Premise

Boral Resources (Country) Pty Ltd

Currabubula Quarry

Statement of environmental effects | Modification s.4.55 (2) to development consent

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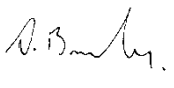
Chloe Bigg		Andrew Brownlow		Andrew Brownlow	

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1 Introduction

1.1 The quarry

Boral Resources (Country) Pty Limited (Boral) operates Currabubula Quarry (the quarry), a hard rock quarry located at 3716 Werris Creek Road, approximately 28 kilometres (km) south west of Tamworth and 4 km south east of Currabubula, within the Liverpool Plains Shire Local Government Area (LGA) (Figure 1).

Development consent applies to the following land parcels, all of which are owned by Boral:

- Lots 1 – 12 on DP1114811;
- Lots 5-11 and 17-19 on DP114714; and
- Lots 70, 92, 97-98, 211 and 236 on DP751011.

The above land parcels (development site) cover a total area of approximately 556 ha.

The development site is depicted in Figure 2.

1.2 The proposal

Boral is seeking to modify the existing development consent (DA51/2017) to increase production to 400,000 tonnes per annum (tpa), operate a mobile pug mill and increase capacity of the existing sediment basin with the view to reducing the spill frequency.

The modification to operations (including capacity increase and operation of the pug mill) is proposed to respond to a rapid increase in demand for quarry product over the last 15 months owing to stimulus investment for road infrastructure, particularly from rural councils and Transport for NSW (TfNSW).

Figure 1 – Regional context

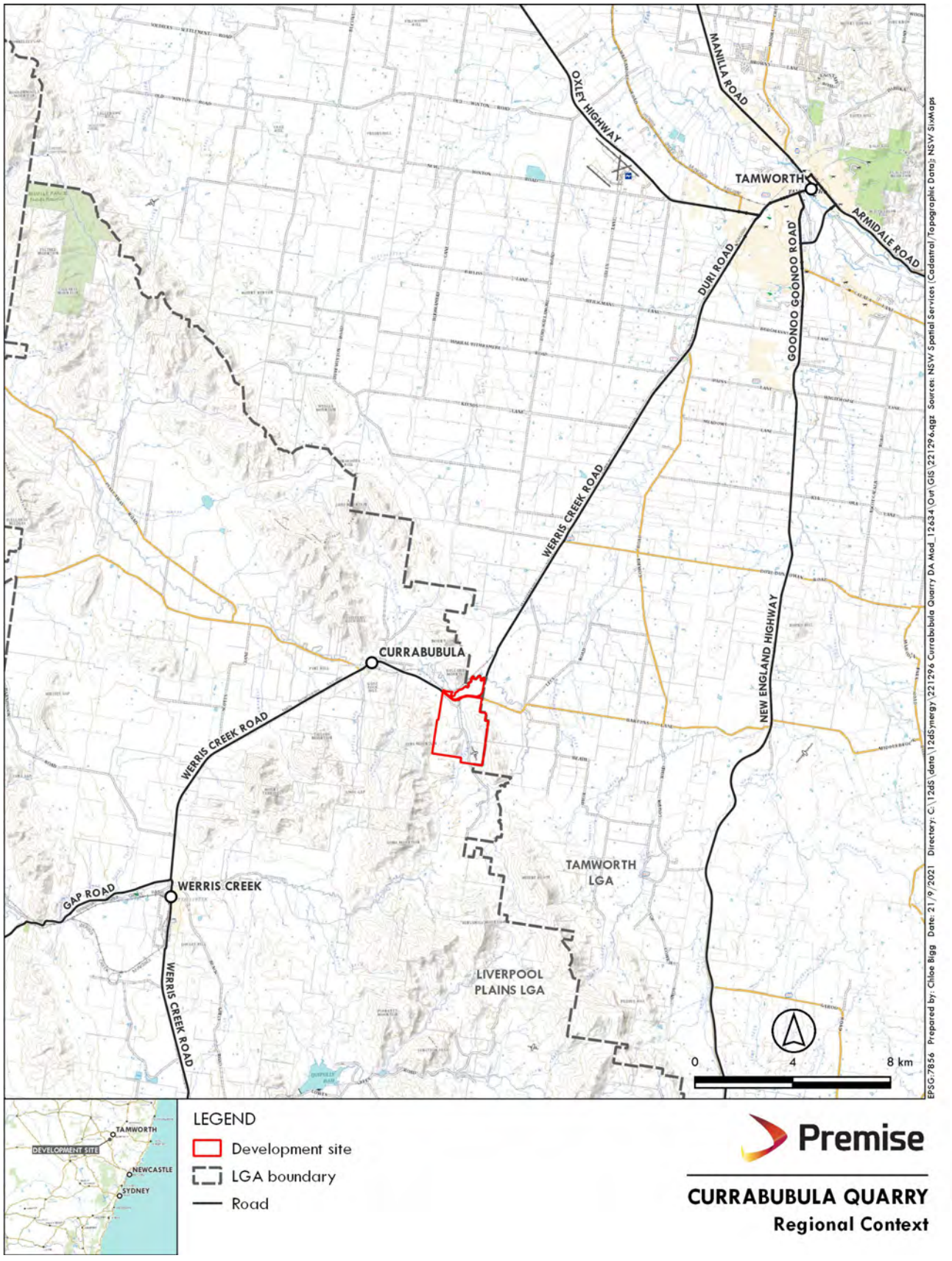
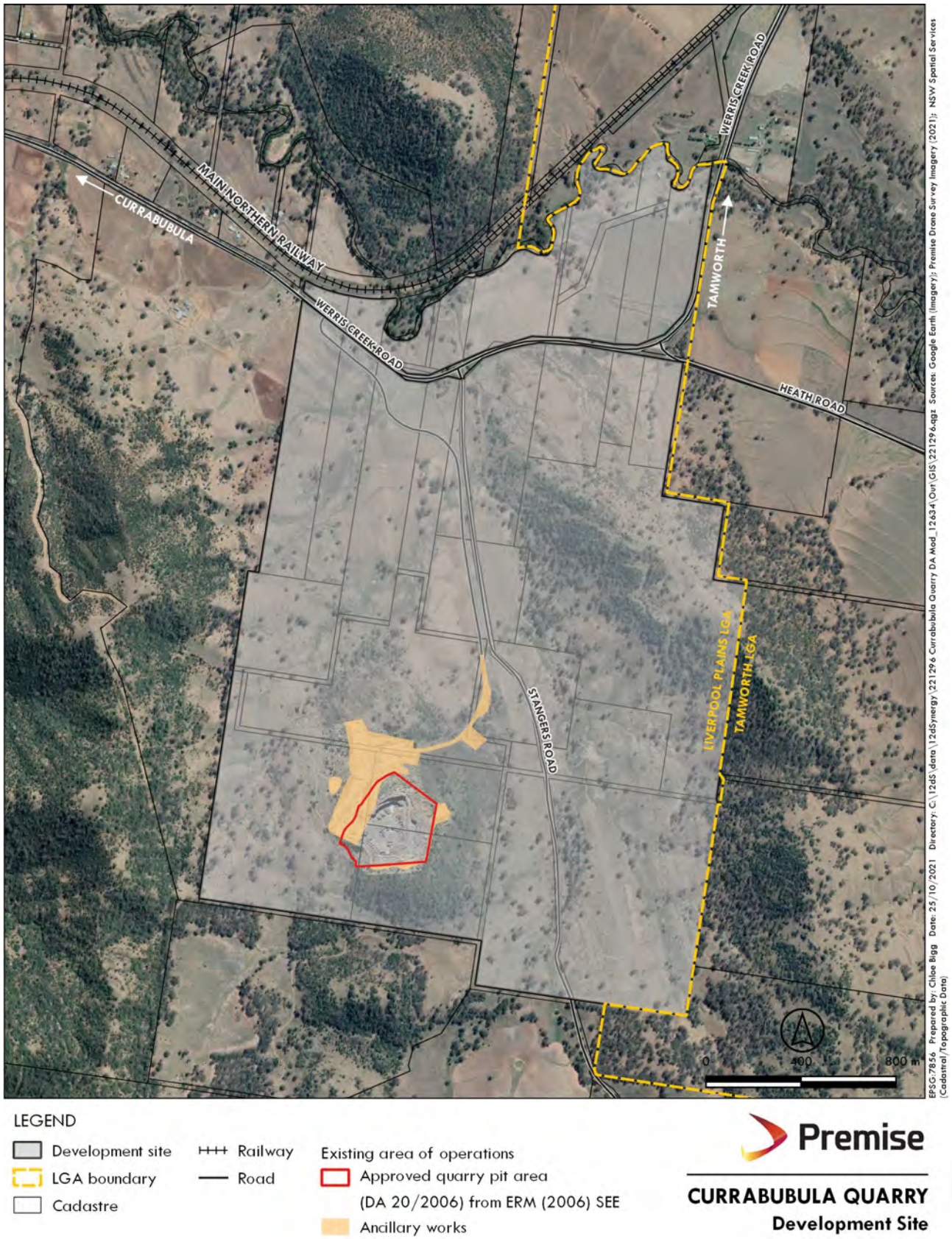


Figure 2 – Development site



1.3 Background

The approvals history is outlined in **Table 1**. The original consent, DA95/114, was granted in 1996 and has been modified three (3) times during which time the application reference has changed. The modified development consent is currently known as DA51/2017.

The general layout of the site, taking into consideration the chronology of modifications is provided in Figure 3, including the extent of the approved pit (expanded under DA20/2006) and all areas of disturbance that support ancillary works associated with the primary consent (DA95/114) and minor changes in layout and use (DA51/2017).

The operations area of the quarry covers a total of 22 ha of the broader site, which is approximately 556 ha.

Table 1 – Approval history

Consent	Granted	Consent authority	Approved development
DA 95/114	25/1/1996	Parry Shire Council	Approved the establishment and operation of a hard rock (andesite) quarry for the extraction of 200,000 tpa with a quarry life of 45 years.
DA 20/2006	2/6/2006	Liverpool Plains Shire Council	Modification of DA95/114, to expand the approved quarry pit. Note: DA 20/2006 stated that all of the conditions of DA 95/114 remained applicable to DA 20/2006, including an extraction limit of 200,000 tpa.
DA 51/2017	26/02/2018	Liverpool Plains Shire Council	Modification to development consent, DA20/2006, to increase extraction and processing rate to 300,000 tpa of andesite and permit the establishment of an ancillary use involved in the receipt/processing of up to 5,000 tpa of recycled concrete and asphalt pavement from concrete plants and road works within the region. The modification application did not include any changes in the extent of the approved pit or areas of ancillary operations. The establishment of the recycling operation was within the existing footprint of the processing yard west of the pit. Note: DA51/2017 superseded the previous consents DA 95/114 and DA 20/2006, as stated in the notice of determination.
DA 51/2017_02	7/12/2020	Liverpool Plains Shire Council	Modification to DA51/2017 to permit a short-term production increase to 330,000 tpa for the 2020 calendar year to address a shortfall in supply to meet market demand. Note: DA51/2017_2 superseded the previous consents DA 95/114 and DA 20/2006, as stated in the notice of determination.
Ancillary development			
DA-14/2018	26/02/2018	Liverpool Plains Shire Council	Approval for the importation and blending of up to 5000 tpa of recycled concrete and asphalt (i.e. resource recovery activity).

1.4 Purpose

This statement of environmental effects (SEE) has been prepared by Premise to accompany an application to modify development consent DA 51/2017. The proposed modification is sought under Section 4.55(2) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The consent authority for the application is Liverpool Plains Shire Council.

This SEE has been prepared pursuant to Clause 50 and Part 1 of Schedule 1 of the NSW *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation).

1.5 Applicant

Boral Resources (Country) Pty Limited (Boral) is the applicant for this proposal. Boral is the largest integrated construction materials company in Australia, with a leading position underpinned by strategically located quarry reserves and a network of 379 operating sites. Boral manufacture and supply a focused range of building products, serving customers nationally in the infrastructure, commercial and residential construction markets.

In NSW, Boral operates over 110 quarries, sand pits, gravel operations, asphalt and concrete plants producing products such as concrete aggregates, crushed rock, asphalt and sealing aggregates, road base materials, sand and gravels for the Australian construction materials industry.

1.6 Consultation

1.6.1 Statutory Authorities

Premise issued consultation letters to the NSW Environment Protection Authority (EPA) and TfNSW – Roads and Maritime Service (RMS) Northern Region on 27 May 2021. No response was received from the EPA. The responses received from TfNSW are outlined below, including where relevant requirements are addressed in this SEE.

Table 2 – Responses from TfNSW

Date/ Organisation	Response summary	Comment
10/06/21 TfNSW	SEE and traffic studies must address requirements of Clause 16 of the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007	Mining SEPP is considered in Section 4.2.7 of this SEE and a Traffic Impact Assessment is provided in Appendix A.
	TfNSW interests include the safety and efficiency of the transport network, the needs of our customers and the integration of land use and transport in accordance with Future Transport Strategy 2056; these matters should be clearly addressed in the SEE and traffic studies.	Traffic impacts are addressed in Section 5.2 of this SEE and strategic justification addressed in Section 6.2. A Traffic Impact Assessment is provided in Appendix A.
	Consideration should be given to adopt/update a Driver Code of Conduct.	Recommendations for the Driver Code of Conduct are provided in the Traffic Impact Assessment in Appendix A and in Section 5.2.4.2 of this SEE.

Date/ Organisation	Response summary	Comment
	An update on the status of current roadworks/intersection upgrades should be provided and addressed in the SEE and traffic studies.	Boral responded to Council on 30 August 2021 with the following: • Confirmation of the status of the intersection upgrade works at the entry/exit to Currabubula Quarry from Werris Creek Road. Intersection upgrade drawings (Drawing No. SY19279, dated 18/11/2020) were provided to TfNSW on this email. • Confirmation that a Traffic Impact Assessment is being prepared to support the proposed modification and is based on Council traffic counts from May 2021.
9/09/2021 TfNSW	TfNSW responded to Boral's email from 30 August 2021, confirming receipt of the email and intersection upgrade drawings. TfNSW also requested Boral to provide the following: • the status of the extent of works completed, including drawings and photographs; and • a copy of the Driver's Code of Conduct.	As at 28 September 2021 the intersection upgrade works are at practical completion awaiting sign-off from Liverpool Plains Shire Council. Boral provided a copy of the requested documents to TfNSW on 30 August 2021.

1.6.2 Community

For this project Boral held two community engagement sessions for the neighbours surrounding the quarry at the Currabubula Memorial Hall on:

- Monday 7 June: 1.00pm – 5.00pm
- Tuesday 8 June: 10.30am – 1.30pm.

To be compliant with the COVID-19 Safety Plan for Currabubula Community Hall, the neighbours were allocated specific meeting times. Representatives from Boral's Property Group, Stakeholder Engagement Team and the Quarry attended the sessions with maps and aerial photography material.

The purpose of the engagement sessions was to provide an update about this modification application.

The neighbours were generally highly supportive of the project on economic grounds. Many reported that they do not notice the scheduled rock blasts owing to the geography of the quarry and that operations had little effect on them. Some minor issues were raised for consideration and action by Boral – refer to **Table 3**.

Table 3 – Community responses requiring action

Community Feedback	Comment
Would like evidence of dust and blast monitoring results	Annual dust monitoring results, and blast monitoring emailed directly to requestor.
Some unmarked trucks have been using the local (unsealed) roads to shortcut from Werris Creek Road via Heath Road towards New England Hwy. Unclear if these trucks are coming to/from the Quarry. Issue raised as a safety concern.	Boral's Quarry Manager has spoken to major haulage contractors and reinforced the need to stay on nominated (sealed) haulage routes in the region.

Community Feedback	Comment
Noise annoyance on occasion associated with non-Boral tipper trucks tipping offloading residue and banging tailgates at the access entry to the quarry early in the morning	Boral will ensure that truck drivers are educated about the site's environmental management requirements including not offloading residue and banging tailgates as part of the Driver Code of Conduct.
Landscaping – continuing on with boundary planting	This is an ongoing activity undertaken in consultation with neighbours. The program will recommence when there is optimal planting conditions.

2 Existing operations

2.1 Site layout

The site is accessed from an access road parallel to Stangers Road connecting the site to Werris Creek Road. The quarry access point is approximately 2 km north of the quarry on a straight section of Werris Creek Road, approximately 750 metres (m) west of Stangers Road and 3.5 km east of the centre of Currabubula township.

The existing area of operations covers approximately 22 ha and is inclusive of the following areas:

- Quarry pit – inclusive of the open cut pit and in-pit processing equipment.
- Stockpile areas – inclusive of product stockpiles and existing pre-coat plant.
- Site access – inclusive of site offices, amenities, car park and the weighbridge.
- Sediment basin.

The existing area of operations is depicted in Figure 3.

2.2 Quarry operations

Approved extraction is currently 300,000 tpa of hard rock (andesite). Small areas of mudstone and tuffaceous sandstone are present and where intersected are stockpiled for fill material for future use on site, such as rehabilitation. The quarry operations do not produce waste with all material extracted sold or used on site.

The quarry is progressing from west to east into the hill, with benches established at each 15 m face to create a series of stepped benches.

Material is extracted by drill and blast (4 blasts per year) and processed in-pit with mobile crushing and screening plant to produce aggregate and road base products of various sizes.

An existing approved pre-coat plant also operates on site for a maximum of 20 hours per week with 20,000 tonnes (t) annual throughput.

All products are stockpiled on site until sold. Product is transported to market by truck via the access road connecting to Werris Creek Road.

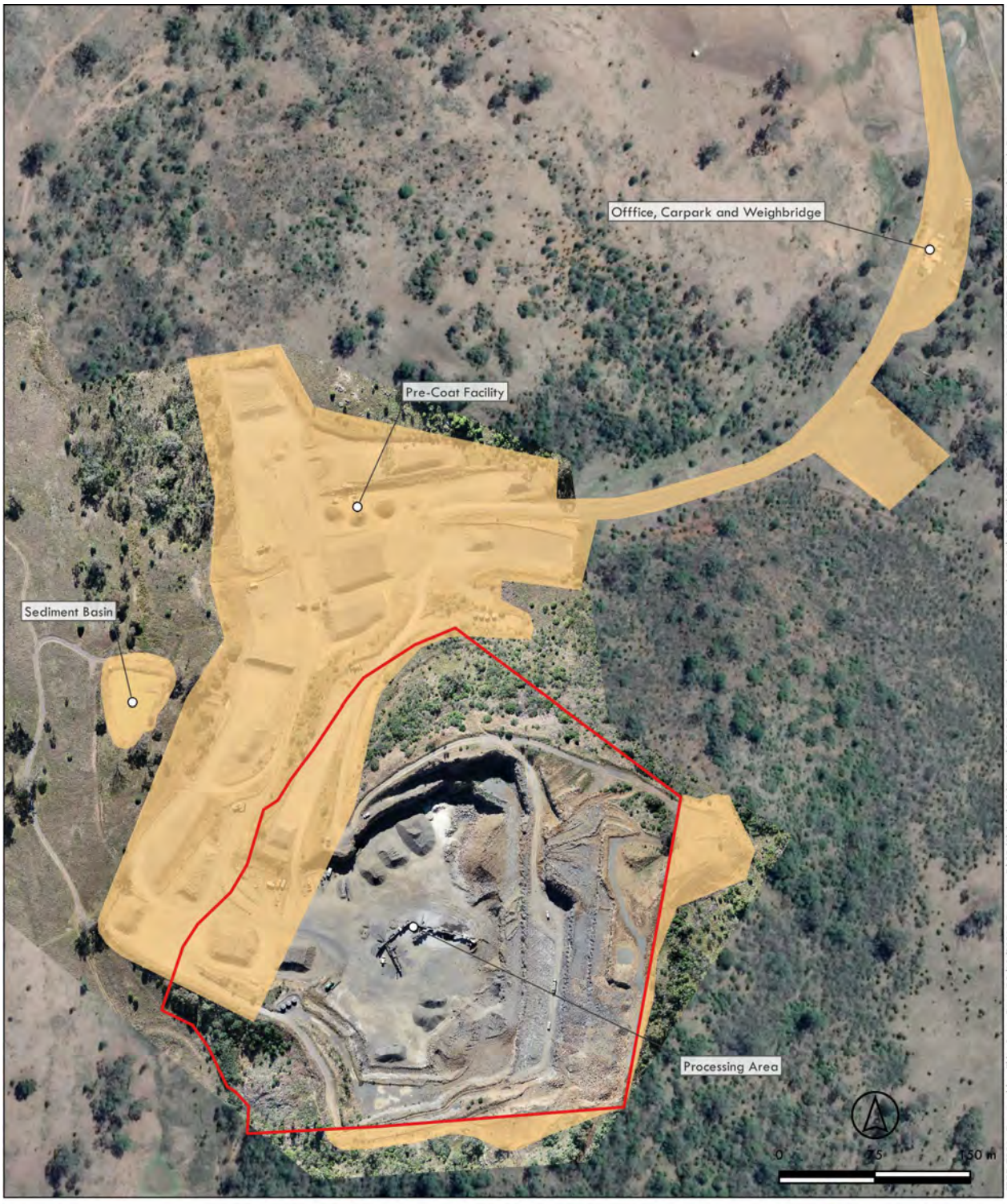
The site is operational between 7am to 6pm Monday to Friday and 7am to 2pm on Saturday. No work is conducted on Sundays or Public Holidays.

2.3 Resource recovery

Approved resource recovery activities include receipt and processing of up to 5,000 tpa of dry concrete and asphalt waste on site, for subsequent use on for road repairs and product re-use (<1%).

The 5,000 tpa of resource recovery would continue to be additional to the total annual production of the quarry i.e. in addition to the 400,000 tpa production.

Figure 3 – Existing area of operations



LEGEND

Existing area of operations

Approved quarry pit area (DA 20/2006) from ERM (2006) SEE

Ancillary works

Premise

CURRABUBULA QUARRY

Existing area of operations

3 Proposed modification

3.1 Purpose

The quarry has received a rapid increase in demand for its product over the last 15 months owing to stimulus investment for road infrastructure, particularly to rural Councils and TfNSW. In order to meet this demand Boral seeks to increase the approved production rate of the quarry and operate a mobile pug mill to produce the required road base product specifications.

Boral customers such as TfNSW also require a broader range of products including a higher quality stabilised road base material. A pug mill is needed to produce this particular specified product.

3.2 Proposal

Boral is seeking to modify development consent DA 51/2017 to:

- increase the production limit from 300,000 tpa to 400,000 tpa; and
- operate a mobile pug mill to produce a maximum of 50,000 tpa. The 50,000 tpa output would form part of the total 400,000 tpa proposed.

The proposal would also require the following:

- additional truck movements;
- additional blast events; and
- modification of the existing sediment basin.

The proposal does not seek to change the following:

- site layout including the extent of the approved pit
- operating hours
- blasting hours
- extraction method
- pre-coat plant operations
- resource recovery activities
- product transport method and site access

A description of each element of the proposal is provided in the following subsections.

3.2.1 Increased production

An overview of changes associated with the increased production rate is provided below.

Table 4 – Changes associated with increased production

Aspect	Existing approved activities	Proposed modification
Production	300,000 tpa	400,000 tpa
Blasting	Four (4) blasts per year	Average of six (6) blasts per year Maximum of eight (8) blasts per year
Truck movements	Average daily truck dispatches: • 40 truckloads per day • 80 movements per day	Average daily truck dispatches: • 50 truckloads per day • 100 movements per day

Aspect	Existing approved activities	Proposed modification
	Average hourly truck dispatches: • 4 truckloads per hour • 8 movements per hour Maximum daily truck dispatches: • 75 truckloads per day • 150 movements per day Maximum peak hourly truck dispatches: • 8 loads per hour • 16 movements per hour	Average peak hourly truck dispatches: • 6 truckloads per hour • 12 movements per hour Maximum daily truck dispatches: • 120 truckloads per day • 240 movements per day Maximum peak hourly truck dispatches: • 15 truckloads per hour • 30 traffic movements per hour Stabilment for pugmill requires 72 loads one-way (incoming) per annum. Note: All out-going stabilised product forms the total quarry production and is accounted for in average/maximum truck dispatches stated above.

3.2.2 Pug mill

A mobile pug mill is proposed to be located in the quarry pit and would be moved within the pit area as required to support quarry operations.

The proposed pug mill is a silo (<10 m height) and bin combination that would utilise aggregate from the quarry and stabilment (blended slag and lime). The following production rates are proposed for the pug mill:

- annual production of 50,000 tpa;
- daily maximum production of 2,000 t;
- daily average production of 200 t; and
- an operating period of 250 days per year.

The operation of a mobile pug mill requires 72 loads (one way, into the quarry) per annum of stabilment. Stabilment is mixed with aggregate in the pug mill to produce the required product specifications. The 50,000 t output from the pug mill would form part of the total 400,000 tpa production proposed via this modification.

3.2.3 Sediment basin modification

The sediment basin embankment is proposed to be raised one (1) m. This will reduce the spill frequency by increasing the basin volume, and therefore enhance compliance with EPA requirements. Noting the maximum allowable harvestable volume will not be exceeded.

The water balance and an assessment of potential impact is provided in Section 5.6 of this SEE.

3.3 Changes to consent conditions

Boral proposes to modify the DA 51/2017_2 as outlined below.

Table 5 – Proposed changes to consent conditions

No.	DA 51/2017_2 Condition	Proposed Change
1	*The development is to be carried out generally in accordance with:*	Update condition to the following: *The development is to be carried out generally in accordance with:*

No.	DA 51/2017_2 Condition	Proposed Change
	• *Environmental Impact Statement (EIS) dated 12th September 1995 prepared by Valerie Smith & Associates;* • *Currabubula Quarry: Section 96 Modification Extension of Quarrying dated February 2006, prepared by Environmental Resources Management (ERM); and* • *Statement of Environmental Effects (SEE) dated 20 September 2017 prepared by EMM (as modified by supplementary information provided:* - *Brief to Liverpool Plains Shire Council - Currabubula Quarry Modification, dated 24 August 2017 prepared by Boral;* - *Noise Matters email dated 11 December 2017, prepared by Brett McLennan (EMM Consulting);* - *Response to Council comments, dated 12 December 2017, prepared by Rod Wallace (Boral).* *If there is any inconsistency between the Conditions of Consent and the documents listed above, the Conditions of Consent shall prevail to the extent of the inconsistency*	• *Environmental Impact Statement (EIS) dated 12th September 1995 prepared by Valerie Smith & Associates;* • *Currabubula Quarry: Section 96 Modification Extension of Quarrying dated February 2006, prepared by Environmental Resources Management (ERM);* • *Statement of Environmental Effects (SEE) dated 20 September 2017 prepared by EMM (as modified by supplementary information provided:* - *Brief to Liverpool Plains Shire Council - Currabubula Quarry Modification, dated 24 August 2017 prepared by Boral;* - *Noise Matters email dated 11 December 2017, prepared by Brett McLennan (EMM Consulting);* - *Response to Council comments, dated 12 December 2017, prepared by Rod Wallace (Boral); and* • ***Statement of Environmental Effects (SEE) dated November 2021 prepared by Premise**.* *If there is any inconsistency between the Conditions of Consent and the documents listed above, the Conditions of Consent shall prevail to the extent of the inconsistency.*
6	*Total hard rock quarry levels mined or processed or transported offsite shall not exceed 300,000 tonnes per annum and/or the expiration of forty five (45) years from the date of consent. The applicant shall annually notify the Council, with in three (3) months of the calendar year, the total quantity of hard rock (andesite) mined and provide details of final output in terms of products. The quarrying operations and mining plan proposed in the Environmental Impact Statement (EIS) shall not be varied without the Council being notified.*	Update condition to the following: *Total hard rock quarry and recycled products transported must levels mined shall not exceed **400,000** tonnes per annum and/or the expiration of forty five (45) Years from the date of consent. The applicant shall annually notify the Council, within three (3) months of the calendar year, the total quantity of hard rock (andesite) mined and provide details of final output in terms of products. The quarrying operations and mining plan proposed in the Environmental Impact Statement (EIS) shall not be varied without the Council being notified.*
6A	*The annual production rate from the quarry shall not exceed 300,000 tonnes per annum but is permitted to increase to 330,000 tonnes per annum to support economic stimulus projects in the 2020 calendar year.*	Remove condition
25	*Access roads and haul routes are to be those nominated in the EIS being via the internal road and Werris Creek Road (MR 130)-Bridge Street-Brisbane Street, Marius Street to Armidale Road within Parry Shire and the confines of Tamworth City.* *The section of access road extending from the junction of Werris Creek Road (M.R. 130) to the quarry area shall be formed and gravelled as identified in the EIS. The access road shall be constructed and maintained to the satisfaction of*	Remove Condition

No.	DA 51/2017_2 Condition	Proposed Change
	the Department of Land and Water Construction and/or the Director of Engineering Services. *Where internal roads or access tracks are no longer required these shall be reshaped, topsoiled, and sown with a recommended seed/fertiliser mixture.*	
26	*Upgrade the left turn access to the quarry off Werris Creek Road, to the requirements of the current Austroads Guide to Road Design BAL treatment P, A and C of Figure 8.2 in Austroads Part 4A, including sealing of the widened shoulder. The upgrade work is to be completed within 6 months of transporting more than 200,000 tonnes in a calendar year. The applicant is to advice Council prior to commencement of works.*	Remove condition
28	*The applicant shall be responsible for construction by Council of the Werris Creek Road (MR 130) and internal access road Type A' intersection in accordance with NAASRA "Guide to Traffic Engineering Practices 1988 Intersection at Grade" and the requirements of the NSW Roads and Traffic Authority. The pavement for the intersection and widening shall be bitumen sealed. The minor road shall be bitumen sealed for a distance of 40m from the centreline of M.R. 130 including the taper flares. Appropriate signposting and pavement marking shall be to the satisfaction of Council's Local Traffic Committee.*	Remove condition

4 Statutory planning framework

This section provides an overview of the statutory framework relevant to the proposal including Commonwealth and State legislation, and State, regional and local plans and policies.

4.1 Commonwealth legislation

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act), actions that may have a significant impact on a matter of national environmental significance (MNES) are 'controlled actions' and require referral and approval under the EPBC Act.

A search using the Protected Matters Search Tool (PMST) was completed on 21 September 2021 and did not identify any MNES at or near the development site, except for nationally threatened species and ecological communities that may occur within the area. On the basis that the proposal does not involve any disturbance outside the existing area of operations, impacts to threatened species and ecological communities are not considered likely to occur.

The proposed modification is not considered likely to have any significant impacts on any MNES and, accordingly, a referral under the EPBC Act has not been made.

4.2 State legislation

4.2.1 Environmental Planning and Assessment Act 1979

4.2.1.1 General

The EP&A Act defines the statutory framework for planning approvals and environmental assessments in NSW. The EP&A Act is administered by the NSW Minister for Planning and Public Spaces, statutory authorities and local councils.

A development consent issued under the EP&A Act may be modified under Section 4.55 of the Act, provided that the development subject to the proposed modification is substantially the same development as the development for which consent was originally granted. There are three types of modifications under Section 4.55 of the EP&A Act:

- Section 4.55(1) modifications involving minor errors, misdescriptions or miscalculations;
- Section 4.55(1A) modifications involving minimal environmental impact; and
- Section 4.55(2) other modifications.

Council confirmed in correspondence to Boral on 15 March 2021 that the proposed modification is likely to be 'substantially the same development as the development for which consent was originally granted' and that the application would be assessed under Section 4.55(2)(a) of the EP&A Act. Council also stated that an SEE is required to accompany the modification application.

4.2.1.2 Substantially the same development

The Land and Environment Court has repeatedly described the modification process as being both beneficial and facultative and is designed to assist with the modification process rather than act as an impediment to it, *"It is to be construed and applied in a way that is favourable to those who seek to benefit from the provision"* (North Sydney Council v Michael Standley & Associates Pty Limited (1998)).

Two legal tests apply to a modification, these being alteration without radical transformation and that the development is substantially the same development; these are discussed as follows.

Alteration without radical transformation

This is a broad threshold that requires careful consideration. Unpacking these terms, it is sensible to consider their ordinary definitions.

The Macquarie Australian Dictionary defines radical as:

> *1. going to the root or origin; fundamental: a radical change.*
> *2. thorough going or extreme, especially towards reform.*

The Macquarie Australian Dictionary defines transformation as:

> *1. the act of transforming.*
> *2. the state of being transformed.*
> *3. change in form, appearance, nature, or character.*

It is sensible to consider firstly whether the proposed modification represents a transformation; if it is concluded that no transformation has taken place, then the degree (or radicalness) is moot. Taking consideration of the above definition, specifically point 3, it is considered that the development does not represent a transformation on the following basis:

- Form – overall form of the development is consistent with the approved form;
- Appearance – no change to the appearance of the site is proposed;
- Nature – no change to the nature of the quarry operation is proposed; and
- Character – no change to the character of the quarry operation is proposed.

On the above basis it is not considered a transformation. Should the alternate view be taken, the question then becomes whether that transformation is considered radical. It is evident from the definition of radical that the change must be one of extremes and must result in an alteration at a fundamental level.

Section 3 sets out the description of the proposed modification. It is evident from that description that the modification is not radical. The proposed use:

- would not alter the approved disturbance area or approved pit extent;
- would not lead to any change in operational hours;
- would not result, in the context of existing traffic volumes, in a significant impact to the traffic environment– refer Section 5.2;
- in the context of existing noise impacts, would not result in a significant impact to acoustic amenity – refer Section 5.3;
- in the context of existing air quality, would not result in a significant impact to the traffic environment– refer Section 5.5;
- in the context of existing surface water management, would not result in a significant impact to surface water – refer Section 5.6; and
- is unlikely, through the effective implementation of proposed mitigation measures, to result in any significant increase in environmental impacts.

On the basis of the above it is considered that the development does not involve radical transformation and therefore satisfies the first test for a modification.

Once the consent authority is satisfied that the development is alteration and not radical transformation, they may then turn to the second issue, namely, confirmation that the development remains substantially the same.

Substantially the same

To determine whether a proposed modification remains substantially the same as the approved development, there are a number of matters that require consideration, including:

- the numerical differences in all key aspects of the development;
- non-numerical factors (e.g. in visual impact, traffic impacts or changed land uses); and
- any changes relating to a material and essential feature of the approved development.

To demonstrate the proposed modification is substantially the same development as the approved development, the key operational features and environmental impacts are compared in Table 6 overleaf.

As demonstrated in Table 6, the proposed modification will not result in any change to the level of environmental impacts associated with the quarry and, as it maintains the same operational hours, number of employees and is restricted to the existing area of operations, it is considered to be 'substantially the same development'.

Table 6 – Comparison of approved and proposed development

Aspect	Approved Development DA 95/114 & DA 20/2006	Approved Development DA 51/2017_2	Proposed development
Operations			
Production rate	200,000 tpa	300,000 tpa	400,000 tpa
Employment	Four (4) employees plus contractors	Five (5) employees plus contractors	No change proposed
Hours of operation	7 am and 6 pm Monday to Friday and 7 am to 2 pm on Saturday	7am to 6pm Monday to Friday 7am to 2pm on Saturday	No change proposed
Blasting	Average frequency of 1 blast per fortnight	Four (4) blasts per year	Average of six (6) blasts per year Maximum of eight (8) blasts per year
Blasting hours	9am to 3pm Monday to Friday	• 9am to 3pm Monday to Friday • 9am to 2pm on Saturday • No blasting on Sundays or Public Holidays without prior approval of the EPA.	No change proposed
Truck movements	The EIS described 36 trucks per day (72 movements per day), with a maximum of 40 loads per day (80 movements per day) at peak productivity.	Average daily truck dispatches: • 40 truckloads per day • 80 movements per day Average hourly truck dispatches: • 4 truckloads per hour • 8 movements per hour Maximum daily truck dispatches: • 75 truckloads per day • 150 movements per day Maximum peak hourly truck dispatches: • 8 loads per hour • 16 movements per hour	Average daily truck dispatches: • 50 truckloads per day • 100 movements per day Average peak hourly truck dispatches: • 6 truckloads per hour • 12 movements per hour Maximum daily truck dispatches: • 120 truckloads per day • 240 movements per day Maximum peak hourly truck dispatches: • 15 truckloads per hour • 30 traffic movements per hour Stabilment for pugmill requires 72 loads one-way (incoming) per annum.

Aspect	Approved Development DA 95/114 & DA 20/2006	Approved Development DA 51/2017_2	Proposed development
			Note: All out-going stabilised product forms the total quarry production and is accounted for in average/maximum truck dispatches stated above. The assessment of the additional net traffic generated by the proposed modification, concluded the following: • The increase in the traffic volumes on the surrounding road network will not change the classifications of the roads under the functional road hierarchy. • The percentage increases in the traffic volumes on the surrounding road network range from 0.9% for AADT on Werris Creek Road (left towards Currabubula) to 4.2% for the AM peak hour on Werris Creek Road (right towards Tamworth). The percentage increase in traffic volume is not considered significant and the net daily traffic volume and peak hour volume generated by the increased production at the quarry are easily absorbed into the surrounding road network with minimal impact on the capacity of the existing traffic streams using the road system. • The additional traffic generated by the proposed quarry modification is well below the capacity of the road network at a Level of Service B and all roads would continue to operate satisfactorily.
In pit processing equipment	Primary and tertiary crushing and screening facilities in the quarry pit.	Primary and tertiary crushing and screening facilities in the quarry pit.	No change to crushing/screening facilities in the pit. New mobile pug mill proposed in the pit with annual production of 50,000 tpa. The pug mill output forms part of the total 400,000 tpa production proposed via this modification.
Pre-Coat Plant	• Conveyor and boot bin • Diesel generator motor • 20,000 t annual throughput • Maximum 20 hours/week	• Conveyor and boot bin • Diesel generator motor • 20,000 t annual throughput • Maximum 20 hours/week	No changes proposed

Aspect	Approved Development DA 95/114 & DA 20/2006	Approved Development DA 51/2017_2	Proposed development
Resource Recovery	N/A	Resource recovery for up to 5,000 tpa of dry concrete and asphalt waste.	No changes proposed. Resource recovery output will continue to be in addition to the total annual production from the quarry.
Environmental impacts			
Traffic	The EIS described 36 trucks per day (72 movements per day), with a maximum of 40 loads per day (80 movements per day) at peak productivity.	Existing approved production at 300,000 tpa: • Average 80 trips/day • Maximum 150 trips/day	Proposed production at 400,000 tpa: • Average 100 trips/day • Maximum 240 trips/day The net increase is: • Average 20 trips/day • Maximum 90 trips/day Impact summary: • No change to surrounding road network road classification from increased traffic volumes. • The additional traffic generated by the proposed quarry modification is well below the capacity of the road network at a Level of Service B and all roads would continue to operate satisfactorily. • The percentage increase in traffic volumes is not considered significant and are easily absorbed into the surrounding road network with minimal impact on the capacity of the existing road system. • Current intersection upgrades at the access point to the quarry from Werris Creek Road are appropriate to support the proposed modification.
Noise	Condition 23 requires the applicant to use all practical means to obtain a maximum design goal of day time 45 dB(A) and night time 35 dB(A) noise levels at all residences.	Condition 23 requires the applicant to use all practical means to obtain a maximum design goal of day-time 45 dB(A) and night-time 35 dB(A) noise levels at all residences.	EPL 5846 does not specify noise limits. Condition L4.1 states: *Noise limits may be added to the licence if verified noise complaints are received by the EPA.* Project noise trigger levels (PNTL) used were standardised $L_{Aeq,15\ min}$ noise levels of 40 dB (day-time) and 35 dB (night-time). The day-time PNTL is below the maximum design goal

Aspect	Approved Development DA 95/114 & DA 20/2006	Approved Development DA 51/2017_2	Proposed development
			of condition 23 and the night-time PNTL is consistent with the maximum design goal of condition 23. The results of the predictive noise modelling undertaken in the Noise Impact Assessment have determined that compliance with the adopted noise criteria is expected to be achieved without any additional acoustic mitigation for the proposed modification (Section 5.3 and Appendix B).
Air quality	No specific air quality objectives provided.	No specific air quality objectives provided.	The results of the Air Quality Assessment demonstrated compliance with the assessment criteria listed in the Approved Methods at all sensitive receptors (Section 5.5 and Appendix C).
Surface Water	Condition 4 pertains to water management dams and Condition 11 pertains to stockpiling near water courses.	Condition 4 pertains to water management dams and Condition 11 pertains to stockpiling near water courses.	The capacity of the sediment basin needs to be increased from 3.2 megalitres (ML) to 5.2 ML to facilitate the modification. No change to the existing area of operations is proposed and therefore no impacts to surface water are considered likely where the modification to the existing sediment basin is completed prior to production increasing to 400,000 tpa (Section 5.6).
Heritage	Conditions 15 to 17 pertain to archaeological surveys and identification/fencing of Aboriginal sites	Conditions 15 to 17 pertain to archaeological surveys and identification/fencing of Aboriginal sites	The proposed modification does not propose disturbance outside the existing area of operations and is therefore unlikely to result in impacts to Aboriginal heritage (Section 5.7).
Biodiversity	Condition 18 pertains to fauna surveys and Condition 19 pertains to revegetation.	Condition 18 pertains to fauna surveys and Condition 19 pertains to revegetation.	The proposed modification does not propose disturbance outside the existing area of operations and is therefore unlikely to result in impacts to biodiversity (Section 5.8.1).
Visual	No visual amenity related conditions provided.	No visual amenity related conditions provided.	No extension of quarry area or changes to layout proposed (Section 5.8.2).
Waste	Condition 33 relates to the disposal of solid waste at the quarry.	Condition 33 relates to the disposal of solid waste at the quarry.	No additional waste is predicted to be generated (Section 5.8.8).

4.2.1.3 Relevant matters for consideration

This proposal is made under Part 4 of the EP&A Act. Under Section 4.15(1)(a) of the EP&A Act, a consent authority is to take into consideration the following matters as relevant to an application:

(a) the provisions of—
(i) any environmental planning instrument, and
(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Planning Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and
(iii) any development control plan, and
(iiia) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4, and
(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph),
(v) (Repealed)
that apply to the land to which the development application relates,
(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,
(c) the suitability of the site for the development,
(d) any submissions made in accordance with this Act or the regulations,
(e) the public interest.

The matters relevant to the proposed modification have been addressed in the following sections.

4.2.2 Environmental Protection and Assessment Regulation 2000

An application for modification of a development consent under Section 4.55 of the EP&A Act must contain the information stipulated in Clause 115 of the EP&A Regulation. The required information and where it has been addressed in this report is detailed in Table 7.

Table 7 – Clause 115 requirements for Section 4.55 applications

Requirement	Addressed
(a) the name and address of the applicant,	Section 1.1 Section 1.5
(b) a description of the development to be carried out under the consent (as previously modified),	Section 3.2
(c) the address, and formal particulars of title, of the land on which the development is to be carried out,	Section 1.1
(d) a description of the proposed modification to the development consent,	Section 3.3
(e) a statement that indicates either— (i) that the modification is merely intended to correct a minor error, misdescription or miscalculation, or (ii) that the modification is intended to have some other effect, as specified in the statement,	Section 4.2
(f) a description of the expected impacts of the modification,	Section 5
(g) an undertaking to the effect that the development (as to be modified) will remain substantially the same as the development that was originally approved,	Section 4.2.1.2

Requirement	Addressed
(g1) in the case of an application that is accompanied by a biodiversity development assessment report, the reasonable steps taken to obtain the like-for-like biodiversity credits required to be retired under the report to offset the residual impacts on biodiversity values if different biodiversity credits are proposed to be used as offsets in accordance with the variation rules under the Biodiversity Conservation Act 2016,	Not applicable
(h) if the applicant is not the owner of the land, a statement that the owner consents to the making of the application (except where the application for the consent the subject of the modification was made, or could have been made, without the consent of the owner),	The applicant is the owner of the development site.
(i) a statement as to whether the application is being made to the Court (under section 4.55) or to the consent authority (under section 4.56).	Not applicable

4.2.3 Protection of the Environment Operations Act 1997

The NSW *Protection of the Environment Operations Act 1997* (POEO Act) requires that scheduled premises, which are defined in Schedule 1 of the Act, obtain and operate under an EPL. The quarry is defined as a scheduled premise and has an EPL (EPL 5846) administered by the NSW Environment Protection Authority (EPA). The EPL licences:

- extraction and processing of 100,000-500,000 tpa of hard rock material; and
- resource recovery for up to 5,000 tpa of dry concrete and asphalt waste.

The proposed increase to the rate of extraction to 400,000 tpa will remain within the licensed limits and no change to resource recovery activities at the quarry is proposed via this modification.

The proposed modification to the existing sediment basin (i.e. raising the embankment by 1 m) would enhance compliance with EPL 5846 Conditions L2.4 and L2.5 (below) as spill frequencies would be reduced.

L2.4 Water and/or Land Concentration Limits

POINT 1

Pollutant	Units of Measure	50 Percentile concentration limit	90 Percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	milligrams per litre				10
pH	pH				6.5-8.5
Total suspended solids	milligrams per litre				50

L2.5 The Total Suspended Solids concentration limits specified in the table above may be exceeded for water discharged from the sediment basins provided that:
(a) the discharge occurs solely as a result of rainfall measured at the premises that exceeds 39.2 millimetres over any consecutive 5 day period immediately prior to the discharge occurring; and
(b) all practical measures have been implemented to dewater all sediment dams within 5 days of rainfall such that they have sufficient capacity to store runoff from a 39.2 millimetre, 5 day rainfall event.

Note: 39.2 millimetres equates to the 5 day 90%ile rainfall depth for Tamworth sourced from Table 6.3a Managing Urban Stormwater: Soils and Construction Volume 1: 4th edition, March 2004.

The EPL will not require amendment to reflect the proposed modification to the development consent.

4.2.4 Biodiversity Conservation Act 2016

Section 1.7 of the EP&A Act requires consideration of Part 7 of the NSW *Biodiversity Conservation Act 2016* (BC Act). Part 7 of the BC Act relates to an obligation to determine whether a proposal is likely to significantly affect threatened species. A development is considered to result in a significant impact in the following assessed circumstances:

> *(a) it is likely to significantly affect threatened species or ecological communities, or their habitats, according to the test in section 7.3, or*
> *(b) the development exceeds the biodiversity offsets scheme threshold if the biodiversity offsets scheme applies to the impacts of the development on biodiversity values, or*
> *(c) it is carried out in a declared area of outstanding biodiversity value*

The site has been the subject of an Environmental Impact Statement (original EIS) by Valerie Smith and Associates (1995), and consent has been granted for extractive industry. The proposed modification does not increase the existing area of operations. Therefore, the proposed modification is not considered likely to significantly affect threatened species or ecological communities or their habitats.

4.2.5 National Parks and Wildlife Act 1974

The NSW *National Parks and Wildlife Act 1974* (NPW Act) provides for nature conservation in NSW including the conservation of places, objects and features of significance to Aboriginal people. A person must not harm or desecrate an Aboriginal object or place without an Aboriginal Heritage Impact Permit under Section 90 of the NPW Act.

The proposed modification does not increase the existing area of operations and is therefore unlikely to impact Aboriginal objects or places.

4.2.6 Water Management Act 2000

The NSW *Water Management Act 2000* (WM Act) governs the issue of water licences and allocations for those water sources in NSW where water sharing plans have commenced, as well as controlled activity approvals.

The quarry holds Water Access Licence (WAL) 27988 which has an annual allocation of 6 ML. No changes to the WAL or its use are required as part of the proposed modification.

A controlled activity approval is required as the proposed modification to the existing sediment basin (i.e. raising the existing embankment by 1 m) is located on waterfront land, specifically within 40 m of a mapped first order watercourse immediately downstream of the existing embankment as shown in Figure 4.

Raising the sediment basin embankment by 1 m would increase the sediment basin capacity from 3.2 megalitres (ML) to 5.2 ML. Review of WaterNSW guidance on licencing requirements confirms the following:

- Licences are not required for harvestable rights dams built on minor streams that capture 10 per cent of the average regional rainfall run-off on land in the Central and Eastern Divisions of New South Wales, and up to 100 percent on land in the Western Division. The total capacity of all dams on a property allowed under the harvestable right is called the Maximum Harvestable Right Dam Capacity (MHRDC).
- A water supply work approval is required for a dam which exceeds the MHRDC, unless the water is taken under a domestic and stock right or native title right.
- Some types of dams should not be included when you are calculating the capacity of dams allowed on a property under a harvestable right. Considered relevant to Currabubula Quarry, this includes:

  Dams for the capture, containment and recirculation of drainage and/or effluent that conform to best management practice or are required by regulation to prevent the contamination of a water

source. The harvestable right is not intended to be contrary to initiatives to prevent pollution of water sources. Many landholders are required to install dams to capture contaminated water or to collect and re-use irrigation tailwater. These dams are not considered in assessing your harvestable right.

Using the MHRDC calculator, the MHRDS for the development site (556 ha) is 41.7 ML.

There is one other dam located within the development site which is estimated to have a capacity of 1 ML. Notwithstanding that the MHRDC would not include the volume of the existing sediment basin (based on the above definition), the MHRDC would not be exceeded as a result of the proposed modification. No water supply work approval is required.

Figure 4 – Watercourse downstream of the sediment basin embankment

4.2.7 State environmental planning policies

4.2.7.1 State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (Mining SEPP) aims to provide for the proper management and development of mineral, petroleum and extractive material resources for the social and economic welfare of the state.

Part 3 of the Mining SEPP sets out matters for consideration for development applications. Clause 12AB(2) of Part 3 of the Mining SEPP states:

> *(2) The matters set out in this clause are identified as non-discretionary development standards for the purposes of section 4.15(2) and (3) of the Act in relation to the carrying out of development for the purposes of mining.*

Modifications under Section 4.55(2) of the EP&A Act only require consideration of Section 4.15(1) of the EP&A Act. Notwithstanding that consideration of matters under Part 3 of the Mining SEPP is not required, they are considered for completeness in Table 8.

Table 8 – Consideration of Part 3 of the Mining SEPP

Matter	Comments
12 Compatibility of proposed mine, petroleum production or extractive industry with other land uses	
(Before determining an application for consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must— (a) consider— (i) the existing uses and approved uses of land in the vicinity of the development, and (ii) whether or not the development is likely to have a significant impact on the uses that, in the opinion of the consent authority having regard to land use trends, are likely to be the preferred uses of land in the vicinity of the development, and (iii) any ways in which the development may be incompatible with any of those existing, approved or likely preferred uses, and (b) evaluate and compare the respective public benefits of the development and the land uses referred to in paragraph (a)(i) and (ii), and (c) evaluate any measures proposed by the applicant to avoid or minimise any incompatibility, as referred to in paragraph (a)(iii).	The proposed modification is on land where an existing quarry operates. Land uses in the vicinity of the development site include grazing and rural-residential land use. The proposed modification would not result in a change of land use, significant adverse environmental impacts are not considered likely to occur for surrounding receptors, and the proposed modification would result in socio-economic benefits. Refer to Section 5.
14 Natural resource management and environmental management	
(1) Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure the following—	
(a) that impacts on significant water resources, including surface and groundwater resources, are avoided, or are minimised to the greatest extent practicable,	A surface water review has been completed to determine appropriate management of water resources at Currabubula Quarry.

Matter	Comments
	Modification to the existing sediment basin is proposed to ensure the average number of spill events from the sediment basin is consistent with the design guidelines for a 90th percentile design basis (DECC, 2008). As stated in Section 4.2.6, the MHRDC would not be exceeded as a result of the proposed modification and therefore, no water supply work approval is required and significant adverse impacts to downstream water resources is considered unlikely. Existing water management measures are in place and will be maintained to avoid impacts to surface water resources. Refer to Section 5.6
(b) that impacts on threatened species and biodiversity, are avoided, or are minimised to the greatest extent practicable,	The proposed modification is not considered likely to impact threatened species or biodiversity. Refer to Section 5.8.3
(c) that greenhouse gas emissions are minimised to the greatest extent practicable.	Emissions will continue to be minimised with existing reduction measures.
(2) Without limiting subclause (1), in determining a development application for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider an assessment of the greenhouse gas emissions (including downstream emissions) of the development, and must do so having regard to any applicable State or national policies, programs or guidelines concerning greenhouse gas emissions.	Greenhouse gas emissions will increase proportionate to the production increase to 400,000 tpa. Whilst emissions of greenhouse gases will increase under a higher production rate, the overall emissions from the quarry project (with a total reserve of 8.1 million tonnes, as stated in the original EIS), are not expected to be significantly different over the full duration of the project (45 years).
(3) Without limiting subclause (1), in determining a development application for development for the purposes of mining, the consent authority must consider any certification by the Chief Executive of the Office of Environment and Heritage or the Director-General of the Department of Primary Industries that measures to mitigate or offset the biodiversity impact of the proposed development will be adequate.	Not applicable to the proposed modification.
15 Resource recovery	
(1) Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider the efficiency or otherwise of the development in terms of resource recovery. (2) Before granting consent for the development, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at optimising the efficiency of resource recovery and the reuse or recycling of material. (3) The consent authority may refuse to grant consent to development if it is not satisfied that the development will be carried out in such a way as to optimise the efficiency of recovery of minerals, petroleum or extractive materials and to minimise the creation of	The proposed modification will ensure the efficiency of the quarry in providing high quality construction materials for regional development.

Matter	Comments
waste in association with the extraction, recovery or processing of minerals, petroleum or extractive materials.	
16 Transport	
(1) Before granting consent for development for the purposes of mining or extractive industry that involves the transport of materials, the consent authority must consider whether or not the consent should be issued subject to conditions that do any one or more of the following—	Noted. See below.
(a) require that some or all of the transport of materials in connection with the development is not to be by public road,	Transportation on public roads is part of the existing approved development. It is neither reasonable or practical to not distribute the additional product by road. As demonstrated by the TIA provided at Appendix A, the modification will not adversely impact on the traffic network or key intersections of key haulage routes used by Boral fleet vehicles.
(b) limit or preclude truck movements, in connection with the development, that occur on roads in residential areas or on roads near to schools ,	Transportation routes used by Boral fleet vehicles seek to minimise the use of roads principally serving residential areas or schools. In some instances, this is unavoidable, in particular where schools are located on main and distributor roads. Such roads are vital in movement of goods by road.
(c) require the preparation and implementation, in relation to the development, of a code of conduct relating to the transport of materials on public roads.	A Driver Code of Conduct is in place. Recommendations for the Driver Code of Conduct are provided in the Traffic Impact Assessment in Appendix A and in Section 5.2.4.2 of this SEE.
(2) If the consent authority considers that the development involves the transport of materials on a public road, the consent authority must, within 7 days after receiving the development application, provide a copy of the application to— (a) each roads authority for the road, and (b) the Roads and Traffic Authority (if it is not a roads authority for the road). Note— Section 7 of the Roads Act 1993 specifies who the roads authority is for different types of roads. Some roads have more than one roads authority.	Noted. TfNSW is the applicable roads authority. As set out in section 1.6.1 Boral has consulted with TfNSW in relation to the modification and where appropriate advice has been incorporated in the application.
(3) The consent authority— (a) must not determine the application until it has taken into consideration any submissions that it receives in response from any roads authority or the Roads and Traffic Authority within 21 days after they were provided with a copy of the application, and (b) must provide them with a copy of the determination.	Noted

Matter	Comments
(4) In circumstances where the consent authority is a roads authority for a public road to which subclause (2) applies, the references in subclauses (2) and (3) to a roads authority for that road do not include the consent authority.	Noted
17 Rehabilitation	
(1) Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring the rehabilitation of land that will be affected by the development.	Development consent conditions 20 and 39 relate to rehabilitation and are supported by the *Currabubula Quarry Plan of Management 1998* which will not be altered as a consequence of the proposed modification.
(2) In particular, the consent authority must consider whether conditions of the consent should— (a) require the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated, or (b) require waste generated by the development or the rehabilitation to be dealt with appropriately, or (c) require any soil contaminated as a result of the development to be remediated in accordance with relevant guidelines (including guidelines under clause 3 of Schedule 6 to the Act and the Contaminated Land Management Act 1997), or (d) require steps to be taken to ensure that the state of the land, while being rehabilitated and at the completion of the rehabilitation, does not jeopardize public safety.	As above

4.2.7.2 State Environmental Planning Policy No 33 – Hazardous and Offensive Development

State Environmental Planning Policy No 33 – Hazardous and Offensive Development (SEPP 33) applies to development considered to be a potentially hazardous industry or potentially offensive industry.

A development is considered potentially hazardous and requires a Preliminary Hazard Analysis (PHA) if the storage or transport of dangerous goods exceeds screening thresholds specified in SEPP 33. Review of Boral's *Hazardous Chemicals and Dangerous Goods Register* (Reference: HSEQ-4-04-F01, Version 3) confirms that dangerous goods stored on site do not exceed screening thresholds specified in SEPP 33. Therefore, the quarry operation including proposed modifications, is not considered to be a potentially hazardous industry.

The proposed modification could be deemed 'offensive' due to generation of noise and air quality emissions. Noise and air quality assessments of the proposed modification demonstrate that, with environmental safeguards in place, the proposal will not significantly increase current noise or air quality emissions from the quarry. Therefore, the proposed modification is not considered to be an 'offensive industry'.

4.2.7.3 State Environmental Planning Policy No 55 - Remediation of Land

State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55) provides a state-wide approach to remediation of contaminated land and aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment.

Clause 7 of the SEPP 55 states that a consent authority must not consent to the carrying of development unless it has considered, among other things, whether the land is contaminated.

A search of the EPA contaminated land public records was undertaken on 21 September 2021 for the development site. No listings were identified relating to the development site or surrounds. No contamination

incidents have been reported at the quarry during its operational history. The proposed modification does not involve activities that will increase any existing risks of contamination at the quarry.

4.2.7.4 State Environmental Planning Policy (Koala Habitat Protection) 2020

The practical effect of *State Environmental Planning Policy (Koala Habitat Protection) 2020* (Koala SEPP) is that in consideration of a development application, the consent authority must ensure that approval is not issued without consideration of impacts on koalas or koala habitat. The Koala SEPP applies to land in relation to which a development application has been made when the site has an area of more than one hectare.

Clause 8 (Step 1) of the KSEPP requires consideration of whether the land is potential koala habitat, which is defined as:

> *potential koala habitat means areas of native vegetation where trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.*

Clause 9 (Step 2) of the KSEPP requires consideration of whether the land is core koala habitat, which is defined as:

> *core koala habitat means an area of land with a resident population of koalas, evidenced by attributes such as breeding females, being females with young, and recent sightings of and historical records of a population.*

On the basis that the proposed modification does not involve any disturbance outside the existing area of operations, koalas and their habitat would not be disturbed. No further consideration of the Koala SEPP is required.

4.3 Local legislation and plans

4.3.1 Liverpool Plains Local Environmental Plan 2011

The land subject to the proposal is in the Liverpool Plains Shire LGA and zoned RU1 Primary Production under the *Liverpool Plains Local Environmental Plan 2011* (LEP). The approved uses at the quarry are permissible with consent in the RU1 zone and no change to land use is proposed via this modification.

4.3.2 Liverpool Plains Development Control Plan 2012

The *Liverpool Plains Development Control Plan 2012* (DCP) applies to Liverpool Plains Shire LGA. As the proposed modification relates to an existing extractive industry and does not involve additional disturbance, there are no relevant controls within the DCP.

5 Environmental assessment

5.1 Introduction

Pursuant to Section 4.15(b) of the EP&A Act, this section of the report outlines the likely impacts of that proposed modification, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality. Mitigation measures are also provided where necessary to prevent or minimise environmental impacts.

The following technical studies were completed to inform the environmental assessment of the proposed modification, including:

- Traffic Impact Assessment by Premise
- Surface Water Review by Premise
- Noise Impact Assessment by Assured Environmental
- Air Quality Assessment by Assured Environmental

5.2 Traffic

5.2.1 Introduction

The proposed modification will increase heavy vehicle movements from the site.

To determine the potential for impact, the modification was assessed with reference to *Guide to Traffic Generating Developments* (RTA, 2002). This section provides a summary of the traffic assessment provided in Appendix A.

5.2.2 Existing Environment

5.2.2.1 Access

The quarry is accessed via an intersection on Werris Creek Road and then an approximately 2 km long access road to reach the quarry's administration offices, weighbridge and carparking areas. These facilities are adjacent to the entry point to the main operational area of the quarry.

The quarry access road intersection with Werris Creek Road is currently under construction and is located on the southern side of a straight section of roadway approximately 750 m west of the Werris Creek Road intersection with Stangers Road.

The site access point is depicted in Figure 5.

5.2.2.2 Product transport

Typically the largest vehicles used to transport the quarry product are truck and quad wheel dog trailers with a payload of 38 t. The standard maximum length of the truck and dog combination is 19 m.

From Currabubula Quarry, product is transported via Werris Creek Road either by a left hand turn towards Currabubula or a right hand turn towards Tamworth. The approximate distribution of production output onto Werris Creek Road is:

- Right hand turn towards Tamworth: 70%
- Left hand turn towards Currabubula: 30%

The local road network is depicted in Figure 5.

Figure 5 – Local road network

LEGEND

- Railway
- Road
- Existing area of operations
- Approved quarry pit area (DA 20/2006) from ERM (2006) SEE
- Ancillary works

Premise

CURRABUBULA QUARRY
Local Road Network

5.2.2.3 Existing traffic volumes

Traffic count data

Site specific traffic counts were carried out for the preparation of the Traffic Impact Assessment. Liverpool Plains Shire Council placed traffic classifiers on Werris Creek Road approximately 400 m to the north-west and south-east of the intersection with the quarry access road. The traffic classifier data provided by Council is attached in Appendix A.

Average annual daily traffic (AADT)

Annual Average Daily Traffic (AADT) is defined as the total volume of traffic passing a roadside observation point over a period of a year divided by the number of days in the year.

Based on the traffic classifier counts carried out and an assessment of the data recorded, estimates of the AADT on Werris Creek Road north-west and south-east of the quarry access are provided in Table 9**.**

Table 9 – AADT on Werris Creek Road

Road / Direction	Vehicles per day	Heavy vehicles class 3-12 (%)	85th percentile speed (km/hr)
Werris Creek Road (Right towards Tamworth)	3,070	24.8	104
Werris Creek Road (Left towards Currabubula)	2,914	22.1	107

Existing quarry traffic generation

Based on the current approved operating conditions and full production output (300,000 tpa), the existing heavy vehicle traffic generated by the quarry is summarised in Table 10.

Table 10 – Truck and trip generation for existing approved quarry operations (300,000 tpa)

Production	Daily truck loads	Daily trips	Hourly truck loads	Hourly trips
Current Average Daily Production	27 loads	54 trips	3 loads	6 trips
Current Maximum Production	40 loads	80 trips	4 loads	8 trips
Approved Average Daily Production	40 loads	80 trips	4 loads	8 trips
Approved Maximum Daily Production	75 loads	150 trips	8 loads	16 trips

5.2.3 Impact assessment

5.2.3.1 Heavy vehicle movements

The proposed increase of the annual output from the quarry from 300,000 to 400,000 tpa will increase heavy vehicle movements associated with the quarry operation. There will be no change in the size of the vehicles or product distribution and haulage routes.

Based on the proposed operating conditions and full production output (400,000 tpa), the heavy vehicle traffic that would be generated by the quarry is summarised in Table 11.

Table 11 – Truck and trip generation for 400,000 tpa quarry production

Production	Daily truck loads	Daily trips	Hourly truck loads	Hourly trips
Proposed average daily production	50 loads	100 trips	6 loads	12 trips
Proposed maximum daily production	120 loads	240 trips	15 loads	30 trips

With respect to the proposed pug mill, the following is noted:

- The operation of the proposed pug mill would require approximately 72 loads of stabilment to be delivered per year. Based on the operation of the pug mill for up to 40 weeks per year, the delivery of the stabilment would be less than 2 deliveries per week. Due to the very low vehicle movements, pug mill stabilment deliveries are not included in the above trip generation figures.
- The production output from the pug mill would be included within the total production capacity of 400,000 tpa and therefore, no net additional traffic would be generated by the pug mill activities.

5.2.3.2 Traffic generation

A comparison of the existing approved truck traffic generation rates (at 300,000 tpa production) and the increased production output to 400,000 tpa is provided in Table 12. This includes the net increase in trucks which is important in assessing the potential impacts for the proposed increase in quarry production on the road network.

Table 12 – Net increase in traffic generation

Production	Existing production 300,000 tpa	Proposed production 400,000 tpa	Net increase
Average daily production	40 loads	50 loads	10 loads
	80 trips	100 trips	20 trips
Maximum daily production	75 loads	120 loads	45 loads
	150 trips	240 trips	90 trips
Average hourly production	4 loads	6 loads	2 loads
	8 trips	12 trips	4 trips
Maximum hourly production	8 loads	15 loads	7 loads
	16 trips	30 trips	14 trips

The net increase between the approved 300,000 tpa and the proposed 400,000 tpa quarry output is used to determine any potential impacts on the surrounding road network and in particular, the following:

- Maximum daily production net increase of 45 loads per day;
- Maximum daily production net increase of 90 trips per day;
- Maximum hourly production net increase of 7 loads per hour; and
- Maximum hourly production net increase of 14 trips per hour.

5.2.3.3 Traffic volume

To allow a comparison to be made between the traffic classifier volume data on Werris Creek Road (north-west and south-east of the quarry access) and the proposed maximum net increase in traffic generation by the

increased output from the quarry, the daily and peak hour trips need to be considered in the context of the distribution of haulage from the quarry.

Based on 70% of the quarry output turning right onto Werris Creek Road (towards Tamworth) and 30% turning left onto Werris Creek Road (towards Currabubula), net increased trip distribution has been determined in Table 13.

Table 13 – Distribution of net increase in traffic generation

Road / Direction	Trips per day	Trips per hour
Werris Creek Road – Right towards Tamworth	63	10
Werris Creek Road – Left towards Currabubula	27	4

A comparison of the AADT and peak hour traffic volumes on Werris Creek Road and the maximum net increase in trips generated by the increased production at the quarry are provided in Table 14.

Table 14 – Comparison of Werris Creek Road traffic volumes and the net increase in trips

Road		Existing traffic volume	Proposed traffic volume	Net increase
Werris Creek Road (Right towards Tamworth)	AADT	3,070 veh/day	3,133 veh/day	2.1%
	AM peak hour	239 veh/hour	249 veh/hour	4.2%
	PM peak hour	254 veh/hour	264 veh/hour	3.9%
Werris Creek Road (Left towards Currabubula)	AADT	2,914 veh/day	2,941 veh/day	0.9%
	AM peak hour	226 veh/hour	230 veh/hour	1.8%
	PM peak hour	241 veh/hour	245 veh/hour	1.7%

The proposed modification to the quarry approval would result in a percentage increase in traffic volumes on the surrounding road network ranging from 0.9% (AADT on Werris Creek Road – left towards Currabubula) to 4.2% (AM peak hour on Werris Creek Road – right towards Tamworth). The percentage increase in traffic volume is not considered significant.

The net increase in daily traffic volume and peak hour volume generated by the proposed production modification would be easily absorbed into the surrounding road network with minimal impact on the capacity of the existing traffic streams using the road system.

5.2.3.4 Intersection assessment

The intersection of Werris Creek Road and the quarry access road forms a standard Tee-Intersection and is currently undergoing upgrade works to provide enhanced intersection control for the turning movements of heavy vehicles accessing the quarry.

EMM Consulting prepared an Options Assessment for the quarry intersection and its report dated 8 November 2019 determined parameters for the upgrade of the intersection in compliance with Conditions of Consent No's 26 and 28 of DA51/2017.

Subsequently, construction plans were prepared on behalf of Boral by Pitt & Sherry (Reference: SY19279, dated 18/11/2020) and indicate the following components will be provided at the intersection:

- A deceleration lane and channelised right turn into the quarry access from Werris Creek Road for traffic arriving from Currabubula. The right turn movement is protected by chevron markings on the roadway.
- A straight through lane for traffic travelling from Currabubula to Tamworth.

- Chevron markings on the roadway to transition through traffic back to the original alignment of Werris Creek Road.
- A widening shoulder for traffic turning left into the quarry access from Werris Creek Road for traffic arriving from Tamworth.
- Widened flaring on the quarry access road leg of the intersection to cater for the left turn and right turn swept paths of heavy vehicles using the intersection.
- Line-marking and signage appropriate to the intersection.

The intersection upgrade works commenced in May 2021 and are nearing completion. The works will improve the connection to the road network for the heavy vehicles operated by the quarry and is appropriate to support the proposed increase in production output from the quarry and no additional measures are required.

5.2.4 Mitigation measures

5.2.4.1 Traffic management

The following mitigation measures are proposed to improve traffic management on the road network:

- Install appropriate "Trucks Crossing or Entering" warning signage (W5-22) on both the Currabubula side (north-west) and the Tamworth side (south-east) approaches to the quarry access intersection on Werris Creek Road.
- Bitumen seal the quarry access road from the Limit of Works indicated on the Pitt & Sherry (2020) intersection plans to the gate at the entry to the quarry, which is a length of approximately 200 m. The provision of the additional bitumen seal will assist in reducing dust and debris being tracked onto Werris Creek Road by the operation of the trucks along the haul road from the quarry, particularly in wet weather.

5.2.4.2 Driver code of conduct

Boral has an established Quarry Truck Driver Induction program in place, a Driver Code of Conduct is proposed to update the existing protocol to include:

- A map of the Boral haulage routes, including any critical locations that drivers must be aware of;
- Measures to ensure that drivers are aware of school bus operations; and
- Ensuring truck drivers are educated about the site's environmental management requirements, including not offloading residue and banging tailgates.

5.2.5 Conclusion

The assessment of the additional net traffic generated by the proposed modification, concluded the following:

- The increase in the traffic volumes on the surrounding road network will not change the classifications of the roads under the functional road hierarchy.
- The percentage increases in the traffic volumes on the surrounding road network range from 0.9% for AADT on Werris Creek Road (left towards Currabubula) to 4.2% for the AM peak hour on Werris Creek Road (right towards Tamworth). The percentage increase in traffic volume is not considered significant and the net daily traffic volume and peak hour volume generated by the increased production at the quarry are easily absorbed into the surrounding road network with minimal impact on the capacity of the existing traffic streams using the road system.

- The additional traffic generated by the proposed quarry modification is well below the capacity of the road network at a Level of Service B and all roads would continue to operate satisfactorily.
- The intersection works at the intersection of the quarry and Werris Creek Road that are currently nearing completion will improve the connection to the road network for the heavy vehicles operated by the quarry and is appropriate to support the proposed increase in production output from the quarry.

5.3 Noise

5.3.1 Introduction

Potential noise impacts from the proposed modification were assessed with reference to the following:

- NSW Noise Policy for Industry (2017) (NPfI); and
- NSW *Road Noise Policy* (2011) (RNP).

This section provides a summary of the Noise Impact Assessment prepared by Assured Environmental (AE) and provided in Appendix B.

5.3.2 Existing environment

5.3.2.1 Terrain

The topography of the development site is dominated by three ridges; one to the east, one to the north and one to the west of the site. The existing quarry is situated adjacent to a peak which rises to 630 m above sea level.

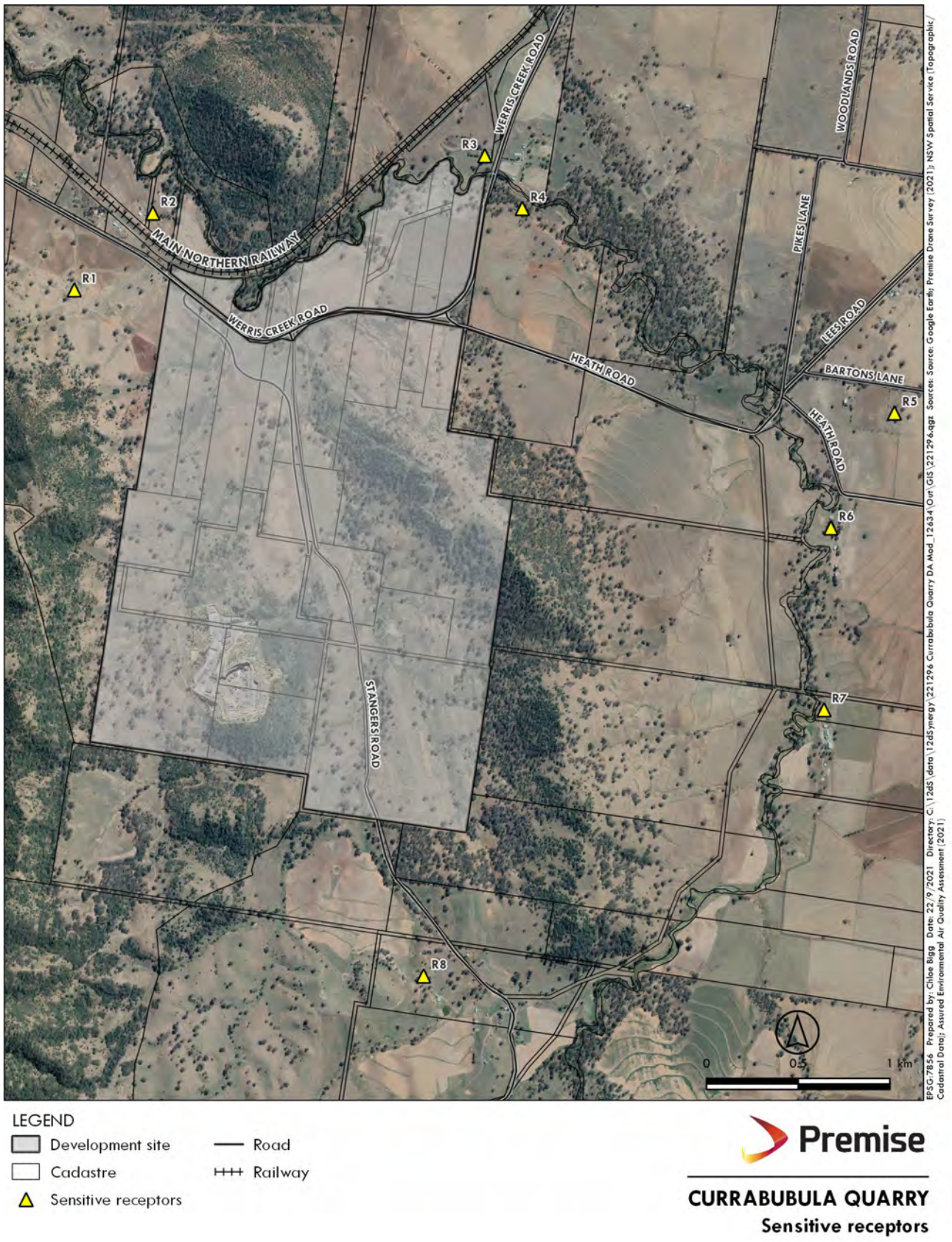
5.3.2.2 Sensitive receptors

Table 15 and Figure 6 present the nearest sensitive receptors to the development site. There are two receptors (R1 and R2) proximate to the haul road at a distance of 550 m and 460 m from the roadway, which joins Werris Creek Road at the north-western corner of the development site.

Table 15 – Sensitive receptors

Receptor	Location		Elevation (m)	Distance from quarry (km)	Land use
	Easting	Northing			
R1	286808	6537874	479	2.3	Dwelling
R2	287196	6538282	457	2.6	Dwelling
R3	289008	6538603	471	3.1	Dwelling
R4	289213	6538314	477	3.0	Dwelling
R5	291236	6537188	492	3.8	Dwelling
R6	290885	6536575	495	3.3	Dwelling
R7	290849	6535587	507	3.2	Dwelling
R8	288669	6534146	553	1.8	Dwelling

Figure 6 – Sensitive receptors



5.3.2.3 Climate

The Tamworth region experiences its hot season during December to March, and cold season from May to August. The warmest month is typically January, with an average maximum temperature of 32°C. The coolest month is July, with an average maximum temperature of 16°C.

5.3.3 Impact assessment – operational noise

5.3.3.1 Meteorology

The NPfI presents guidelines for the consideration of meteorological effects on noise propagation, specifically temperature inversions and/or gradient winds. NPfI provides two options for assessing meteorological effects as detailed in Table 16.

Table 16 – Standard and noise enhancing meteorological conditions

Meteorological conditions	Parameters
Standard conditions	Day/Evening/Night: stability categories[a] A-D with wind speed up to 0.5 m/s at 10 m AGL[b].
Noise enhancing conditions	Day/Evening: stability categories A-D with light winds (up to 3 m/s at 10 m AGL).
	Night: stability categories A-D with light winds (up to 3 m/s at 10 m AGL). And/or stability category F with light winds (up to 2 m/s at 10 m AGL).
a) Pasquill-Gifford Atmospheric Stability Class *b) AGL: Above ground level*	

The following conditions have been modelled:

- Day Periods – Stability class D at 3 m/s representing a worst-case assessment for day-periods; and
- Night Periods - Temperature inversion (stability class F) with light (2 m/s) winds - a worst-case assessment of potential impacts for night periods.

5.3.3.2 Operational assessment criteria

The NPfI establishes two separate noise criteria to meet environmental noise objectives: one to account for intrusive noise and the other to protect the amenity of particular land uses. These two criteria are used to determine project triggers levels against which the proposal will be assessed. The project noise trigger level is a level that, if exceeded, would indicate a potential noise impact on the community, and so 'trigger' a management response.

The derivation of the two sets of criteria are presented below. For residential dwellings, the noise criteria are assessed at the most-affected point (i.e. highest noise level) on or within the property boundary. Where the property boundary is more than 30 m from the house, then the criteria applies at the most-affected point within 30 m of the house.

Intrusiveness noise criteria

The project intrusiveness noise level is intended to protect against significant changes in noise levels as a result of industrial development.

The minimum Rating Background Noise Level (RBL) has been used to define the minimum intrusiveness criteria. The NPfI adds 5 dB to the minimum RBL to derive the intrusiveness criteria. Table 17 presents the derivation of the intrusiveness criteria based on the minimum background noise level established by the NPfI.

Table 17 – Minimum intrusiveness noise criteria

Receptor	Parameters	Period		
		Day	Evening	Night
Minimum Assumed Rating Background Noise Level	RBL (dB(A))	35	30	30
Minimum Intrusiveness Project Noise Levels [a)]	$L_{Aeq,15\text{-minute}}$	40 [b)]	35 [b)]	35 [b)]
a) Receptor noise criteria applied at a location 30 m from the dwelling façade. *b) Minimum background noise level established by the NPfI 2017 + 5 dB.*				

Amenity criteria

The project amenity noise level seeks to protect against cumulative noise impacts from industry and maintain amenity for particular land uses. Review of the surrounding area has identified that there are no other industrial noise sources in the area, and that future industrial development in the area is unlikely. As such, the project amenity noise levels are equivalent to the total industrial noise levels for the indicative noise amenity area, defined as "rural". These are presented in Table 18.

Table 18 – Amenity noise levels

Type of receiver	Indicative noise amenity area	Time of day	Recommended L_{Aeq} noise level (dB(A))	
			Total industrial noise	Project specific
Residence	Rural [a)]	Day	50	50
		Evening	45	45
		Night	40	40
a) Rural amenity noise levels sourced from Table 2.2 of NPfI.				

Project noise trigger levels

The project noise trigger level (PNTL), i.e. the noise criteria considered by the assessment, is the lower value of the project intrusiveness noise level and the project amenity noise level (PANL), after the conversion to LAeq, 15 min dB(A) equivalent level. Table 19 presents the standardised intrusiveness noise level and the project amenity level as derived by adding 3 dB(A) to each period of the day (as described in Section 2.2 of the NPfI).

Table 19 – Project noise trigger level

Type of receiver	Time of day	Standardised $L_{Aeq,15\ min}$ noise level (dB)		
		Intrusiveness noise level	PANL	PNTL
Residence	Day	40	50 + 3 = 53 [a)]	40
	Evening	35	45 + 3 = 48 [a)]	35
	Night	35	40 + 3 = 48 [a)]	35
a) The LAeq is determined over a 15-minute period for the project intrusiveness noise level and over an assessment period (day, evening and night) for the project amenity noise level. This leads to the situation where, because of the different averaging periods, the same numerical value does not necessarily represent the same amount of noise heard by a person for different time periods. To standardise the time periods for the intrusiveness and amenity noise levels, this policy assumes that the LAeq,15min will be taken to be equal to the LAeq, period + 3 decibels (dB), unless robust evidence is provided for an alternative approach for the particular project being considered.				

Sleep disturbance

As the quarry only operates during the daytime period between, sleep disturbance does not have to be assessed.

5.3.3.3 Noise sources

Most noise sources associated with the quarry are generally continuous in nature and are associated with fixed plant items operating in the production process. Short-term or variable sources include operation of the front-end loader (FEL) and truck movements. It should be noted that some sources will be operated on a campaign basis but to account for worst-case scenario, they have been modelled on continuous day-time operation.

Table 20 provides a summary of the noise sources adopted for this assessment and the operational details of each source. Typical sound power levels have been taken from AE's database from verified sources. The location of modelled noise sources is depicted in Figure 7.

Table 20 – Typical sound power levels

Activity	Noise source	Height above ground (m)	Typical sound power levels dB(A)		Time period modelled	Usage (%) during modelled period
			L_{Aeq}	L_{Amax}		
Quarry vehicles	Road Truck (aggregate) [b]	2	105	-	Day	30/hr (240 trips per day)
	Water truck	1.5	105	-	Day	1/hr
	Haul Truck (CAT 770)	2	115	-	Day	100
Mobile Plant	FEL (CAT 972H)	2	112 [a]	-	Day	100
	FEL (Hyundai 770) [b]	2	112 [a]	-	Day	100
	FEL (Komatsu)	2	116 [a]	-	Day	100
	Excavator (Kobelco WA480) [c]	2	111 [a]	-	Day	100
Processing Plant Vehicles	Screen x 2	2	108 [a]	-	Day	100
	Crusher (jaw crusher)	2	115 [a]	-	Day	100
	Crusher (secondary)	2	110 [a]	-	Day	100
	Conveyor x 9	2	89	-	Day	100
	Conveyor Drives x 9	2	100	-	Day	100
	Pugmill	2	110 [a]	-	Day	100
	Pre-Coat plant [d]	1	105 [a]	-	Day	100

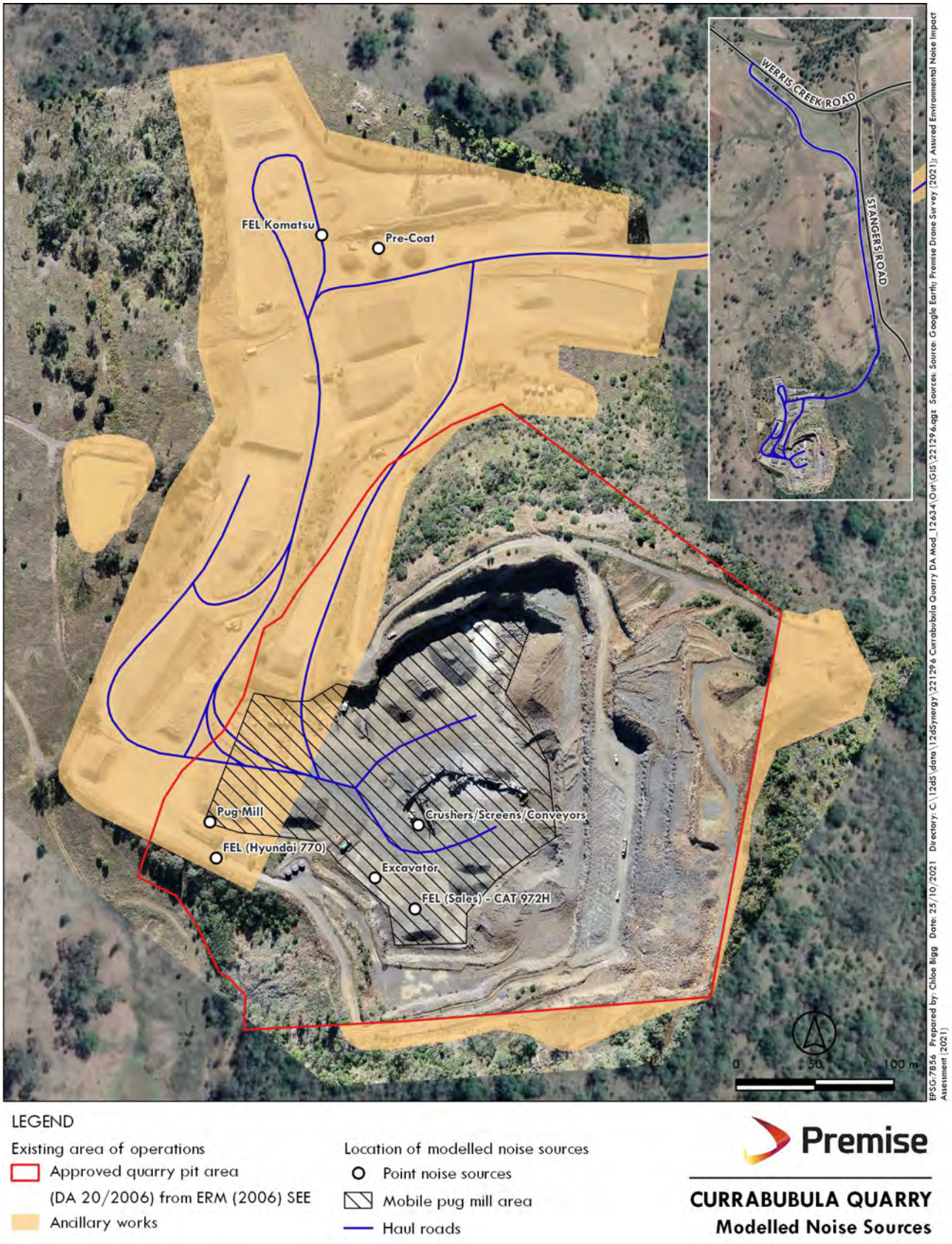
a) Includes +5 dB correction for potential impulsive/tonal characteristics (as per NPfI Fact Sheet C).

b) Include maximum peak hourly truck movements (15 truckloads per hour, 30 movements) and allowance for an additional 2 movements per hour for stabilment trucks.

c) Noted as a backup excavator. Its operation was included as worst-case scenario.

d) The pre-coat plant may be moved as required within the pit.

Figure 7 – Locations of modelled noise sources



5.3.3.4 Predicted noise levels

Table 21 presents predicted receptor noise levels during the operational phase of the quarry with the proposed modifications. Review of the predicted noise levels confirms that compliance with the PNTL criteria established in accordance with the NPfI can be achieved for all receptors during the daytime period under noise enhancing meteorological conditions (refer to Table 16).

Table 21 – Predicted receptor noise levels

Receptor	Predicted operational noise levels $L_{Aeq,\ 15min}$ Day	Project noise trigger level (PNTL) $L_{Aeq,\ 15\ min}$ Day	Compliance
R1	35	40	YES
R2	33	40	YES
R3	20	40	YES
R4	17	40	YES
R5	<10	40	YES
R6	<10	40	YES
R7	<10	40	YES
R8	25	40	YES

5.3.4 Impact assessment – traffic noise

5.3.4.1 Assessment criteria

The sections of Werris Creek Road leading to the development site are classified as an arterial road. Table 22 presents the road noise assessment criteria for this road category as listed in the RNP.

Table 22 – RNP road traffic noise criteria

Road category	Type of project and land use	Assessment criteria
Freeway / arterial / sub-arterial road	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	Day: $L_{Aeq,15\ hour}$ 60 dB(A) Night: $L_{Aeq,9\ hour}$ 55 dB(A) (external)

The RNP states that where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to +2 dB(A), after consideration of all feasible and reasonable noise mitigation and management measures.

5.3.4.2 Traffic volumes

Traffic volumes under the existing production (300,000 tpa) and proposed production (400,000 tpa) are provided in Table 23 and have been derived from the Traffic Impact Assessment provided in Appendix A of this SEE.

Table 23 – Total traffic volumes

Location	Vehicle Counts			
	2021 Vehicle Counts (300,000 tpa)		2021 Vehicle Counts (400,000 tpa)	
	AADT	HV [a)]	HV [a)]	Total
Werris Creek Road – North	3,070	761	761 + 168 [b)] = 953	3,999
Werris Creek Road – South	2,914	644	644 + 72 [c)] = 692	3,630

a) Additional trucks were calculated using maximum values of 240 trips per day based on peak daily quarry production rate (sourced from Table 8 of the project Traffic Impact Assessment, Premise 2021)

b) 70% of maximum traffic generation(240) in Table 11.

c) 30% of maximum traffic generation (240)in Table 11.

5.3.4.3 Predicted noise levels

To the north on Werris Creek Road (towards Tamworth), the nearest residential facades (roadside) that could be affected by an increase in road traffic noise are set back approximately 15 m and 40 m (or greater) from the road in the 60 km/hr and 100 km/hr speed zones respectively. To the south on Werris Creek Road (towards Werris Creek), the nearest residential facades are set back approximately 10 m, 7 m, and 35 m (or greater) from the road in the 50 km/hr, 80 km/hr and 100 km/hr speed zones respectively.

Table 24 presents predicted traffic noise levels.

Table 24 – Predicted traffic noise levels (maximum vehicles)

Road	Distance from road (m)	Speed (km/hr)	Existing traffic noise level $L_{Aeq(Day)}$, dB	Proposed traffic noise level $L_{Aeq(Day)}$, dB	Change (dB)	Compliance
Werris Creek Road – North	≥15	60	58.0	58.5	+ 0.5	YES
	≥40	100	58.2	58.6	+ 0.4	YES
Werris Creek Road – South	≥7	80	65.9	65.9	No change	YES
	≥10	50	59.4	59.4	No change	YES
	≥35	100	59.0	59.0	No change	YES

The RNP recommends a relative increase criterion for residential land uses to be 2 dB(A) above existing traffic noise levels. It is noted that the RNP specifies an $L_{Aeq,15\text{-}hour}$ and $L_{Aeq,9\text{-}hour}$ criteria of 60 dB(A) and 55 dB(A) for the Day (7am to 10 pm) and the Night (10pm to 7am) periods, respectively for traffic-generating developments.

For this assessment, the increase in noise level expected from the increase in daily capacity from the quarry has been calculated. The maximum predicted increase in noise level associated with the increase in vehicle movements is $L_{Aeq,\ 1\ hour}$ 1 dB(A), which complies with the relative increase criterion.

5.3.5 Conclusion

The results of the predictive noise modelling undertaken in the Noise Impact Assessment have determined that compliance with the adopted noise criteria is expected to be achieved without any additional acoustic mitigation for the proposed modification.

5.4 Vibration

5.4.1 Introduction

A vibration assessment has been undertaken to determine potential impacts as a result of vibration generated by plant, equipment and blasts during quarry operations. In particular, the assessment has considered the potential for impacts on both human comfort and structural damage for the nearest residence to the quarry expansion.

This section provides a summary of the vibration assessment, undertaken as part of the Noise Impact Assessment provided in Appendix B.

5.4.2 Existing monitoring

During blasting events, the blasting contractor undertakes measurements for airblast overpressure and ground vibration at the nearest receptor, R8. A review of the most recent blasting events since 2019 has identified that the maximum charge was 400 kg, and the resultant PPV at the receptor was 0.1 mm/s, with an airblast of 104 dB(Z).

Note: dB(Z) is a measure of the overall noise level of sound across the audible spectrum with a "Z" frequency weighting which is effectively the un-weighted signal.

No vibration monitoring has been undertaken for non-blast events. Typically, vibration from mobile plant and other quarry activities are very localised and as such, a distance separation calculation was undertaken based on measurements by US Department of Transport. Typically, no vibration is felt beyond 100 m from the source.

5.4.3 Impact assessment

5.4.3.1 Assessment criteria

Criteria for vibration from non-blasting sources

The vibration criteria presented in the *Environmental Noise Management – Assessing Vibration: A Technical Guideline* (DECCW, 2006). Table 25 and Table 26 present the criteria for continuous and impulsive vibration and intermittent vibration, respectively.

Table 25 – Continuous and impulsive vibration criteria for residences – peak velocity

Location	Vibration Type	Preferred Limit (mm/s)	Maximum Limit (mm/s)
Residences	Continuous	0.28	0.56
	Impulsive	8.6	17

Table 26 – Intermittent vibration criteria for residences

Location	Assessment Period	Preferred Limit (mm/s)	Maximum Limit (mm/s)
Residences	Day-time	0.20	0.40

The above criteria are suitable for assessing human annoyance in response to vibration levels. In order to assess potential damage to buildings, reference has been made to British Standard *BS 7385-2: 1993 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground borne vibration.*

Table 27 presents vibration criteria for assessing the potential for building damage.

Table 27 – Transient vibration guide values for cosmetic damage

Type of Building	Peak Particle Velocity (mm/s)	
	4 Hz to 15 Hz	15 Hz and above
Unreinforced or light framed structures – residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Blasting criteria

Blasting criteria are specified in Section 5 of EPL 5846, reproduced below. It is not proposed to change the Blasting Conditions in the EPL as a result of the proposed modification.

L5.1 The overpressure level from blasting operations at the premises must not exceed 120dB (Lin Peak) at any time and at any point within 30 metres of any non-project related residential building or other noise sensitive location. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.

L5.2 The overpressure level from blasting operations at the premises must not exceed 115dB (Lin Peak) for more than five per cent of the total number of blasts over each reporting period, or one blast in each reporting period, whichever is greater at any time and at any point within 30 metres of any non-project related residential building or other noise sensitive location. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.

L5.3 Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 10mm/sec at any time and at any point within 3.5 metres of any non-project related residential building or other noise sensitive location. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.

L5.4 Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 5mm/sec for more than five per cent of the total number of blasts over each reporting period, or one blast in each reporting period, whichever is greater at any point within 3.5 metres of any non-project related residential building or other noise sensitive location. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.

L5.5 To determine compliance with condition(s) L4.1, L4.2, L4.3 and L4.4: a) Airblast overpressure and ground vibration levels must be measured and electronically recorded at the nearest non-project related premises [exact location to be confirmed] for all blasts carried out in or on the premises; and b) Instrumentation used to measure the airblast overpressure and ground vibration levels must meet the requirements of Australian Standard AS 2187.2-2006.

L5.6 Blasting in or on the premises must only be carried out between 0900 hours and 1500 hours, Monday to Friday, and 0900 hours and 1400 hours on Saturday. Blasting in or on the premises must not take place on Sundays or Public Holidays without the prior approval of the EPA.

L5.7 The hours during which blasting is permitted may be varied by the EPA upon consideration of the impact any variation may have on the amenity of the residents in the locality.

L5.8 Blasting at the premises is limited to 1 blast on each day on which blasting is permitted.

L5.9 Additional blasts are permitted where it is demonstrated to be necessary for compelling safety reasons and the EPA and neighbours have been notified of the intended blast prior to the additional blast being fired.

L5.10 Blasting must not take place when there is heavy cloud cover, severe temperature inversion, or winds of velocity greater then10 metres/second blowing towards residences not associated with the quarry.

5.4.3.2 Vibration sources

Table 28 provides indicative vibration source levels for the "vibration-significant equipment" used at the quarry. The processing plant is not considered "vibration-significant equipment" as almost all vibration energy associated with its operation is directed towards performing its primary function and avoiding the generation of high levels of ground vibration.

Table 28 – Intermittent vibration sources

Source	Preferred limit (mm/s)	Source
Loaded trucks (rough surface)	5	USA DT [a)]
Loaded trucks (smooth surface)	1 – 2	USA DT [a)]
Excavator	2.5 – 4	DECCW
Loader	6 – 8	USA DT [a)]
a) Transit Noise and Vibration Impact Assessment, US Department of Transportation, May 2006.		

5.4.3.3 Operational impacts

Based on the vibration source levels at 10 m (presented in Table 28), peak particle velocities (PPV) have been predicted at various separation distances. Table 29 presents PPV predictions for the vibration significant equipment.

Table 29 – Predicted peak particle velocity at sensitive receptors

Distance from source	Predicted peak particle velocity (mm/s)			
	Loaded trucks (rough surface)	Loaded trucks (smooth surface)	Excavator	Loader
10	5	1 - 2	2.5 - 4	6 - 8
20	1.77	0.35 - 0.71	0.88 - 1.41	2.12 - 2.83
30	0.96	0.19 - 0.38	0.48 - 0.77	1.15 - 1.54

Distance from source	Predicted peak particle velocity (mm/s)			
	Loaded trucks (rough surface)	Loaded trucks (smooth surface)	Excavator	Loader
40	0.63	0.13 - 0.25	0.31 - 0.5	0.75 - 1
50	0.45	0.09 - 0.18	0.22 - 0.36	0.54 - 0.72
60	0.34	0.07 – 0.14	0.17 – 0.27	0.41 – 0.54
80	0.22	0.04 – 0.09	0.11 – 0.18	0.27 – 0.35
100	0.16	0.03 - 0.06	0.08 - 0.13	0.19 - 0.25
150	0.09	0.02 - 0.03	0.04 - 0.07	0.1 - 0.14
200	0.06	0.01 - 0.02	0.03 - 0.04	0.07 - 0.09
250	0.04	0.01 - 0.02	0.02 - 0.03	0.05 - 0.06
Type	Intermittent	Intermittent	Continuous	Continuous
Nuisance criteria	8.6 (preferred) / 17 (max)		0.28 (preferred) / 0.56 (max)	
Building criteria	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz 20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above			

The predicted vibration levels presented in Table 29 indicate compliance with the continuous preferred vibration nuisance criteria for locations at a separation distance of 40-80 m. As the closest receptors (R1 is the closest receptor at 2.3 km from the quarry) are beyond these distances, nuisance vibration criteria will be achieved.

Haul truck movements (on rough surfaces) at distances of >50 m is predicted to comply within the maximum continuous criteria of 0.56 mm/s. This comparison with the continuous criteria (as a conservative approach) indicates that vibration levels associated with operation of the quarry are not considered to be significant (which is expected given the significant separation distances).

5.4.3.4 Blasting impacts

Airblast overpressure

A conservative maximum instantaneous charge (MIC) of 1000 kg (which is 600 kg higher than 2019 blast MIC) results in predicted compliance with the EPL criterion of 115 dB (Lin Peak) at all nearby receptors.

Ground vibration

Applying the MIC as determined from the air blast overpressure calculation of 1000 kg, the ground vibration level predicted to occur at receptor R8 is 2 mm/s, which complies with the criterion of 5 mm/sec.

It should be noted however that the impacts of blasting are dependent on-site specific factors including the blast management techniques, ground conditions and geological strata types and locations. Given this, the blast reports from Orica have showed that the maximum MIC used is 400 kg.

5.4.4 Conclusion

The vibration impact assessment indicates that the proposed quarry operations are capable of complying with the applicable vibration criteria established by the existing EPL. The results of the screening assessment have determined that compliance with the adopted criteria for ground vibration and airblast are expected to be achieved with a MIC size less than 1000 kg. Blasting at the quarry will be able to continue to achieve compliance with vibration and airblast limits using different sizes of MIC along with a combination of appropriate site-specific blast design parameters.

5.5 Air quality

5.5.1 Introduction

Potential air quality impacts from the proposed modification were assessed in accordance with a Level 2 assessment methodology detailed in *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (2017).

This section provides a summary of the air quality assessment which is in Appendix C.

5.5.2 Background air quality

5.5.2.1 TSP, PM_{10} and $PM_{2.5}$

Background air quality data has been obtained from the NSW EPA. The nearest and most representative monitoring station is Tamworth, where PM_{10} and $PM_{2.5}$ are monitored. A summary of background air quality is provided in Table 30.

Table 30 – Summary of background concentrations

Compound	Averaging period	Parameter	Concentration	EPA site
Total Suspended Particulates (TSP)	1 year	Average	30.8 µg/m^3	Calculated from PM_{10}
PM_{10}	24 hours	70th percentile	17.7 µg/m^3	Tamworth
	1 year	Average	15.1 µg/m^3	
$PM_{2.5}$	24 hours	70th percentile	9.3 µg/m^3	Tamworth

5.5.2.2 Dust deposition

Boral undertake dust deposition monitoring at two locations at the development site, including the weighbridge, the site exit to Werris Creek Road, with a third monitoring location at the nearby receptor Bellbrook Farm (Receptor R8). Dust deposition monitoring samples are collected on a 30±2 days sampling regime, data results of this sampling regime were provided by Boral for the purposes of this assessment and covered the period between November 2019 and November 2020.

The monitoring conducted at receptor R8 is geographically the closest to the quarry and is the only receptor location where dust deposition levels are monitored. The dust deposition levels are considered suitable for all nearby receptors. The average deposition levels recorded at Receptor 8 are 2.5 g/m^2/month, which is below the NSW EPA assessment criteria of 4 g/m^2/month.

5.5.3 Impact assessment

5.5.3.1 Assessment criteria

For the purposes of the assessment, the throughput for the quarry (including the pugmill) has been assessed as 400,000 tpa.

Assessment criteria are presented in Table 31. Air quality criteria has been selected based on the requirements of the '*Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*'.

Table 31 – Approved methods ground level concentration criteria

Compound	Air quality criteria (µg/m³)	Averaging time
TSP	90	Annual
PM_{10}	50	24-hour
	25	Annual
PM_{25}	25	24-hour
	8	Annual
Deposited dust	2 g/m²/month (increment) 4 g/m²/month (total)	Month

5.5.3.2 Sources of emissions

Dust emissions from the quarry are fugitive particulates TSP, PM_{10} and $PM_{2.5}$. The main sources of fugitive particulates are from the following sources:

- drill and blasting activities;
- extraction and handling of blasted materials;
- crushing, screening, and conveying of material at the mobile crushing plant;
- pugmill operations;
- pre-coat plant;
- wheel-generated dust from vehicle movements across unpaved and paved roads; and
- wind erosion from stockpiles and exposed surfaces.

5.5.3.3 Estimate of emissions

Emission estimates for the above activities have been derived from the *USEPA AP-42: Compilation of Air Emission Factors* (US Environmental Protection Agency, Various Dates) and National Pollution Inventory (NPI) *Emission Estimation Technique Manual for Mining* (2012).

Table 32 presents the emission rates for the proposed increase in production and pugmill operations.

Table 32 – Summary of emission rates

Activity	Emission rate (kg/annum)		
	TSP	PM_{10}	$PM_{2.5}$
Drill	944	491	28
Blast	134	70	4
Truck unloading to Materials Storage Area	866	410	62
Front end loader (FEL) in Materials Storage Area	866	410	62
Unpaved Road - Material Storage Area	19,046	5,337	801
Trucks Loading in Pit	866	410	62
Screening (5 points)	25,000	8,600	581
Crushing (3 points)	3240	432	80
Stockpile Loading	600	220	62

Activity	Emission rate (kg/annum)		
	TSP	PM_{10}	$PM_{2.5}$
Trucks loading from stockpiles	600	220	62
Paved Roads - Product Trucks (exit to weighbridge)	4,486	861	208
Paved Roads - Product Trucks (weighbridge to stockpile)	8,392	1,611	390
Pugmill - Unloading Aggregate	108	51	8
Pugmill - Loading Trucks	41	19	3
Pugmill – Pneumatic loading of silos	9	5	0.7
Paved Roads - Stabilment (exit to weighbridge)	56	11	3
Paved Roads - Stabilment (weighbridge to stockpile)	2.1	0.4	0.1
Unpaved Road - Stabilment Trucks	103	29	4
Wind erosion area exposed area	16,837	8,418	631
Wind erosion on stockpiles	15	7	1
Total	**82,203**	**27,607**	**3,052**

5.5.3.4 Impacts

A summary of the predicted ground level concentrations at the sensitive receptors and at the development site boundary is provided in Table 33, demonstrating that predicted concentrations comply at all sensitive receptors and at the site boundary.

Table 33 – Summary of maximum predicted ground level concentrations

Pollutant	Averaging period	Predicted ground level concentration (µg/m³)		Criteria (µg/m3)	Compliant at receptor	Compliant at boundary
		Discrete receptor	Site boundary			
TSP	Annual	31.8	32.1	90	YES	YES
PM_{10}	24 hours	39.2	39.3	50	YES	YES
	Annual	15.8	16.0	25	YES	YES
$PM_{2.5}$	24 hours	11.33	11.32	25	YES	YES
	Annual	4.49	4.50	8	YES	YES
Dust	Month	2.6	2.6	4	YES	YES

5.5.4 Conclusion

An air quality assessment was completed by EMM in 2017, at the time the quarry was extracting and processing up to 300,000 tpa. While a complete profile of fugitive particulates is not available, it is acknowledged that the proposed modification would result in an increase of the PM_{10} emission rate from19,238 kg/annum to 27,607 kg/annum. It is reasonable to assume that the increase would be reflected across all particulate types.

Notwithstanding the modelled increased, the results of the Air Quality Assessment demonstrate that the proposed development is capable of compliance with the assessment criteria listed in the Approved Methods at all sensitive receptors, which indicates the existing dust mitigation measures are sufficient.

The proposed modification is not expected to adversely impact on the air environment of nearby sensitive uses.

5.6 Surface water

5.6.1 Existing environment

Around the quarry, natural drainage flows away from the hill in all directions, ultimately draining into Sandy Creek which flows north into Currabubula Creek approximately 1.8 km north of the quarry. The local surface water environment is depicted in Figure 8, including Strahler stream orders.

The watercourse mapped downstream of the existing sediment basin is a 1st order Strahler stream that flows into a 3rd order unnamed Strahler stream. Apart from the existing sediment basin, there is one other dam located within the development site which is approximately 60 m south-west of the approved quarry pit area, as shown in Figure 8. This dam is not used by the quarry operation and only collects clean water from the surrounding catchment.

The existing sediment basin and embankment is depicted in Figure 9.

Figure 8 – Surface water

Figure 9 – Existing sediment basin and embankment

5.6.2 Existing surface water management

5.6.2.1 Existing water management plan

A Water Management Plan (WMP), prepared in March 2016, is implemented at the quarry. The WMP documents the locations and types of structures used to divert clean water around the working areas of the quarry and structures used to manage water collected in the working areas of the quarry.

5.6.2.2 Existing surface water management system

The existing quarry surface water management system includes a series of clean and dirty water drains and a sediment basin. The sediment basin is positioned to capture the dirty water runoff from disturbed areas including active quarry areas, unsealed roads and material stockpiles. Some captured water is reused from the sediment basin for on-site dust suppression and product processing. Excess water discharges off-site to an unnamed watercourse. The discharge point is licensed under EPL 5846 (EPL point 1). Releases from the sediment basin are managed to achieve the EPL water concentration limits.

The catchment area draining to the sediment basin is 16.79 ha.

5.6.2.3 Water balance

A water balance model is presented in Appendix D. Results are summarised in Table 34.

DECC (2008) guidelines for a 90th percentile design basis should have an average number of two (2) to four (4) spill events per year. As the average number of spill events from the existing sediment basin exceeds four (4) per year, it is proposed to increase the sediment basin volume by raising the embankment by one (1) metre. This will reduce the spill frequency and increase basin airspace, enhancing compliance with EPL Conditions L2.4 and L2.5 – refer to Section 4.2.3.

The proposed location of the embankment works are shown in Figure 10.

Table 34 – Summary of water balance results

Parameter	Existing Operations (300,000 tpa) and Sediment Basin	Existing Operations (400,000 tpa) with increased sediment basin capacity
Sediment basin capacity (ML)	3.2	5.2
Average annual site run-off (ML/year)	31	31 Note: there is no change as there is no change to the quarry catchment area
Reuse from sediment basin (ML/year)	16.3	19.8
Average annual bore use (ML/year)	5.1	5.6
Average spill events per year	6	4

The surface water review results demonstrate that the capacity of the sediment basin needs to be increased from 3.2 ML to 5.2 ML to reduce the number of spill events per year, consistent with the design guidelines for a 90th percentile design basis (DECC, 2008) and to enhance compliance with EPL requirements.

Figure 10 – Existing sediment basin embankment

5.6.3 Impact assessment

Raising the sediment basin embankment by 1 m will reduce the spill frequency by increasing basin airspace, and therefore enhance compliance with EPA requirements. No change to the existing area of operations is proposed to complete the embankment works.

As stated in Section 4.2.6, the increased basin capacity would not result in the MHRDC being exceeded and therefore, no water supply work approval is required and significant adverse impacts to downstream water resources is considered unlikely.

5.7 Heritage

5.7.1 Existing Environment

5.7.1.1 Historic heritage

The original EIS states there are no known European heritage sites in proximity to the development site. A review of the following desktop sources confirms there are no known historic heritage sites at or near the development site based on the:

- State Heritage Inventory;
- NSW Planning Portal; and
- Protected Matters Search Tool.

5.7.1.2 Aboriginal heritage

A review of the following desktop sources and previous assessments confirms that no known Aboriginal heritage sites would be impacted by the proposed modification:

- Aboriginal Heritage Information Management System (AHIMS); and
- The original EIS and Aboriginal heritage assessments by Gaynor and Wilson (1995 and 1996).

5.8 Other matters

5.8.1 Cumulative Impacts

A review of other extractive industries and mines within 50 km of the Currabubula Quarry identified the following sites and separation distances from Currabubula Quarry:

- BMR Quarry – 17 km north-west
- Zeolite Australia Quarry – 17 km south-west
- Werris Creek Coal Mine – 17 km south-west
- Willow Tree Gravels – 43 km south
- Ardglen Quarry – 50 km south

A review of the NSW Department of Planning, Industry and Environment (DPIE) Major Projects portal identified the closest State Significant Development (SSD) project as the existing Werris Creek Coal Mine and Middlebrook Solar Farm which is proposed approximately 20 km east of Currabubula Quarry.

The Major Projects Portal provides details for approved modifications at Werris Creek Coal Mine, including:

- Mod 1 – void water dam
- Mod 2 – related to overburden emplacement, dry separation plant and irrigation
- Mod 3 – involved a correction to the conditions to reflect the already approved project layout
- Mod 4 – related to disposal of heavy plant waste tyres

Based on review of available information on the Major Projects portal, the above modifications only relate to operations at the existing Werris Creek Mine. The modifications are considered unlikely to affect or interact significantly with Currabubula Quarry operations.

Review of available information on the Major Projects Portal for Middlebrook Solar Farm indicates that access is likely to be gained via the New England Highway and Middlebrook Road and is therefore unlikely to affect or interact with Currabubula Quarry operations.

Given the separation of the quarry from other major projects and mines/extractive industries, the existing and increasing demand for product, and the absence of any significant adverse impacts to traffic, noise or air quality under the 400,000 tpa production, the proposed modification is not considered likely to result in cumulative impacts such as:

- individual impacts so close in time that the effects of one are not dissipated before the next (time crowded effects);
- individual impacts so close in space that the effects overlap (space crowded effects);
- repetitive, often minor impacts eroding environmental conditions (nibbling effects); or
- different types of disturbances interacting to produce an effect which is greater or different than the sum of the separate effects (synergistic effects).

5.8.2 Visual

Visibility of the quarry is limited from receptors and Werris Creek Road due to presence of vegetation around the quarry.

The 2006 SEE determined that the extension of the quarry workings would have a minor additional impact and that this would be reduced with additional tree plantings. Plantings are an ongoing activity undertaken in consultation with neighbours.

The proposed modification, no disturbance is to occur outside the existing area of operations.

5.8.3 Biodiversity

The proposed modification including the works to the sediment basin, will not increase the area disturbance beyond the existing operations area. Therefore, the proposed modification is will not significantly affect threatened species or ecological communities or their habitats.

5.8.4 Soil

The proposed modification involves minimal earth moving or forming works, limited to the placement of suitable materials (including soil) to raise the existing sediment basin embankment by one (1) metre.

The proposed modification would be subject to detailed design with an appropriate erosion and sediment control plan prepared to ensure the works do not result in erosion or sedimentation. These matters can be controlled through existing conditions of consent, specifically Condition No. 4 and Condition 35 provided below.

4. All dams constructed on the site for the purpose of containment of sediment and/or water storage shall be designed and constructed to acceptable standards, guidelines and specifications of the Department of Land and Water Conservation. Such design shall incorporate plans at half metre contour intervals and at a suitable scale.

35. The applicant shall prepare and submit for Council's approval a plan of management in consultation with, but not limited to, other government authorities by the 31st January every 5 years from the date of this consent. The applicant shall meet the cost of the annual plan of management.

5.8.5 Natural hazards

The development site contains mapped bushfire prone land but is not known to be affected by other natural hazards such as acid sulphate soils, salinity, naturally occurring asbestos, flooding or landslide risks.

5.8.5.1 Bushfire

The site is identified as being bushfire prone land, with risk levels ranging from medium to high dependant on the density of vegetation.

The quarry operation itself, is considered to be present a low risk as a source of bushfire as quarry activities are contained within the quarry pit and therefore separated from areas of vegetation. Notwithstanding this, the operation and staff may be at risk of bushfire.

Notwithstanding the above, potential bushfire impacts have been assessed under the previous development application and modifications with mitigation measures implemented at the site. Given the proposed development does not alter the layout of the site or the nature of operations, there is no change to previously assessed impacts.

5.8.6 Groundwater

The original EIS stated that the quarry would be unlikely to intercept groundwater and the proposed modification would not change this as no expansion of the quarry area (including deeper excavation) is proposed. In addition, no groundwater has been intercepted during quarry operations to date.

5.8.7 Rehabilitation

The proposed modification does not alter the existing area of operations, including extent of the quarry pit. Therefore, no amendments are required to the adopted rehabilitation plan.

Rehabilitation will continue be undertaken in accordance with the relevant conditions of consent and the rehabilitation section of *Currabubula Quarry Plan of Management 1998*.

5.8.8 Waste

The proposed modification to increase production will result in a minor increase of waste material (filler). There is existing storage space with the established stockpile areas to store material on site for future use as fill or rehabilitation material on site.

Other general waste generated by the quarry operation is not anticipated to significantly increase as a result of the proposed modification and would continue to be managed in accordance with an existing Waste Management Plan.

5.8.9 Servicing

Existing services to the site are sufficient to support the proposed modification. No augmentation of services is proposed.

5.8.10 Socio-economic

The proposed modification will not increase permanent onsite staffing numbers. However, it will contribute to continued direct employment for up to four (4) people connected to the onsite operations combined with indirect employment opportunities that result from the continued and expanded operations.

The increased production rate may contribute to an increase in contract truck drivers associated with additional product truck movements.

The proposed modification will facilitate the entry of more construction material into the expanding regional construction sector. This will have the benefit of facilitating associated employment and indirect economic benefits associated with the increase in construction activity.

6 Justification and conclusion

6.1 Introduction

The proposed modification is to:

- increase the maximum production rate at the quarry from 300,000 tpa to 400,000 tpa;
- operate a mobile pug mill within the quarry pit to produce a maximum of 50,000 tpa; and
- increase the capacity of the existing sediment basin.

The proposed modification does not propose any alteration to the current existing area of operations, the boundary of the site or the proposed final land uses of the rehabilitated site.

6.2 Strategic justification

The proposed modification is considered to be consistent with relevant strategic plans, including the following:

- increased production will improve supply of materials to meet demand for transport infrastructure projects, including those projects mapped in the *Projects and Initiatives Map* as part of the TfNSW *Future Transport 2056 Strategy* including 41 infrastructure projects (38 in progress, 2 yet to commence and 1 under investigation) in the North West New England region; and
- increased production supports relevant goals within the *New England North West Regional Plan 2036*, in particular:
  - Goal 1 – A strong and dynamic regional economy, specifically Direction 4 – Sustainably manage mineral resources. The Regional Plan notes the resources available in the region for major infrastructure projects and the need to avoid sterilisation of those resources, whilst also minimising negative impacts to the environment and community. The proposed modification is considered to promote the sustainable management of the hard rock resource as it would not result in disturbance outside the existing area of operations and would continue to extract available resources from the existing approved quarry, which is also well separated from sensitive land uses and receptors.
  - Goal 3 – Strong infrastructure and transport networks for a connected future, specifically Direction 14 – Enhance transport and infrastructure networks. Increasing annual production and operating a mobile pug mill will allow Boral to meet current market demand and requirements for aggregate products used to construct and enhance transport networks.

6.3 Site suitability

The site is considered suitable for the proposed modification for the following reasons:

- the quarry produces a very high quality aggregate which is suitable for most general and specialised engineering applications. The aggregate, which has a particularly low shrinkage, is suitable for use in high strength concrete as well as asphalt, bitumen sealing and a full range of road bases;
- the quarry has been operating with minimal complaints from neighbouring properties for about 20 years;
- no concerns were raised about the proposed modification during community consultation sessions;
- the quarry is well screened from neighbouring properties by topography and vegetation;
- the proposed modification would not require any change to existing operations in terms of employment levels, infrastructure, operating hours, or quarry pit size and depth; and
- the remaining resource can be extracted with minimal environmental impacts. No clearing of vegetation is required and other environmental impacts, such as traffic, air quality, surface water, noise and vibration are not considered likely to result in significant adverse impacts.

6.4 Submissions

Council has advised that adjoining properties will be notified of the application to modify the development consent. Any submissions made on the application will be considered by Council in their determination of the application.

6.5 Public interest

The proposed modification is considered to be in the public interest as it will enable increased supply of high quality and competitively priced construction materials into the expanding regional construction industry.

The socio-economic benefits of the quarry outputs and employment will continue and be of benefit to the local and regional economies without causing any significant adverse impacts.

6.6 Conclusion

The proposed modification seeks to increase the rate of extraction from 300,000 tpa to 400,000 tpa, operate a mobile pug mill and modify the existing sediment basin. This SEE describes and assesses the proposed modification against the relevant provisions of Section 4.15 of the EP&A Act.

The proposed modification is considered to be substantially the same as the originally approved development as it does not result in any change to the material nature of the development and no changes are proposed to the existing area of operations. The relevant environmental impacts, including numerical factors, associated with the proposed modification have been assessed and are not likely to result in significant adverse impacts.

The proposed modification is in accordance with the requirements of relevant planning instruments, policy and guidelines and is not considered likely to result in significant adverse environmental impacts to the site and surrounds where environmental management measures and the specific mitigation measures in this SEE are implemented effectively.

References

Australian Government Department of Agriculture, Water and the Environment (DAWE), (n.d.). Protected Matters Search Tool. Accessed 21 September 2021 via http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf

Boral Resources (Country) Pty Ltd, (2016). Currabubula Quarry Water Management Plan.

DECC, (2008). Managing Urban Stormwater – Soils and Construction Volume 2E Mines and Quarries. Available via https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Water/Water-quality/managing-urban-stormwater-soils-construction-volume-2e-mines-quarries-08208.pdf

EMM Consulting, (2017). Statement of Environmental Effects. Currabubula Quarry | Modification to development consent. Prepared for Boral Resources (Country) Pty Limited.

Landcom, (2004). Managing Urban Stormwater – Soils and Construction – Volume 1. Available via https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Water/Water-quality/managing-urban-stormwater-soils-construction-volume-1-fourth-edition.pdf

Liverpool Plains Shire Council, (2017). Modification to Notice of determination of a development application. Development application number 51/2017.

Liverpool Plains Shire Council, (2017). Modification to Notice of determination of a development application. Development application number 51/2017-02.

NSW Department of Planning and Environment (DPE), (2017). New England North West Regional Plan 2036 . Available via https://www.planning.nsw.gov.au/-/media/Files/DPE/Plans-and-policies/new-england-north-west-final-regional-plan-2017-09.pdf

NSW Department of Urban Affairs and Planning (DUAP), (2001). Crime prevention and the assessment of development applications – Guidelines under section 79C of the Environmental Planning and Assessment Act 1979. Available via https://www.police.nsw.gov.au/__data/assets/pdf_file/0003/9390/duapguide_s79c.pdf

NSW Office of Environment and Heritage (OEH), (2021). Aboriginal Heritage Information Management System (AHIMS). Accessed 13 July 2021 via https://www.environment.nsw.gov.au/awssapp/

Transport for NSW (TfNSW), (n.d.). Projects and initiatives map (part of the TfNSW Future Transport 2056 Strategy. Accessed 23 September 2021 via https://future.transport.nsw.gov.au/projects-and-initiatives-map

Valerie Smith & Associates, (1995). Environmental Impact Statement for a Proposed Hard Rock Quarry, Stangers Road, Currabubula. Prepared for Singhs Ready Mixed Concrete Pty Ltd.

WaterNSW, (2017). Do I need a licence (Guidance Material). Available via https://www.waternsw.com.au/__data/assets/pdf_file/0003/128352/2.-Dams-in-NSW-Do-you-need-a-licence-V2.pdf

APPENDIX A

Traffic Impact Assessment

Premise

Boral Resources (Country) Pty Ltd

Currabubula Quarry

Traffic Impact Assessment

Report No: 221296_TIA_001
Rev: C
11 November 2021

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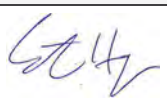
Stephen Hoynes		Chloe Bigg		Chloe Bigg	

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1 Introduction

1.1 Purpose

Boral Resources (Country) Pty Limited (Boral) is seeking to modify the existing development consent (DA51/2017) for Currabubula Quarry to increase production from 300,000 to 400,000 tonnes per annum (tpa), operate a mobile pug mill and increase capacity of the existing sediment basin with the view to reducing the spill frequency.

The modification to operations is proposed to respond to a rapid increase in demand for quarry product over the last 15 months owing to stimulus investment for road infrastructure, particularly from rural councils and Transport for NSW (TfNSW).

This Traffic Impact Assessment assesses the potential traffic impacts of the proposed modification and has been prepared in accordance with:

- Response to consultation from Transport for NSW (TfNSW) on 10 June 2021; and
- the Roads and Traffic Authority (RTA), now Roads and Maritime Services (RMS) *Guide to Traffic Generating Developments* (2002), which is the relevant guidance for traffic impact assessments in NSW.

The basis and scope of this Traffic Impact Assessment is detailed in Section 1.3 of this report.

1.2 The quarry

Boral operates Currabubula Quarry, a hard rock quarry located at 3716 Werris Creek Road, approximately 28 kilometres (km) south west of Tamworth and 4 km south east of Currabubula, within the Liverpool Plains Shire Local Government Area (LGA).

The quarry is accessed via an intersection on Werris Creek Road and then an approximately 2 km long access road to reach the quarry's administration offices, weighbridge and carparking areas. These facilities are adjacent to the entry point to the main operational area of the quarry. The local road network is depicted in Figure 1 overleaf.

The quarry access intersection on Werris Creek Road is currently under construction and is located on the southern side of a straight section of roadway approximately 750 m west of the Werris Creek Road intersection with Stangers Road.

The quarry is located on land owned by Boral, including:

- Lots 1 – 12 on DP1114811;
- Lots 5-11 and 17-19 on DP114714; and
- Lots 70, 92, 97-98, 211 and 236 on DP751011.

Figure 1 – Local road network

LEGEND

- Railway
- Road
- Existing area of operations
- Approved quarry pit area (DA 20/2006) from ERM (2006) SEE
- Ancillary works

Premise

CURRABUBULA QUARRY
Local Road Network

1.3 Scope

Schedule 3 of *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) classifies developments based upon the potential to generate additional traffic onto the surrounding road network.

Developments listed in Schedule 3 of ISEPP require referral to Transport for NSW (TfNSW) by the consent authority. The consent authority is required to take into consideration any submission that TfNSW provides in response to the notice of the development. However, the proposed expansion of the Currabubula Quarry is not classified under Schedule 3 of the ISEPP.

Given the proposed increase in annual production to 400,000 tpa and the quarry's access to a classified (Regional) road, the proponent required the preparation of a Traffic Impact Assessment to support the proposed consent modification.

In response to consultation, TfNSW state the following requirements for the Traffic Impact Assessment:

> *In accordance with Clause 16 of the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007, TfNSW will be given the opportunity to review and provide comment on the proposed modification. As such, both the SOEE and any traffic studies are referred to us for review and comment.*
>
> *As our interests include the safety and efficiency of the transport network, the needs of our customers and the integration of land use and transport in accordance with Future Transport Strategy 2056, these matters should be clearly addressed in the Statement of Environmental Effects (SOEE) and Traffic Impact Assessment (TIA).*

TfNSW also requested that the status of required intersection upgrades (relating to Conditions 26 and 28 of DA51/2017) is confirmed in the TIA.

On this basis, this Traffic Impact Assessment addresses the following:

- Existing traffic conditions, including details of intersection upgrades to comply with Conditions 26 and 28 of DA51/2017.
- Proposed operating conditions and transport routes and access to and from the quarry.
- Impacts of proposed operating conditions, including impacts on the efficiency and safety of the surrounding road network.
- Mitigation measures to minimise impacts of the proposed modification.

The following is excluded from the scope of this report:

- Light vehicle traffic and parking is excluded from the scope of this report as no change to staff numbers and associated light vehicle movements or parking requirements is proposed via the modification.

2 Existing traffic conditions

2.1 Existing quarry haulage routes

From Currabubula Quarry, product is transported via Werris Creek Road either by a left hand turn towards Currabubula or a right hand turn towards Tamworth.

The approximate distribution of production output onto Werris Creek Road is:

- Right hand turn towards Tamworth: 70%
- Left hand turn towards Currabubula: 30%

2.2 Road network hierarchy

The NSW Roads and Traffic Authority's (RTA) *Guide to Traffic Generating Developments* proposes four basic road classes as the basis for the functional hierarchy of a road network.

A functional classification considers the relative balance of the traffic mobility function and amenity/access functions of streets and roads and defines the purpose of a road within the context of a road network.

The four road classes are arterial, sub-arterial, collector and local roads and are defined below. Werris Creek Road is a collector road.

Table 1 – Road classes and functions

Road class	Road function
Arterial roads	Roads whose main function is to carry through traffic from one region to another forming the principal means of communication for major traffic movements.
Sub-Arterial roads	Those roads which supplement the arterial roads in providing for through traffic movement to an individually determined limit that is sensitive to both roadway characteristics and adjoining land uses.
Collector roads	Roads that distribute traffic between the arterial roads and the local street system and provide access to adjoining property.
Local roads	Subdivisional roads whose main traffic function is to provide access to adjoining property.

2.3 Existing roadway conditions

The existing roadway configuration, conditions and intersection facilities of Werris Creek Road is outlined in the following sections of the report.

2.3.1 Werris Creek Road

Werris Creek Road is a Classified (Regional) Road designated as MR130 and connects Quirindi in the south to Tamworth in the north following its transition to Duri Road. Along its length Werris Creek Road connects the villages of Werris Creek, Currabubula and Duri.

Access to the quarry is located off Werris Creek Road.

Werris Creek Road is a two-way two-lane bitumen sealed rural road with a 3.5 m wide carriageway in each direction. The roadway is centreline and edge line marked with variable width bitumen sealed shoulders. Single and double centrelines are provided as appropriate where sight distance is limited due to undulations in the vertical alignment of the road.

Werris Creek Road is speed limited at 100km/hr.

The alignment of the initial sections of the roadway towards Tamworth is undulating and several horizontal curves have advisory speed signage ranging from 75km/hr to 85km/hr. After several kilometres, the horizontal alignment of the roadway flattens out and provides a very good standard.

Several sections of Werris Creek Road are line-marked with the new style widened centreline marking. The bitumen sealed carriageway is widened in these areas to approximately 10 m to accommodate the new line-marking with edge lines and bitumen sealed shoulders.

Roadworks are currently being carried out to provide overtaking lanes for southbound traffic.

2.3.2 Intersection of Werris Creek Road and the Quarry Access Road

The intersection of Werris Creek Road and the quarry access road forms a standard Tee-Intersection and is currently under construction to upgrade the intersection to provide enhanced intersection control for the turning movements of heavy vehicles accessing the quarry.

The upgrade of this intersection is being undertaken in accordance with DA Condition No.'s 26 and 28 of DA51/2017.

Construction plans prepared on behalf of Boral by Pitt & Sherry (2020) indicate the following components will be provided at the intersection:

- A deceleration lane and channelised right turn into the quarry access from Werris Creek Road for traffic arriving from Currabubula. The right turn movement is protected by chevron markings on the roadway.
- A straight through lane for traffic travelling from Currabubula to Tamworth.
- Chevron markings on the roadway to transition through traffic back to the original alignment of Werris Creek Road.
- A widening shoulder for traffic turning left into the quarry access from Werris Creek Road for traffic arriving from Tamworth.
- Widened flaring on the quarry access road leg of the intersection to cater for the left turn and right turn swept paths of heavy vehicles using the intersection.
- Line-marking and signage appropriate to the intersection.

2.4 Existing roadway capacity

The provision of roads within an urban area provides four main functions:

- to cater for moving vehicles;
- to cater for parked vehicles;
- to cater for pedestrians and bicycle traffic; and
- to allow for development and to provide access to adjoining property.

In carrying out the above functions, a road must also be capable of handling the traffic demands placed on it. Roads have varying capacities dependent on the function they are performing. *AUSTROADS Guide to Traffic Engineering Practice* defines capacity as follows:

> *"Capacity is the maximum number of vehicles which has a reasonable expectation of passing over a given section of a lane or roadway in one direction (or in both directions for a two-lane or three- lane highway) during a given time period under prevailing roadway and traffic conditions."*

The physical characteristics of a roadway such as lane width, alignment and frequency of intersections make up the prevailing roadway conditions.

The road's capacity and a driver's expectations of the operational characteristics of a traffic stream defines a qualitative measure denoted as the Level of Service (LOS) of a road.

Level of service definitions combine such factors as speed, travel time, safety, convenience and traffic interruptions and fall into six levels of service categories ranging from A down to F. The categories are graduated from Level of Service A down through six levels to Level of Service F that is a zone of forced flow.

Based on the physical configurations of the surrounding road network, observations of traffic movements and the methodology outlined in Part 2 *Roadway Capacity of AUSTROADS Guide to Traffic Engineering Practice*, the capacity and LOS of the surrounding roads can be determined, Werris Creek Road is determined to have LOS B with a two way hourly capacity of 1,800 vehicles per hour.

The AUSTROADS *Guide to Traffic Engineering Practice* describes Level of Service B as:

> *"A condition of stable flow and drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream, although the general level of comfort and convenience is a little less than with Level of Service A"*

2.5 Existing traffic volumes

2.5.1 Traffic count data

Site specific traffic counts were carried out for the preparation of this report. Liverpool Plains Shire Council placed traffic classifiers on Werris Creek Road approximately 400 m to the north-west and south-east of the intersection with the quarry access road.

The traffic classifiers were placed on the roadway and recorded data over the following periods with complete readings available for:

- North-west of the quarry access from Wednesday 21 April 2021 to Tuesday 25 May 2021.
- South-east of the quarry access from Wednesday 21 April 2021 to Friday 4 June 2021.

The traffic classifier data provided by Council is attached in Appendix A of this report.

Analysis of the traffic classifier data can determine parameters such Average Annual Daily Traffic (AADT), peak hour traffic by volume and time occurrence and vehicle speed statistics.

2.5.2 Average annual daily traffic

Annual Average Daily Traffic (AADT) is defined as the total volume of traffic passing a roadside observation point over a period of a year divided by the number of days in the year.

Based on the traffic classifier counts carried out and an assessment of the data recorded, estimates of the AADT on Werris Creek Road north-west and south-east of the quarry access are provided in Table 2 below.

Table 2 – AADT on Werris Creek Road

Road / Direction	Vehicles per day	Heavy vehicles class 3-12 (%)	85th percentile speed (km/hr)
Werris Creek Road (Right towards Tamworth)	3,070	24.8	104
Werris Creek Road (Left towards Currabubula)	2,914	22.1	107

2.5.3 Peak traffic volumes

The traffic classifier counts carried out provide information on the morning peak hour and evening peak hour traffic volumes on Werris Creek Road north-west and south-east of the quarry access. Data is provided for both the weekday peak hours and the full week peak hours. Full week peak hours are considered in this assessment as product transportation will continue to be undertaken 6 days per week (Monday – Saturday).

An assessment of the recorded data provides the following peak hour traffic volumes. It is noted that the data showed some variance in peak hours; the most common peak hour occurrence is provided in Table 3 below.

Table 3 – Peak hour traffic volumes on Werris Creek Road

Road / Direction	Timeframe	Peak hour	Peak volume (vehicles per hour)
Werris Creek Road (Right towards Tamworth)	Weekday	Morning 8:00am – 9:00am	245
		Evening 4:00 – 5:00pm	266
	Full week	Morning 8:00am – 9:00am	239
		Evening 4:00 – 5:00pm	254
Werris Creek Road (Left towards Currabubula)	Weekday	Morning 8:00am – 9:00am	242
		Evening 4:00 – 5:00pm	265
	Full week	Morning 8:00am – 9:00am	226
		Evening 4:00 – 5:00pm	241

Several TfNSW traffic recording stations are located on roads used for the transportation of product from the quarry. However, this data has not been used in this assessment as the site specific traffic counts on Werris Creek Road are the most appropriate and current dataset.

2.5.4 Existing quarry traffic generation

Information provided by the proponent based on weighbridge data details the existing heavy vehicles and usage for the transportation of the current production rates at the quarry.

The typically (largest) trucks used to transport the quarry product are truck and quad wheel dog trailers with a payload of 38 tonnes. The standard maximum length of the truck and dog combination is 19 m.

Based on the current approved operating conditions and full production output (300,000 tpa), the existing heavy vehicle traffic generated by the quarry is summarised in Table 4.

Table 4 – Truck and trip generation for existing approved quarry operations (300,000 tpa)

Production	Daily truck loads	Daily trips	Hourly truck loads	Hourly trips
Current average daily production	27 loads	54 trips	3 loads	6 trips
Current maximum production	40 loads	80 trips	4 loads	8 trips
Approved average daily production	40 loads	80 trips	4 loads	8 trips
Approved maximum daily production	75 loads	150 trips	8 loads	16 trips

The current distribution of quarry output onto Werris Creek Road is provided in Table 5 below.

Table 5 – Existing trip distribution

Production	Output	Werris Creek Road Right towards Tamworth	Werris Creek Road Left towards Currabubula
Current average daily production	27 loads	19 loads	8 loads
	54 trips	38 trips	16 trips
Current maximum daily production	40 loads	28 loads	12 loads
	80 trips	56 trips	24 trips
Approved average daily production	40 loads	28 loads	12 loads
	80 trips	56 trips	24 trips
Approved maximum daily production	75 loads	53 loads	22 loads
	150 trips	106 trips	44 trips

3 Traffic impact assessment

3.1 Proposed modification

The following section outlines the operating conditions proposed via the modification as they relate to heavy vehicle movements.

3.1.1 Heavy vehicle movements

The proposed increase the annual output from the quarry from 300,000 tonnes to 400,000 tpa will increase heavy vehicle movements associated with the quarry operation.

No change to the vehicle for product transportation is proposed. Trucks used to transport quarry products will remain as the truck and quad wheel dog trailers with a payload of 38 tonnes.

Whilst approval is sought for an increase in production output from the quarry to 400,000 tpa, no change to product distribution is proposed, with approximately 70% to be transported from the quarry onto Werris Creek Road to the right (towards Tamworth) and approximately 30% to the left onto Werris Creek Road (towards Currabubula).

Based on the proposed operating conditions and full production output (400,000 tpa), the heavy vehicle traffic generated by the quarry is summarised in Table 6 below.

Table 6 – Truck and trip generation for 400,000 tpa quarry production

Production	Daily truck loads	Daily trips	Hourly truck loads	Hourly trips
Proposed average daily production	50 loads	100 trips	6 loads	12 trips
Proposed maximum daily production	120 loads	240 trips	15 loads	30 trips

The proposed distribution of the daily loads and trips onto Werris Creek Road is provided in Table 7 below.

Table 7 – Distribution of 400,000 tpa quarry production

Production	Output	Werris Creek Road Right towards Tamworth	Werris Creek Road Left towards Currabubula
Proposed average daily production	50 loads	36 loads	14 loads
	100 trips	72 trips	28 trips
Proposed maximum daily production	120 loads	84 loads	36 loads
	240 trips	168 trips	72 trips

With respect to the proposed pug mill, the following is noted:

- The operation of the proposed pug mill would require approximately 72 loads of stabilment to be delivered per year. Based on the operation of the pug mill for up to 40 weeks per year, the delivery of the stabilment would be less than 2 deliveries per week. Due to the very low vehicle movements, pug mill stabilment deliveries are not included in the above trip generation figures.
- The production output from the pug mill would be included within the total production capacity of 400,000 tpa, and therefore, no net additional traffic would be generated by the pug mill activities.

3.2 Impact of the generated traffic

3.2.1 Traffic generation assessment

A comparison of the existing approved truck traffic generation rates (at 300,000 tpa production) and the increased production output to 400,000 tpa is provided in Table 8. This includes the net increase in trucks which is important in assessing the potential impacts for the proposed increase in quarry production on the road network.

Table 8 – Net increase in traffic generation

Production	Existing production 300,000 tpa	Proposed production 400,000 tpa	Net increase
Average daily production	40 loads	50 loads	10 loads
	80 trips	100 trips	20 trips
Maximum daily production	75 loads	120 loads	45 loads
	150 trips	240 trips	90 trips
Average hourly production	4 loads	6 loads	2 loads
	8 trips	12 trips	4 trips
Maximum hourly production	8 loads	15 loads	7 loads
	16 trips	30 trips	14 trips

The net increase between the approved 300,000 tpa tonnes per annum and the proposed 400,000 tpa tonnes per annum quarry output is used to determine any potential impacts on the surrounding road network and in particular, the following:

- Maximum daily production net increase of 45 loads per day;
- Maximum daily production net increase of 90 trips per day;
- Maximum hourly production net increase of 7 loads per hour; and
- Maximum hourly production net increase of 14 trips per hour.

3.2.2 Traffic volume

To allow a comparison to be made between the traffic classifier volume data on Werris Creek Road (north-west and south-east of the quarry access) and the proposed maximum net increase in traffic generation by the increased output from the quarry, the daily and peak hour trips need to be considered in the context of the distribution of haulage from the quarry.

Based on 70% of the quarry output turning right onto Werris Creek Road (towards Tamworth) and 30% turning left onto Werris Creek Road (towards Currabubula), net increased trip distribution has been determined in Table 9 below.

Table 9 – Distribution of net increase in traffic generation

Road/Direction	Trips per day	Trips per hour
Werris Creek Road – Right towards Tamworth	63	10
Werris Creek Road – Left towards Currabubula	27	4

A comparison of the AADT and peak hour traffic volumes on Werris Creek Road and the maximum net increase in trips generated by the increased production at the quarry are provided in Table 10.

Table 10 – Comparison of Werris Creek Road traffic volumes and net increase in trips

Road		Existing traffic volume	Proposed traffic volume	Net increase
Werris Creek Road (Right towards Tamworth)	AADT	3,070 veh/day	3,133 veh/day	2.1%
	AM peak hour	239 veh/hour	249 veh/hour	4.2%
	PM peak hour	254 veh/hour	264 veh/hour	3.9%
Werris Creek Road (Left towards Currabubula)	AADT	2,914 veh/day	2,941 veh/day	0.9%
	AM peak hour	226 veh/hour	230 veh/hour	1.8%
	PM peak hour	241 veh/hour	245 veh/hour	1.7%

The proposed modification to the quarry approval would result in a percentage increase in traffic volumes on the surrounding road network ranging from 0.9% (AADT on Werris Creek Road – left towards Currabubula) to 4.2% (AM peak hour on Werris Creek Road – right towards Tamworth). The percentage increase in traffic volume is not considered significant.

The net increase in daily traffic volume and peak hour volume generated by the proposed production modification would be easily absorbed into the surrounding road network with minimal impact on the capacity of the existing traffic streams using the road system.

3.2.3 Post 10 year operation scenario

TfNSW generally require an assessment to be carried out to determine if there are any impacts from proposed developments for a + 10 years post development scenario.

Existing traffic volumes on roads are expected to increase over time and for a road such as Werris Creek Road, the natural growth of the traffic volume is expected to be low and in the order of 1% per annum.

On this basis, the AADT on Werris Creek Road (right towards Tamworth) would grow over 10 years from the existing 3,070 veh/day to 3,390 veh/day and for Werris Creek Road (left towards Currabubula) would grow from 2,914 veh/day to 3,218 veh/day.

Whilst the traffic volumes on the surrounding roads may increase over time, the production output from the quarry would be in accordance with the approval of the proposed modification to increase production to 400,000 tpa.

The number of trucks transporting the product from the quarry are determined by the output produced by the quarry. As the truck movements to transport 400,000 tonne per annum are fixed, the number of haulage trucks on the roads forms a lesser percentage over time when compared to the 10 year growth of traffic on Werris Creek Road.

Therefore, the potential impact of the transport of product from the quarry would decrease over time.

3.2.4 Intersection assessment

As outlined previously, the intersection of Werris Creek Road and the quarry access road forms a standard Tee-Intersection and is currently under construction to upgrade the intersection to provide enhanced intersection control for the turning movements of heavy vehicles accessing the quarry.

EMM Consulting prepared an Options Assessment for the quarry intersection and its report dated 8 November 2019 determined parameters for the upgrade of the intersection in compliance with Conditions of Consent No's 26 and 28 of DA51/2017.

Subsequently, construction plans were prepared on behalf of Boral by Pitt & Sherry (2020) and indicate the following components will be provided at the intersection:

- A deceleration lane and channelised right turn into the quarry access from Werris Creek Road for traffic arriving from Currabubula. The right turn movement is protected by chevron markings on the roadway.
- A straight through lane for traffic travelling from Currabubula to Tamworth.
- Chevron markings on the roadway to transition through traffic back to the original alignment of Werris Creek Road.
- A widening shoulder for traffic turning left into the quarry access from Werris Creek Road for traffic arriving from Tamworth.
- Widened flaring on the quarry access road leg of the intersection to cater for the left turn and right turn swept paths of heavy vehicles using the intersection.
- Line-marking and signage appropriate to the intersection.

The intersection works that are currently under construction will improve the connection to the road network for the heavy vehicles operated by the quarry and is appropriate to support the proposed increase in production output from the quarry and no additional measures are required.

3.3 Mitigation measures

3.3.1 Traffic management

Werris Creek Road is well regulated including the provision of the following facilities as appropriate:

- Give Way signs
- Flashing light signal controlled rail crossings
- Roundabouts
- Deceleration and turning lanes at intersections

However, the following mitigation measures are proposed to improve traffic management on the road network:

- Install appropriate "Trucks Crossing or Entering" warning signage (W5-22) on both the Currabubula side (north-west) and the Tamworth side (south-east) approaches to the quarry access intersection on Werris Creek Road.
- Bitumen seal the quarry access road from the Limit of Works indicated on the Pitt & Sherry (2020) intersection plans to the gate at the entry to the quarry, which is a length of approximately 200 m. The provision of the additional bitumen seal will assist in reducing dust and debris being tracked onto Werris Creek Road by the operation of the trucks along the haul road from the quarry, particularly in wet weather.

3.3.2 Driver code of conduct

Boral has an established Quarry Truck Driver Induction program in place, a Driver Code of Conduct is proposed to update the existing protocol to include:

- A map of the Boral haulage routes, including any critical locations that drivers must be aware of;
- Measures to ensure that drivers are aware of school bus operations; and
- Ensuring truck drivers are educated about the site's environmental management requirements, including not offloading residue and banging tailgates.

4 Conclusion

The assessment of the additional net traffic generated by the proposed modification, concluded the following:

- The increase in the traffic volumes on the surrounding road network will not change the classifications of the roads under the functional road hierarchy.
- The percentage increases in the traffic volumes on the surrounding road network range from 0.9% for AADT on Werris Creek Road (left towards Currabubula) to 4.2% for the AM peak hour on Werris Creek Road (right towards Tamworth). The percentage increase in traffic volume is not considered significant and the net daily traffic volume and peak hour volume generated by the increased production at the quarry are easily absorbed into the surrounding road network with minimal impact on the capacity of the existing traffic streams using the road system.
- The additional traffic generated by the proposed quarry modification is well below the capacity of the road network at a Level of Service B and all roads would continue to operate satisfactorily.
- The intersection works at the intersection of the quarry and Werris Creek Road that are currently nearing completion will improve the connection to the road network for the heavy vehicles operated by the quarry and is appropriate to support the proposed increase in production output from the quarry.

References

Roadway Capacity of AUSTROADS Guide to Traffic Engineering Practice

RTA Guide to Traffic Generating Developments (2002)

EMM Consulting Intersection Options Assessment dated 8 November 2019

Pitt & Sherry (2020) Currabubula Quarry Werris Creek Road Intersection Upgrade (Reference SY19279 G000 to C601)

Plates

Plate 1 – Currabubula Quarry access road

Plate 2 – Currabubula Quarry access gate

Plate 3 – Currabubula quarry access road viewed towards the intersection with Werris Creek Road

Plate 4 – Intersection works for the quarry access road on Werris Creek Road

Plate 5 – Intersection works for the quarry access road on Werris Creek Road

Plate 6 – Typical alignment of Werris Creek Road

Plate 7 – New style of line-marking on Werris Creek Road with widened centreline marking

Plate 8 – Construction of an overtaking lane on Werris Creek Road for southbound traffic

APPENDIX A

Traffic classifier data for Werris Creek Road

Provided by Liverpool Plains Shire Council

MetroCount Traffic Executive
Weekly Vehicle Counts

WeeklyVehicle-152 -- English (ENA)

Datasets:

Site:	**[21009] Werris Creek Road - Boral Quarry to 400 mtrs north**
Attribute:	Currabubula
Direction:	5 - South bound A>B, North bound B>A. **Lane:** 0
Survey Duration:	14:17 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021,
Zone:	
File:	21009 0 2021-06-09 1224.EC0 (Plus)
Identifier:	DP52MZ07 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**14:18 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021 (34.9705)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound), P = North, Lane = 0-16
Separation:	GapX > 0 sec, Span 0 - 100 metre
Name:	Default Profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (metre, kilometre, m/s, km/h, kg, tonne)
In profile:	Vehicles = 106064 / 106089 (99.98%)

Weekly Vehicle Counts

WeeklyVehicle-152
Site: 21009.0.1SN
Description: **Werris Creek Road - Boral Quarry to 400 mtrs north**
Filter time: **14:18 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	19 Apr	20 Apr	21 Apr	22 Apr	23 Apr	24 Apr	25 Apr	1 - 5	1 - 7
Hour									
0000-0100	*	*	0	13	8	6	13	7.0	8.0
0100-0200	*	*	0	3	5	9	8	2.7	5.0
0200-0300	*	*	0	10	12	4	4	7.3	6.0
0300-0400	*	*	0	19	13	15	8	10.7	11.0
0400-0500	*	*	0	38	33	13	15	23.7	19.8
0500-0600	*	*	0	86	87	45	34	57.7	50.4
0600-0700	*	*	0	156	113	54	40	89.7	72.6
0700-0800	*	*	0	**254**	229	117	47	161.0	129.4
0800-0900	*	*	**261**	239	249	182	94	**249.7**	205.0
0900-1000	*	*	233	247	238	226	135	239.3	**215.8**
1000-1100	*	*	217	225	238	223	**156**	226.7	211.8
1100-1200	*	*	184	226	**258**	**245**	139	222.7	210.4
1200-1300	*	*	217	227	201	**258**	158	215.0	212.2
1300-1400	*	*	229	194	212	256	**185**	211.7	**215.2**
1400-1500	*	0	241	248	272	222	181	190.3	194.0
1500-1600	*	0	285	308	286	201	160	219.8	206.7
1600-1700	*	0	289	**321**	**310**	187	143	**230.0**	208.3
1700-1800	*	0	**293**	287	262	135	147	210.5	187.3
1800-1900	*	0	117	182	206	114	81	126.3	116.7
1900-2000	*	0	92	99	80	62	59	67.8	65.3
2000-2100	*	0	40	68	73	37	48	45.3	44.3
2100-2200	*	0	40	53	46	31	25	34.8	32.5
2200-2300	*	0	25	24	32	24	17	20.3	20.3
2300-2400	*	0	10	16	19	27	24	11.3	16.0
Totals									
0700-1900	*	*	2566	2958	2961	2366	1626	2502.8	2312.8
0600-2200	*	*	2738	3334	3273	2550	1798	2740.2	2527.6
0600-0000	*	*	2773	3374	3324	2601	1839	2771.7	2563.9
0000-0000	*	*	2773	3543	3482	2693	1921	2880.7	2664.1
AM Peak	*	*	0800	0700	1100	1100	1000		
	*	*	261	254	258	245	156		
PM Peak	*	*	1700	1600	1600	1200	1300		
	*	*	293	321	310	258	185		

*** - No data.**

Weekly Vehicle Counts

WeeklyVehicle-152
Site: 21009.0.1SN
Description: **Werris Creek Road - Boral Quarry to 400 mtrs north**
Filter time: **14:18 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	26 Apr	27 Apr	28 Apr	29 Apr	30 Apr	01 May	02 May	1 - 5	1 - 7
Hour									
0000-0100	6	6	12	10	13	13	13	9.4	10.4
0100-0200	5	4	3	4	13	12	14	5.8	7.9
0200-0300	5	12	15	9	14	7	6	11.0	9.7
0300-0400	11	11	10	17	22	16	10	14.2	13.9
0400-0500	37	27	39	42	34	23	17	35.8	31.3
0500-0600	104	87	95	104	86	45	39	95.2	80.0
0600-0700	140	150	148	161	142	80	43	148.2	123.4
0700-0800	239	242	261	239	256	144	124	247.4	215.0
0800-0900	**263**	**268**	**271**	**279**	251	303	193	**266.4**	261.1
0900-1000	231	214	230	225	**323**	261	352	244.6	262.3
1000-1100	202	212	233	205	262	**338**	574	222.8	289.4
1100-1200	184	182	226	215	231	325	**782**	207.6	**306.4**
1200-1300	215	197	220	191	266	318	**591**	217.8	**285.4**
1300-1400	208	164	206	237	299	**322**	397	222.8	261.9
1400-1500	242	237	244	230	**354**	316	345	261.4	281.1
1500-1600	228	259	264	252	279	259	245	256.4	255.1
1600-1700	**276**	268	287	**329**	312	272	223	**294.4**	281.0
1700-1800	262	**285**	**290**	299	284	198	199	284.0	259.6
1800-1900	122	143	164	153	179	126	126	152.2	144.7
1900-2000	64	77	80	100	104	74	56	85.0	79.3
2000-2100	43	71	48	75	81	45	57	63.6	60.0
2100-2200	35	39	44	51	45	52	27	42.8	41.9
2200-2300	23	24	26	26	34	52	23	26.6	29.7
2300-2400	23	15	12	16	19	19	8	17.0	16.0
Totals									
0700-1900	2672	2671	2896	2854	3296	3182	4151	2877.8	3103.1
0600-2200	2954	3008	3216	3241	3668	3433	4334	3217.4	3407.7
0600-0000	3000	3047	3254	3283	3721	3504	4365	3261.0	3453.4
0000-0000	3168	3194	3428	3469	3903	3620	4464	3432.4	3606.6
AM Peak	0800	0800	0800	0800	0900	1000	1100		
	263	268	271	279	323	338	782		
PM Peak	1600	1700	1700	1600	1400	1300	1200		
	276	285	290	329	354	322	591		

*** - No data.**

Weekly Vehicle Counts

WeeklyVehicle-152
Site: 21009.0.1SN
Description: **Werris Creek Road - Boral Quarry to 400 mtrs north**
Filter time: **14:18 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	03 May	04 May	05 May	06 May	07 May	08 May	09 May	1 - 5	1 - 7
Hour									
0000-0100	6	5	14	7	7	9	11	7.8	8.4
0100-0200	12	5	2	4	6	3	9	5.8	5.9
0200-0300	11	9	7	14	11	15	10	10.4	11.0
0300-0400	22	21	24	22	13	10	8	20.4	17.1
0400-0500	34	34	34	37	37	21	13	35.2	30.0
0500-0600	78	80	79	83	81	35	29	80.2	66.4
0600-0700	147	136	128	148	132	56	29	138.2	110.9
0700-0800	**289**	243	225	**255**	203	100	45	243.0	194.3
0800-0900	260	**276**	263	247	**263**	171	110	**261.8**	227.1
0900-1000	285	234	**270**	250	262	208	172	260.2	**240.1**
1000-1100	177	217	218	212	229	203	220	210.6	210.9
1100-1200	228	199	209	211	247	**232**	**337**	218.8	237.6
1200-1300	191	189	199	197	237	**228**	239	202.6	211.4
1300-1400	206	189	221	223	219	220	211	211.6	212.7
1400-1500	254	213	226	229	249	200	206	234.2	225.3
1500-1600	251	226	214	261	282	211	238	246.8	240.4
1600-1700	**263**	**254**	**286**	267	**306**	153	**293**	**275.2**	**260.3**
1700-1800	254	225	277	**271**	278	158	176	261.0	234.1
1800-1900	131	126	131	163	190	112	99	148.2	136.0
1900-2000	66	65	75	111	105	68	57	84.4	78.1
2000-2100	34	55	55	60	56	49	54	52.0	51.9
2100-2200	26	31	28	57	50	49	35	38.4	39.4
2200-2300	19	20	29	31	41	35	14	28.0	27.0
2300-2400	13	11	11	5	21	19	10	12.2	12.9
Totals									
0700-1900	2789	2591	2739	2786	2965	2196	2346	2774.0	2630.3
0600-2200	3062	2878	3025	3162	3308	2418	2521	3087.0	2910.6
0600-0000	3094	2909	3065	3198	3370	2472	2545	3127.2	2950.4
0000-0000	3257	3063	3225	3365	3525	2565	2625	3287.0	3089.3
AM Peak	0700	0800	0900	0700	0800	1100	1100		
	289	276	270	255	263	232	337		
PM Peak	1600	1600	1600	1700	1600	1200	1600		
	263	254	286	271	306	228	293		

*** - No data.**

Weekly Vehicle Counts

WeeklyVehicle-152
Site: 21009.0.1SN
Description: **Werris Creek Road - Boral Quarry to 400 mtrs north**
Filter time: **14:18 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	10 May	11 May	12 May	13 May	14 May	15 May	16 May	1 - 5	1 - 7
Hour									
0000-0100	8	10	7	6	12	15	15	8.6	10.4
0100-0200	6	5	6	8	8	6	11	6.6	7.1
0200-0300	7	8	7	5	10	12	8	7.4	8.1
0300-0400	16	21	22	25	19	21	10	20.6	19.1
0400-0500	47	32	42	43	34	17	12	39.6	32.4
0500-0600	77	79	80	79	77	40	30	78.4	66.0
0600-0700	126	122	127	151	151	50	49	135.4	110.9
0700-0800	214	213	213	242	218	92	91	220.0	183.3
0800-0900	**234**	**234**	**228**	**263**	231	191	113	**238.0**	213.4
0900-1000	220	233	222	237	**258**	**269**	153	234.0	**227.4**
1000-1100	232	190	200	224	212	222	180	211.6	208.6
1100-1200	216	195	202	220	211	222	**203**	208.8	209.9
1200-1300	226	182	206	218	224	**237**	175	211.2	209.7
1300-1400	196	167	208	206	256	224	172	206.6	204.1
1400-1500	222	219	223	245	277	208	237	237.2	233.0
1500-1600	234	222	247	265	291	196	236	251.8	241.6
1600-1700	**278**	274	272	269	309	193	**244**	280.4	**262.7**
1700-1800	236	**279**	**273**	**324**	**317**	152	178	**285.8**	251.3
1800-1900	123	148	157	181	181	90	96	158.0	139.4
1900-2000	70	67	56	94	104	48	60	78.2	71.3
2000-2100	43	49	52	72	76	40	28	58.4	51.4
2100-2200	28	42	36	49	55	46	30	42.0	40.9
2200-2300	27	18	37	32	50	37	14	32.8	30.7
2300-2400	12	20	17	17	24	19	11	18.0	17.1
Totals									
0700-1900	2631	2556	2651	2894	2985	2296	2078	2743.4	2584.4
0600-2200	2898	2836	2922	3260	3371	2480	2245	3057.4	2858.9
0600-0000	2937	2874	2976	3309	3445	2536	2270	3108.2	2906.7
0000-0000	3098	3029	3140	3475	3605	2647	2356	3269.4	3050.0
AM Peak	0800	0800	0800	0800	0900	0900	1100		
	234	234	228	263	258	269	203		
PM Peak	1600	1700	1700	1700	1700	1200	1600		
	278	279	273	324	317	237	244		

*** - No data.**

Weekly Vehicle Counts

WeeklyVehicle-152
Site: 21009.0.1SN
Description: **Werris Creek Road - Boral Quarry to 400 mtrs north**
Filter time: **14:18 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	17 May	18 May	19 May	20 May	21 May	22 May	23 May	1 - 5	1 - 7
Hour									
0000-0100	7	9	4	7	10	16	11	7.4	9.1
0100-0200	4	0	9	8	7	10	4	5.6	6.0
0200-0300	9	16	18	9	15	11	3	13.4	11.6
0300-0400	11	18	15	10	21	14	4	15.0	13.3
0400-0500	32	36	42	25	36	14	11	34.2	28.0
0500-0600	73	70	77	35	79	55	34	66.8	60.4
0600-0700	124	127	149	**86**	125	65	38	122.2	102.0
0700-0800	**247**	**227**	239	44	207	108	51	192.8	160.4
0800-0900	242	223	**258**	5	**263**	180	123	**198.2**	184.9
0900-1000	215	223	243	3	229	**236**	155	182.6	**186.3**
1000-1100	218	196	190	4	224	217	**196**	166.4	177.9
1100-1200	194	163	212	3	247	223	194	163.8	176.6
1200-1300	199	181	239	2	224	**258**	194	169.0	185.3
1300-1400	193	189	243	1	254	234	189	176.0	186.1
1400-1500	224	222	220	1	272	235	200	187.8	196.3
1500-1600	223	237	262	6	**320**	247	178	209.6	210.4
1600-1700	245	**290**	**275**	3	318	168	**205**	**226.2**	**214.9**
1700-1800	**264**	236	272	69	265	190	139	221.2	205.0
1800-1900	113	146	174	**142**	165	104	114	148.0	136.9
1900-2000	64	68	85	97	94	66	80	81.6	79.1
2000-2100	41	50	55	48	82	50	39	55.2	52.1
2100-2200	23	32	41	26	41	35	29	32.6	32.4
2200-2300	22	20	16	15	34	32	27	21.4	23.7
2300-2400	16	15	14	23	28	14	11	19.2	17.3
Totals									
0700-1900	2577	2533	2827	283	2988	2400	1938	2241.6	2220.9
0600-2200	2829	2810	3157	540	3330	2616	2124	2533.2	2486.6
0600-0000	2867	2845	3187	578	3392	2662	2162	2573.8	2527.6
0000-0000	3003	2994	3352	672	3560	2782	2229	2716.2	2656.0
AM Peak	0700	0700	0800	0600	0800	0900	1000		
	247	227	258	86	263	236	196		
PM Peak	1700	1600	1600	1800	1500	1200	1600		
	264	290	275	142	320	258	205		

*** - No data.**

Weekly Vehicle Counts

WeeklyVehicle-152
Site: 21009.0.1SN
Description: **Werris Creek Road - Boral Quarry to 400 mtrs north**
Filter time: **14:18 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	24 May	25 May	26 May	27 May	28 May	29 May	30 May	1 - 5	1 - 7
Hour									
0000-0100	5	15	*	*	*	*	*	10.0	10.0
0100-0200	9	8	*	*	*	*	*	8.5	8.5
0200-0300	6	10	*	*	*	*	*	8.0	8.0
0300-0400	11	21	*	*	*	*	*	16.0	16.0
0400-0500	33	39	*	*	*	*	*	36.0	36.0
0500-0600	69	81	*	*	*	*	*	75.0	75.0
0600-0700	133	150	*	*	*	*	*	141.5	141.5
0700-0800	211	**257**	*	*	*	*	*	234.0	234.0
0800-0900	**275**	243	*	*	*	*	*	**259.0**	**259.0**
0900-1000	206	212	*	*	*	*	*	209.0	209.0
1000-1100	204	198	*	*	*	*	*	201.0	201.0
1100-1200	197	182	*	*	*	*	*	189.5	189.5
1200-1300	197	185	*	*	*	*	*	191.0	191.0
1300-1400	217	103	*	*	*	*	*	160.0	160.0
1400-1500	225	*	*	*	*	*	*	225.0	225.0
1500-1600	266	*	*	*	*	*	*	266.0	266.0
1600-1700	**285**	*	*	*	*	*	*	**285.0**	**285.0**
1700-1800	232	*	*	*	*	*	*	232.0	232.0
1800-1900	146	*	*	*	*	*	*	146.0	146.0
1900-2000	81	*	*	*	*	*	*	81.0	81.0
2000-2100	51	*	*	*	*	*	*	51.0	51.0
2100-2200	41	*	*	*	*	*	*	41.0	41.0
2200-2300	16	*	*	*	*	*	*	16.0	16.0
2300-2400	19	*	*	*	*	*	*	19.0	19.0
Totals									
0700-1900	2661	*	*	*	*	*	*	2597.5	2597.5
0600-2200	2967	*	*	*	*	*	*	2912.0	2912.0
0600-0000	3002	*	*	*	*	*	*	2947.0	2947.0
0000-0000	3135	*	*	*	*	*	*	3100.5	3100.5
AM Peak	0800	0700	*	*	*	*	*		
	275	257	*	*	*	*	*		
PM Peak	1600	*	*	*	*	*	*		
	285	*	*	*	*	*	*		

*** - No data.**

MetroCount Traffic Executive
Daily Classes

DailyClass-151 -- English (ENA)

Datasets:

Site:	**[21009] Werris Creek Road - Boral Quarry to 400 mtrs north**
Attribute:	Currabubula
Direction:	5 - South bound A>B, North bound B>A. **Lane:** 0
Survey Duration:	14:17 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021,
Zone:	
File:	21009 0 2021-06-09 1224.EC0 (Plus)
Identifier:	DP52MZ07 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**14:18 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021 (34.9705)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound), P = North, Lane = 0-16
Separation:	GapX > 0 sec, Span 0 - 100 metre
Name:	Default Profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (metre, kilometre, m/s, km/h, kg, tonne)
In profile:	Vehicles = 106064 / 106089 (99.98%)

Daily Classes

DailyClass-151
Site: 21009.0.1SN
Description: **Werris Creek Road - Boral Quarry to 400 mtrs north**
Filter time: **14:18 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

Monday, 19 April 2021

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Tue*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Wed	1961	61	505	49	14	13	31	4	47	86	2	0	2773
(%)	70.7	2.2	18.2	1.8	0.5	0.5	1.1	0.1	1.7	3.1	0.1	0.0	
Thu	2531	87	619	43	17	20	54	8	69	90	5	0	3543
(%)	71.4	2.5	17.5	1.2	0.5	0.6	1.5	0.2	1.9	2.5	0.1	0.0	
Fri	2454	109	661	35	5	26	40	10	70	65	7	0	3482
(%)	70.5	3.1	19.0	1.0	0.1	0.7	1.1	0.3	2.0	1.9	0.2	0.0	
Sat	2036	97	452	8	3	34	39	1	9	14	0	0	2693
(%)	75.6	3.6	16.8	0.3	0.1	1.3	1.4	0.0	0.3	0.5	0.0	0.0	
Sun	1417	68	318	6	0	20	35	5	9	41	2	0	1921
(%)	73.8	3.5	16.6	0.3	0.0	1.0	1.8	0.3	0.5	2.1	0.1	0.0	

Average daily volume

Entire week													
	2080	84	511	28	8	23	40	6	41	59	3	0	2882
(%)	72.2	2.9	17.7	1.0	0.3	0.8	1.4	0.2	1.4	2.1	0.1	0.0	
Weekdays													
	2315	86	595	42	12	20	42	7	62	80	5	0	3266
(%)	70.9	2.6	18.2	1.3	0.4	0.6	1.3	0.2	1.9	2.5	0.1	0.0	
Weekend													
	1727	83	385	7	2	27	37	3	9	28	1	0	2307
(%)	74.8	3.6	16.7	0.3	0.1	1.2	1.6	0.1	0.4	1.2	0.0	0.0	

*** - Incomplete**

Daily Classes

DailyClass-151
Site: 21009.0.1SN
Description: **Werris Creek Road - Boral Quarry to 400 mtrs north**
Filter time: **14:18 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

Monday, 26 April 2021

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon	2183	99	617	34	16	29	35	10	68	75	2	0	3168
(%)	68.9	3.1	19.5	1.1	0.5	0.9	1.1	0.3	2.1	2.4	0.1	0.0	
Tue	2257	70	595	44	4	27	27	9	75	82	4	0	3194
(%)	70.7	2.2	18.6	1.4	0.1	0.8	0.8	0.3	2.3	2.6	0.1	0.0	
Wed	2353	67	648	19	13	33	22	15	122	134	2	0	3428
(%)	68.6	2.0	18.9	0.6	0.4	1.0	0.6	0.4	3.6	3.9	0.1	0.0	
Thu	2420	106	657	32	7	36	36	3	71	97	4	0	3469
(%)	69.8	3.1	18.9	0.9	0.2	1.0	1.0	0.1	2.0	2.8	0.1	0.0	
Fri	2968	95	616	26	4	23	21	11	71	65	3	0	3903
(%)	76.0	2.4	15.8	0.7	0.1	0.6	0.5	0.3	1.8	1.7	0.1	0.0	
Sat	2880	95	549	11	4	20	22	4	14	20	0	1	3620
(%)	79.6	2.6	15.2	0.3	0.1	0.6	0.6	0.1	0.4	0.6	0.0	0.0	
Sun	3711	107	510	18	1	20	39	3	19	35	1	0	4464
(%)	83.1	2.4	11.4	0.4	0.0	0.4	0.9	0.1	0.4	0.8	0.0	0.0	

Average daily volume

Entire week													
	2682	91	599	26	7	27	29	8	63	73	2	0	3607
(%)	74.4	2.5	16.6	0.7	0.2	0.7	0.8	0.2	1.7	2.0	0.1	0.0	
Weekdays													
	2436	87	627	31	9	30	28	10	81	91	3	0	3432
(%)	71.0	2.5	18.3	0.9	0.3	0.9	0.8	0.3	2.4	2.6	0.1	0.0	
Weekend													
	3296	101	530	15	3	20	31	4	17	28	1	1	4042
(%)	81.5	2.5	13.1	0.4	0.1	0.5	0.8	0.1	0.4	0.7	0.0	0.0	

*** - Incomplete**

Daily Classes

DailyClass-151
Site: 21009.0.1SN
Description: **Werris Creek Road - Boral Quarry to 400 mtrs north**
Filter time: **14:18 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

Monday, 3 May 2021

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon	2276	88	580	35	19	27	33	12	91	93	3	0	3257
(%)	69.9	2.7	17.8	1.1	0.6	0.8	1.0	0.4	2.8	2.9	0.1	0.0	
Tue	2208	59	553	27	6	21	26	5	85	69	4	0	3063
(%)	72.1	1.9	18.1	0.9	0.2	0.7	0.8	0.2	2.8	2.3	0.1	0.0	
Wed	2312	59	587	36	5	13	22	14	81	92	4	0	3225
(%)	71.7	1.8	18.2	1.1	0.2	0.4	0.7	0.4	2.5	2.9	0.1	0.0	
Thu	2383	76	642	27	4	24	31	12	78	86	2	0	3365
(%)	70.8	2.3	19.1	0.8	0.1	0.7	0.9	0.4	2.3	2.6	0.1	0.0	
Fri	2484	76	697	34	5	36	39	6	79	66	3	0	3525
(%)	70.5	2.2	19.8	1.0	0.1	1.0	1.1	0.2	2.2	1.9	0.1	0.0	
Sat	1911	85	473	10	3	15	40	5	10	12	1	0	2565
(%)	74.5	3.3	18.4	0.4	0.1	0.6	1.6	0.2	0.4	0.5	0.0	0.0	
Sun	2042	71	414	7	1	13	22	4	22	27	2	0	2625
(%)	77.8	2.7	15.8	0.3	0.0	0.5	0.8	0.2	0.8	1.0	0.1	0.0	

Average daily volume

Entire week													
	2231	73	564	25	6	21	30	8	64	64	3	0	3089
(%)	72.2	2.4	18.2	0.8	0.2	0.7	1.0	0.3	2.1	2.1	0.1	0.0	
Weekdays													
	2333	72	612	32	8	24	30	10	83	81	3	0	3287
(%)	71.0	2.2	18.6	1.0	0.2	0.7	0.9	0.3	2.5	2.5	0.1	0.0	
Weekend													
	1977	78	444	9	2	14	31	5	16	20	2	0	2595
(%)	76.2	3.0	17.1	0.3	0.1	0.5	1.2	0.2	0.6	0.8	0.1	0.0	

*** - Incomplete**

Daily Classes

DailyClass-151
Site: 21009.0.1SN
Description: **Werris Creek Road - Boral Quarry to 400 mtrs north**
Filter time: **14:18 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

Monday, 10 May 2021

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon	2138	81	615	20	5	32	38	9	68	88	4	0	3098
(%)	69.0	2.6	19.9	0.6	0.2	1.0	1.2	0.3	2.2	2.8	0.1	0.0	
Tue	2143	65	630	31	5	16	22	10	49	51	7	0	3029
(%)	70.7	2.1	20.8	1.0	0.2	0.5	0.7	0.3	1.6	1.7	0.2	0.0	
Wed	2267	68	595	35	13	19	21	4	59	56	3	0	3140
(%)	72.2	2.2	18.9	1.1	0.4	0.6	0.7	0.1	1.9	1.8	0.1	0.0	
Thu	2529	65	625	36	6	22	42	6	60	82	2	0	3475
(%)	72.8	1.9	18.0	1.0	0.2	0.6	1.2	0.2	1.7	2.4	0.1	0.0	
Fri	2648	81	645	37	16	23	33	10	58	52	2	0	3605
(%)	73.5	2.2	17.9	1.0	0.4	0.6	0.9	0.3	1.6	1.4	0.1	0.0	
Sat	1989	112	426	21	2	27	44	2	11	12	1	0	2647
(%)	75.1	4.2	16.1	0.8	0.1	1.0	1.7	0.1	0.4	0.5	0.0	0.0	
Sun	1702	111	398	14	0	28	41	5	13	43	1	0	2356
(%)	72.2	4.7	16.9	0.6	0.0	1.2	1.7	0.2	0.6	1.8	0.0	0.0	

Average daily volume

Entire week													
	2202	83	562	28	7	24	34	7	45	55	3	0	3050
(%)	72.2	2.7	18.4	0.9	0.2	0.8	1.1	0.2	1.5	1.8	0.1	0.0	
Weekdays													
	2345	72	622	32	9	22	31	8	59	66	4	0	3269
(%)	71.7	2.2	19.0	1.0	0.3	0.7	1.0	0.2	1.8	2.0	0.1	0.0	
Weekend													
	1846	112	412	18	1	28	43	4	12	28	1	0	2502
(%)	73.8	4.5	16.5	0.7	0.0	1.1	1.7	0.1	0.5	1.1	0.0	0.0	

*** - Incomplete**

Daily Classes

DailyClass-151
Site: 21009.0.1SN
Description: **Werris Creek Road - Boral Quarry to 400 mtrs north**
Filter time: **14:18 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

Monday, 17 May 2021

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon	2135	66	577	20	6	21	21	8	81	62	6	0	3003
(%)	71.1	2.2	19.2	0.7	0.2	0.7	0.7	0.3	2.7	2.1	0.2	0.0	
Tue	2150	68	530	30	12	15	29	4	88	66	2	0	2994
(%)	71.8	2.3	17.7	1.0	0.4	0.5	1.0	0.1	2.9	2.2	0.1	0.0	
Wed	2390	87	606	44	11	17	29	7	80	79	1	1	3352
(%)	71.3	2.6	18.1	1.3	0.3	0.5	0.9	0.2	2.4	2.4	0.0	0.0	
Thu	470	9	136	7	1	8	7	3	11	20	0	0	672
(%)	69.9	1.3	20.2	1.0	0.1	1.2	1.0	0.4	1.6	3.0	0.0	0.0	
Fri	2518	85	701	39	1	25	35	19	67	65	5	0	3560
(%)	70.7	2.4	19.7	1.1	0.0	0.7	1.0	0.5	1.9	1.8	0.1	0.0	
Sat	2111	84	488	4	2	31	38	0	15	8	1	0	2782
(%)	75.9	3.0	17.5	0.1	0.1	1.1	1.4	0.0	0.5	0.3	0.0	0.0	
Sun	1600	109	396	5	5	25	40	2	24	23	0	0	2229
(%)	71.8	4.9	17.8	0.2	0.2	1.1	1.8	0.1	1.1	1.0	0.0	0.0	

Average daily volume

Entire week													
	1911	73	491	21	5	20	28	6	52	46	2	0	2656
(%)	71.9	2.7	18.5	0.8	0.2	0.8	1.1	0.2	2.0	1.7	0.1	0.0	
Weekdays													
	1933	63	510	28	6	17	24	8	65	58	3	0	2716
(%)	71.2	2.3	18.8	1.0	0.2	0.6	0.9	0.3	2.4	2.2	0.1	0.0	
Weekend													
	1856	97	442	5	4	28	39	1	20	16	1	0	2506
(%)	74.1	3.9	17.6	0.2	0.1	1.1	1.6	0.0	0.8	0.6	0.0	0.0	

*** - Incomplete**

Daily Classes

DailyClass-151
Site: 21009.0.1SN
Description: **Werris Creek Road - Boral Quarry to 400 mtrs north**
Filter time: **14:18 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

Monday, 24 May 2021

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon	2179	66	604	24	5	31	27	13	83	100	2	1	3135
(%)	69.5	2.1	19.3	0.8	0.2	1.0	0.9	0.4	2.6	3.2	0.1	0.0	
Tue*	1169	32	348	18	7	10	11	8	62	39	0	0	1704
(%)	68.6	1.9	20.4	1.1	0.4	0.6	0.6	0.5	3.6	2.3	0.0	0.0	
Wed*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Thu*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Fri*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sun*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Average daily volume

Entire week

	2179	66	604	24	5	31	27	13	83	100	2	1	3135
(%)	69.5	2.1	19.3	0.8	0.2	1.0	0.9	0.4	2.6	3.2	0.1	0.0	

Weekdays

	2179	66	604	24	5	31	27	13	83	100	2	1	3135
(%)	69.5	2.1	19.3	0.8	0.2	1.0	0.9	0.4	2.6	3.2	0.1	0.0	

Weekend No complete days.

*** - Incomplete**

MetroCount Traffic Executive
Speed Statistics

SpeedStat-150 -- English (ENA)

Datasets:

Site:	**[21009] Werris Creek Road - Boral Quarry to 400 mtrs north**
Attribute:	Currabubula
Direction:	5 - South bound A>B, North bound B>A. **Lane:** 0
Survey Duration:	14:17 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021,
Zone:	
File:	21009 0 2021-06-09 1224.EC0 (Plus)
Identifier:	DP52MZ07 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**14:18 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021 (34.9705)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound), P = North, Lane = 0-16
Separation:	GapX > 0 sec, Span 0 - 100 metre
Name:	Default Profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (metre, kilometre, m/s, km/h, kg, tonne)
In profile:	Vehicles = 106064 / 106089 (99.98%)

Speed Statistics

SpeedStat-150
Site: 21009.0.1SN
Description: **Werris Creek Road - Boral Quarry to 400 mtrs north**
Filter time: **14:18 Tuesday, 20 April 2021 => 13:35 Tuesday, 25 May 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

Vehicles = 106064
Posted speed limit = 100 km/h, Exceeding = 33274 (31.37%), Mean Exceeding = 105.25 km/h
Maximum = 155.2 km/h, **Minimum** = 14.9 km/h, **Mean** = 95.2 km/h
85% Speed = 104.22 km/h, **95% Speed** = 109.26 km/h, **Median** = 95.94 km/h
20 km/h Pace = 86 - 106, **Number in Pace** = 78992 (74.48%)
Variance = 92.19, **Standard Deviation** = 9.60 km/h

Speed Bins (Partial days)

Speed	Bin	Below	Above	Energy	vMult	n * vMult
0 - **10**	0 0.000%	0 0.000%	106064 100.0%	0.00	0.00	0.00
10 - **20**	6 0.006%	6 0.006%	106058 99.99%	0.00	0.00	0.00
20 - **30**	20 0.019%	26 0.025%	106038 99.98%	0.00	0.00	0.00
30 - **40**	92 0.087%	118 0.111%	105946 99.89%	0.00	0.00	0.00
40 - **50**	79 0.074%	197 0.186%	105867 99.81%	0.00	0.00	0.00
50 - **60**	163 0.154%	360 0.339%	105704 99.66%	0.00	0.00	0.00
60 - **70**	751 0.708%	1111 1.047%	104953 98.95%	0.00	0.00	0.00
70 - **80**	4917 4.636%	6028 5.683%	100036 94.32%	0.00	0.00	0.00
80 - **90**	21726 20.48%	27754 26.17%	78310 73.83%	0.00	0.00	0.00
90 - **100**	45036 42.46%	72790 68.63%	33274 31.37%	0.00	0.00	0.00
100 - **110**	28829 27.18%	101619 95.81%	4445 4.191%	0.00	0.00	0.00
110 - **120**	3955 3.729%	105574 99.54%	490 0.462%	0.00	0.00	0.00
120 - **130**	422 0.398%	105996 99.94%	68 0.064%	0.00	0.00	0.00
130 - **140**	57 0.054%	106053 99.99%	11 0.010%	0.00	0.00	0.00
140 - **150**	8 0.008%	106061 100.00%	3 0.003%	0.00	0.00	0.00
150 - **160**	3 0.003%	106064 100.0%	0 0.000%	0.00	0.00	0.00
160 - **170**	0 0.000%	106064 100.0%	0 0.000%	0.00	0.00	0.00
170 - **180**	0 0.000%	106064 100.0%	0 0.000%	0.00	0.00	0.00
180 - **190**	0 0.000%	106064 100.0%	0 0.000%	0.00	0.00	0.00
190 - **200**	0 0.000%	106064 100.0%	0 0.000%	0.00	0.00	0.00

Total Speed Rating = 0.00
Total Moving Energy (Estimated) = 0.00

Speed limit fields (Partial days)

	Limit	Below	Above
0	100 (PSL)	72790 68.6%	33274 31.4%

MetroCount Traffic Executive
Weekly Vehicle Counts

WeeklyVehicle-149 -- English (ENA)

Datasets:

Site:	**[21008] Werris Creek Road - Boral Quarry to 400 mtrs south**
Attribute:	Currabubula
Direction:	7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration:	14:15 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021,
Zone:	
File:	21008 0 2021-06-09 1240.EC0 (Plus)
Identifier:	MG442W8H MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021 (49.9338)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound), P = North, Lane = 0-16
Separation:	GapX > 0 sec, Span 0 - 100 metre
Name:	Default Profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (metre, kilometre, m/s, km/h, kg, tonne)
In profile:	Vehicles = 137136 / 137237 (99.93%)

Weekly Vehicle Counts

WeeklyVehicle-149
Site: 21008.0.1NS
Description: **Werris Creek Road - Boral Quarry to 400 mtrs south**
Filter time: **14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	19 Apr	20 Apr	21 Apr	22 Apr	23 Apr	24 Apr	25 Apr	1 - 5	1 - 7
Hour									
0000-0100	*	*	0	14	11	6	13	8.3	8.8
0100-0200	*	*	0	2	5	9	8	2.3	4.8
0200-0300	*	*	0	10	12	4	4	7.3	6.0
0300-0400	*	*	0	19	13	16	9	10.7	11.4
0400-0500	*	*	0	40	34	14	15	24.7	20.6
0500-0600	*	*	0	89	83	44	34	57.3	50.0
0600-0700	*	*	0	153	117	52	38	90.0	72.0
0700-0800	*	*	0	244	218	119	52	154.0	126.6
0800-0900	*	*	73	240	245	189	97	186.0	168.8
0900-1000	*	*	**223**	**253**	245	229	139	**240.3**	**217.8**
1000-1100	*	*	213	228	242	222	**162**	227.7	213.4
1100-1200	*	*	188	223	**258**	**242**	141	223.0	210.4
1200-1300	*	*	206	221	194	256	158	207.0	207.0
1300-1400	*	*	210	193	213	**267**	**182**	205.3	**213.0**
1400-1500	*	0	240	246	276	215	178	190.5	192.5
1500-1600	*	0	292	303	280	209	165	218.8	208.2
1600-1700	*	0	291	**311**	**321**	189	136	**230.8**	208.0
1700-1800	*	0	**295**	291	268	138	138	213.5	188.3
1800-1900	*	0	122	184	198	109	77	126.0	115.0
1900-2000	*	0	96	98	79	62	54	68.3	64.8
2000-2100	*	0	40	65	73	37	51	44.5	44.3
2100-2200	*	0	40	51	44	30	23	33.8	31.3
2200-2300	*	0	28	26	36	24	12	22.5	21.0
2300-2400	*	0	11	17	18	26	24	11.5	16.0
Totals									
0700-1900	*	*	2353	2937	2958	2384	1625	2422.8	2269.0
0600-2200	*	*	2529	3304	3271	2565	1791	2659.3	2481.5
0600-0000	*	*	2568	3347	3325	2615	1827	2693.3	2518.5
0000-0000	*	*	2568	3521	3483	2708	1910	2804.0	2620.1
AM Peak	*	*	0900	0900	1100	1100	1000		
	*	*	223	253	258	242	162		
PM Peak	*	*	1700	1600	1600	1300	1300		
	*	*	295	311	321	267	182		

*** - No data.**

Weekly Vehicle Counts

WeeklyVehicle-149
Site: 21008.0.1NS
Description: **Werris Creek Road - Boral Quarry to 400 mtrs south**
Filter time: **14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	26 Apr	27 Apr	28 Apr	29 Apr	30 Apr	01 May	02 May	1 - 5	1 - 7
Hour									
0000-0100	9	6	8	10	12	13	10	9.0	9.7
0100-0200	4	4	3	4	11	9	14	5.2	7.0
0200-0300	6	13	14	9	15	9	6	11.4	10.3
0300-0400	10	10	9	16	22	16	10	13.4	13.3
0400-0500	39	28	40	42	36	21	19	37.0	32.1
0500-0600	101	92	96	102	83	42	34	94.8	78.6
0600-0700	138	147	143	155	128	78	43	142.2	118.9
0700-0800	247	235	257	240	220	138	117	239.8	207.7
0800-0900	**269**	**260**	**257**	**283**	238	277	169	**261.4**	250.4
0900-1000	243	206	215	232	**262**	242	341	231.6	248.7
1000-1100	210	202	215	203	224	**320**	556	210.8	275.7
1100-1200	185	172	231	213	203	304	**775**	200.8	**297.6**
1200-1300	205	188	204	195	232	**304**	**596**	204.8	**274.9**
1300-1400	214	163	201	227	261	302	402	213.2	252.9
1400-1500	234	227	231	232	271	291	337	239.0	260.4
1500-1600	238	263	261	250	254	251	237	253.2	250.6
1600-1700	**278**	264	**287**	**326**	**291**	258	210	**289.2**	273.4
1700-1800	263	**285**	278	284	243	186	181	270.6	245.7
1800-1900	115	143	168	159	176	125	120	152.2	143.7
1900-2000	60	71	80	106	95	70	52	82.4	76.3
2000-2100	39	71	51	70	67	47	56	59.6	57.3
2100-2200	34	37	38	50	43	53	25	40.4	40.0
2200-2300	25	24	26	22	29	48	23	25.2	28.1
2300-2400	19	15	13	15	19	19	12	16.2	16.0
Totals									
0700-1900	2701	2608	2805	2844	2875	2998	4041	2766.6	2981.7
0600-2200	2972	2934	3117	3225	3208	3246	4217	3091.2	3274.1
0600-0000	3016	2973	3156	3262	3256	3313	4252	3132.6	3318.3
0000-0000	3185	3126	3326	3445	3435	3423	4345	3303.4	3469.3
AM Peak	0800	0800	0800	0800	0900	1000	1100		
	269	260	257	283	262	320	775		
PM Peak	1600	1700	1600	1600	1600	1200	1200		
	278	285	287	326	291	304	596		

*** - No data.**

Weekly Vehicle Counts

WeeklyVehicle-149
Site: 21008.0.1NS
Description: **Werris Creek Road - Boral Quarry to 400 mtrs south**
Filter time: **14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	03 May	04 May	05 May	06 May	07 May	08 May	09 May	1 - 5	1 - 7
Hour									
0000-0100	6	5	8	7	7	7	11	6.6	7.3
0100-0200	9	5	3	4	4	5	9	5.0	5.6
0200-0300	11	13	11	14	12	15	11	12.2	12.4
0300-0400	18	20	24	21	14	10	8	19.4	16.4
0400-0500	30	34	35	36	37	21	13	34.4	29.4
0500-0600	83	79	83	82	81	36	30	81.6	67.7
0600-0700	132	135	125	138	126	56	27	131.2	105.6
0700-0800	**257**	240	207	**263**	201	96	44	233.6	186.9
0800-0900	233	**262**	**232**	251	255	188	108	**246.6**	218.4
0900-1000	219	230	209	251	**266**	212	166	235.0	221.9
1000-1100	165	212	208	221	227	204	217	206.6	207.7
1100-1200	222	195	195	214	242	**234**	**339**	213.6	**234.4**
1200-1300	184	199	204	207	231	221	241	205.0	212.4
1300-1400	202	190	221	222	216	**223**	212	210.2	212.3
1400-1500	255	206	239	234	252	196	197	237.2	225.6
1500-1600	246	212	224	**282**	278	207	252	248.4	243.0
1600-1700	**265**	**249**	264	269	**303**	148	**301**	**270.0**	**257.0**
1700-1800	251	215	**273**	267	277	156	173	256.6	230.3
1800-1900	126	128	139	166	195	108	99	150.8	137.3
1900-2000	65	65	75	101	94	67	59	80.0	75.1
2000-2100	34	53	53	63	63	53	55	53.2	53.4
2100-2200	24	32	28	53	49	48	32	37.2	38.0
2200-2300	19	19	32	26	45	35	14	28.2	27.1
2300-2400	9	13	12	5	23	17	9	12.4	12.6
Totals									
0700-1900	2625	2538	2615	2847	2943	2193	2349	2713.6	2587.1
0600-2200	2880	2823	2896	3202	3275	2417	2522	3015.2	2859.3
0600-0000	2908	2855	2940	3233	3343	2469	2545	3055.8	2899.0
0000-0000	3065	3011	3104	3397	3498	2563	2627	3215.0	3037.9
AM Peak	0700	0800	0800	0700	0900	1100	1100		
	257	262	232	263	266	234	339		
PM Peak	1600	1600	1700	1500	1600	1300	1600		
	265	249	273	282	303	223	301		

*** - No data.**

Weekly Vehicle Counts

WeeklyVehicle-149
Site: 21008.0.1NS
Description: **Werris Creek Road - Boral Quarry to 400 mtrs south**
Filter time: **14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	10 May	11 May	12 May	13 May	14 May	15 May	16 May	1 - 5	1 - 7
Hour									
0000-0100	9	10	7	5	10	14	16	8.2	10.1
0100-0200	5	5	7	8	8	6	9	6.6	6.9
0200-0300	8	8	6	6	11	12	8	7.8	8.4
0300-0400	16	20	21	24	19	19	10	20.0	18.4
0400-0500	42	33	44	46	34	18	15	39.8	33.1
0500-0600	84	77	86	80	74	41	31	80.2	67.6
0600-0700	117	113	123	144	143	46	50	128.0	105.1
0700-0800	214	**232**	208	249	211	100	89	222.8	186.1
0800-0900	226	213	224	**273**	219	193	112	231.0	208.6
0900-1000	219	228	**224**	227	**257**	**267**	155	**231.0**	**225.3**
1000-1100	**246**	198	200	216	212	213	180	214.4	209.3
1100-1200	204	203	197	211	207	215	**197**	204.4	204.9
1200-1300	226	179	215	220	224	**235**	177	212.8	210.9
1300-1400	194	185	213	202	247	226	175	208.2	206.0
1400-1500	216	213	228	239	281	216	234	235.4	232.4
1500-1600	230	222	244	269	298	203	220	252.6	240.9
1600-1700	**277**	**272**	**272**	271	**312**	195	**249**	**280.8**	**264.0**
1700-1800	234	271	265	**309**	309	153	172	277.6	244.7
1800-1900	122	142	172	191	175	87	92	160.4	140.1
1900-2000	71	70	49	88	101	45	55	75.8	68.4
2000-2100	37	48	55	79	77	35	30	59.2	51.6
2100-2200	26	36	34	55	52	46	30	40.6	39.9
2200-2300	29	18	40	32	52	33	15	34.2	31.3
2300-2400	11	20	16	17	24	21	9	17.6	16.9
Totals									
0700-1900	2608	2558	2662	2877	2952	2303	2052	2731.4	2573.1
0600-2200	2859	2825	2923	3243	3325	2475	2217	3035.0	2838.1
0600-0000	2899	2863	2979	3292	3401	2529	2241	3086.8	2886.3
0000-0000	3063	3016	3150	3461	3557	2639	2330	3249.4	3030.9
AM Peak	1000	0700	0900	0800	0900	0900	1100		
	246	232	224	273	257	267	197		
PM Peak	1600	1600	1600	1700	1600	1200	1600		
	277	272	272	309	312	235	249		

*** - No data.**

Weekly Vehicle Counts

WeeklyVehicle-149
Site: 21008.0.1NS
Description: **Werris Creek Road - Boral Quarry to 400 mtrs south**
Filter time: **14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	17 May	18 May	19 May	20 May	21 May	22 May	23 May	1 - 5	1 - 7
Hour									
0000-0100	7	9	4	7	10	16	11	7.4	9.1
0100-0200	4	1	9	4	7	9	4	5.0	5.4
0200-0300	9	15	15	12	15	11	3	13.2	11.4
0300-0400	11	18	14	14	20	14	4	15.4	13.6
0400-0500	31	35	38	33	36	15	10	34.6	28.3
0500-0600	75	73	78	58	84	51	35	73.6	64.9
0600-0700	115	126	143	96	120	68	37	120.0	100.7
0700-0800	241	**230**	244	178	212	108	51	221.0	180.6
0800-0900	**242**	207	**256**	**185**	**264**	181	121	**230.8**	208.0
0900-1000	214	218	249	162	223	**236**	159	213.2	**208.7**
1000-1100	209	197	203	160	207	211	196	195.2	197.6
1100-1200	193	160	231	134	231	233	**198**	189.8	197.1
1200-1300	199	179	238	135	221	**264**	196	194.4	204.6
1300-1400	191	181	257	131	234	229	191	198.8	202.0
1400-1500	232	213	227	193	269	222	**206**	226.8	223.1
1500-1600	216	249	270	215	**329**	250	175	255.8	243.4
1600-1700	255	**289**	**276**	**251**	306	171	200	**275.4**	**249.7**
1700-1800	**255**	239	271	216	274	193	132	251.0	225.7
1800-1900	112	143	168	143	165	106	111	146.2	135.4
1900-2000	59	67	82	94	95	65	78	79.4	77.1
2000-2100	39	48	54	47	83	49	37	54.2	51.0
2100-2200	23	30	40	25	45	37	29	32.6	32.7
2200-2300	23	21	16	15	39	31	22	22.8	23.9
2300-2400	15	13	14	23	28	14	11	18.6	16.9
Totals									
0700-1900	2559	2505	2890	2103	2935	2404	1936	2598.4	2476.0
0600-2200	2795	2776	3209	2365	3278	2623	2117	2884.6	2737.6
0600-0000	2833	2810	3239	2403	3345	2668	2150	2926.0	2778.3
0000-0000	2970	2961	3397	2531	3517	2784	2217	3075.2	2911.0
AM Peak	0800	0700	0800	0800	0800	0900	1100		
	242	230	256	185	264	236	198		
PM Peak	1700	1600	1600	1600	1500	1200	1400		
	255	289	276	251	329	264	206		

*** - No data.**

Weekly Vehicle Counts

WeeklyVehicle-149
Site: 21008.0.1NS
Description: **Werris Creek Road - Boral Quarry to 400 mtrs south**
Filter time: **14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	24 May	25 May	26 May	27 May	28 May	29 May	30 May	1 - 5	1 - 7
Hour									
0000-0100	5	12	2	4	13	8	5	7.2	7.0
0100-0200	9	7	9	6	5	6	3	7.2	6.4
0200-0300	6	10	11	8	14	11	8	9.8	9.7
0300-0400	12	19	17	22	12	14	13	16.4	15.6
0400-0500	34	38	41	43	31	12	12	37.4	30.1
0500-0600	70	84	87	86	79	33	32	81.2	67.3
0600-0700	126	148	135	129	113	59	25	130.2	105.0
0700-0800	219	**250**	**259**	**268**	229	61	66	245.0	193.1
0800-0900	**283**	236	237	240	264	182	111	**252.0**	221.9
0900-1000	202	210	251	229	237	206	165	225.8	214.3
1000-1100	212	187	196	174	219	287	215	197.6	212.9
1100-1200	189	171	189	207	**292**	**299**	**269**	209.6	**230.9**
1200-1300	211	181	226	206	231	270	238	211.0	223.3
1300-1400	221	195	176	215	263	**270**	**254**	214.0	227.7
1400-1500	240	181	221	254	285	262	243	236.2	240.9
1500-1600	266	275	268	**304**	310	255	247	284.6	**275.0**
1600-1700	**290**	**288**	**279**	298	**336**	192	221	**298.2**	272.0
1700-1800	227	248	238	280	305	188	177	259.6	237.6
1800-1900	147	155	155	180	175	103	107	162.4	146.0
1900-2000	81	68	71	90	105	56	58	83.0	75.6
2000-2100	47	46	65	98	59	44	38	63.0	56.7
2100-2200	44	41	29	53	53	38	29	44.0	41.0
2200-2300	19	15	24	37	52	38	20	29.4	29.3
2300-2400	18	16	19	13	24	23	14	18.0	18.1
Totals									
0700-1900	2707	2577	2695	2855	3146	2575	2313	2796.0	2695.4
0600-2200	3005	2880	2995	3225	3476	2772	2463	3116.2	2973.7
0600-0000	3042	2911	3038	3275	3552	2833	2497	3163.6	3021.1
0000-0000	3178	3081	3205	3444	3706	2917	2570	3322.8	3157.3
AM Peak	0800	0700	0700	0700	1100	1100	1100		
	283	250	259	268	292	299	269		
PM Peak	1600	1600	1600	1500	1600	1300	1300		
	290	288	279	304	336	270	254		

*** - No data.**

Weekly Vehicle Counts

WeeklyVehicle-149
Site: 21008.0.1NS
Description: **Werris Creek Road - Boral Quarry to 400 mtrs south**
Filter time: **14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	31 May	01 Jun	02 Jun	03 Jun	04 Jun	05 Jun	06 Jun	1 - 5	1 - 7
Hour									
0000-0100	1	8	7	13	8	0	0	7.4	5.3
0100-0200	4	6	7	4	2	0	0	4.6	3.3
0200-0300	9	11	12	17	6	0	0	11.0	7.9
0300-0400	16	25	20	19	23	0	0	20.6	14.7
0400-0500	27	32	48	39	39	0	0	37.0	26.4
0500-0600	86	81	76	74	69	0	0	77.2	55.1
0600-0700	112	126	140	132	109	0	0	123.8	88.4
0700-0800	232	247	231	**237**	192	0	0	227.8	162.7
0800-0900	**242**	**250**	233	229	203	0	0	**231.4**	**165.3**
0900-1000	203	226	**250**	219	**224**	0	0	224.4	160.3
1000-1100	202	204	182	200	202	0	0	198.0	141.4
1100-1200	191	194	184	183	195	**0**	**0**	189.4	135.3
1200-1300	171	197	213	209	**138**	0	0	185.6	132.6
1300-1400	194	176	208	194	0	0	0	154.4	110.3
1400-1500	228	219	238	206	0	0	0	178.2	127.3
1500-1600	239	234	274	**262**	0	0	0	201.8	144.1
1600-1700	**259**	**258**	**300**	247	0	0	0	**212.8**	**152.0**
1700-1800	238	253	234	248	0	0	0	194.6	139.0
1800-1900	129	128	137	130	0	0	0	104.8	74.9
1900-2000	65	66	69	88	0	0	0	57.6	41.1
2000-2100	38	52	47	60	0	0	0	39.4	28.1
2100-2200	26	27	42	45	0	0	0	28.0	20.0
2200-2300	27	22	22	30	0	0	0	20.2	14.4
2300-2400	12	12	12	16	0	**0**	**0**	10.4	7.4
Totals									
0700-1900	2528	2586	2684	2564	1154	0	0	2303.2	1645.1
0600-2200	2769	2857	2982	2889	1263	0	0	2552.0	1822.9
0600-0000	2808	2891	3016	2935	1263	0	0	2582.6	1844.7
0000-0000	2951	3054	3186	3101	1410	0	0	2740.4	1957.4
AM Peak	0800	0800	0900	0700	0900	1100	1100		
	242	250	250	237	224	0	0		
PM Peak	1600	1600	1600	1500	1200	2300	2300		
	259	258	300	262	138	0	0		

*** - No data.**

Weekly Vehicle Counts

WeeklyVehicle-149
Site: 21008.0.1NS
Description: **Werris Creek Road - Boral Quarry to 400 mtrs south**
Filter time: **14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages	
	07 Jun	08 Jun	09 Jun	10 Jun	11 Jun	12 Jun	13 Jun	1 - 5	1 - 7
Hour									
0000-0100	0	0	0	*	*	*	*	0.0	0.0
0100-0200	0	0	0	*	*	*	*	0.0	0.0
0200-0300	0	0	0	*	*	*	*	0.0	0.0
0300-0400	0	0	0	*	*	*	*	0.0	0.0
0400-0500	0	0	0	*	*	*	*	0.0	0.0
0500-0600	0	0	0	*	*	*	*	0.0	0.0
0600-0700	0	0	0	*	*	*	*	0.0	0.0
0700-0800	0	0	0	*	*	*	*	0.0	0.0
0800-0900	0	0	0	*	*	*	*	0.0	0.0
0900-1000	0	0	0	*	*	*	*	0.0	0.0
1000-1100	0	0	0	*	*	*	*	0.0	0.0
1100-1200	**0**	**0**	**0**	*	*	*	*	**0.0**	**0.0**
1200-1300	0	0	0	*	*	*	*	0.0	0.0
1300-1400	0	0	*	*	*	*	*	0.0	0.0
1400-1500	0	0	*	*	*	*	*	0.0	0.0
1500-1600	0	0	*	*	*	*	*	0.0	0.0
1600-1700	0	0	*	*	*	*	*	0.0	0.0
1700-1800	0	0	*	*	*	*	*	0.0	0.0
1800-1900	0	0	*	*	*	*	*	0.0	0.0
1900-2000	0	0	*	*	*	*	*	0.0	0.0
2000-2100	0	0	*	*	*	*	*	0.0	0.0
2100-2200	0	0	*	*	*	*	*	0.0	0.0
2200-2300	0	0	*	*	*	*	*	0.0	0.0
2300-2400	**0**	**0**	*	*	*	*	*	**0.0**	**0.0**
Totals									
0700-1900	0	0	*	*	*	*	*	0.0	0.0
0600-2200	0	0	*	*	*	*	*	0.0	0.0
0600-0000	0	0	*	*	*	*	*	0.0	0.0
0000-0000	0	0	*	*	*	*	*	0.0	0.0
AM Peak	1100	1100	1100	*	*	*	*		
	0	0	0	*	*	*	*		
PM Peak	2300	2300	*	*	*	*	*		
	0	0	*	*	*	*	*		

*** - No data.**

MetroCount Traffic Executive
Daily Classes

DailyClass-148 -- English (ENA)

Datasets:

Site:	**[21008] Werris Creek Road - Boral Quarry to 400 mtrs south**
Attribute:	Currabubula
Direction:	7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration:	14:15 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021,
Zone:	
File:	21008 0 2021-06-09 1240.EC0 (Plus)
Identifier:	MG442W8H MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021 (49.9338)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound), P = North, Lane = 0-16
Separation:	GapX > 0 sec, Span 0 - 100 metre
Name:	Default Profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (metre, kilometre, m/s, km/h, kg, tonne)
In profile:	Vehicles = 137136 / 137237 (99.93%)

Daily Classes

DailyClass-148
Site: 21008.0.1NS
Description: **Werris Creek Road - Boral Quarry to 400 mtrs south**
Filter time: **14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

Monday, 19 April 2021

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Tue*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Wed	1902	52	412	46	13	19	19	3	40	60	2	0	2568
(%)	74.1	2.0	16.0	1.8	0.5	0.7	0.7	0.1	1.6	2.3	0.1	0.0	
Thu	2586	86	556	56	18	23	48	6	65	70	6	1	3521
(%)	73.4	2.4	15.8	1.6	0.5	0.7	1.4	0.2	1.8	2.0	0.2	0.0	
Fri	2612	104	540	52	9	28	31	8	56	40	3	0	3483
(%)	75.0	3.0	15.5	1.5	0.3	0.8	0.9	0.2	1.6	1.1	0.1	0.0	
Sat	2115	100	383	23	2	31	28	2	10	14	0	0	2708
(%)	78.1	3.7	14.1	0.8	0.1	1.1	1.0	0.1	0.4	0.5	0.0	0.0	
Sun	1451	67	269	10	0	22	29	5	11	44	2	0	1910
(%)	76.0	3.5	14.1	0.5	0.0	1.2	1.5	0.3	0.6	2.3	0.1	0.0	

Average daily volume

Entire week													
	2133	82	432	37	8	25	31	5	36	46	3	0	2838
(%)	75.2	2.9	15.2	1.3	0.3	0.9	1.1	0.2	1.3	1.6	0.1	0.0	
Weekdays													
	2367	81	503	51	13	23	33	6	54	57	4	0	3191
(%)	74.2	2.5	15.8	1.6	0.4	0.7	1.0	0.2	1.7	1.8	0.1	0.0	
Weekend													
	1783	84	326	17	1	27	29	4	11	29	1	0	2309
(%)	77.2	3.6	14.1	0.7	0.0	1.1	1.2	0.2	0.5	1.3	0.0	0.0	

*** - Incomplete**

Daily Classes

DailyClass-148
Site: 21008.0.1NS
Description: **Werris Creek Road - Boral Quarry to 400 mtrs south**
Filter time: **14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

Monday, 26 April 2021

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon	2302	94	523	46	18	30	36	6	53	74	3	0	3185
(%)	72.3	3.0	16.4	1.4	0.6	0.9	1.1	0.2	1.7	2.3	0.1	0.0	
Tue	2322	71	497	51	5	23	25	12	55	61	3	1	3126
(%)	74.3	2.3	15.9	1.6	0.2	0.7	0.8	0.4	1.8	2.0	0.1	0.0	
Wed	2469	70	539	37	11	22	22	9	79	65	3	0	3326
(%)	74.2	2.1	16.2	1.1	0.3	0.7	0.7	0.3	2.4	2.0	0.1	0.0	
Thu	2529	108	536	41	8	29	33	6	65	86	4	0	3445
(%)	73.4	3.1	15.6	1.2	0.2	0.8	1.0	0.2	1.9	2.5	0.1	0.0	
Fri	2579	96	548	39	8	29	22	8	46	56	4	0	3435
(%)	75.1	2.8	16.0	1.1	0.2	0.8	0.6	0.2	1.3	1.6	0.1	0.0	
Sat	2712	104	492	19	4	25	19	5	20	21	2	0	3423
(%)	79.2	3.0	14.4	0.6	0.1	0.7	0.6	0.1	0.6	0.6	0.1	0.0	
Sun	3666	111	442	18	1	24	21	6	17	34	4	1	4345
(%)	84.4	2.6	10.2	0.4	0.0	0.6	0.5	0.1	0.4	0.8	0.1	0.0	

Average daily volume

Entire week													
	2654	93	511	36	8	26	25	7	48	57	3	0	3469
(%)	76.5	2.7	14.7	1.0	0.2	0.7	0.7	0.2	1.4	1.6	0.1	0.0	
Weekdays													
	2440	88	529	43	10	27	28	8	60	68	3	0	3303
(%)	73.9	2.7	16.0	1.3	0.3	0.8	0.8	0.2	1.8	2.1	0.1	0.0	
Weekend													
	3189	108	467	19	3	25	20	6	19	28	3	1	3884
(%)	82.1	2.8	12.0	0.5	0.1	0.6	0.5	0.1	0.5	0.7	0.1	0.0	

*** - Incomplete**

Daily Classes

DailyClass-148
Site: 21008.0.1NS
Description: **Werris Creek Road - Boral Quarry to 400 mtrs south**
Filter time: **14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

Monday, 3 May 2021

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon	2205	90	504	40	22	27	26	12	73	64	2	0	3065
(%)	71.9	2.9	16.4	1.3	0.7	0.9	0.8	0.4	2.4	2.1	0.1	0.0	
Tue	2271	65	475	34	9	24	16	5	59	52	1	0	3011
(%)	75.4	2.2	15.8	1.1	0.3	0.8	0.5	0.2	2.0	1.7	0.0	0.0	
Wed	2277	54	506	46	9	17	17	10	64	102	2	0	3104
(%)	73.4	1.7	16.3	1.5	0.3	0.5	0.5	0.3	2.1	3.3	0.1	0.0	
Thu	2477	86	504	49	5	16	22	19	85	131	3	0	3397
(%)	72.9	2.5	14.8	1.4	0.1	0.5	0.6	0.6	2.5	3.9	0.1	0.0	
Fri	2622	86	542	52	8	29	37	6	46	65	5	0	3498
(%)	75.0	2.5	15.5	1.5	0.2	0.8	1.1	0.2	1.3	1.9	0.1	0.0	
Sat	2021	79	370	19	3	13	29	6	10	12	1	0	2563
(%)	78.9	3.1	14.4	0.7	0.1	0.5	1.1	0.2	0.4	0.5	0.0	0.0	
Sun	2117	72	325	17	1	15	22	5	22	29	2	0	2627
(%)	80.6	2.7	12.4	0.6	0.0	0.6	0.8	0.2	0.8	1.1	0.1	0.0	

Average daily volume

Entire week													
	2284	76	461	37	8	20	24	9	51	65	2	0	3038
(%)	75.2	2.5	15.2	1.2	0.3	0.7	0.8	0.3	1.7	2.1	0.1	0.0	
Weekdays													
	2370	76	506	44	11	23	24	10	65	83	3	0	3215
(%)	73.7	2.4	15.7	1.4	0.3	0.7	0.7	0.3	2.0	2.6	0.1	0.0	
Weekend													
	2069	76	348	18	2	14	26	6	16	21	2	0	2595
(%)	79.7	2.9	13.4	0.7	0.1	0.5	1.0	0.2	0.6	0.8	0.1	0.0	

*** - Incomplete**

Daily Classes

DailyClass-148
Site: 21008.0.1NS
Description: **Werris Creek Road - Boral Quarry to 400 mtrs south**
Filter time: **14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

Monday, 10 May 2021

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon	2240	79	509	31	5	26	31	10	58	71	3	0	3063
(%)	73.1	2.6	16.6	1.0	0.2	0.8	1.0	0.3	1.9	2.3	0.1	0.0	
Tue	2287	63	472	45	4	17	17	11	42	55	3	0	3016
(%)	75.8	2.1	15.6	1.5	0.1	0.6	0.6	0.4	1.4	1.8	0.1	0.0	
Wed	2411	70	488	45	10	12	17	3	46	44	4	0	3150
(%)	76.5	2.2	15.5	1.4	0.3	0.4	0.5	0.1	1.5	1.4	0.1	0.0	
Thu	2670	64	509	41	8	24	33	7	45	58	2	0	3461
(%)	77.1	1.8	14.7	1.2	0.2	0.7	1.0	0.2	1.3	1.7	0.1	0.0	
Fri	2686	81	570	53	16	18	38	7	33	49	5	1	3557
(%)	75.5	2.3	16.0	1.5	0.4	0.5	1.1	0.2	0.9	1.4	0.1	0.0	
Sat	2068	111	347	26	3	22	33	2	14	13	0	0	2639
(%)	78.4	4.2	13.1	1.0	0.1	0.8	1.3	0.1	0.5	0.5	0.0	0.0	
Sun	1735	112	327	22	3	29	33	6	18	45	0	0	2330
(%)	74.5	4.8	14.0	0.9	0.1	1.2	1.4	0.3	0.8	1.9	0.0	0.0	

Average daily volume

Entire week													
	2300	83	460	38	7	21	29	7	37	48	2	0	3031
(%)	75.9	2.7	15.2	1.2	0.2	0.7	1.0	0.2	1.2	1.6	0.1	0.0	
Weekdays													
	2459	71	510	43	9	19	27	8	45	55	3	0	3249
(%)	75.7	2.2	15.7	1.3	0.3	0.6	0.8	0.2	1.4	1.7	0.1	0.0	
Weekend													
	1902	112	337	24	3	26	33	4	16	29	0	0	2485
(%)	76.5	4.5	13.6	1.0	0.1	1.0	1.3	0.2	0.6	1.2	0.0	0.0	

*** - Incomplete**

Daily Classes

DailyClass-148
Site: 21008.0.1NS
Description: **Werris Creek Road - Boral Quarry to 400 mtrs south**
Filter time: **14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

Monday, 17 May 2021

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon	2196	64	489	41	7	20	18	8	68	56	3	0	2970
(%)	73.9	2.2	16.5	1.4	0.2	0.7	0.6	0.3	2.3	1.9	0.1	0.0	
Tue	2242	61	466	37	15	14	25	3	41	54	2	1	2961
(%)	75.7	2.1	15.7	1.2	0.5	0.5	0.8	0.1	1.4	1.8	0.1	0.0	
Wed	2499	83	536	77	13	21	24	10	47	86	1	0	3397
(%)	73.6	2.4	15.8	2.3	0.4	0.6	0.7	0.3	1.4	2.5	0.0	0.0	
Thu	1896	67	425	29	3	13	21	8	29	39	1	0	2531
(%)	74.9	2.6	16.8	1.1	0.1	0.5	0.8	0.3	1.1	1.5	0.0	0.0	
Fri	2612	82	623	48	4	18	35	9	37	47	2	0	3517
(%)	74.3	2.3	17.7	1.4	0.1	0.5	1.0	0.3	1.1	1.3	0.1	0.0	
Sat	2177	91	413	14	4	30	29	1	17	7	1	0	2784
(%)	78.2	3.3	14.8	0.5	0.1	1.1	1.0	0.0	0.6	0.3	0.0	0.0	
Sun	1614	121	355	18	5	19	33	5	20	25	2	0	2217
(%)	72.8	5.5	16.0	0.8	0.2	0.9	1.5	0.2	0.9	1.1	0.1	0.0	

Average daily volume

Entire week													
	2177	81	472	38	7	19	26	6	37	45	2	0	2911
(%)	74.8	2.8	16.2	1.3	0.3	0.7	0.9	0.2	1.3	1.5	0.1	0.0	
Weekdays													
	2289	71	508	46	8	17	25	8	44	56	2	0	3075
(%)	74.4	2.3	16.5	1.5	0.3	0.6	0.8	0.2	1.4	1.8	0.1	0.0	
Weekend													
	1896	106	384	16	5	25	31	3	19	16	2	0	2501
(%)	75.8	4.2	15.4	0.6	0.2	1.0	1.2	0.1	0.7	0.6	0.1	0.0	

*** - Incomplete**

Daily Classes

DailyClass-148
Site: 21008.0.1NS
Description: **Werris Creek Road - Boral Quarry to 400 mtrs south**
Filter time: **14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

Monday, 24 May 2021

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon	2276	64	544	64	8	22	27	8	77	86	2	0	3178
(%)	71.6	2.0	17.1	2.0	0.3	0.7	0.8	0.3	2.4	2.7	0.1	0.0	
Tue	2253	61	536	42	10	17	23	7	71	59	1	1	3081
(%)	73.1	2.0	17.4	1.4	0.3	0.6	0.7	0.2	2.3	1.9	0.0	0.0	
Wed	2360	97	505	33	11	24	23	11	68	69	3	1	3205
(%)	73.6	3.0	15.8	1.0	0.3	0.7	0.7	0.3	2.1	2.2	0.1	0.0	
Thu	2564	65	570	57	5	23	28	11	66	53	2	0	3444
(%)	74.4	1.9	16.6	1.7	0.1	0.7	0.8	0.3	1.9	1.5	0.1	0.0	
Fri	2801	94	605	31	10	22	42	6	52	40	3	0	3706
(%)	75.6	2.5	16.3	0.8	0.3	0.6	1.1	0.2	1.4	1.1	0.1	0.0	
Sat	2341	97	392	9	6	21	27	1	14	9	0	0	2917
(%)	80.3	3.3	13.4	0.3	0.2	0.7	0.9	0.0	0.5	0.3	0.0	0.0	
Sun	2028	94	320	14	0	26	24	6	24	34	0	0	2570
(%)	78.9	3.7	12.5	0.5	0.0	1.0	0.9	0.2	0.9	1.3	0.0	0.0	

Average daily volume

Entire week													
	2375	82	496	36	7	22	28	7	53	50	2	0	3157
(%)	75.2	2.6	15.7	1.1	0.2	0.7	0.9	0.2	1.7	1.6	0.0	0.0	
Weekdays													
	2451	76	552	45	9	22	29	9	67	61	2	0	3323
(%)	73.8	2.3	16.6	1.4	0.3	0.7	0.9	0.3	2.0	1.8	0.1	0.0	
Weekend													
	2185	96	356	12	3	24	26	4	19	22	0	0	2744
(%)	79.6	3.5	13.0	0.4	0.1	0.9	0.9	0.1	0.7	0.8	0.0	0.0	

*** - Incomplete**

Daily Classes

DailyClass-148
Site: 21008.0.1NS
Description: **Werris Creek Road - Boral Quarry to 400 mtrs south**
Filter time: **14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

Monday, 31 May 2021

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon	2125	101	508	19	8	18	31	9	51	79	2	0	2951
(%)	72.0	3.4	17.2	0.6	0.3	0.6	1.1	0.3	1.7	2.7	0.1	0.0	
Tue	2213	60	512	45	7	32	32	10	50	91	2	0	3054
(%)	72.5	2.0	16.8	1.5	0.2	1.0	1.0	0.3	1.6	3.0	0.1	0.0	
Wed	2349	66	529	40	14	9	19	7	47	102	4	0	3186
(%)	73.7	2.1	16.6	1.3	0.4	0.3	0.6	0.2	1.5	3.2	0.1	0.0	
Thu	2260	43	591	30	8	13	26	12	52	63	3	0	3101
(%)	72.9	1.4	19.1	1.0	0.3	0.4	0.8	0.4	1.7	2.0	0.1	0.0	
Fri	1006	33	300	14	0	4	15	5	15	18	0	0	1410
(%)	71.3	2.3	21.3	1.0	0.0	0.3	1.1	0.4	1.1	1.3	0.0	0.0	
Sat	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sun	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Average daily volume

Entire week

	1422	43	349	21	5	11	18	6	31	50	2	0	1957
(%)	72.6	2.2	17.8	1.1	0.3	0.6	0.9	0.3	1.6	2.6	0.1	0.0	

Weekdays

	1991	61	488	30	7	15	25	9	43	71	2	0	2740
(%)	72.6	2.2	17.8	1.1	0.3	0.6	0.9	0.3	1.6	2.6	0.1	0.0	

Weekend

	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

*** - Incomplete**

Daily Classes

DailyClass-148
Site: 21008.0.1NS
Description: **Werris Creek Road - Boral Quarry to 400 mtrs south**
Filter time: **14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

Monday, 7 June 2021

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Tue	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Wed*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Thu*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Fri*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sun*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Average daily volume

Entire week

	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Weekdays

	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Weekend No complete days.

*** - Incomplete**

MetroCount Traffic Executive
Speed Statistics

SpeedStat-147 -- English (ENA)

Datasets:

Site:	**[21008] Werris Creek Road - Boral Quarry to 400 mtrs south**
Attribute:	Currabubula
Direction:	7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration:	14:15 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021,
Zone:	
File:	21008 0 2021-06-09 1240.EC0 (Plus)
Identifier:	MG442W8H MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021 (49.9338)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound), P = North, Lane = 0-16
Separation:	GapX > 0 sec, Span 0 - 100 metre
Name:	Default Profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (metre, kilometre, m/s, km/h, kg, tonne)
In profile:	Vehicles = 137136 / 137237 (99.93%)

Speed Statistics

SpeedStat-147
Site: 21008.0.1NS
Description: **Werris Creek Road - Boral Quarry to 400 mtrs south**
Filter time: **14:16 Tuesday, 20 April 2021 => 12:40 Wednesday, 9 June 2021**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) GapX(>0) Span(0 - 100) Lane(0-16)

Vehicles = 137136
Posted speed limit = 100 km/h, Exceeding = 61016 (44.49%), Mean Exceeding = 106.27 km/h
Maximum = 159.8 km/h, **Minimum** = 10.3 km/h, **Mean** = 96.7 km/h
85% Speed = 106.74 km/h, **95% Speed** = 113.04 km/h, **Median** = 98.91 km/h
20 km/h Pace = 89 - 109, **Number in Pace** = 99045 (72.22%)
Variance = 177.07, **Standard Deviation** = 13.31 km/h

Speed Bins (Partial days)

Speed	Bin	Below	Above	Energy	vMult	n * vMult
0 - **10**	0 0.000%	0 0.000%	137136 100.0%	0.00	0.00	0.00
10 - **20**	52 0.038%	52 0.038%	137084 99.96%	0.00	0.00	0.00
20 - **30**	250 0.182%	302 0.220%	136834 99.78%	0.00	0.00	0.00
30 - **40**	586 0.427%	888 0.648%	136248 99.35%	0.00	0.00	0.00
40 - **50**	898 0.655%	1786 1.302%	135350 98.70%	0.00	0.00	0.00
50 - **60**	1527 1.113%	3313 2.416%	133823 97.58%	0.00	0.00	0.00
60 - **70**	3180 2.319%	6493 4.735%	130643 95.27%	0.00	0.00	0.00
70 - **80**	5036 3.672%	11529 8.407%	125607 91.59%	0.00	0.00	0.00
80 - **90**	15280 11.14%	26809 19.55%	110327 80.45%	0.00	0.00	0.00
90 - **100**	49311 35.96%	76120 55.51%	61016 44.49%	0.00	0.00	0.00
100 - **110**	49541 36.13%	125661 91.63%	11475 8.368%	0.00	0.00	0.00
110 - **120**	9180 6.694%	134841 98.33%	2295 1.674%	0.00	0.00	0.00
120 - **130**	1767 1.289%	136608 99.61%	528 0.385%	0.00	0.00	0.00
130 - **140**	420 0.306%	137028 99.92%	108 0.079%	0.00	0.00	0.00
140 - **150**	88 0.064%	137116 99.99%	20 0.015%	0.00	0.00	0.00
150 - **160**	20 0.015%	137136 100.0%	0 0.000%	0.00	0.00	0.00
160 - **170**	0 0.000%	137136 100.0%	0 0.000%	0.00	0.00	0.00
170 - **180**	0 0.000%	137136 100.0%	0 0.000%	0.00	0.00	0.00
180 - **190**	0 0.000%	137136 100.0%	0 0.000%	0.00	0.00	0.00
190 - **200**	0 0.000%	137136 100.0%	0 0.000%	0.00	0.00	0.00

Total Speed Rating = 0.00
Total Moving Energy (Estimated) = 0.00

Speed limit fields (Partial days)

	Limit	Below	Above
0	100 (PSL)	76120 55.5%	61016 44.5%

Premise

APPENDIX B

Noise Impact Assessment

Currabubula Quarry - Noise Impact Assessment

Project ID: 13644

24/09/2021

Release: R6

Prepared For:

Premise Australia

Assured Environmental

DOCUMENT CONTROL PAGE

Project Title: Currabubula Quarry - Noise Impact Assessment

Project Reference ID: 13644

Report Prepared by:

Assured Environmental
Unit 7, 142 Tennyson Memorial Avenue
Tennyson, QLD, 4105

Report Prepared for:

Premise Australia
154 Peisley St
Orange, NSW, 2800

Author: Aiden Allen

Reviewer: Michelle Clifton

Table 1: History of Revisions

Revision	Date	Issued to	Changes
R0	01/07/2021	C. Bigg	Initial Release
R1	19/07/2021	C. Bigg	Client Comment
R2	2/8/2021	C. Bigg	Updated Model
R3	5/08/2021	C. Bigg	Final Review
R4	21/09/2021	C. Bigg	Final
R5	23/09/2021	C. Bigg	Client Comment
R6	24/09/2021	C. Bigg	Final

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GLOSSARY

A-Weighting	A response provided by an electronic circuit which modifies sound in such a way that the resulting level is similar to that perceived by the human ear.
ADT	Average Daily Traffic.
AADT	Annual Average Daily Traffic.
AGL	Above Ground Level.
dB (decibel)	This is the scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and the reference pressure (0.00002 N/m^2).
dB(A) or dBA	This is a measure of the overall noise level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
dB(Z)	This is a measure of the overall noise level of sound across the audible spectrum with a "Z" frequency weighting which is effectively the un-weighted signal.
Free-field	Refers to a sound pressure level determined at a point away from reflective surfaces other than the ground with no significant contribution due to sound from other reflective surfaces; generally, as measured outside and away from buildings.
ha	Hectare.
HV	Heavy Vehicles (Class 3 and above).
Hz	Hertz. Unit of frequency of a variable parameter. Units: 1/seconds.
L_{Aeq}	This is the equivalent steady sound level in dB(A) containing the same acoustic energy as the actual fluctuating sound level over the given period. Noise levels often fluctuate over a wide range with time. Therefore, when a noise varies over time, the L_{Aeq} is the equivalent continuous sound which would contain the same sound energy as the time varying sound. Many studies show that human reaction to level-varying sounds tends to relate closer to the L_{Aeq} noise level than any other descriptor.
L_{A10}, L_{A90}, L_{An}	Noise level exceeded for n% of the measurement period with A-weighted, calculated by statistical analysis - where n is between 0.01% and 99.99%. For example, L_{A10} is the noise level just exceeded for 10% of the measurement period, calculated by statistical analysis and used to determine traffic noise and L_{A90} is the noise level exceeded for 90% of the measurement period, A-weighted and calculated by statistical analysis and used to determine background noise levels.
L_{AFmax}	A-weighted, fast response, maximum, sound level.
L_{AFmin}	A-weighted, fast response, minimum, sound level.
LV	Light Vehicles (Class 2 and below).
PNTL	Project Noise Trigger Level. Noise level criteria derived in accordance with NPfI (2017).

PPV	Peak Particle Velocity. A measure of vibration magnitude, based on the velocity (speed) of the surface of a vibrating object.
RBL	Rating background noise level – the overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period.
tpa	Tonnes per Annum.
VDV	Vibration Dose Value.
SWL	Sound Power Level in decibels is ten times the logarithm of the ratio of the sound power to the sound power reference level of 1 pico Watt.

ABBREVIATIONS

BOM	Bureau of Meteorology
CONCAWE	Conservation of Clean Air and Water in Europe
DA	Development Application
DECCW	NSW Department of Environment, Climate Change and Water
ELVIS	Elevation Information System (Intergovernmental Committee on Surveying and Mapping)
EPA	Environmental Protection Authority
FEL	Front End Loader
NPfI	Noise Policy for Industry (NSW EPA, 2017)
NSW	New South Wales
RNP	NSW Road Noise Policy
TfNSW	Transport for New South Wales
USA DT	United States of America Department of Transport

1 INTRODUCTION

1.1 Background

Boral Resources (Country) Pty Ltd (hereafter referred to as Boral) operates a quarry at 3716 Werris Creek Road, Currabubula (Subject Site) in the Liverpool Plains LGA. The quarry has received a rapid increase in demand for its product over the last 15 months owing to stimulus investment in road infrastructure, particularly for rural Councils and Transport in NSW (TfNSW).

The existing Development Consent has an annual production limit of 300,000 tpa. It is proposed to increase the annual production limit to 400,000 tpa, as well as install a mobile pugmill to blend and mix 50,000 tpa of aggregate (from the quarry) and stabilment (blended slag and lime). The proposed increase in the extraction limit would allow the quarry to increase production to meet the increasing demand for construction materials in the Tamworth and surrounding areas.

The proposed modification includes no changes to the following:

- site layout or operations;
- the current development footprint;
- the quarry consent area; or
- the quarry's operating hours.

1.2 Scope of Assessment

Assured Environmental (AE) was appointed by Premise Australia to undertake a noise assessment for the proposed increase in operational capacity of the quarry and changes to infrastructure.

This noise assessment forms part of the Statement of Environmental Effects (SEE) to accompany the application to modify the quarry's development consent. The assessment has been conducted in accordance with the following documents:

- NSW Noise Policy for Industry (2017);
- NSW Road Noise Policy (2011).

In accordance with the requirements of the above guidelines, computational modelling and first principal calculations have been undertaken to assess the potential for adverse amenity as a result of the modification.

1.3 This Report

This report summarises the methodology, results, and conclusions of the noise impact assessment.

2 DESCRIPTION OF EXISTING ENVIRONMENT

2.1 Location

The quarry is approximately 28 km southwest of Tamworth and 4 km southeast of Currabubula on 28 lots, as shown in Figure 1. The surrounding area is agricultural land, with livestock grazing.

- Lots 1-12 on DP1114811;
- Lots 5-11 and 17-19 on DP114714; and
- Lots 70, 92, 97-98, 211 and 236 on DP751011.

2.2 Terrain

Figure 2 illustrates the local topography, as obtained from a combination of Lidar data at 25 m resolution obtained from ELVIS spatial database and extracted for 10 m intervals.

The topography of the Subject Site is dominated by three ridges; one to the east, one to the north and one to the west of the Site. The existing quarry is situated adjacent to a peak which rises to 630 m above sea level.

2.3 Receptors

Table 2 and Figure 3 present the nearest sensitive receptors to the Subject Site. The nearest receptors (R1 and R2) are located approximately 550 m and 460 m from the nearest point of the quarry haul road, which is at the point where the haul road joins Werris Creek Road at the north-western corner of the Subject Site as shown in Figure 3.

Table 2: Sensitive Receptors

ID	Location (UTM Zone 56)		Elevation (m)	Distance from Quarry (km)	Land Use
	X	Y			
R1	286808	6537874	479	2.3	Dwelling
R2	287196	6538282	457	2.6	Dwelling
R3	289008	6538603	471	3.1	Dwelling
R4	289213	6538314	477	3.0	Dwelling
R5	291236	6537188	492	3.8	Dwelling
R6	290885	6536575	495	3.3	Dwelling
R7	290849	6535587	507	3.2	Dwelling
R8	288669	6534146	553	1.8	Dwelling

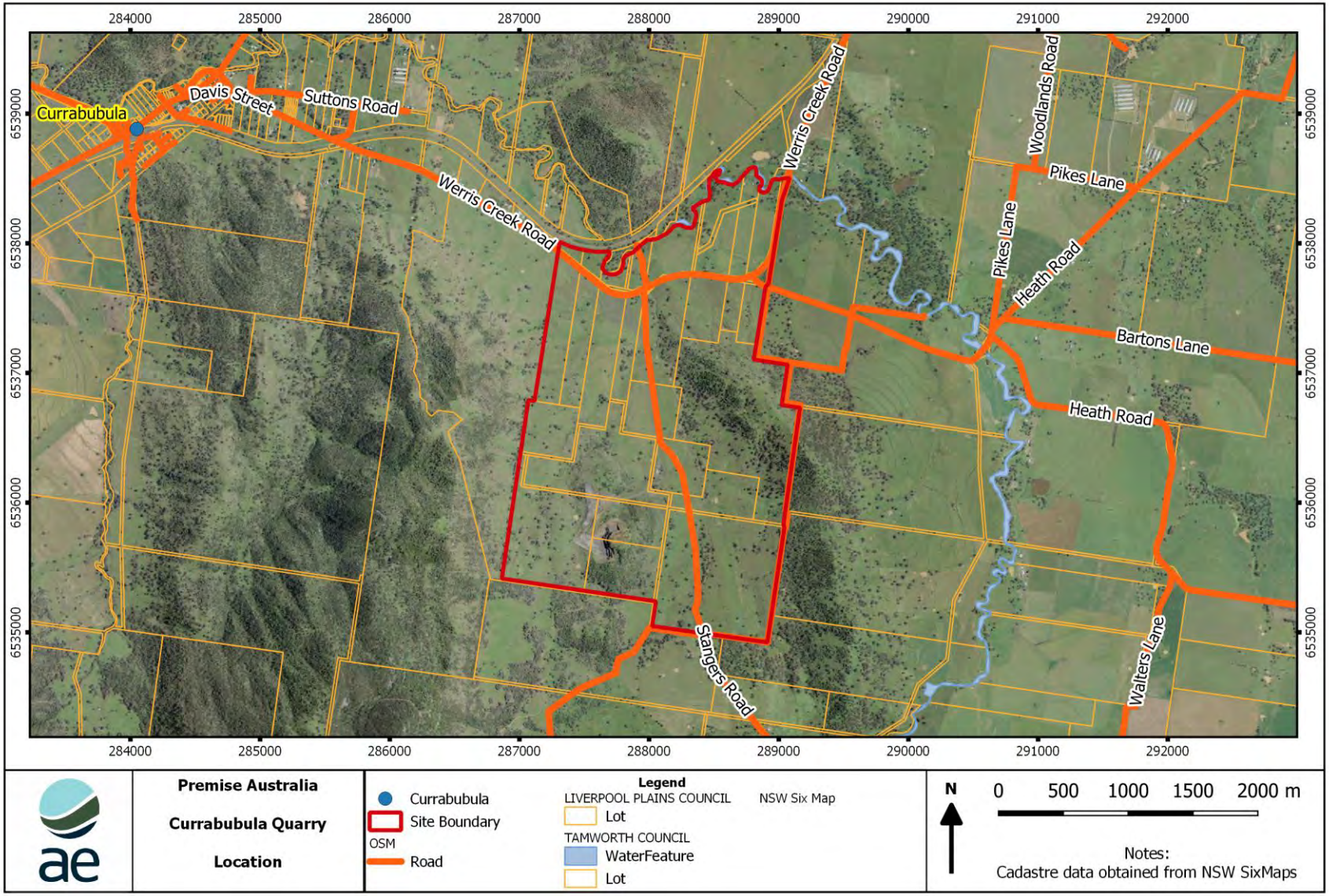


Figure 1: Site Location and Surrounding Areas

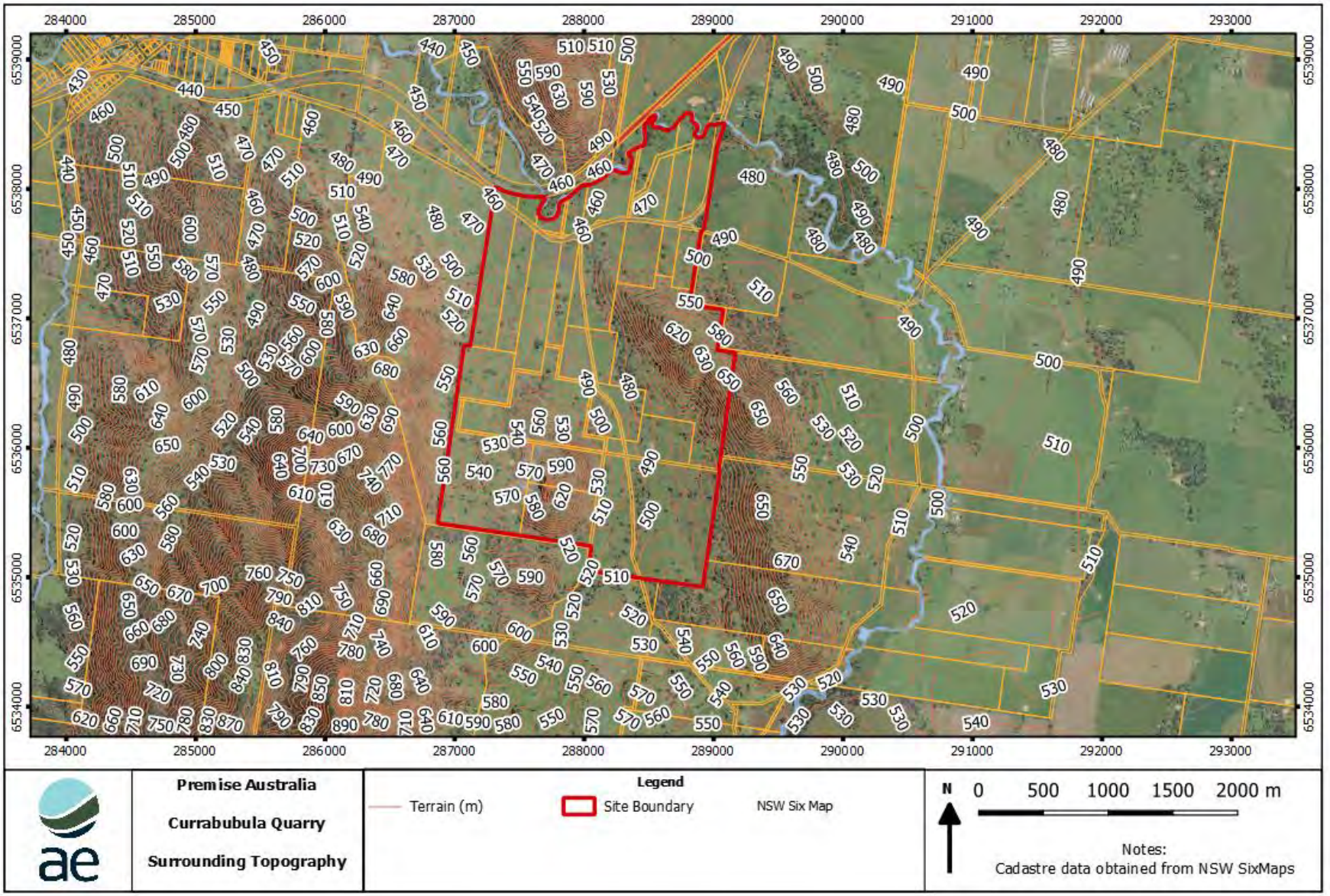


Figure 2: Surrounding Topography (ELVIS)

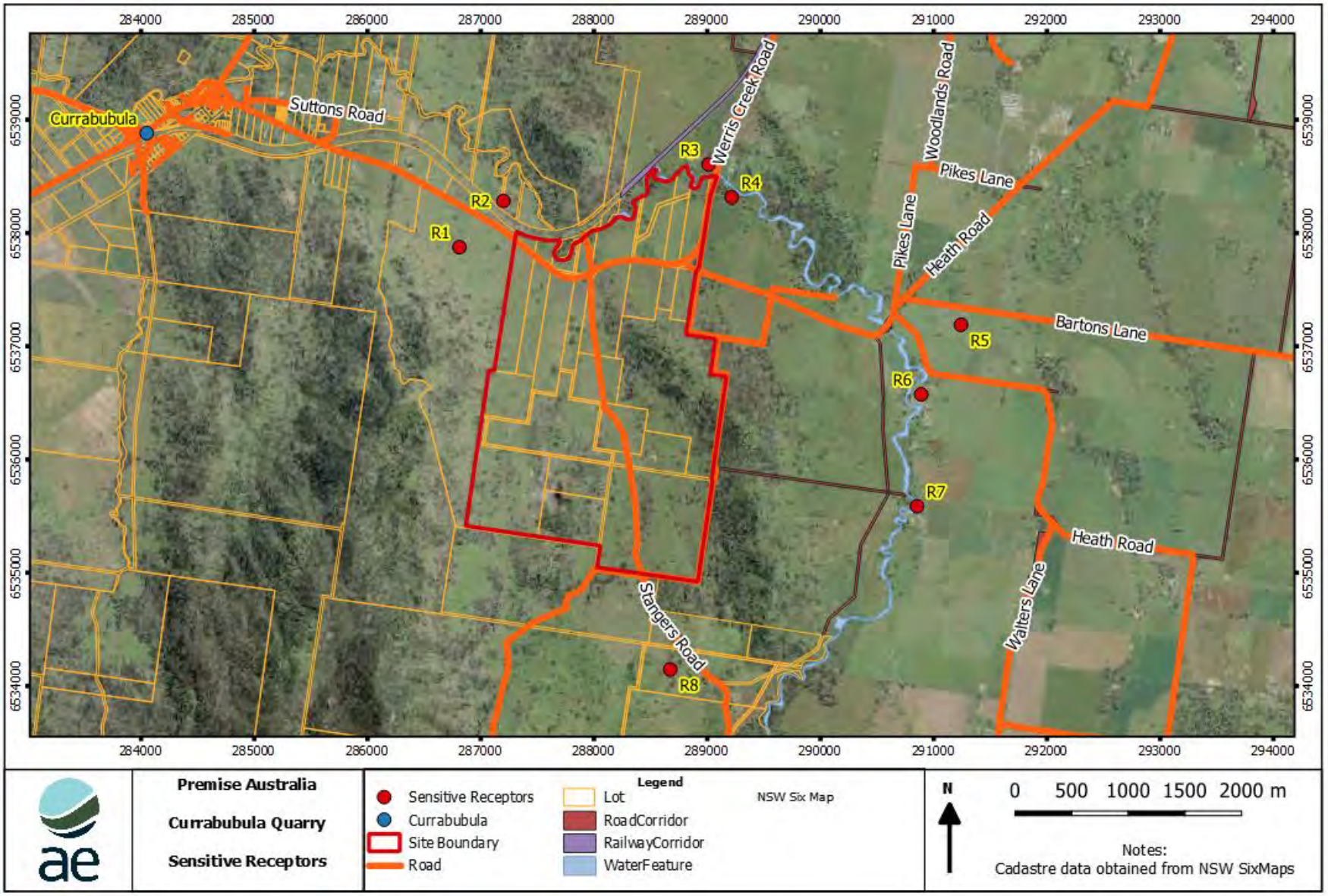


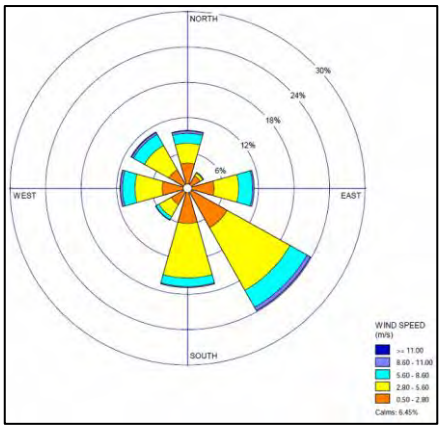
Figure 3: Sensitive Receptors

2.4 Climate

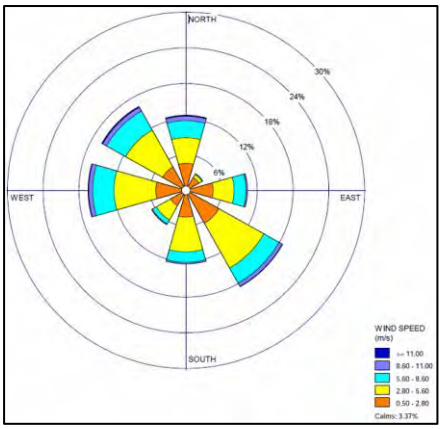
The Tamworth region experiences its hot season during December to March, and cold season from May to August. The warmest month is typically January, with an average maximum temperature of 32°C. The coolest month is July, with an average maximum temperature of 16°C.

The average percentage of the sky covered by clouds experiences mild seasonal variation over the course of the year; the sky is clear, mostly clear, or partly cloudy 81% of the time, and overcast or mostly cloudy 19% of the time, meaning temperature inversions would be very common in this location, even during the cooler months.

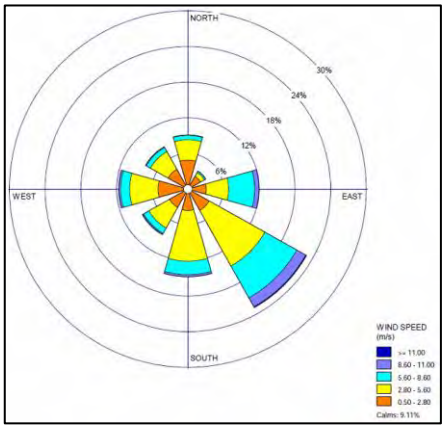
The prevailing winds in the area are predominantly from the southeast and south as shown in figure 4 below. The wind roses include data for the years 2012-2019 measured at the BOM station 055325 - Tamworth Airport.



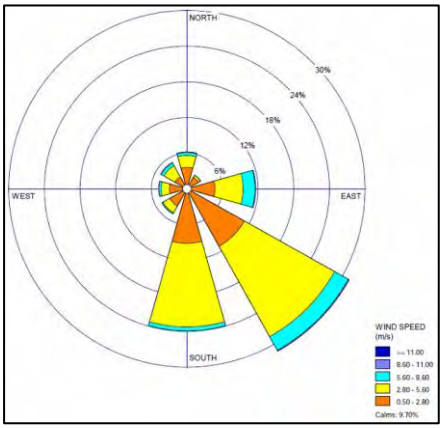
Annual



Day (0700 – 1800 hours)



Evening (1800 – 2200 hours)



Night (2200 – 0700 hours)

Figure 4: Wind Roses from Tamworth Airport

3 PROJECT DESCRIPTION

3.1 History of the Facility

Consent was granted for the purposes of a hard rock (andesite) quarry and processing plant on 25 January 1996, DA 95/114, for 200,000 tpa over a 45-year period. Boral was granted a modification to the original consent to expand the quarry operations under DA 20/2006 on 2 June 2006.

Boral subsequently sought a consent modification and obtained approval DA51/2017 on 26 February 2018 for the purpose of quarrying up to 300,000 tonnes per annum of andesite. As stated in the Notice of Determination, DA51/2017 supersedes the previous consents DA 95/114 and DA 20/2006.

As a short-term measure to address a short-fall in production demand, consent was granted on 7 December 2020 for a "short-term" production increase to 330,000 tpa for the 2020 calendar year (DA 51/2017_02).

3.2 Current Operations

The quarry, associated processing facilities and haul road occupy approximately 20 ha. The remainder of the 556-ha site provides access and a large buffer to the nearest residential receivers and Werris Creek Road.

Figure 6 below displays the following major features of the quarry:

- a series of benched working quarry faces;
- in-pit mobile crushing and screening equipment;
- a product stockpiling area in the north of the quarry;
- precoat facility located in the stockpiling area with an annual throughput of 20,000 tpa;
- a site office, meal room, amenities, and weighbridge to the east of the quarry;
- an access road parallel to Stangers Road connecting the site to Werris Creek Road; and
- a primary sediment dam, clean water diversion bunds and dirty water capture bunds to the west of the quarry.

The quarry's administration offices, weighbridge and car parking area are adjacent to the entry point of the main portion of the quarry, which is approximately 2 km along the quarry access road (haul road) from the intersection with Werris Creek Road. This intersection is on the southern side of a straight section of Werris Creek Road, approximately 750 m west of Stangers Road and 3.5 km east of the centre of Currabubula township.

The current elevations in the quarry, as obtained by a drone survey, are shown in Figure 5.

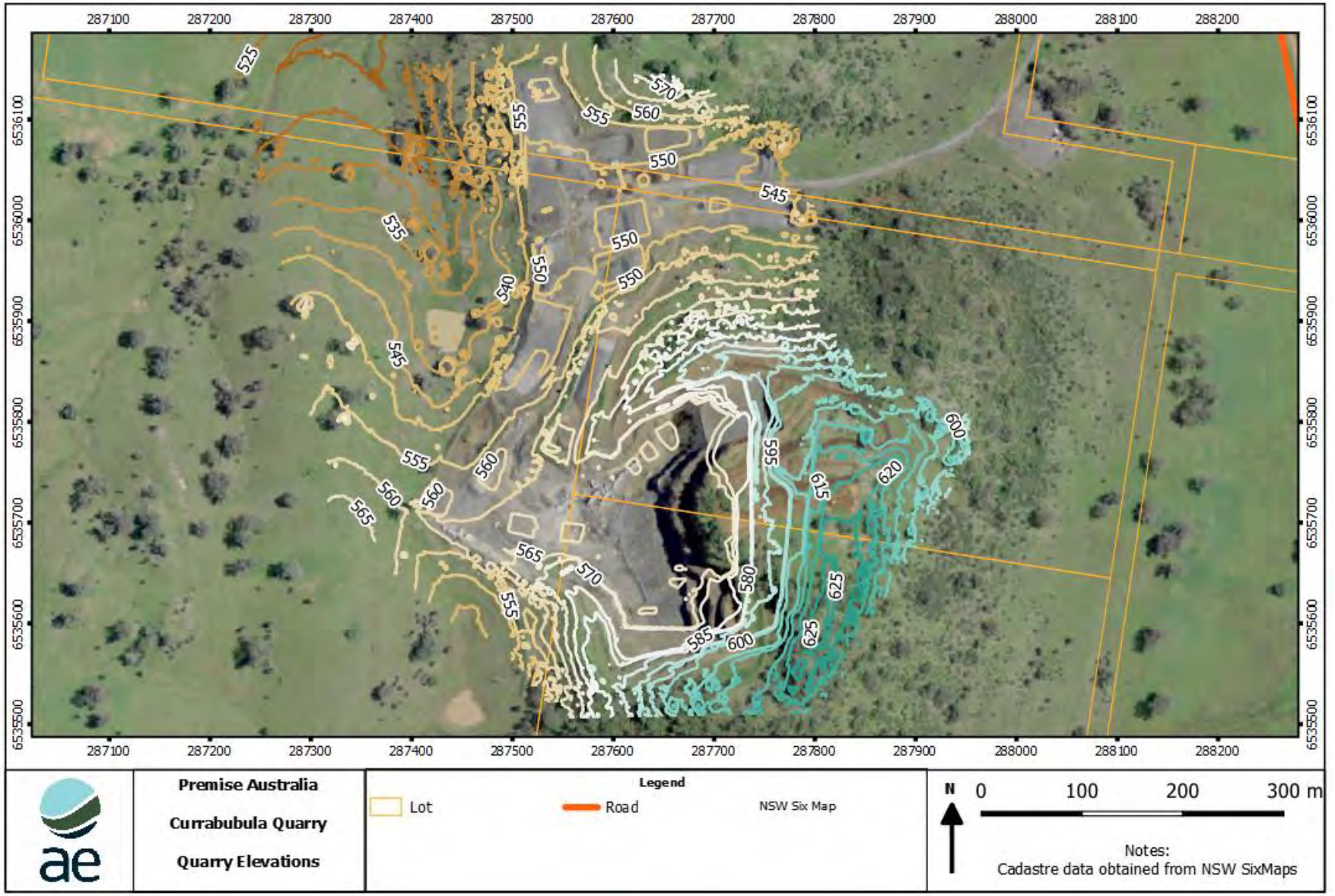


Figure 5: Quarry Elevations (Drone Survey)

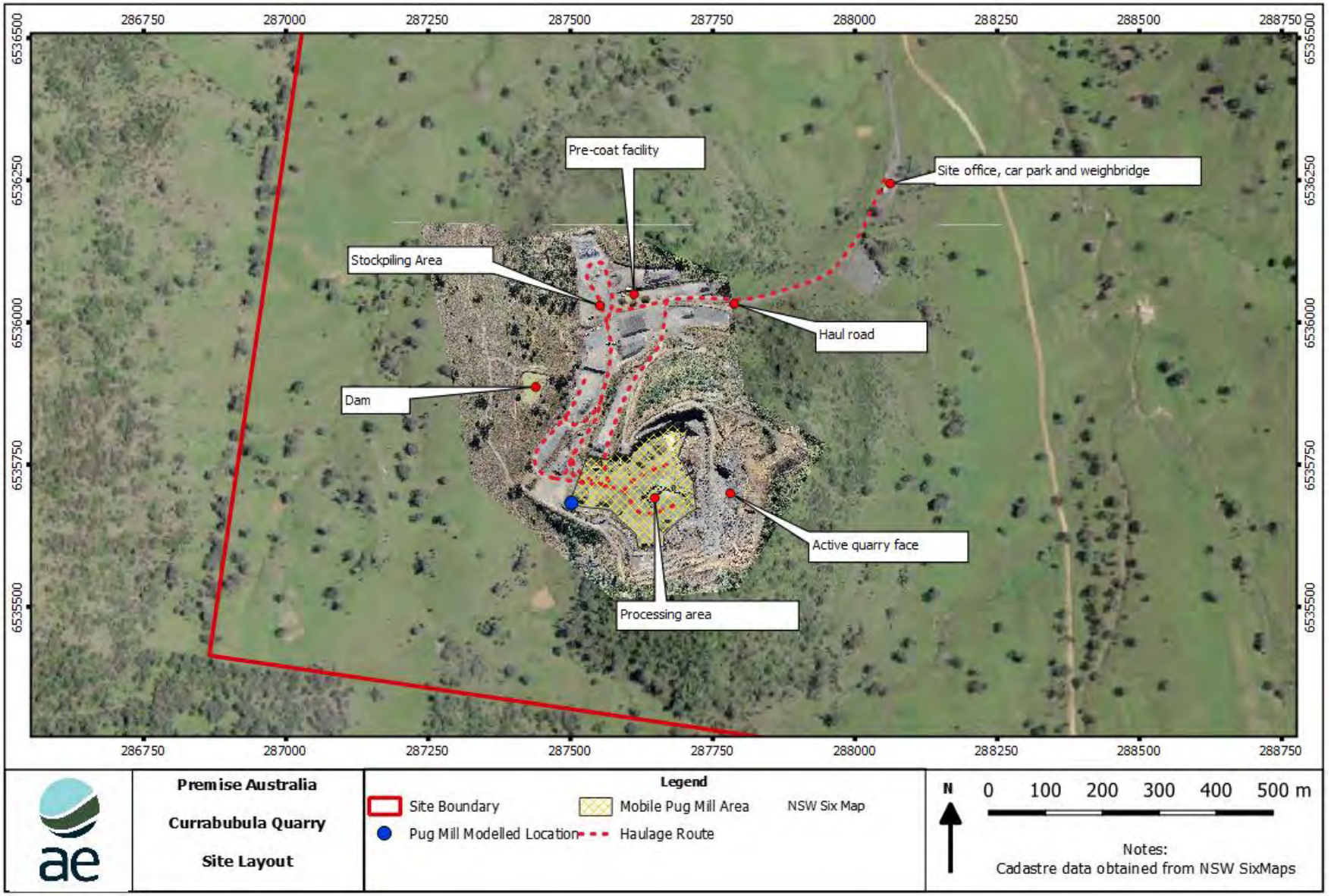


Figure 6: Site Layout

3.3 Comparison of Activities

Table 3 provides a comparison of the current approved existing activities and future proposed modification activities as part of the increase in production.

Table 3: Comparison of Activities

Aspect	Existing Activities	Proposed Modification
Land Use	Approval granted for an extractive industry and associated processing and crushing and grinding.	N/A – no change proposed.
Quarry footprint	As per consent.	N/A – no change proposed.
Hours of operation Includes all processing, handling and movement of materials and substances	7 am to 6 pm Monday to Friday. 7 am to 2 pm on Saturday. No operation on Sundays or Public Holidays without prior approval from the EPA.	N/A – no change proposed.
Blasting hours	9 am to 3 pm Monday to Friday. 9 am to 2 pm Saturday. No blasting on Sundays or Public Holidays without prior approval from the EPA.	N/A – no change proposed.
Production and Transportation limits	Up to 300,000 tpa from the site.	Up to 400,000 tpa from the site.
Extraction method	Extraction by blast and drill.	N/A – no change proposed.
Site infrastructure and plant	Primary and tertiary crushing and screening facilities.	No change to the crushing/ screening facilities in the quarry pit. New pugmill proposed in the quarry pit.
Pre-coat Plant	Conveyor and boot bin. Diesel generator motor. 20,000 t annual throughput. Maximum 20 hours/week.	N/A – no change proposed.
Product transport method and access	Via truck to Werris Creek Road.	N/A – no change proposed.
Truck Movements	Average daily truck dispatches: 40 truckloads per day / 80 movements per day Average hourly truck dispatches: 4 truckloads per hour / 8 movements per hour Maximum daily truck dispatches: 75 truckloads per day / 150 movements per day Maximum peak hourly truck dispatches: 8 loads per hour / 16 movements per hour	Average daily truck dispatches: 50 truckloads per day / 100 movements per day Average peak truck dispatches: 6 truckloads per hour / 12 movements per hour Maximum daily truck dispatches: 120 truckloads per day / 240 movements per day Maximum peak hourly truck dispatches: 15 truckloads per hour / 30 traffic movements per hour Stabilment for pugmill requires 72 loads one-way (incoming) per annum. Note: All out-going stabilised product forms the total quarry production and is accounted for in

Aspect	Existing Activities	Proposed Modification
		average/maximum truck dispatches stated above.
Blasting	Four (4) blasts per year	Average of six (6) blasts per year. Maximum of eight (8) blasts per year.

3.4 Pugmill Operations

As listed in Table 3 above, a mobile pugmill is proposed in the quarry pit, shown in Figure 6. The proposed pugmill will be a silo and bin combination which will utilise aggregate from the quarry and stabilment (blended slag and lime).

The following production rates are proposed:

- Annual production of 50,000 tpa;
- Daily maximum production of 2,000 tonnes;
- Daily average production of 200 tonnes; and
- An operating period of 250 days per year.

4 ASSESSMENT CRITERIA

4.1 Operational Assessment Criteria

The acoustic assessment has been completed in accordance with the procedure identified in the NPfI. The NPfI recognises that scientific literature has identified that both the increase in noise level above background levels (that is, intrusiveness of a source), as well as the absolute level of noise are important factors in how a community will respond to noise from industrial sources.

In response to this, the NPfI establishes two separate noise criteria to meet environmental noise objectives: one to account for intrusive noise and the other to protect the amenity of particular land uses. These two criteria are then used to determine project triggers levels against which the proposed development will be assessed. The project noise trigger level is a level that, if exceeded, would indicate a potential noise impact on the community, and so 'trigger' a management response.

The derivation of the two sets of criteria are presented below in sections 4.1.1 and 4.1.2. For residential dwellings, the noise criteria are assessed at the most-affected point (i.e. highest noise level) on or within the property boundary. Where the property boundary is more than 30 m from the house, then the criteria applies at the most-affected point within 30 m of the house.

4.1.1 Intrusiveness Noise Criteria

The project intrusiveness noise level is intended to protect against significant changes in noise levels as a result of industrial development. To achieve this, the NPfI describes intrusive noise as noise that exceeds background noise levels (as defined by the Rating Background Level or RBL) by more than 5 dB.

The noise assessment prepared for the quarry by Dick Benbow and Associates Pty Limited (Benbow) in 1995, identified that background noise levels at residential receivers surrounding the quarry were in the order of 25 to 35 dB(A) and characteristic of a rural environment generally controlled by natural, agricultural, and local traffic noise sources.

For this assessment, the minimum Rating Background Noise Level (RBL) has been used to define the minimum intrusiveness criteria. The NPfI adds 5 dB to the minimum RBL to derive the intrusiveness criteria. Table 4 presents the derivation of the intrusiveness criteria based on the minimum background noise level established by the NPfI.

Table 4: Minimum Intrusiveness Noise Criteria

Receptor	Parameters	Period		
		Day	Evening	Night
Minimum Assumed Rating Background Noise Level	RBL (dB(A))	35	30	30
Minimum Intrusiveness Project Noise Levels [a]	$L_{Aeq,15\text{-minute}}$	40 [b]	35 [b]	35 [b]

a) Receptor noise criteria applied at a location 30 m from the dwelling façade.
b) Minimum background noise level established by the NPfI 2017 + 5 dB.

4.1.2 Amenity Criteria

The project amenity noise level seeks to protect against cumulative noise impacts from industry and maintain amenity for particular land uses. Review of the surrounding area has identified that there are no other industrial noise sources in the area, and that future industrial

development in the area is unlikely. As such, the project amenity noise levels are equivalent to the indicative noise amenity area total industrial noise levels presented in Table 5.

Table 5: NPfI Amenity Noise Levels

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended L_{Aeq} Noise Level (dB(A))	
			Total Industrial Noise	Project Specific
Residence	Rural[a)]	Day	50	50
		Evening	45	45
		Night	40	40

a) Rural amenity noise levels sourced from Table 2.2 of NPfI.

4.1.3 Project Noise Trigger Levels

The project noise trigger level (PNTL), i.e. the noise criteria considered by the assessment, is the lower value of the project intrusiveness noise level and the project amenity noise level (PANL), after the conversion to $L_{Aeq,\ 15\ min}$ dB(A) equivalent level. Table 6 presents the standardised intrusiveness noise level and the project amenity level as derived by adding 3 dB(A) to each period of the day (as described in Section 2.2 of the NPfI).

Table 6: Determining Project Trigger Level

Type of Receiver	Time of Day	Standardised $L_{Aeq,\ 15\ min}$ Noise Level (dB)		
		Intrusiveness Noise Level	PANL	PNTL
Residence	Day	40	50 + 3 = 53[a)]	40
	Evening	35	45 + 3 = 48 [a)]	35
	Night	35	40 + 3 = 48 [a)]	35

a) The L_{Aeq} is determined over a 15-minute period for the project intrusiveness noise level and over an assessment period (day, evening and night) for the project amenity noise level. This leads to the situation where, because of the different averaging periods, the same numerical value does not necessarily represent the same amount of noise heard by a person for different time periods. To standardise the time periods for the intrusiveness and amenity noise levels, this policy assumes that the $L_{Aeq,15min}$ will be taken to be equal to the L_{Aeq}, period + 3 decibels (dB), unless robust evidence is provided for an alternative approach for the particular project being considered.

4.1.4 Sleep Disturbance

NSW EPA have identified a screening assessment for sleep disturbance based on the night-time noise levels at a residential location. Where noise levels at a residential location exceed the following levels during the night-time period, the potential for sleep disturbance should be investigated:

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

As the quarry only operates during the daytime period between 7 am and 6 pm, sleep disturbance does not have to be assessed.

4.2 Road Traffic Assessment Criteria

The principle guidance for assessing the impact of road traffic noise on receivers is in the NSW Road Noise Policy (RNP) (2011). The proposed modifications will include an increase in truck

movements on the transport route. The Subject Site is accessed from Werris Creek Road, with most vehicles originating from the north, and some from the south.

The sections of Werris Creek Road leading to the Subject Site are classified as an arterial road. Table 7 presents the road noise assessment criteria for this road category as listed in the NSW Road Noise Policy.

Table 7: Road Traffic Noise Criteria (NSW Road Noise Policy)

Road Category	Type of Project & Land Use	Assessment Criteria
Freeway / arterial / sub-arterial road	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	Day: $L_{Aeq,15\ hour}$ 60 dB(A) Night: $L_{Aeq,9\ hour}$ 55 dB(A) (external)

The RNP states that where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to +2 dB(A), after consideration of all feasible and reasonable noise mitigation and management measures.

5 ASSESSMENT METHODOLOGY

5.1 Overview

For the purposes of predicting impacts associated with noise emissions from the Subject Site on nearby sensitive receptors, noise modelling of the sources was completed using the proprietary software CadnaA (version 2020 build 181.5100), developed by DataKustik. CadnaA incorporates the influence of meteorology, terrain, ground type and air absorption in addition to source characteristics to predict noise impacts at receptor locations. All predictions have been undertaken in accordance with the CONCAWE noise propagation calculation method.

The model is utilised to assess the potential noise emissions from the Subject Site under a range of operating scenarios and meteorological conditions. The noise modelling also allows investigation of possible noise management solutions, in the event that non-compliance with the assessment criterion is predicted.

5.2 Meteorology

The NPfI presents guidelines for the consideration of meteorological effects on noise propagation, specifically temperature inversions and/or gradient winds. NPfI provides two options for assessing meteorological effects as detailed in Table 8.

Table 8: Standard and Noise Enhancing Meteorological Conditions

Meteorological Conditions	Meteorological Parameters
Standard conditions	Day/Evening/Night: stability categories[a] A-D with wind speed up to 0.5 m/s at 10 m AGL[b].
Noise enhancing conditions	Day/Evening: stability categories A-D with light winds (up to 3 m/s at 10 m AGL).
	Night: stability categories A-D with light winds (up to 3 m/s at 10 m AGL). And/or stability category F with light winds (up to 2 m/s at 10 m AGL).

a) Pasquill-Gifford Atmospheric Stability Class
b) AGL: Above ground level

The following conditions have been modelled:

- Day Periods – Stability class D at 3 m/s representing a worst-case assessment for day-periods; and
- Night Periods - Temperature inversion (stability class F) with light (2 m/s) winds - a worst-case assessment of potential impacts for night periods.

5.3 Terrain

Terrain information of the quarry and surrounding areas were obtained from a combination of publicly available terrain data (ELVIS) and low-altitude survey of the existing quarry by drone. The terrain data was included in the noise model as 5 m topographical contours.

5.4 Noise Sources

Most noise sources associated with the quarry are generally continuous in nature and are associated with fixed plant items operating in the production process. Short-term or variable sources include operation of the front-end loader (FEL) and truck movements. It should be noted that some sources will be operated on a campaign basis but to account for worst-case scenario, they have been modelled on continuous day-time operation.

Table 9 provides a summary of the noise sources adopted for this assessment and the operational details of each source. Sound power levels have been taken from AE's database and typical levels taken from verified sources.

Table 9: Sound Power Levels

Activity	Noise Source	Height above Ground (m)	Sound Power Level (dB(A)		Time Period Modelled	Usage (%) during Modelled Period
			L_{Aeq}	L_{Amax}		
Vehicles	Road Truck (aggregate)[b]	2	105	-	Day	30/hr (240 trips per day)
	Water truck	1.5	105	-	Day	1/hr
	Haul Truck (CAT 770)	2	115	-	Day	100
Mobile Plant	FEL (CAT 972H)	2	112[a]	-	Day	100
	FEL (Hyundai 770)[b]	2	112 [a]	-	Day	100
	FEL (Komatsu)	2	116 [a]	-	Day	100
	Excavator (Kobelco WA480)[c]	2	111 [a]	-	Day	100
Processing Plant Vehicles	Screen x 2	2	108 [a]	-	Day	100
	Crusher (jaw crusher)	2	115 [a]	-	Day	100
	Crusher (secondary)	2	110 [a]	-	Day	100
	Conveyor **x** 9	2	89	-	Day	100
	Conveyor Drives **x** 9	2	100	-	Day	100
	Pugmill	2	110 [a]	-	Day	100
	Pre-Coat plant	1	105 [a]	-	Day	100

a) Includes +5 dB correction for potential impulsive/tonal characteristics (as per NPfI Fact Sheet C).
b) Include maximum peak hourly truck movements (15 truckloads per hour, 30 movements) and allowance for an additional 2 movements per hour for stabilment trucks.
c) Noted as a backup excavator. Its operation was included as worst-case scenario.

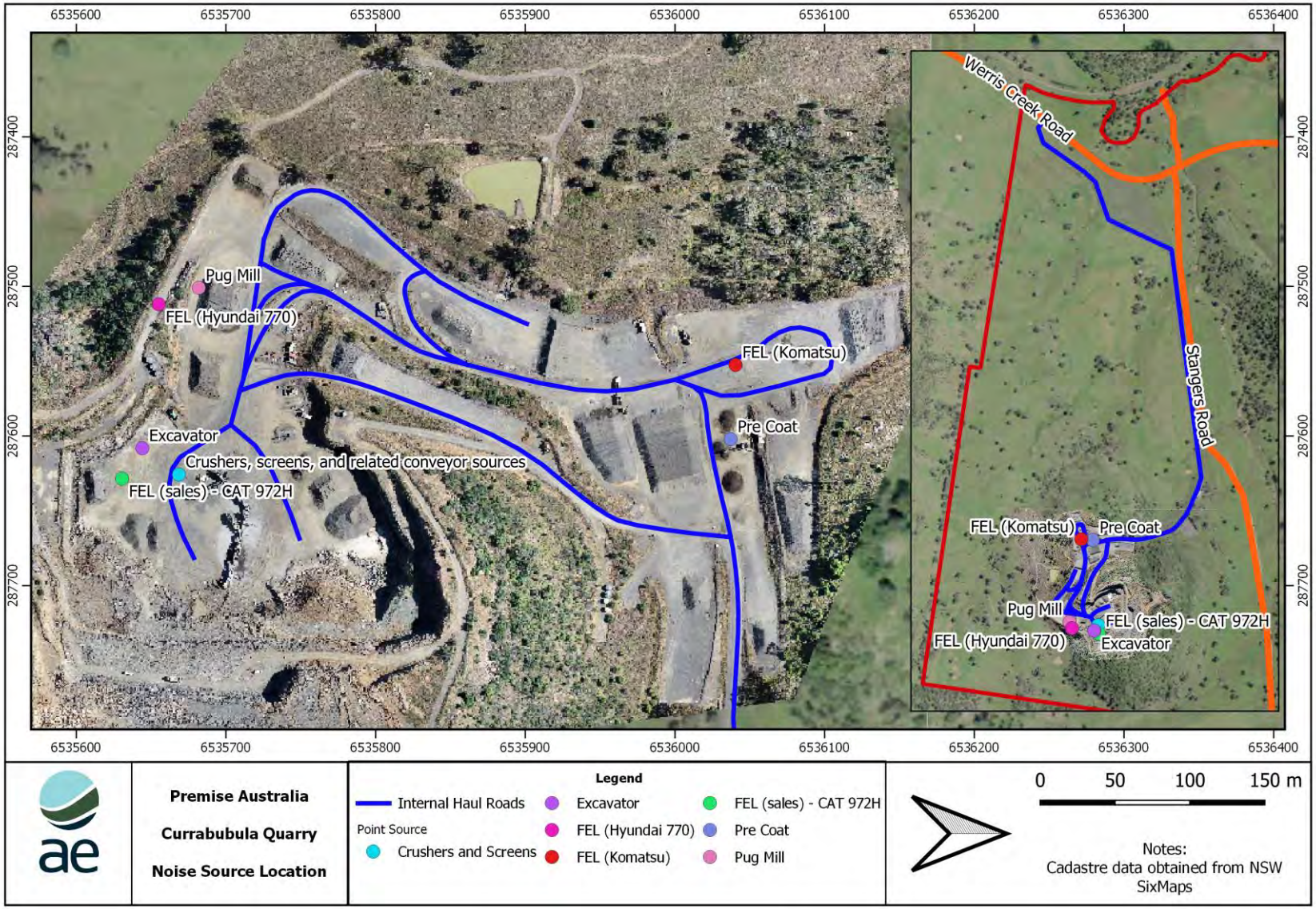


Figure 7: Locations of Noise Sources as Modelled

5.5 PREDICTED NOISE LEVELS FROM QUARRY

Table 10 below presents predicted receptor noise levels during the operational phase of the quarry with the proposed modifications. Review of the predicted noise levels confirms that compliance with the PNTL criteria established in accordance with the NPfI can be achieved for all receptors during the daytime period under noise enhancing meteorological conditions (Table 8).

Table 10: Predicted Receptor Noise Levels

Receptor	Predicted Operational Noise Levels, $L_{Aeq, 15min}$ Day	PNTL $L_{Aeq, 15\ min}$ Day	Comply (Y/N)
R01	35	40	Y
R02	33	40	Y
R03	20	40	Y
R04	17	40	Y
R05	<10	40	Y
R06	<10	40	Y
R07	<10	40	Y
R08	25	40	Y

6 TRAFFIC NOISE ASSESSMENT

In addition to the above noise sources at the quarry, vehicle movements associated with raw materials and product delivery generate noise. It is expected that the majority (approximately 70%) of quarry product will be transported to the north on Werris Creek Road (towards Tamworth), with the remainder (approximately 30%) travelling to the south on Werris Creek Road (towards Werris Creek). These hourly traffic movements do not include site employee traffic movements which would normally occur independently of the road truck traffic, either earlier or later, at the beginning and the end of each working day.

The following traffic movements are expected for a plant production rate of 400,000 tonnes per annum in Table 11.

Table 11: Traffic Generation Summary

Production	300,000 tpa	400,000 tpa
Approved Maximum Daily Production	75 loads	120 loads
	150 trips	240 trips

Traffic volume data was obtained from Premise, which showed that traffic classifier counts carried out and an assessment of the data recorded, estimates of the Annual Average Daily Traffic (AADT) on Werris Creek Road north-west and south-east of the quarry access are provided in Table 12.

Table 12: Existing Traffic Volumes

Road	Location	Vehicle Counts	
		AADT	Heavy Vehicles (%)
Werris Creek Road	North - east of Currabubula towards Tamworth	3,070	24.8 (761 vehicles)
	South - east of Currabubula towards Werris Creek	2,914	22.1 (643 vehicles)

Traffic volumes with the influence of traffic generated by the existing and proposed additional trucks due to quarry operations are shown in Table 13.

Table 13: Total Traffic Volumes with Existing and Proposed Quarry Traffic

Location	Vehicle Counts				
	2021 Vehicle Counts (300,000 tonnes per annum)		2021 Vehicle Counts (400,000 tonnes per annum)		
	AADT	HV[a]	AADT	HV[a]	Total
Werris Creek Road – North	3,070	761	3,070	761 + 168[b)] = 929	3,999
Werris Creek Road – South	2,914	644	2,914	644 + 72[c)] = 716	3,630

a) Additional trucks were calculated using maximum values of 240 trips per day based on peak daily quarry production rate (sourced from Table 8 of the project Traffic Impact Assessment, Premise 2021)
b) 70% of maximum traffic generation(240) in Table 11.
c) 30% of maximum traffic generation (240)in Table 11.

6.1 Predicted Noise Levels

To the north on Werris Creek Road (towards Tamworth), the nearest residential facades (roadside) that could be affected by an increase in road traffic noise are set back approximately 15 m and 40 m (or greater) from the road in the 60 km/h and 100 km/h speed zones respectively. To the south on Werris Creek Road (towards Werris Creek), the nearest residential facades are set back approximately 10 m, 7 m, and 35 m (or greater) from the road in the 50 kilometres per hour (km/hr), 80 km/hr and 100 km/hr speed zones respectively.

Table 14 below presents predicted traffic noise levels.

Table 14: Predicted Traffic Noise Levels Using Maximum Vehicles Number

Road	Distance from road (m)	Speed (km/hr)	Traffic noise level 2021 with existing quarry trucks $L_{Aeq(Day)}$, dB	Traffic noise level 2021 with proposed quarry trucks $L_{Aeq(Day)}$, dB	Change (dB)	Compliant (Y / N)
Werris Creek Road – North East	≥15	60	58.0	58.5	+ 0.5	Y
	≥40	100	58.2	58.6	+ 0.4	Y
Werris Creek Road – South East	≥7	80	65.9	65.9	No change	Y
	≥10	50	59.4	59.4	No change	Y
	≥35	100	59.0	59.0	No change	Y

The NSW Road Noise Policy 2011 (RNP) recommends a relative increase criterion for residential land uses to be 2 dB(A) above existing traffic noise levels. It is noted that the RNP specifies an $L_{Aeq,15\text{-}hour}$ and $L_{Aeq,9\text{-}hour}$ criteria of 60 dB(A) and 55 dB(A) for the Day (7 am to 10 pm) and the Night (10 pm to 7 am) periods, respectively for traffic-generating developments.

For this assessment, the increase in noise level expected from the increase in daily capacity from the quarry has been calculated. The maximum predicted increase in noise level associated with the increase in vehicle movements is $L_{Aeq,\ 1\ hour}$ 1 dB(A), which complies with the relative increase criterion.

7 VIBRATION ASSESSMENT

7.1 Introduction

An assessment of the potential for vibration impacts has been undertaken to determine potential impacts as a result of vibration generated by plant and equipment during quarry operation. In particular, the assessment has considered the potential for impacts on both human comfort and structural damage for the nearest residence to the quarry expansion.

7.2 Vibration Assessment Criteria

7.2.1 Criteria for Vibration from Non-Blasting Sources

The vibration criteria presented in the Environmental Noise Management – Assessing Vibration: A Technical Guideline (2006) published by the NSW Department of Environment Climate Change and Water (DECCW) have been adopted for the assessment. The technical guide provides vibration criteria associated with amenity impacts (human annoyance) for the three categories of vibration:

- Continuous vibration – e.g. road traffic, continuous construction activity;
- Impulsive vibration – includes less than 3 distinct vibration events in an assessment period (e.g. occasional dropping of heavy equipment); and
- Intermittent vibration – includes interrupted periods of continuous vibration (e.g. drilling), repeated periods of impulsive vibration (e.g. crushers) or continuous vibration that varies significantly in amplitude.

Table 15 and Table 16 present the criteria for continuous and impulsive vibration and intermittent vibration, respectively.

Table 15: Continuous & Impulsive Vibration Criteria for Residences – Peak Velocity

Location	Vibration Type	Preferred Limit (mm/s)	Maximum Limit (mm/s)
Residences	Continuous	0.28	0.56
Residences	Impulsive	8.6	17

Table 16: Intermittent Vibration Criteria for Residences

Location	Assessment Period	Preferred Limit (mm/s)	Maximum Limit (mm/s)
Residences	Day-time	0.20	0.40

The above criteria are suitable for assessing human annoyance in response to vibration levels. In order to assess potential damage to buildings, reference has been made to British Standard *BS 7385-2: 1993 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground borne vibration.* Table 17 presents vibration criteria for assessing the potential for building damage.

Table 17: Transient Vibration Guide Values for Cosmetic Damage

Type of Building	Peak Particle Velocity (mm/s)	
	4 Hz to 15 Hz	15 Hz and above
Unreinforced or light framed structures – residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

7.2.2 Blasting Criteria

For blasting, the existing environmental licence EPL 5846, section L5 Blasting, provides the following criteria:

> *L5.1 The overpressure level from blasting operations at the premises must not exceed 120dB (Lin Peak) at any time and at any point within 30 metres of any non-project related residential building or other noise sensitive location. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.*
>
> *L5.2 The overpressure level from blasting operations at the premises must not exceed 115dB (Lin Peak) for more than five per cent of the total number of blasts over each reporting period, or one blast in each reporting period, whichever is greater at any time and at any point within 30 metres of any non-project related residential building or other noise sensitive location. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.*
>
> *L5.3 Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 10mm/sec at any time and at any point within 3.5 metres of any non-project related residential building or other noise sensitive location. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.*
>
> *L5.4 Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 5mm/sec for more than five per cent of the total number of blasts over each reporting period, or one blast in each reporting period, whichever is greater at any point within 3.5 metres of any non-project related residential building or other noise sensitive location. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.*
>
> *L5.5 To determine compliance with condition(s) L4.1, L4.2, L4.3 and L4.4: a) Airblast overpressure and ground vibration levels must be measured and electronically recorded at the nearest non-project related premises [exact location to be confirmed] for all blasts carried out in or on the premises; and b) Instrumentation used to measure the airblast overpressure and ground vibration levels must meet the requirements of Australian Standard AS 2187.2-2006.*
>
> *L5.6 Blasting in or on the premises must only be carried out between 0900 hours and 1500 hours, Monday to Friday, and 0900 hours and 1400 hours on Saturday. Blasting in or on the premises must not take place on Sundays or Public Holidays without the prior approval of the EPA.*

L5.7 The hours during which blasting is permitted may be varied by the EPA upon consideration of the impact any variation may have on the amenity of the residents in the locality.

L5.8 Blasting at the premises is limited to 1 blast on each day on which blasting is permitted.

L5.9 Additional blasts are permitted where it is demonstrated to be necessary for compelling safety reasons and the EPA and neighbours have been notified of the intended blast prior to the additional blast being fired.

L5.10 Blasting must not take place when there is heavy cloud cover, severe temperature inversion, or winds of velocity greater then 10 metres/second blowing towards residences not associated with the quarry.

It is not recommended or expected that the Blasting Conditions in the EPL would need to change as a result of the proposed modification to the Development Consent.

7.3 Assessment of Vibration Impacts

7.3.1 Assessment of Impacts – Operations (Except Blasting)

7.3.1.1 Vibration Sources

Table 18 provides indicative vibration source levels for the vibration-significant equipment used at the quarry. It should be noted that there are no vibration source levels for the processing plant, however these plant elements typically do not create high levels of ground vibration, as they are designed to constrain and direct almost all of their vibration energy into performing their primary functions on the product material.

Table 18: Intermittent Vibration Sources

Location	Preferred Limit (mm/s)	Source
Loaded trucks (rough surface)	5	USA DT [a)]
Loaded trucks (smooth surface)	1 – 2	USA DT [a)]
Excavator	2.5 – 4	DECCW
Loader	6 – 8	USA DT [a)]

a) Transit Noise and Vibration Impact Assessment, US Department of Transportation, May 2006.

7.3.1.2 Assessment of Potential Impacts

Based on the vibration source levels at 10 metres (presented in Table 18), peak particle velocities have been predicted at various separation distances. The NSW DECCW indicates that in predicting vibration levels, it can be assumed that the vibration level is inversely proportional to distance (with the relationship varying between $d^{-0.8}$ to $d^{-1.6}$ based on field data).

The US Department of Transportation's Transit Noise and Vibration Impact Assessment (May 2006) presents the following construction vibration propagation formula assuming an inverse relationship:

$$PPV@d_2 = PPV@d_1 \times (d_1/d_2)^{1.5}$$

where: d_1 = distance 1 (reference distance for source data) (m)

d_2 = distance 2 (separation distance for predicted PPV) (m)

PPV = peak particle velocity (mm/s)

The above formula has been considered for predicted PPVs at various distances from construction equipment. Based on the above information, Table 19 presents PPV predictions for the various construction equipment.

Table 19: Predicted Peak Particle Velocity at Sensitive Receptors (mm/s)

Distance from Source	Predicted Peak Particle Velocity (mm/s)			
	Loaded trucks (rough surface)	Loaded trucks (smooth surface)	Excavator	Loader
10	5	1 - 2	2.5 - 4	6 - 8
20	1.77	0.35 - 0.71	0.88 - 1.41	2.12 - 2.83
30	0.96	0.19 - 0.38	0.48 - 0.77	1.15 - 1.54
40	0.63	0.13 - 0.25	0.31 - 0.5	0.75 - 1
50	0.45	0.09 - 0.18	0.22 - 0.36	0.54 - 0.72
60	0.34	0.07 – 0.14	0.17 – 0.27	0.41 – 0.54
80	0.22	0.04 – 0.09	0.11 – 0.18	0.27 – 0.35
100	0.16	0.03 - 0.06	0.08 - 0.13	0.19 - 0.25
150	0.09	0.02 - 0.03	0.04 - 0.07	0.1 - 0.14
200	0.06	0.01 - 0.02	0.03 - 0.04	0.07 - 0.09
250	0.04	0.01 - 0.02	0.02 - 0.03	0.05 - 0.06
Type	Intermittent	Intermittent	Continuous	Continuous
Nuisance Criteria	8.6 (preferred) / 17 (max)		0.28 (preferred) / 0.56 (max)	
Building Criteria	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz 20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above			

The predicted vibration levels presented in Table 19 indicate compliance with the continuous preferred vibration nuisance criteria for locations at a separation distance of 40-80 metres. As the closest receptors are beyond these distances, nuisance vibration criteria will be achieved.

Compliance with the building damage criteria is predicted at 10 metres from operations for each source.

For intermittent vibration associated with haul vehicles, it is difficult to provide an appropriate comparison with the relevant criteria (which is presented as a Vibration Dose Value (VDV) in $m/s^{1.75}$). The calculation of a VDV requires both the overall weighted RMS (root mean square), and acceleration (m/s^2), typically obtained from on-site measurements and the estimated time period for vibration events.

It is noted that, however, that haul truck movements (on rough surfaces) at distances of >50 m is predicted to comply within the maximum continuous criteria of 0.56 mm/s. This comparison with the continuous criteria (as a conservative approach) indicates that vibration levels associated with operation of the quarry are not considered to be significant (which is expected given the significant separation distances).

7.3.2 Assessment of Impacts - Blasting

7.3.2.1 Existing Monitoring

During blasting events, the blasting contractor undertakes measurements for airblast overpressure and ground vibration at the nearest receptor, R8, as shown in Figure 3. A review of the most recent blasting events since 2019 has identified that the maximum charge was 400 kg, and the resultant PPV at the receptor was 0.1 mm/s, with an airblast of 104 dB(Z).

The maximum instantaneous charge (MIC) distance from receptor from each blast event, has been used to determine the site constant for the site. The calculations showed a constant of 10 is suitable.

7.3.2.2 Airblast Overpressure

Airblast levels have been estimated using the following equation from AS 2187.2-2006, *"Explosives - Storage and use - Use of explosives":*

$$P = K_a \left(\frac{R}{Q^{1/3}}\right)^a$$

Where:

P = pressure (kPa)

Q = explosives mass charge (kg)

R = distance from charge (m)

K_a = site constant (10 – 100)

A = site exponent (-1.45)

Applying a site constant (K_a) of 10 for receptor R8, a conservative MIC of 1000 kg results in predicted compliance with the criterion of 115 dB(Lin Peak) at all nearby receptors.

7.3.2.3 Ground Vibration

Ground vibration levels have been estimated using the following equation from AS 2187.2-2006 *"Explosives - Storage and use - Use of explosives":*

$$V = K_g \left(\frac{R}{Q^{1/2}}\right)^{-B}$$

Where:

V = ground vibration as PPV (mm/s)

Q = explosives mass charge (kg)

R = distance from charge (m)

K_g = site constant (1140)

B = site constant (1.6)

Applying the MIC as determined from the air blast overpressure calculation of 1000 kg, the ground vibration level predicted to occur at receptor R8 is 2 mm/s, which complies with the criterion of 5 mm/sec.

It should be noted however that the impacts of blasting are dependent on-site specific factors including the blast management techniques, ground conditions and geological strata types and locations. Given this, the blast reports from Orica have showed that the maximum MIC used is 400 kg.

8 CONCLUSIONS

8.1 Noise

A noise impact assessment has been undertaken to confirm the suitability of the proposal in terms of acoustic amenity for nearby sensitive uses. Specifically, the assessment has considered the potential for adverse impacts upon existing residential land uses as a result of noise emissions associated with the proposed site operations and traffic generation.

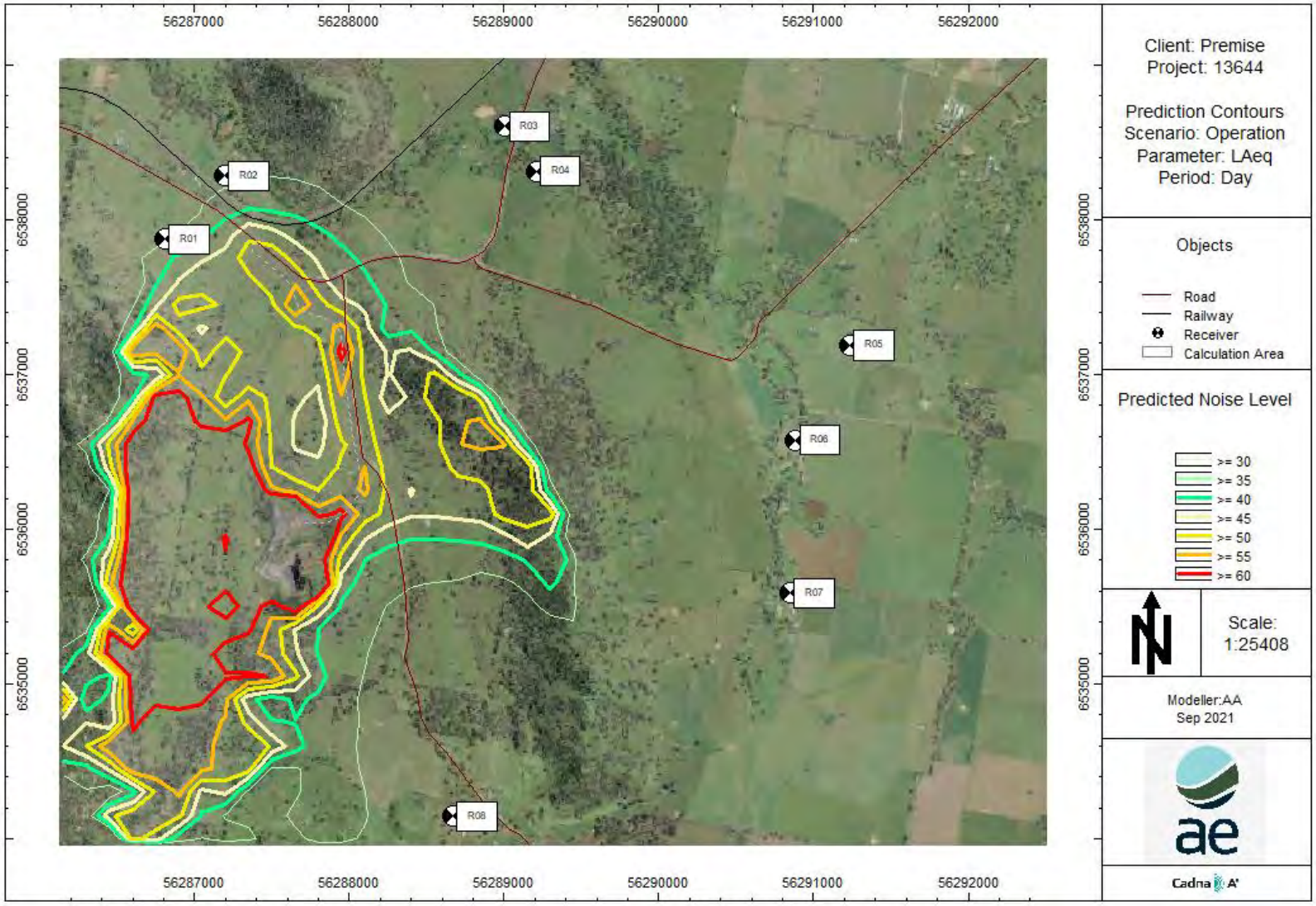
Predictive noise modelling has been undertaken for the site to assess the potential impacts of noise emission from quarry operations and traffic generation. The results of the predictive noise modelling have determined that compliance with the adopted noise criteria is expected to be achieved without any additional acoustic mitigation for the proposed modification.

8.2 Vibration

A vibration impact assessment has been undertaken to confirm the suitability of the proposed modification in terms of amenity for nearby sensitive uses. Specifically, the assessment has considered the potential for adverse impacts upon existing residential land uses from plant and equipment during quarry operations. In particular, the assessment has considered the potential for impacts on both human comfort and structural damage for the nearest residence to the quarry. The assessment indicates that the current and proposed quarry operations comply with the applicable vibration criteria.

Predictive screening assessment has been undertaken for the proposed modification to assess the potential impacts of ground vibration and airblast from blasting at the quarry based on conservative blasting assumptions. The results of the screening assessment have determined that compliance with the adopted criteria for ground vibration and airblast are expected to be achieved with a MIC size less than 1000 kg. Blasting at the quarry will be able to continue to achieve compliance with vibration and airblast limits using different sizes of MIC along with a combination of appropriate site-specific blast design parameters.

APPENDIX A: NOISE CONTOURS



Noise Contours Day Time Operation at 1.5m- L_{Aeq}

Appendix C

Air Quality Assessment

Currabubula Quarry - Air Quality Assessment

Project ID: 13644

21/09/2021

Release: R4

Prepared For:

Premise Australia

Assured Environmental

DOCUMENT CONTROL PAGE

Project Title: Currabubula Quarry - Air Quality Assessment

Project Reference ID: 13644

Report Prepared by:

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Report Prepared for:

Premise Australia
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Author: Michelle Clifton

Reviewer: Craig Beyers

Table 1: History of Revisions

Revision	Date	Issued to	Changes
R0	02/07/2021	C. Bigg	Initial Release
R1	07/07/2021	C. Bigg	Comments
R2	02/08/2021	C. Bigg	Updated model
R3	04/08/2021	C. Bigg	Final Review
R4	21/09/2021	C. Bigg	Final

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GLOSSARY

°C	Degrees centigrade
Conversion of ppm to mg/m^3	Where R is the ideal gas constant; T, the temperature in kelvin (273.16 + T°C); and P, the pressure in mm Hg, the conversion is as follows: $mg\ m^3 = (P/RT) \times \text{Molecular weight} \times (\text{concentration in ppm})$ $= \frac{P \times \text{Molecular weight} \times (\text{concentration in ppm})}{62.4 \times (273.2 + T°C)}$ For the purposes of the air quality assessment all conversions were made at 0°C unless stated otherwise.
g/s	Grams per second.
g/m^2	Gram per metre square.
g/m^2/month	Gram per metre square per month.
ha	Hectares.
m	Metre.
m/s	Metres per second
mg/m^3	Milligrams (10-3) per cubic metre. Conversions from mg/m^3 to parts per volume concentrations (i.e., ppm) are calculated at 0 °C.
kg	Kilograms.
kg/annum	Kilograms per annum.
km	Kilometre
$\mu g/m^3$	Micrograms (10-6) per cubic metre. Conversions from $\mu g/m^3$ to parts per volume concentrations (i.e., ppb) are calculated at 0 °C.
ppb	Parts per billion.
ppm	Parts per million.
PM_{10}, $PM_{2.5}$, PM_1	Fine particulate matter with an equivalent aerodynamic diameter of less than 10, 2.5 or 1 micrometres, respectively. Fine particulates are predominantly sourced from combustion processes. Vehicle emissions are a key source in urban environments.
TSP	Total suspended particulate.
70^{th} percentile	The value exceeded for 70 % of the time.

ABBREVIATIONS

GLC	Ground Level Concentration
FEL	Front End Loader
TfNSW	Transport for NSW
AE	Assured Environmental
tpa	Tonnes per annum
NPI	National Pollutant Inventory

1 INTRODUCTION

1.1 Background

Boral Resources (Country) Pty Ltd (hereafter referred to as Boral) operates a quarry at 3716 Werris Creek Road, Currabubula (Subject Site) in the Liverpool Plains LGA. The quarry has received a rapid increase in demand for its product over the last 15 months owing to stimulus investment in road infrastructure, particularly for rural Councils and Transport in NSW (TfNSW).

The existing Development Consent has an annual production limit of 300,000 tpa. It is proposed to increase the annual production limit to 400,000 tpa, as well as install a mobile pugmill to blend and mix 50,000 tpa of aggregate (from the quarry), and stabilment (blended slag and lime). The proposed increase in the extraction limit would allow the quarry to increase production to meet the increasing demand for construction materials in the Tamworth and surrounding areas.

The proposed modification includes no changes to the following:

- site layout or operations;
- the current development footprint;
- the quarry consent area; or
- the quarry's operating hours.

1.2 Scope of Assessment

Assured Environmental (AE) was appointed by Premise Australia to undertake an air quality impact assessment for the proposed increase in operational capacity of the quarry and changes to infrastructure.

The assessment has been conducted in accordance with a Level 2 assessment detailed in *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (2017).

In accordance with the requirements of the above guidelines, computational modelling and first principle calculations have been undertaken to assess the potential for adverse amenity and health impacts as a result of the proposed development.

1.3 This Report

This report summarises the methodology, results, and conclusions of the air quality assessment.

2 DESCRIPTION OF ENVIRONMENTAL VALUES

2.1 Location

The quarry is approximately 28 km southwest of Tamworth and 4 km southeast of Currabubula on 28 lots, as shown in Figure 1. The surrounding area is agricultural land, with livestock grazing.

2.2 Terrain

Figure 2 illustrates the local topography, as obtained from a combination of Lidar data at 25 m resolution obtained from ELVIS spatial database and extracted for 10 m intervals.

The topography of the Subject Site is dominated by three ridges; one to the east, one to the north and one to the west of the Site. The existing quarry is situated adjacent to a peak which rises to 630 m above sea level.

2.3 Receptors

Table 2 and Figure 3 present the nearest sensitive receptors to the Subject Site. It can be seen in Figure 3 that there are only two receptors (R1 and R2) proximate to the haul road at a distance of 550 m and 460 m from roadway, which joins Werris Creek Road at the north-western corner of the Subject Site.

Table 2: Sensitive Receptors

Receptor ID	Location (UTM Zone 56)		Elevation (m)	Distance from Quarry (km)	Land Use
	X	Y			
R1	286808	6537874	479	2.3	Dwelling
R2	287196	6538282	457	2.6	Dwelling
R3	289008	6538603	471	3.1	Dwelling
R4	289213	6538314	477	3.0	Dwelling
R5	291236	6537188	492	3.8	Dwelling
R6	290885	6536575	495	3.3	Dwelling
R7	290849	6535587	507	3.2	Dwelling
R8	288669	6534146	553	1.8	Dwelling

2.4 Climate

The Tamworth region experiences its hot season during December to March, and cold season from May to August. The warmest month is typically January, with an average maximum temperature of 32°C. The coolest month is July, with an average maximum temperature of 16°C.

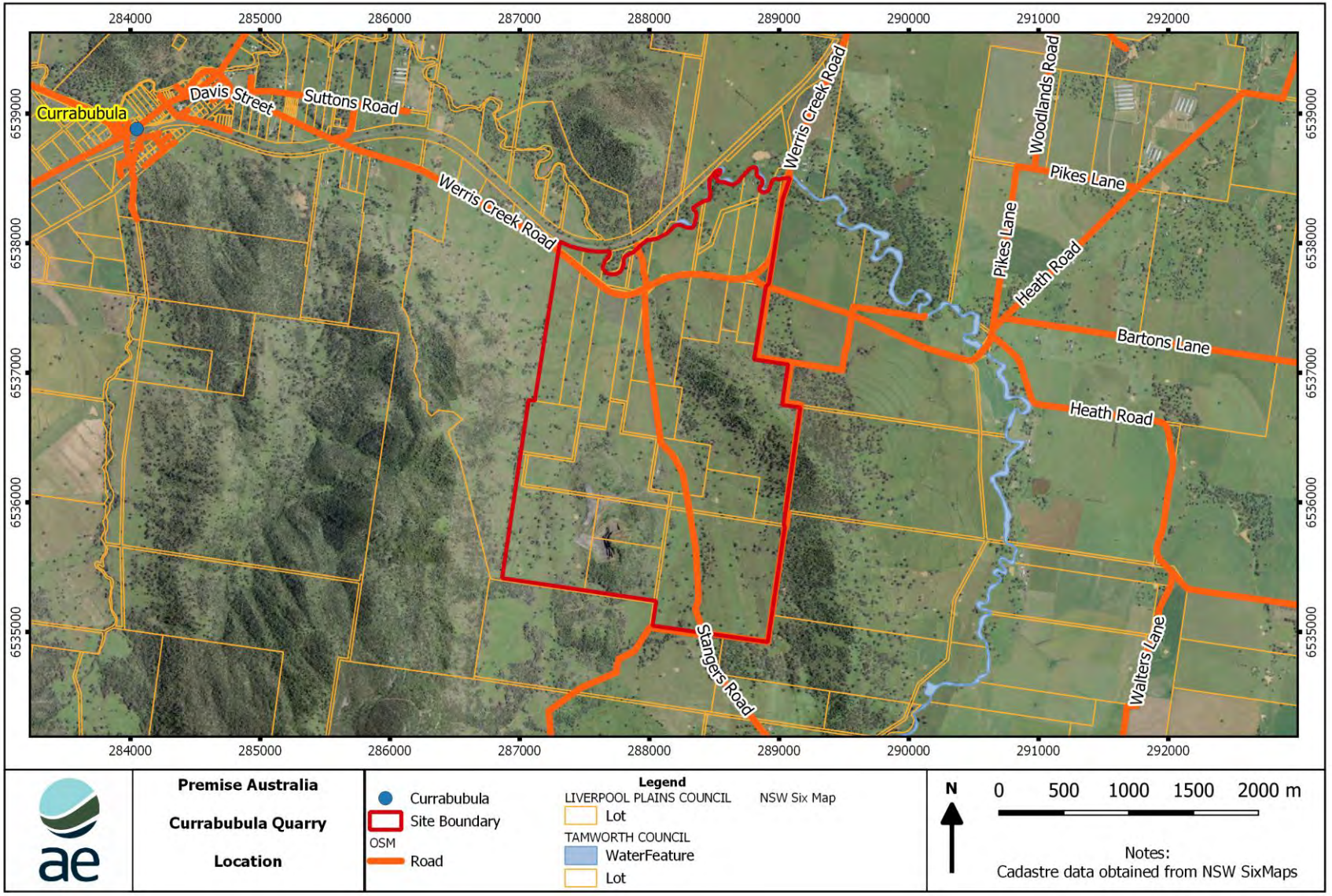


Figure 1: Site Location and Surrounding Areas

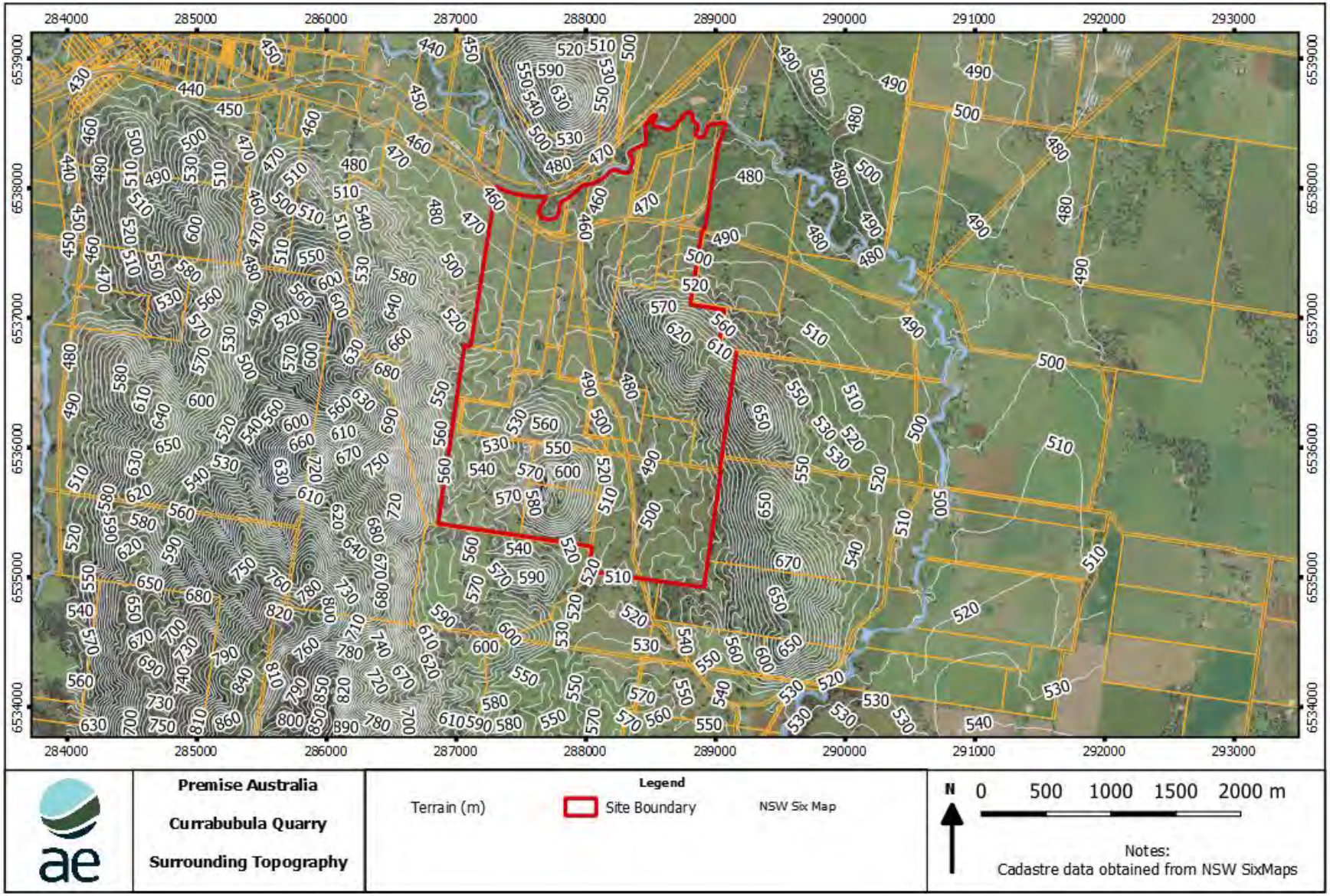


Figure 2: Surrounding Topography (ELVIS)

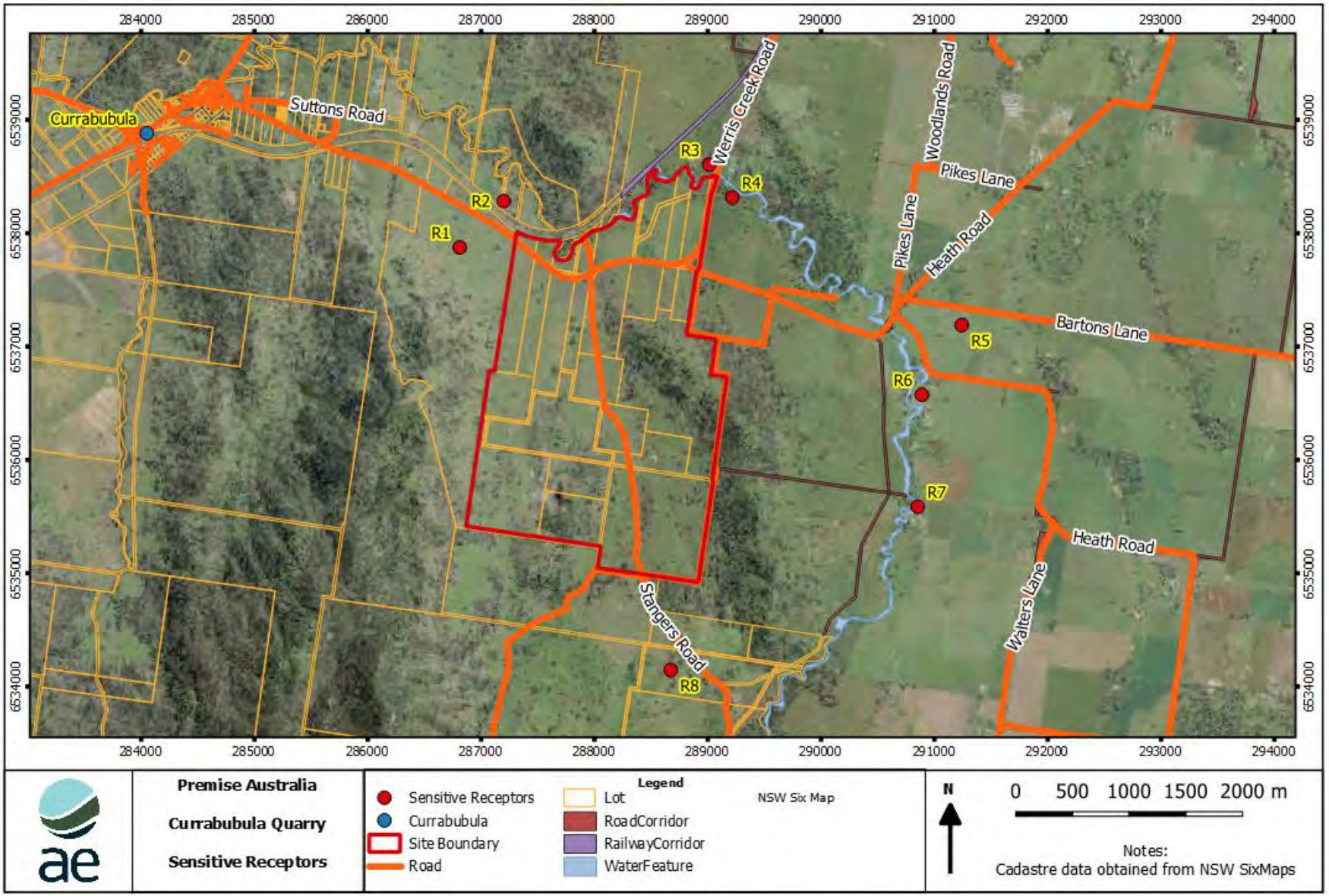


Figure 3: Sensitive Receptors

3 PROJECT DESCRIPTION

3.1 History of the Facility

Consent was granted for the purposes of a hard rock (andesite) quarry and processing plant on 25 January 1996, DA 95/114, for 200,000 tpa over a 45-year period. Boral was granted a modification to the original consent to expand the quarry operation under DA 20/2006 on 2 June 2006.

Boral subsequently sought a consent modification and obtained approval DA51/2017 on 26 February 2018 for the purpose of quarrying up to 300,000 tonnes per annum of andesite. As stated in the Notice of Determination, DA51/2017 supersedes the previous consents DA 95/114 and DA 20/2006.

As a short-term measure to address a short-fall in production demand, consent was granted on 7 December 2020 for a "short-term" production increase to 330,000 tpa for the 2020 calendar year (DA 51/2017_02).

3.2 Current Operations

The quarry, associated processing facilities and haul road occupy approximately 20 ha. The remainder of the 556-ha site provides access and a large buffer to the nearest residential receivers and Werris Creek Road.

Figure 5 below displays the following major features of the quarry:

- a series of benched working quarry faces;
- in-pit mobile crushing and screening equipment;
- a product stockpiling area in the north of the quarry;
- precoat facility located in the stockpiling area with an annual throughput of 20,000 tpa;
- a site office, meal room, amenities, and weighbridge to the east of the quarry;
- an access road parallel to Stangers Road connecting the site to Werris Creek Road; and
- a primary sediment dam, clean water diversion bunds and dirty water capture bunds to the west of the quarry.

The quarry's administration offices, weighbridge and car parking area are adjacent to the entry point of the main portion of the quarry, which is approximately 2 km along the quarry access road (haul road) from the intersection with Werris Creek Road. This intersection is on the southern side of a straight section of Werris Creek Road, approximately 750 m west of Stangers Road and 3.5 km east of the centre of Currabubula township.

The current elevations in the quarry, as obtained by a drone survey, are shown in Figure 4.

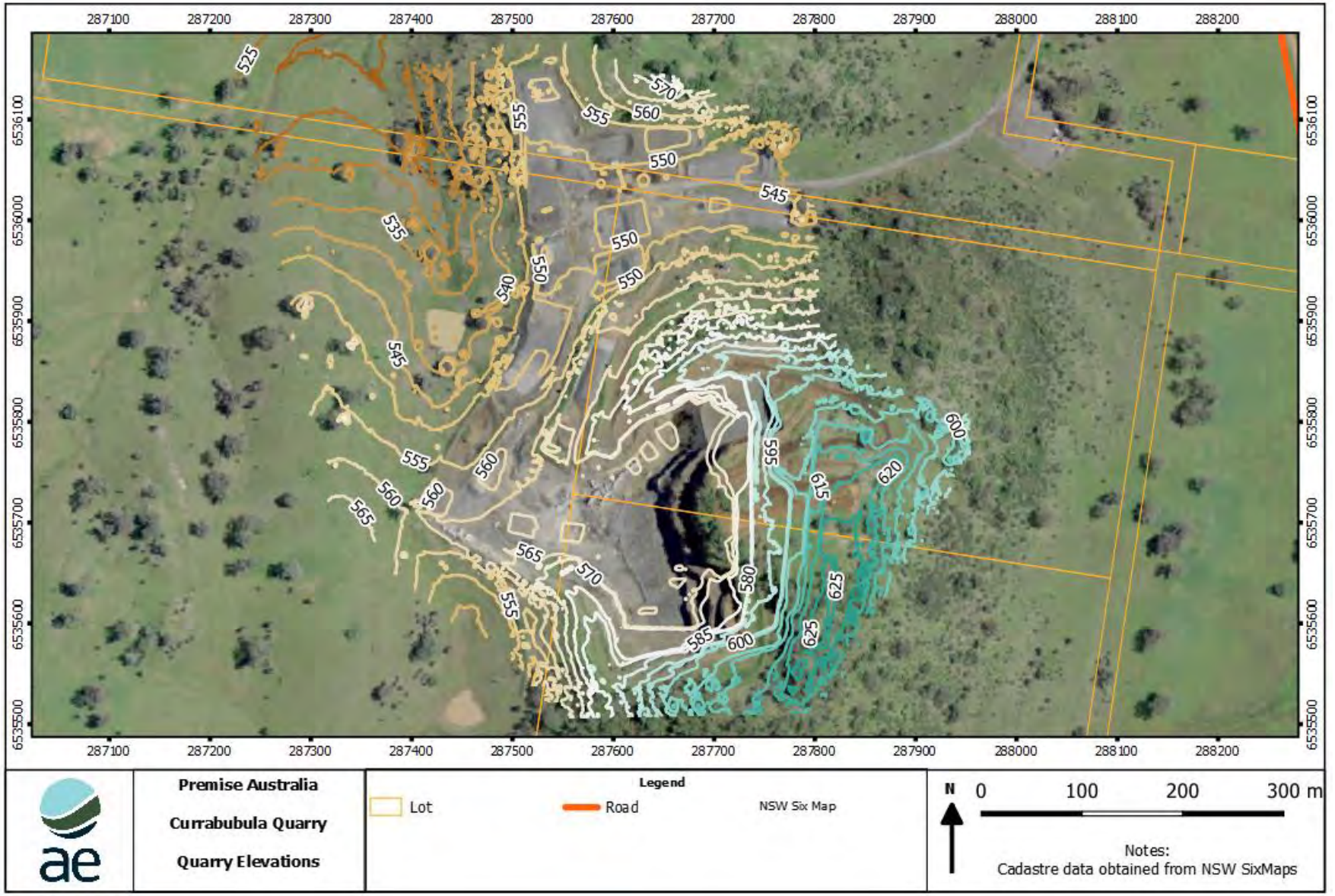


Figure 4: Quarry Elevations

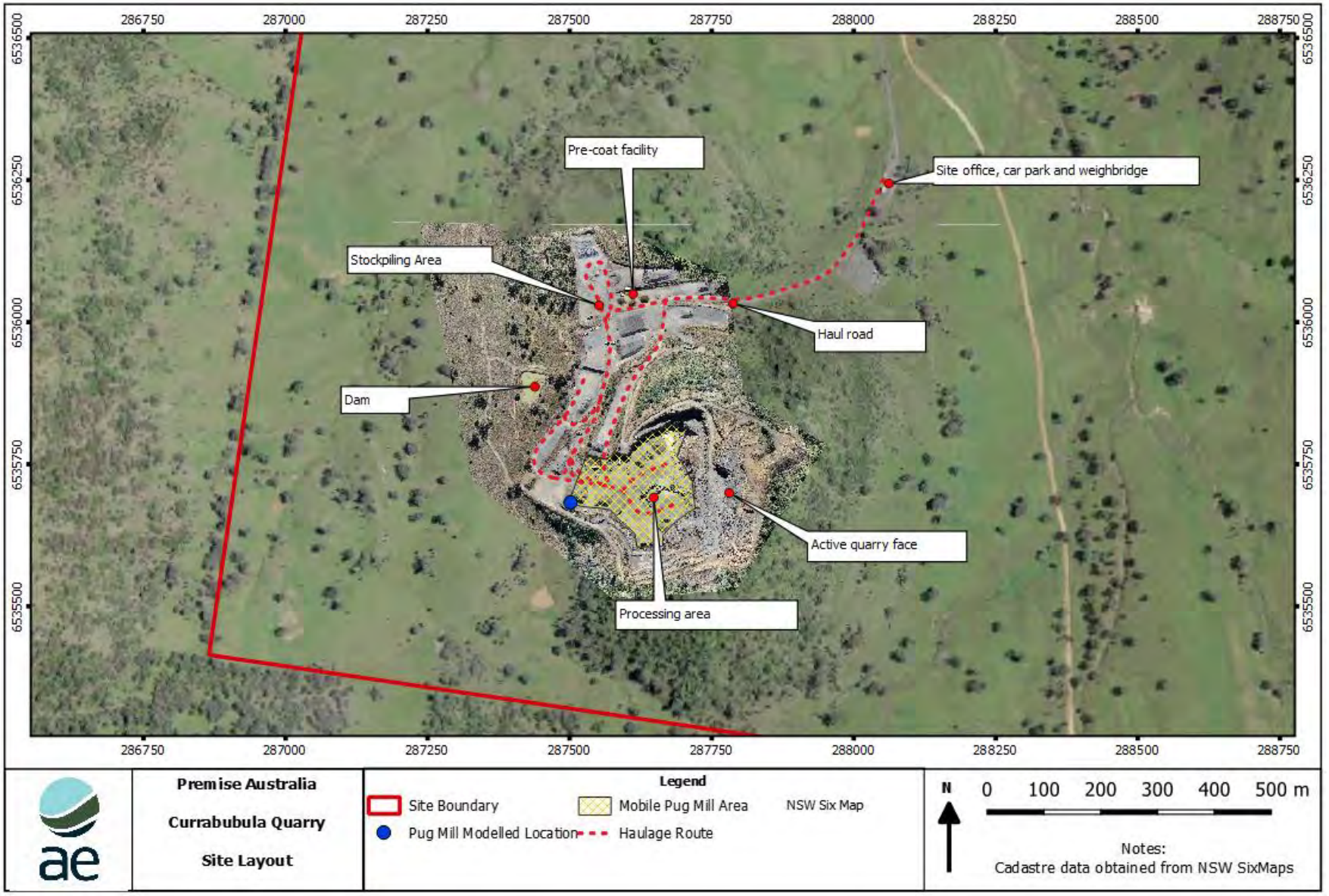


Figure 5: Site Layout

3.3 Comparison of Activities

Table 3 provides a comparison of the current approved existing activities and future proposed modification activities as part of the increase in production.

Table 3: Comparison of Activities

Aspect	Existing Activities	Proposed Modification
Land Use	Approval granted for an extractive industry and associated processing and crushing and grinding.	N/A – no change proposed.
Quarry footprint	As per consent.	N/A – no change proposed.
Hours of operation Includes all processing, handling and movement of materials and substances	7am to 6pm Monday to Friday 7am to 2 pm on Saturday. No operation on Sundays or Public Holidays without prior approval from the EPA.	N/A – no change proposed.
Blasting hours	9am to 3pm Monday to Friday 9am to 2pm Saturday. No blasting on Sundays or Public Holidays without prior approval from the EPA.	N/A – no change proposed.
Production and Transportation limits	Up to 300,000 tpa from the site.	Up to 400,000 tpa from the site.
Extraction method	Extraction by blast and drill.	N/A – no change proposed.
Site infrastructure and plant	Primary and tertiary crushing and screening facilities.	No change to the crushing/screening facilities in the quarry pit. New pugmill proposed in the quarry pit.
Site infrastructure and plant	Primary and tertiary crushing and screening facilities in the quarry pit.	No change to the crushing/screening facilities in the quarry pit. New pugmill proposed in the quarry pit.
Pre-coat Plant	Conveyor and boot bin. Diesel generator motor. 20,000 t annual throughput. Maximum 20 hours/week.	N/A – no change proposed.
Product transport method and access	Via truck to Werris Creek Road.	N/A – no change proposed.
Truck Movements	Average daily truck dispatches: • 40 truckloads per day • 80 movements per day Average hourly truck dispatches: • 4 truckloads per hour • 8 movements per hour	Average daily truck dispatches: • 50 truckloads per day • 100 movements per day Average peak hourly truck dispatches: • 6 truckloads per hour • 12 movements per hour

Aspect	Existing Activities	Proposed Modification
	Maximum daily truck dispatches: • 75 truckloads per day • 150 movements per day Maximum peak hourly truck dispatches: • 8 loads per hour • 16 movements per hour	Maximum daily truck dispatches: • 120 truckloads per day • 240 movements per day Maximum peak hourly truck dispatches: • 15 truckloads per hour • 30 traffic movements per hour Stabilment for pugmill requires 72 loads one-way (incoming) per annum. Note: All out-going stabilised product forms the total quarry production and is accounted for in average/maximum truck dispatches stated above.
Blasting	Four (4) blasts per year	Average of six (6) blasts per year. Maximum of eight (8) blasts per year.

3.4 Pugmill Operations

As listed in Table 3 above, a mobile pugmill will be located in the quarry pit, shown in Figure 5. The proposed pugmill will be a silo and bin combination which will utilise aggregate from the quarry and stabilment (blended slag and lime).

The following production rates are proposed:

- Annual production of 50,000 tpa;
- Daily maximum production of 2,000 tonnes;
- Daily average production of 200 tonnes; and
- An operating period 250 days per year.

4 ASSESSMENT CRITERIA

Assessment criteria relevant to this assessment are presented below in Table 4. Air quality criteria has been selected based on the requirements of the '*Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*'.

Table 4: Approved Methods Ground Level Concentration Criteria

Compound	Air Quality Criteria (µg/m^3)	Averaging Time
TSP	90	Annual
PM_{10}	50	24-hour
	25	Annual
$PM_{2.5}$	25	24-hour
	8	Annual
Deposited Dust	2 g/m^2/month (increment)	Month
	4 g/m^2/month (total)	

5 EXISTING ENVIRONMENT

To assess cumulative impacts, background air quality has been obtained from the EPA website. The nearest and most representative monitoring station is Tamworth, where PM_{10} and $PM_{2.5}$ are monitored. Figure 6 and Figure 7 are the 24-hour graphs for the measured PM_{10} and $PM_{2.5}$ concentrations in 2017.

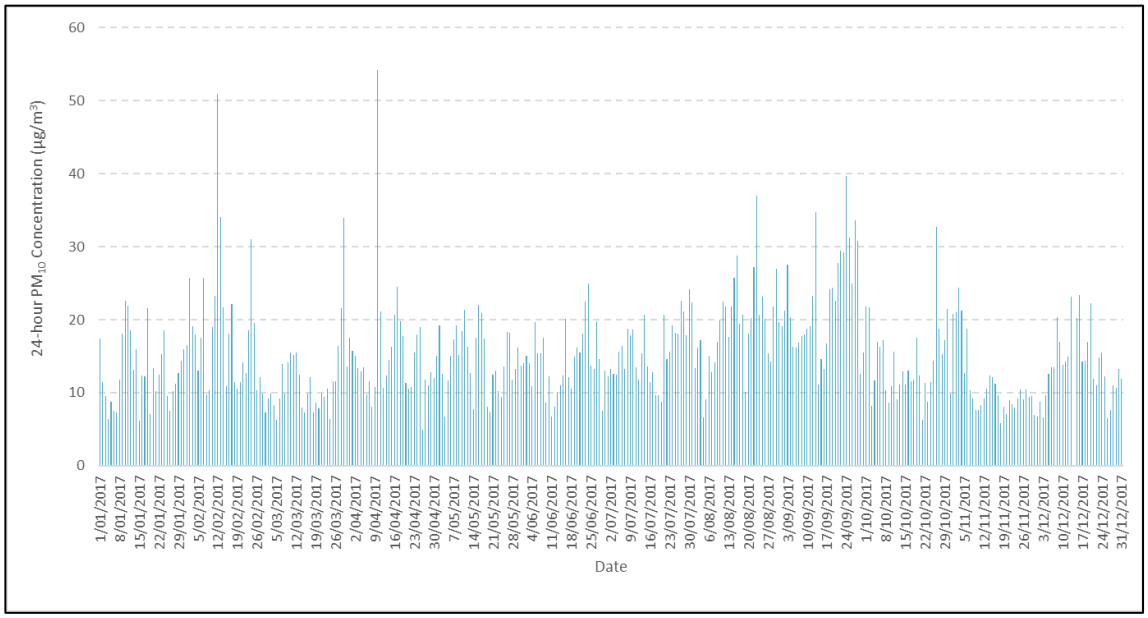


Figure 6: 24-hour Average PM_{10} Concentrations Measured at Tamworth in 2017

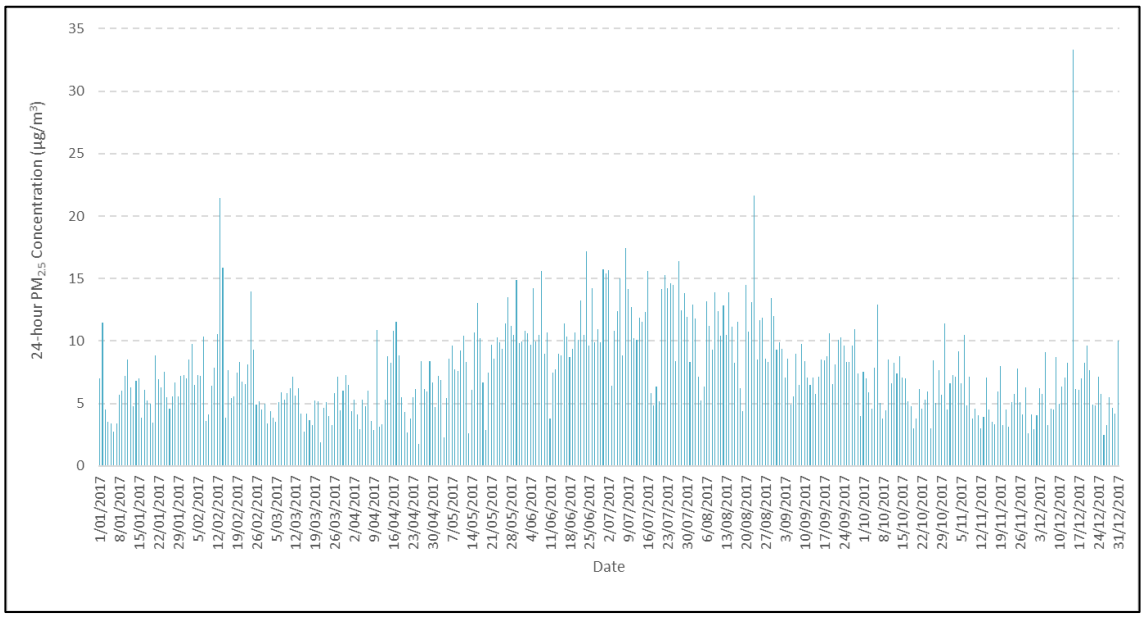


Figure 7: 24-hour Average $PM_{2.5}$ Concentrations Measured at Tamworth in 2017

Exceedances of the PM_{10} concentration occurred on two (2) days; 12 February and 10 April 2017, whilst there was one $PM_{2.5}$ exceedance on 15 December. The *New South Wales Annual Compliance Report 2017 National Environment Protection (Air Quality) Measure* (EPA, 2018) attributed these three exceedances to natural events (bush fire or dust storms). In accordance with the Approved Methods, these three days have been removed from the analysis of the background concentrations presented in Table 5, which presents the background (70^{th} percentile) air quality for 2017 for each pollutant.

TSP is not monitored at any representative station. In lieu of this, research indicates that in rural areas, PM_{10} typically represents 49% of total TSP, therefore, TSP concentrations have been estimated based on the application of this ratio[a].

Table 5: Summary of Background Concentrations (µg/m³)

Compound	Averaging Period	Parameter	Concentration	EPA Site
TSP	1 year	Average	30.8 µg/m³	Calculated from PM_{10}
PM_{10}	24 hours	70^{th} percentile	17.7 µg/m³	Tamworth
	1 year	Average	15.1 µg/m³	
$PM_{2.5}$	24 hours	70^{th} percentile	9.3 µg/m³	Tamworth

The hourly concentrations have been modelled contemporaneously in accordance with a Level 2 assessment.

Boral undertake dust deposition monitoring at three locations at the Subject Site, including the weighbridge, at the site exit to Werris Creek Road, and at the nearby receptor Bellbrook Farm (Receptor R8). Dust deposition monitoring samples are collected on a 30±2 days sampling regime, with results provided by Boral for the assessment period between November 2019 and November 2020.

The monitoring conducted at receptor R8 is geographically the closest to the quarry and is the only location where dust deposition levels are monitored, in lieu of other monitoring data, the dust deposition levels are considered suitable for all nearby receptors. The average deposition levels recorded at Receptor 8 for the data provided by Boral are 2.5 g/m²/month, which is below the NSW EPA assessment criteria of 4 g/m²/month.

[a] Air Noise Environment Pty Ltd (1999) 'Fine dust and the implications for the coal industry', ACARP Project C7009.

6 MODELLING METHODOLOGY

Atmospheric dispersion modelling involves the mathematical simulation of the dispersion of air contaminants in the environment. The modelling utilises a range of information to estimate the dispersion of pollutants released from a source, including:

- Meteorological data for surface and upper air winds, temperature, and pressure profiles, as well as humidity, rainfall, cloud cover and ceiling height information;
- Emissions parameters including source, location, and height, source dimensions and physical parameters (e.g. exit velocity and temperature) along with pollutant mass emission rates;
- Terrain elevations and land use both at the source and throughout the surrounding region; and
- The location, height, and width of any obstructions (such as buildings or other structures) that could significantly impact on the dispersion of the plume.

For the purpose of the assessment, meteorological modelling has been undertaken using TAPM (The Air Pollution Model) and CALMET to predict localised meteorological conditions. The meteorological data derived from these models have been used as an input for the CALPUFF dispersion modelling.

A site-specific meteorological dataset has been determined using the prognostic model TAPM (The Air Pollution Model). Prognostic models, such as TAPM, permit the development of localised meteorological datasets, based on synoptic weather conditions. The model predicts the regional flows important to dispersion, such as sea breezes and terrain induced flows, against a background of larger-scale meteorology provided by synoptic analyses.

The output of this model, when used with a diagnostic meteorological model, such as CALMET, provides a meteorological dataset suitable for introduction into the wind field results. This methodology is the recommended approach for the modelling of contaminant concentrations using CALMET[b].

[b]TRC Environmental Corporation (March 2011) 'Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the 'Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia' prepared on behalf of the NSW Office of Environment and Heritage

Table 6: Summary of Meteorological Modelling Parameter

Model	Aspect	Assigned Parameter
TAPM (v4.04)	Year Modelled	One full year - 2017 which is compared to long-term observations to demonstrate suitability. Observations from Tamworth Airport was included in TAPM model.
	Domains Grid	47 x 47 x 25 grid points
	Nesting Spacing	30 km, 10 km, 3 km, and 1 km
	Databases	Default databases for sea temperature, terrain and land cover applied
CALMET (v 7.00)	Model Domain	45-km x 45-km grid (250 m grid intervals)
	Terrain Data	Nasa Shuttle Radar Topography Mission (SRTM) 1-second (approximately 30 m) digital elevation model
	Land Use	Default from USGS for 1 km spacing. Review of the land use was undertaken and updated based on recent aerial imagery at 50 m intervals.
	Vertical Layers	12 Layers - 20 m, 50 m, 75 m, 150 m, 200 m, 500 m, 750 m, 1,000 m, 1,500 m, 2,000 m, 3,000 m, and 4,000 m
	TAPM Input	3D meteorological data (no-obs mode) was derived from the 1 km meteorological grid from TAPM used as initial guess field to predict meteorological conditions

Figure 8 presents the annual wind rose for the Subject Site during 2017. Detailed meteorological analysis of the dataset is presented in Appendix B.

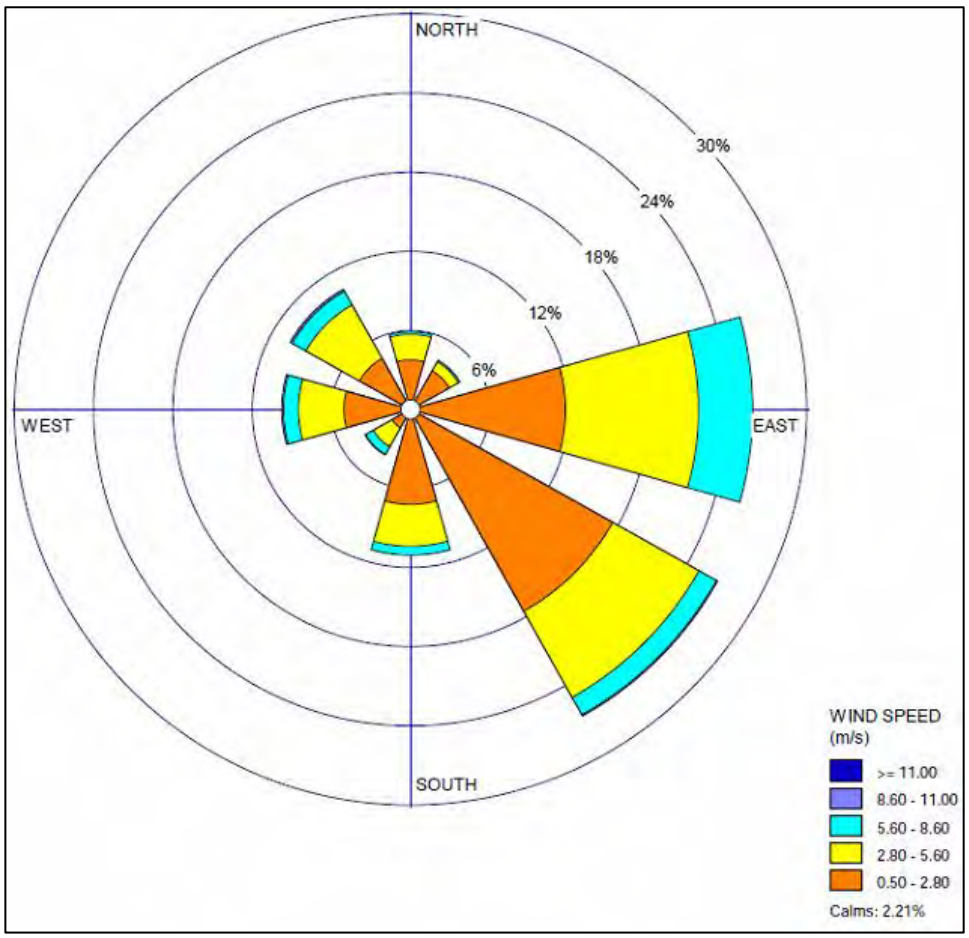


Figure 8: Predicted Annual Wind Rose at Subject Site for 2017

7 AIR DISPERSION MODELLING

7.1 Overview

The CALPUFF modelling system treats emissions as a series of puffs. These puffs are then dispersed throughout the modelling area and allowed to grow and bend with spatial variations in meteorology. In doing so, the model can retain a memory of the plume's movement throughout a single hour and from one hour to the next while continuing to better approximate the effects of complex air flows.

CALPUFF utilises the meteorological processing and prediction model CALMET to provide three-dimensional wind field predictions for the area of interest. The final wind field developed by the model (for consideration by CALPUFF) includes an approximation of the effects of local topography, the effects of varying surface temperatures (as is observed in land and sea bodies) and surface roughness (resulting from varied land uses and vegetation cover in an area). The CALPUFF model can resolve complex terrain influences on local wind fields including consideration of katabatic flows and terrain blocking.

Post processing of modelled emissions is undertaken using the CALPOST package. This allows the rigorous analysis of pollutant predictions generated by the CALPUFF system. CALPOST is able to provide an analysis of predicted pollutant concentrations for a range of averaging periods from 1 hour to 1 year.

7.2 Receptors

A computational grid of 6 km by 6 km at 250 m spacing has been modelled. A nested grid centred on the Subject Site was modelled as at 1 km from centre at varying spacings:

- 500 m from source – 50 m spacing; and
- 1,000 m from source – 100 m spacing.

Additionally, the boundary of the Subject Site has been modelled as discrete receptors at a spacing of 20 m intervals.

7.3 Other Settings

For the purposes of the assessment, the air dispersion modelling has utilised the following settings for CALPUFF:

- three-dimensional mode using meteorological data file from CALMET;
- ISC rural wind speed profile;
- no chemical transformation;
- no gaseous deposition;
- transitional plume rise;
- stack tip downwash for point sources;
- partial plume penetration for point sources;
- dispersion coefficients using Pasquill–Gifford coefficients or turbulence calculated from micro-meteorology;
- no adjustment of dispersion curves for roughness;
- partial plume path adjustment method for terrain using default coefficients; and
- no building wakes were modelled.

8 AIR EMISSION ESTIMATION

8.1 Scenario Assessed

For the purposes of the assessment, the throughput for the quarry (including the pugmill) has been assessed as 400,000 tonnes per annum.

8.2 Sources of Emissions

Dust emissions from the quarry are fugitive particulates TSP, PM_{10} and $PM_{2.5}$. The main sources of fugitive particulates are from the following sources:

- drill and blasting activities;
- extraction and handling of blasted materials;
- crushing, screening, and conveying of material at the mobile crushing plant;
- pugmill operations;
- pre-coat plant;
- wheel-generated dust from vehicle movements across unpaved and paved roads; and
- wind erosion from stockpiles and exposed surfaces.

8.3 Emission Estimation

Emission estimates for the above activities have been derived based on the USEPA AP-42: Compilation of Air Emission Factors (US Environmental Protection Agency, Various Dates) and National Pollution Inventory (NPI) Emission Estimation Technique Manual for Mining (2012).

Emission factors within these documents are used to estimate emissions of TSP, PM_{10} and $PM_{2.5}$ to the air from various sources. Emission factors relate to the quantity of a substance emitted from a source to some measure of activity associated with the source. Emission factors used to estimate a facility's emissions based on activity rates and control measures are presented in Appendix B.

Table 7 presents the emission rates for the proposed increase in production and pugmill operations. As a comparison of the total emission rates with available data from a previous air quality assessment, completed by EMM in 2017 for 300,000 tpa, a PM_{10} emission rate of 19,238 kg/annum was calculated. Unfortunately, TSP and $PM_{2.5}$ data from this study is unavailable for comparison.

Table 7: Summary of Emission Rates

Activity	Emission Rate (kg/annum)		
	TSP	PM_{10}	$PM_{2.5}$
Drill	944	491	28
Blast	134	70	4
Truck unloading to Materials Storage Area	866	410	62
FEL in Materials Storage Area	866	410	62
Unpaved Road - Material Storage Area	19,046	5,337	801
Trucks Loading in Pit	866	410	62
Screening (5 points)	25,000	8,600	581
Crushing (3 points)	3240	432	80
Stockpile Loading	600	220	62
Trucks loading from stockpiles	600	220	62

Activity	Emission Rate (kg/annum)		
	TSP	PM_{10}	$PM_{2.5}$
Paved Roads - Product Trucks (exit to weighbridge)	4,486	861	208
Paved Roads - Product Trucks (weighbridge to stockpile)	8,392	1,611	390
Pugmill - Unloading Aggregate	108	51	8
Pugmill - Loading Trucks	41	19	3
Pugmill – Pneumatic loading of silos	9	5	0.7
Paved Roads - Stabilment (exit to weighbridge)	56	11	3
Paved Roads - Stabilment (weighbridge to stockpile)	2.1	0.4	0.1
Unpaved Road - Stabilment Trucks	103	29	4
Wind erosion area exposed area	16,837	8,418	631
Wind erosion on stockpiles	15	7	1
Total	**82,203**	**27,607**	**3,052**

9 PREDICTED GROUND LEVEL CONCENTRATIONS

In accordance with the Approved Methods, the individual dispersion model predictions for each receptor is added to the corresponding measured background concentration. In doing so, the tables presented in this Section show the highest predicted cumulative (source contribution plus existing background) receptor concentrations along with the highest predicted source contribution concentrations (for the Project) and the corresponding predicted date of occurrence.

To determine the maximum concentrations from the plant, the Subject Site boundary has been used. The maximum ground level cumulative concentration contours (isopleths) are presented in Appendix C.

9.1 Summary

Table 8 presents a summary of the maximum predicted ground level concentrations at the sensitive receptors and at the Subject Site boundary with background concentrations included. It can be seen that the predicted concentrations comply at all sensitive receptors and at the site boundary.

Table 8: Summary of Maximum Predicted Ground Level Concentrations at Receptors and Site Boundary

Pollutant	Averaging Period	Predicted GLC (µg/m^3)		Criteria (µg/m^3)	Compliant at Discrete / Site Boundary
		Discrete Receptor	Site Boundary		
TSP	Annual	31.8	32.1	90	Y / Y
PM_{10}	24 hours	39.2	39.3	50	Y / Y
	Annual	15.8	16.0	25	Y / Y
$PM_{2.5}$	24 hours	11.33	11.32	25	Y / Y
	Annual	4.49	4.50	8	Y / Y
Deposited Dust	Month	2.6	2.6	4	Y / Y

9.2 Contemporaneous Background Analysis: PM_{10}

Table 9 presents the maximum predicted 24-hour average cumulative (source plus background) PM_{10} receptor concentrations at each of the identified sensitive receptors. Review of the maximum predicted concentrations show that the total concentrations are dominated by the highest 24-hour period on the 24 September 2017. The results confirm that compliance with the 50 µg/m^3 criterion is predicted to be achieved for all sensitive receptors.

Table 10 presents the predicted annual average cumulative PM_{10} concentrations across the CALPUFF modelling domain. The results of the modelling presented confirm that the predicted concentrations are significantly below the 50 µg/m^3 criteria.

Table 9: Maximum Predicted 24-Hour Average Cumulative PM_{10} Concentrations (µg/m³)

Receptor ID	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations			
	Date	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	24/09/2017	0.0	39.2	39.2
R2	24/09/2017	0.0	39.2	39.2
R3	24/09/2017	0.0	39.2	39.2
R4	24/09/2017	0.0	39.2	39.2
R5	24/09/2017	0.0	39.2	39.2
R6	24/09/2017	0.0	39.2	39.2
R7	24/09/2017	0.0	39.2	39.2
R8	24/09/2017	0.1	39.2	39.3
Air Quality Objective				***50***

Table 10: Predicted Annual Average Cumulative PM_{10} Concentrations (µg/m³)

Receptor ID	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	0.5	15.3	15.8
R2	0.1	15.3	15.5
R3	0.1	15.3	15.4
R4	0.1	15.3	15.4
R5	0.03	15.3	15.3
R6	0.03	15.3	15.3
R7	0.05	15.3	15.4
R8	0.1	15.3	15.4
Air Quality Objective			**25**

Table 11 presents maximum predicted source contribution PM_{10} receptor concentrations at each of the identified sensitive receptors. Also presented in this table is the coincident background concentration and predicted cumulative receptor concentration for the same period in September 2017. The results of the modelling confirm that emissions from the proposed activities are predicted to result in maximum off-site PM_{10} concentrations of 47% of the relative criterion specified in the Approved Methods, ensuring compliance.

Table 11: Maximum Predicted 24-Hour Average Source Contribution PM_{10} Concentrations ($\mu g/m^3$)

Receptor ID	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	4.1	15.9	20.0
R2	2.9	20.6	23.5
R3	4.1	13.7	17.8
R4	3.1	19.5	22.6
R5	0.8	19.5	20.3
R6	0.6	19.5	20.1
R7	0.6	10.7	11.3
R8	3.2	16.0	19.1
	Air Quality Objective		**50**

9.3 Contemporaneous Background Analysis: $PM_{2.5}$

Table 12 presents the maximum predicted 24-hour average cumulative (source plus background) $PM_{2.5}$ receptor concentrations at each of the identified sensitive receptors. Review of the maximum predicted concentrations are dominated by the highest 24-hour period on the 24 September 2017. The contours confirm that compliance with the 25 $\mu g/m^3$ criterion is predicted to be achieved for all sensitive receptors.

Table 13 presents the predicted annual average cumulative $PM_{2.5}$ concentrations across the modelling domain. The results of the modelling presented confirm that the predicted concentrations are significantly below the 8 $\mu g/m^3$ criteria.

Table 12: Maximum Predicted 24-Hour Average Cumulative $PM_{2.5}$ Concentrations ($\mu g/m^3$)

Receptor ID	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations			
	Date	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	24/09/2017	0.00	11.3	11.3
R2	24/09/2017	0.00	11.3	11.3
R3	24/09/2017	0.00	11.3	11.3
R4	24/09/2017	0.00	11.3	11.3
R5	24/09/2017	0.00	11.3	11.3
R6	24/09/2017	0.00	11.3	11.3
R7	24/09/2017	0.00	11.3	11.3
R8	24/09/2017	0.01	11.3	11.3
Air Quality Objective				***25***

Table 13: Predicted Annual Average Cumulative $PM_{2.5}$ Concentrations (µg/m³)

ID	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	0.08	4.4	4.5
R2	0.02	4.4	4.4
R3	0.01	4.4	4.4
R4	0.01	4.4	4.4
R5	0.00	4.4	4.4
R6	0.00	4.4	4.4
R7	0.01	4.4	4.4
R8	0.02	4.4	4.4
Air Quality Objective			**8**

Table 14 presents maximum predicted source contribution $PM_{2.5}$ receptor concentrations at each of the identified sensitive receptors and the maximum at the Subject Site boundary. Also presented in this table are the coincident background concentrations and predicted cumulative receptor concentrations for the same period in September 2017. The results of the modelling confirm that emissions from the proposed activities are predicted to result in maximum off-site $PM_{2.5}$ concentrations of 26% of the relative criterion specified in the Approved Methods.

Table 14: Maximum Predicted 24-Hour Average Source Contribution $PM_{2.5}$ Concentrations (µg/m³)

Receptor ID	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	0.6	4.6	5.2
R2	0.5	5.9	6.4
R3	0.6	4.0	4.6
R4	0.5	5.6	6.1
R5	0.1	5.6	5.7
R6	0.1	5.6	5.7
R7	0.1	3.1	3.2
R8	0.4	4.6	5.0
Air Quality Objective			**25**

9.4 Contemporaneous Background Analysis: TSP

Table 15 presents the predicted annual average cumulative TSP concentrations across the modelling domain. The results of the modelling presented confirm that the predicted concentrations are significantly below the 90 µg/m³ criteria.

Table 15: Predicted Annual Average Cumulative TSP Concentrations (µg/m^3)

ID	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	0.53	31.2	31.8
R2	0.14	31.2	31.4
R3	0.05	31.2	31.3
R4	0.05	31.2	31.3
R5	0.02	31.2	31.3
R6	0.03	31.2	31.3
R7	0.04	31.2	31.3
R8	0.11	31.2	31.4
Air Quality Objective			**90**

The predicted pollutant concentration contours are presented in Appendix C.

10 CONCLUSIONS

Boral operates a quarry at 3716 Werris Creek Road, Currabubula (Subject Site) in the Liverpool Plains LGA. The quarry has received a rapid increase in demand for its product over the last 15 months owing to stimulus investment in road infrastructure, particularly for rural Councils and Transport in NSW (TfNSW).

The existing Development Consent has an annual production limit of 300,000 tpa. It is proposed to increase the annual production limit to 400,000 tpa, as well as install a mobile pugmill to blend and mix 50,000 tpa of aggregate (from the quarry), and stabilment (blended slag and lime). The proposed increase in the extraction limit would allow the quarry to increase production to meet the increasing demand for construction materials in the Tamworth and surrounding areas.

An air quality impact assessment has been undertaken to demonstrate the increase in production and associated changes to infrastructure will not have adverse effects on surrounding receptors. The assessment has been conducted in accordance with a Level 2 assessment detailed in Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2017).

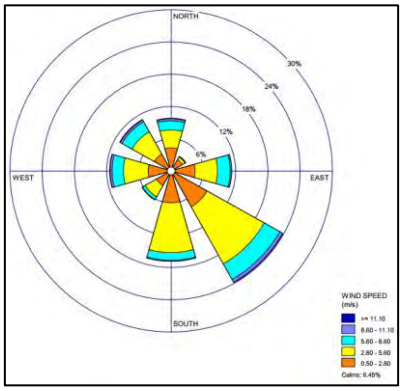
The results of the contemporaneous modelling for 400,000 tpa demonstrated compliance with the assessment criteria listed in the Approved Methods at all sensitive receptors. The results showed compliance at all receptors which indicates the existing dust mitigation measures are sufficient.

Overall, the proposed increase in production is not expected to adversely impact on the air environment of nearby sensitive uses.

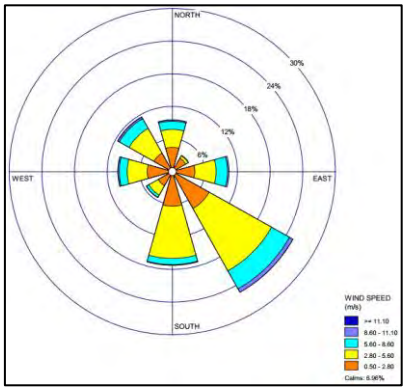
APPENDIX A: METEOROLOGICAL REVIEW

Section of Representative Year

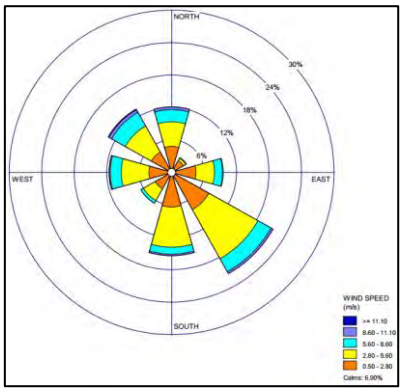
To determine the most representative meteorological year to utilise in the modelling, seven years (2012 - 2019) of meteorological observations from BOM Tamworth Airport (station number 055325) were reviewed. The Figure below presents the wind roses for 2012 – 2019.



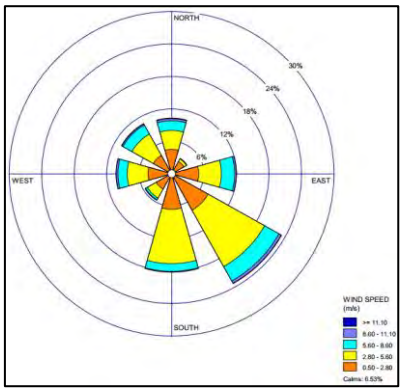
Annual 2012 - 2019



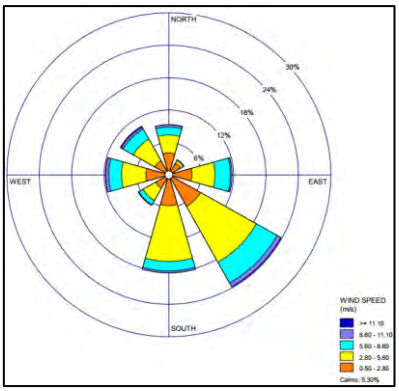
Annual 2015



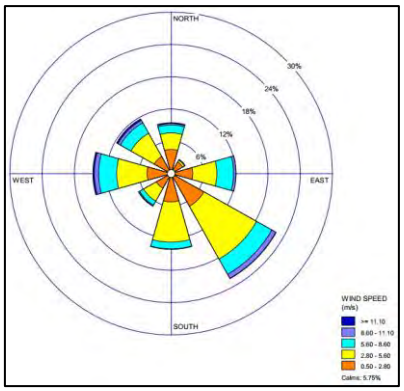
Annual 2016



Annual 2017



Annual 2018



Annual 2019

Long-term Wind Roses from BOM Tamworth Airport (2015 - 2019)

Based on the wind roses alone, most years are considered representative with small variations in the frequency of wind directions. The table below presents a yearly comparison of various meteorological parameters against the seven-year dataset of 2012-2019, averaged due to data scarcity. It can be seen form the Table that 2017 is the most representative year based on the analysis of individual parameters.

Data Analysis

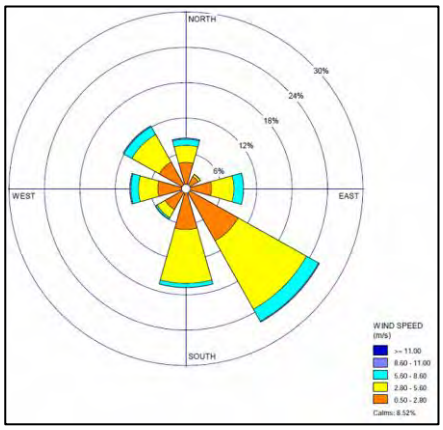
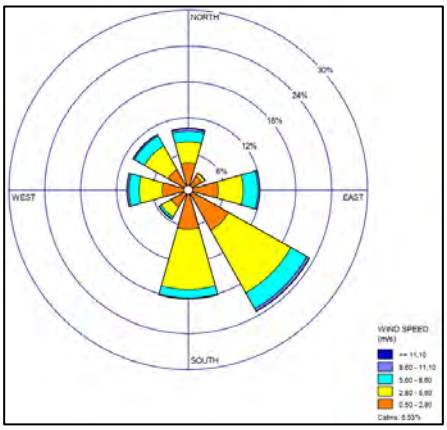
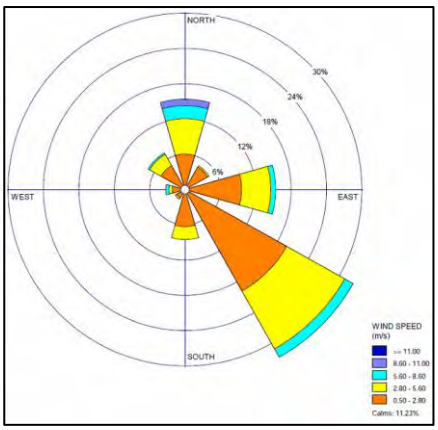
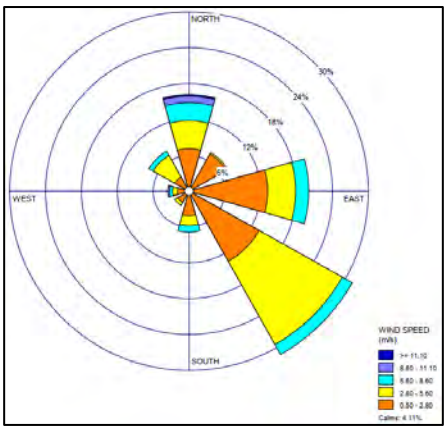
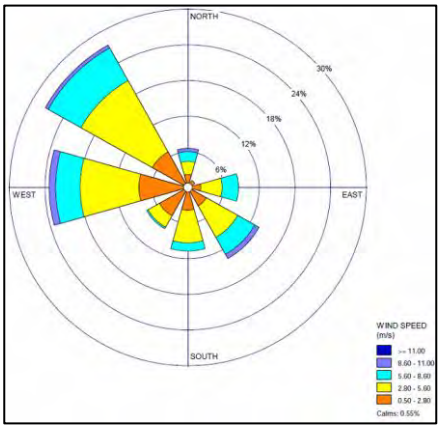
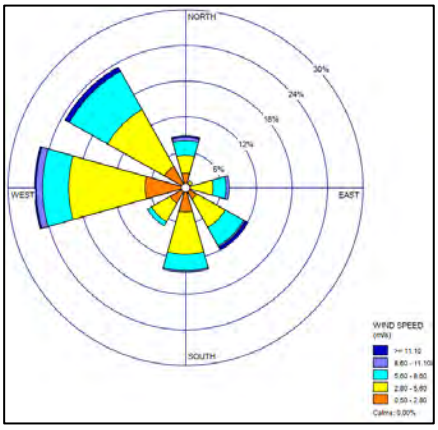
Parameter		Year					
		2012 - 2019	2015	2016	2017	2018	2019
Wind Conditions	Data Availability	99.8	99.97	99.92	99.92	99.99	99.82
	Calm Conditions (%)	6.5	7.0	6.9	6.53	5.3	5.75
	Ave. Wind Speed (m/s)	3.5	3.4	3.4	3.4	3.7	3.7
Rainfall	Data Availability	99.8	99.97	99.92	99.92	99.99	99.82
	Rainfall (mm)	628 [a)]	669.6	763.4	622.2	362.6	257.8
	Average Hourly Rainfall (mm/hour)	0.07	0.08	0.09	0.07	0.04	0.03
Correlations of Datasets by Month	RH (%)		0.02	0.20	0.86	0.79	0.32
	Temperature (°C)		0.98	0.97	0.99	1.00	0.61
	Wind Speed (m/s)		0.89	0.91	0.95	0.92	0.67

a) Based on long-term data from BOM website

As such, 2017 is considered the most representative year for locations close to Tamworth.

Observations vs Prognostic Dataset at Tamworth Airport

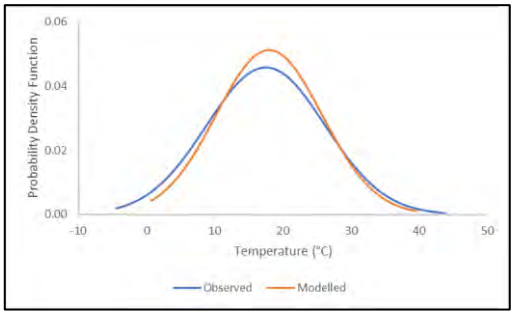
An evaluation of the performance of the meteorological model is presented in this section. The evaluation compares the observed meteorological data from BOM Tamworth Airport with the output from CALMET, which included data assimilation in TAPM. The figure below presents a comparison of the 9 am, 3 pm and annual 2017 predicted and observed wind roses at BOM Tamworth Airport monitoring station, which is located approximately 25 km to the NNE of the Subject Site.

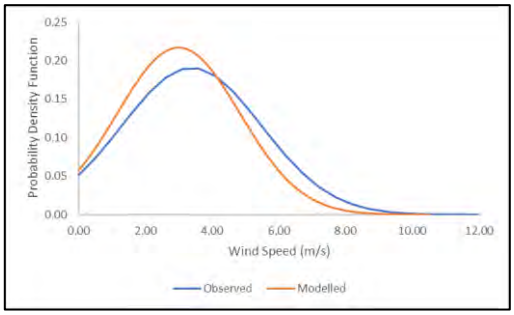
Period	Tamworth Airport Predicted (2017)	Tamworth Airport BOM (2017)
Annual		
0900		
1500		

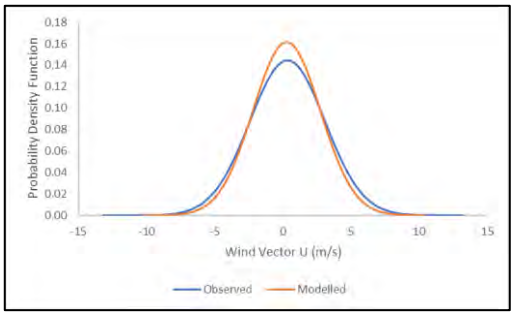
Comparison of Predicted (2017) and BOM Observed Wind Roses (2017) at Tamworth Airport

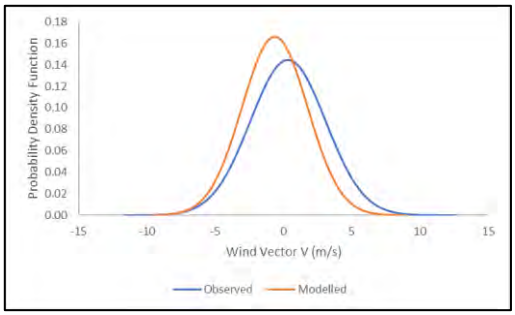
Comparison of the BOM site observed wind roses with the predicted wind roses indicate that the model has fewer wind flows from the south on an annual basis. At 9 am, the model is predicting fewer easterlies, whereas the 3 pm wind roses show that north westerlies are more common for the predicted wind roses compared to the observed wind rose. The frequency of calm conditions are very similar indicating the prognostic model is replicating the local meteorological conditions sufficiently.

The figure below shows the probability density functions that graphically compare statistical distributions of individual meteorological parameters between TAPM/CALMET output and observational data, as extracted from the closest grid point to the Tamworth Airport location.









Probability Density Functions (pdf) Comparing Observational and Modelled Data at BOM Tamworth Airport

Review of the data has identified that the modelled and observed datasets are very similar, with the following noted:

- The modelled temperatures are more likely to be narrower than those observed;
- The model has a cut of wind speed of 10.5 m/s;
- The wind vectors U (east/west component) and V (south/north component) are very similar.

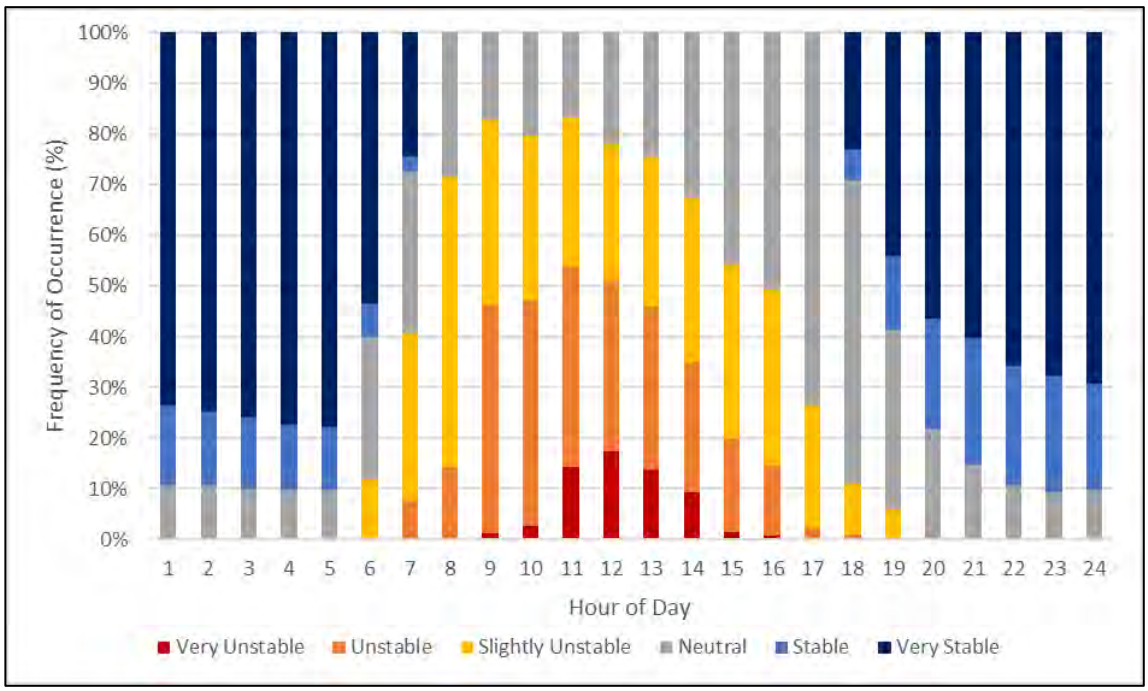
On this basis, the prognostic dataset is considered suitable for the purposes of the assessment.

Prognostic Dataset Review at Subject Site

This section provides an analysis of the prognostic meteorological dataset extracted from the CALMET model for 2017 at the Subject Site.

The amount of turbulence in the ambient air has a major effect upon the rise and dispersion of emissions. In particular, the amount of turbulence in the atmosphere plays a key role in diffusion of an emitted plume in the air with stronger turbulence (increased instability) increasing the rate of diffusion. Where the atmosphere exhibits weak turbulence (increased stability), downwind contaminant concentrations can be expected to increase due to the limited diffusion.

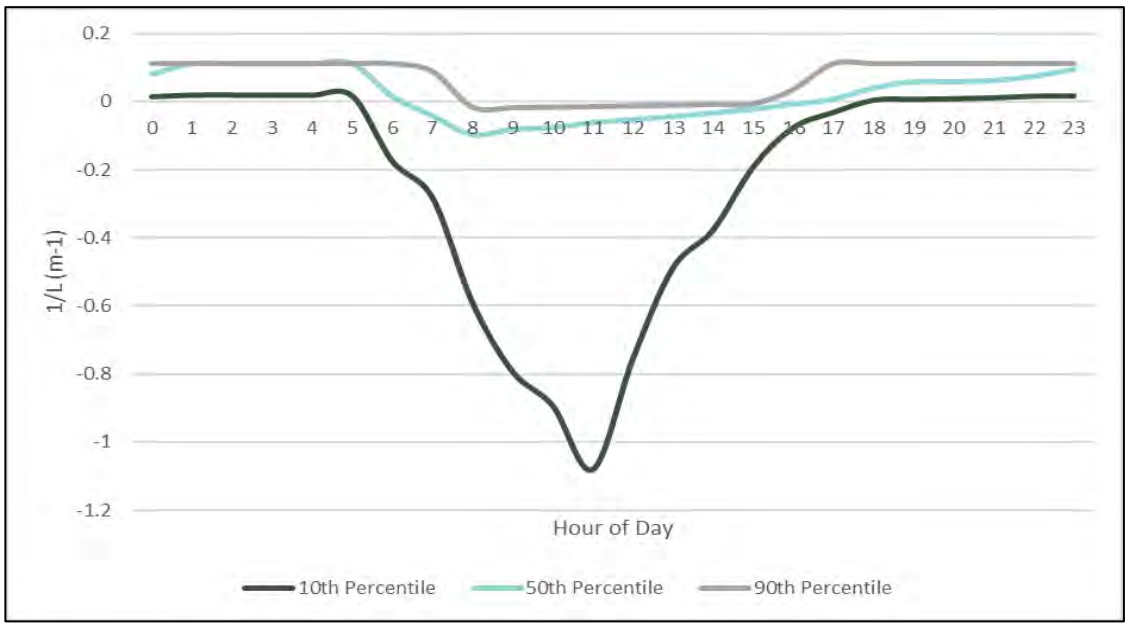
The figure below presents the diurnal variability in atmospheric stability identified in the predicted meteorological dataset. As can be seen, atmospheric instability increased during the day where the influence of solar energy drives convection in the atmosphere. Conversely, increased stability can be seen during night periods where stable conditions are predicted for more than 80 % of the time.



Annual Distribution of Diurnal Atmospheric Stability Variability

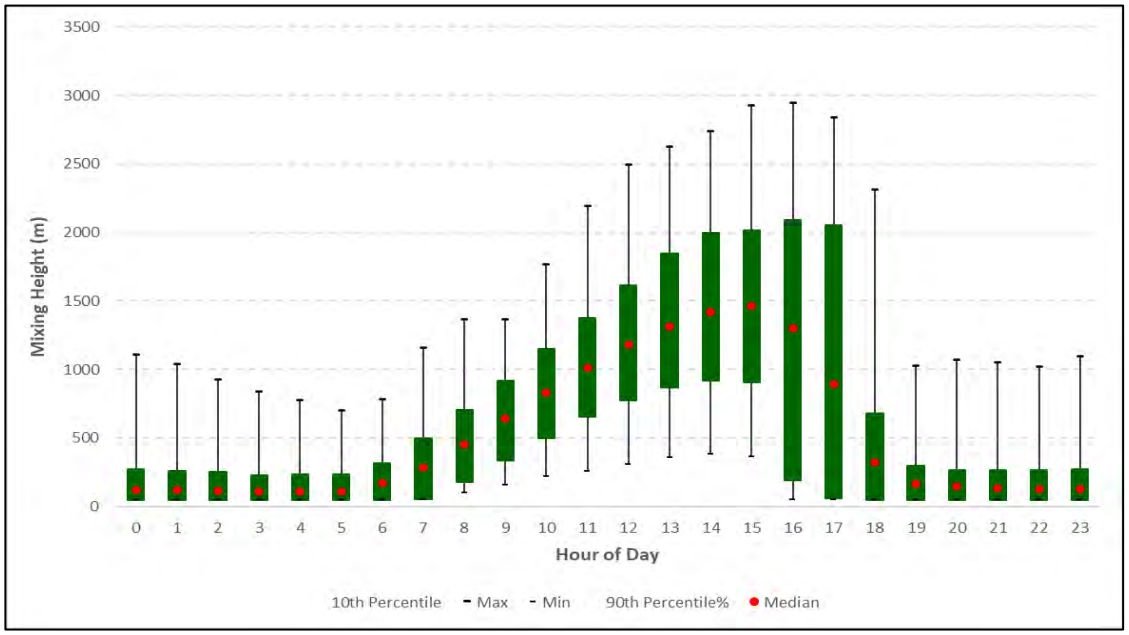
The Monin-Obukhov Length represents a parameter (with dimension of length) which provides a relationship between parameters characterising dynamic, thermal, and buoyant processes. The parameter, first described by Obukhov in 1946, is the characteristic height scale of the dynamic sub-layer of the atmosphere and is positive for stable stratifications and negative for unstable stratifications.

The figure below presents a graphical representation of the reciprocal of the Monin-Obukhov length (1/L) for the 2017 prognostic (CALMET) dataset. In this figure, neutral stability conditions have the 1/L value of zero (0), stable conditions have positive values of 1/L and unstable conditions have negative values of 1/L. The more positive 1/L value, the more stable the atmosphere is assumed to be by the model. Similarly, the more negative 1/L becomes, the more unstable the atmosphere is assumed to be by the model.



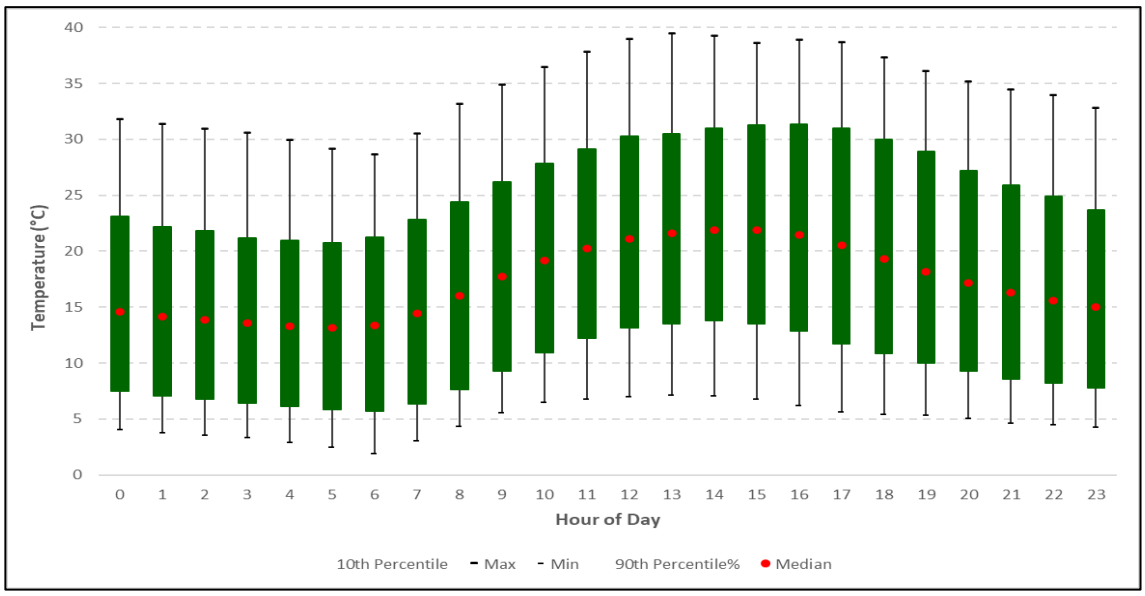
Annual Variability of Monin-Obukhov Length by Hour

The figure below presents an illustration of diurnal variations in maximum and average mixing heights predicted by CALMET at the Subject Site across the 2017 prognostic meteorological dataset. As expected, an increase in mixing height during the morning is apparent, arising due to the onset of vertical mixing following sunrise. Maximum mixing heights generally occur in the mid to late afternoon, due to the dissipation of ground-based temperature inversions and growth of the convective mixing layer. The highest maximum mixing height for the Subject Site occurs during the late afternoon period.



Atmospheric Mixing Height by Hour

The figure below presents an illustration of diurnal variations in maximum and average temperatures predicted by CALMET at the Subject Site across the 2017 prognostic meteorological dataset.



Temperature by Hour

APPENDIX B: EMISSION ESTIMATION

Emission factors can be used to estimate emissions of TSP, PM_{10} and $PM_{2.5}$ to the air from various sources associated with the site.

Activity	Units	TSP Emission Factor	PM_{10} Emission Factor	$PM_{2.5}$ Emission Factor	Source
Wind Erosion for exposed areas	t/ha/hr	0.85 x (365-RD)/365	TSP x 0.5	PM_{10} x 0.075	AP-42 11.9
Wind Erosion from active stockpiles	kg/ha/hr	1.8 x U x (365-RD)/365	TSP x 0.5	PM_{10} x 0.075	AP-42 11.9
Loading / unloading trucks from stockpiles	kg/t	$0.74\ x\ 0.0016\ x\ \frac{(U/2.2)^{1.3}}{(M/2)^{1.4}}$	$0.35\ x\ 0.0016\ x\ \frac{(U/2.2)^{1.3}}{(M/2)^{1.4}}$	$0.053\ x\ 0.0016\ x\ \frac{(U/2.2)^{1.3}}{(M/2)^{1.4}}$	AP-42 13.2.4
Wheel generated dust on paved roads	kg/VKT	$3.23\ x\ \frac{S^{0.91}}{W^{1.02}}$	$0.62\ x\ \frac{S^{0.91}}{W^{1.02}}$	$0.15\ x\ \frac{S^{0.91}}{W^{1.02}}$	AP-42 13.2.1
Wheel generated dust on unpaved roads	kg/VKT	$4.9\ x\ \frac{(s/12)^{0.7}}{(W/3)^{0.45}}$	$1.5\ x\ \frac{(s/12)^{0.9}}{(W/3)^{0.45}}$	PM_{10} x 0.15	AP-42 13.2.2
Material transfer	kg/t per transfer point	$0.74\ x\ 0.0016\ x\ \frac{(U/2.2)^{1.3}}{(M/2)^{1.4}}$	$0.35\ x\ 0.0016\ x\ \frac{(U/2.2)^{1.3}}{(M/2)^{1.4}}$	$0.053\ x\ 0.0016\ x\ \frac{(U/2.2)^{1.3}}{(M/2)^{1.4}}$	AP-42 13.2.4
Screening	kg/t	0.0125	0.0043	0.00029	AP-42 11.19.2
Crushing	kg/t	0.0027	0.0012	$2.22\ x10^{-5}$	AP-42 11.19.2
Conveyor transfer point	kg/t	0.0015	0.00055	0.00016	AP-42 11.19.2
Drill	kg/hole	0.59	0.31	0.017	NPI Mining
Blasting	kg/blast	$0.00022\ xA^{1.5}$	$0.000114\ xA^{1.5}$	TSP x 0.03	NPI Mining
Cement supplement unloading to silo	kg/tonne	0.0045	0.0024	PM_{10} x 0.15	AP-42 11.12.4

Where:

- M = material moisture content (%)
- S = material silt content (or surface content in unpaved roads (%) or silt loading on paved roads (g/m^2))
- U = wind speed (m/s)
- RD = rainfall days >0.25 mm
- W = mean vehicle weight (tonnes)
- Area (m^2)

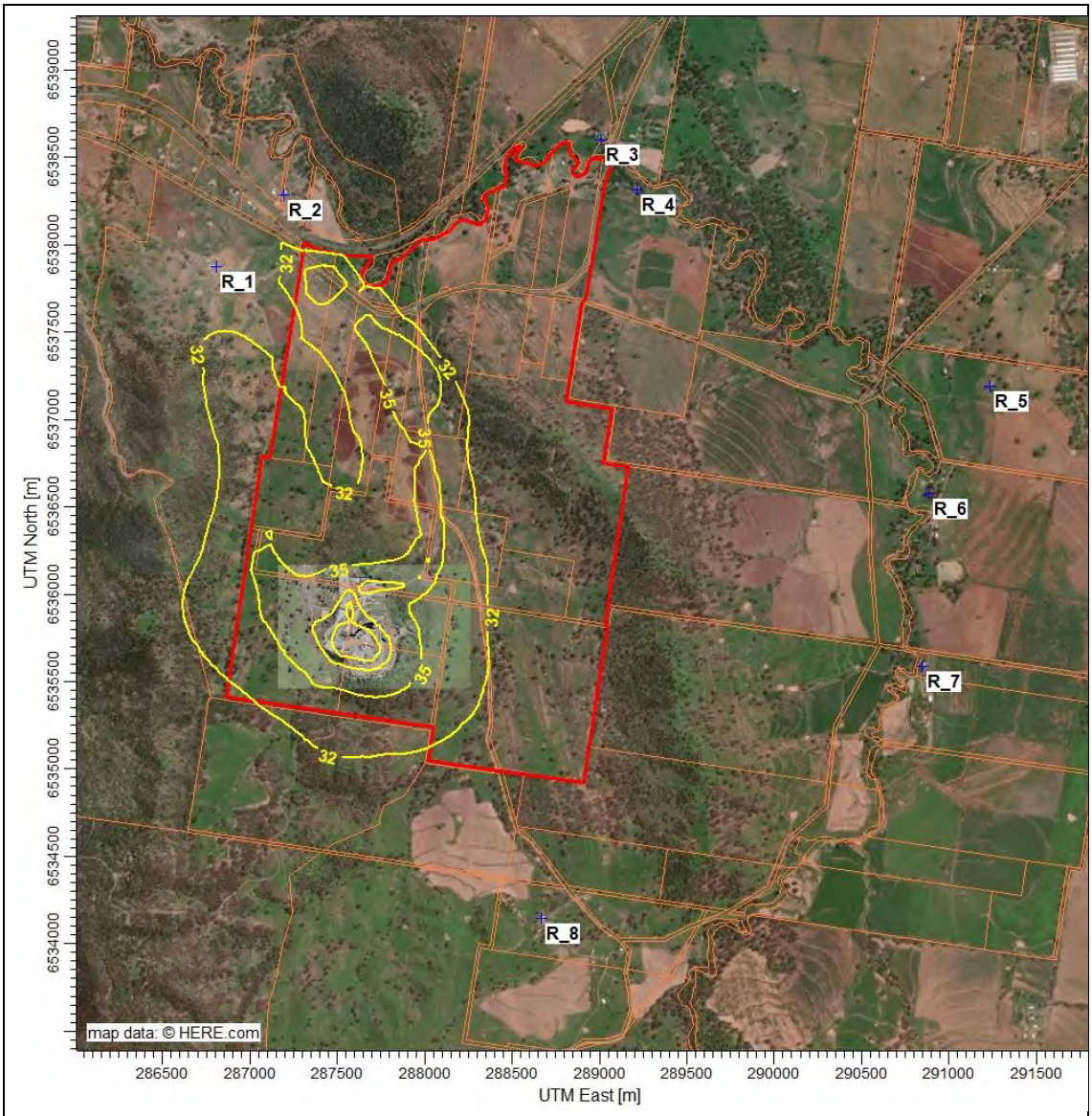
List of Activity Data and Assumptions for Dust Emission Rates

Parameter	Units	Value
Operating Times		
Operating hours	hrs per day	11
Operating days	day / year	312
Volumes / Areas		
Total product	tonnes	400,000
Stockpiles	ha	11.3
Exposed area	ha	94.9
Pugmill		
Stabilment product	tonnes	2,000
Pugmill Production (Annual)	tonnes	50,000
Pugmill Production (Daily Max / Average)	tonnes	2000 / 200
Drill and Blast		
Drilling	Holes per blast	200
Blasts	Per year	8
Area per blast	m^2	1800
Material Transfer		
Truck loading to pit	tonnes	400,000
Screening (5 transfer points)	tonnes	2,000,000
Crushing (3 transfer points)	tonnes	1,200,000
Stockpile loading	tonnes	400,000
Truck loading from stockpiles	tonnes	400,000
Truck unloading to stockpile area	tonnes	400,000
FEL in stockpile area	tonnes	400,000
Vehicles		
Product truck weight (unladen)	tonnes	16
Product truck weight (laden)	tonnes	54
Haul truck weight (unladen)	tonnes	30
Haul truck weight (laden)	tonnes	67
Stabilment truck weight (unladen)	tonnes	16
Stabilment truck weight (laden)	tonnes	44
Unpaved Road Length (pit to stockpiles)	km	0.5
Paved Road Length (stockpiles to weighbridge)	km	0.5
Paved Road Length (weighbridge to exit)	km	1.9
Haul road trips (pit to stockpiles)	VKT	10,811
Haul road trips (stockpiles to weighbridge)	VKT	10,526
Haul road trips (weighbridge to exit)	VKT	40,147
Material Characteristics		
Aggregate moisture content	%	2
Pugmill moisture content	%	4
Silt content of paved road	g/m^2	0.6 / 5.2

Parameter	Units	Value
Silt content of unpaved road	%	7.1 / 8.3
Weather		
Mean wind speed	m/s	3.5
Days where rain >0.25 mm	Qty	60
Emission Controls		
Crushing	%	70
Paved Roads	%	30
Unpaved roads	%	50
Stockpile watering	%	50

APPENDIX C: PREDICTED POLLUTION CONTOURS

Contour plots illustrate the spatial distribution of ground-level concentrations across the modelling domain for each time period of interest. However, this process of interpolation causes a smoothing of the base data that can lead to minor differences between the contours and receptor model predictions.



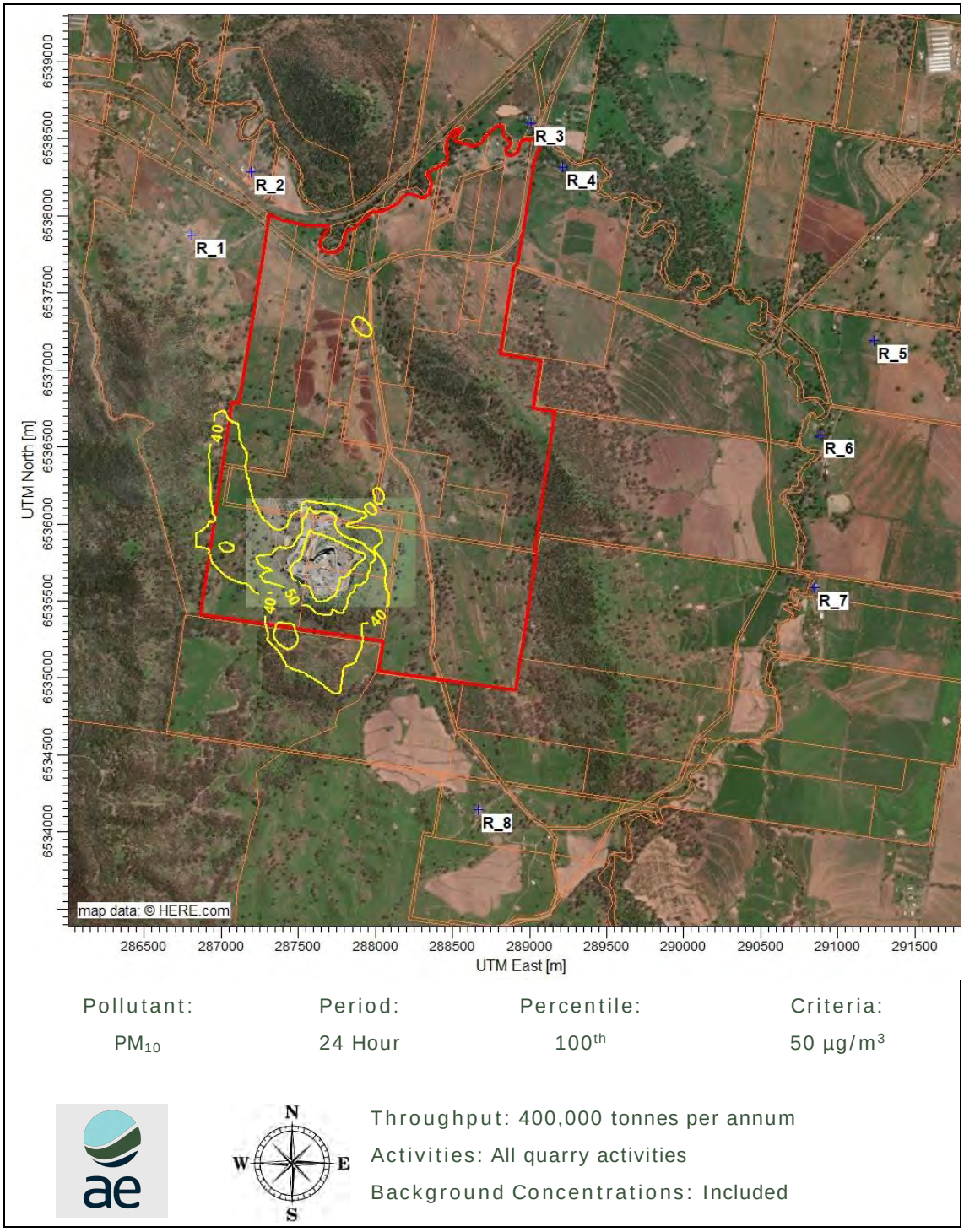
Pollutant:	Period:	Percentile:	Criteria:
TSP	1 Year	100th	90 µg/m³

N
W
E
S

Throughput: 400,000 tonnes per annum

Activities: All quarry activities

Background Concentrations: Included



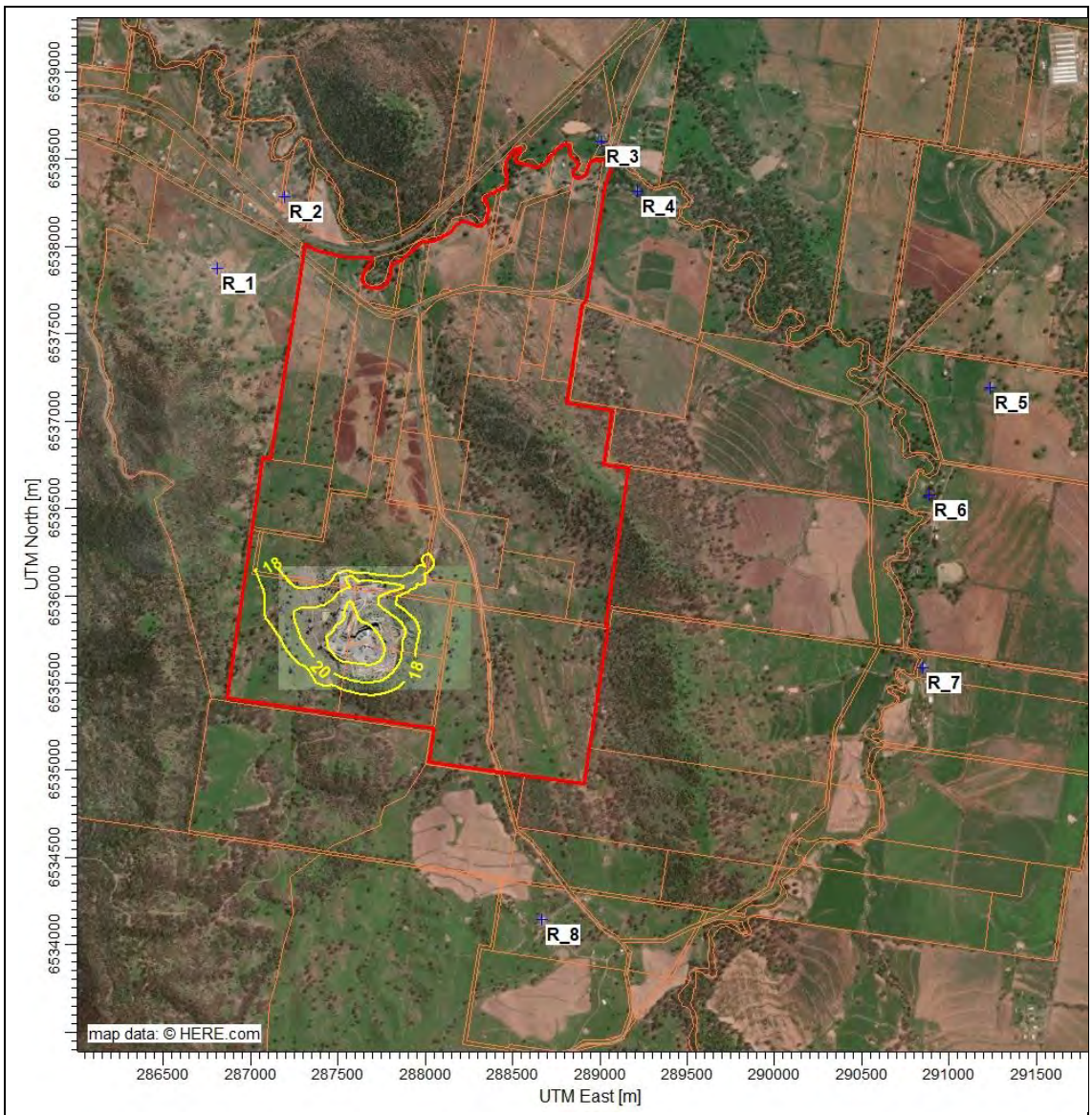
Pollutant:	Period:	Percentile:	Criteria:
PM_{10}	24 Hour	100th	50 µg/m³

N
W
E
S

Throughput: 400,000 tonnes per annum

Activities: All quarry activities

Background Concentrations: Included



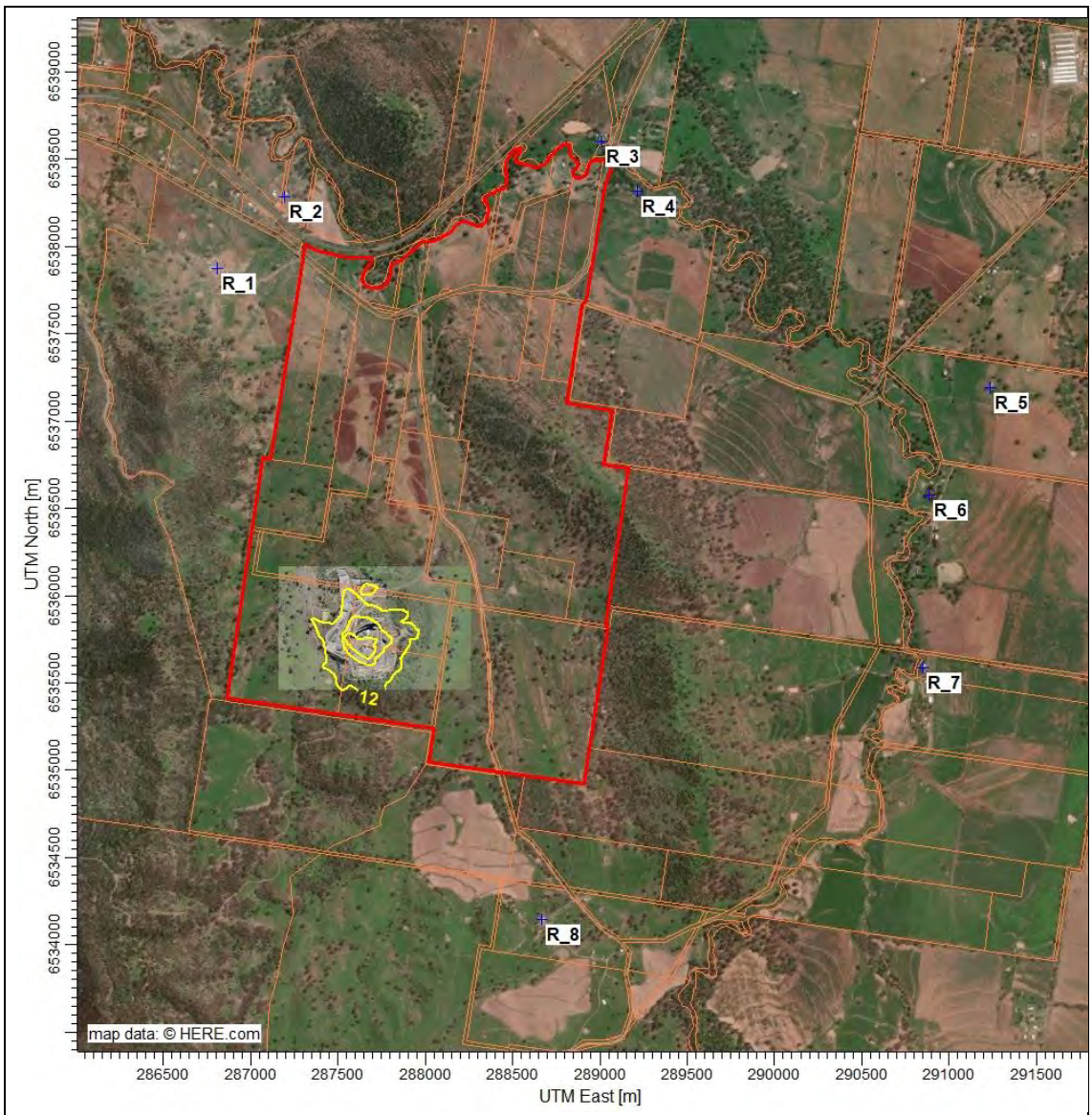
Pollutant:	Period:	Percentile:	Criteria:
PM_{10}	1 Year	100th	25 µg/m³

N
W
E
S

Throughput: 400,000 tonnes per annum

Activities: All quarry activities

Background Concentrations: Included



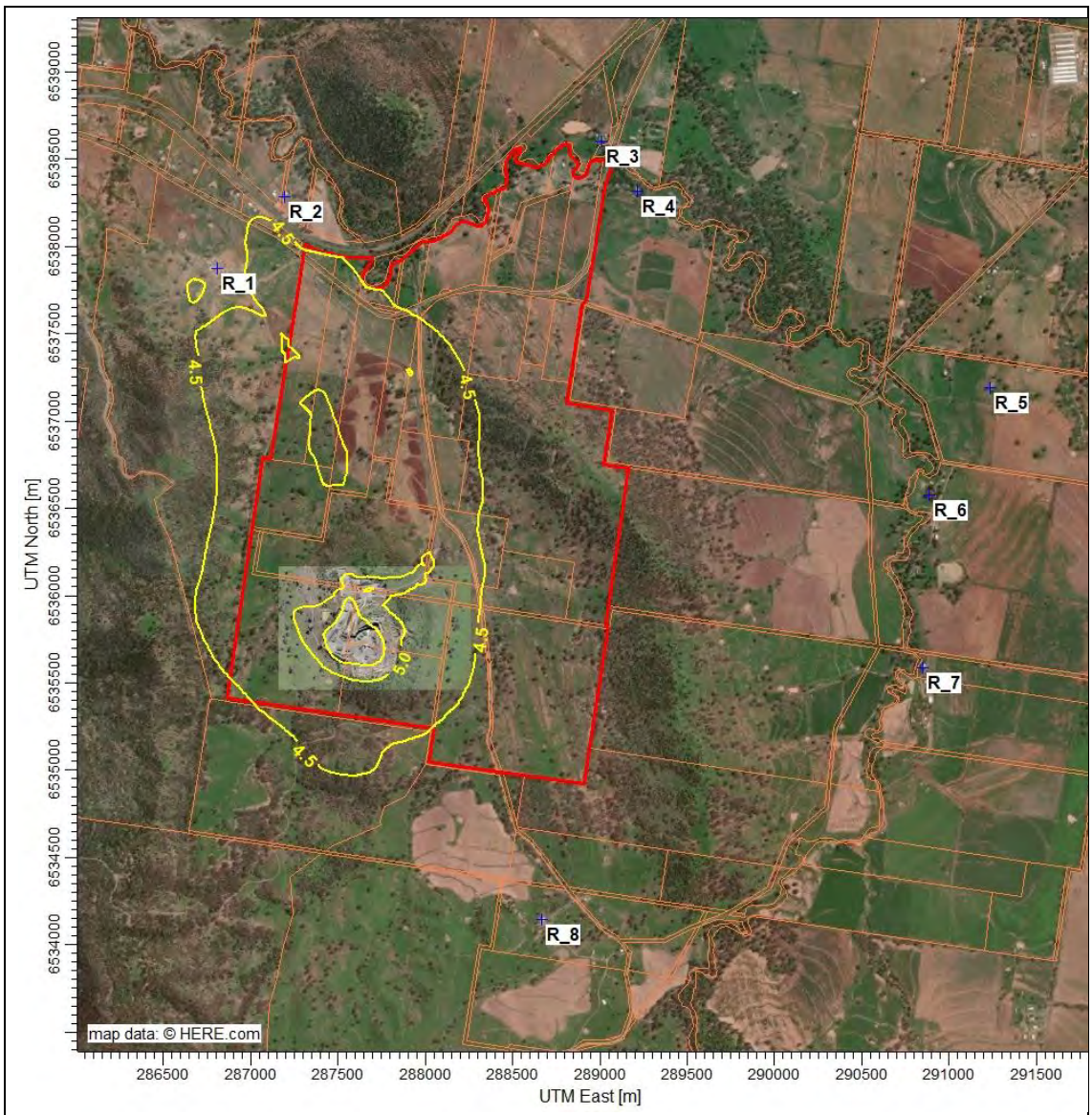
Pollutant:	Period:	Percentile:	Criteria:
$PM_{2.5}$	24 hours	100th	25 µg/m³

N
W
E
S

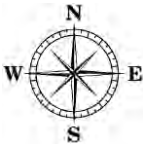
Throughput: 400,000 tonnes per annum

Activities: All quarry activities

Background Concentrations: Included



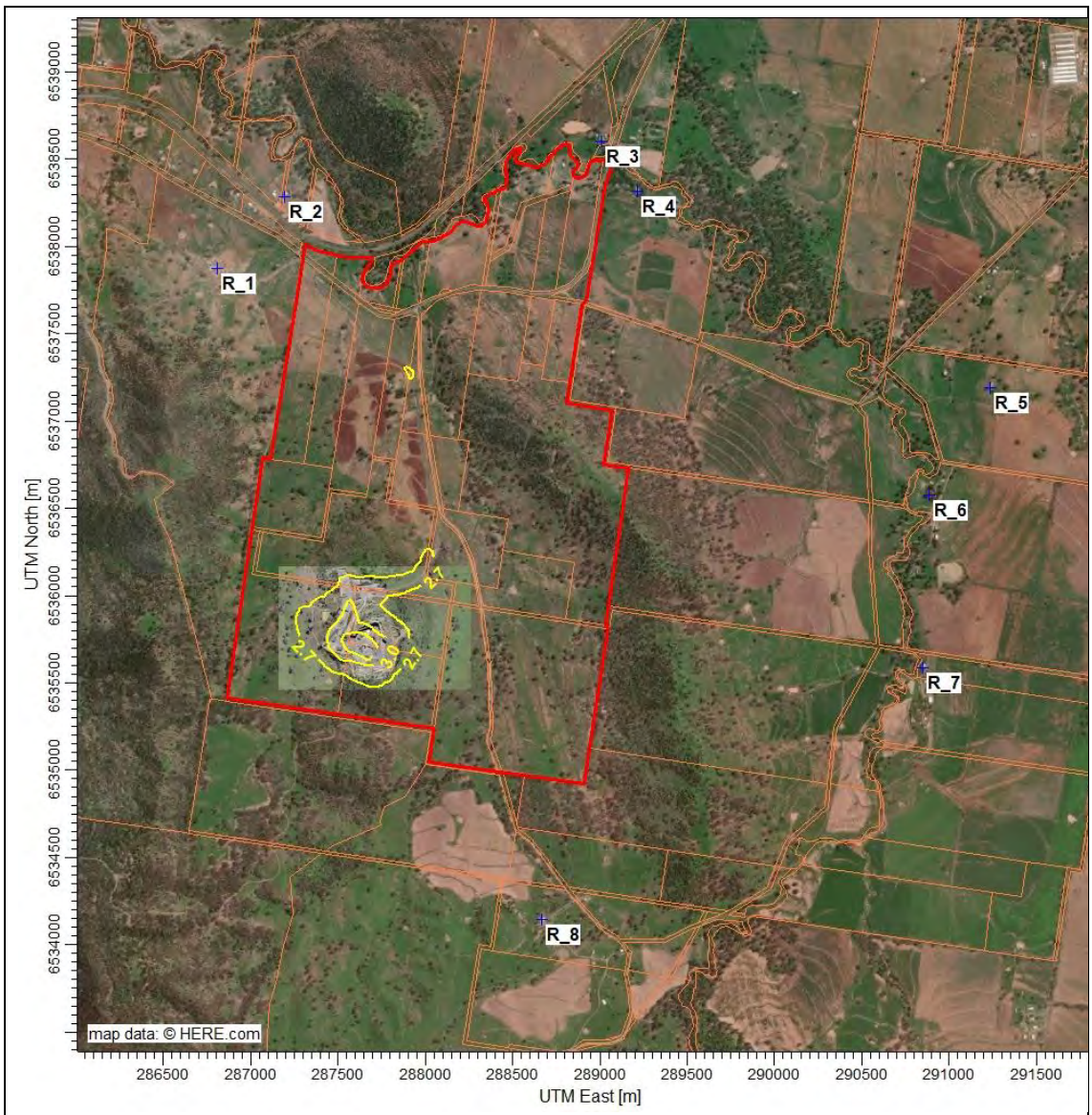
Pollutant:	Period:	Percentile:	Criteria:
$PM_{2.5}$	1 Year	100th	8 µg/m³



Throughput: 400,000 tonnes per annum

Activities: All quarry activities

Background Concentrations: Included



Pollutant:	Period:	Percentile:	Criteria:
Deposited Dust	1 Month	100th	4 g/m²/month

N
W
E
S

Throughput: 400,000 tonnes per annum

Activities: All quarry activities

Background Concentrations: Included

Appendix D

Water Balance

Sediment basin volume calculations

The existing sediment basin has a volume of 3,200 m^3 to its spillway.

The required sediment basin volume was calculated in accordance with the procedures outlined in *Managing Urban Stormwater – Soils and Construction – Volume 1* (Landcom, March 2004) and *Volume 2E Mines and Quarries* (DECC, June 2008). These calculations adopted the following:

- A total catchment area of 16.79 ha;
- A design rainfall depth of 39.2 mm which is for a standard receiving environment and disturbance greater than 3 years (refer to Table 6.1 in DECC, 2008);
- A weighted runoff coefficient (C_v) of 0.43;
- Sediment storage zone based on four months soil loss calculated using the Universal Soil Loss Equation (USLE) and the following factors:
  - R = 1320
  - K = 0.05
  - L = 100 m
  - S = 2%
  - LS = 0.44
  - P= 1.3
  - C = 1
  - Density = 1.3 t/m^3

The required sediment basin volume is:

- Settling zone 2,847 m^3
- Sediment storage 162 m^3
- Total 3,009 m^3

Water balance model

Water demand on set is met through a combination of sources, including the sediment basin and groundwater.

Water is used from the sediment basin for dust suppression and processing. A diesel pump is located on the western edge of the sediment basin, and this is used to pump water to header tanks for use around the quarry.

The surface water supply is supplemented with groundwater extracted from a licensed bore. Boral holds a water access licence with an entitlement of 6 ML per year.

A site specific daily water balance model was used to assess the overall water cycle for the quarry operations and determine:

1. if adequate surface water and groundwater supplies are available to meet water demand for the expanded production; and
2. the average number of spill events from the sediment basin. For a 90th percentile design basis, the average number of spill events should be 2 to 4 spill events per year (DECC, 2008).

The model uses 132 years of daily SILO (climate database) rainfall and evaporation data for the site (1 January 1889 to 31 December 2020). The SILO data interpolates rainfall and evaporation values from surrounding

climate stations to provide a long term data set for the specific location (Data Drill for Latitude, Longitude: -31.30 150.75).

The water cycle is broken down into its various components and then the inflows and outflows are modelled for each section.

Dust suppression

Water for dust suppression is drawn from on-site tanks which are filled from the sediment basin and distributed across working areas using a 12,000 litre water cart. The water balance model adopted the following for dust suppression water:

- No dust suppression undertaken on Saturday or Sunday (non-working days);
- No dust suppression if rainfall on current day is greater than 5 mm;
- Four (4) tanker loads applied each working day (subject to rainfall constraint) in warmer months (November, December, January, February and March); and
- Two (2) tanker loads applied each working day (subject to rainfall constraint) outside of the warmer months.

The dust suppression supply was topped up with bore water if there was no water available from the sediment basin.

Process water

Process water is used for dust suppression on screens and conveyors and to add moisture to the product for processing. The water balance model adopted the following for process water:

- 400,000 tpa;
- 5 days per week, 52 weeks per year
- 1.538 t per day; and
- Water added at 4% of product (i.e. for each tonne of material processed, 40 L of water is used).

Modelling assumed the process water supply was topped up with bore water if there was no water available from the sediment basin.

Water balance results

The water balance model was used to assess two operating scenarios:

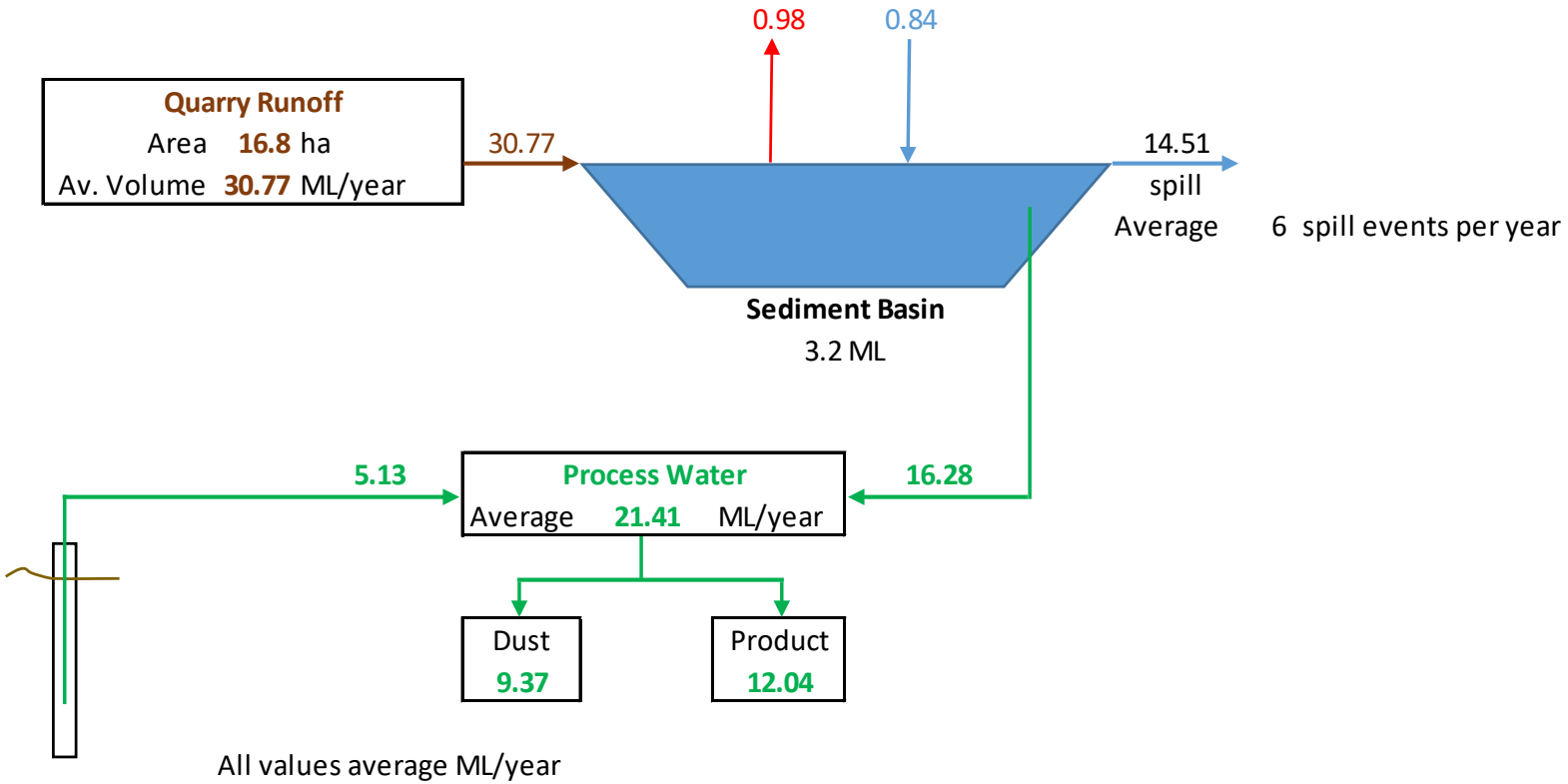
- Existing – annual production of 300,000 tpa; and
- Proposed – annual production of 400,000 tpa.

Existing operations

Results for the existing operations are summarised in Figure 11 and show:

- Average annual site runoff is approximately 31 ML/year;
- Around 16.3 ML/year is reused from the sediment basin;
- An average of 5.1 ML/year is used from the bore; and
- There is an average of 6 spill events per year from the sediment basin.

Figure 11 – Existing operations water balance results



Proposed operations

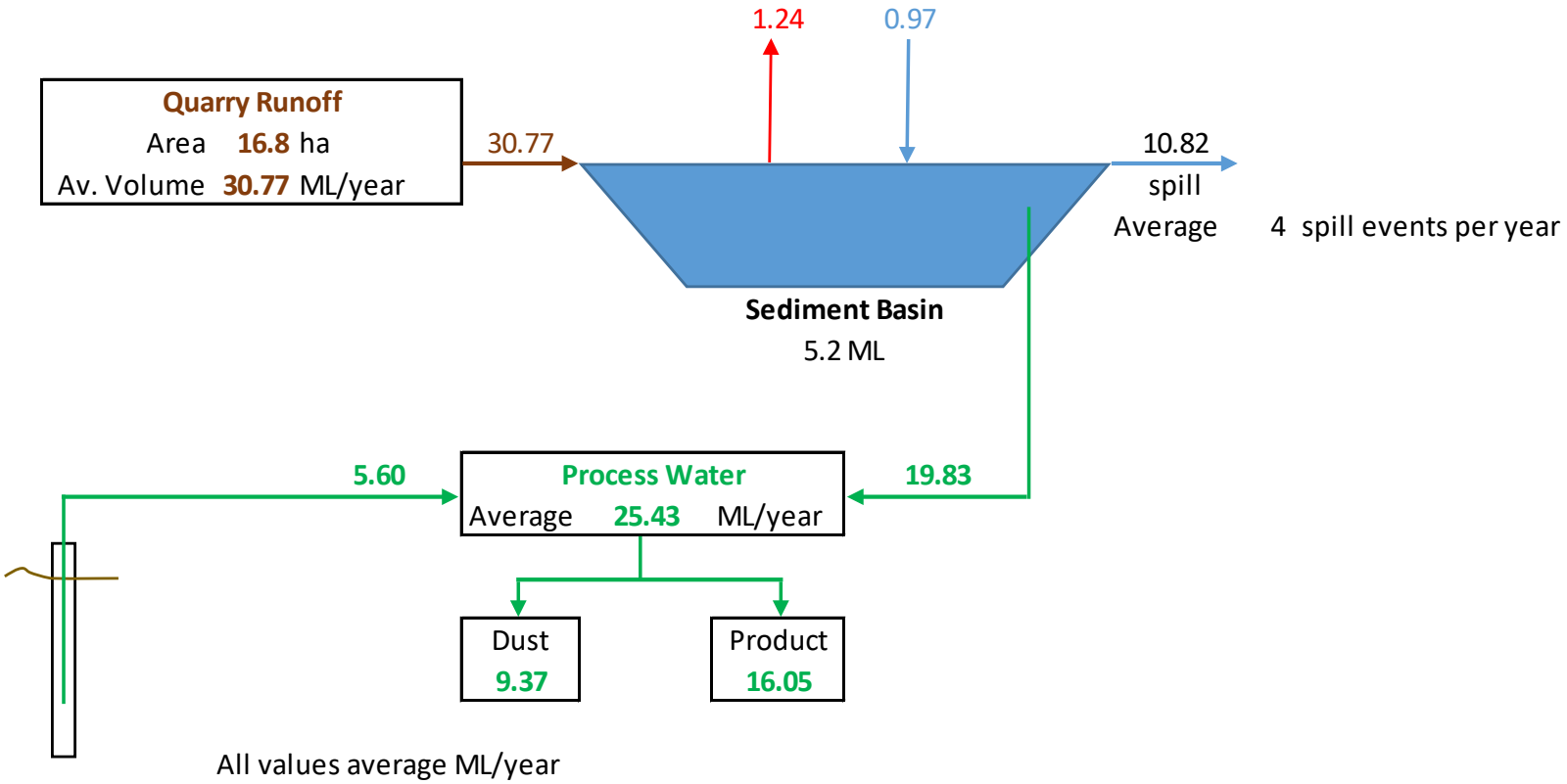
The average number of spill events from the existing sediment basin exceeds four per year. As such, it is proposed to increase the sediment basin volume by raising the embankment by one (1) metre which will increase the volume to approximately 5,200 m^3 (5.2 ML).

The proposed works will reduce the number of spill events and provide more surface water for reuse in the quarry operations.

Results for the proposed operations including the enlarged sediment basin are summarised Figure 12 and show:

- Average annual site runoff remains at approximately 31 ML/year as there is no change to the quarry catchment area;
- Around 19.8 ML/year is reused from the sediment basin;
- An average of 5.6 ML/year is used form the bore; and
- There is an average of 4 spill events per year.

Figure 12 – Proposed operations water balance results



Premise