit, dBA	**45**	**40**	**33**

4.3.2 Cumulative Noise Impacts

The quarry is located adjacent to an industrial zone fronting Canterbury Road consisting of warehouses and workshops. Metal work was audible at Landy Court during the monitoring, seemingly originating from workshops accessible from Twobar Place to the immediate west of Landy Court.

Noise from all commercial and industrial operations are required to cumulatively comply with the identified noise limits.

This can be a complicated aspect to address and further guidance is provided in the EPA 2021 Publication 1997 *Technical Guide – Measuring and analysing Industry noise and music noise.* The guidance provided in Section 3.3.1 of this publication is as follows:

> **Proposed new industry or extension of existing premises in major urban areas**
>
> *For new industries, plant expansion or major new sources in major urban areas, including new industry areas in an urban growth zone, the equal sharing principle applies. The contribution of the proposed development should be abated to meet, for each of the day, evening, or night period, a level set below the relevant noise limit by 10 x log10(N) decibels, where N is the total number of existing and likely contributing industry premises.*
>
> *New individual noise sources located within existing premises should be chosen, sited, or abated so that the noise contribution within noise sensitive areas is 10–15 dB below the noise limit.*
>
> *When considering the noise design for the proposal, the applicant, acoustic consultant and approval body should discuss the noise design objectives at an early stage.*

The equal sharing principle also applies to existing industry. In this case most noise sources are existing, with the exception of haul routes and working face; i.e. the dominant sources are not changing.

In considering the above, some practical considerations need to be made. In the case of the subject site:

- What is a reasonable allowance for the total number of industries.
- Many industries in the precinct have considerably smaller acoustic emissions than the quarry.
- Most other industries are closer to the receptors than the quarry. Industries further away from the receptors are shielded by closer industries. As such, only the nearest unshielded uses are likely to contribute significantly to noise levels at the sensitive receivers.
- Industries can operate at different times and with different sound output. It is not possible to accurately determine if worst case / concurrent noise operations could occur from all sites at once.

Impractical consideration of the above would result in a particularly high “10 Log (N)” adjustment to noise limits being applied to account for all individual commercial / industrial operators in the precinct.

Consideration of cumulative impacts is however deemed required. SLR attended site on 12 December 2023 to investigate the type of industries on Canterbury Road and make a subjective assessment of their contributions to industry noise in the area.

Given the discussion above and site assessment, the cumulative industry adjustment was based on the closest industries to each receptor within in each direction. **Table 13** shows the number of considered industries near each receptor and the resulting cumulative industry noise adjustment.

Table 14 summarises the noise limits for each receptor. Note that the cumulative industry adjustment was applied to the day time limit only. The quarry does not operate at night, also it is assumed that many of the industries do not emit noise at night as well.

Table 13 Cumulative Industry Adjustment

Receptor	Number of Industries	Cumulative Industry Adjustment, dB
R1	6	8
R2	6	8
R3	2	3
R4	2	3
R5	1	0
R6	1	0
R7	1	0
R8	1	0
R9	1	0
R10	4	6

Receptor	Number of Industries	Cumulative Industry Adjustment, dB
R11	4	6

Table 14 Summary of Noise Limits, dBA

Receptors	Assessment Period		
	Day	Evening	Night
R1, R2	48	50	45
R3, R4	56	53	42
R5	53	45	39
R6, R7	45	39	35
R8, R9	45	40	33
R10, R11	50	50	45
Cumulative industry adjustment has been applied to the day time noise limits.			

4.3.3 Specific Noise Limit Variations for Mines, Quarries and Landfills.

The Noise Protocol provides several variations to the noise limit for some quarry activities. Initial removing of top soil, before acoustic noise bunds are constructed and the construction of noise bunds for example may be exempted from noise limits during the day period. **Table 15** reproduces the mine, quarry and landfill activities that are exempt or assessed under relaxed noise limits. Note that these variations apply only when noise limits cannot be achieved.

Table 15 Mine, Quarry, and Landfill Variations

Activity	Application of variations	Variations to noise limits
Installation of construction noise control works	The variation applies to the construction of structures that are specifically designed for a noise-control purpose, (such as walls or earth bunds) to meet the noise limits. The variation applies to noise control works to protect different noise sensitive areas at a later stage in the project e.g. where extraction works take place in a different part of a large site. The variation does not include mining or quarrying works carried out during the project that have a coincidental, secondary noise-control benefit e.g. general overburden stockpiling, or building construction or demolition.	Noise from the activity may be exempted from noise limits during the day period.
Site clearing and preparation works	The variation applies to vegetation removal, topsoil removal, subsoil removal, road construction and civil works such as site drainage where the	Noise from the activity may be exempted from noise limits during the day period

Activity	Application of variations	Variations to noise limits
	activity will happen before acoustic mounds can feasibly be constructed. The variation does not apply to overburden removal.	
Site rehabilitation	The variation applies to progressive and final site rehabilitation, occurring at the final surface level. The variation does not apply to backfilling of a pit.	During the day period, the noise limit may be increased by up to 10 decibels, to a maximum of 68 dB(A).
Necessary unshielded work	The variation applies to waste dump extensions (at a mine or quarry) or tailings dam construction that is necessary but cannot practicably be shielded by barriers, landforms or natural topography.	During the day period, the noise limit may be increased by up to 10 decibels, to a maximum of 68 dB(A).

4.4 Low Frequency Noise Guidelines

EPA Publication 1996 “Noise guidelines: Assessing low frequency noise” (LFNG) provides guidance for acoustic consultants and other qualified professionals who assess low frequency noise (10Hz – 160Hz).

Frequency spectrum is a prescribed factor under the EP Act and subordinate legislation. The assessment of frequency spectrum applies to noise from commercial, industrial and trade premises only.

Low frequency noise emitted from commercial, industrial and trade premises should be assessed by comparing its frequency spectrum to the relevant threshold levels. Specifically, Z-frequency weighted (unweighted or linear) measurements in one-third octave bands from 10 Hz to 160 Hz are compared with low frequency threshold levels.

The threshold levels are not set limits. Rather, they are levels that indicate a potential risk of problematic low frequency noise. The disturbance from low frequency noise depends on the:

- noise level,
- characteristics that can increase annoyance with the noise, for example, tonality, frequency modulation,
- baseline noise levels in the absence of the noise of concern.

Table 16 details the outdoor noise threshold criterion to be used for outdoor measurements. The noise threshold level for outdoor low frequency is based on the assumed façade noise reductions given in Downey and Parnell (2017).

Table 16 Outdoor low frequency noise threshold levels

Outdoor one-third octave low frequency noise threshold levels													
Freq, Hz	**10**	**12.5**	**16**	**20**	**25**	**31.5**	**40**	**50**	**63**	**80**	**100**	**125**	**160**
L_{eq}, dB	92	89	86	77	69	61	54	50	50	48	48	46	44

4.5 Noise Not Formally Assessable Under the Regulations

Other sources of noise that are not assessed under the Regulations in the EP Act still require evaluation once the principles of GED have been applied. The following sections provide an overview of how noise not assessed under the Regulations is assessed in Victoria.

4.5.1 Environment Reference Standard

The Environment Reference Standard (ERS) tool is defined in the EP Act. The ERS:

- identifies environmental values that the Victorian community want to achieve and maintain.
- provides a way to assess those environmental values in locations across Victoria.

The ERS is made up of four main components in relation to ambient sound:

- Environmental values: These are the central parts of the ERS. An environmental value is a statement about a desired outcome for human health and the environment. For example, an ambient sound environment that supports child development and learning. Environmental values are the uses, attributes, or functions of the environment that the Victorian community wants to achieve and maintain.
- Areas of application: The ERS defines the area or areas to which the environmental values, or specific indicators and objectives, apply. For example, most ambient sound indicators and objectives relate to specified land use planning zones.
- Indicators: These are usually defined in relation to each environmental value. The indicators are the parameters or markers used to assess whether environmental values are being achieved or maintained, or if they are threatened. For example 'outdoor LAeq' ('outdoor LAeq,16h from 6 am to 10 pm' or 'outdoor LAeq,8h from 10 pm to 6 am'), which is a key indicator used for ambient sound (ERS Table 3.3).
- Objectives: These are the assessment benchmarks. An objective is the character, level, load, concentration or amount of an indicator used to assess whether an environmental value (or several environmental values) is being achieved, maintained or threatened. Most objectives are scientifically derived quantitative assessment levels or a prescribed scientific basis for assessment. For example, the ambient sound objective for 'natural areas' is 'a sound quality that is conducive to human tranquillity and enjoyment having regard to the ambient natural soundscape' (ERS Table 3.3).

Table 17 presents the ERS environmental values relating to the ambient sound environment.

Table 17 ERS environmental values relating to the ambient sound environment

Environmental value	Description of environmental value
Sleep during the night	An ambient sound environment that supports sleep at night
Domestic and recreational activities	An ambient sound environment that supports recreational and domestic activities in a residential setting
Normal conversation	An ambient sound environment that allows for a normal conversation indoors without the need to raise voices
Child learning and development	An ambient sound environment that supports cognitive development and learning in children

Environmental value	Description of environmental value
Human tranquillity and enjoyment outdoors in natural areas	An ambient sound environment that allows for the appreciation and enjoyment of the environment for its natural condition and the restorative benefits of tranquil soundscapes in natural areas
Musical entertainment	An ambient sound environment that recognises the community's demand for a wide range of musical entertainment

For the purposes of 'areas of application' the ERS outlines a framework for assessing the ambient sound environment over a period of time based on the land use category of the area of assessment. **Table 18** presents the land use categories relating to the ambient sound environment.

Table 18 Land use categories for the ambient sound environment

Land use category	General description	Planning zones
Category I	An urban form with distinctive features or characteristics of taller buildings, high commercial and residential intensity, and high site coverage.	Industrial Zone 1 (IN1Z) Industrial Zone 2 (IN2Z) Port Zone (PZ) Road 1 Zone (RDZ1) Capital City Zone (CCZ) Docklands Zone (DZ)
Category II	Medium rise building form with a strong urban or commercial character. Typically contains mixed land uses including activity centres and larger consolidated sites, and an active public realm.	Industrial Zone 3 (IN3Z) Commercial 1 Zone (C1Z) Commercial 2 Zone (C2Z) Commercial 3 Zone (C3Z) Activity Centre Zone (ACZ) Mixed Use Zone (MUZ) Road 2 Zone (RDZ2)
Category III	Lower rise building form including lower density residential development and detached housing typical of suburban residential settings or in towns of district or regional significance.	Residential Growth Zone (RGZ) General Residential Zone (GRZ) Neighbourhood Residential Zone (NRZ) Urban Floodway Zone (UFZ) Public Park and Recreation Zone (PPRZ) Urban Growth Zone (UGZ)
Category IV	Lower density or sparse populations with settlements that include smaller hamlets, villages and small towns that are generally unsuited for further expansion. Land uses include primary industry and farming.	Low Density Residential Zone (LDRZ) Township Zone (TZ) Rural Living Zone (RLZ) Green Wedge A Zone (GWAZ) Rural Conservation Zone (RCZ) Public Conservation and Resource Zone (PCRZ) Green Wedge Zone (GWZ) Farming Zone (FZ) Rural Activity Zone (RAZ)

Land use category	General description	Planning zones
Category V	Unique combinations of landscape, biodiversity, and geodiversity. These natural areas typically provide undisturbed species habitat and enable people to see and interact with native vegetation and wildlife	Natural areas are classified as land within Category V irrespective of the planning zones that apply to that land.
Category I, II, III or IV depending on surrounding land uses and the intent of the specific planning zone (which may have a diversity of uses) as specified in a schedule to the planning zone		Comprehensive Development Zone (CDZ) Priority Development Zone (PDZ) Special Use Zone (SUZ) Public Use Zone (PUZ)

For the ambient sound environment, for each land use category, the ERS sets out indicators and objectives. The objectives for each land use category are typical ambient sound level values and are neither noise limits nor noise design criteria. **Table 19** presents the indicators and objectives relating to the ambient sound environment.

Table 19 Indicators and objectives for the ambient sound environment

Land use category	Indicators	Objectives
Category I	Outdoor LAeq,8h from 10pm to 6am	55 dBA
	Outdoor LAeq,16h from 6am to 10pm	60 dBA
Category II	Outdoor LAeq,8h from 10pm to 6am	50 dBA
	Outdoor LAeq,16h from 6am to 10pm	55 dBA
Category III	Outdoor LAeq,8h from 10pm to 6am	40 dBA
	Outdoor LAeq,16h from 6am to 10pm	50 dBA
Category IV	Outdoor LAeq,8h from 10pm to 6am	35 dBA
	Outdoor LAeq,16h from 6am to 10pm	40 dBA
Category V	Qualitative	A sound quality that is conducive to human tranquillity and enjoyment having regard to the ambient natural soundscape

Where noise (not assessable under the Protocol) is generated as part of the Project, it will be evaluated against the ERS in accordance with the guidance provided in EPA Publication 1992: “Guide to the Environment Reference Standard”.

The residential receptors that surround the Project are Category III and IV. The suburban development to the north and east fit within Category III, while the “rural style” homes in the Green Wedge Zone to the south on Glasgow Road and Sheffield Road are defined as Category IV. The closest Category V areas are Dr Ken Leversha Reserve and Mount Dandenong and the surrounding natural areas. The noise objectives applicable to areas surrounding the quarry are presented in **Table 20** below.

Table 20 Established Indicators and Objectives for The Project

Land use category	Established Indicators	Established Objectives
Category III	Outdoor LAeq,8h from 10pm to 6am	40 dBA
	Outdoor LAeq,16h from 6am to 10pm	50 dBA
Category IV	Outdoor LAeq,8h from 10pm to 6am	35 dBA
	Outdoor LAeq,16h from 6am to 10pm	40 dBA
Category V	Qualitative	A sound quality that is conducive to human tranquillity and enjoyment having regard to the ambient natural soundscape

4.5.2 Application Hierarchy of Noise Considerations

The EP Act and subordinate legislation provides different assessment pathways for noise sources and receivers. Whilst classifications of noise impacts are dependent on both the type of noise source and the type of receiver, the hierarchy for both classifications of noise adopts the following steps:

1 1. Apply GED and seek to eliminate risks of harm to human health and the environment so far as reasonably practicable. If it is not reasonably practicable to eliminate risks of harm to human health and the environment, then reduce those risks so far as reasonably practicable.

2 2a. Assess residual impacts against Regulations (noise assessed under the Regulations) or the ERS (noise assessed other than under the Regulations).

3 2b. Assess residual impacts against relevant guidelines (all noise).

Table 21 presents several types of noise sources and receivers identified for the Project, and the relevant noise criteria to assess them against.

Table 21 Framework for Managing and Assessing noise

Type of Noise Source	Type of Receiver	Reference instrument/document
All noise sources	All receivers	All noises need to consider GED
All noise sources	All receivers	All noises need to consider Unreasonable Noise[1]
Operational noise (commercial / industrial)	Noise sensitive areas	Noises that are assessable under the Regulations - Noise Protocol and LFN Guidelines

Type of Noise Source	Type of Receiver	Reference instrument/document
Operational noise (commercial / industrial)	Areas relating to human tranquillity and enjoyment outdoors in natural areas	Noises that are assessable other than under the regulations - ERS

1: Unreasonable noise as defined by part (a) of the definition of unreasonable noise in the EP Act, Section 3(1).

5.0 General Environmental Duty

The EPA 'General Environmental Duty' (GED) forms an essential component of the EP Act. It requires that a person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste, must minimise those risks, so far as reasonably practicable. Irrespective of compliance with the Noise Protocol Limits, the GED requires consideration of noise control measures to further reduce the noise levels, where feasible and practicable.

The following reasonably practicable control measures have been proposed, or implemented, to reduce the risk of harm to human health and the environment:

- Enclosed primary and secondary processing plant.
- Noise and visual bund in the southwest corner.
- Slow moving product in Zone 2 to enable less frequent vehicle movements close to sensitive receptors.
- No processing or use of the rotary blast drill prior to 7 am.
- The replacement of the aged heavy vehicle fleet with new late model haul trucks fitted with the latest noise attenuation muffler.
- Equipment shall be regularly maintained, to ensure noise levels do not increase over time. Particular attention should be paid to lubrication, vibration from loose parts, engine maintenance and any acoustic enclosures.
- The replacement of reverse alarms with squawker reversing alarms – these are 5dB quieter than the pure tone alarms.

6.0 Noise Assessment

The noise emissions from current quarry operations have been measured and this data, together with the proposed quarry expansion plans a noise model has been developed in SoundPLAN software to assess predicted effective noise levels at the noise sensitive receptors identified in **Section 3.1** against the project specific noise limits established in **Section 4.3** in accordance with the Noise Protocol.

Low frequency noise levels (between 10 and 160 Hz) are also evaluated at each identified noise sensitive receptor in accordance with the Low Frequency Noise Guidelines.

6.1 General Noise Modelling Assumptions

The following general assumptions are made based on best practice modelling methods to suit the project:

- Noise modelling was conducted using the ISO 9613-2[2] algorithms incorporated in the noise modelling software. The ISO 9613-2 algorithm predicts the A-weighted sound pressure levels under meteorological conditions favourable to propagation from sources of known sound power levels. This enhanced propagation is equivalent to downwind propagation or a moderate ground-based temperature inversion. The model also includes attenuation due to air absorption, ground attenuation and shielding.
- Buildings (noise sensitive and outbuildings) were identified in contemporary aerial imagery (Nearmap) and included in the noise model.
- The reflection order of buildings was set to three (3), indicating that the noise model allowed for up to three (3) reflections off facades. Building facades were assigned a 1 dB reflection loss.
- Noise sources were measured on site, see **Section 6.3** and **Appendix C**.
- Source heights were set according to the source item.
- Receivers are located 1m from the most exposed façade of a noise sensitive building[3] and set to 1.5 m above ground level.
- Ground topography within 2 km of the quarry was sourced from publicly available 1 second (~30 m grid spacing) digital elevation model published by Geoscience Australia. Ground topography of the quarry site itself was supplied by Boral.
- Proposed topography of the extension scenarios was supplied by Boral.
- Ground attenuation is modelled by a single number parameter between 0 (hard – reflective) and 1 (soft – absorptive). Ground within the quarry (and extension), industrial areas and roads were modelled as hard surfaces, other ground was modelled with a ground absorption parameter of 0.6, which is suitable for suburban areas.
- The model was calibrated by running the model and comparing predicted levels at the calibration measurement points at strategic locations around the quarry boundary. Individual source levels were adjusted until predicted levels at all calibration points were within +/- 1 dB of the measured levels. Calibration locations and levels are shown in **Appendix C**.

6.2 Noise Assessment Scenarios

Eight staging plans were developed by Boral and GHD and are used for the basis of noise modelling[4]. **Table 22** describes each stage of the expansion. Highlighted rows show stages modelled in this noise assessment. Eight staging plans were developed by Boral and GHD and are used for the basis of noise modelling[5]. **Table 22** describes each stage of the expansion. Highlighted rows show stages modelled in this noise assessment.

Stages 1, 2, 3, 5 and 7 are modelled as part of this noise assessment. The initial stages involve works close to the surface with minimal acoustic shielding. As the pit expansion progress, product extraction is performed at lower relative levels and acoustic shielding

[2] ISO 9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*

[3] With the exception R5, which was located in an undeveloped block.

[4] GHD, 12559266, Boral Montrose Staging Plan and Rehabilitation Concept, 04 November 2022

[5] GHD, 12559266, Boral Montrose Staging Plan and Rehabilitation Concept, 04 November 2022

increases. Therefore the earlier stages have the highest potential for noise impacts and are the priority for modelling.

Table 22 Expansion Stage Descriptions

Noise Scenario	Stage	Time from commencement (years)	Description
1	N/A	N/A	Current operating scenario. Product is extracted from the pit.
2	1	0.5	Initial eastern ramp access, OB extraction at RL 192. Upgrade of western haul road. Initial southern access ramp; at RL 192 and RL 160
3	2	2.3	Advance eastern batter face at RL 192. Advance southern OB and resource faces from RL 192 to RL 144. Complete first tier of dump at RL 36 and begin second tier at RL 50
4	3	5.5	Eastern batter complete RL 192. Advance southern OB and resource faces, introduce bench level RL 128. Complete second tier dump at RL 50 and commence third tier at RL 70
-	4	7.2	Eastern batter, excavate RL 176. Southern batter, Advance benches RL 126 to RL 160 eastwards. Complete third tier of OB dump at RL 70 and begin fourth tier at RL 88
5	5	10.2	OB excavation completed (to RL 128). Eastern batter, complete RL 176 and 160, establish RL 144. Finish dumping to RL 88 (fourth / final tier).
-	6	14.7	Eastern batter, complete RL 144 and RL 128, establish RL 112. Southern batter, complete RL 128 and establish RL 112
6	7	21.8	Eastern batter, continue RL 112 and establish RL 96. Southern batter, continue RL 96 and establish RL 80. No access from western haul road, access now from eastern haul road.
-	8	29.3	Completion of levels RL 96 & RL 80. Commencement of levels RL 64, RL 48 and RL 32 via extension of access ramp on southern and eastern sides. Potential to commence placement of imported fill material
-	Final	32.2	Completion of levels RL 48, RL 32 and RL 20. (Final Extraction Batters)
RL = Relative level, OB = Overburden Shaded stages are modelled in this noise assessment.			

Scenario 1: Current Operations

Scenario 1 models the current day time operation of the quarry, asphalt and concrete plants. Product extraction is occurring within the pit and hauled to the primary crusher. The quarry processing plant, asphalt plant and concrete batch plant is operating and customer trucks access the three plants through out the day.

A drill rig, excavator and water cart are working within the pit. Three rigid haul trucks haul extracted rock to the top of the pit and dump it into the primary crusher for processing.

Product is refined and sorted in the processing plant and stored in hoppers to be sold or transferred to the sales yard.

A total of 9 sales trucks attends the quarry per 30 minute assessment period. 2.5 trucks per assessment period attends the asphalt plant and 2.5 concrete trucks access the concrete batch plant per period as well.

Scenario 2: Expansion Stage 1

Scenario 2 models the initial expansion stage. The quarry processing plant, asphalt plant and concrete batch plant are operating, and extraction is continuing in the pit as per Scenario 1.

Access roads to the eastern and southern areas are established and overburden (OB) removal is undertaken in both areas at RL192.

Note that OB extraction will not occur in both areas simultaneously, however the eastern and southern areas are sufficiently removed from each other that extraction in both areas were modelled in this scenario.

Scenario 3: Expansion Stage 2

OB removal continues at RL192 in the eastern area.

OB removal also continues at RL192 in the south. Extraction commences in the southern area at RL144.

OB is hauled into the pit and dumped. An excavator and dozer works in the pit.

The quarry processing plant, asphalt and concrete batch plants are operating as normal throughout the expansion scenarios. Extraction is concluded in the pit.

Scenario 4: Expansion Stage 3

OB removal at RL192 is completed in the eastern area.

OB removal continues in the south east corner of the quarry at RL160, extraction is also modelled on the RL160 bench.

Waste is hauled and dumped into the pit.

Scenario 5: Expansion Stage 5

OB removal concluded to RL128. Extraction in the southern area at RL128. Waste is hauled and dumped into the pit.

Scenario 6: Expansion Stage 7

East and south areas join, access is via eastern route; the haul route to the southern expansion area via the western boundary is closed. Extraction at RL 80 and RL 96.

6.3 Sound Power Levels

A site noise survey was conducted on 18 March 2022 to measure all noise emitting plant. Tables of 1/3 octave sound pressure levels measurements and derived sound power levels (SWL) are provided in **Appendix C**.

In terms of source contribution, noise sources were categorised into several groups:

- Asphalt
- Concrete
- Quarry
- Overburden Removal
- Extraction
- Pit Dump

Summaries of the effective SWL for each group are presented in the following tables.

Table 23 Asphalt Sound Power Levels

Item	Qty	SWL, per unit, dBA
Asphalt plant siren	1	109
Asphalt plant	1	99
Sales trucks	2.5	109

Table 24 Concrete Batch Plant Sound Power Levels

Item	Qty	SWL, per unit, dBA
Concrete loading	1	105
Concrete siren	1	109
Slump stand	1	112
Concrete truck	2.5	107

Table 25 Quarry Sound Power Levels

Item	Qty	SWL, per unit, dBA
Quarry Sales truck	9	107
Coding house	1	95
Screens (north)	1	113
Screens (south)	1	118
Dumping rock into crusher	1	110
Primary crusher	1	112
Barmac crusher	1	109
Front end loader	1	107

Table 26 Overburden Removal Sound Power Levels

Item	Qty	SWL, per unit, dBA
Haul truck	3	113
Excavator	1	107
Dozer	1	108

Table 27 Extraction Sound Power Levels

Item	Qty	SWL, per unit, dBA
Drill rig	1	118
Excavator breakout and loading	1	107
Water cart	1	108
Dumping rock into haul truck	1	110

Item	Qty	SWL, per unit, dBA
Haul truck	3	113

Table 28 Pit Backfill Sound Power Levels

Item	Qty	SWL, per unit, dBA
Excavator	1	107
Dozer	1	108

7.0 Results

The following sections presents assessment results for each noise scenario. Tables showing adjustments for noise character are also provided.

Noise levels at most receptors (except R5) are façade reflected as they are located 1 m from the most exposed façade of a noise sensitive building, therefore a -2.5 dB adjustment is applied.

Individually, some of the noise sources may have audible character in the nearfield; for example, the slump stand was observed to be tonal and loading haul trucks impulsive. However, the Noise Protocol and EPA advice requires that any character adjustment to occur to the 'as received' cumulative noise from the operation. During attended noise surveys it was observed that no prominent audible character was readily detectible. In fact noise from local industry on the northern side of Canterbury Road was easily identifiable (grinding) at Landy Court, it was difficult to identify the quarry above local noise and traffic on Canterbury Road.

The noise limits presented in the following tables accounts for cumulative noise from other nearby industry, see **Section 4.3.2** for the discussion and application of the cumulative noise adjustment to the day period noise limits.

7.1 Scenario 1: Current Operations

Table 29 shows the predicted quarry source group contributions at each assessed receptor.

Table 30 applies the character and measurement position adjustments to determine the Effective Noise Level (ENL). The ENL is compared with the noise limit and the margin on compliance is shown in the final column of the table.

Compliance is achieved at all receptors during the day period. The quarry group (i.e. crushing and processing) is the dominant noise source for R1 and R2 to the north. These receptors have a 1 dBA margin of compliance. A noise risk management assessment is provided in Appendix D that assesses the risk of excessive noise from Montrose activities.

Figure 6 shows the noise contour map for this scenario.

Table 29 Scenario 1 Current Operations Results

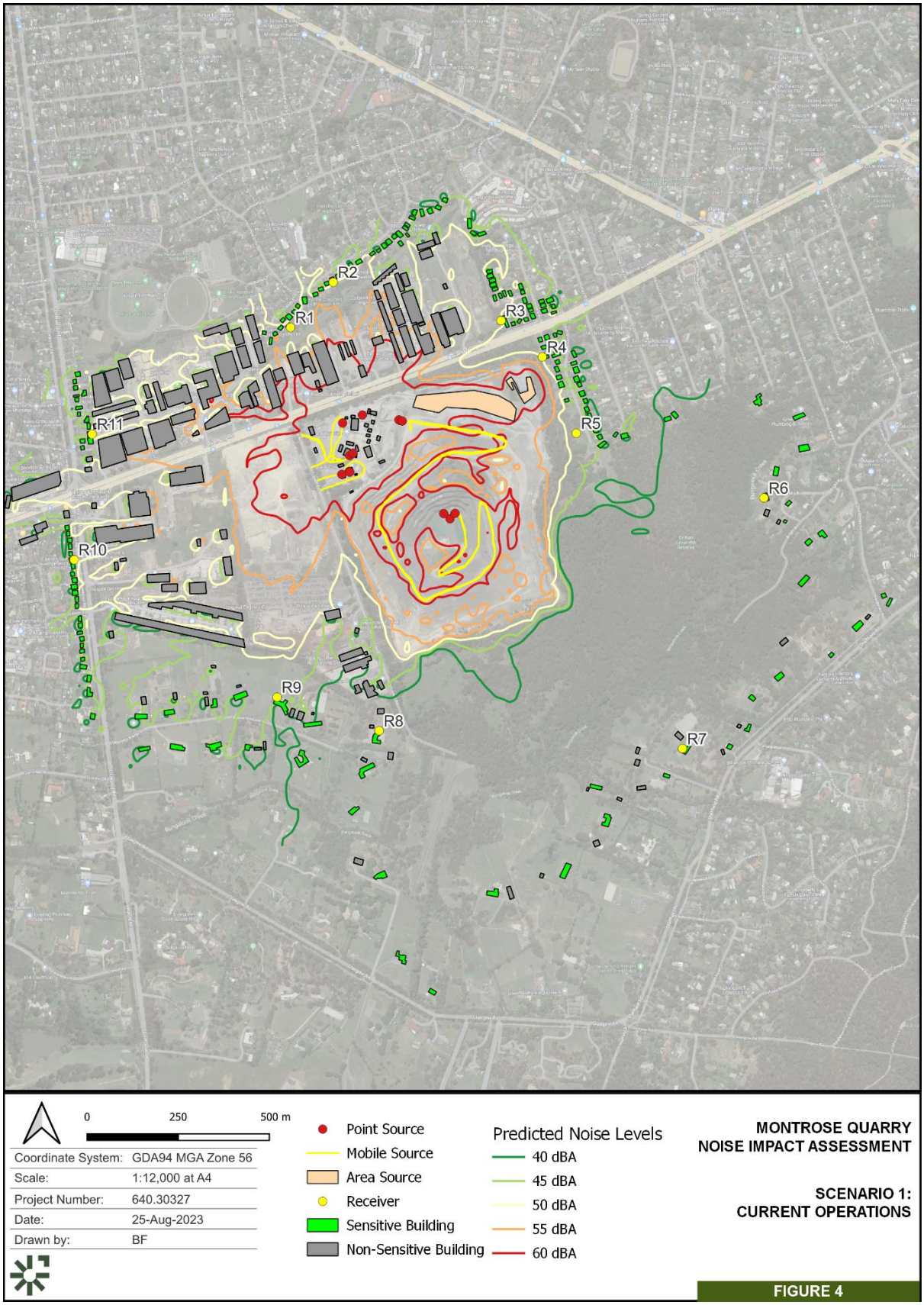
Receptor	Montrose Quarry Source Group, dBA				L_{Aeq}, dBA
	Asphalt	Concrete	Quarry	Extraction	
R1	30	39	49	25	49
R2	23	38	49	27	49
R3	20	33	46	28	47
R4	21	29	47	29	47
R5	27	37	44	32	45
R6	< 20	<20	23	< 20	24
R7	< 20	<20	28	22	29
R8	< 20	<20	29	23	30
R9	24	34	42	24	43
R10	28	41	43	24	46
R11	28	42	48	25	49

Table 30 Scenario 1: Current Operations Assessment Results

Receptor	L_{Aeq}	A_{dur}	A_{tone}	A_{imp}	A_{int}	A_{refl}	A_{ind}	ENL	Noise Limit	Margin of Compliance
R1	49	-	-	-	-	-2.5	-	47	48	1
R2	49	-	-	-	-	-2.5	-	47	48	1
R3	47	-	-	-	-	-2.5	-	44	56	12
R4	47	-	-	-	-	-2.5	-	45	56	11
R5	45	-	-	-	-	-	-	45	53	8
R6	24	-	-	-	-	-2.5	-	22	45	23
R7	29	-	-	-	-	-2.5	-	27	45	19
R8	30	-	-	-	-	-2.5	-	28	45	17
R9	43	-	-	-	-	-2.5	-	41	45	4
R10	46	-	-	-	-	-2.5	-	43	50	7
R11	49	-	-	-	-	-2.5	-	47	50	3

Effective Noise Level (ENL) = $L_{Aeq} + A_{dur} + A_{tone} + A_{imp} + A_{int} + A_{refl} + A_{ind}$
Where, L_{Aeq} = measured / predicted nose level at the receptor
A_{dur} = duration adjustment
A_{tone} = tonality adjustment
A_{imp} = impulse adjustment
A_{int} = intermittency adjustment
A_{refl} = reflection adjustment
A_{ind} = indoor adjustment

Figure 6 Scenario 1: Current Operations Noise Contour Map



7.2 Scenario 2: Expansion Stage 1

Scenario 2 models the initial overburden removal in the southern and eastern expansion areas. Extraction is continuing in the pit as per Scenario 1 with some overburden being dumped in the pit too.

Table 31 presents the contributions for the quarry source groups. As there is only one overburden removal group, the greater of the south and east contributions were included in the overall receptor level. Excluded noise contributions are shown as faded numbers in **Table 31** for completeness. Contributions from both overburden teams are included in the contour map (**Figure 7**). **Table 32** presents the assessment results. Compliance with the daytime criteria is predicted at all receptors.

Table 31 Scenario 2: Expansion Stage 1 Results

Receptor	Montrose Quarry Source Group, dBA							L_{Aeq}, dBA
	Asphalt	CBP	Quarry	Extract.	OB South	OB East	Pit Dump	
R1	30	36	49	25	36	31	< 20	49
R2	23	35	49	27	36	35	< 20	50
R3	20	30	46	28	37	34	< 20	47
R4	21	26	47	29	38	35	20	48
R5	27	34	44	32	40	41	28	46
R6	< 20	< 20	23	< 20	35	21	< 20	35
R7	< 20	< 20	29	22	41	25	< 20	41
R8	< 20	< 20	29	23	40	27	< 20	41
R9	24	32	42	24	37	29	< 20	44
R10	28	39	43	24	36	33	< 20	45
R11	28	40	48	25	36	32	< 20	49

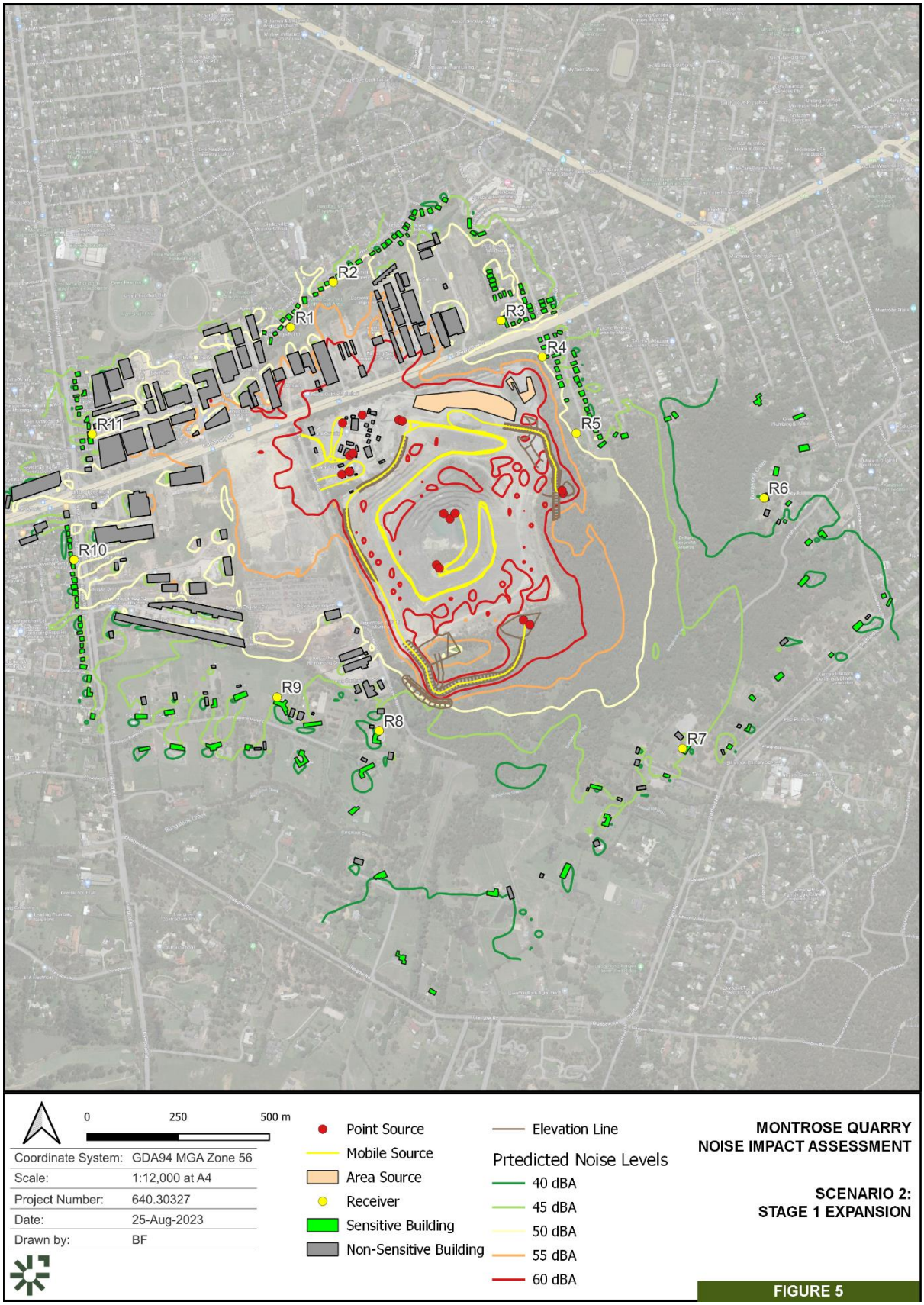
CBP = Concrete Batch Plant
OB = Overburden

Table 32 Scenario 2: Expansion Stage 1 Assessment Results

Receptor	L_{Aeq}	A_{dur}	A_{tone}	A_{imp}	A_{int}	A_{refl}	A_{ind}	ENL	Noise Limit	Margin of Compliance
R1	49	-	-	-	-	-2.5	-	47	48	1
R2	50	-	-	-	-	-2.5	-	47	48	1
R3	47	-	-	-	-	-2.5	-	44	56	12
R4	48	-	-	-	-	-2.5	-	45	56	11
R5	46	-	-	-	-	-	-	46	53	7
R6	35	-	-	-	-	-2.5	-	33	45	12
R7	41	-	-	-	-	-2.5	-	39	45	6
R8	41	-	-	-	-	-2.5	-	38	45	7
R9	44	-	-	-	-	-2.5	-	41	45	4
R10	45	-	-	-	-	-2.5	-	43	50	7
R11	49	-	-	-	-	-2.5	-	47	50	3

Effective Noise Level (ENL) = $L_{Aeq} + A_{dur} + A_{tone} + A_{imp} + A_{int} + A_{refl} + A_{ind}$
Where, L_{Aeq} = measured / predicted nose level at the receptor
A_{dur} = duration adjustment
A_{tone} = tonality adjustment
A_{imp} = impulse adjustment
A_{int} = intermittency adjustment
A_{refl} = reflection adjustment
A_{ind} = indoor adjustment

Figure 7 Scenario 2: Expansion Stage 1 Noise Contour Map



7.3 Scenario 3: Expansion Stage 2

Table 33 shows the predicted quarry source group contributions at each assessed receptor.

Extraction has commenced in the southern expansion zone at RL144. This is the dominant noise source at R8 and R9 on Jeanette Maree Court. Overburden removal continues in the east and south (one team working in campaigns), the greatest contribution of both area is included in the assessment.

Table 34 presents the assessment results. Compliance with the daytime noise limits is predicted at all receptors.

The noise contour map and source locations are show in **Figure 8**.

Table 33 Scenario 3: Expansion Stage 2 Source Contributions

Receptor	Montrose Quarry Source Group, dBA							L_{Aeq}, dBA
	Asphalt	CBP	Quarry	Extract.	OB South	OB East	Pit Dump	
R1	30	36	49	40	35	33	< 20	50
R2	23	35	49	40	36	36	< 20	50
R3	20	30	46	40	34	37	20	48
R4	21	26	47	43	35	36	22	49
R5	27	34	44	43	38	40	26	48
R6	< 20	< 20	23	24	23	25	< 20	29
R7	< 20	< 20	29	33	31	36	< 20	38
R8	< 20	< 20	29	47	41	28	< 20	48
R9	24	32	42	45	38	29	22	47
R10	28	39	43	42	36	32	24	47
R11	28	40	48	41	35	34	< 20	50

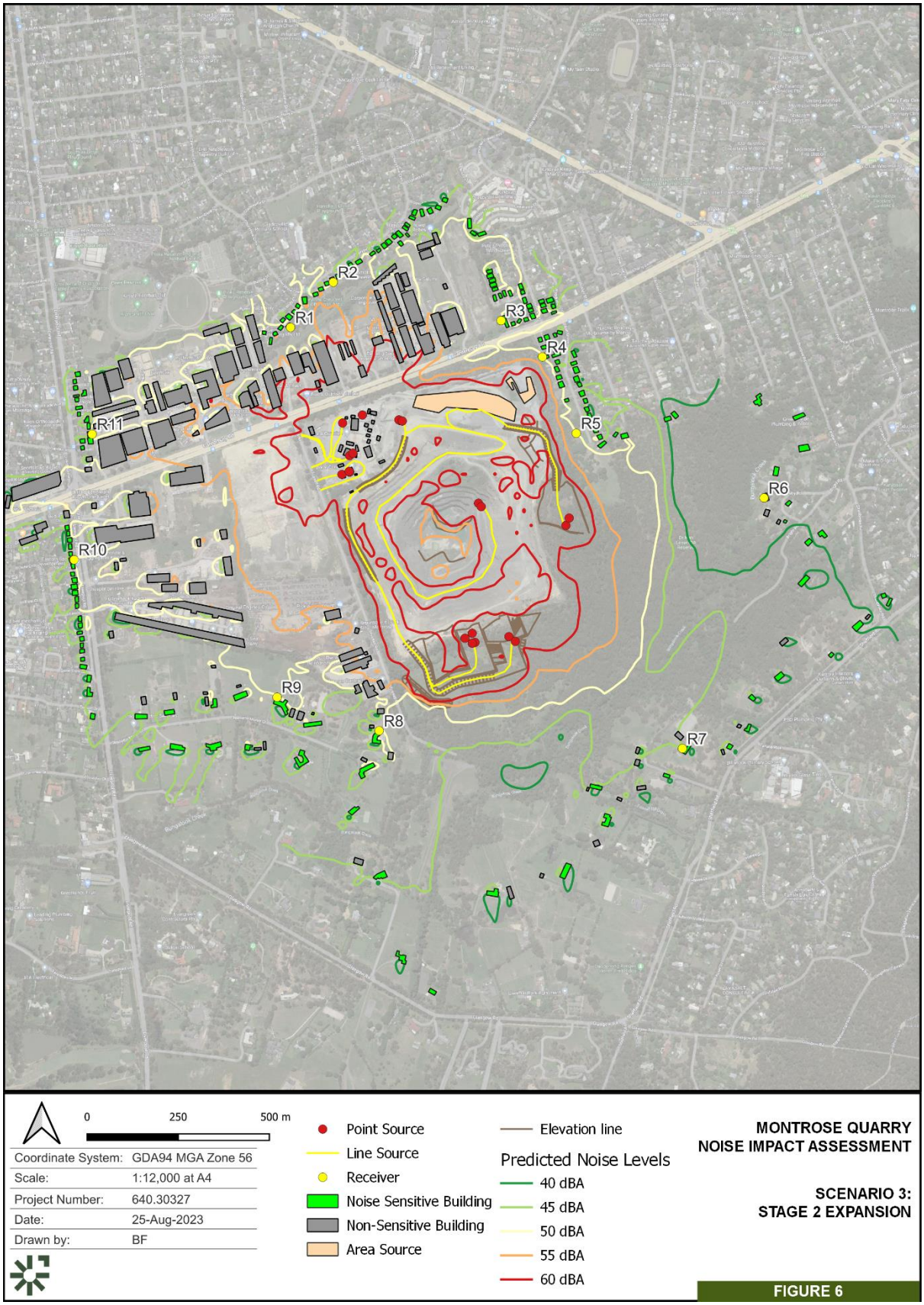
CBP = Concrete Batch Plant
OB = Overburden

Table 34 Scenario 3: Expansion Stage 2 Assessment Results

Receptor	L_{Aeq}	A_{dur}	A_{tone}	A_{imp}	A_{int}	A_{refl}	A_{ind}	ENL	Noise Limit	Margin of Compliance
R1	50	-	-	-	-	-2.5	-	47	48	1
R2	50	-	-	-	-	-2.5	-	47	48	1
R3	48	-	-	-	-	-2.5	-	45	56	11
R4	49	-	-	-	-	-2.5	-	46	56	10
R5	48	-	-	-	-	-	-	48	53	5
R6	29	-	-	-	-	-2.5	-	26	45	19
R7	38	-	-	-	-	-2.5	-	35	45	10
R8	48	-	-	-	-	-2.5	-	45	45	0
R9	47	-	-	-	-	-2.5	-	45	45	0
R10	47	-	-	-	-	-2.5	-	44	50	6
R11	50	-	-	-	-	-2.5	-	47	50	3

Effective Noise Level (ENL) = $L_{Aeq} + A_{dur} + A_{tone} + A_{imp} + A_{int} + A_{refl} + A_{ind}$
Where, L_{Aeq} = measured / predicted nose level at the receptor
A_{dur} = duration adjustment
A_{tone} = tonality adjustment
A_{imp} = impulse adjustment
A_{int} = intermittency adjustment
A_{refl} = reflection adjustment
A_{ind} = indoor adjustment

Figure 8 Scenario 3: Expansion Stage 2 Noise Contour Map



7.4 Scenario 4: Expansion Stage 3

Table 35 shows the predicted quarry source group contributions at each assessed receptor.

Extraction is being undertaken at RL160 near the southeast corner of the site. It is the dominant source for R7 on Sheffield Road to the south and remains the dominant source for R8 on Jeanette Maree Court. The quarry processing plant is the dominant for all other receptors.

Table 36 presents the assessment results. Compliance with the daytime noise limits is predicted at all receptors.

The noise contour map and source locations are show in **Figure 9**.

Table 35 Scenario 4: Expansion Stage 3 Source Contributions

Receptor	Montrose Quarry Source Group, dBA							L_{Aeq}, dBA
	Asphalt	CBP	Quarry	Extract.	OB South	OB East	Pit Dump	
R1	30	36	49	38	26	32	< 20	49
R2	23	35	49	40	27	35	< 20	50
R3	20	30	46	37	26	36	20	47
R4	21	26	47	33	28	37	23	48
R5	27	34	44	35	31	40	31	45
R6	< 20	< 20	23	28	25	29	< 20	31
R7	< 20	< 20	33	46	40	40	< 20	47
R8	< 20	< 20	29	42	34	33	20	43
R9	24	32	42	41	33	33	< 20	45
R10	28	39	43	40	32	34	< 20	46
R11	28	40	48	41	29	33	< 20	50

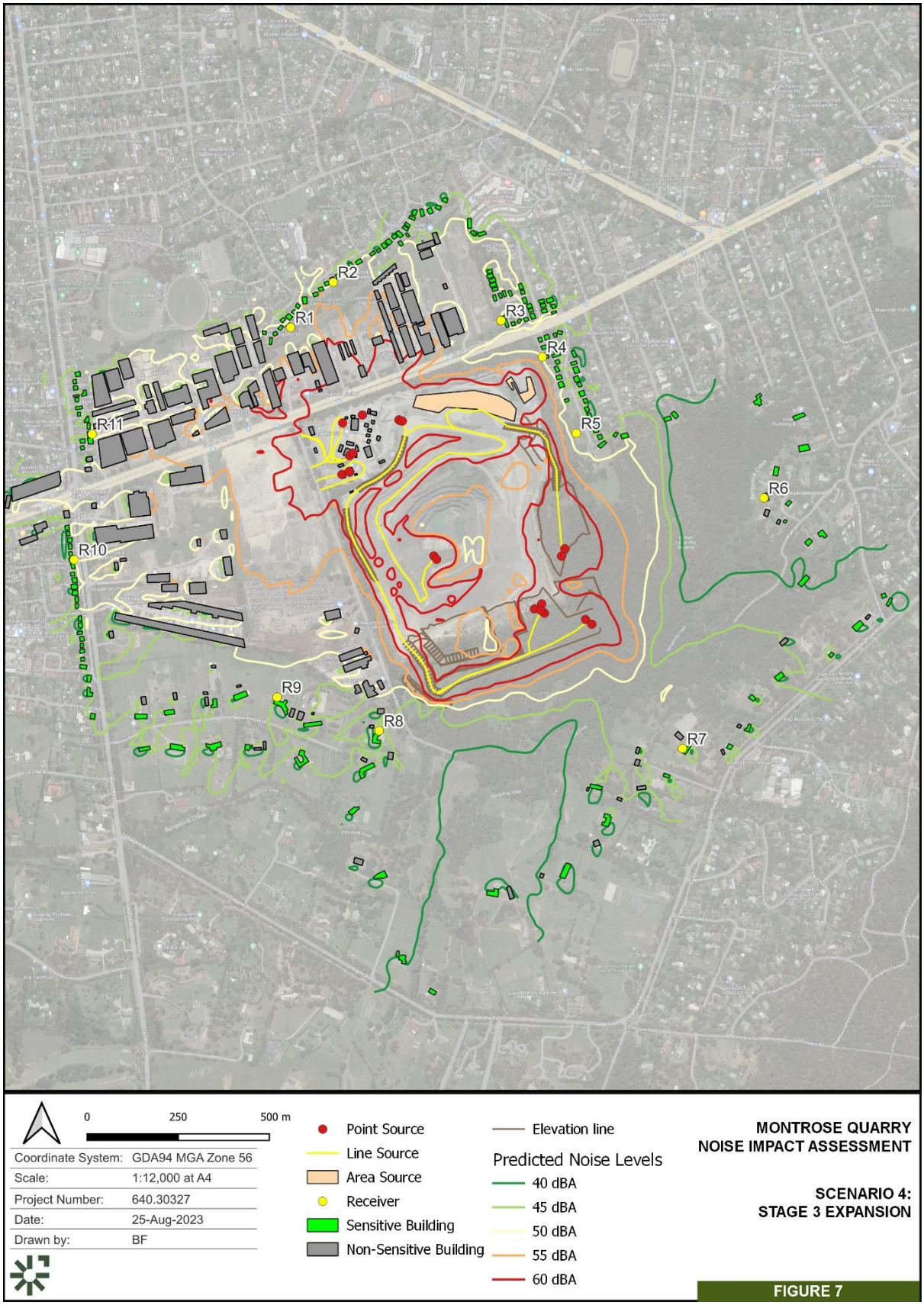
CBP = Concrete Batch Plant
OB = Overburden

Table 36 Scenario 4: Expansion Stage 3 Assessment Results

Receptor	L_{Aeq}	A_{dur}	A_{tone}	A_{imp}	A_{int}	A_{refl}	A_{ind}	ENL	Noise Limit	Margin of Compliance
R1	49	-	-	-	-	-2.5	-	47	48	1
R2	50	-	-	-	-	-2.5	-	47	48	1
R3	47	-	-	-	-	-2.5	-	44	56	12
R4	48	-	-	-	-	-2.5	-	45	56	11
R5	45	-	-	-	-	-	-	45	53	8
R6	31	-	-	-	-	-2.5	-	29	45	16
R7	47	-	-	-	-	-2.5	-	44	45	1
R8	43	-	-	-	-	-2.5	-	40	45	5
R9	45	-	-	-	-	-2.5	-	43	45	2
R10	46	-	-	-	-	-2.5	-	43	50	7
R11	50	-	-	-	-	-2.5	-	47	50	3

Effective Noise Level (ENL) = $L_{Aeq} + A_{dur} + A_{tone} + A_{imp} + A_{int} + A_{refl} + A_{ind}$
Where, L_{Aeq} = measured / predicted nose level at the receptor
A_{dur} = duration adjustment
A_{tone} = tonality adjustment
A_{imp} = impulse adjustment
A_{int} = intermittency adjustment
A_{refl} = reflection adjustment
A_{ind} = indoor adjustment

Figure 9 Scenario 4: Expansion Stage 3 Noise Contour Map



7.5 Scenario 5: Expansion Stage 5

Table 37 shows the predicted quarry source group contributions at each assessed receptor.

Overburden removal has concluded in the southern area and extraction is being undertaken in the south-eastern corner at RL128.

Table 38 presents the assessment results. Compliance with the daytime noise limits is predicted at all receptors.

The noise contour map and source locations are show in **Figure 10**.

Table 37 Scenario 5: Expansion Stage 5 Source Contributions

Receptor	Montrose Quarry Source Group, dBA						L_{Aeq}, dBA
	Asphalt	CBP	Quarry	Extract.	OB	Pit Dump	
R1	30	36	49	35	25	< 20	49
R2	23	35	49	38	30	< 20	50
R3	20	30	46	35	28	21	47
R4	21	26	47	37	29	25	48
R5	27	34	44	37	33	34	45
R6	< 20	< 20	23	26	19	< 20	28
R7	< 20	< 20	33	41	31	28	42
R8	< 20	< 20	29	38	30	< 20	39
R9	24	32	42	37	32	< 20	44
R10	28	39	43	38	33	< 20	46
R11	28	40	48	38	31	< 20	49

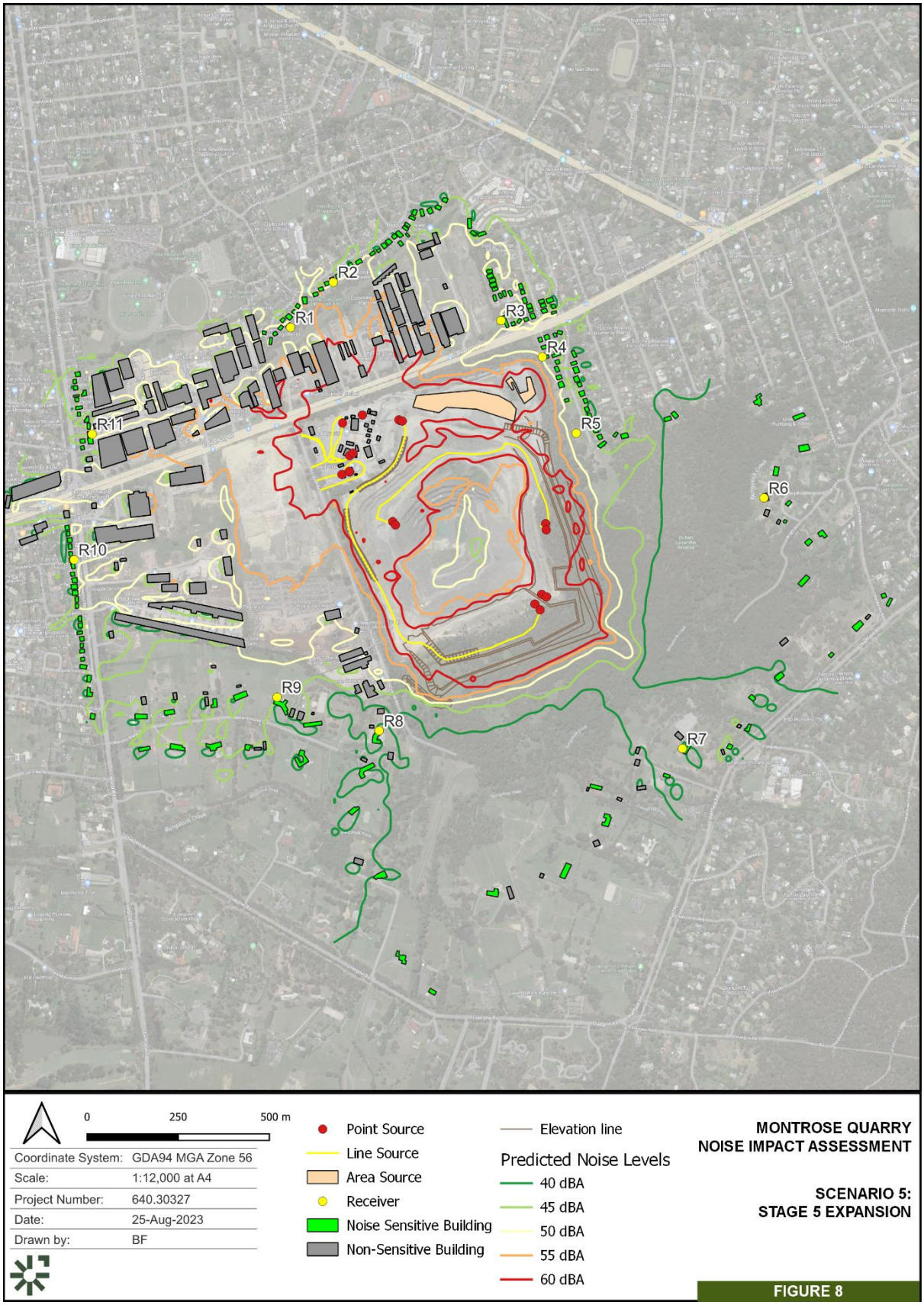
CBP = Concrete Batch Plant
OB = Overburden

Table 38 Scenario 5: Expansion Stage 5 Assessment Results

Receptor	L_{Aeq}	A_{dur}	A_{tone}	A_{imp}	A_{int}	A_{refl}	A_{ind}	ENL	Noise Limit	Margin of Compliance
R1	49	-	-	-	-	-2.5	-	47	48	1
R2	50	-	-	-	-	-2.5	-	47	48	1
R3	47	-	-	-	-	-2.5	-	44	56	12
R4	48	-	-	-	-	-2.5	-	45	56	11
R5	45	-	-	-	-	-	-	45	53	8
R6	28	-	-	-	-	-2.5	-	26	45	19
R7	42	-	-	-	-	-2.5	-	39	45	6
R8	39	-	-	-	-	-2.5	-	36	45	9
R9	44	-	-	-	-	-2.5	-	42	45	3
R10	46	-	-	-	-	-2.5	-	43	50	7
R11	49	-	-	-	-	-2.5	-	47	50	3

Effective Noise Level (ENL) = $L_{Aeq} + A_{dur} + A_{tone} + A_{imp} + A_{int} + A_{refl} + A_{ind}$
Where, L_{Aeq} = measured / predicted nose level at the receptor
A_{dur} = duration adjustment
A_{tone} = tonality adjustment
A_{imp} = impulse adjustment
A_{int} = intermittency adjustment
A_{refl} = reflection adjustment
A_{ind} = indoor adjustment

Figure 10 Scenario 5: Expansion Stage 5 Noise Contour Map



7.6 Scenario 6: Expansion Stage 7

Table 39 shows the predicted quarry source group contributions at each assessed receptor.

The southern and eastern expansion zones have combined. The southern haul route is closed; access to the extraction zone is via the eastern route. Overburden removal has concluded.

Table 40 presents the assessment results. Compliance with the daytime noise limits is predicted at all receptors.

The noise contour map and source locations are show in **Figure 11**.

Table 39 Scenario 6: Expansion Stage 7 Source Contributions

	Montrose Quarry Source Group					
Receptor	**Asphalt**	**CBP**	**Quarry**	**Extract.**	**Pit Dump**	**L_{Aeq}**
R1	30	36	49	35	22	49
R2	23	35	49	38	23	49
R3	20	30	46	35	25	47
R4	21	26	47	37	28	48
R5	27	34	44	37	35	45
R6	< 20	< 20	23	26	< 20	27
R7	< 20	< 20	33	41	29	37
R8	< 20	< 20	29	38	26	34
R9	24	32	42	37	27	43
R10	28	39	43	38	27	45
R11	28	40	48	38	24	49

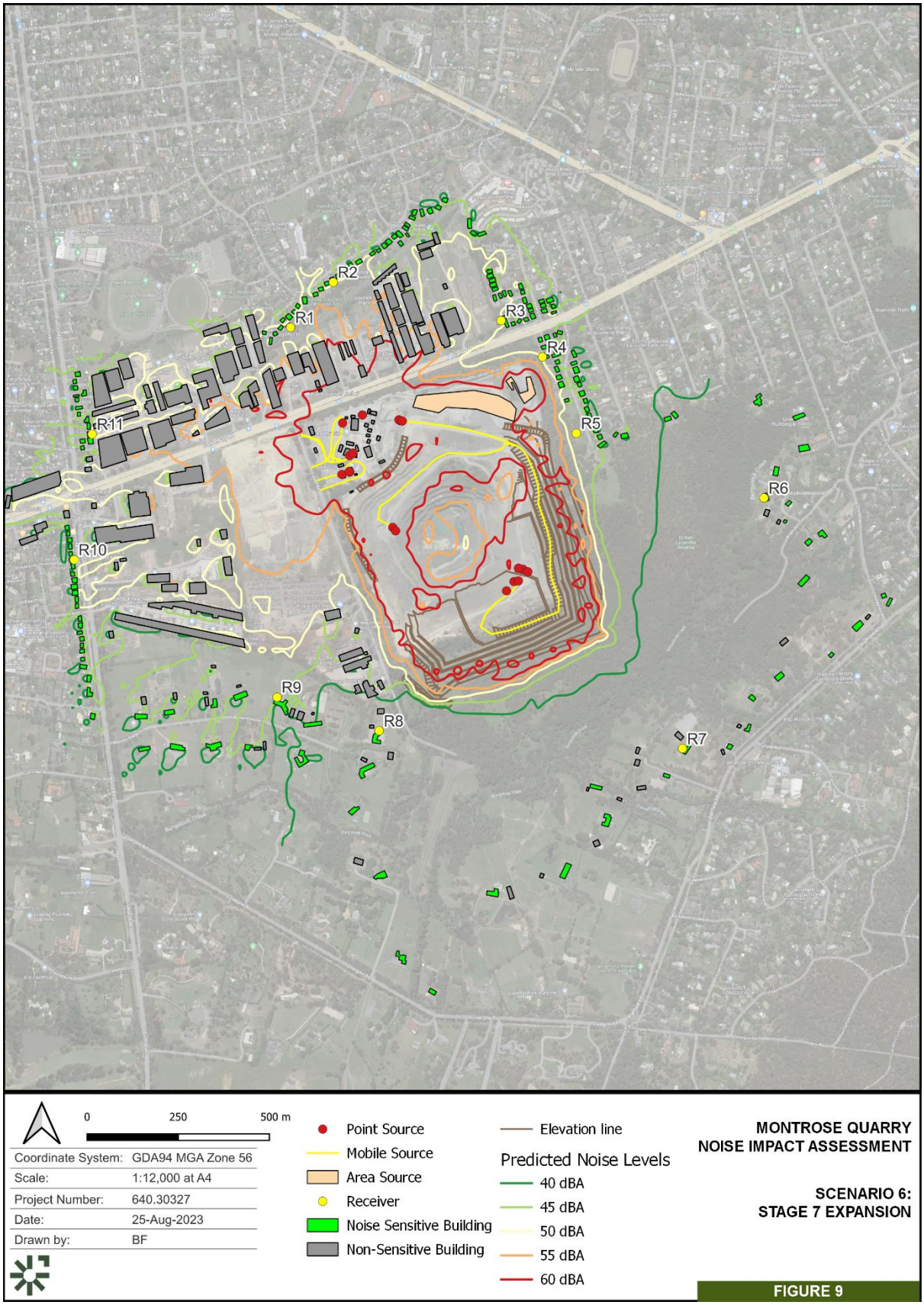
CBP = Concrete Batch Plant
OB = Overburden

Table 40 Scenario 6: Expansion Stage 7 Assessment Results

Receptor	L_{Aeq}	A_{dur}	A_{tone}	A_{imp}	A_{int}	A_{refl}	A_{ind}	ENL	Noise Limit	Margin of Compliance
R1	49	-	-	-	-	-2.5	-	47	48	1
R2	49	-	-	-	-	-2.5	-	47	48	1
R3	47	-	-	-	-	-2.5	-	44	56	12
R4	48	-	-	-	-	-2.5	-	45	56	11
R5	45	-	-	-	-	-	-	45	53	8
R6	27	-	-	-	-	-2.5	-	25	45	20
R7	37	-	-	-	-	-2.5	-	34	45	11
R8	34	-	-	-	-	-2.5	-	32	45	13
R9	43	-	-	-	-	-2.5	-	41	45	4
R10	45	-	-	-	-	-2.5	-	42	50	8
R11	49	-	-	-	-	-2.5	-	47	50	3

Effective Noise Level (ENL) = $L_{Aeq} + A_{dur} + A_{tone} + A_{imp} + A_{int} + A_{refl} + A_{ind}$
Where, L_{Aeq} = measured / predicted nose level at the receptor
A_{dur} = duration adjustment
A_{tone} = tonality adjustment
A_{imp} = impulse adjustment
A_{int} = intermittency adjustment
A_{refl} = reflection adjustment
A_{ind} = indoor adjustment

Figure 11 Scenario 6: Expansion Stage 7 Noise Contour Map



7.7 Environmental Reference Standard – Natural Areas

The identified natural areas require a qualitative assessment. The objective of the assessment is to maintain a sound quality that is conductive to human tranquillity and enjoyment having regard to the ambient natural soundscape.

Table 41 presents the predicted cumulative quarry noise to the closest natural areas. Quarry noise may be occasionally just audible from the southern natural areas, depending on meteorological factors. However it is unlikely to be intrusive above other natural ambient noise sources during the day time. The quarry does not operate at night.

Dr Ken Leversha Reserve is closer to the quarry and will be particularly affected by activities on the eastern side of the quarry. Impacts are most apparent during the overburden removal from the eastern area in Scenarios 3 and 4. Levels are expected to decrease as extraction is undertaken at lower levels.

Ambient levels measured at the closest receptor to the Dandenong Ranges, R7, were 36 dBA L_{90}, 50 dBA $L_{eq.}$ Although levels are predicted to increase somewhat as the expansion moves south, the proposed expansion will not adversely impact any natural areas.

Table 41 Predicted Quarry Contribution to Natural Areas

Natural Area	Distance, m	Predicted Noise Level, dBA					
		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Dr Ken Leversha Reserve	700	40	47	51	52	44	41
Doongalla Forest	1890	31	34	36	37	36	35
Dandenong Ranges	2410	31	36	39	39	36	33

7.8 Noise Assessment Discussion

This assessment demonstrates compliance with the Noise Protocol day-time limits throughout the life of the project. **Table 42** summaries the predicted effective noise level for each scenario. **Table 43** summaries the margin of compliance.

Quarry activities, (crushing, processing and sales, excluding product extraction) are the dominant sources for receptors to the north and north east (R1 through to R4), these receptors are relatively unaffected by the quarry expansion.

R7, R8 and R9 to the south are most impacted by expansion activities, particularly product extraction of the higher levels (see Scenario 3 Expansion Stage 2) the southern expansion. Noise levels are expected to reduce over time as extraction is undertaken at lower levels.

Since the predicted levels are within 2 dB of the noise limit for these receivers during the Expansion Stage 2 and 3, a process to review the effectiveness of noise controls will be reviewed to ensure that risk of impacts is minimised. A noise risk management assessment is provided in Appendix C that assesses the risk of excessive noise from quarry activities.

A noise risk management assessment is provided in Appendix D that assesses the risk of excessive noise from Montrose activities.

Table 42 Predicted Effective Noise Levels Summary, dBA

Receptor	Scenario 1 Existing Operations	Scenario 2 Expansion Stage 1	Scenario 3 Expansion Stage 2	Scenario 4 Expansion Stage 3	Scenario 5 Expansion Stage 5	Scenario 6 Expansion Stage 7	Day Limit
R1	47	47	47	47	47	47	48
R2	47	47	47	47	47	47	48
R3	44	44	45	44	44	44	56
R4	45	45	46	45	45	45	56
R5	45	46	48	45	45	45	53
R6	22	33	26	29	26	25	45
R7	27	39	35	44	39	34	45
R8	28	38	45	40	36	32	45
R9	41	41	45	43	42	41	45
R10	43	43	44	43	43	42	50
R11	47	47	47	47	47	47	50

Table 43 Margin of Compliance Summary, dBA

Receptor	Scenario 1 Existing Operations	Scenario 2 Expansion Stage 1	Scenario 3 Expansion Stage 2	Scenario 4 Expansion Stage 3	Scenario 5 Expansion Stage 5	Scenario 6 Expansion Stage 7
R1	1	1	1	1	1	1
R2	1	1	1	1	1	1
R3	12	12	11	12	12	12
R4	11	11	10	11	11	11
R5	8	7	5	8	8	8
R6	26	12	19	16	19	20
R7	18	6	10	1	6	11
R8	17	7	0	5	9	13
R9	4	4	0	2	3	4
R10	7	7	6	7	7	8
R11	3	3	3	3	3	3

7.9 Low Frequency Noise Assessment

EPA Publication 1997: Noise guidelines: Assessing low frequency noise (EPA LFN Guidelines) provides guidance on assessment of low frequency noise (LFN), whereby measurements are compared with low frequency threshold levels through the analysis of the received 1/3 octave band spectrum, in the low frequency range of 10 Hz to 160 Hz.

It should be noted that the threshold levels are not set limits, nor represent a risk of harm or health impact, rather, they are levels that indicate a potential risk of problematic LFN from the perspective of annoyance.

Furthermore, it should be noted that whilst the EPA LFN Guidelines uses thresholds derived from the 2005 academic paper by Waddington, Adams & Moorhouse *Proposed criteria for the assessment of low frequency noise disturbance*, they have failed to include the recommendations of those authors for a 5 dB relaxation for day period, nor have they included the additional 5 dB relaxation for steady state noise emissions.

The EPA LFN Guideline therefore represents an extremely conservative method for evaluating potential additional LFN disturbance for generally steady state day-time operations.

7.9.1 Limitations of Low Frequency Noise Measurement and Prediction

The guideline acknowledges the difficulty and limitations of being able to reliably predict low frequency, noting; a lack of suitable manufacturer or test data and limitations of the prediction algorithms at low frequencies.

The source levels presented in this assessment were measured on site, based on near field, short term L_{eq}, outdoor measurements with a standard 90 mm wind sock. it should be noted that under such conditions, gusts of wind would likely be a cause for a spike in measured low frequency L_{eq} noise that is not representative of the plant being measured.

In addition, the results presented in this section are based on computer modelling of the measured noise sources. The ISO 9613 air absorption, ground absorption and barrier attenuation algorithms are not properly validated for sub 63 Hz frequency bands. It also applies these losses to octave band levels, the losses are interpolated by SoundPLAN for 1/3 octave results.

The above limitations should be considered before placing much emphasis on the result.

7.9.2 Low Frequency Noise Results

The highest measured quarry noise levels were measured at the receptors north of Canterbury Road (R1, R2 and R10).

Table 45 to **Table 56** presents the low frequency noise assessment results for each scenario. The even numbered tables present the linear-weighted predicted low frequency 1/3 octave levels. Shaded cells show exceedances of the low frequency noise threshold. Low frequency threshold levels have been reproduced in **Table 44** for convenience. **Table 46** shows the difference between the low frequency noise thresholds and predicted levels for the Current Operations scenario. The following odd numbered tables show the change in LFN for each expansion stage compared with current operations. Increases in LFN by at least 10 dB and also exceeding the low frequency thresholds are highlighted with red text.

Exceedances are predicted at most receptors throughout the life of the project. The exceedances are generally limited to 50 to 160 Hz and are less than 10 dB. Receptors close to Canterbury Road are predicted to exceed some threshold limits by more than 10 dB at

times. Note that the day-time traffic on Canterbury Road is a significant source of low frequency noise itself. Since the expansion operations are concentrated to the south of the site, the change in LFN at the northern receivers is not expected to be altered by the quarry expansion.

The receivers to the east and south will experience increases in LFN during the early stages of the expansion, when the mobile plant is close to the surface. The LFN exposure of the receivers will decrease as extraction is undertaken lower in the pit.

Low frequency noise can be reduced by taking the hierarchy of controls approach, elimination, substitution, engineering and administration controls. Examples of recommendations to reduce low frequency noise include:

- The replacement of the aged heavy vehicle fleet with new late model haul trucks fitted with the latest noise attenuation muffler.
- Equipment shall be regularly maintained, to ensure noise levels do not increase over time. Particular attention should be paid to lubrication, vibration from loose parts, engine maintenance and any acoustic enclosures.

Table 44 Outdoor Low Frequency Noise Threshold Levels

Outdoor one-third octave low frequency noise threshold levels													
Freq, Hz	**10**	**12.5**	**16**	**20**	**25**	**31.5**	**40**	**50**	**63**	**80**	**100**	**125**	**160**
L_{eq}, dB	92	89	86	77	69	61	54	50	50	48	48	46	44

Table 45 Scenario 1: Current Operations Low Frequency Assessment Results

	1/3 Octave L_{eq}, dB												
Receptor	**10**	**12.5**	**16**	**20**	**25**	**31.5**	**40**	**50**	**63**	**80**	**100**	**125**	**160**
R1	57	59	60	54	52	54	54	55	61	54	47	51	48
R2	57	59	59	54	52	54	54	55	59	54	47	49	47
R3	55	56	57	54	51	51	52	52	56	53	46	47	45
R4	54	55	55	54	51	51	51	51	54	53	46	45	44
R5	53	55	55	53	50	50	51	51	54	53	44	44	43
R6	41	42	42	38	35	36	35	35	38	34	25	25	23
R7	44	46	46	43	40	41	41	41	45	41	32	33	31
R8	47	49	49	44	41	42	42	42	48	43	33	35	32
R9	50	53	53	48	46	48	48	49	54	49	40	43	41
R10	50	52	52	47	45	47	47	48	53	48	43	46	44
R11	50	52	53	48	46	48	48	50	54	49	45	48	45
Dr Ken Reserve	49	50	50	47	44	44	45	45	50	47	37	39	36
Doongalla Forest	43	46	45	41	39	40	40	41	45	41	33	33	31
Dandenong Ranges	42	45	44	40	37	39	39	39	44	40	31	33	30

Table 46 Scenario 1: Current Operations Margin of Exceedance

Receptor	1/3 Octave L_{eq}, dB												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
R1	-35	-30	-26	-23	-17	-7	0	5	11	6	-1	5	4
R2	-35	-30	-27	-23	-17	-7	0	5	9	6	-1	3	3
R3	-37	-33	-29	-23	-18	-10	-2	2	6	5	-2	1	1
R4	-38	-34	-31	-23	-18	-11	-3	1	4	5	-2	-1	0
R5	-39	-34	-31	-24	-19	-11	-4	1	4	5	-4	-2	-1
R6	-51	-47	-44	-39	-34	-25	-19	-15	-12	-14	-23	-21	-21
R7	-48	-43	-40	-35	-29	-20	-13	-9	-5	-7	-16	-13	-13
R8	-45	-40	-37	-33	-28	-19	-12	-8	-2	-5	-15	-11	-12
R9	-42	-36	-33	-29	-23	-13	-6	-1	4	1	-8	-3	-4
R10	-42	-37	-34	-30	-24	-14	-7	-2	3	0	-5	0	0
R11	-42	-37	-33	-29	-23	-13	-6	-1	4	1	-4	2	1
Dr Ken Reserve	-43	-39	-36	-30	-25	-17	-9	-5	0	-1	-11	-7	-8
Doongalla Forest	-49	-43	-41	-36	-30	-21	-14	-9	-5	-7	-15	-13	-13
Dandenong Ranges	-50	-44	-42	-37	-32	-23	-15	-11	-6	-8	-17	-13	-14

Table 47 Scenario 2: Expansion Stage 1

Receptor	1/3 Octave Leq, dB												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
R1	57	59	60	55	53	54	54	56	61	56	48	52	49
R2	57	60	59	55	53	55	54	56	59	56	48	50	48
R3	56	57	57	55	53	52	53	53	56	57	48	48	47
R4	56	56	57	57	53	52	53	53	55	58	48	46	47
R5	57	59	59	59	56	55	55	56	57	60	50	47	49
R6	47	48	48	49	46	44	44	46	45	47	38	37	36
R7	48	49	50	50	47	46	47	48	49	52	42	41	42
R8	50	52	52	52	49	47	48	49	50	55	44	40	44
R9	52	54	54	52	49	49	50	51	54	55	44	44	44
R10	51	53	53	50	48	48	48	50	54	52	45	47	46
R11	51	53	54	50	48	49	49	50	54	52	46	48	47
Dr Ken Reserve	56	57	58	59	56	54	55	56	56	57	49	48	47
Doongalla Forest	45	48	47	47	44	43	43	45	46	49	37	35	36
Dandenong Ranges	46	48	48	48	45	44	45	46	47	50	37	36	37

Table 48 Scenario 2: Expansion Stage 1 Change in LFN Levels

Receptor	1/3 Octave Leq, dB												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
R1	0	0	0	1	1	0	0	0	0	2	1	0	1
R2	0	0	0	1	1	1	1	1	0	3	1	0	1
R3	1	1	1	2	2	1	1	1	0	4	2	1	2
R4	2	1	1	2	2	2	1	2	1	5	2	1	3
R5	4	4	4	7	7	5	5	6	3	7	6	3	6
R6	6	6	6	11	11	8	9	11	7	12	13	12	13
R7	4	4	4	8	8	5	6	7	4	10	10	8	11
R8	4	3	3	8	8	5	6	7	3	13	10	5	12
R9	2	1	1	4	3	2	2	2	1	6	4	1	4
R10	1	1	1	3	3	1	2	2	0	4	3	1	2
R11	1	0	0	2	1	1	1	1	0	3	1	0	1
Dr Ken Reserve	7	7	7	12	12	10	9	11	6	10	12	9	11
Doongalla Forest	2	2	2	5	5	3	4	4	2	8	4	2	5
Dandenong Ranges	4	3	4	8	8	6	6	7	3	10	7	3	7

Table 49 Scenario 3: Expansion Stage 2

Receptor	1/3 Octave L_{eq}, dB												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
R1	57	59	61	55	53	55	54	56	61	57	49	52	49
R2	57	60	60	55	53	55	54	56	59	57	49	50	48
R3	56	57	59	56	53	53	53	54	57	58	49	48	48
R4	55	56	58	56	53	52	53	54	55	58	49	46	48
R5	56	58	59	58	55	53	54	55	56	60	50	46	50
R6	47	48	50	49	45	43	43	45	43	46	35	31	33
R7	50	51	56	52	49	48	48	50	49	53	42	40	41
R8	53	54	61	55	52	51	52	55	53	58	50	45	48
R9	53	55	60	54	51	51	52	54	55	56	48	46	47
R10	51	53	56	51	48	49	49	51	54	53	48	48	47
R11	51	53	55	50	48	49	49	51	55	53	48	49	47
Dr Ken Reserve	58	59	60	61	58	56	57	59	58	58	51	50	49
Doongalla Forest	46	48	50	48	45	44	45	47	47	50	39	36	37
Dandenong Ranges	46	48	52	48	45	44	45	47	47	51	41	38	39

Table 50 Scenario 3: Expansion Stage 2 Change in LFN Levels

Receptor	1/3 Octave L_{eq}, dB												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
R1	0	0	1	1	1	1	1	1	0	3	2	0	1
R2	0	0	1	1	1	1	1	1	0	3	2	0	2
R3	1	1	2	2	2	1	1	2	1	5	3	1	3
R4	1	1	3	2	2	2	2	2	1	5	3	1	4
R5	3	3	4	5	5	4	3	4	2	7	6	3	7
R6	6	5	8	11	11	8	9	9	5	11	10	6	9
R7	6	5	10	10	9	7	7	9	4	11	10	7	10
R8	6	5	12	11	11	10	10	12	6	15	17	10	16
R9	3	2	7	6	5	3	4	5	1	8	8	3	6
R10	1	1	3	4	3	2	2	2	1	5	5	1	4
R11	1	1	2	2	2	1	1	1	0	4	3	1	2
Dr Ken Reserve	9	9	10	14	14	12	12	14	8	11	14	11	13
Doongalla Forest	3	2	5	7	6	4	5	6	2	9	6	3	6
Dandenong Ranges	4	3	8	8	8	6	6	8	3	11	11	5	10

Table 51 Scenario 4: Expansion Stage 3

Receptor	1/3 Octave L_{eq}, dB												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
R1	57	59	61	55	53	55	54	56	62	55	48	52	49
R2	57	60	61	55	53	55	54	56	60	54	48	51	48
R3	56	58	61	56	53	53	54	55	60	54	48	50	47
R4	56	57	60	56	53	52	53	54	60	54	48	49	46
R5	56	58	62	58	55	54	54	56	62	55	49	52	47
R6	49	50	55	51	48	46	46	48	51	45	39	39	35
R7	53	54	60	55	52	51	52	54	56	53	48	47	45
R8	52	54	60	54	51	50	51	53	58	51	46	47	43
R9	53	55	59	53	50	51	51	53	58	52	46	47	44
R10	51	53	56	51	48	49	49	51	56	50	47	49	46
R11	51	53	56	50	48	49	49	51	56	50	47	50	47
Dr Ken Reserve	58	60	64	62	59	57	58	60	62	58	53	54	51
Doongalla Forest	47	49	54	49	47	46	47	49	52	47	39	39	36
Dandenong Ranges	46	49	53	49	46	46	46	49	52	47	41	41	38

Table 52 Scenario 4: Expansion Stage 3 Change in LFN Levels

Receptor	1/3 Octave L_{eq}, dB												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
R1	0	0	1	1	1	0	1	1	1	1	1	1	1
R2	0	0	2	1	1	1	1	1	2	1	1	1	1
R3	1	1	4	2	2	1	2	3	4	1	2	3	2
R4	2	2	5	2	2	2	2	3	5	1	2	5	2
R5	3	3	8	5	5	4	4	6	8	2	4	8	4
R6	8	8	13	13	13	10	12	13	12	11	14	14	12
R7	8	8	14	13	13	10	11	13	11	11	16	14	14
R8	5	5	11	10	10	8	9	11	10	9	13	12	11
R9	2	2	6	5	4	3	3	4	4	3	6	4	4
R10	1	1	4	4	3	2	2	3	3	2	4	3	2
R11	1	1	3	2	2	1	1	2	2	1	3	2	1
Dr Ken Reserve	10	10	13	14	15	13	12	15	12	11	16	15	15
Doongalla Forest	4	3	9	8	8	6	7	8	7	6	6	7	5
Dandenong Ranges	4	4	9	9	9	7	8	9	8	7	10	8	8

Table 53 Scenario 5: Expansion Stage 5

Receptor	1/3 Octave L_{eq}, dB												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
R1	57	59	60	54	52	54	54	56	61	56	48	52	48
R2	57	59	60	55	53	55	54	55	59	55	48	49	48
R3	56	57	58	55	52	52	53	53	56	55	47	47	46
R4	55	56	57	56	53	52	52	53	55	55	48	45	45
R5	55	56	58	56	53	52	52	53	55	56	47	45	46
R6	44	45	49	44	40	39	39	40	40	43	33	28	30
R7	49	50	56	51	48	47	48	50	50	51	45	41	42
R8	50	51	57	51	48	47	48	49	50	51	44	39	40
R9	51	54	56	51	48	49	50	51	54	53	45	44	43
R10	50	52	54	49	47	48	48	50	53	51	46	47	46
R11	51	53	55	50	47	49	49	50	54	51	47	48	46
Dr Ken Reserve	53	54	58	54	51	49	50	51	52	55	48	43	45
Doongalla Forest	44	47	49	46	43	43	43	45	46	48	38	36	36
Dandenong Ranges	45	47	50	46	43	43	43	45	47	47	40	37	37

Table 54 Scenario 5: Expansion Stage 5 Change in LFN Levels

Receptor	1/3 Octave L_{eq}, dB												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
R1	0	0	1	1	1	0	0	0	0	1	1	0	1
R2	0	0	1	1	1	0	0	0	0	2	1	0	1
R3	1	1	1	1	1	1	1	1	0	2	1	0	1
R4	1	1	2	2	1	1	1	1	1	2	2	1	2
R5	2	1	3	3	3	2	2	2	1	3	3	1	3
R6	3	2	7	6	5	3	4	5	2	9	8	3	7
R7	5	4	10	9	8	7	7	9	6	10	13	8	11
R8	3	2	8	7	7	5	6	7	2	8	11	4	8
R9	1	1	4	3	3	1	2	2	1	4	5	1	3
R10	1	1	2	2	2	1	1	1	0	3	3	1	2
R11	0	0	1	1	1	1	1	1	0	2	2	0	1
Dr Ken Reserve	4	4	8	7	7	5	4	6	2	8	11	4	9
Doongalla Forest	2	1	4	4	4	3	3	4	2	6	6	3	5
Dandenong Ranges	3	2	6	6	6	4	4	6	2	7	9	4	7

Table 55 Scenario 6: Expansion Stage 7

Receptor	1/3 Octave L_{eq}, dB												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
R1	57	59	60	54	52	54	54	55	61	55	47	51	48
R2	57	59	59	54	53	55	54	55	59	55	47	49	47
R3	55	57	57	55	52	52	53	53	56	54	46	47	45
R4	55	56	57	55	52	51	52	52	55	55	47	45	45
R5	54	56	57	55	52	51	52	52	55	56	47	45	46
R6	44	44	47	43	39	38	37	38	39	39	29	27	27
R7	48	50	54	50	47	46	46	48	49	50	41	38	39
R8	49	51	55	50	46	45	45	46	49	49	39	36	37
R9	51	54	55	50	47	49	49	50	54	52	42	43	42
R10	50	52	54	49	46	48	48	49	53	50	44	47	45
R11	51	52	54	49	47	49	48	50	54	50	45	48	46
Dr Ken Reserve	52	53	57	53	50	49	49	50	52	53	43	41	41
Doongalla Forest	44	47	49	45	42	42	42	44	46	47	37	35	35
Dandenong Ranges	44	46	49	45	42	42	42	43	46	46	36	35	35

Table 56 Scenario 6: Expansion Stage 7 Change in LFN Levels

Receptor	1/3 Octave L_{eq}, dB												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
R1	0	0	0	0	0	0	0	0	0	1	0	0	0
R2	0	0	0	0	0	0	0	0	0	1	0	0	0
R3	0	0	1	1	1	0	0	0	0	1	1	0	1
R4	1	1	1	1	1	1	1	1	0	2	1	0	1
R5	1	1	3	2	2	2	1	2	1	3	2	1	3
R6	2	2	5	5	4	2	3	3	1	5	5	2	4
R7	4	4	8	7	7	5	5	7	4	8	9	6	8
R8	3	2	6	6	5	4	3	4	1	7	6	1	5
R9	1	1	3	2	2	1	1	1	0	3	2	0	1
R10	0	0	2	1	1	1	1	1	0	2	1	0	1
R11	0	0	1	1	0	0	0	0	0	1	1	0	0
Dr Ken Reserve	3	3	7	6	6	4	4	5	2	5	6	2	5
Doongalla Forest	1	1	4	4	3	2	3	3	1	5	5	3	4
Dandenong Ranges	2	2	5	5	5	3	3	4	1	6	6	2	5

8.0 Conclusion

SLR have undertaken a noise assessment of potential noise impacts from the existing and proposed expansion of Boral's Montrose Quarry to nearby noise sensitive receptors. The assessment included cumulative noise considerations due to nearby industry.

Background noise monitoring was conducted to define relevant noise limits in accordance with the Noise Protocol. Noise emissions from all plant were measured during a site survey.

A detailed computer noise model was developed and noise levels predicted at the nearest noise sensitive receptors for the current as well as proposed future expansion operational scenarios.

The predicted effective noise levels of all proposed future expansion operational scenarios are below the Noise Protocol limits at all sensitive receptors during the proposed day-time operating hours. Natural areas were assessed subjectively under the Environmental Reference Standard. The potential for low frequency issues were assessed under the

The GED requires that the Project must take reasonable steps to eliminate or minimise emissions so far as practicable. Boral is committed to minimising their noise emissions by sourcing a new haul truck fleet and regular maintenance of their existing fleet. Acoustic and visual amenity will be protected by installing a bund in the south-west corner of the expansion.

Appendix A Noise Monitoring Results

Noise Impact Assessment

Montrose Quarry

Boral

SLR Project No.: 640.30327.00000

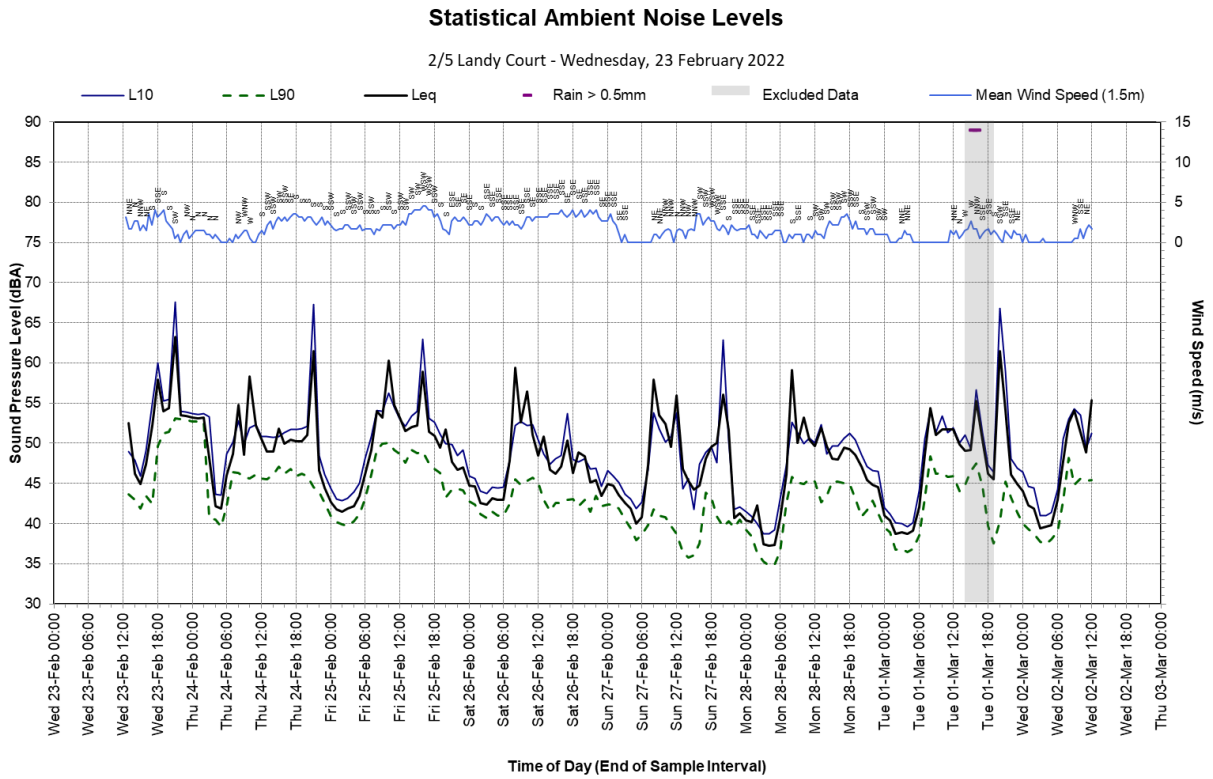
21 November 2024

Table 57 Noise Monitoring Results

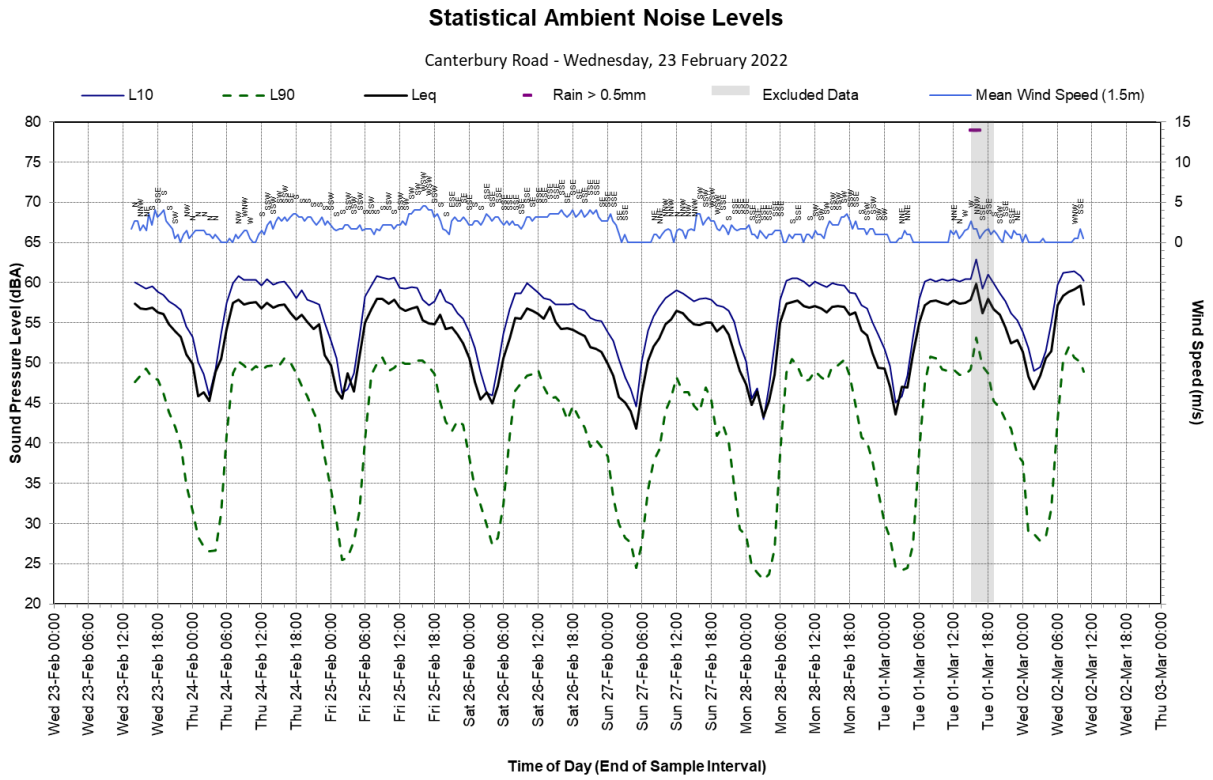
	Date	L_{90}, dBA			L_{eq}, dBA			L_{10}, dBA			L1, dBA		
		Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
R1: 2/5 Landy Court	Wednesday, 23 February 2022	43	51	47	49	59	53	49	60	51	56	65	56
	Thursday, 24 February 2022	46	46	41	52	56	52	51	56	50	58	61	56
	Friday, 25 February 2022	49	45	42	55	50	50	54	51	48	62	58	53
	Saturday, 26 February 2022	44	42	41	53	47	50	50	48	47	58	55	54
	Sunday, 27 February 2022		40	37		52	49		50	46		60	52
	Monday, 28 February 2022	45	43	39	52	48	51	50	49	49	58	56	54
	Tuesday, 1 March 2022	46	41	39	52	56	49	52	55	47	60	61	52
	Wednesday, 2 March 2022				52			52			59		
R4: Canterbury Road	Wednesday, 23 February 2022	48	45	32	57	55	50	60	58	52	65	64	61
	Thursday, 24 February 2022	50	46	33	57	55	51	60	58	52	65	64	61
	Friday, 25 February 2022	50	45	34	57	55	50	59	58	51	65	63	59
	Saturday, 26 February 2022	46	42	32	56	53	48	58	57	51	63	61	58
	Sunday, 27 February 2022		43	28		55	49		57	50		62	60
	Monday, 28 February 2022	49	44	30	57	55	50	60	58	51	65	64	60
	Tuesday, 1 March 2022	50	45	34	58	56	52	60	59	54	65	64	62
	Wednesday, 2 March 2022	50			59			61			65		

	Date	L90, dBA			Leq, dBA			L10, dBA			L1, dBA		
		Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
R5: 20 Ash Grove	Wednesday, 23 February 2022	42	38	31	46	43	38	48	46	40	52	52	46
	Thursday, 24 February 2022	43	38	30	46	46	37	48	45	37	52	54	44
	Friday, 25 February 2022	43	38	35	47	44	43	48	45	44	54	51	50
	Saturday, 26 February 2022	38	37	33	44	42	38	45	44	40	52	51	46
	Sunday, 27 February 2022			29		43	36		43	38		51	45
	Monday, 28 February 2022	42	36	30	47	42	37	48	43	38	54	51	45
	Tuesday, 1 March 2022	43	39	34	47	63	41	48	62	43	54	65	49
	Wednesday, 2 March 2022	43			49			49			56		
R7: 265 Sheffield Road	Wednesday, 2 March 2022	36	39	35	50	52	42	48	49	41	57	56	46
	Thursday, 3 March 2022	36	39	31	50	43	38	48	45	33	56	49	38
	Friday, 4 March 2022	37	35	36	49	49	47	48	46	45	55	52	49
	Saturday, 5 March 2022	37	34	33	51	47	39	48	48	41	56	53	47
	Sunday, 6 March 2022		39	39		54	48		49	49		60	56
	Monday, 7 March 2022	37	35	35	53	46	49	48	48	43	57	51	50
	Tuesday, 8 March 2022	37	38	41	52	50	49	51	47	50	59	57	56
	Wednesday, 9 March 2022	38	34	30	47	42	36	49	43	37	56	49	44
	Thursday, 10 March 2022	36			47			47			56		
R8: Fussell Road	Wednesday, 23 February 2022	35	38	28	46	47	33	40	50	33	47	55	39
	Thursday, 24 February 2022	35	37	27	41	43	34	40	44	32	49	51	37
	Friday, 25 February 2022	37	35	34	44	40	47	44	42	44	53	47	51
	Saturday, 26 February 2022	31	31		46	39		43	40		52	48	

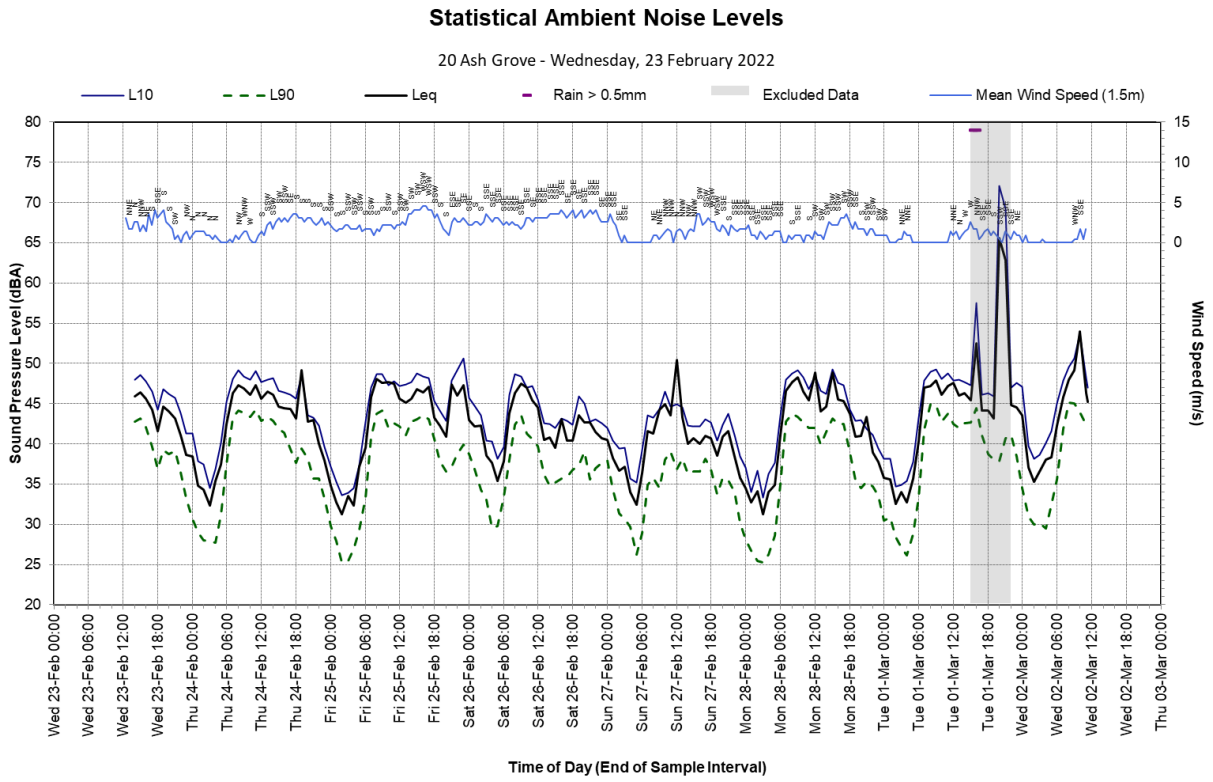
A.1 R1: 2/5 Landy Court



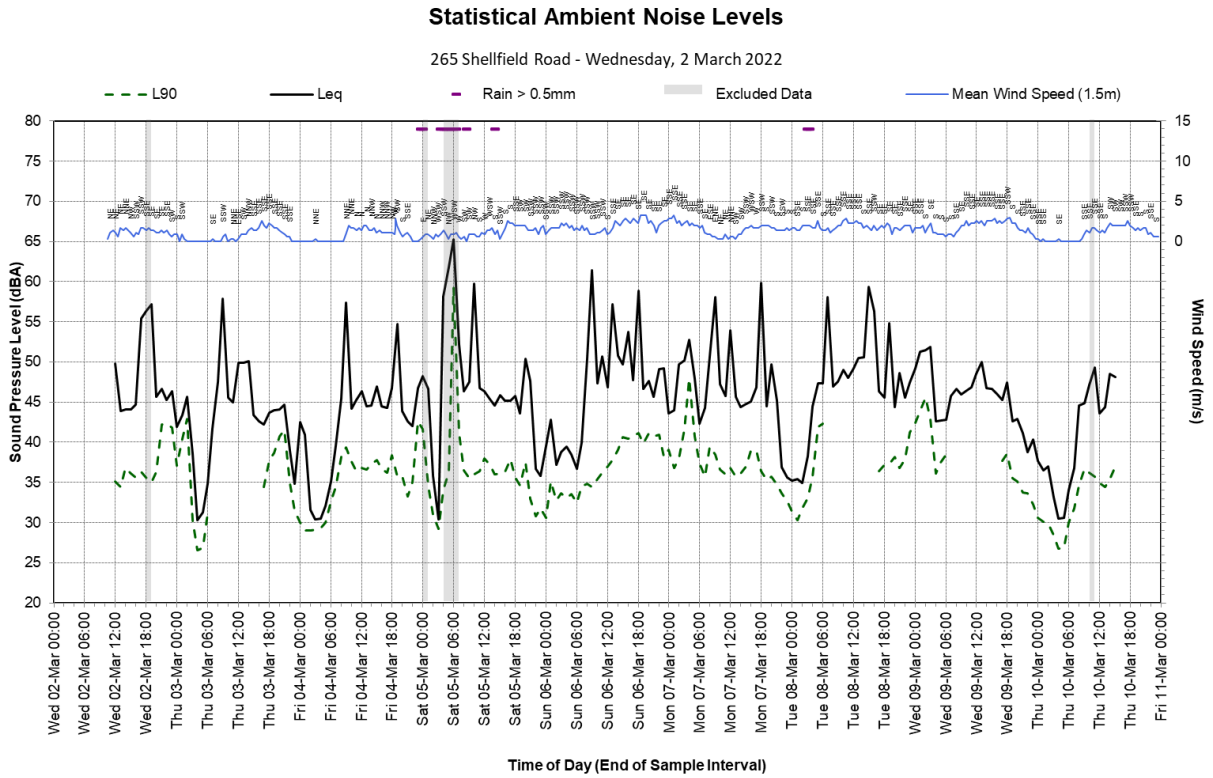
A.2 R4: Canterbury Road



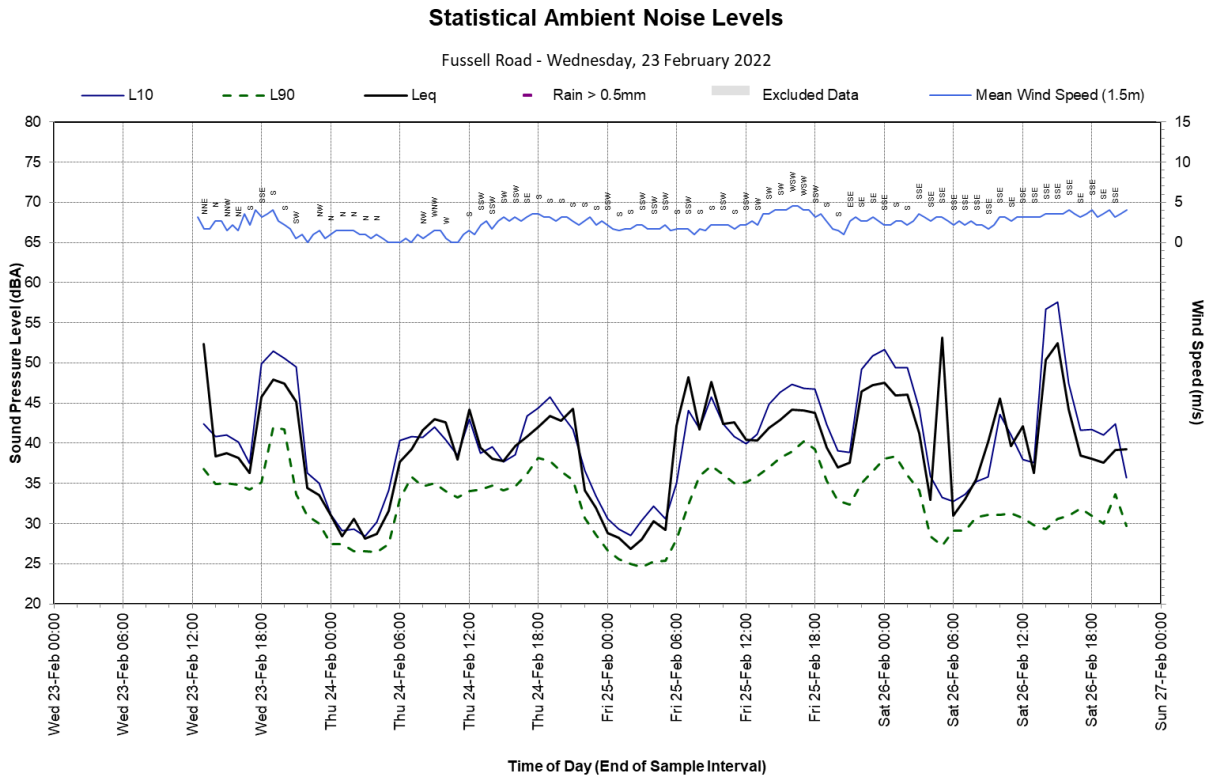
A.3 R5: 20 Ash Grove



A.4 R7: 265 Sheffield Road



A.5 R8: Fussell Road



Appendix B EPA Protocol – Noise Limit Results

Noise Impact Assessment

Montrose Quarry

Boral

SLR Project No.: 640.30327.00000

21 November 2024

Zone Type

NRZ1 Neighbourhood Residential Zone = Type 1
SUZ6 Extractive Resource Environmental Buffer = Type 1
PCRZ Public Conservation and Resource Zone = Type 1
SUZ1 Earth and Energy Resources Zone = Type 3

INFUENCING FACTORS AND ZONING LEVELS

27 Ash Grove, Montrose			
Zone	AREA, %		
	Type 1	Type 2	Type 3
	(eg. Residential)	(eg. Commercial)	(eg. Heavy Industry)
Circle - 140m diameter	97%	0	3%
Circle - 400m diameter	69%	0%	31%
INFLUENCING FACTOR	**0.17**		
Zoning Level, dBA	Day	Evening	Night
	53	47	42

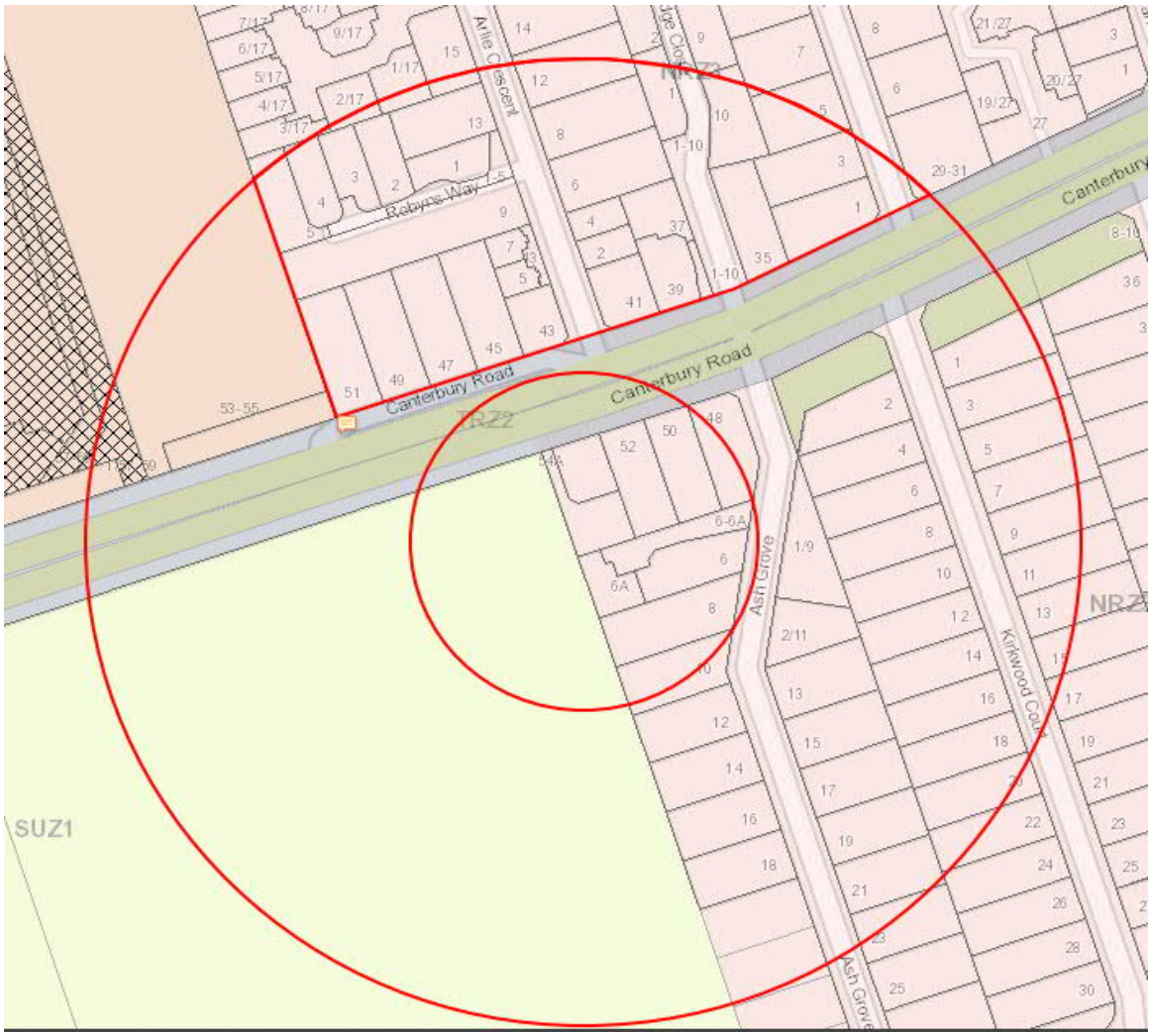
N

SLR Consulting Australia Pty Ltd
Level 11, 176 Wellington Parade
EAST MELBOURNE
VICTORIA, 3002

A.B.N. 29 001 584 612
Tel: (03) 9249 9400

Appendix A:
Noise Protocol Zone Map for
27 Ash Grove, Montrose

DRAWN	DATE	SCALE	FILE	JOB No.	DRG. No.	REVISION
BF	2022-05-24	NTS	SEPP limits 27 Ash Grove.XLS	640.30327	1	0



Zone Type

NRZ1 Neighbourhood Residential Zone = Type 1
TRZ2 Principal Road Network = Type 3
IN1Z Industrial 1 Zone = Type 3
SUZ1 Earth and Energy Resources Zone = Type 3

INFUENCING FACTORS AND ZONING LEVELS

54A Canterbury Road, Montrose			
Zone	AREA, %		
	Type 1 (eg. Residential)	Type 2 (eg. Commercial)	Type 3 (eg. Heavy Industry)
Circle - 140m diameter	45%	0	55%
Circle - 400m diameter	52%	0%	48%
INFLUENCING FACTOR	**0.52**		
Zoning Level, dBA	Day	Evening	Night
	59	53	48

N

SLR Consulting Australia Pty Ltd
Level 11, 176 Wellington Parade
EAST MELBOURNE
VICTORIA, 3002

A.B.N. 29 001 584 612
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Appendix A:
Noise Protocol Zone Map for
54A Canterbury Road, Montrose

DRAWN	DATE	SCALE	FILE	JOB No.	DRG. No.	REVISION
BF	2022-05-24	NTS	SEPP limits 54A Canterbury Road.XLS	640.30327	1	0

Zone Type

GWAZ1 Green Wedge A Zone = Trpe 1

SUZ6 Extractive Resource Environmental Buffer = Type 1

PUZ1 Public Use Zone - Services & Utility = Type 2

IN1Z Industrial 1 Zone = Type 3

SUZ1 Earth and Energy Resources Zone = Type 3

INFUENCING FACTORS AND ZONING LEVELS

13 Jeannette Maree Court, Kilsyth			
Zone	AREA, %		
	Type 1	Type 2	Type 3
	(eg. Residential)	(eg. Commercial)	(eg. Heavy Industry)
Circle - 140m diameter	100%	0	0%
Circle - 400m diameter	88%	0%	12%
INFLUENCING FACTOR	**0.06**		
Zoning Level, dBA	Day	Evening	Night
	51	45	40

N

SLR Consulting Australia Pty Ltd
Level 11, 176 Wellington Parade
EAST MELBOURNE
VICTORIA, 3002

A.B.N. 29 001 584 612
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Appendix A:
Noise Protocol Zone Map for
13 Jeannette Maree Court, Kilsyth

DRAWN	DATE	SCALE	FILE	JOB No.	DRG. No.	REVISION
BF	2022-05-24	NTS	SEPP limit Fussel Rd aka Jeannette Maree Ct.XLS	640.30327	1	0

Zone Type

NRZ1 Neighbourhood Residential Zone = Type 1
PPRZ Park and Recreation Zone = Type 1
PUZ2 Public Use Zone - Education = Type 1
PUZ1 Public Use Zone - Service & Utility = Type 2
IN1Z Industrial 1 Zone = Type 3

INFUENCING FACTORS AND ZONING LEVELS

U2 5 Landy Court, Kilsyth			
Zone	AREA, %		
	Type 1	Type 2	Type 3
	(eg. Residential)	(eg. Commercial)	(eg. Heavy Industry)
Circle - 140m diameter	75%	2293	10%
Circle - 400m diameter	45%	6%	49%
INFLUENCING FACTOR	**0.35**		
Zoning Level, dBA	Day	Evening	Night
	56	50	45

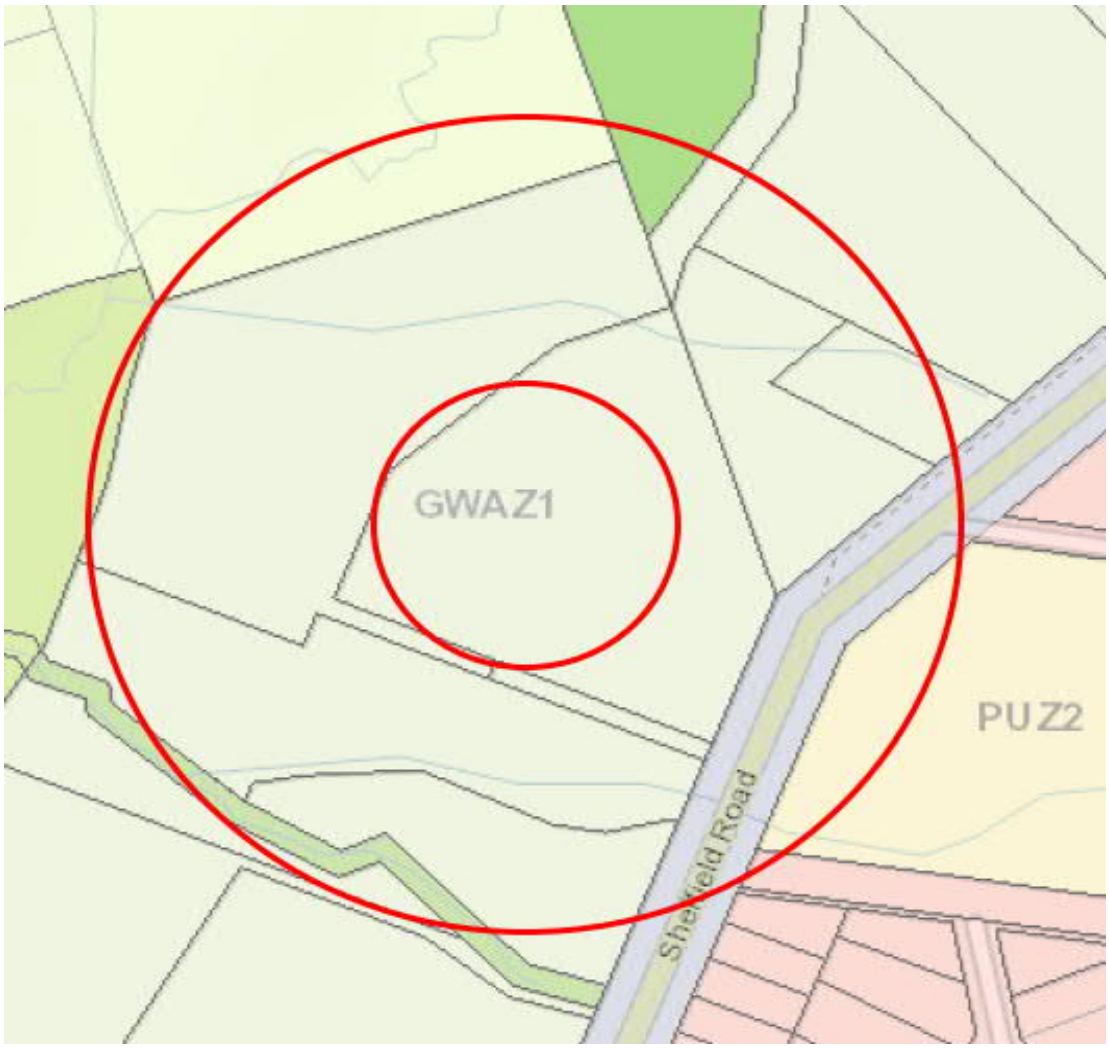
N

SLR Consulting Australia Pty Ltd
Level 11, 176 Wellington Parade
EAST MELBOURNE
VICTORIA, 3002

A.B.N. 29 001 584 612
Tel: (03) 9249 9400

Appendix A:
Noise Protocol Zone Map for
U2 5 Landy Court, Kilsyth

DRAWN	DATE	SCALE	FILE	JOB No.	DRG. No.	REVISION
BF	2022-05-24	NTS	SEPP N-1 Zoning Circle Mp U2 5 Landy Court.XLS	640.30327	1	0



Zone Type

GWAZ1 Green Wedge A Zone = Trpe 1
SUZ6 Extractive Resource Environmental Buffer = Type 1
PUZ2 Public Use Zone - Education = Type 1
PCRZ Public Conservation and Resource Zone = Type 1
TRZ3 Significant Municipal Road = Type 2
PUZ1 Public Use Zone - Services & Utility = Type 2

INFUENCING FACTORS AND ZONING LEVELS

265 Sheffield Road, Montrose			
Zone	AREA, %		
	Type 1 (eg. Residential)	Type 2 (eg. Commercial)	Type 3 (eg. Heavy Industry)
Circle - 140m diameter	100%	0	0%
Circle - 400m diameter	92%	8%	0%
INFLUENCING FACTOR	**0.02**		
Zoning Level, dBA	Day	Evening	Night
	50	44	39

N

SLR Consulting Australia Pty Ltd
Level 11, 176 Wellington Parade
EAST MELBOURNE
VICTORIA, 3002

A.B.N. 29 001 584 612
Tel: (03) 9249 9400

Appendix A:
Noise Protocol Zone Map for
265 Sheffield Road, Montrose

DRAWN	DATE	SCALE	FILE	JOB No.	DRG. No.	REVISION
BF	2022-05-24	NTS	SEPP limits 265 Sheffield Road.XLS	640.30327	1	0

Appendix C Sound Power Levels

Noise Impact Assessment

Montrose Quarry

Boral

SLR Project No.: 640.30327.00000

21 November 2024

C.1 Measurement Locations

C.2 Measurement Locations

Job No.	Job Title			
640.30327	Montrose Quarry Extension Acoustics			
Date Created	By	Date Revised	Rev	Sheet
18 Mar 2022	BF	02 Jun 2022	45153	1
Date Reviewed	By	Review Type	Review Status	

Measurement Results - SPL

Item / Description	Distance to source (m)	dB(A)	1/3 Octave Band Centre Frequency, Hz																											Notes
			25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	
Loading Concrete - Loc 1	8	78 (A)	65	63	68	69	74	77	66	69	69	67	67	70	67	77	70	68	67	65	66	68	64	63	60	58	56	53	50	Trucks will back into concrete building and load up, siren sounds when complete.
Slump Stand - Loc 2	11	83 (A)	67	67	67	67	78	82	69	72	73	70	72	80	75	83	71	68	69	67	67	67	65	65	63	61	59	58	54	Trucks will then advance into Slump Stand and wash down and add water to concrete mix, then leave site
Siren concrete load - Loc 2	11	80 (A)	71	66	68	62	64	70	61	61	64	63	62	66	65	65	63	65	68	71	71	73	72	64	63	60	60	53	49	Siren is short duration - 2 - 3 seconds
Coding house - Loc 3	5	73 (A)	73	77	71	72	72	69	70	74	75	69	65	68	68	66	64	61	62	62	61	58	58	57	54	54	54	54	54	Drops aggrigate into trucks - relatively quiet
Laydown area - Loc 4	18	82 (A)	77	82	76	77	79	75	76	78	75	74	80	73	72	73	72	74	73	72	72	70	70	69	67	65	63	61	58	Measurement point roughly 20m from screens 5 & 6 building
Screen 5 & 6 building - Loc 5	5	86 (A)	77	80	77	80	78	75	74	76	78	79	77	74	77	78	77	77	77	75	75	74	74	73	73	72	71	70	68	
Bin house - Loc 6	14	79 (A)	74	78	74	81	77	70	71	72	75	74	70	69	71	71	71	70	69	69	68	68	66	64	63	62	60	60	57	Barmac crusher not operating
Back of screenhouse - Loc 7	9	85 (A)	74	76	75	74	73	73	72	74	74	74	75	76	74	75	75	78	78	75	76	74	72	71	68	66	64	64	60	Screen 3
Loading crusher on ROM pad - Loc 8	19	76 (A)	72	77	83	72	77	80	69	74	79	72	71	67	68	67	66	66	65	65	65	64	62	62	59	57	55	53	49	
Loading crusher on ROM pad repeat - Loc 8	19	76 (A)	76	78	82	80	79	75	73	77	73	71	67	66	70	69	66	67	65	66	66	63	63	63	61	58	56	55	51	Second measurement
Dump truck leaving ROM pad - Loc 8	19	77 (A)	72	79	83	77	79	78	77	79	80	75	72	69	70	68	66	65	64	65	65	64	63	62	59	57	55	53	49	
Dump truck backing up to crusher - Loc 8	19	74 (A)	71	73	76	72	79	76	70	72	71	67	67	63	62	61	62	62	61	62	69	61	60	60	57	55	53	51	47	Reverse beepers
Asphalt plant siren - Loc 9	9	81 (A)	68	70	77	70	68	71	66	67	66	63	67	67	67	68	66	65	66	62	63	63	79	65	60	59	57	54	51	Siren is short duration 10s
Concrete truck pass by - Loc 9	11	74 (A)	71	75	67	84	83	67	77	71	73	69	68	65	65	64	66	66	65	63	64	62	61	59	56	54	51	50	49	4s Leq as the truck passed by the closest point
Asphalt plant active - Loc 9	9	76 (A)	74	75	72	75	73	71	68	71	70	73	70	72	69	67	66	65	67	64	63	62	61	59	60	58	56	56	54	Only fires up when cooking a batch of ashpalt (on for approx 10 minutes for this load) - Significant tone at 12.5Hz - 94 dB
Ashphalt plant inactive - Loc 9	9	67 (A)	69	75	66	65	66	63	62	64	62	60	62	61	58	57	59	57	57	55	55	53	57	50	48	45	43	42	40	
Asphalt truck drive by - Loc 9	9	80 (A)	72	68	84	80	69	74	73	74	73	69	69	69	71	73	72	71	71	69	70	68	67	65	62	60	58	57	56	
Asphalt truck reversing squwarker - Loc 9	9	73 (A)	70	70	75	83	65	64	63	65	63	62	63	62	62	62	63	63	66	63	62	59	60	59	57	55	53	50	45	
Loader moving gravel in Zone 1	64	63 (A)	57	57	58	58	59	62	59	56	56	55	55	55	54	54	52	53	54	54	54	52	51	49	46	43	41	40	38	
Primary crusher --Loc 10	18	82 (A)	73	77	80	80	83	78	79	79	76	77	76	74	77	76	71	72	71	70	69	68	67	66	64	63	61	59	56	
Primary crusher repeat --Loc 10	18	82 (A)	73	76	76	80	81	80	79	79	75	75	75	73	76	75	72	73	71	71	71	70	69	68	66	64	62	61	59	
Calibration point - NE boundary - Loc 11	192	61 (A)	52	49	51	53	54	49	57	55	55	56	54	53	55	55	52	50	51	50	51	50	49	45	42	37	31	24	14	210 m to truck driving from pit to ROM pad
Truck going ROM pad to pit - Loc 12	10	81 (A)	68	69	77	80	72	75	84	77	73	78	73	70	76	74	71	70	69	70	70	69	66	66	64	61	64	63	58	4s Leq as the truck passed by the closest point
Truck going ROM pad to pit 2 - Loc 12	10	82 (A)	72	71	74	80	73	71	84	84	74	75	75	70	72	78	72	70	72	72	71	70	68	67	66	64	66	66	59	4s Leq as the truck passed by the closest point
Truck going pit to ROM pad - Loc 12	10	85 (A)	70	73	73	70	71	96	87	74	89	81	73	68	72	77	75	74	77	74	75	73	70	68	66	64	63	63	61	4s Leq as the truck passed by the closest point
Calibration point - W boundary - Loc 13	390	69 (A)	60	61	59	72	65	60	63	58	63	58	55	59	59	60	59	59	61	63	60	56	56	53	51	47	43	40	37	390m to drill rig at the bottom of the pit
Calibration point - W boundary - Loc 13	390	66 (A)	57	60	63	68	60	62	63	59	60	56	53	56	59	58	58	57	55	57	55	54	54	51	49	45	41	36	30	Repeat of above
Drill rig bottom of pit	13	85 (A)	68	66	67	73	70	80	86	73	79	75	75	76	72	76	78	75	74	74	74	73	72	73	73	70	71	69	67	
Drill rig bottom of pit	20	80 (A)	61	60	65	70	67	80	84	72	77	74	72	73	66	70	72	69	69	69	69	66	67	66	66	63	63	63	60	
Drill rig bottom of pit	9	90 (A)	64	67	68	74	73	82	88	74	83	78	77	81	76	82	81	79	79	78	79	78	77	79	78	79	77	77	75	
Truck movment average Lmax	10	81 (A)				87	84	80	77	74	73	72	71	71	71	71	71	71	71	71	70	70	69	67	65	63	61	59	57	

Job No.	Job Title			
Date Created	By	Date Revised	Rev	Sheet
14 Aug 2023	BF	23 Aug 2023	1	2
Date Reviewed	By	Review Type	Review Status	

Montrose Quarry Current - SWLs

Item / Description	Rating/Broadband/Input Rating	dB	dB(A)	1/3 Octave Band Centre Frequency, Hz 25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k
Quarry																														
Coding house			95 (A)	95	99	93	94	94	91	92	95	97	91	87	90	89	88	86	83	84	84	83	80	79	78	76	76	76	76	76
Screens (north)			113 (A)	104	106	104	106	105	101	101	103	104	106	104	101	104	105	104	104	103	102	101	101	101	100	100	99	97	96	95
Screens (south)			118 (A)	109	111	109	111	110	106	106	108	109	111	109	106	109	110	109	109	108	107	106	106	106	105	105	104	102	101	100
Dumping rock into crusher hopper			110 (A)	105	111	117	106	110	114	103	107	113	106	104	100	101	101	100	100	99	98	98	97	96	95	93	90	88	86	83
Primary Crusher			112 (A)	103	107	108	110	112	109	109	109	106	106	106	104	107	106	102	103	101	101	100	99	98	97	95	94	92	90	88
Barmac crusher			109 (A)	92	92	93	94	97	99	98	101	97	98	98	95	95	96	96	97	99	99	99	99	99	97	96	95	93	91	87
Front end loader			107 (A)	101	101	102	103	104	106	103	100	100	99	99	99	98	98	96	97	98	98	98	96	95	93	90	87	85	84	82
Sales truck			107 (A)				113	109	106	103	100	99	98	97	97	97	97	97	97	97	97	96	96	95	93	91	89	87	85	83
Asphalt Plant																														
Asphalt plant siren			109 (A)	96	97	104	97	95	98	93	94	93	90	94	94	95	96	93	92	93	89	90	90	106	93	87	86	84	81	78
Asphalt plant			99 (A)	99	104	96	98	97	94	92	95	93	95	94	95	92	90	90	89	90	87	87	85	87	82	82	80	78	78	76
Sales truck			109 (A)				115	111	108	105	102	101	100	99	99	99	99	99	99	99	99	98	98	97	95	93	91	89	87	85
Concrete Batch Plant																														
Concrete loading			105 (A)	91	89	94	95	100	103	93	95	95	93	93	97	93	103	96	95	93	91	92	94	90	89	86	84	82	79	77
Concrete loading siren			109 (A)	100	95	96	91	93	98	90	90	93	92	91	95	93	94	91	94	97	100	100	102	101	93	92	89	89	82	78
Slump stand			112 (A)	96	96	96	96	107	110	98	101	102	98	100	109	104	112	100	96	98	95	95	96	94	93	92	90	88	87	83
Concrete truck			107 (A)	104	108	100	117	116	100	110	104	106	102	101	98	98	97	99	99	98	96	97	95	94	92	89	87	84	83	82
Pit																														
Drill rig			118 (A)	91	94	96	101	101	109	115	102	110	105	104	108	103	109	108	106	106	105	107	105	104	106	106	106	104	104	103
Excavator breakout and loading			107 (A)				110	108	105	103	100	100	100	100	100	101	101	99	97	96	95	95	94	93	92	91	90	88	86	84
Water cart			108 (A)				103	103	104	105	105	103	99	97	98	102	103	101	97	95	96	97	98	96	94	93	91	90	88	86
Dumping rock into haul truck			110 (A)	94	106	107	111	106	107	108	107	106	108	104	104	103	101	101	100	99	100	99	99	98	96	91	86	81	75	68
Haul truck			113 (A)	98	101	101	98	99	123	115	102	117	109	101	96	99	105	103	102	105	102	102	101	98	96	94	92	91	90	89

Job No.	Job Title			
Date Created	By	Date Revised	Rev	Sheet
14 Aug 2023	BF	14 Aug 2023	1	3
Date Reviewed	By	Review Type	Review Status	

Montrose Quarry Expansion - SWLs

Item / Description	Rating/Broadband/Input Rating	dB	dB(A)	1/3 Octave Band Centre Frequency, Hz 25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k
Overburden removal																														
Haul truck			113 (A)	98	101	101	98	99	123	115	102	117	109	101	96	99	105	103	102	105	102	102	101	98	96	94	92	91	90	89
Excavator			107 (A)				110	108	105	103	100	100	100	100	100	101	101	99	97	96	95	95	94	93	92	91	90	88	86	84
Dozer			108 (A)				108	108	108	109	109	107	103	101	100	99	97	97	97	97	97	98	98	95	91	89	87	86	84	82
Extraction																														
Excavator			107 (A)				110	108	105	103	100	100	100	100	100	101	101	99	97	96	95	95	94	93	92	91	90	88	86	84
Drill rig			118 (A)	91	94	96	101	101	109	115	102	110	105	104	108	103	109	108	106	106	105	107	105	104	106	106	106	104	104	103
Water cart			108 (A)				103	103	104	105	105	103	99	97	98	102	103	101	97	95	96	97	98	96	94	93	91	90	88	86
Dumping rock into haul truck			110 (A)	94	106	107	111	106	107	108	107	106	108	104	104	103	101	101	100	99	100	99	99	98	96	91	86	81	75	68
Haul truck			113 (A)	98	101	101	98	99	123	115	102	117	109	101	96	99	105	103	102	105	102	102	101	98	96	94	92	91	90	89
Pit backfill																														
Excavator			107 (A)				110	108	105	103	100	100	100	100	100	101	101	99	97	96	95	95	94	93	92	91	90	88	86	84
Dozer			108 (A)				108	108	108	109	109	107	103	101	100	99	97	97	97	97	97	98	98	95	91	89	87	86	84	82

Appendix D Noise Risk Assessment

Noise Impact Assessment

Montrose Quarry

Boral

SLR Project No.: 640.30327.00000

21 November 2024

Risk Management Assessment Table

Business: Boral Resources Vic P/L

State/Location: VIC - Montrose

Revision Date: #########

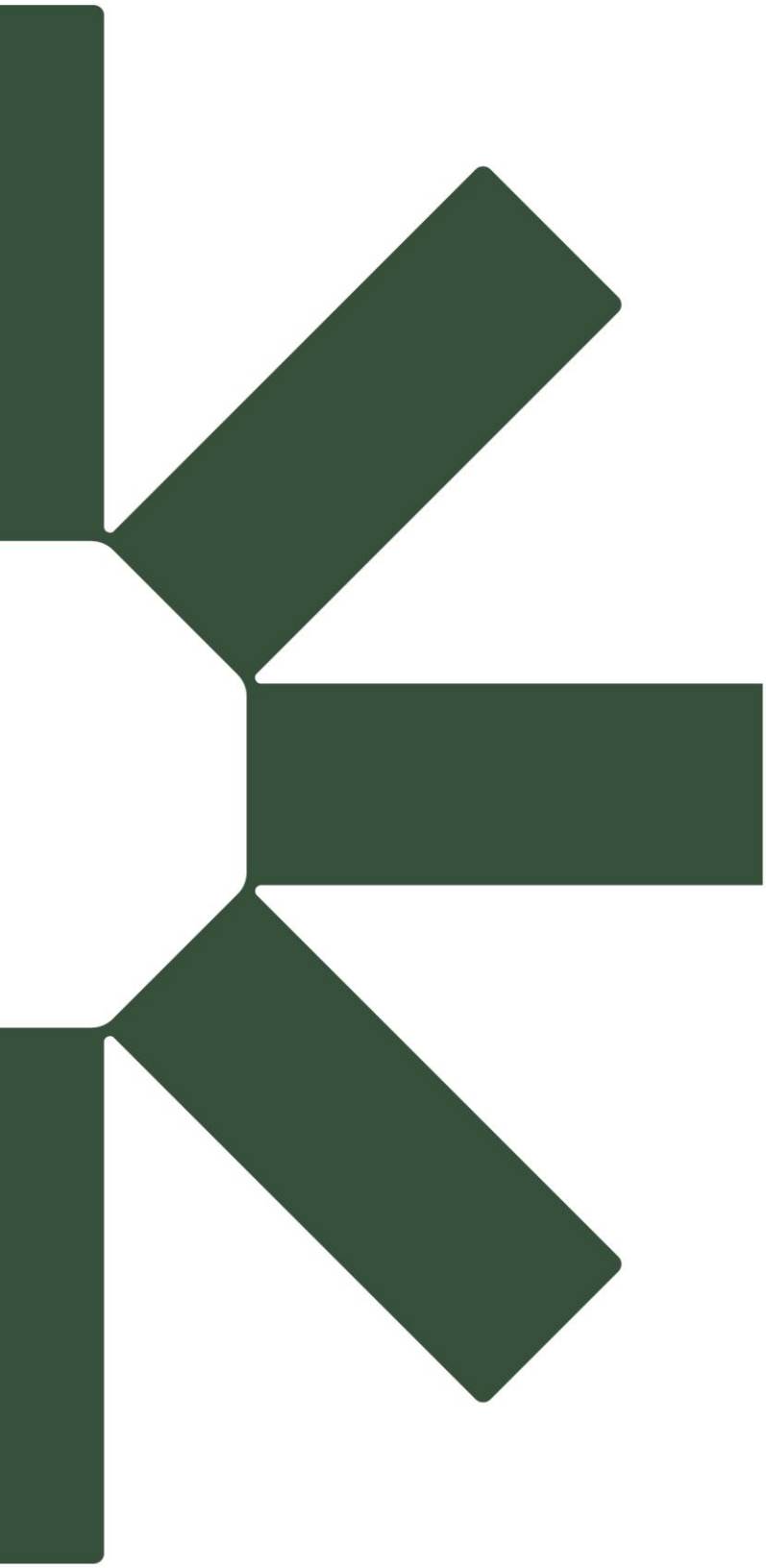
Project Name: WA100 - Montrose Noise Assessment – Work Plan Variation (V1)

Prepared by:

Likelihood	Insignificant	Minor	Moderate	Major	Critical
Almost Certain	Medium	High	Very High	Very High	Very High
Likely	Medium	Medium	High	Very High	Very High
Possible	Low	Medium	Medium	High	Very High
Unlikely	Low	Low	Medium	High	High
Rare	Low	Low	Medium	Medium	High

Consequence

				ASSESSMENT OF RISK										
				Inherent Risk					Residual Risk			Monitoring and Ongoing Management		
Potentail Risk Hazard/Event:	Phase of Development	Potentail Risk Event	Potential Receptors or At Risk Entities				Likelihood	Consequence	Risk rating	Treatment measures (Controls)	Performance Standards	Residual Likelihood	Residual Consequence	Residual Risk	Aspect to be monitored	Details of monitoring and ongoing management
			Details of sensitive receptor	Location and proximity to site	How hazard may harm or damage sensitive receptor	Evidence to support assessment										
Excessive noise at any sensitive receptors from processing plant/ (primary/Secondary/Tertiary)	Fixed Plant	Fixed and Mobile Plant	Neighbouring residences	Closest receivers are approximately 400 m to 1,000 m from the primary crusher	Amenity	Noise Impact Assessment	Likley	Minor	MEDIUM	Operations should ensure that appropriate steps have been taken to minimise noise and/or vibration emissions, both to minimise noise and/or vibration nuisance to neighbours and that regulatory limits are met. For example: ● all plant and equipment is well-maintained ● where possible, restrict particularly noisy activities to suitable times of day e.g. not early morning or at night ● where possible, restrict particularly noisy activities to suitable weather conditions e.g. not during temperature inversions or strong wind towards the community ● plan and design blasts to minimise both noise and vibration ● monitor all blasts for both noise and vibration to ensure limits are met and for future blast design ● implement work instructions and standard operating procedures (SOPs) that, where possible, restrict noisy activities (such as material grinding) to enclosed areas and/or require doors to be kept closed ● employ buffer zones (such as vegetation buffers) or setbacks, where possible	● Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues ● Only operate during approved hours ● Processing plant and equipment is maintained as per manufacture specifications	Unlikley	Minor	LOW	Noise monitoring will be carried out periodically to ensure the defined limits are being met. How frequently noise is monitored will depend on changes to: ● plant operations ● stringency of noise limits ● number of noise complaints received ● or as defined in the Licence conditions.	Noise and/or vibration complaints received from neighbours or employees will be carefully monitored and investigated, as they may indicate a particular problem with a piece of plant or the operation that needs to be rectified. In serious cases of noise and/or vibration nuisance, a suitable consultant should be engaged to carry out a survey to identify and quantify the main sources. The results should serve as a basis to define appropriate improvement projects where on-site modifications may need to be performed to lower the noise and/or vibration impacts of the site
Excessive noise at any sensitive receptors from Extraction (Drill rig/Excavator/Loading Haul Trucks)	Plant and equipment, Mobile Plant	Plant and equipment, Mobile Plant	Neighbouring residences	Receivers can be ~350m to 1,000m from extraction areas	Amenity	Noise Impact Assessment	Likley	Minor	MEDIUM	Operations should ensure that appropriate steps have been taken to minimise noise and/or vibration emissions, both to minimise noise and/or vibration nuisance to neighbours and that regulatory limits are met. For example: ● all plant and equipment is well-maintained ● where possible, restrict particularly noisy activities to suitable times of day e.g. do not operate the rock breaker first thing in the morning ● where possible, restrict particularly noisy activities to suitable weather conditions e.g. not during temperature inversions or strong wind towards the community ● plan and design blasts to minimise both noise and vibration ● monitor all blasts for both noise and vibration to ensure limits are met and for future blast design ● employ buffer zones (such as vegetation buffers) or setbacks, where possible	● Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues ● Only operate during approved hours ● Mobile equipment is maintained as per manufacture specifications	Unlikley	Minor	LOW	Noise monitoring will be carried out periodically to ensure the defined limits are being met. How frequently noise is monitored will depend on changes to: ● plant operations ● stringency of noise limits ● number of noise complaints received ● or as defined in the Licence conditions.	Noise and/or vibration complaints received from neighbours or employees will be carefully monitored and investigated, as they may indicate a particular problem with a piece of plant or the operation that needs to be rectified. In serious cases of noise and/or vibration nuisance, a suitable consultant should be engaged to carry out a survey to identify and quantify the main sources. The results should serve as a basis to define appropriate improvement projects where on-site modifications may need to be performed to lower the noise and/or vibration impacts of the site
Excessive noise at any sensitive receptors from Haulage (mobile plant conveyor, rigid/articulated haul truct/water cart)	Haulage	Plant and equipment, Mobile Plant	Neighbouring residences	Receivers can be as close as 130m from internal haul routes	Amenity	Noise Impact Assessment	Likley	Minor	MEDIUM	Operations should ensure that appropriate steps have been taken to minimise noise and/or vibration emissions, both to minimise noise and/or vibration nuisance to neighbours and that regulatory limits are met. For example: ● all plant and equipment is well-maintained ● maintain the condition of internal haul routes ● avoid excessive engine noise e.g. hard acceleration, design gradient of haul routes to be a low as practicable ● install earth bunding at strategic locations between haul routes and sensitive receivers	● Assessment against the Noise Protocol ● Only operate during approved hours ● Mobile equipment is maintained as per manufacture specifications	Unlikley	Minor	LOW	Noise monitoring will be carried out periodically to ensure the defined limits are being met. How frequently noise is monitored will depend on changes to: ● plant operations ● stringency of noise limits ● number of noise complaints received ● or as defined in the Licence conditions.	Noise and/or vibration complaints received from neighbours or employees will be carefully monitored and investigated, as they may indicate a particular problem with a piece of plant or the operation that needs to be rectified. In serious cases of noise and/or vibration nuisance, a suitable consultant should be engaged to carry out a survey to identify and quantify the main sources. The results should serve as a basis to define appropriate improvement projects where on-site modifications may need to be performed to lower the noise and/or vibration impacts of the site
Excessive noise at any sensitive receptors from Sale track/fromnt end loader	Sales	Plant and equipment, Mobile Plant	Neighbouring residences	Receivers on Ash Grove can be <100m from the eastern most stockpiles	Amenity	Noise Impact Assessment	Likley	Minor	MEDIUM	Operations should ensure that appropriate steps have been taken to minimise noise and/or vibration emissions, both to minimise noise and/or vibration nuisance to neighbours and that regulatory limits are met. For example: ● all plant and equipment is well-maintained ● maintain the condition of sire access road ● maintain the condition of internal haul routes ● limit sales truck access prior to 7 am - e.g. operate one loader prior to 7 am ● avoid contact between front end loader bucket and trailer ● out of hours operations, if required for large infrastructure projects, shall be supported by a noise assessment	● Assessment against the Noise Protocol ● Only operate during approved hours ● Mobile equipment is maintained as per manufacture specifications	Unlikley	Minor	LOW	Noise monitoring will be carried out periodically to ensure the defined limits are being met. How frequently noise is monitored will depend on changes to: ● plant operations ● stringency of noise limits ● number of noise complaints received ● or as defined in the Licence conditions.	Noise and/or vibration complaints received from neighbours or employees will be carefully monitored and investigated, as they may indicate a particular problem with a piece of plant or the operation that needs to be rectified. In serious cases of noise and/or vibration nuisance, a suitable consultant should be engaged to carry out a survey to identify and quantify the main sources. The results should serve as a basis to define appropriate improvement projects where on-site modifications may need to be performed to lower the noise and/or vibration impacts of the site



Making Sustainability Happen