Vipac Engineers and Scientists Limited
Level 2, 146 Leichhardt Street, Spring Hill, QLD 4000 Australia
PO Box 47, Spring Hill, Qld, 4000 Australia
t. +61 7 3377 0400 | **e.** brisbane@vipac.com.au
w. www.vipac.com.au | A.B.N. 33 005 453 627 | A.C.N. 005 453 627

Outline Planning Consultants Pty ltd

Braidwood Sand Pit Expansion Air & Noise Assessments

Noise & Vibration Impact Assessment

70B-25-0169-TRP-111411-2

24 October 2025

Job Title:	Braidwood Sand Pit Expansion Air & Noise Assessments
Report Title:	Noise & Vibration Impact Assessment
Document Reference:	70B-25-0169-TRP-111411-2

Prepared For:	**Prepared By:**
Outline Planning Consultants Pty ltd [redacted] [redacted] Australia **Contact:** Gary Peacock [redacted]	Vipac Engineers and Scientists Limited Level 2, 146 Leichhardt Street, Spring Hill, QLD 4000 Australia **Tel:** +61 7 3377 0400

Author:	Henri Magisson 24 Oct 2025	[redacted]	Project Engineer
Reviewer:	Jackson Yu 24 Oct 2025	[redacted]	Principal Acoustic Consultant, Team Leader (B.I.E.)
Issued By:	Jackson Yu 24 Oct 2025	[redacted]	Principal Acoustic Consultant, Team Leader (B.I.E.)

Revision History:

Rev. #	*Comments / Details of change(s) made*	*Date*	*Revised by:*
Rev. 00	Original issue	14 Aug 2025	
Rev. 01	Minor amendments as per client requests	26 Aug 2025	HM
Rev. 02	Updated Drawings	24 Oct 2025	JY

Executive Summary

Vipac Engineers and Scientists Ltd (Vipac) was engaged by Outline Planning Consultants Pty Ltd on behalf of Braidwood Sand and Gravel and Lentro Earthmoving (the Proponent) to prepare a noise and vibration impact assessment to support the proposed expansion of the approved sand extraction operation from a sand pit at 552 Larbert Rd, Larbert NSW on Lot 332 and 333 DP 755418 (the Project).

The proposed quarry has a footprint of 17.92ha with a total quarry resource of 1.2 million tonnes. The quarry will operate in the daytime and a short 1-hour shoulder period from 6am to 7am (night-time period), and extract 200,000 tonnes of material per annum.

The purpose of this assessment is to evaluate the potential impacts of noise and vibration generated by the quarry and to provide recommendations to mitigate any potential impacts that might have an effect on any sensitive receptors.

Noise modelling has been undertaken using the SoundPLAN 8.2 computational noise modelling software package for the worst-case operational scenario supplied by Outline Planning Consultants.

Noise emissions have been calculated at the closest noise sensitive receptors and all operational stage scenarios are predicted to comply under the neutral and adverse weather scenarios modelled.

Haul truck noise impacts along Larbert Rd are predicted to comply without the need for acoustic mitigations for both daytime and night-time periods.

Vibration levels are not expected to exceed the criteria at any of the closest sensitive receptors for the operational stages or haul truck movements associated with the quarry.

A cumulative noise impact assessment was conducted considering the noise emissions from the nearby approved (in April 2025) Canberra Sand & Gravel quarry located approximately 600m west of the Braidwood Sand & Gravel quarry. Results are predicted to comply with the relevant criteria at all NSRs.

Table of Contents

1 Introduction

Vipac Engineers and Scientists Ltd (Vipac) was engaged by Outline Planning Consultants Pty Ltd on behalf of Braidwood Sand and Gravel and Lentro Earthmoving (the Proponent) to prepare a noise and vibration impact assessment to support the proposed expansion of the approved sand extraction operation from a sand pit at 552 Larbert Rd, Larbert NSW on Lot 332 and 333 DP 755418 (the Project).

The Proponent seeks consent for the staged, progressive expansion of the existing sand extraction area of 1.92 ha by an additional 16ha approximately as well as an increase in the rate of sand extraction, from the currently approved 25,000 tonnes per annum to 200,000 tonnes per annum. The proposal also includes an increase in truck movements, with an average of 20 loaded trucks per day and a maximum of up to 50 loaded trucks per day.

The project site is illustrated in Figure 1-1.

Figure 1-1: Project Site

1.1 Study Objectives and Requirements

The NSW Environment Protection Authority (EPA) has considered the details of the proposal as provided by the Department of Planning, Industry and Environment (DPIE) and has identified the information it requires for the Environmental Impact Statement (EIS). The key requirements specified in relation to noise and vibration and how the requirements are addressed within this document are summarised in Table 1-1.

The purpose of this assessment is to evaluate the potential impacts of noise generated from the Project which addresses the specific EPA requirements and provides recommendations to mitigate any potential impacts that might have an effect on nearby sensitive receptors.

Table 1-1: Summary of EAR

Requirements	How requirement is addressed
Operational and construction activities on the premises that maybe considered vibration intensive should be assessed using the guidelines contained in the Assessing Vibration: a technical guideline (DEC, 2006). These are available at: https://www.epa.nsw.gov.au/yourenvironment/noise/industrial-noise/assessing-vibration	Vibration levels from the quarry road traffic movements along the surrounding road networks were assessed in Section 8.1 at the closest receivers along the haul routes. Vibration from the quarry operation is also addressed in Section 8.1.
If blasting is required for any reasons during the construction or operational stage of the proposed development, blast impacts should be demonstrated to be capable of complying with the guidelines contained in Australian and New Zealand Environment Council – Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZEC, 1990). These are available at: https://www.epa.nsw.gov.au/yourenvironment/noise/industrial-noise/construction-noise	No blasting is expected to be required for the project.
Operational noise from noise intensive activities to be undertaken on the premises should be assessed using the guidelines contained in the NSW Noise Policy for Industry (EPA, 2017). Available at: https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/noisepolicy-for-industry-(2017)	Operational noise of the quarry was modelled and illustrated under Section 4.2. Other details of the modelling and methodology are shown in Section 4 and detailed results are shown in Section 5.1. Road traffic noise from existing quarry truck movements along the haul route were also assessed in the road traffic noise impact assessment in Section 0.
If applicable, noise on public roads from increased road traffic generated by land use developments other than road projects should be assessed using the guidelines contained in the NSW Road Noise Policy (EPA, 2011) and associated application notes. Available at: https://www.epa.nsw.gov.au/your-environment/noise/transport-noise.	A road traffic noise impact assessment was conducted for the potential increase in quarry truck movements along the haul route at a number of closest receivers along the haul route in Section 0.
If applicable, noise on rail lines from increased rail traffic generated by land-use developments other than rail projects should be assessed using the guidelines contained in the Rail Infrastructure Noise Guideline (EPA, 2013) and associated application notes. Available at: https://www.epa.nsw.gov.au/your-environment/noise/transport-noise.	No additional rail traffic is expected to be generated by the project.

2 Project Description

2.1 Site Location

The proponent, Braidwood Sand and Gravel and Lentro Earthworks Pty Ltd operates a sand extraction operation (sand quarry) from a site covering 1.92ha on Lot 332 in Deposited Plan (DP) 755915, at No. 552 Larbert Road, Larbert. The proponent seeks to expand the sand quarry footprint into Lot 332 and adjoining Lot 333 DP 755915 by an additional 16ha.

The existing sand extraction area is situated on the eastern side of Larbert Road, approximately 5.5 km north of the intersection with the Kings Highway, and about 14 km northwest of the township of Braidwood.

Larbert Road is a rural, no-through road comprising one lane of traffic in each direction. It extends from a cul-de-sac in the north to its southern connection with the Kings Highway. The road primarily services extractive industry operations within the locality.

The site at 552 Larbert Road falls within the Queanbeyan-Palerang Regional Council (QPRC) local government area and is zoned RU1 – Primary Production under the Queanbeyan-Palerang Regional Local Environmental Plan 2022 (QPRLEP 2022).

2.2 Sensitive Receptors

The region surrounding the project site is sparsely populated, with the nearest noise sensitive receptors (NSRs) described in Table 2-1. A map of these receptors is presented in Figure 2-1. Three rural residential receptors not associated with the project have been identified within a 2km radius from the proposed expansion.

Table 2-1: List of Nearest Noise Sensitive Receptors (NSRs)

Identifier	Lot Number	Address	Approximate Distance & Direction to Site
NSR 1	99//DP755915	481 Larbert Road, Larbert	700m SW from project site
NSR 2	62//DP755915	412 Larbert Road, Larbert	860m S from project site
NSR 3	3//DP1192360	428 Mayfield Rd, Larbert	1700m NW from project site
*NSR 4 **	*329//DP7755915*	*552 Larbert Rd, Larbert*	*480m W from project site*

** NSR 4 is not considered as a noise sensitive receptor as it related to the project.*

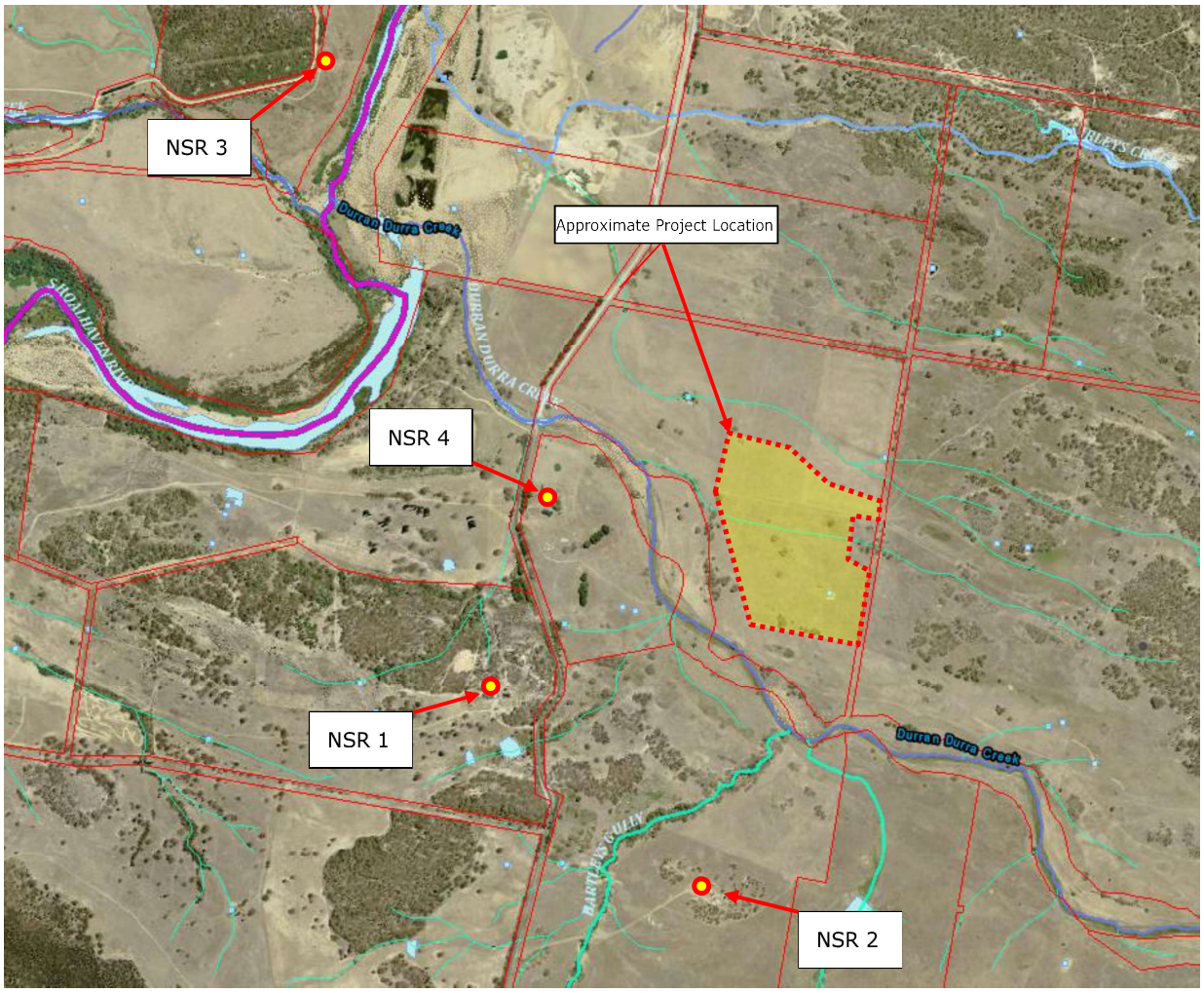


Figure 2-1: Map of Noise Sensitive Receivers

2.3 Sand Extraction Operations

The Project would comprise an increase to the annual production rate to 200,000 tonnes per annum and expansion into an additional extraction area over Lots 332 and 333 DP 755915 of approximately 17.92ha, with a resource of approximately 1.2 million tonnes. Extraction to a depth of approximately 5 metres is planned, consistent with the current approval.

Key elements of the currently approved sand extraction operation includes:

- The extraction of up to 25,000 tonnes per annum of sand, being 800 tonnes per week over 48 weeks.
- Sand extraction area of 1.92ha approximately.
- Material extracted with an excavator and front-end loader and processed on site.
- Access to and from the sand pit back to Larbert Road, with sand products transported via Larbert Road and the Kings Highway heading towards Canberra only. Intersection of site access with Larbert Road upgraded, in accordance with the consent.
- Approved hours of operation of the facility being 7.00am to 5.00pm Monday to Friday and 7.00am to 1.00pm on Saturdays with truck movements associated with the delivery of the material during these hours. No work undertaken on Sunday's or Public Holidays.
- Extraction to occur on a staged basis.

The key Project elements for the proposed expansion can be summarised as:

- The staged, progressive expansion of the existing sand extraction area by an additional 16 ha approximately.
- An increase in the rate of sand extraction, to 200,000 tonnes per annum.
- Reliance on existing approved access to and from the sand pit back to Larbert Road.
- Approved hours of operation of the facility being 6.00am to 6.00pm Monday to Friday and 7.00am to 2.00pm on Saturdays with truck movements associated with the delivery of the material during these hours. No work undertaken on Sunday's or Public Holidays.
- An increase in loaded truck volumes, equivalent to an average of 20 loaded trucks per day, with a maximum of up to about 50 loaded trucks per day.
- Avoidance of stand of trees located to the north of the currently approved extraction area.
- Rehabilitation once as each sand extraction stage is completed.
- Increase the number of jobs within extractive industry sectors in the region.
- Operational Management Plan proposed.

It is noted that no drilling or blasting activity is proposed for the project. The proposed hours of operation of the project are outlined in Table 2-2.

Table 2-2: Current and Proposed Operating Hours

Activity	Monday – Friday	Saturday	Sunday & Public Holidays
Extraction & Processing of the Resource	6:00am – 6:00pm	7:00am – 2:00pm	Not permitted

2.3.1 Staging

Sand extraction operations are proposed to be undertaken in a staged and progressive manner across six stages. Rehabilitation is proposed to occur progressively, with each stage rehabilitated upon completion of sand extraction. This assessment does not account for the progressive staging of the operations. Instead, it adopts a conservative approach by assessing potential noise impacts for the stage closest to the most exposed receptor (NSR 1), being Stage 1a. If noise emissions are predicted to comply during Stage 1a, then all other stages are expected to comply due to increased separation distances.

The proposed staging plan is illustrated in Figure 2-2.

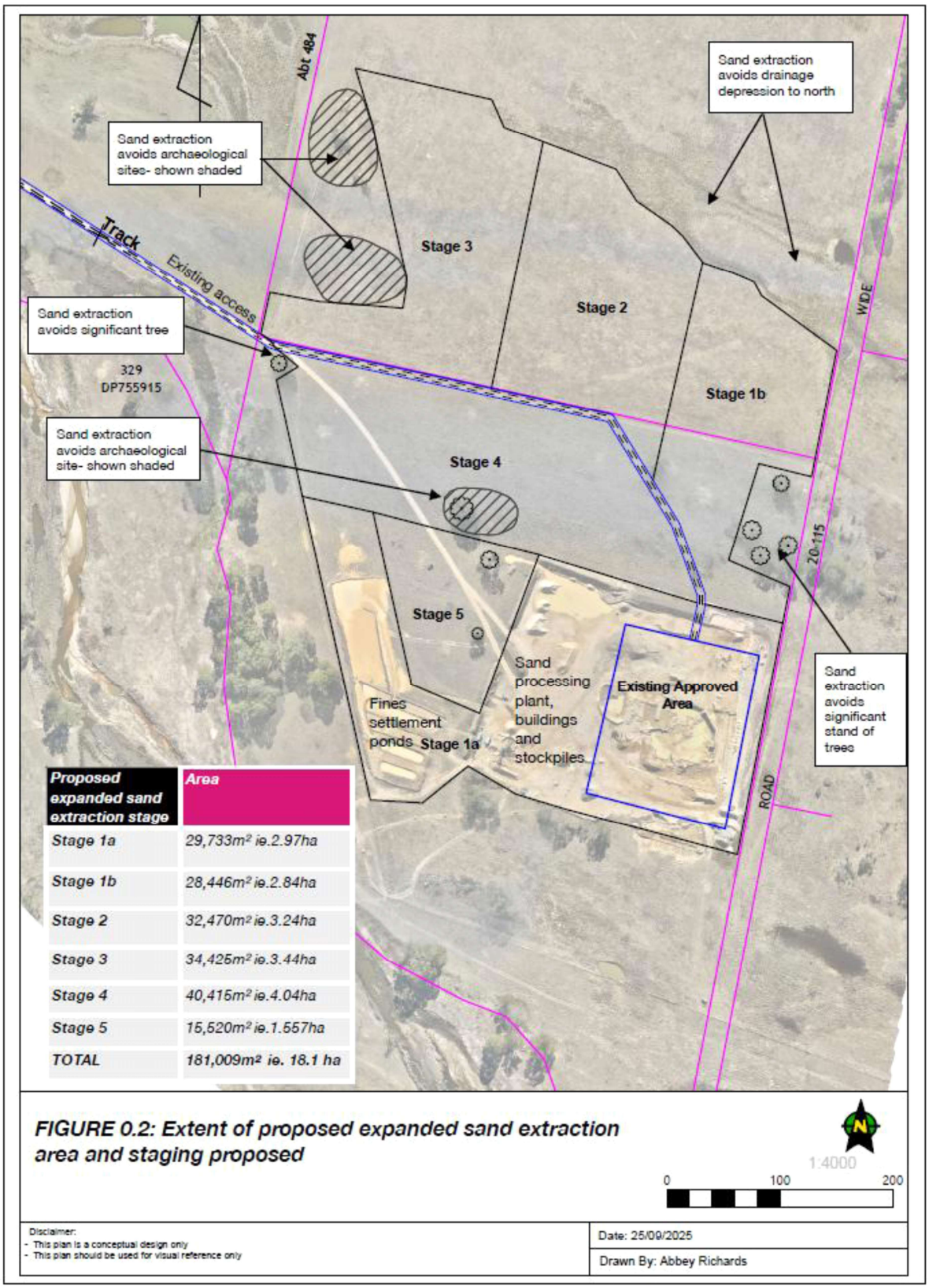


Figure 2-2 – Proposed Staging Plan

3 Criteria

The noise criteria are determined in accordance with the NSW Noise Policy for Industry (NPI, 2017), the NSW Road Noise Policy (RNP, 2011), and the NSW Assessing Vibration: A Technical Guideline (2006). Note that blasting will not be required. Construction works will not be carried out for this project, as such, the NSW Interim Construction Noise Guideline (ICNG, 2009) is not applicable.

3.1 NSW EPA Noise Policy for Industry (NPI)

The project specific noise criterion limits the noise that a development can make in accordance with the *NSW Noise Policy for Industry 2017* (NPI) in order to limit the effects of the development on the existing noise sensitive receptors.

3.1.1 Project Specific Noise Criterion

The project specific noise criterion limits the noise that a development can make in accordance with the NPI in order to limit the impact of the development on the existing noise sensitive receptors.

The NPI sets limits on the noise that may be generated by a wide array of facilities and includes guidance that is applicable for the assessment of potential noise impacts from the operational stages of developments and preparation stages of quarries. These limits are dependent upon the existing noise levels at the site and are designed to ensure changes to the existing noise environment are minimised and deal with the intrusiveness of the noise and the amenity of the environment. The most stringent of the limits is taken as the Project Specific Noise Level which is the most stringent of the amenity criteria or the intrusiveness criteria for the location.

The amenity criteria for this project are recommended acceptable $L_{Aeq,T}$ noise levels for residences in rural areas as provided in Table 2.2 of the NPI. Amenity criteria are formulated to protect against cumulative impacts. The intrusiveness noise criterion requires that the $L_{Aeq,15minutes}$ for the noise source, measured at the most sensitive receiver under worst-case conditions, should not exceed the Rated Background Level (RBL) by more than 5dB, represented as follows:

- $L_{Aeq,15minutes}$ < RBL+ 5dB

Noise levels associated with the quarry at nearby noise sensitive receptors (located in the surrounding area) should not exceed the Project Specific Noise Levels detailed in Table 3-2 which have been determined from the lower of the amenity and intrusiveness criteria.

3.1.2 Amenity Noise Criterion

The amenity criterion is specific to land use and associated activities. It aims to limit continuing increases in noise levels. The maximum ambient noise level within an area should not exceed the acceptable noise levels specified in Table 3-1.

To ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area with other industry present, the project amenity noise level for a new industrial development is the recommended amenity noise level minus 5dB, as per Section 2.4 of the NPI. A +3dB adjustment to convert the assessment periods (day, evening, and night) to a 15-minute assessment period to match the intrusiveness noise criteria may also be applied as per Section 2.2 of the NPI.

Table 3-1 – Amenity Noise Levels

Receiver	Noise Amenity Area	Time of Day	L_{Aeq}, dB(A)
Residential	Rural	Day (7am-6pm)	50
		Evening* (6pm-10pm)	45
		Night (10pm-7am)	40

* The quarry proposes to operate under the operating hours presented in Section 2.3. All hours of operating are between 6am and 6pm and therefore only the day and night period has been considered for assessment.

3.1.3 Intrusiveness Noise Criteria

The intrusiveness criterion states that the equivalent continuous noise level of the source should not be more than 5 decibels above the rated background level when measured over a 15-minute period. It aims to control intrusive noise impacts in the short term for residences.

$L_{Aeq,\ 15\ minute}$ ≤ rating background level + 5 dB

The NSW NPI states that where the rating background noise level (RBL) is found to be less than 35dB(A) for daytime, or 30dB(A) night-time periods, then the RBL should be set to 35dB(A) for the daytime, and 30dB(A) for the night-time. No noise monitoring was carried out at the Braidwood Sand and Gravel pit but from previous noise monitoring work carried out by Vipac on similar quarry sites in the region, it is unlikely the RBL at the nearest NSRs is greater than 35 dB(A) during the daytime or 30dB(A) at night. Therefore, the RBL has assumed to be 35 dB(A, and 30 dB(A) during the during the day and night-time respectively, which sets the intrusiveness criterion to 40dB(A) during the day, and 35 dB(A) during the night.

3.1.4 Project Specific Noise Levels

The project specific noise criterion was determined in accordance with the NPI. The approved in April 2025 Canberra Sand & Gravel pit in the area will be considered as being another industry present in the area, therefore, as per Section 2.2 of the NPI, a -5dB correction will be applied to the amenity criterion.

Table 3-2 – Project Specific Noise Levels (dB (A))

Receptor	Time of Day	Rating Background Level (RBL)	Intrusiveness Criterion	Amenity Criterion	Project Specific Noise Level
All	Day	35 [1]	40	48 [2]	**40**
	Night (Morning Shoulder)	30 [1]	35	38 [2]	**35**

[1] The NSW NPI states that where the rating background noise level is found to be less than 35dB(A) or 30dB(A) for the daytime and night-time periods respectively, then it is set to 35dB(A) for the daytime, and 30dB(A) for the night-time.

[2] Includes a +3dB adjustment to convert the amenity period to a 15-minute assessment period (matching the intrusiveness criterion) as per Section 2.2 of the NPI. Also includes a -5dB correction to account for other industry present in the area (Canberra Sand & Gravel).

3.1.5 Maximum Noise Level Event Assessment

The NPI states that the potential for sleep disturbance from maximum noise level events from premises during the night time period needs to be considered. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages.

Where the subject development/premises night time noise levels at a residential location exceed:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5dB, whichever is the greater, and/or
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,

a detailed maximum noise level event assessment should be undertaken.

If $L_{Aeq,15min}$ noise levels are compliant with the night project noise trigger level ($L_{Aeq,15min}$ < 35 dBA) then they will also be complaint with the less stringent, maximum noise level criteria ($L_{Aeq,15min}$ < 40 dBA). The L_{AFmax} criteria for this project evaluates to L_{AFmax} 52 dB(A).

3.2 NSW Road Noise Policy (RNP)

The requirements of the *NSW Road Noise Policy 2011* (RNP) are applicable to this assessment. Table 3-3 summarises the road category to establish the noise assessment criteria based on the type of roads proposed for use. The criteria for the applicable categories of the roads surrounding the project site are detailed in Table 3-3. Note that these criteria are for assessment against façade-corrected noise levels when measured in front of a building façade.

Table 3-3 - Road Traffic Noise Assessment Criteria for Residential Land Uses

Road Category	Type of project / land use	Assessment Criteria/ Target Noise Level, dB(A)	
		Day (7am-10pm)	Night (10pm-7am)
Local Roads	Existing residences affected by additional traffic on existing local roads generated by land use developments.	$L_{Aeq,\ (1\ hour)}$ 55 (external)	$L_{Aeq,\ (1\ hour)}$ 50 (external)

Freeway/arterial/sub-arterial Road[1] (Larbert Rd)	Existing residences affected by additional traffic on existing local roads generated by land use developments.	$L_{Aeq,\ (15\ hour)}$ 60 (external)	$L_{Aeq,\ (9\ hour)}$ 50 (external)

[1] Principal haulage routes are to be assessed against the criteria for arteria/sub-arterial roads in accordance with Section 2.2.2 of the RNP.

In addition to the criteria detailed in the table above, the magnitude of increase in the total traffic noise level at a location due to a proposed project or traffic-generating development must be considered. Residences experiencing increases in total traffic noise level above the relative increase criteria in Table 3-4 should also be considered for mitigation.

Table 3-4 – Relative Increase Criteria for Residential Land Uses

Road Category	Type of project / land use	Total traffic noise level increase, dB(A)	
		Day (7am-10pm)	Night (10pm-7am)
Freeway/arterial/sub-arterial Road	New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road	Existing traffic $L_{Aeq,\ (15\ hour)}$ + 12 dB (external)	Existing traffic $L_{Aeq,\ (9\ hour)}$ + 12 dB (external)

A relative increase of 12 dB represents slightly more than an approximate doubling of perceived loudness (AS2659.1–1988) and is likely to trigger community reaction, particularly in environments where there is a low existing level of traffic noise.

Section 3.4 of the RNP states that should the existing traffic noise levels already exceed the criteria in Table 3-3 with the outlined feasible and reasonable mitigations measures implemented, any increase in the total traffic noise level from additional traffic on existing roads generated by land use developments should be limited to 2 dB above that of the corresponding 'no build option'.

3.3 Operational Vibration Criteria

The NSW DEC guideline *Assessing Vibration: A Technical Guideline* (2006) is based on guidelines contained in British Standard BS 6472-2008 'Evaluation of human exposure to vibration in buildings (1-80Hz)'.

The guideline provides preferred and maximum vibration values for use in assessing human responses to vibration and provides recommendations for measurement and evaluation techniques. At vibration values below the preferred values, there is a low probability of adverse comment or disturbance to building occupants. Where all feasible and reasonable mitigation measures have been applied and vibration levels are still beyond the maximum level, it is recommended the operator negotiate directly with the affected community.

The guideline defines three vibration types and provides direction for assessing and evaluating the applicable criteria. Table 2.1 of the DEC guideline provides examples of the three vibration types and are summarised as continuous vibration, impulsive vibration and intermittent vibration. The relevant type of vibration for this project is intermittent vibration. Intermittent vibration (as defined in the DEC guideline) is assessed using the vibration dose concept which relates to vibration magnitude and exposure time. Intermittent vibration is representative of activities such as impact hammering, rolling or general excavation work (such as an excavator tracking). Section 2.4 of the guideline provides acceptable values for intermittent vibration in terms of vibration dose values (VDV) which requires the measurement of the overall weighted root mean square (rms) acceleration levels over the frequency range 1 Hz to 80 Hz; the criteria are presented in Table 3-5.

Table 3-5 – Acceptable Vibration Dose Values (VDV) for Intermittent Vibration ($m/s^{1.75}$).

Location	Daytime (7am-10pm), VDV		Night time (10pm-7am), VDV	
	Preferred Value	Maximum Value	Preferred Value	Maximum Value
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60
Critical areas (e.g. hospital operating theatres)	0.10	0.20	0.10	0.20

Structural vibration criteria for building damage due to blasting is considered the same as that induced by transient groundborne vibration due to general construction activities. Vibration levels for potential building damage contained in *British Standard BS 7385-2:1993 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from groundborne vibration* are referenced in *British Standard BS 5228-2:2009* and *Australian Standard AS 2187.2:2006*.

The vibration levels in BS 7385-2:1993 are adopted as building damage criteria from construction activities and have been reproduced in Table 3-6.

Table 3-6 – Transient Vibration Guide for Values of Cosmetic Damage (Table J4.4.2.1 of BS 7385-2:1993)

Line	Type of Building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz to 15 Hz	15 Hz and Above
1	Reinforced or framed structures. Industrial and heavy commercial buildings	50mm/s at 4Hz and above	
2	Unreinforced or light framed structure. Residential or light commercial type buildings	15mm/s at 4Hz increasing to 20mm/s at 15 Hz	20mm/s at 15 Hz increasing to 50mm/s at 40Hz and above

Notes:

Values referred to are at the base of the building.

For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6mm (zero to peak) should not be exceeded)

4 Noise Modelling

Noise modelling has been undertaken using the SoundPLAN 8.2 computational noise modelling software package. The use of the SoundPLAN software and referenced modelling methodology is accepted for use in the State of NSW by the EPA for environmental noise modelling purposes. Vipac have undertaken numerous noise modelling and impact assessments previously using SoundPLAN for a range of projects, including infrastructure development and industrial projects.

4.1 Reference Information

Outline Planning Consultants have supplied the following documents and drawings to be used for the noise prediction model:

- '250806_Braidwood_export' dxf files containing ground elevation data of the quarry for each stage and the surrounding terrain, with Google Earth data containing ground elevation data to include terrain to all NSRs in Section 2.2, sent to Vipac on the 7th of August 2025.
- 'Attachment 2 - Agency Responses' containing EPA's Recommended Environmental Assessment Requirements, prepared by Outline Planning Consultants and sent to Vipac on the 13th of June 2025.
- Traffic Impact Assessment report, prepared by StreetWise Road Safety & Traffic Services Pty Ltd and sent to Vipac on the 15th August 2025.
- 'Noise and Vibration Impact Assessment - DA.2024.0047 - 552 Larbert Road LARBERT' Noise and Vibration Impact Assessment for the nearby Canberra Sand & Gravel quarry (doc ref: MAC221577-01RP1V3), prepared by MAC and sent to Vipac on the 11th of August 2025.

4.2 Noise Sources

Noise sources for all modelled stages of the quarry have been detailed in Section 4.2.1 and have been conservatively modelled as operating simultaneously for 100% of the time over the 15-minute assessment period. Scenarios for daytime and night-time operations have been separately modelled.

Some characteristics of industrial noise can be classified as 'annoying' as per Fact Sheet C of the NSW Noise Policy. These characteristics include corrections for tonality, low frequency, intermittent and the duration of noise. A correction factor of 2-5dB applies for each factor, with a maximum correction factor of 10 dB if there is more than 1 annoying noise characteristic. The corrections are to be applied to predicted noise from the annoying noise source at each receptor.

An evaluation for these 'annoying characteristics' was conducted by MAC (doc ref: MAC221577-01RP1V3) for the same noise sources modelled in this report. The analysis concluded that no correction was necessary at any of the receptors.

4.2.1 Operational Stage Noise Sources

Operational plant and equipment details for all operational stages during the day and night-time periods have been provided by Outline Planning Consultants on behalf of the client and is detailed in Table 4-1 and Table 4-2. Note that the front end loader is expected to travel from stockpile to stockpile and to the wet screening & wash plant to load material.

Table 4-1 – Sound Power Levels of Construction Equipment & Plant

Day Period	Plant / Equipment	Quantity	Sound Power Level L_{Aeq} dB(A)	Source Height
Daytime	Excavator	1	106	3.5
Daytime	Haul Truck *	1	108	3.5
Day & Night-time	Front End Loader *	1	106	3.5
Day & Night-time	Wet Screening & Wash Plant	1	107	5
Day & Night-time	Genset	1	99	2
Day & Night-time	Road Truck *	1	101	2

[#] Noise source was modelled as a line source travelling at 10 km/h along the path presented in Section 4.2.2.

Table 4-2 – Sound Power Levels of Construction Equipment & Plant – Sleep Disturbance Assessment

Day Period	Plant / Equipment	Quantity	Sound Power Level L_{Amax} dB(A)	Source Height
Night-time	Loading Aggregate into Road Truck	1	117	2

4.2.2 Noise Source Locations

Noise modelling has been conducted for the operational stage closest to the NSRs (Stage 1a), with quarry plant and equipment modelled on the existing ground level, before any excavation has been completed. This scenario represents realistic worse-case locations to ensure a conservative assessment.

The worst-case noise source locations for the operational Stages 1a are shown in Figure 4-1.

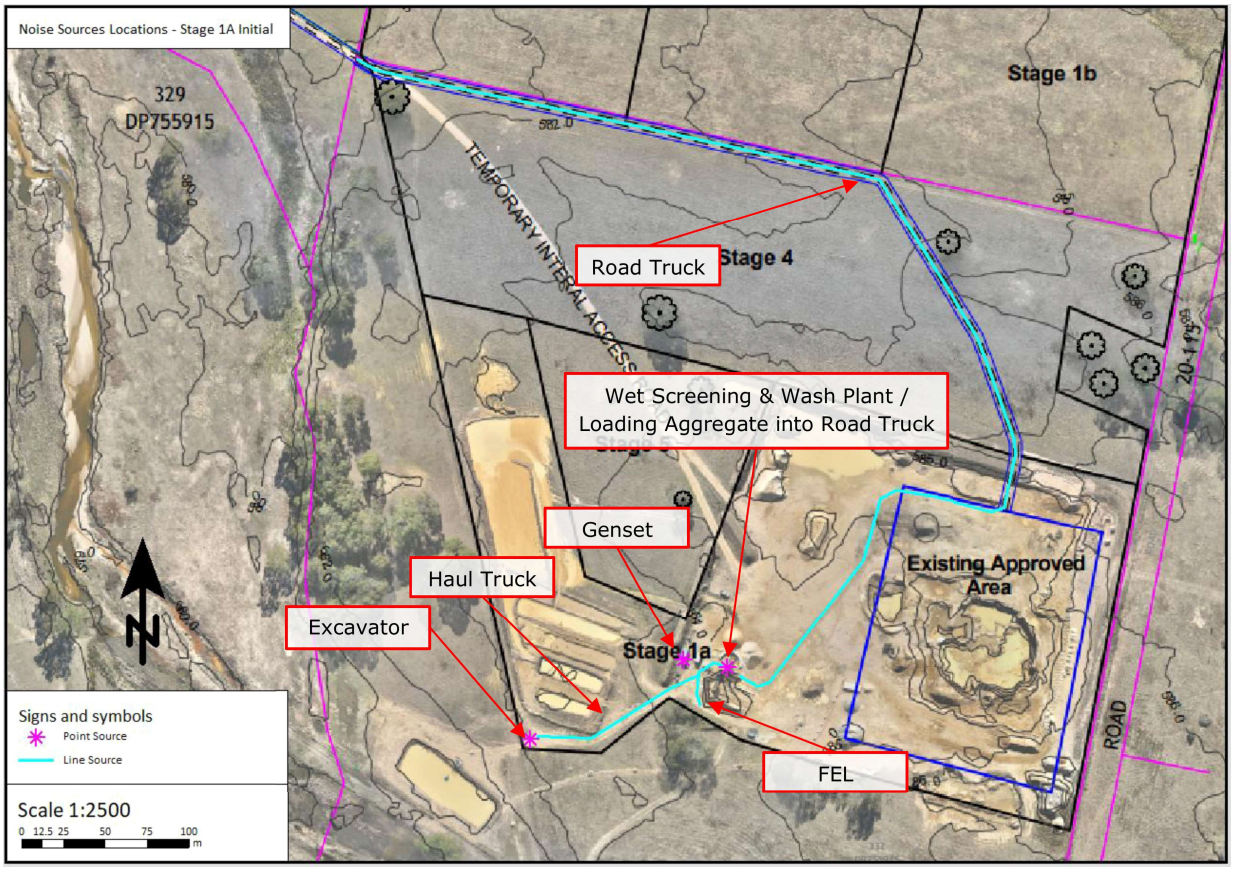


Figure 4-1 - Operational Stage Noise Source Locations

4.3 Weather Conditions

Noise propagation over long distances can be significantly affected by the weather conditions, mainly source-to-receiver winds and temperature inversions, as both these conditions can increase noise levels at sensitive receptors.

The CONCAWE methodology can predict to one of six meteorological categories (CAT). To determine which category is modelled, the Pasquill Stability Classes need to be determined for the Quarry. For this assessment the weather conditions, including stability class frequencies at the Quarry have been obtained from The Air Pollution Model (TAPM). TAPM is a three-dimensional prognostic model developed and verified by Commonwealth Scientific and Industrial Research Organisation (CSIRO). TAPM data was generated for the noise assessment has been used for uniformity. The wind parameters were compared for the Bureau of Meteorology (BOM) and TAPM data and were found to be very similar.

Atmospheric stability refers to the tendency of the atmosphere to resist or enhance the motion of noise. The Pasquill-Gifford Stability Classes define the amount of turbulence in the air, of which the most widely used categories are Classes A-F. The TAPM generated meteorology determined the stability class for each hour of the year. The frequency of each stability class occurrence is shown in Table 4-3. Temperature inversions are defined as Class F. These conditions only occur with clear and calm conditions during the evening and night-time periods. During temperature inversions noise emissions from distant sources can be amplified.

Table 4-3 – Annual Stability Class Distribution Predicted [TAPM, 2023]

Stability Class	Description	Frequency of Occurrence (%)	Average Wind Speed (m/s)
A	Very unstable low wind, clear skies, hot daytime conditions	1.0	1.8
B	Unstable clear skies, daytime conditions	7.1	2.0
C	Moderately unstable moderate wind, slightly overcast daytime	13.1	3.0
D	Neutral high winds or cloudy days and nights	49.1	3.4
E	Stable moderate wind, slightly overcast night-time conditions	6.1	2.9
F	Very stable low winds, clear skies, cold night-time conditions	23.7	1.3

The long term wind roses recorded daily at the Braidwood Racecourse weather station (station ID: 069132) at 9am and 3pm are provided in Figure 4-2. Winds are shown to be primarily from the north and northwest at 9am and from the northwest directions at 3pm. Stronger winds (>40km/hr or >11.1m/s) occur infrequently, mostly from the northwest at 9am and from the northwest and west at 3pm.

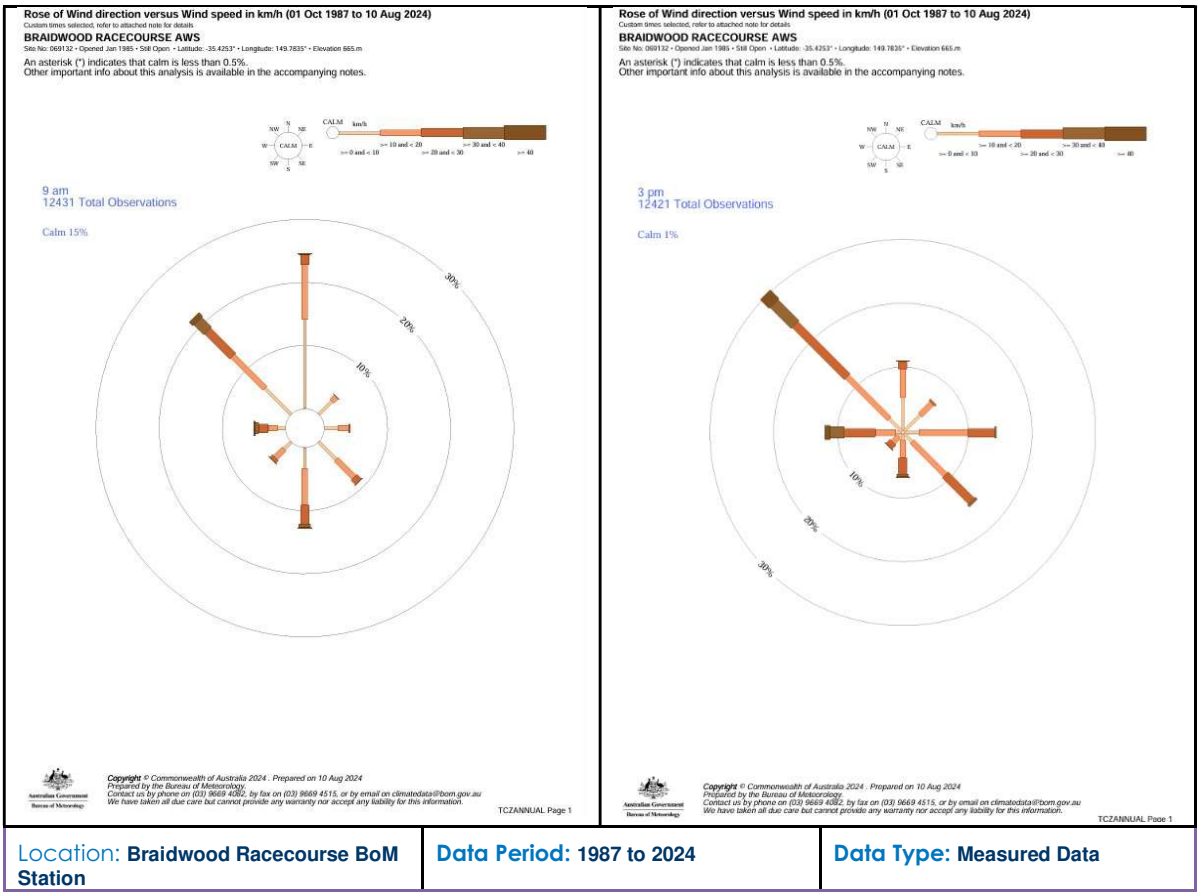
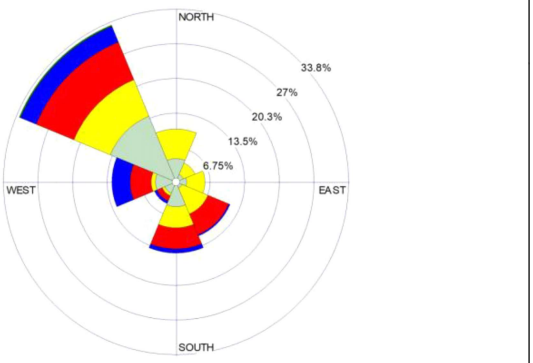
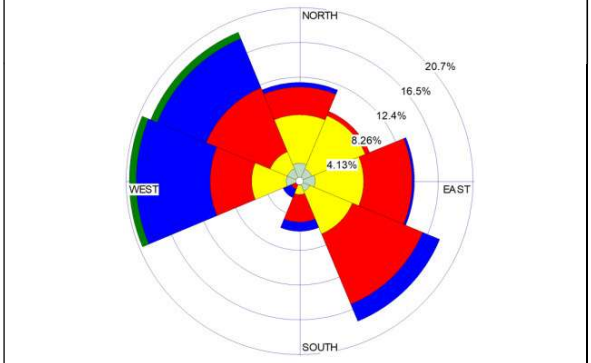


Figure 4-2: Annual wind roses for Braidwood Racecourse Station (1987 to 2024)

Figure 4-3 shows the wind roses for the time of day during the year for 2023 for the modelled data at a site as close as possible to the Braidwood BoM Station site. It can be seen that north-westerly winds are dominant at 9am and winds from the west and northwest at 3pm. Winds from the east and southeast are also frequent at 3pm, with stronger winds (>5.7 m/s) occurring more frequently from the west and northwest. These wind patterns are generally consistent with those shown for the long term measured data at the Braidwood BoM Station in Figure 4-2.





Location: South of site	*Data Period:* Jan 2023 to Dec 2023	*Data Type:* TAPM-CALMET extract
Period	**Average windspeed (m/s)**	**Percent calm (%)**
9am	2.9	4.1
3pm	4.3	0.0

Figure 4-3: Site-specific wind roses at 9am and 3pm for the TAPM-CALMET derived dataset, 2023

4.3.1 Modelled Weather Scenarios

For the purposes of providing a worst-case assessment, source to receptor winds have been applied to all receptors surrounding the sand pit.

Stability classes A, B, and C are associated with an unstable atmosphere and are generally unfavourable for noise propagation. Condition D is a neutral condition for noise propagation while conditions E and F are unfavourable as stable conditions further facilitate noise propagation.

Taking into consideration the time of day and night the Quarry is proposing to operate, the following weather scenarios have been assessed:

Average/Neutral Climatic Conditions:

- Class D has been modelled for the average climatic condition scenarios for day, with 0m/s wind speeds.
- Class F has been modelled for the average climatic condition scenarios for night, with 0m/s wind speeds.

Worst Case Climatic Conditions:

- Worst case climatic conditions during the day period have been assessed as per Class D, but with 3m/s wind speeds blowing towards the receivers.
- Worst case climatic conditions during the night period have been assessed as per Class F, but with 2m/s wind speeds blowing towards the receivers.

5 Predicted Noise Impact

Noise prediction modelling has been carried out to assess the potential impact associated with the Quarry operations at the nearest noise sensitive receptors when subject to neutral and adverse weather conditions during the day-time period. Graphical representations of these results are shown in Appendix A, with source contributions at all receptors during adverse weather in Appendix B.

5.1 Operational Noise

Table 5-1 contains the predicted noise level from operational Stage 1a of the proposed sand pit for both daytime and night-time operation periods during neutral and adverse modelled weather conditions.

Table 5-1 - Predicted Operational Noise Levels – Stage 1a

NSR	Predicted Noise Level $L_{Aeq,15min}$ dB(A)				Predicted Noise Level L_{Amax} dB(A)	
	Neutral Weather		Adverse Weather		Neutral Weather	Adverse Weather
	Day – Criteria $L_{Aeq,15min}$ 40 dB(A)	Night – Criteria $L_{Aeq,15min}$ 35 dB(A)	Day – Criteria $L_{Aeq,15min}$ 40 dB(A)	Night – Criteria $L_{Aeq,15min}$ 35 dB(A)	Night – Criteria L_{Amax} 52 dB(A)	
NSR 1	32	33	37	34	42	42
NSR 2	32	33	36	34	40	41
NSR 3	20	22	25	23	31	32
*NSR 4**	*34*	*35*	*38*	*35*	*43*	*44*

** Criteria does not apply to NSR 4 as it related to the project.*

Noise emissions from the Braidwood Sand & Gravel pit are predicted to comply with the criteria outlined in Section 3.1.4 at all NSRs during both neutral and adverse weather conditions.

6 Road Traffic Noise Impact Assessment

6.1 Traffic Noise Impact Methodology

The Calculation of Road Traffic Noise (CoRTN) method of traffic noise prediction has been used, which is a method approved by the EPA. The assessment considers the proposed haul route where all quarry truck movements are going south on Larbert Rd, leading to the Kings Hwy. This is equal to an additional maximum 50 truck movements per day (i.e. laden and unladen) as a 'worst case'.

According to the traffic count data and assessment from StreetWise Road Safety & Traffic Services Pty Ltd (sent to Vipac via email correspondence on the 15th of August 2025), the average annual daily traffic (AADT) volumes were estimated to be less than 400 for Larbert Rd. As a conservative measure, this value was used for modelling as detailed below.

- AADT of 400 on Larbert Rd, South of the Intersection with the internal quarry road.

Traffic volumes on Larbert Rd, are currently below the minimum threshold for CoRTN to predict road traffic noise levels reliably. Section 2, paragraph 30 of CoRTN stipulates that a minimum of 1,000 vehicles in an 18-hour period are required to predict noise levels (inclusive of a low traffic flow correction). Calculations using traffic flow data that is below 1,000 vehicles in an 18-hour period are considered unreliable, and CoRTN recommends noise measurements be conducted when evaluating such cases.

Noise measurements of the surrounding road network have not been undertaken, however as a proof of concept, any low traffic flow correction that results from calculating noise impacts from a road with a minimum AADT of 1,100 (18-hour volume of 1,034) has been applied to the predicted results for this assessment.

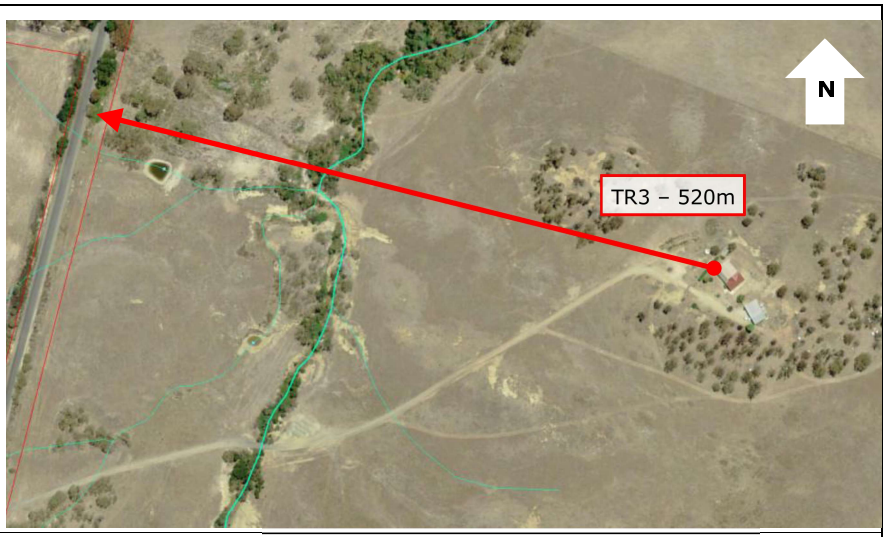
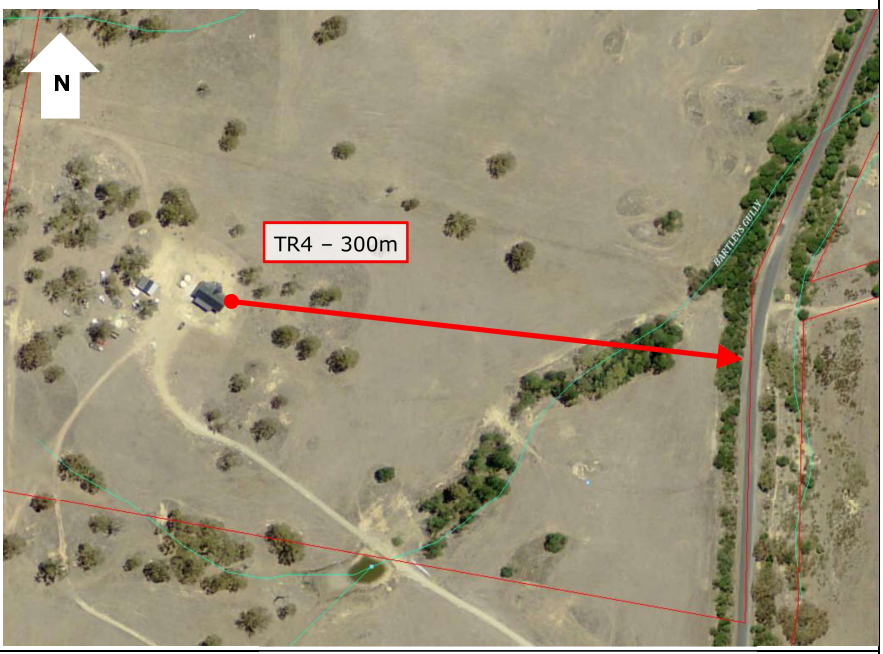
It is noted that this correction is conservative, as a low traffic flow correction decreases as traffic flow numbers increase. For example:

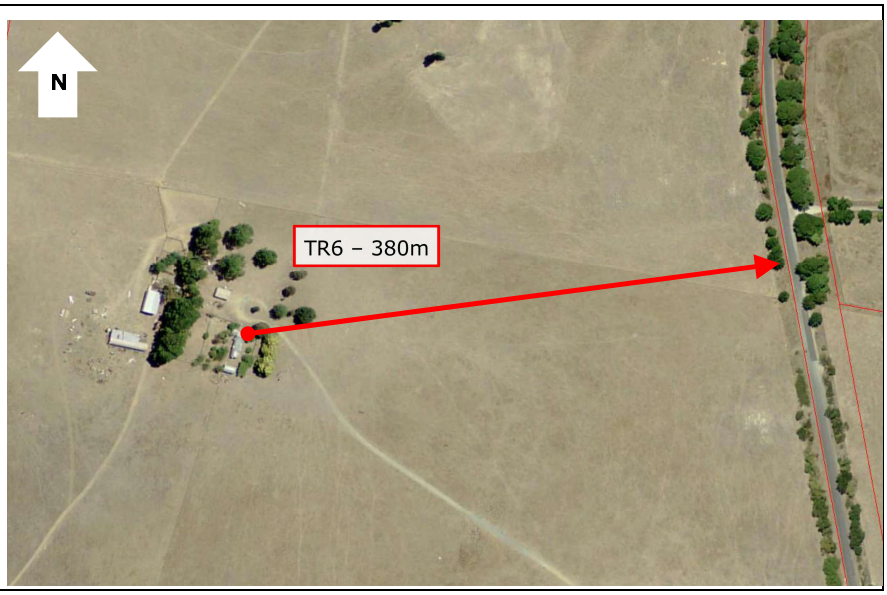
- The low traffic flow correction is applicable to roads with 1000 to 4000 vehicles in an 18-hour period where receptors are within 30m of the road.
- The low traffic flow correction for 1,034 vehicles (mentioned above) equates to a -2dB(A) correction for receptors within 30m of the road.
- As the traffic flow increases, the correction reduces i.e. 4,000 vehicles equates to no correction required.
- As the existing and future numbers are below 1,000, it is expected that should a correction be applied for these numbers, it would be greater than a -2dB(A) correction, and therefore a -2dB(A) correction applied to these values would be considered conservative.

6.1.1 Traffic Noise Sensitive Receptors

Table 6-1 - Road Traffic NSRs

NSR	Distance to Road	Aerial Imagery
*TR1 - 552 Larbert Rd, Larbert on 329//DP775591 5 **	*95m*	
TR2 - 481 Larbert Road, Larbert on 99//DP755915	110m	

TR3 - 412 Larbert Road, Larbert on 62//DP755915	520m	
TR4 - 287 Larbert Road, Larbert on 58//DP755915	300m	
TR5 – 210 Larbert Road, Larbert on 54//DP755915	420m	

TR6 – 173 Larbert Road, Larbert on 50//DP755915	380m	

** TR1 is not considered as a noise sensitive receptor as it is related to the project.*

6.1.2 Traffic Noise Impact Calculation Parameters

The worst-case scenario of a maximum of 50 additional truck (i.e. laden and unladen) movements has been assessed under one scenario:

- All trucks travelling south on Larbert Rd from the quarry site.

Vipac has conducted initial noise calculations for the scenario detailed above. The traffic noise assessment has also considered the following assumptions:

- L_{Aeq} values were calculated from the L_{A10} values predicted by the CoRTN algorithms using the well-validated approximation of $L_{Aeq} = L_{A10} - 3$.
- No low traffic flow correction was applied as all receptors at a distance greater than 30m from the road (refer to Section 6.1.1).
- A conservative assumption of 94% of the AADT values to occur within the 15-hour daytime period.
- An assumption of 10% of the AADT values to occur within the 9-hour night-time period considered to be conservative due to the above mentioned 94% for daytime.
- Assumed speed limits of 80km/h for Larbert Rd.
- A heavy vehicle percentage of 10%
- An angle of view of 160 degrees for all receptors.
- A conservative assumption of 50% soft ground absorption, where in reality the soft ground perception is expected to be greater.
- No road surface correction has been applied.
- Sensitive receptors are assumed to have direct, unobstructed line of sight to the roads, with no shielding from intervening structures applicable.
- Receptor heights modelled at 1.8m above ground, 1m from the façade (i.e. façade-corrected).

Potential vibration levels from quarry truck movements are likely to be less than 0.5 mm/s PPV (Peak Particle Velocity) for receptors along the adjacent public roads, which is well below all accepted criteria for structural damage and human comfort from ground borne vibration.

6.2 Haul Route Traffic Noise Assessment Results

Calculations were conducted to assess the potential noise impacts associated with the additional quarry truck movements on the proposed haul route.

Road traffic noise monitoring was not conducted as part of this traffic noise assessment, therefore validation of a traffic noise model used to predict noise levels at the nearest receivers cannot be undertaken, however, it is anticipated that existing traffic noise levels for all other receptors are below the current criteria for both local roads and principal haulage routes.

Table 6-2 and Table 6-3 below presents the traffic noise predictions for existing traffic, alongside future predicted traffic volumes at the nearest residential receptors for both daytime and night-time. Note that because noise levels of the existing traffic are unknown, the results are intended to provide a conservative indication based on a worst-case scenario of the sole use of heavy vehicles travelling to and from the site.

Table 6-2 – Indicative Traffic Noise Impact Predicted Results - Daytime

Receptor	Noise Levels, $L_{Aeq,\ 15\ hour}$ – Façade Corrected		Criteria	Predicted Compliance?	Maximum Difference* (Existing v Future) ≤12dB(A)
	Predicted Existing Traffic Noise, dB(A)	Predicted Future Traffic Noise, dB(A)			
*TR1**	*42.9*	*45.2*	*n/a*	*n/a*	*+2.3*
TR2	42.2	44.5	60 dB(A)	✓	+2.3
TR3	33.7	36.0		✓	+2.3
TR4	36.8	39.1		✓	+2.3
TR5	34.9	37.2		✓	+2.3
TR6	35.5	37.8		✓	+2.3

** Criteria does not apply to TR1 as it is related to the project.*

Table 6-3 – Indicative Traffic Noise Impact Predicted Results – Night-time

Receptor	Noise Levels, $L_{Aeq,\ 9\ hour}$ – Façade Corrected		Criteria	Predicted Compliance?	Maximum Difference* (Existing v Future) ≤12dB(A)
	Predicted Existing Traffic Noise, dB(A)	Predicted Future Traffic Noise, dB(A)			
*TR1**	*33.1*	*38.4*	*n/a*	*n/a*	*+5.3*
TR2	32.4	37.7	50 dB(A)	✓	+5.3
TR3	23.9	29.2		✓	+5.3
TR4	27.0	32.3		✓	+5.3
TR5	25.1	30.4		✓	+5.3
TR6	25.7	31.0		✓	+5.3

** Criteria does not apply to TR1 as it is related to the project.*

6.3 Haul Route Traffic Noise Results Discussion

As stated in Section 3.4 of the Road Noise Policy, with regard to existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use development, any increase in total traffic noise level should be limited to less than 2dB above that of the corresponding existing noise level at any residential property, should the criteria outlined in Table 6-2 already be exceeded. However, considering the predicted existing traffic noise levels at each of the closest receptors on each road is below the criteria, this assessment is not applicable, although the increase has been included for transparency.

It can be seen in Table 6-2 that existing and future traffic noise levels at existing residential receptors are predicted to comply with the criteria without the need for acoustic mitigation.

Given the increase in noise levels between existing and future traffic flow are also well below the relative increase criteria detailed in Table 3-4 (existing traffic + 12dB), the increased traffic from the proposed development is predicted to comply with the relevant road traffic noise criteria.

Therefore, traffic noise associated with the additional quarry truck movements on Larbert Rd are predicted to comply with the criteria without the need for acoustic mitigation measures.

7 Canberra Sand & Gravel Cumulative Noise Impact Assessment

It is noted that a separate quarry in the area (Canberra Sand & Gravel) has been approved in April 2025 and is located approximately 600m west of the proposed Braidwood Sand pit on Lot 24, 25, 27 & 300 in DP 755915. This quarry's production rate is to progressively increase to a maximum of 200,000 tonnes per annum with an average rate of 400 tonnes per day over 20 years. Haul trucks associated with Canberra Sand & Gravel are proposed to have a maximum of 55 truck movements per day on Larbert Road.

To account for cumulative noise impacts of both these quarries to the surrounding receptors, a cumulative operational noise and traffic noise impact assessment for the operational stage of Canberra Sand & Gravel has been conducted. The noise impact assessment report for the Canberra Sand & Gravel was conducted by MAC and sent to Vipac on the 11th of August 2025 (doc ref: MAC221577-01RP1V3).

7.1 Cumulative Operational Noise Impact Assessment

Predicted noise levels from noise emissions of the Braidwood Sand and Gravel pit during adverse weather from Section 5.1, together with the predicted noise levels of the operational stage from the Canberra Sand & Gravel from its noise impact assessment at the surrounding receptors have been reproduced below in Table 7-1. Cumulative noise levels from both quarry's noise emissions were calculated and are also presented at each NSRs for both day and night-time periods. Noise levels were assessed against the relevant amenity criteria from Section 3.1.

Table 7-1 – Predicted Cumulative Operational Noise Levels

Receptor	Predicted Noise Level $L_{Aeq,15min}$ dB(A)				Predicted Noise Level L_{Amax} dB(A)		Cumulative Noise Level $L_{Aeq,15min}$ dB(A)		Cumulative Noise Level L_{Amax} dB(A)
	Braidwood Sand & Gravel		Canberra Sand & Gravel		Braidwood Sand & Gravel	Canberra Sand & Gravel			
	Day	Night	Day	Night	Night		Day – Criteria $L_{Aeq,15min}$ 48 dB(A)	Night – Criteria $L_{Aeq,15min}$ 38 dB(A)	Night – Criteria L_{Amax} 52 dB(A)
NSR 1	37	34	36	32	42	39	40	36	44
NSR 2	36	34	<30	<30	41	<30	37	35	41
NSR 3	25	23	33	30	32	30	34	31	34
*NSR 4**	*38*	*35*	*40*	*35*	*44*	*40*	*42*	*38*	*46*

** Criteria does not apply to NSR 4 as it related to the project.*

Cumulative noise emissions from the Braidwood Sand & Gravel and Canberra Sand & Gravel pit are predicted to comply with the relevant amenity criteria from Section 3.1 at all NSRs for both daytime and night-time operations during both neutral and adverse weather conditions.

7.2 Cumulative Road Traffic Noise Impact Assessment

The noise emission of the proposed Braidwood Sand & Gravel pit related daily vehicular traffic movements of maximum of 50 trucks, together with the proposed Canberra Sand & Gravel daily 55 truck movement at the surrounding receptors has been calculated and presented below in Table 7-2 and Table 7-3 for both daytime and night-time.

Table 7-2 – Predicted Cumulative Road Traffic Noise Levels - Daytime

Receptor	Cumulative Noise Levels, $L_{Aeq,\ 15\ hour}$ – Façade Corrected Predicted Cumulative Future Traffic Noise, dB(A)	Criteria	Predicted Compliance?	Maximum Difference* (Existing v Future) ≤12dB(A)
*TR1**	*47.0*	*n/a*	*n/a*	*+4.1*
TR2	46.3	60 dB(A)	✓	+4.1
TR3	37.8		✓	+4.1
TR4	40.9		✓	+4.1
TR5	39.0		✓	+4.1
TR6	39.6		✓	+4.1

** TR1 is not considered as a noise sensitive receptor as it is related to the project.*

Table 7-3 – Predicted Cumulative Road Traffic Noise Levels – Night-time

Receptor	Cumulative Noise Levels, $L_{Aeq,\ 9\ hour}$ – Façade Corrected Predicted Cumulative Future Traffic Noise, dB(A)	Criteria	Predicted Compliance?	Maximum Difference* (Existing v Future) ≤12dB(A)
*TR1**	*41.8*	*n/a*	*n/a*	*+8.7*
TR2	41.1	50 dB(A)	✓	+8.7
TR3	32.6		✓	+8.7
TR4	35.7		✓	+8.7
TR5	33.8		✓	+8.7
TR6	34.4		✓	+8.7

** TR1 is not considered as a noise sensitive receptor as it is related to the project.*

Cumulative noise emissions from the Braidwood Sand & Gravel and Canberra Sand & Gravel pit road traffic noise are predicted to comply with the relevant amenity criteria from Section 3.2 at all NSRs for both daytime and night-time operations.

8 Vibration Impact Assessment

8.1 Operational Vibration (Non-Blasting)

Both continuous/quasi-continuous and intermittent vibration has been considered. Most machinery items are likely to generate some continuous or quasi-continuous vibration during their operation, and some intermittent or transient vibration could be caused by machinery during start-up compaction (and possibly during loading of trucks).

Ground-borne vibration resulting from activities on site are compared against the applicable criteria relating to human comfort and potential structural damage (usually in terms of Peak Particle Velocity, PPV). The recommended limits or guide values (refer Section 3.3) for transient vibration to ensure minimal risk of cosmetic damage to residential buildings (and community buildings) are in the range 15 to 20 mm/s PPV (depending on the frequency), with higher limits of 50 mms/ for industrial buildings. The stipulated human comfort criterion (lower limit) for vibration is typically 1 mm/s PPV (to an upper limit of 2 mm/s).

The ground vibration predictions for machinery were based on previously measured data by Vipac or sourced data for construction machinery from various vibration databases and literature references (Ref: *Ground Vibration Engineering* (Srbulov, 2010), *Construction Vibrations* (Dowding, 2000), CALTRANS *Construction Vibration Manual* (US CALTRANS, 2013), US FTA *Transit Noise & Vibration Manual* (2018)).

The calculation formulae used for ground vibration predictions (in terms of Peak Particle Velocity, V_{PPV} in mm/s) for vibratory compaction rollers are given as follows (Ref: BS 5228-2; Hiller & Crabb, 2000):

Table 8-1 :Ground Vibration Prediction Formulae

Normal compaction passes:	$V_{PPV} = ks * n^{0.5} * (A/(x+w))^{1.5}$	[mm/s]	ks	75	50% exceedance probability
			ks	143	33% exceedance probability
			ks	276	5% exceedance probability
Transient startup/shutdown:	$V_{PPV} = kt * n^{0.5} * (A^{1.5}/(x+w)^{1.3})$	[mm/s]	kt	65	50% exceedance probability
			kt	106	33% exceedance probability
			kt	177	5% exceedance probability

x	distance along ground from roller to receiver (m)
n	number of vibrating drums in roller
A	nominal amplitude of vibrating roller (mm)
w	width of vibrating drum (m)

** Note: The exceedance probability represents the level of conservatism in the predictions, where a 5% predicted level would be the most conservative or worst case situation (higher prediction) to represent the maximum level predicted for 95% of possible cases and therefore only 5% of cases likely to exceed the predicted level.*

A conservative prediction of the potential ground-borne vibration impacts associated with the proposed equipment on site has been made (primarily quasi-continuous vibration). Ground vibration levels (in mm/s PPV) from other construction machinery items (e.g. excavator, crusher) are typically in the range of 0.1 to 1 mm/s at distances of 25 to 50 m. Truck traffic (over rough/irregular road surfaces) will typically generate ground vibration levels of 0.1 to 0.5 mm/s (or less) at distances of 25 to 50 m. Considering the nearest sensitive receptors are at far greater distances (>95m) away from the quarry or haul routes, predicted vibration levels would meet the human comfort criteria and are well below structural damage criteria for all nearby buildings.

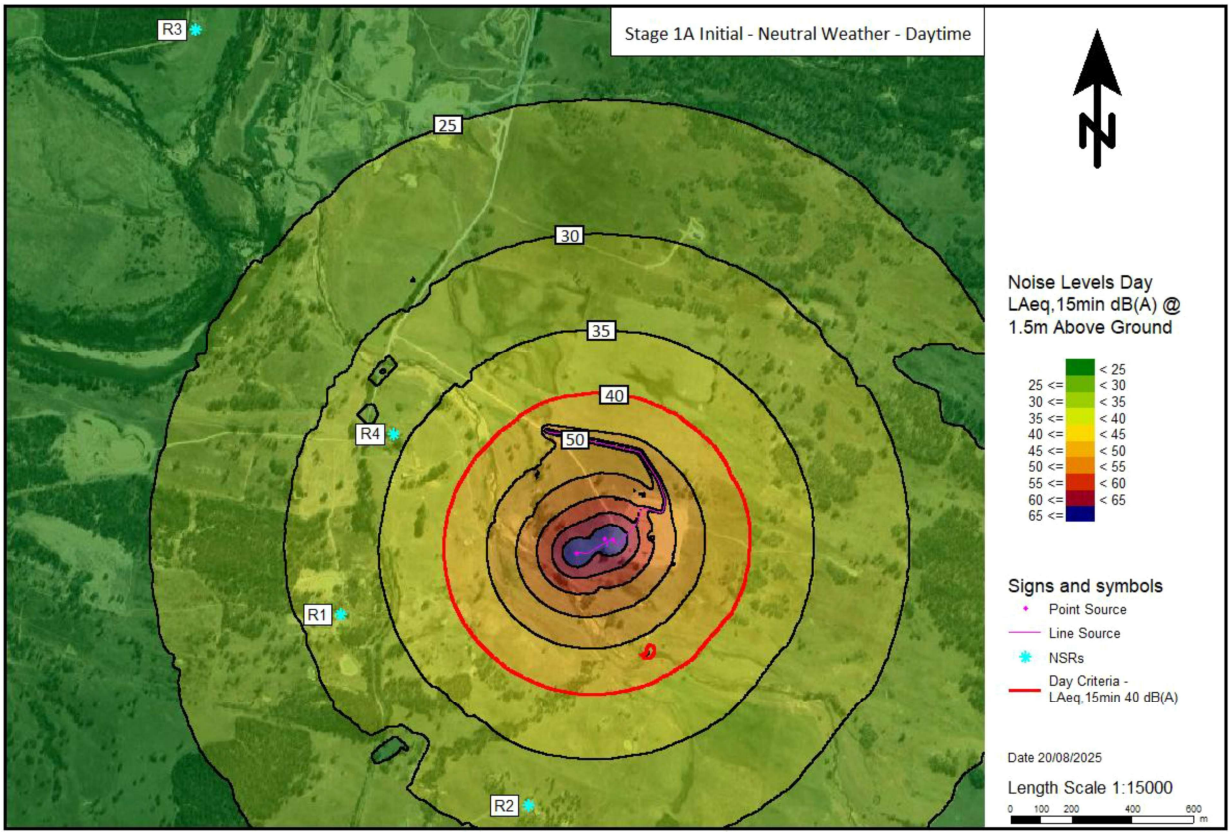
9 Conclusions

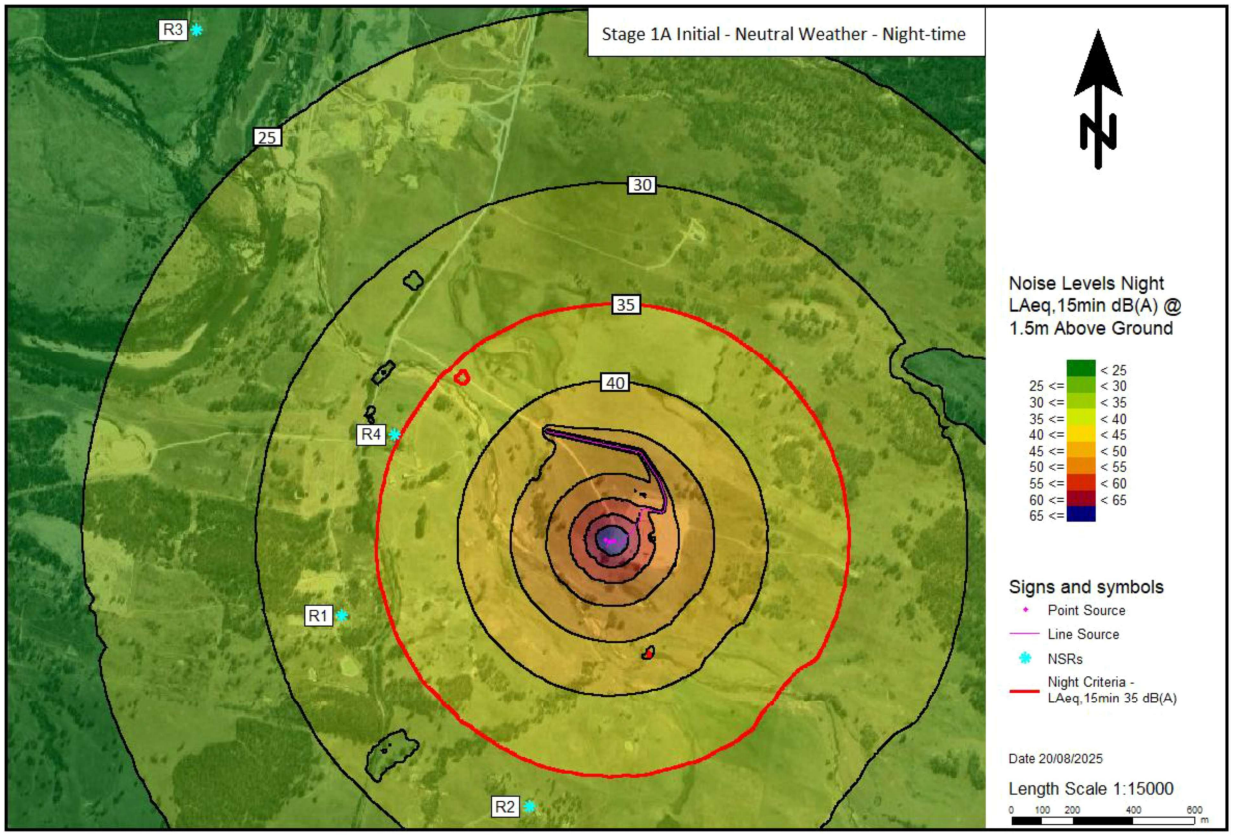
Vipac Engineers and Scientists Ltd (Vipac) was engaged by Outline Planning Consultants Pty Ltd on behalf of Braidwood Sand and Gravel and Lentro Earthmoving (the Proponent) to prepare a noise and vibration impact assessment to support the proposed expansion of the approved sand extraction operation from a sand pit at 552 Larbert Rd, Larbert NSW on Lot 332 and 333 DP 755418 (the Project).

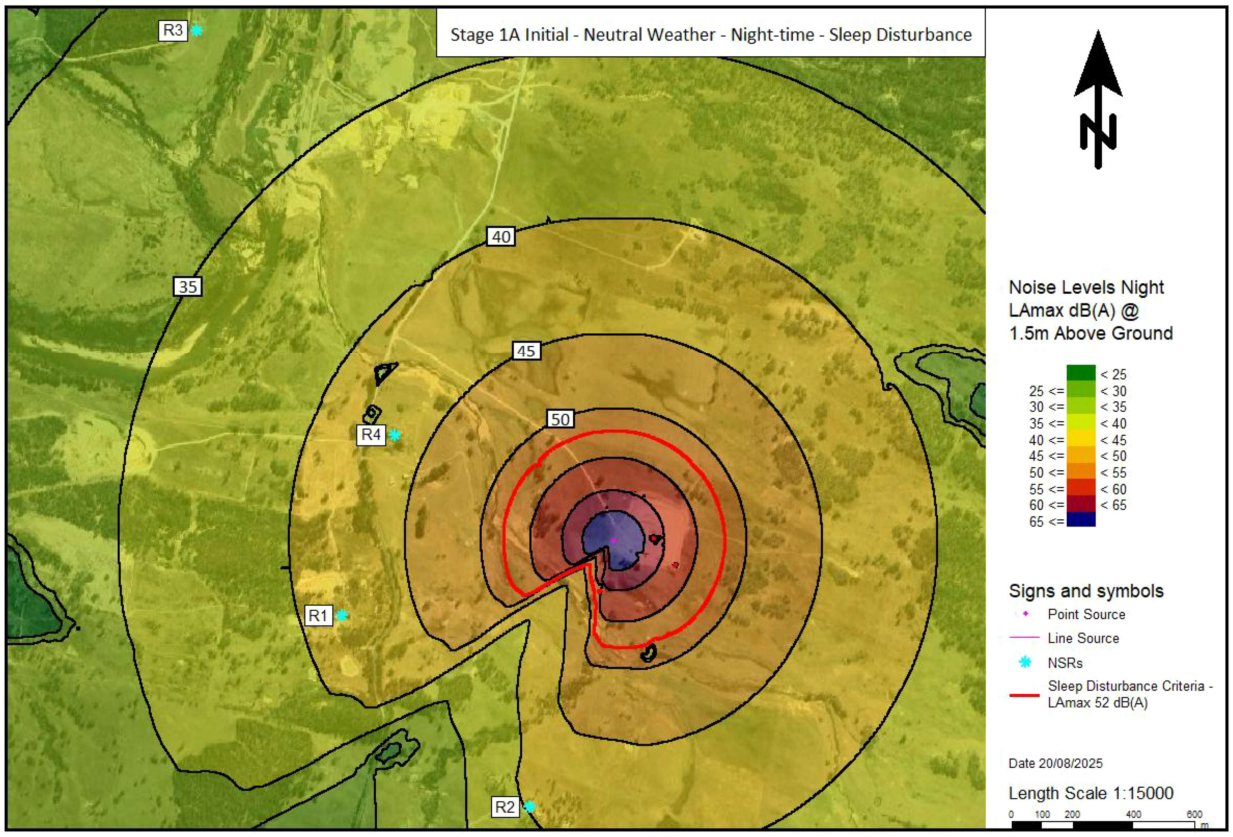
Future noise levels were predicted using SoundPLAN modelling software for the proposed operational scenarios of the stage closest to the surrounding noise sensitive receptors. Cumulative noise levels at the NSRs from the nearby April 2025 approved Canberra Sand and Gravel pit, located approximately 600m west of the Braidwood Sand and Gravel pit were also calculated.

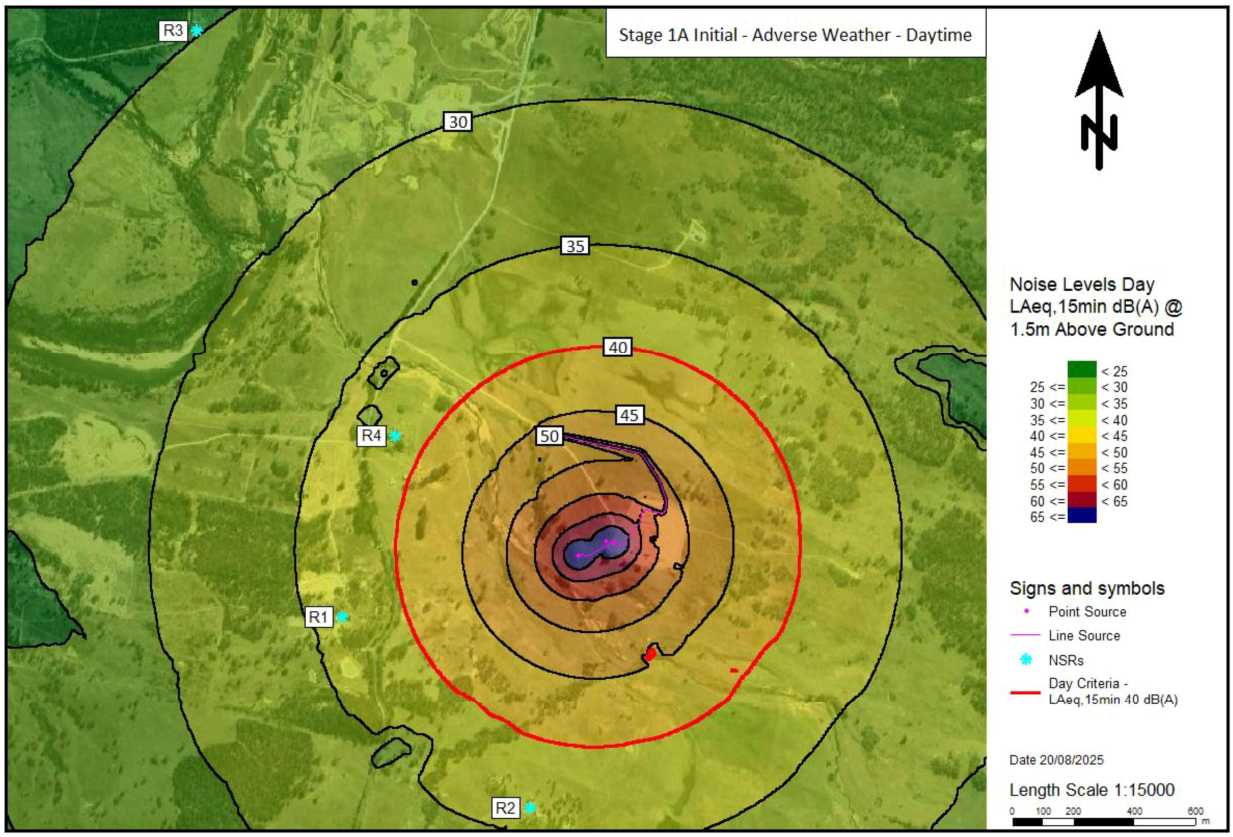
Predicted noise emissions from both quarries for all stages complied with the criteria outlined in Section 3 without the need for any further mitigations at all receptors for all time periods.

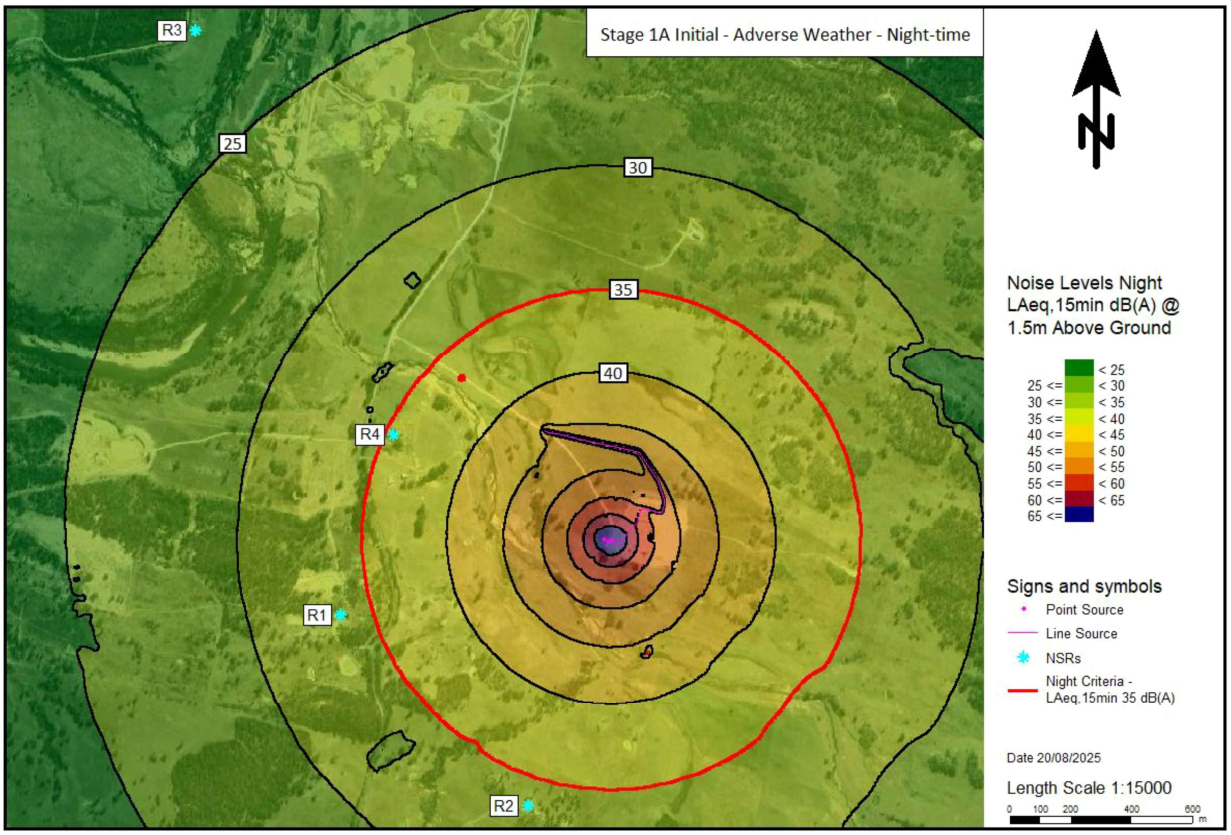
Appendix A Grid Noise Maps

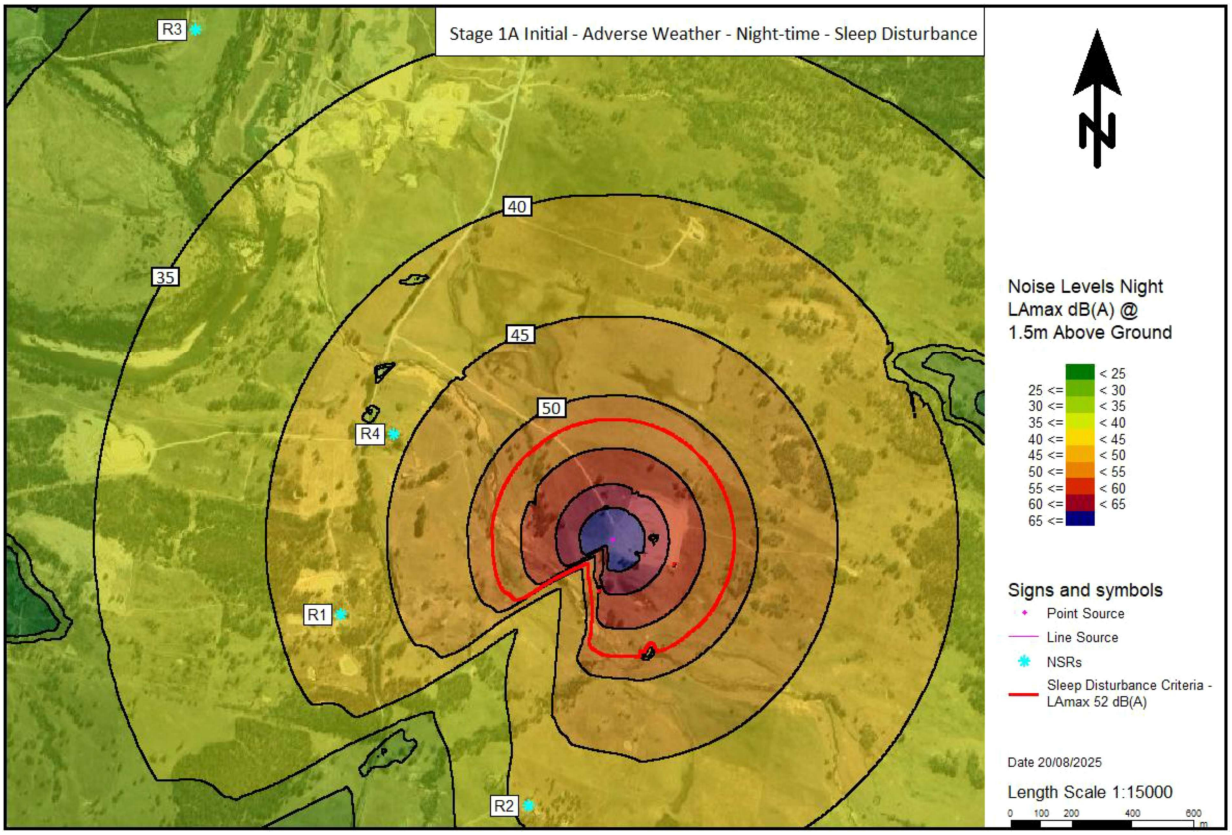





Stage 1A Initial - Neutral Weather - Night-time - Sleep Disturbance
R3
R4
R1
R2
35
40
45
50
Noise Levels Night
LAmax dB(A) @
1.5m Above Ground
25 <= < 25
30 <= < 30
35 <= < 35
40 <= < 45
45 <= < 50
50 <= < 55
55 <= < 60
60 <= < 65
65 <=
Signs and symbols
Point Source
Line Source
NSRs
Sleep Disturbance Criteria - LAmax 52 dB(A)
Date 20/08/2025
Length Scale 1:15000
0 100 200 400 600 m


Stage 1A Initial - Adverse Weather - Daytime
R3
R4
R1
R2
30
35
40
45
50
Noise Levels Day
LAeq,15min dB(A) @
1.5m Above Ground
25 <= < 25
30 <= < 30
35 <= < 35
40 <= < 45
45 <= < 50
50 <= < 55
55 <= < 60
60 <= < 65
65 <=
Signs and symbols
Point Source
Line Source
NSRs
Day Criteria - LAeq,15min 40 dB(A)
Date 20/08/2025
Length Scale 1:15000
0 100 200 400 600 m


Stage 1A Initial - Adverse Weather - Night-time
R3
25
30
35
40
R4
R1
R2
N
Noise Levels Night
LAeq,15min dB(A) @
1.5m Above Ground
25 <= < 25
30 <= < 30
35 <= < 35
40 <= < 40
45 <= < 45
50 <= < 50
55 <= < 55
60 <= < 60
65 <= < 65
Signs and symbols
Point Source
Line Source
NSRs
Night Criteria -
LAeq,15min 35 dB(A)
Date 20/08/2025
Length Scale 1:15000
0 100 200 400 600 m


Stage 1A Initial - Adverse Weather - Night-time - Sleep Disturbance
R3
35
40
45
50
R4
R1
R2
N
Noise Levels Night
LAmax dB(A) @
1.5m Above Ground
25 <= < 25
30 <= < 30
35 <= < 40
40 <= < 45
45 <= < 50
50 <= < 55
55 <= < 60
60 <= < 65
65 <= < 65
Signs and symbols
Point Source
Line Source
NSRs
Sleep Disturbance Criteria -
LAmax 52 dB(A)
Date 20/08/2025
Length Scale 1:15000
0 100 200 400 600 m

Appendix B Noise Source Contributions (Stage 1a – Daytime – Adverse Weather)

Braidwood Sand & Gravel
Source Contribution Levels - Stage 1a - Daytime - Adverse Weather

Source	Source type	LAeq, 15min dB(A)
Receiver R1 LAeq,15min 36.7 dB(A)		
Road Truck	Line	13.4
Haul Truck	Line	15.3
FEL	Line	7.6
Excavator	Point	33.7
Genset	Point	25.3
Wet Screening & Wash Plant	Point	32.8
Receiver R2 LAeq,15min 36.4 dB(A)		
Road Truck	Line	12.5
Haul Truck	Line	15.2
FEL	Line	7.7
Excavator	Point	33.1
Genset	Point	25.5
Wet Screening & Wash Plant	Point	32.9
Receiver R3 LAeq,15min 24.9 dB(A)		
Road Truck	Line	3.9
Haul Truck	Line	3.2
FEL	Line	-4.1
Excavator	Point	21.1
Genset	Point	13.7
Wet Screening & Wash Plant	Point	21.7
Receiver R4 LAeq,15min 38.3 dB(A)		
Road Truck	Line	18.3
Haul Truck	Line	16.7
FEL	Line	9.4
Excavator	Point	35.1
Genset	Point	27.2
Wet Screening & Wash Plant	Point	34.6

Vipac Engineers & Scientists Pty Ltd 1

SoundPLAN 8.2