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Peppertree Quarry

Noise and Blast Management Plan

April 2017

DOCUMENT CONTROL

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Change History

Rev No.	Date	Prepared By	Approved By	Comments
1	Thursday, 5 April 2012	ERM	Sharon Makin (Boral)	First version of NBMP based on November 2011 requirements
2	Wednesday, 18 April 2012	ERM	Sharon Makin (Boral)	Preliminary Final version of NBMP
3	Thursday, 10 May 2012	ERM	Sharon Makin (Boral)	Final version of NBMP
4	Thursday, 2 August 2012	ERM	Sharon Makin (Boral)	Revised Final version of NBMP
5	November 2016	Sharon Makin (Boral)	A Shedden	Revised Final version of NBMP (Mod 4 August 2016 approval)
6	8th April 2017	Sharon Makin (Boral)	Angus Shedden (Boral)	Final AQMP submitted (including DP&E and EPA comments)
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1 INTRODUCTION

1.1 BACKGROUND

Boral Resources (NSW) Pty Ltd (Boral) own and operates Peppertree Quarry (the Quarry), a hard rock quarry located in Marulan South, New South Wales (refer to Figure 1). In February 2007, Boral was granted Project Approval (06_0074) to establish and operate the Peppertree Quarry under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Construction of the Quarry was completed in 2013 with commercial extraction operations having commenced in 2014.

The existing Quarry operations have been constructed and operated in accordance with the Project Approval (with modifications in 2009, 2011, 2012 and 2016) and an Environment Protection Licence (EPL No. 13088).

The 2007 Project Approval required the preparation and implementation of a number of management plans detailing environmental commitment, controls and performance objectives at the Quarry throughout its operational life. In accordance with the Conditions of Approval (CoA), a Noise and Blast Management Plan (NBMP) was first prepared by ERM for Boral in 2012.

In August 2016, the Project Approval was modified for the fourth time (hereafter referred to as Modification 4) under Section 75W of the EP&A Act, to allow an extension of in-pit operating hours and the establishment of a new overburden emplacement area.

This document is a revised version of the initial 2012 NBMP and incorporates changes associated with Modification 4 and reflects air quality management associated with current quarry activities. The NBMP will continue to remain a dynamic document which will be updated as required over the life of quarry operations until the Project Approval end date of December 2038.

1.2 OVERVIEW OF OPERATIONS

The Quarry has an identified resource area of approximately 250 million tonnes, which dependent upon extraction rates, would allow quarrying for 70 years or more over an area of approximately 104 hectares (ha), within a 650 ha parcel of land owned by Boral.

The Quarry produces granodiorite aggregate products and manufactured sand. All quarry products and materials are transported by rail to a number of Boral rail terminals for distribution by trucks into the Sydney metropolitan area.

Typical quarrying operations involve the stripping of overburden and the extraction of hard rock using open-cut drill and blast techniques.

Overburden is stripped by dozer, loaded onto trucks using excavators and/or front end loaders and transported to the overburden emplacement areas, where it is spread and shaped by dozer.

Traditional drill and blast methods are then used to break up the hard rock. A drill rig stationed on top of each production bench drills a series of holes that are later charged with explosives, detonators and delays. Boral apply standard practice of limiting the maximum instantaneous charge to stay within the relevant noise and vibration criteria.

Blasted rock is then processed on-site using various crushers and screens to obtain the desired product. Material is initially crushed in a primary mobile crusher located within the pit, which is currently fed by an excavator, front end loaders and trucks. In the future in-pit works will avoid the use of trucks, with blasted

rock fed directly into the primary mobile crusher by excavator. After passing through the primary crusher, the crushed material is taken from the pit along a series of conveyors to the first set of screens located to the northwest of the pit and material is stockpiled in a surge pile. Material in the surge pile is reclaimed and conveyed to the main processing area where it undergoes further crushing, screening and shaping. Product material is stored in the various covered storage bins prior to being dispatched off-site by train.

1.3 Scope and Objectives

This NBMP applies to all activities undertaken by the Quarry including quarrying, crushing, screening, stockpiling and transportation of quarry products, maintenance activities; and associated service and support functions.

The NBMP provides the framework and guidance for the Quarry activities to be conducted in a manner that appropriate control measures are implemented to minimise the potential for adverse impacts on the amenity, property and safety of quarry neighbours and meet compliance requirements of the CoA of the Project Approval.

Specific objectives of the NBMP are to:

- Ensure contributed noise emissions from the quarrying operations comply with the noise impact assessment criteria in the Project Approval;
- Identify potential noise sources and their relative contribution to noise impacts from the development;
- Outline the methodologies to be used, including justification for monitoring intervals, weather conditions, seasonal variations, monitoring locations, periods and times of measurements, including the means for determining the noise levels emitted by the development;
- Ensure air-blast overpressure and ground vibration levels during blasting events comply with the relevant assessment criteria in the Project Approval;
- Outline procedures associated with blast management and community consultation; and
- Provided data suitable to demonstrate compliance with the CoA of the Project Approval and subsequent modifications.

All operational noise levels in this document are expressed as A-Weighted decibels, dBA. C-Weighted decibels, dBC are referred to as applicable to the assessment of low frequency noise.

1.4 Responsibility for Implementation

The Quarry Manager carries ultimate responsibility for the ongoing development and implementation of this NBMP and providing the necessary resources as required. The site Environmental Officer is responsible for carrying out and/or coordinating the monitoring and reporting requirements of this plan, and responding to any community concerns.

Operations personnel (Quarry Supervisors) are responsible for implementing noise mitigation measures and planning of blasts to meet criteria.

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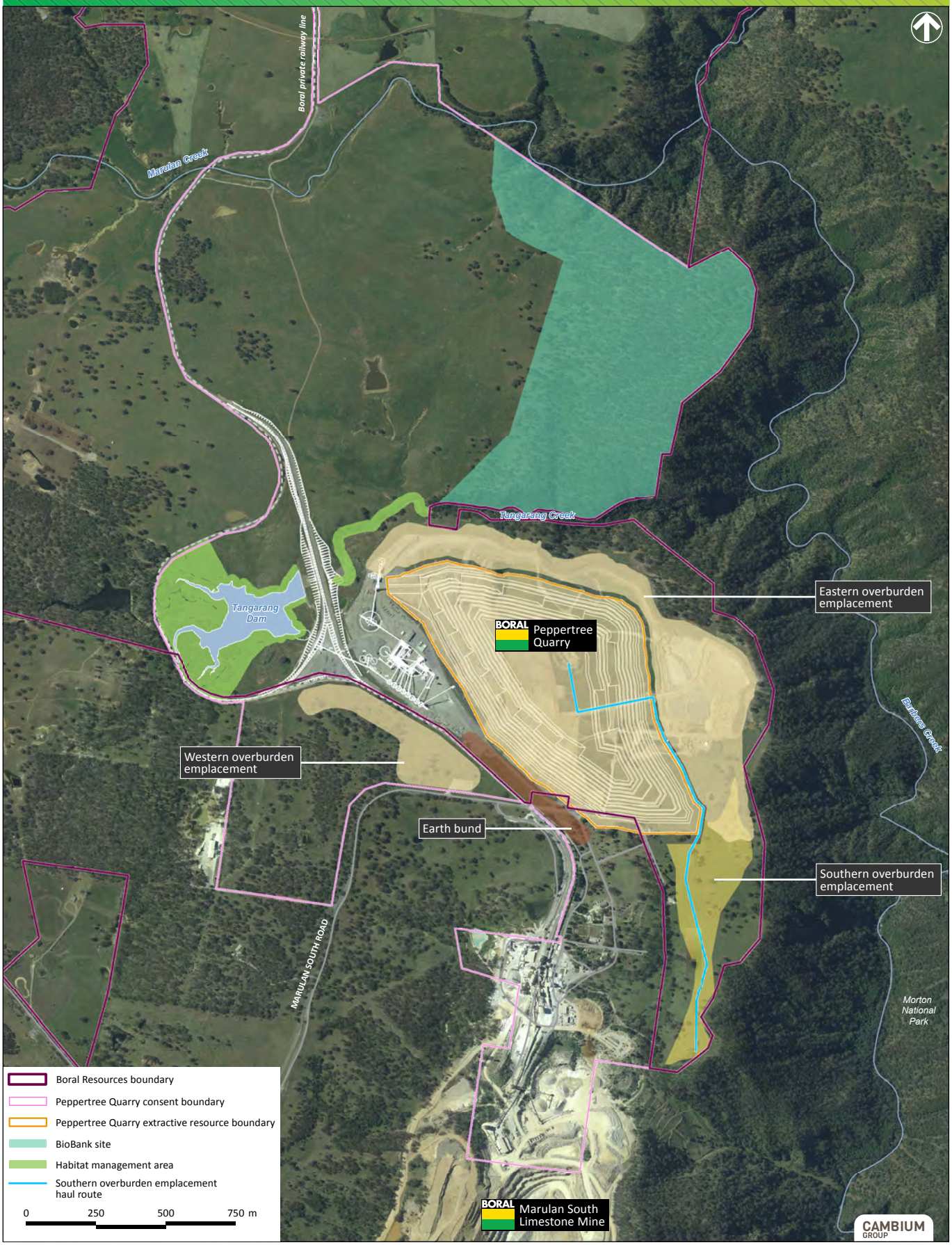
Figure 1
Site layout

Noise and Blast Management Plan / Peppertree Quarry



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1.5 CONSULTATION

In accordance with the requirements of CoA 10, consultation has been undertaken with the Environment Protection Authority (EPA), in the revision of this plan.

A meeting was held with EPA, onsite at Peppertree Quarry on the 19th December 2016 to outline the approach to the plan. EPA were satisfied with the approach and undertook to review the plan based on their inspection. Comments were received from the EPA via email on the 1st February 2017.

The main area of concern identified by the EPA was the need for additional information on low frequency noise assessment.

More detail on low frequency noise has been included in this revision.

A copy of the email is in Appendix 1.

1.6 ALIGNMENT WITH OTHER PLANS

This document is a revised version of the NBMP initially prepared by ERM (2011). In support of the NBMP, an Air Quality Management Plan (2017) and a Dust Management Plan (Boral) have been prepared for the Quarry. Both of these plans have aspects of managing noise and blasts and will be applied in combination with the NBMP where relevant.

This NBMP will also incorporate findings of a Noise Impact Assessment (Wilkinson Murray Pty Limited, 2016) that was undertaken as part of the Modification No.4 application which included predicted noise levels for:

- Activities associated with the proposed southern overburden emplacement;
- Nightshift activities including the proposed in-pit operations;
- Maximum noise levels from the modified Quarry operations; and,
- Cumulative industrial noise levels estimated at the closest residential receivers.

1.7 DOCUMENT STRUCTURE

The structure of the Management plan is outlined in Table 1.

Table 1: Structure of the Management plan

Section	Content
1	Provides an overview of the project, and objectives of the plan
2	Details the statutory requirements as outlined in the conditions of consent dated august 2016
3	Describes the existing environment of the site
4	Describes the noise and blast management actions in place and to be implemented in the operation of the quarry
5	Requirements of modification 4 noise and blast management

6	Noise and blast monitoring protocols
7	Noise and blast assessment criteria
8	Outlines incident planning and responses
9	Financial provisions for the work required
10	Specifies training requirements
11	Outlines the reporting and review requirements
12	Summaries the management actions to be undertaken
13	Lists references used in the plan preparation

2 STATUTORY REQUIREMENTS

2.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

The project was declared a 'major development' under the provisions of Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act) and State Environmental Planning Policy (SEPP Major Development) 2005. Since Project Approval was granted in 2007, there have been four approved modifications (with conditions), as detailed below:

- Modification 1 (2009) approved for exploratory blasting and test pitting in order to verify the design of the processing plant;
- Modification 2 (2011) approved for the construction of a new rail line rather than use the existing rail facilities to the Limestone Mine; and
- Modification 3 (2012) approved the construction of a high voltage power line from an existing substation to the processing plant and to provide a rail siding near the junction with the Main Southern Railway Line.
- Modification 4 (2016) approved for the extension of daily in-pit operating hours and Establishment of a new overburden emplacement area.

The quarrying operations will continue to be subject to the provisions of the EP&A Act for any subsequent changes or modifications to the operations. Additionally, the operations will need to be able to demonstrate compliance against the current CoA of the Project Approval relevant to noise and blasting issued under the provisions of the EP&A Act (refer to Table 2).

Table 2: Noise and Blasting Conditions of Approval (Project Approval – Modification 4)

CoA	Condition of Project Approval	Addressed in Section
4 (Schedule 3)	**Operational Noise Impact Assessment Criteria** The Proponent must ensure that the noise generated by the project does not exceed the noise impact assessment criteria presented in Table 1 of the Project Approval at any residence on privately-owned land.	Section 4.0
9 (Schedule 3)	**Operating Conditions** The Proponent must:	
	(a) implement best practice noise management, including all reasonable and feasible noise mitigation measures to minimise the noise generated by the project;	Section 4.0
	(b) investigate ways to minimise the noise generated by the project;	Section 4.0
	(c) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and noise monitoring data to guide the day to day planning of quarrying operations and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this approval;	Section 4.0, 6.0

	(d) minimise noise impacts during adverse weather conditions; and	Section 4.0
	(e) report on these investigations and the implementation and effectiveness of these measures in the Annual Review,	Section 11.0
10 (Schedule 3)	**Noise Management Plan** The Proponent must prepare a Noise Management Plan for the project to the satisfaction of the Secretary. This plan must be prepared in consultation with EPA and submitted to the Secretary by the end of March 2012, and must:	
	(a); describe the measures that would be implemented to ensure compliance with the relevant conditions of this approval;	Section 4.0
	(b) describe the noise management system;	Section 4.0
	(c) include a noise monitoring program that: • supports the noise management system; provides information to evaluate the performance of the project; • includes a protocol for determining exceedances of relevant conditions of this approval; • provides for the use of real-time and/or supplementary attended monitoring measures, if directed by the Secretary; • includes regular attended and unattended monitoring at appropriate locations, including at receiver locations R4 and R17; and • includes a program to characterise and measure low frequency noise (dBC) emissions	Section 6.0
	(d) include a community notification protocol for the proposed construction activities; and	Section 11.2
	(e) detail who would be responsible for monitoring, reviewing and implementing the plan. The Proponent must implement the approved management plan as approved from time to time by the Secretary	Section 1.0

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(Schedule 3)
	Hours of Operation
	
	The Proponent must comply with the following hours detailed in Table 3 of the Project Approval:
	
	• Construction Works:
	  – 7.00am to 6.00pm (Mon to Fri)
	  – 8.00am to 1.00pm (Saturday)
	  – Not permitted on Sundays or Public Holidays
	• Topsoil/overburden removal/emplacement: 7.00am to 7.00pm (Any Day)
	• Blasting:
	  – 9.00am to 5.00pm (Mon to Sat)
	  – Not permitted on Sundays or Public Holidays
		Section 4.0

	• In-pit activities: 5.00am to 11.00pm (Any Day) • Out-of-pit activities:	
11a (Schedule 3)	Between the hours of 5:00am to 7:00am and 7:00pm to 11:00pm the: (a) in-pit crusher must not operate above RL 555; and (b) mobile plant in the pit, including excavators, front-end loaders and trucks, must not operate above RL 570.	Section 4.0
12 (Schedule 3)	**Airblast Overpressure Criteria** The Proponent must ensure that the airblast overpressure level from blasting at the project does not exceed the following criteria at any residence on privately-owned land. • Airblast overpressure level (dB(Lin Peak)): – 115 with an allowable exceedance of 5% of the total number of blasts over a period of 12 months – 120 is the maximum allowable limit – no exceedances permitted	Section 4.0
13 (Schedule 3)	**Ground Vibration Criteria** The Proponent must ensure that the ground vibration level from blasting at the project does not exceed the following criteria at any residence or sensitive receiver on privately-owned land. • Peak particle velocity (mm/s): – 5 with an allowable exceedance of 5% of the total number of blasts over a period of 12 months – 10 is the maximum allowable limit – no exceedances permitted	Section 4.0
14 (Schedule 3)	The Proponent must implement best blasting practice to: (a) ensure that no flyrock leaves the site; (b) protect the safety of people, property, and livestock; and (c) minimise the dust and fume emissions from blasting on the site, to the satisfaction of the Secretary.	Section 4.0
15 (Schedule 3)	The Proponent must: (a) notify the landowner/occupier of any residence within 2 kilometres of the quarry pit who registers an interest in being notified about the blasting schedule on site; (b) operate a blasting hotline, or alternative system agreed to by the Secretary, to enable the public to get up-to-date information on blasting operations at the project; and (c) keep the public informed about this hotline (or any alternative system), to the satisfaction of the Secretary.	Section 4.0
16 (Schedule 3)	The Proponent must prepare a Blast Monitoring Program for the project to the satisfaction of the Secretary. This program must: (a) be submitted to the Secretary for approval prior to the commencement of construction;	Section 6.0

	(b) be prepared in consultation with the EPA; and (c) monitor the performance of the project against the relevant blasting criteria.	
2 (Schedule 5)	**Management Plan Requirements** The Proponent must ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:	
	(a) detailed baseline data	Section 3.0
	(b) a description of: • the relevant statutory requirements (including any relevant approval, licence or lease conditions); • any relevant limits or performance measures/criteria; and • the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;	Section 2.0
	(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Section 4.0
	(d) a program to monitor and report on the: • impacts and environmental performance of the project; and • effectiveness of any management measures.	Section 6.0
	(e) a contingency plan to manage any unpredicted impacts and their consequences, and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;	Section 8.0
	(f) a program to investigate and implement ways to improve the environmental performance of the project over time;	Section 4.0
	(g) a protocol for managing and reporting any: • incidents; • complaints; • non-compliances with statutory requirements; and • exceedances of the impact assessment criteria and/or performance criteria;	Section 8.0
	(h) a protocol for periodic review of the plan; and	Section 11.0
	(i) a document control table that includes version numbers, dates when the management plan was prepared and reviewed, names and positions of people who prepared and reviewed the management plan, a description of any revisions made and the date of the Secretary's approval.	Document Control Page

3 (Schedule 5)	**Revision of Strategies, Plans & Programs** Within 3 months of the submission of an: (a) Annual Review under condition 10 (Schedule 5); (b) incident report under condition 8 (Schedule 5); (c) audit report under condition 11 (Schedule 5); and (d) any modifications to this approval.	Section 11.0
8 (Schedule 5)	**Incident Reporting** The Proponent must immediately notify the Secretary and any other relevant agencies of any incident. Within 7 days of the date of the incident, the Proponent must provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.	Section 8.0
10 (Schedule 5)	**Annual Review** By the end of March each year, or other timing as may be agreed by the Secretary, the Proponent must submit a report to the Department reviewing the environmental performance of the project to the satisfaction of the Secretary. The Annual Review must address detail required under sub-conditions (a) to (f).	Section 11.0
11 (Schedule 5)	**Independent Environmental Audit** Within 3 years of the date of the commencement of construction and every 3 years thereafter, unless the Secretary directs otherwise, the Proponent must commission and pay the full cost of an Independent Environmental Audit of the project The Annual Review must address detail required under sub-conditions (a) to (f).	Section 11.0

2.1.1 Statement of Commitments

The EA for Peppertree Quarry recommends a range of measures to avoid, manage, mitigate, offset and/or monitor the environmental impacts of the project, as set out in the Statement of Commitments. Commitments that relate to noise and blast management are set out in Table 3 below.

Table 3: Statement of Commitments (EA, 2006)

Statement of Commitment	Referenced in NBMP
construction of a 10m earth bund spanning the pit boundary facing the residences to the east, west and the north;	Section 4.0
construction of an enclosure to house the tertiary plant, west of the quarry. The enclosure will be designed to provide adequate attenuation	Section 4.0
using a drill rig with a suitable sound power level emission; limitation of in-pit operations to the day period (7am- 7pm) only;	Section 4.0
limitation of blasting to between the hours of 7.00 am to 6.00 pm. A blast management strategy will be used to ensure appropriate charge masses are used to avoid excessive air blast overpressure and ground vibrations;	Section 4.0
partial cladding of the in-pit crushers to achieve an adequate reduction in their sound power levels;	Section 4.0
selection of a dozer with lower sound power level;	Section 4.0
cladding of the conveyors to achieve a reduction in their sound power levels;	Section 4.0
the overburden stripping fleet will be limited to an excavator, trucks and a dozer	Section 4.0
air-blast overpressure will not exceed 115 dB(Lpeak) for more than 5 % of the total number of blasts over a period of 12 months with a maximum level of 120 dB(Lpeak) at any time;	Section 7.0
peak particle velocity (ppv) from ground vibration will not exceed 5 mm/s for more than 5 % of the total number of blasts over a period of 12 months. The maximum level will not exceed 10 mm/s at any time.	Section 7.0
Noise limits will be maintained at the closest residential receivers are outlined in Table 17.1.	Section 4.0, 6.0

2.1.2 Overview of Modification 4

The building and construction industry in NSW and particularly Sydney has seen a great deal of growth in the last year, with this growth forecast to continue. The NSW Government, together with Federal funding, has committed to significant infrastructure projects, including the Badgery's Creek Airport, new rail lines, and major road construction and upgrading. This has created a significant demand for hard rock aggregates from the main construction material suppliers. Boral is, and will be supplying a number of these projects with concrete and asphalt, that includes aggregates and sand from Peppertree Quarry on rail through terminals at St Peter's and Enfield.

Modification 4 was approved in August 2016, allowing an increase of in-pit operating hours by 6 hours per day, 7 days a week in order to meet annual production volumes up to the approved limit of 3.5 million

tonnes per annum. The modification also incorporates a proposed new Southern Overburden Emplacement that has been designed as an extension to the existing Eastern Overburden Emplacement and is located entirely within both Boral owned land and the quarry's development consent boundary.

A Noise Impact Assessment was undertaken and considered the potential operational noise impacts of the Project on nearby sensitive residential, commercial and industrial receivers.

It concluded that relative to the existing operations, the modification is unlikely to contribute to any significant change in existing operational or cumulative noise levels at identified sensitive receivers. This is supported by the findings of the Noise Impact Assessment, which predicts that there would be no exceedances of the operational noise impact assessment criteria stipulated by the Project Approval and Environment Protection Licence at any identified sensitive receiver as a result of modification.

As such, this revised NBMP remains substantially consistent with initial 2011 version with additional detail reflecting CoA within Modification 4 and current quarry activities as of 2016.

2.2 Protection of Environment Operations Act 1997

The objectives of the *Protection of Environment Operations Act 1997* (PoEO Act) are to protect, restore and enhance the quality of the environment. Some of the mechanisms that can be applied, under the PoEO Act, to achieve these objectives include reduction of pollution at source, monitoring and reporting of environmental quality.

Based on annual production volumes, Peppertree Quarry has been determined to be a 'Scheduled Activity' under Schedule 1 of the POEO Act which requires site operations to be the subject of an Environmental Protection Licence (EPL No. 13088).

The EPL has the following compliance conditions relevant to noise management:

- Condition L.2.1: Details the noise limits to which the Quarry must comply at residential and other sensitive receivers.
- Condition L2.2: Details the location and whether conditions that noise must be measured.
- Condition L3.1: Presents the overpressure level blasting limits detailed under CoA 12 (Schedule 3) of the Project Approval (Refer to Table 1 above)
- Condition L3.2: Presents the ground vibration level blasting limits detailed under CoA 13 (Schedule 3) of the Project Approval (Refer to Table 1 above)

2.3 Boral Commitments to Noise Management

2.3.1 Integrated Management System

The Quarry operates under a Boral integrated Health, Safety, Environment and Quality Management System (HSEQMS). The HSEQMS has commitments to the Boral Environmental Policy through established standards and procedures which require internal conformance to high levels of environmental performance with continual improvement objectives.

Boral have an established corporate and divisional risk-based audit program that periodically assess operational sites for conformance with HSEQMS requirements. In addition, the Quarry must be the

subject of an Independent Audit every three years. An Independent Audit of the Quarry was most recently conducted in 2015 and the next Audit is due in 2018.

2.3.2 Statement of Commitment

The HSEQMS Noise Standard (GRP-HSEQ-8-05) requires each Boral operational quarry to undertake activities in accordance with the following commitments in relation to noise and blast emissions:

Table 4: Statement of Commitment

Commitment	
Noise	**Blasting**
All plant and equipment is well-maintained	Plan and design blasts to minimise noise and comply with overpressure and vibration criteria
Restrict particularly noisy activities to suitable times of day e.g. not early morning or at night	Monitor all blasts for both noise and vibration to ensure limits are met
Restrict particularly noisy activities to suitable weather conditions e.g. not during temperature inversions or strong wind towards the community	Quarry Manager and relevant personnel will be trained on the environmental obligations in relation to blasting controls
Implement work instructions and standard operating procedures (SOPs) that, where possible, restrict noisy activities (such as material grinding) to enclosed areas and/or require doors to be kept closed	All blasts are to planned and conducted within approved times i.e. – 9.00am to 5.00pm (Mon to Sat) – Not permitted on Sundays or Public Holidays
Employ buffer zones (such as vegetation buffers) or setbacks, where possible	The surrounding landowners to be notified prior to undertaking a blast
Use acoustic enclosures or treatment such as silencers (for extremely noisy facilities) where possible	Review of blast monitoring data for trends and learnings to further refine the blast design and management as a continual improvement process
If it is necessary to do out-of-hours maintenance work or other work that generates unusual noise, Regulatory approval must be obtained, the community be notified this will take place as per the GRP-HSEQ-2-02 HSEQ Communication and Consultation Standard.	Blast design, blast management procedures and the NBMP will be periodically reviewed to evaluate performance and identify any corrective action.

2.3.3 Roles and Responsibilities

The HSEQMS Noise Standard has a roles and responsibilities protocol for the management of noise and vibration actions when any incident occurs:

- ..Identification and reporting: All personnel are trained to recognise and report excessive noise to Quarry Manger, Site Environmental Officer or Shift Supervisor;
- ..Take immediate action to prevent or minimise the noise which may involve ceasing operations completely;

- ..If necessary, report the incident to relevant stakeholders in accordance with GRP-HSEQ-2-02 HSEQ Communication and Consultation Standard
- ..Only resume operations when the cause of the noise has been investigated and mitigated;
- ..Investigate the contributing factors associated with the incident and apply any learnings through communication, additional controls and revision of management plans/procedures; and
- In serious cases of noise and/or vibration nuisance, a suitable consultant should be engaged to carry out a survey to identify and quantify the main sources. The results should serve as a basis to define appropriate improvement projects where on-site modifications may need to be performed to lower the noise and/or vibration impacts of the site.

3 BACKGROUND NOISE CONDITIONS

The Quarry is located within a rural area, which is generally characterised by low background noise levels. Noise sources in the local area include natural sources (e.g. birdsong, insects, road noise and livestock), commercial operations such as fireworks manufacturing and turkey farming, industrial operations including the agricultural lime manufacturing facility, Marulan South Road, the Limestone Mine and the Quarry.

As part of the Modification 4 approval application, noise levels at sensitive receivers in the vicinity of the Quarry were calculated using the Environmental Noise Model (ENM) a proprietary computer program from RTA Technology Pty Ltd. ENM accounts for the effects of distance, shielding, ground effects, air absorption and meteorological effects. This modelling software is recommended by the NSW Industrial Noise Policy (INP) and has been previously accepted by the EPA for use in environmental noise assessments.

The assessment models the total noise at each receiver from the operation of the Project. Total predicted operational noise levels were then compared with the current operational noise criteria presented in the Project Approval and EPL.

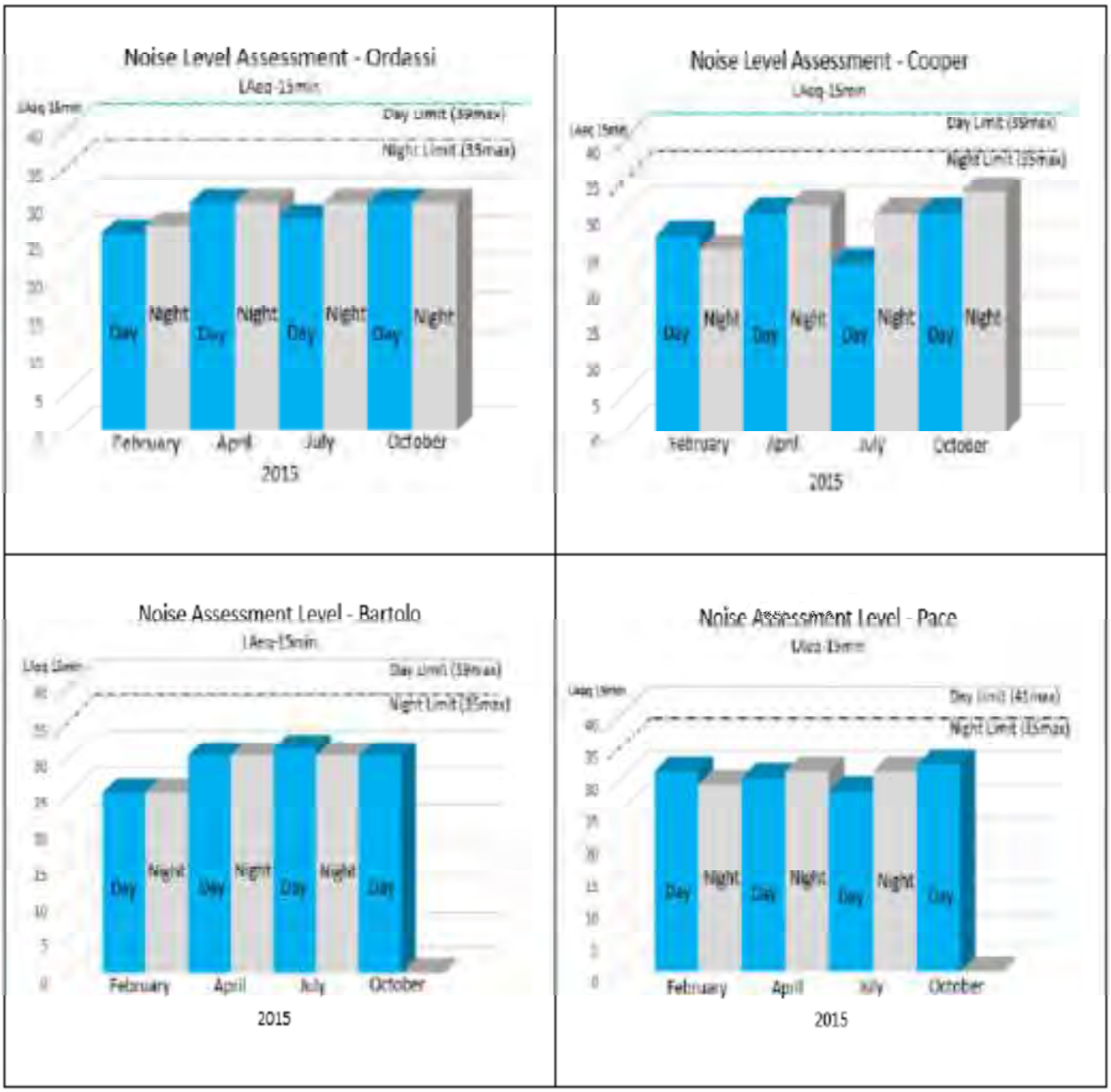
The modelling found that the predicted noise level based on calm and worst-case meteorological conditions complied with the Day and Night operational noise impact assessment criteria in the Project Approval at all locations.

Further to the modelling, a comprehensive noise monitoring program has been in place since 2012 consisting of attended and unattended monitoring at a number of sensitive receivers. Monitoring has been undertaken each quarter – January, April, July and October unless weather has caused a delay.

Results to date are such that there has been no exceedance to the criteria.

Figure 2 provides a summary of the maximum day and night time noise assessment measurements against the respective Development Consent compliance criteria for measured LAeq (15minutes) noise levels at all four receiver locations, over 2015. The assessment results found that the Quarry LAeq (15minutes) noise levels were in compliance with the averaged levels being considerably lower than the respective prescribed limits.

Figure 2: Noise Assessment Results (LAeq 15min)



4 NOISE AND BLASTING MANAGEMENT CONTROLS

4.1 NOISE AND BLAST MANAGEMENT OBJECTIVES AND PERFORMANCE CRITERIA

The NBMP provides the framework and guidance for the Quarry activities to be conducted in a manner that appropriate control measures are implemented to minimise the potential for adverse noise and blasting impacts on the amenity, property and safety of quarry neighbours and meet compliance requirements of the CoA of the Project Approval.

The performance criteria will be used to assess the success of the management actions and are outlined in Table 5.

Table 5: Noise and Blast Management objectives and performance criteria

Objective	Performance Criteria
Compliance with regulatory requirements including Project Approval and EPA Environment Protection Licence	No non compliances
implement best reasonable and feasible management practices to minimise noise levels emitted by the operations	Management controls in the NBMP in place
Identify potential noise sources and their relative contribution to noise impacts from the development	Monthly review of noise and blast monitoring data
Ensure air-blast overpressure and ground vibration levels during blasting events comply with the relevant assessment criteria in the Project Approval;	Monthly review of noise and blast monitoring data
assess the effectiveness of noise and blast control measures	Monthly review of monitoring data including complaints
Provided data suitable to demonstrate compliance with the CoA of the Project Approval and subsequent modifications.	Monitoring undertaken as per the MP
ensure noise , ground vibration and over pressure remain below relevant criteria at the nearest residences	Monthly review of monitoring data including complaints Management controls in the NBMP in place

4.2 ASPECTS AND IMPACTS

In accordance with HSEQMS requirements, the Quarry has developed an aspects and impacts register which aligns with Australian & New Zealand Standard AS/NZS 31000:2009 Risk Management - Principles and Guidelines. The register has identified, risk assessed and applied appropriate controls to activities with potential for noise and blasting issues, some of which include.

- Drilling and blasting of rock;

- Rail loading and product transportation;
- In-pit extraction and processing operations; and
- Loading and unloading of material to crushers, stockpiles, trains and trucks.

4.3 NOISE MANAGEMENT CONTROLS

The primary objective of the following noise management controls is to minimise impacts on the surrounding community. The following hierarchical approach is used to ensure that works comply with the relevant conditions of the Project Approval;

- Quarry operations will be managed to meet the Project Approval and EPL noise criteria, through operational practices and the implementation of reasonable and feasible environmental controls as outlined in 4.3.1, 4.3.2, 4.3.3 and 4.3.4.
- Where noise levels exceed noise criteria, ensure all controls are in place or determine the need to reduce operations and point of source noise;
- Liaise with the local community regarding scheduled works which are predicted to have increased impacts.

Furthermore, this noise management system has been developed with due regard to AS2436, which provides further guidance and detail regarding noise control mitigation and/or management that may be applied at the Quarry.

4.3.1 General Management Measures

The Quarry is committed to minimising impact on neighbour's amenity from noise and blasting with the following management controls being implemented throughout the life of the operation:

- Implement a combination of predictive meteorological forecasting and noise monitoring data to guide the day to day planning of quarrying operations and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of the Project Approval – refer section 4.3.4;
- Minimise noise impacts during adverse weather conditions. Where it is deemed necessary due to offsite disturbances, operations may be restricted. This may include ceasing the loading of trucks or changing start and finish times of crushing operations. This will need to be assessed on an individual basis depending on the weather conditions and the activities occurring at the time.
- From time to time, operations and activities vary onsite. These changes in activities can result in unplanned noise. Examples include loading from stockpiles from different locations, movement of surge materials with excavators, maintenance and /or construction activities. A Change management system is in place to assist in identifying the potential for environmental impacts including noise. This allows the change in activity to be planned to minimise any possible impacts. Should excessive noise be generated the activity is to cease until neighbours can be notified and or the noise mitigated;
- During site inductions for all operators (e.g. truck drivers, mobile plant operators), identify the closest and potentially most affected noise sensitive receivers in the vicinity of current works, present the applicable noise criteria for the site and identify the site culture of best operational practice;
- Tertiary operations west of the pit to be enclosed
- Conveyors to be covered

- Avoid dropping materials from height, where practicable;
- Avoid metal-to-metal contact on equipment;
- Avoid mobile plant clustering near residences;
- Close openings where appropriate on processing plant;
- Ensure all covers are in place and closed at all times when fixed and mobile plant is in operation;
- Maintain 10m earth bund spanning the pit boundary and facing residences to the east, west and north, and
- Inform all potentially impacted residents of the nature of potentially high noise generating works to be carried out, the expected noise levels and duration, as well as contact details.
- Blasting is designed and planned to ensure approval criteria is not exceeded. A number of residents (at their request) are advised of the blasts.

4.3.2 Management of Plant and Equipment

The Aspects and Impacts Register has identified Quarry plant and equipment have the highest potential for noise impacts and the following controls have been adopted to minimise the potential of Project Approval and EPL exceeding noise criteria:

- Select the most effective mufflers, enclosures and low-noise tool bits and blades;
- Select equipment (dozers, drill rigs) with suitable sound power level emissions
- Less annoying alternatives to audible reversing alarms (such as broadband noise emitting models i.e. 'squashed duck') that provide a safe system of work are used on site.
- Use alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, where feasible and reasonable;
- Reduce throttle settings and turn off equipment and plant when not being used;
- Regularly inspect and maintain equipment to ensure it is in good working order, also check the condition of mufflers. Equipment must not be operated until it is maintained or repaired, where maintenance or repair would address the annoying character of noise identified.
- Fit for purpose and Pre start checks are required on all mobile equipment which ensures effective mufflers and reversing alarms are installed.
- For machines with fitted enclosures, check that doors and door seals are in good working order and that the doors close properly against the seals; and
- Utilise site topographic detail or structures to shield noise emission sources from the affected receivers, where practicable.

4.3.3 Operational Hours

Boral will comply with the approved operational hours, reproduced in Table 6.

Table 6: Hours of Operations

Activity	Day	Time
Construction Works	Monday-Friday	7:00 AM to 6:00 PM
	Saturday	8:00 AM to 1:00 PM
	Sunday and public holidays	None
Topsoil/overburden removal/emplacement	Any day	7:00 AM to 7:00 PM
Blasting	Monday-Saturday	9:00 AM to 5:00 PM
	Sunday and public holidays	None
In-pit activities (including drilling, extraction, processing, and transfer or material out of the pit)	Any day	5:00 AM to 11:00 PM
Out-of-pit activities (including processing, stockpiling, train loading and distribution, and maintenance)	Any day	24 hours

11A. Between the hours of 5:00am to 7:00am and 7:00pm to 11:00pm the:

(a) in-pit crusher must not operate above RL 555; and
(b) mobile plant in the pit, including excavators, front-end loaders and trucks, must not operate above RL 570.

4.3.4 Monitoring Of Meteorological Conditions

Weather conditions have the potential to increase noise levels at the residential receptors in the vicinity of the quarry. Routine monitoring of meteorological conditions (including predictive meteorological forecasting) is conducted, together with liaison with the Bureau of Meteorology and reference to the on-site meteorological station.

This noise management strategy is of particular importance during overburden (east and west) emplacement works where plant and equipment are elevated when compared to the quarry pit, are more exposed compared to other noise sources on site and as such are more susceptible to the effects of prevailing winds and temperature inversions.

Meteorological data is evaluated to plan on site activities potentially associated with high noise level generating activities, prior to the work being undertaken, and as close as practical to the work. The expected weather conditions and their effect on the noise generated, is considered and plans and/or timing altered if necessary. Meteorological conditions considered are:

- prevailing wind direction and velocity;
- temperature inversions;
- time of day;
- seasonal effects on weather patterns; and
- cloud cover.

A weather station has been installed on the Peppertree Quarry site to provide for active monitoring of meteorological conditions for the operation of Peppertree Quarry.

In 2015, the Quarry commenced the utilisation of a commercially available weather forecasting dashboard which uses local weather data in providing predictions of meteorological conditions that may generate extreme noise events at nominated sensitive receivers (Refer to Figure 3).

The procedure for managing noise based on the alert levels is still being refined as to the appropriate trigger levels and the sensitivity of the Alerts. The procedure will be completed by early 2017 and staff trained in its use.

Figure 3: Weather Forecast and Predicted Impacts on Operations

4.4 BLAST MANAGEMENT

A comprehensive Blast management protocol is in place for all blasting operations in Boral.

The Blast Management Plan (BMP) for Peppertree Quarry was originally developed in September 2009.

The Blast Management Plan is reviewed annually and a separate BMP record is collated for each blast.

This BMP is prepared to satisfy Regulatory Conditions specified within the Development Consent PA 06_0074 and Boral's Drilling and Blasting SOP (No. 34).

Measures that are implemented to ensure compliance with the blast criteria nominated in Schedule 3, Conditions 12 to 16 of the Project Approval include the following:

4.4.1 Blast Design

- Blasts are designed to minimise (within practical limits) the occurrence of fly-rock and to eliminate unconfined explosives related air-blast i.e. face blowouts and rifling from the blast-hole collars;
- Generally, single hole (delayed) initiation will be used with signal tube technology connecting each blast-hole and also being used to fire the blast; and
- Stemming is used to produce reliable, controlled blasts.
- Boral will review and approve the proposed blast design with respect to potential blast emissions based on the current predictive site laws for ground vibration and air-blast.

4.4.2 Explosive Loading, Initiation Hook-up and Firing

- Blast-hole depths will be accurately determined to within ±200 mm;
- Bulk explosive loading equipment is selected to offer a loading accuracy of ±5 kg of product, if required; and
- Column rise of the explosive product is measured and checked against design with corrective options in place to manage variations.

4.4.3 Training

All personnel involved in the drilling and blasting operations are adequately trained to ensure that people are up to date with the most current product technology and blasting techniques.

4.4.4 Avoidance of Concurrent Blasts with Adjoining Mines

Boral's Quarry Management shall be in daily contact with the adjacent Boral Cement Limestone Mine management to reduce the possibility of blasting concurrently. Blasts are planned several days in advance and notified to the Limestone management via email. Peppertree Quarry has a tendency to blast once a week and later in the day. The Limestone mine blasts more frequently and usually early afternoon.

4.4.5 Notifying Landowners or Occupiers of Blasts

Prior to production blasting, Boral will contact affected landowners or occupiers within two kilometres of the pit seeking expressions of interest in being notified of future blasts. This invitation will also be permanently posted on the quarry website.
(http://www.boral.com/article/marulan_operations_homepage.asp).

Those who register an interest will be asked how and when they would like to be notified i.e. by telephone on the morning of blasting indicating an expected time of firing or by email, letter, or a combination of their choosing.

Two neighbours are currently notified by email and 2 by phone.

4.4.6 Operational Hours

Blasting is conducted between the hours of 9am and 5pm Monday to Friday with no blasting occurring on the weekends or public holidays.

This is as per Table 6.

If blasting is delayed, the shot will be slept overnight and blasted the next day within the allowable hours.

5 MODIFICATION 4 – NOISE AND BLAST MANAGEMENT

The building and construction industry in NSW and particularly Sydney has seen a great deal of growth in the last year, with this growth forecast to continue. The NSW Government, together with Federal funding, has committed to significant infrastructure projects, including the Badgery's Creek Airport, new rail lines, and major road construction and upgrading. This has created a significant demand for hard rock aggregates from the main construction material suppliers. Boral is, and will be supplying a number of these projects with concrete and asphalt, that includes aggregates and sand from Peppertree Quarry on rail through terminals at St Peter's and Enfield.

Modification 4 was approved in August 2016, allowing an increase of in-pit operating hours by 6 hours per day, 7 days a week in order to meet annual production volumes up to the approved limit of 3.5 million tonnes per annum. The modification also incorporates a proposed new Southern Overburden Emplacement that has been designed as an extension to the existing Eastern Overburden Emplacement and is located entirely within both Boral owned land and the quarry's development consent boundary.

A Noise Impact Assessment was undertaken and considered the potential operational noise impacts of the Project on nearby sensitive residential, commercial and industrial receivers.

It concluded that relative to the existing operations, the modification is unlikely to contribute to any significant change in existing operational or cumulative noise levels at identified sensitive receivers.

This is supported by the findings of the Noise Impact Assessment, which predicts that there would be no exceedances of the operational noise impact assessment criteria stipulated by the Project Approval and Environment Protection Licence at any identified sensitive receiver as a result of modification. This incorporates both noise emissions of the Quarry along with additional background sources (including the Marulan South Limestone Mine). In order to comply with the operational noise impact assessment criteria, the mobile in-pit crusher must not operate above RL555 during the extended in-pit operating hours and all other noise mitigation measures identified in the Project Approval, previous environmental assessments and the Peppertree Quarry Noise and Blast Management Plan must be implemented.

A low frequency noise assessment has been conducted which identified compliance with the appropriate EPA noise criteria. However, the assessment indicated that there is potential risk for low frequency noise from the site. It is therefore recommended that quarterly compliance monitoring, currently undertaken in accordance with the Peppertree Quarry Noise and Blast Management Plan must include additional noise monitoring locations R4 and R17 and a more detailed low frequency noise assessment and reporting regime.

Given the results of the Noise Impact Assessment and the demonstrated performance of existing operations via the ongoing noise monitoring regime, it is considered that the continued implementation of the Peppertree Quarry Noise and Blast Management Plan as well as recommended additional noise management and monitoring measures, would be adequate to maintain operational noise levels associated with the proposed modification, within the noise impact assessment criteria.

6 NOISE AND BLAST MONITORING

This section details the Noise and Blast monitoring program, including the monitoring sites, equipment and frequency of monitoring.

The Quarry monitors levels of noise associated with operations as well as Overpressure and ground borne vibration during blasting in the vicinity of the site in accordance with the Project Approval CoAs and EPL requirements.

As required by the CoA , schedule 3, condition 10c, a program for Low frequency noise has been developed and implemented. Monitoring will occur on a quarterly basis in line with the existing noise monitoring program with the results reported in the quarterly noise report and the required online POEO reporting.

Four remote online blast monitors have been installed at site boundaries or adjacent to the quarry and continually record vibration and overpressure.

One remote online blast monitor is located adjacent to the gas pipeline which intersects the quarry. This is monitored at the request of Jemena.

Five sites associated with identified sensitive receivers are monitored quarterly for noise.

An on-site weather station has been installed to provide real-time monitoring of meteorological conditions throughout the quarry operations. In addition, the Quarry utilises a commercially available weather forecasting dashboard which uses local weather data in providing predictions of meteorological conditions that may generate extreme noise events.

A summary of blast and noise monitoring to be conducted is provided in Table 7.

Table 7: Summary of Monitoring Program

Site	location	Parameter	Monitoring Period[1]	Monitoring Collection	Equipment
R3	Greenhills road	noise	48 hours for unattended, 3 to 4 attended events	quarterly	Type 1 or Type 2 Sound Level Meter / noise logger
R2	Greenhills road	noise	48 hours for unattended, 3 to 4 attended events	quarterly	Type 1 or Type 2 Sound Level Meter / noise logger
R8	Marulan south Road	noise	48 hours for unattended, 3 to 4 attended events	quarterly	Type 1 or Type 2 Sound Level Meter / noise logger
R4	Marulan creek road	noise	48 hours for unattended, 3 to 4 attended events	quarterly	Type 1 or Type 2 Sound Level Meter / noise logger
R17	Long point road	noise	48 hours for unattended, 3 to 4	quarterly	Type 1 or Type 2 Sound Level Meter /

Site	location	Parameter	Monitoring Period[1]	Monitoring Collection	Equipment
			attended events		noise logger
B1	Gas pipeline	Overpressure, ground vibration	continuous	Immediately Formal Blast report – 2 days after blast)	Remote monitor
B2	North east	Overpressure, ground vibration	continuous	Immediately Formal Blast report – 2 days after blast)	Remote monitor
B3	North west	Overpressure, ground vibration	continuous	Immediately Formal Blast report – 2 days after blast)	Remote monitor
B4	Manager house (643 Marulan south road)	Overpressure, ground vibration	continuous	Immediately Formal Blast report – 2 days after blast)	Remote monitor
B5	Turkey farm	Overpressure, ground vibration	continuous	Immediately Formal Blast report – 2 days after blast)	Remote monitor
WS1	Quarry east	Meteorological Conditions	Continuous	n/a – automatic download to PC	Weather Station

1. Continuous monitoring excludes periods for instrument calibrations/ maintenance and extended periods of data downloads.

6.1 NOISE MONITORING

6.1.1 Introduction

Noise monitoring shall be undertaken with due regard to and in accordance with the procedures presented below.

The findings of noise monitoring will guide the day to day planning of quarrying operations and the implementation of both proactive and reactive noise mitigation and management measures to ensure compliance with the relevant CoA.

If directed by the Secretary, Boral will ensure real-time unattended noise monitoring is implemented and/or supplementary attended noise measurements are conducted. The specification and requirements of any additional monitoring or measurement shall be as per those presented below.

6.1.2 Monitoring equipment

All acoustic instrumentation shall meet with the requirements of Standards Australia AS IEC 61672.1–2004™ (AS61672) – *Electro Acoustics - Sound Level Meters Specifications Monitoring* or Standards Australia AS1259.2-1990™ (AS1259) – *Acoustics – Sound Level Meters – Integrating Averaging*, as applicable to the device.

Noise measurements will be taken using a Type 1 or Type 2 'integrating-averaging' Sound Level Meter (SLM) and used for operator attended noise monitoring. The SLM will be capable of conducting third octave analysis and shall be set to frequency weighting 'A', a 'fast' time weighting will apply in all cases. Measurements shall be completed at the receiver locations identified in Figure 4 and be at least 3.5m from any reflecting structure other than the ground, with the SLM microphone placed between 1.2 and 1.5 metres above the ground.

Noise loggers shall be programmed to continuously record statistical noise level indices in 15 minute intervals which may include the LAmax, LA1, LA10, LA90, LAmin and the LAeq.

Instrument calibration (all devices) shall be checked before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dB(A). A hand held calibrator will be used to do these field checks, it will comply meet with the requirements of Standards Australia AS/IEC 60942:2004/IEC 60942:2003 (IEC60942) – Australian Standard™ – *Electroacoustics* – *Sound Calibrators*, or similar.

All noise measurements shall be accompanied by both qualitative description (including cloud cover) and quantitative measurements of local weather conditions throughout the survey period.

6.1.3 Site Noise Level Audits

As part of the noise management strategy, the noise monitoring program will conduct regular (annual) noise measurements of acoustically significant plant and equipment, to ensure that they remain within the specified design levels. Quarterly noise monitoring will also provide for a regular review of noise generating plant and equipment, with noise measurements of new or noisy plant being conducted if they are considered to be acoustically significant.

6.1.4 Frequency of Noise Monitoring

Noise is monitored quarterly and consists of continuous unattended and operator attended noise monitoring. The frequency of monitoring will be reviewed at the end of 2017 to determine future monitoring requirements.

6.1.5 Noise Monitoring Locations

The key monitoring locations representative of the surrounding receivers, and identified in the Project Approval, are to be used for evaluating and assessing noise emissions from the project.

Boral will ensure that the noise generated by the project does not exceed the noise impact assessment criteria (refer Table 10) at these residential receiver locations.

Details of these receiver locations are summarised in Table 7 and visually presented in Figure 4.

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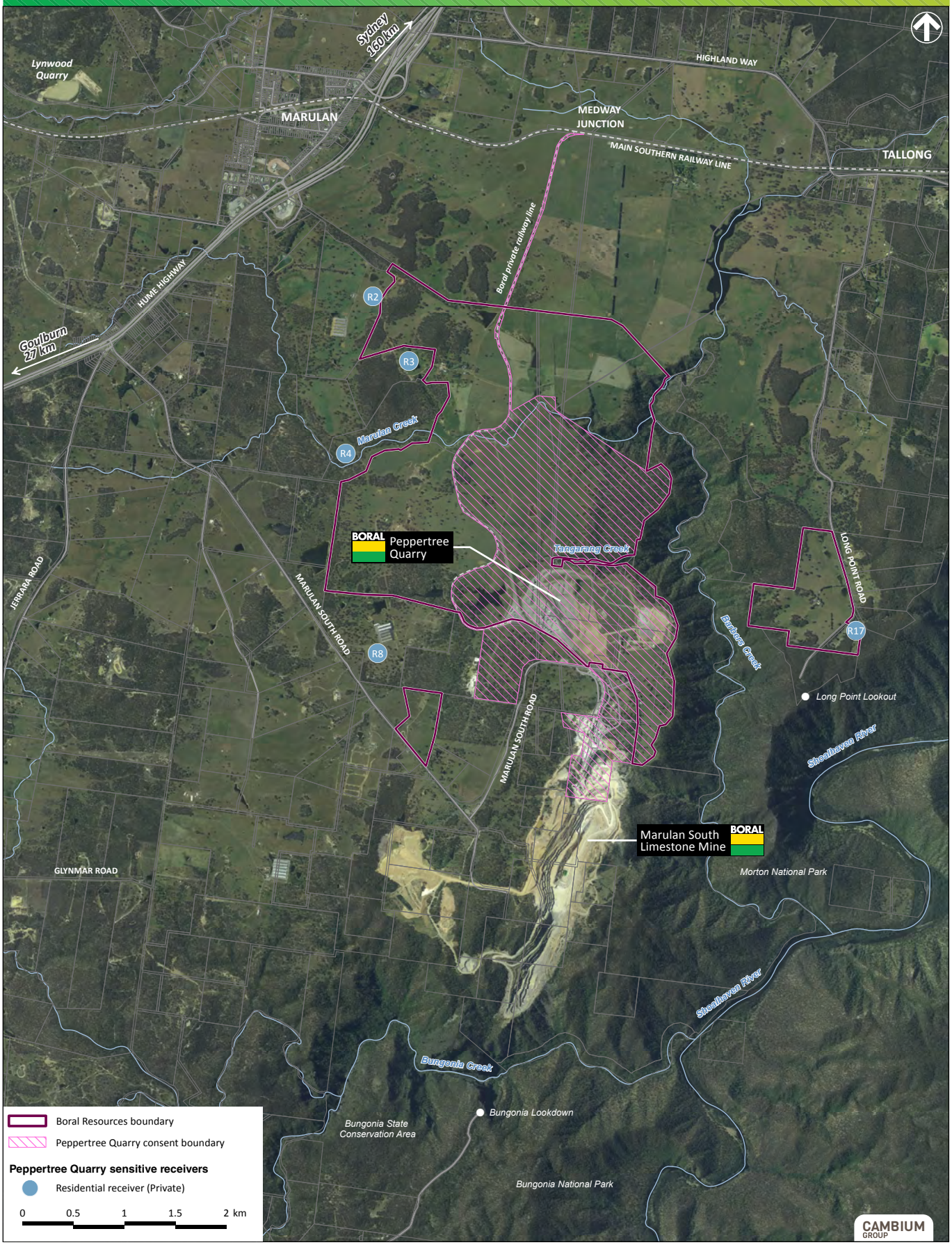
Figure 4
Sensitive receiver locations
Noise and Blast Management Plan / Peppertree Quarry



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6.1.6 Operator-Attended Noise Surveys

The SLM shall be programmed to record statistical noise levels including the LAmax, LA1, LA10, LA90, LAmin and the LAeq parameters, for each measurement conducted.

Operator-attended noise measurements shall be conducted at each of the five locations to quantify and characterise the maximum (LAmax or LA1, 1minute) and energy equivalent (LAeq) noise levels from quarry operations over a 15 minute measurement period. Noise levels from extraneous, ambient and background noise sources and emissions should be quantified and reported upon where necessary.

The operator shall quantify site noise emissions and estimate the LAeq, Period noise contribution from the operation for the day and night time periods, as well as the overall level of ambient noise

During the attended noise measurements, the operator shall record any significant noise sources (i.e. haul trucks, dozers, etc). In addition, the operator shall obtain copies of the relevant fixed plant and mobile equipment operating shift logs that could be included in the noise monitoring report, if relevant.

6.1.7 Unattended Noise Monitoring

To supplement the operator-attended measurements, unattended continuous noise monitoring will be undertaken to quantify overall ambient noise levels resulting from quarry operations as well as other industrial noise sources in the area. Data from unattended continuous noise logging will allow trends to be identified in ambient noise levels surrounding the quarry and the assessment of cumulative noise impacts from all industrial related noise sources in the area.

Unattended noise monitoring is undertaken on a quarterly basis at the same 5 identified sensitive receiver sites. Unattended monitoring is conducted over a 48 hour period where possible in line with operator attended noise surveys.

6.1.8 Data Analysis and Determining Compliance

The noise measurements shall be guided by the requirements of AS1055 and the NSW INP. The site noise level contribution (LAeq, 15min and/or LA1, 1min) for the quarry shall be determined in the absence of any influential, extraneous or erroneous sound that is audibly distinguishable to that of the quarry, and compared the operational noise assessment criteria to determine compliance.

The LAeq, Period cumulative noise level contributions from the operations as well as the overall ambient noise levels together with the weather and quarry operating conditions shall be compiled on a quarterly basis and reported as per the EPL requirements on the nominated Peppertree Quarry website

It should be noted that in instances where monitoring may not be conducted at residential receivers due to access limitations, noise levels may be measured at the nearest accessible point and extrapolated via calculation to the nearest residential receiver location for comparison to noise assessment criteria.

The unattended ambient noise logger data from each monitoring location, together with the weather shall be presented in the quarterly noise monitoring report. Prior to further analysis, the ambient noise level data from each monitoring location which correlate with periods of unstable weather (i.e. rainfall greater than 0.5 mm or wind speed greater than 5 m/s) at the microphone shall be discarded.

It should be noted that the ambient noise levels do not necessarily reflect the contributed level of noise emissions from the quarry operations. The ambient noise level data quantifies the overall noise level at a given location independent of its source or character. The ambient noise monitoring data will provide indications of the cumulative noise emissions from all industrial noise sources and amenity levels.

6.1.9 Accounting for Annoying Noise Characteristics – low frequency noise

The INP states that a noise source may exhibit a range of particular characteristics that increase annoyance, such as tones, impulses, low frequency noise and intermittent noise. Where this is the case, an adjustment ("modifying factor" penalty) is applied to the source noise level received at an assessment point before it is compared with criteria to account for the additional annoyance caused by the particular characteristic.

Application of these modifying factors is described in Section 4 of the INP. The INP provides the following definitions to support the modifying factor corrections:

- Tonal Noise – containing a prominent frequency and characterised by a definite pitch.
- Low Frequency Noise – containing major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.
- Impulsive Noise – having a high peak of short duration or a sequence of such peaks.
- Intermittent Noise – the level suddenly drops to that of the background noise several times during the assessment period, with a noticeable change in noise level of at least 5 dB.

The modifying factor corrections (and how they are applied) are presented in Table 4.1 of the INP and vary depending on the noise characteristic being assessed. **All noise levels generated by the Quarry will be assessed with due regard to these modifying factor penalties, and in accordance with the requirements presented in the CoA and EPL.** Tonal noise and low frequency noise (LFN) are most relevant to the Quarry and those modifying corrections are reproduced below:

Table 8: modifying factor corrections

Factor	Assessment and Measurement	When to Apply	Correction	Comment
Tonal Noise	One-third octave or narrow band analysis	Level of one-third octave band exceeds the level of the adjacent bands on both sides by: • 5 dB or more if the centre frequency of the band containing the tone is above 400 Hz • 8 dB or more if the centre frequency of the band containing the tone is 160 to 400 Hz inclusive • 15 dB or more if the centre frequency of the band containing the tone is below 160 Hz	5 dB	Narrow-band frequency analysis may be required to precisely detect occurrence
Low Frequency Noise	Measurement of C-weighted and A-weighted level	Measure/assess C and A weighted levels over same time period. Correction to be applied if the difference between the two levels is 15 dB or more	5 dB	C-weighting is designed to be more responsive to low-frequency noise

In accordance with the INP, a maximum correction of up to 10 dBA will be applied where two or more modifying factors are present. Where a source emits tonal and low frequency noise, only one 5 dBA correction will be applied if the tone is in the low frequency range.

6.2 BLAST MONITORING

6.2.1 Introduction

Blast monitoring is undertaken at five locations as presented in Figure 5 and shown in Table 10.

Blast monitors are operated for all blasts at the quarry.

At the commencement of quarry construction, blasting was limited to the development of the pit and was infrequent. Manually operated blast monitors were used and place at nominated locations prior to blasting and collected after the event.

The blast monitoring system now comprises remote monitors that are in continuous operation with results being able to be reviewed online through a restricted access website.

Blasting reports are prepared and made available after each blast.

6.2.2 Monitoring equipment and installation

Table 9 presents the general instrumentation specification for blast monitoring equipment.

Table 9: general instrumentation specification for blast monitoring equipment

Specification	Seismic	Air Blast
Sample Rate	Minimum 1024 samples per second per channel	
Frequency Response	2 Hz to 250 Hz (3 dB points)	
Resolution	0.016 mm/s	0.1 dB
Range	0.1 mm/s to 254 mm/s	88 dB to 148 dB
Accuracy	3% at 15 Hz	0.2 dB at 30 Hz
Communications Link	Keyboard and modem	
Recording Mode	Full waveform recording and archiving	

Monitors have been situated in open areas where there is little potential for interference with the collection of the data from the blast.

These locations are representative of sensitive receivers and were selected following a review of the blast monitoring results from initial trial blasts.

The blast monitoring locations are close to residential receiver locations wherever practicable. In instances where monitoring cannot be conducted at residential receivers due to access limitations, then blast monitoring is undertaken at a representative site boundary location that represents the residential or sensitive receiver. Table 9 shows the details of the location of the monitors.

The monitors are fenced where disturbance by animals might be possible.

Table 10: Location of blast monitors

Monitoring Station	Entry Address	Station Description	GPS Coordinates
1	Gas Pipeline 680m from closest blast	Adjacent to ramp up to the TLO	Latitude: [227663] Longitude: [6150065]
2	Turkey Farm 950m from closest blast	Adjacent to high voltage corridor and boundary fence	Latitude: [227282] Longitude: [6149834]
3	Rail Line 970m from closest blast	At the points to the north of the site	Latitude: [227441] Longitude: [6150813]
4	843 Marulan south road 1.6km from closest blast	Limestone Managers House	Latitude: [227109] Longitude: [6148751]
5	Long point road 1.8km from closest blast	Residence on opposite side of the gorge	Latitude: [230491] Longitude: [6150176]

Individual blast design records shall be maintained to assist in the design and optimisation of future events, planning and control of blasting emissions and to provide a traceable system of documentation in case of accident or complaint. This is completed as part of the Boral Blast Management plan.

The blasting contractor shall record the blast parameters for each blast and include the location co-ordinates (East, North, RL) of the blast site and the maximum instantaneous charge (MIC) to be detonated in any 8 millisecond (ms) interval.

For the purposes of blast emission monitoring, the mine shall maintain a Blast Design and Emissions Record for each blast event in a suitable format guided by the requirements of AS *2187.2-1993*.

In order to maximise the benefits of the blast monitoring process, the significant design parameters, emission levels and meteorological data shall be collated on a concise Blast Emissions Summary Record. The record shall form the basis for updating the blast emission site laws for vibration and air-blast at appropriate interval.

A blast report is generated as part of the monitoring system for each blast (refer appendix 2).

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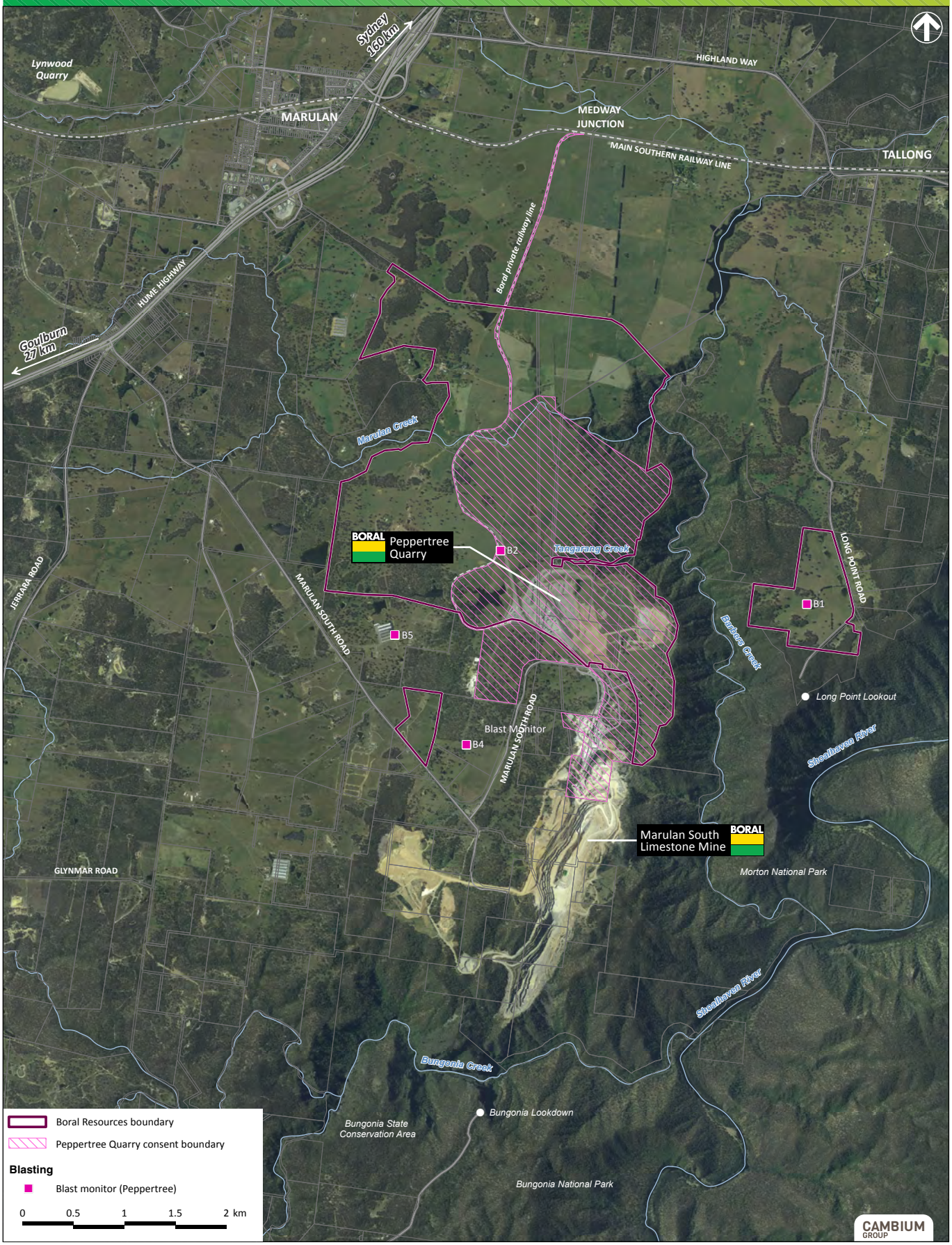
Figure 5
Location of blast monitors
Water Management Plan / Peppertree Quarry



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6.3 MONITORING OF METEOROLOGICAL CONDITIONS

Real-time measurements of meteorological conditions will be taken to support noise and blast monitoring and to identify weather conditions which may trigger the need to modify operations.

A solar-powered weather station (WS1) will be maintained at the location identified in Table 10, located on the quarry site. This station will consist of solar panels, a weatherproof enclosure which contains a data logger (which reads the sensors) and power supply, and sensors which continuously measure:

- rainfall;
- wind speed and direction (measured at three metres above ground level);
- relative humidity;
- temperature; and
- solar radiation.

The station will be equipped with a digital cell phone kit which retrieves data from the logger and transmits it directly to a computer at the site office. Loggernet software will be used for automatically downloading the data and to create monitoring programs e.g. for calculations of evaporation and temperature inversion. The equipment will facilitate real-time monitoring of weather conditions.

Meteorological conditions and forecasting will also be monitored via a commercially available weather forecasting dashboard which uses local weather data in providing predictions of meteorological conditions that may generate extreme noise events at nominated sensitive receivers.

7 ASSESSMENT CRITERIA

To meet the objectives set out in Section 1.3, 3.3 and the conditions of Project Approval, monitoring data is analysed as set out below. It is noted that monitoring results will include noise contributions from operation of Peppertree Quarry and from other sources. Noise assessment criteria is given for Operational impacts at identified sensitive receivers as well as for the acquisition of land should noise become intrusive.

7.1 NOISE CRITERIA

The noise measurement procedures employed throughout the management plan and monitoring program shall be guided by the requirements of Standards Australia AS1055–1997™ (AS1055) – *Description and Measurement of Environmental Noise*, Parts 1, 2 and 3, and the NSW INP.

7.1.1 Operational Noise Criteria

The approved project noise limits are presented in Table 1, Schedule 3, Condition 4 of the Project Approval, and are reproduced in Table 11 below.

Table 11: Operational Noise Impacts Assessment Criteria

Residential Receiver location	Day (7:00am to 7:00pm) LAeq (15min)	Evening (7:00pm to 10:00pm) LAeq (15min)	Night (10:00pm to 7:00pm) LAeq (15min)	Night (10:00pm to 7:00pm) LA1 (1 min)
No. 3 (5)	35	35	35	45
No. 2 (6)	35	35	35	45
No. 8 (16)	41	35	35	45
Any other noise sensitive location	35	35	35	45

Receiver numbers in parentheses are those identified in the approval prior to the notification of Modification 4 in 2016.

Noise generated by the development is to be measured in accordance with the relevant requirements of the Industrial Noise Policy (as may be updated from time-to-time)(refer Appendix 3). Appendix 7 (of the Project Approval) sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

It also needs to be noted that the noise criteria in Table 1 (of the Project approval) (Table 11 above) do not apply if the Proponent has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria, and the Proponent has advised the Department in writing of the terms of this agreement.

7.1.2 Land Acquisition Criteria

Schedule 3, Condition 5 of the Project Approval states:

If the noise generated by the project exceeds the criteria in Table 2 of the Project Approval (reproduced in Table 11 below), the Proponent shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in conditions 6 and 7 of Schedule 4.

Table 12: Land Acquisition Criteria

Residential Receiver location	Day (7:00am to 7:00pm) LAeq (15min)	Evening / Night (7:00pm to 7:00am) LAeq (15min)
No. 3 (5)	40	40
No. 2 (6)	40	40
No. 8 (16)	44	44

7.1.3 Accounting for Annoying Noise Characteristics – low frequency noise

Low frequency noise will be assessed as per section 6.1.9.

7.2 Blasting Criteria

7.2.1 Air-blast Overpressure Criteria

The Project Approval requires that air-blast overpressure level from blasting from the project should not exceed the criteria in Table 13 at any residence on privately-owned land.

Table13: Air-blast Overpressure Impact Criteria

Air-blast overpressure level (dB Lin peak)	Allowable Exceedance
115	5% of the total number of blasts over a period of 12 months
120	0%

7.2.2 Ground Vibration Criteria

The Project Approval requires that ground vibration level from blasting does not exceed the criteria in Table 14 at any residence or sensitive receiver on privately-owned land.

Table 14: Ground Vibration Criteria

Peak Particle Velocity (mm/s)	Allowable Exceedance
5	5% of the total number of blasts over a period of 12 months
10	0%

8 NOISE AND BLAST RESPONSE PLAN

8.1 INTRODUCTION

The objective of this section is to provide procedures for responding to impacts identified by the monitoring program and by routine monitoring of the noise and blast management controls.

It is also designed to act as a response plan for taking action in the unlikely event that an unforeseen incident occurs at the site; eg. Failure of Noise control equipment or procedures

Responding to identified impacts will be the responsibility of the quarry supervisor.

Schedule 5, Condition 8 of the Project Approval details the reporting requirements for identified impacts/incidents and the states that:

“The Proponent must immediately notify the Secretary and any other relevant agencies of any incident. Within 7 days of the date of the incident, the Proponent must provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested. “

An incident as defined in the Approval, Schedule 1 is deemed to be “a set of circumstances that:

- Causes or threatens to cause material harm to the environment ‘; and or
- Breaches or exceeds the limits or performance measures /criteria in this approval.”

The response plans for incidents are detailed below.

8.2 NOISE MONITORING OPERATIONAL CRITERIA EXCEEDANCE RESPONSE

Noise monitoring exceedances may result due to activities at the quarry or due to the surrounding environmental conditions and other activities. Exceedances are notified once the results have been supplied by the consultant undertaking the monitoring or identified at the time of attended operator monitoring.

Should low frequency noise as outlined in section 6.1.9 be identified as an area of concern during monitoring or identified through a complaint, it will be treated as an operational noise exceedance.

Should an exceedance be identified the following actions will be taken:

- the Department of Planning and Environment (DP&E), affected residents and EPA will be notified of the incident/impact/potential impact within seven days of its identification;
- an investigation will be undertaken to establish the root cause of the exceedance. This will include checking weather conditions at the time of the exceedance, Peppertree Quarry operations and other possible impacts;
- subject to the findings of the investigation actions will be taken to minimise any reoccurrence of the exceedance and
- the identified cause of the impact and the selected response will be formally documented in an incident response report.

8.3 NOISE MONITORING LAND ACQUISITION CRITERIA EXCEEDANCE RESPONSE

8.3.1 NOTIFICATION OF LANDOWNERS

1. If the results of monitoring required in Schedule 3 (section 7) identify that impacts generated by the project are greater than the relevant impact assessment criteria, then the Proponent must notify the Secretary and the affected landowners and/or existing or future tenants (including tenants of quarry owned properties) accordingly, and provide quarterly monitoring results to each of these parties until the results show that the project is complying with the relevant criteria.

8.3.2 INDEPENDENT REVIEW

2. If a landowner (excluding quarry owned properties) considers that the operations of the quarry are exceeding the impact assessment criteria in Schedule 3, then he/she may ask the Proponent in writing for an independent review of the impacts of the project on his/her land.

   If the Secretary is satisfied that an independent review is warranted, then within 2 months of the Secretary's decision, the Proponent must:

   (a) commission a suitably qualified, experienced and independent expert, whose appointment has been approved by the Secretary, to:
   - consult with the landowner to determine his/her concerns;
   - conduct monitoring to determine whether the project is complying with the relevant impact assessment criteria in schedule 3; and
   - if the project is not complying with these criteria then:
     - o determine if the more than one quarry/mine is responsible for the exceedance, and if so the relative share of each quarry/mine regarding the impact on the land;
     - o identify the measures that could be implemented to ensure compliance with the relevant criteria; and

   (b) give the Secretary and landowner a copy of the independent review.

3. If the independent review determines that the quarrying operations are complying with the relevant criteria in Schedule 3, then the Proponent may discontinue the independent review with the approval of the Secretary.

4. If the independent review determines that the quarrying operations are not complying with the relevant criteria in Schedule 3, and that the quarry is primarily responsible for this non-compliance, then the Proponent must:

   (a) implement all reasonable and feasible mitigation measures, in consultation with the landowner and appointed independent expert, and conduct further monitoring until the project complies with the relevant criteria; or

   (b) secure a written agreement with the landowner to allow exceedances of the relevant impact assessment criteria, to the satisfaction of the Secretary.

   If the independent review determines that the project is not complying with the relevant acquisition criteria, and that the project is primarily responsible for this non-compliance, then upon receiving a written request from the landowner, the Proponent must acquire all or part of the landowner's land in accordance with the procedures in condition 6-7 below.

5. If the independent review determines that the relevant criteria are being exceeded, but that more than one quarry/mine is responsible for this exceedance, then together with the relevant quarry/mine/s, the Proponent must:

(a) implement all reasonable and feasible mitigation measures, in consultation with the landowner and appointed independent expert, and conduct further monitoring until there is compliance with the relevant criteria; or

(b) secure a written agreement with the landowner and other relevant mine/s to allow exceedances of the relevant impact assessment criteria, to the satisfaction of the Secretary.

If the independent review determines that the project is not complying with the relevant acquisition criteria in schedule 3, but that more than one mine is responsible for this non-compliance, then upon receiving a written request from the landowner, the Proponent must acquire all or part of the landowner's land on as equitable a basis as possible with the relevant quarries/mine/s, in accordance with the procedures in conditions 6-7 below.

8.3.3 LAND ACQUISITION

6. Within 3 months of receiving a written request from a landowner with acquisition rights, the Proponent must make a binding written offer to the landowner based on:

(a) the current market value of the landowner's interest in the property at the date of this written request, as if the land was unaffected by the project the subject of the project application, having regard to the:

- existing and permissible use of the land, in accordance with the applicable planning instruments at the date of the written request; and
- presence of improvements on the land and/or any approved building or structure which has been physically commenced at the date of the landowner's written request, and is due to be completed subsequent to that date, but excluding any improvements that have resulted from the implementation of the 'additional noise mitigation measures' in condition 7, of Schedule 3; (Mod 3 approval)

(b) the reasonable costs associated with:

- relocating within the Goulburn Mulwaree local government area, or to any other local government area determined by the Secretary; and
- obtaining legal advice and expert advice for determining the acquisition price of the land, and the terms upon which it is required; and

(c) reasonable compensation for any disturbance caused by the land acquisition process.

However, if at the end of this period, the Proponent and landowner cannot agree on the acquisition price of the land, and/or the terms upon which the land is to be acquired, then either party may refer the matter to the Secretary for resolution.

Upon receiving such a request, the Secretary will request the President of the NSW Division of the Australian Property Institute to appoint a qualified independent valuer to:

- a fair and reasonable acquisition price for the land and/or the terms upon which the land is to be acquired, having regard to the matters referred to in paragraphs (a)-(c) above;
- prepare a detailed report setting out the reasons for any determination; and
- provide a copy of the report to both parties.

Within 14 days of receiving the independent valuer's report, the Proponent must make a binding written offer to the landowner to purchase the land at a price not less than the independent valuer's determination.

However, if either party disputes the independent valuer's determination, then within 14 days of receiving the independent valuer's report, they may refer the matter to the Secretary for review. Any request for a review must be accompanied by a detailed report setting out the reasons why the party disputes the independent valuer's determination. Following consultation with the independent valuer and both parties, the Secretary will determine a fair and reasonable acquisition price for the land, having regard to the matters referred to in paragraphs (a)-(c) above, the independent valuer's report, the detailed report of the party that disputes the independent valuer's determination and any other relevant submissions.

Within 14 days of this determination, the Proponent must make a binding written offer to the landowner to purchase the land at a price not less than the Secretary's determination.

If the landowner refuses to accept the Proponent's binding written offer under this condition within 6 months of the offer being made, then the Proponent's obligations to acquire the land must cease, unless the Secretary determines otherwise.

7. The Proponent must pay all reasonable costs associated with the land acquisition process described in condition 6 above, including the costs associated with obtaining Council approval for any plan of subdivision (where permissible), and registration of this plan at the Office of the Registrar-General.

8.4 BLAST MONITORING CRITERIA EXCEEDANCE RESPONSE

Blast monitoring exceedances may result due to errors in blast planning or due to the surrounding environmental conditions and other activities. Exceedances are notified once the blast monitoring report has been prepared or immediately after the blast from the restricted access website.

Should an exceedance be identified the following actions will be taken:

- the Department of Planning and Environment (DP&E), affected residents and EPA will be notified of the incident/impact/potential impact within seven days of its identification;
- an investigation will be undertaken to establish the root cause of the exceedance. This will include checking weather conditions at the time of the exceedance, Peppertree Quarry operations and other possible impacts;
- subject to the findings of the investigation actions will be taken to minimise any reoccurrence of the exceedance and
- the identified cause of the impact and the selected response will be formally documented in an incident response report.

8.5 NOISE OR BLAST IMPACT RESPONSE

Adverse noise or blasting impacts are likely to be associated with malfunction of the site's engineering controls or operational procedures. This would potentially include:

- incorrect blast planning
- noise from train movements
- Vehicle movements and
- Failure of equipment due to lack of maintenance

If it is identified that noise or blasting may have impacted on local residences the following actions will be taken:

- Impacted operations to be stopped if necessary until appropriate control systems can be implemented or repaired;
- the Department of Planning and Environment (DP&E) and NSW EPA will be notified of the incident/impact/potential impact within seven days of its identification;
- an investigation will be undertaken to establish the root cause of the issues.
- subject to the findings of the investigation actions will be taken to repair, replace or change the identified cause of the noise and blasting impacts. These actions will be completed by appropriately qualified personnel or consultants; and
- the identified cause of the impact and the selected response will be formally documented in an incident response report.
- Training will be undertaken, if changes are required to procedures or operations.

8.6 COMMUNITY COMPLAINTS

In the first instance, after receiving a complaint, the environment officer will attend the location of the complaint to confirm the noise source, quarry operations and the weather conditions.

Investigations into the complaint will be undertaken and findings reported to the complainant.

It may be identified that additional noise monitoring may be required. Depending on the type of complaint, and location, several measurement methods and techniques can be utilised to identify the noise source causing the complaint. Such methods may include:

- operator attended measurement at the affected location combined with audio recordings or at an alternate representative location;
- unattended noise monitoring;
- real-time noise monitoring combined with audio recordings;
- calculation from near field measurements; and
- a combination of any or all the methods shown.

If monitoring is required, findings will be made available to the complainant.

In terms of complaints, Boral will record details of all complaints received in the organisation's safety and environment system (SIMS) and ensure that a response is provided to the complainant within 24 hours.

If Boral's response does not address the complaint to the satisfaction of the complainant within six weeks, Boral will refer the matter to an independent mediator (approved by the Director-General) and bear the costs of such mediation. Boral will then immediately carry out such works as agreed through the mediation process.

Further, Boral will make available a report on complaints received to the Community Consultative Committee and to relevant government agencies and the Councils upon request and include a summary in the Annual Review. The report shall include the number of complaints that have been resolved with or without mediation.

A monthly report is also placed on the Peppertree Quarry website.

9 FINANCING AND PROVISION

Funding of works associated with the NBMP will be from operational and capital budgets associated with the quarry operations.

10 TRAINING

10.1 INDUCTION

Every employee and contractors working onsite must be inducted. The Peppertree Quarry induction covers the controls associated with managing potential impacts from noise.

10.2 SITE SPECIFIC TRAINING

Where identified by management representatives, additional site specific training may be developed and implemented and delivered to relevant personnel and contractors.

Blasting personnel are trained in the Boral Blast Management plan which identifies the criteria to be met and the controls to be in place.

11 REPORTING AND REVIEW

11.1 REGULATORY COMPLIANCE

All Boral sites will be aware of regulatory noise and blasting limits to ensure the necessary controls and monitoring is carried out for the purpose of verifying compliance.

Regulatory documents such as the following, should be periodically reviewed for site compliance with noise management obligations:

- environmental licences and
- planning consents

Compliance with relevant criteria will be managed by appropriate operational management, which includes:

- maintenance and inspection of pollution controls associated with noise and blast management and
- Application of procedures / blast management protocols

11.2 COMMUNITY COMMUNICATION

Boral will ensure that the local community is kept informed by way of periodic newsletters, leaflets, local newspaper advertisements and the quarry web page of the progress of the quarry, including details of the blasting hotline.

Community Consultative Committee meetings are used to inform the committee of the general progress of the blast emissions and noise monitoring and to advise of any variation to the monitoring programs.

On request, members of the community within a 2 km radius of the quarry are informed of blasting, either by email or directly via hone prior to each blast.

11.3 REPORTING

11.3.1 AEMR

The site environmental officer is responsible for managing the environmental reporting program and arranging specialist consultants to prepare reports, as required. The activities and performance outcomes of the NBMP will be presented in the Annual Environmental Management Review (AEMR).

This will include detailed assessment of monitoring results collected over the course of the NBMP, an evaluation of any trends occurring across the site, any community/stakeholder complaints or non-conformances with licences/criteria and recommendations for management actions.

By the end of March each year, an AEMR will be submitted to DP&E. It must ….

- describe the works (including rehabilitation) that were carried out in the previous calendar year, and the works that are proposed to be carried out over the current calendar year;
- (b) include a comprehensive review of the monitoring results and complaints records of the project over the previous calendar year, which includes a comparison of these results against the:
- • relevant statutory requirements, limits or performance measures/criteria;

- • requirements of any plan or program required under this approval;
- • monitoring results of previous years; and
- • relevant predictions in the documents listed in condition 2(a) of Schedule 2;
- (c) identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to ensure compliance;
- (d) identify any trends in the monitoring data over the life of the project;
- (e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and
- (f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the project.

11.3.2 EPL Data and Annual Return

In accordance with EPL No. 13088, all data associated with monitoring of dust, noise and blasting events is posted onto the following dedicated website for the Quarry:

http://www.boral.com.au/article/marulan_operations_homepage.asp

In addition, an EPL Annual Return which provides a statement of compliance with the licence conditions within 60-days after the Anniversary Date.

11.3.3 Noise Monitoring Report

All routine monitoring results are documented and reported on a quarterly basis.

Quarterly reports consist of the following information:

- Summary of all attended and unattended noise monitoring results;
- Contributed noise levels from the quarry operation;
- Statement of compliance/ non-compliance;
- Meteorological conditions should also be reported in accordance with the NSW INP.

This information shall also be included in the Annual Review, which shall also report on any mitigation investigation and the implementation and effectiveness of these measures, to the satisfaction of the Secretary.

11.3.4 Blast Monitoring Report

The Blast monitoring report is prepared within 48 hours where possible of a blast and is available on the restricted access website. Results are reported monthly as required by the EPL on the nominated Peppertree quarry website.

11.3.5 Internal Reporting

In accordance with the HSEQMS and corporate divisional requirements a monthly report on environmental compliance and performance is prepared by the site environmental officer which is distributed to senior divisional managers for review for provision of additional resources that may be

required to mitigate a significant environmental issue. The Boral Group Environmental Advisor is also provided with a monthly overview of any significant matters which may be escalated to Board level.

11.3.6 Incident Reporting

Incident reporting will be conducted In accordance with Condition 8, Schedule 5, where by

"The Proponent must immediately notify the Secretary and any other relevant agencies of any incident.

Within 7 days of the date of the incident, the Proponent must provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested."

An incident as defined in the Approval, Schedule 1 is deemed to be "a set of circumstances that:

- Causes or threatens to cause material harm to the environment '; and or
- Breaches or exceeds the limits or performance measures /criteria in this approval."

In accordance with Part 5.7A of the *Pollution of the Environment Operations Act* 1997 (POEO Act), a Pollution Incident Response Management Plan (PIRMP) has been implemented at the Quarry. Although noise is not a consideration under PIRMP, there is potential for an incident associated with Blasting. The POEO Act requires:

- Identifying and risk assessing the likelihood of hazards;
- Actions for preventing and responding to incidents;
- A site specific inventory of all potential pollutants;
- Equipment to be used in an incident response;
- Plan to minimise environmental and human harm by the implementation of actions to be taken during or immediately after a pollution incident;
- Consideration of how an incident may impact neighbours;
- Communicating an incident to ARAs and neighbours;
- Staff training on their roles and responsibilities under the PIRMP; and
- Annual testing and review of the PIRMP.

The Quarry Manager (or nominated Boral Authority) has the responsibility of ensuring all PIRMP reviews, revisions, training, testing and internal and external notifications are undertaken in compliance with POEO Act requirements.

11.4 AUDITING

Boral has an established corporate and divisional risk-based audit program that periodically assess operational sites for conformance with HSEQMS requirements.

In accordance with the requirements of CoA 11 (Schedule 5), within 3 years of the date of the commencement of construction and every 3 years thereafter, unless the Secretary directs otherwise, Boral will commission and pay the full cost of an Independent Environmental Audit of the project. The adequacy of this NBMP will be included in the Environmental Audit. An Independent Audit of the Quarry was conducted in 2015 and the next Audit is due in 2018.

11.5 REVIEW OF MANAGEMENT PLAN

The NBMP is to be reviewed in response to:

- Schedule 5 (Condition3) of the Project Approval which requires a review within 3 months of:
    - An Annual review under Schedule 5 (Condition 9) of the Project Approval;
    - Submission of an incident report in accordance with Schedule 5 (Condition 8) of the Project Approval;
    - Of an Independent Audit under Schedule 5 (Condition 11) of the Project Approval; and
    - Upon approval of any future Modifications to the Project Approval.

If any of the above reviews result in any revisions, a revised NBMP must be provided to the Secretary within 4-weeks for approval.

11.5.1 Review Objectives

This NBMP will be reviewed periodically by suitably qualified persons to determine the efficacy of the Plan and ensure it continues to fulfil its intended purpose. This will allow for and promote adaptive management through progressive stages of future quarry operations.

Noise and blasting actions and performance will be measured through regular environmental performance reviews. These will be based on the measurable outcomes identified in this management plan and key performance criteria outlined in Section 1.3 and 3.3. The reviews will be used to assess progress in meeting NBMP objectives and performance criteria and will be undertaken by the site environmental officer:

12 SUMMARY OF MANAGEMENT ACTIONS

The NBMP provides the framework and guidance for the Quarry activities to be conducted in a manner that appropriate control measures are implemented to minimise the potential for adverse impacts on the amenity, property and safety of quarry neighbours and meet compliance requirements of the CoA of the Project Approval. A number of management actions have been put in place to assist in meeting these objectives.

These actions are summarised in Table 15.

Table 15: Summary of Management actions

Management action ref ID	Environmental management measure	Indicative timeframe	responsibility	Section
NOISE AND BLAST MANAGEMENT CONTROLS				
PTQ-NBMP-01	Implement a noise and blast management system as per NBMP	ongoing	Quarry Manager	4.0
PTQ-NBMP-02	The Proponent must ensure that the noise generated by the project does not exceed the noise impact assessment criteria presented in Table 1 of the Project Approval at any residence on privately-owned land.	ongoing	Quarry Manager	4.0, 6.0
PTQ-NBMP-03	Ensure air-blast overpressure and ground vibration levels during blasting events comply with the relevant assessment criteria in the Project Approval	ongoing	Quarry Manager	4.0, 6.0
PTQ-NBMP-04	implement best practice noise management, including all reasonable and feasible noise mitigation measures to minimise the noise generated by the project;	ongoing	Quarry Manager	4.0, 6.0
PTQ-NBMP-05	investigate ways to minimise the noise generated by the project;	ongoing	Quarry Manager	4.0, 6.0
PTQ-NBMP-06	operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and noise monitoring data to guide the day to day planning of quarrying operations and the implementation of both proactive and reactive	ongoing	Quarry Manager	4.0, 6.0

	noise mitigation measures to ensure compliance with the relevant conditions of this approval;			
PTQ-NBMP-7	NBMP to be prepared and in place	November 2016	Quarry Manager	1.0
PTQ-NBMP-8	Hours of operation as outlined in the Project approval to be complied with	ongoing	Quarry Manager	4.0
PTQ-NBMP-9	Maintain Aspects and Impacts register for the site.	Annual review	Quarry Manager	4.2
NOISE MANAGEMENT CONTROLS				
PTQ-NBMP-10	Tertiary operations west of the pit to be enclosed	ongoing	Quarry Manager	4.0
PTQ-NBMP-11	Conveyors to be covered	ongoing	Quarry Manager	4.0
PTQ-NBMP-12	Avoid dropping materials from height, where practicable;	ongoing	Quarry Manager	4.0
PTQ-NBMP-13	Avoid metal-to-metal contact on equipment;	ongoing	Quarry Manager	4.0
PTQ-NBMP-14	Avoid mobile plant clustering near residences;	ongoing	Quarry Manager	4.0
PTQ-NBMP-15	Close openings where appropriate on processing plant;	ongoing	Quarry Manager	4.0
PTQ-NBMP-16	Ensure all covers are in place and closed at all times when fixed and mobile plant is in operation	ongoing	Quarry Manager	4.0
PTQ-NBMP-17	Maintain 10m earth bund spanning the pit boundary and facing residences to the east, west and north,	ongoing	Quarry Manager	4.0
PTQ-NBMP-18	Select the most effective mufflers, enclosures and low-noise tool bits and blades;	ongoing	Quarry Manager	4.0

PTQ-NBMP-19	Select equipment (dozers, drill rigs) with suitable sound power level emissions	ongoing	Quarry Manager	4.0
PTQ-NBMP-20	Use less annoying alternatives to audible reversing alarms (such as broadband noise emitting models i.e. 'squashed duck') that provide a safe system of work, or configuring the quarry to maximise forward movements of mobile plant;	ongoing	Quarry Manager	4.0
PTQ-NBMP-21	Use alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, where feasible and reasonable;	ongoing	Quarry Manager	4.0
PTQ-NBMP-22	Reduce throttle settings and turn off equipment and plant when not being used;	ongoing	Quarry Manager	4.0
PTQ-NBMP-23	Regularly inspect and maintain equipment to ensure it is in good working order, also check the condition of mufflers. Equipment must not be operated until it is maintained or repaired, where maintenance or repair would address the annoying character of noise identified;	ongoing	Quarry Manager	4.0
PTQ-NBMP-24	For machines with fitted enclosures, check that doors and door seals are in good working order and that the doors close properly against the seals	ongoing	Quarry Manager	4.0
PTQ-NBMP-25	Boral EAM to be used to ensure maintenance of engineering controls	ongoing	Quarry Manager	4.0
BLASTING MANAGEMENT CONTROLS				
PTQ-NBMP-26	Review of meteorological conditions prior to blasting and amendment of plans if excessive dust generation is anticipated	ongoing	Blast manager	4.0
PTQ-NBMP-27	The Blast Management Plan is reviewed annually and a separate BMP record is collated for each	annual	Quarry Manager	4.0

	blast.			
PTQ-NBMP-28	Blasts are designed to minimise (within practical limits) the occurrence of fly-rock and to eliminate unconfined explosives related air-blast i.e. face blowouts and rifling from the blast-hole collars;	ongoing	Blast manager	4.0
PTQ-NBMP-29	implement best blasting practice to: (a) ensure that no flyrock leaves the site; (b) protect the safety of people, property, and livestock; and (c) minimise the dust and fume emissions from blasting on the site, to the satisfaction of the Secretary.	ongoing	Blast manager	4.0
PTQ-NBMP-30	Generally, single hole (delayed) initiation will be used with signal tube technology connecting each blast-hole and also being used to fire the blast; and	ongoing	Blast manager	4.0
PTQ-NBMP-31	Stemming is used to produce reliable, controlled blasts	ongoing	Blast manager	4.0
PTQ-NBMP-32	Boral will review and approve the proposed blast design with respect to potential blast emissions based on the current predictive site laws for ground vibration and air-blast	ongoing	Blast manager	4.0
PTQ-NBMP-33	Bulk explosive loading equipment is selected to offer a loading accuracy of ±5 kg of product, if required; and		Blast manager	4.0
PTQ-NBMP-34	Column rise of the explosive product is measured and checked against design with corrective options in place to manage variations.		Blast manager	4.0
PTQ-NBMP-35	Blast-hole depths will be accurately determined to within	ongoing	Blast manager	4.0

	±200 mm;			
PTQ-NBMP-36	Peppertree Quarry will not blast concurrently with the adjacent Boral Cement Limestone Mine	Every blast	Blast manager	4.0
EXTREME WEATHER EVENT MANAGEMENT				
PTQ-NBMP-37	Weatherzone dashboard system to be in place as forecast for nominated trigger events to) minimise noise impacts during adverse weather conditions;	ongoing	Environment advisor	4.0
PTQ-NBMP-38	The procedure for managing noise based on the alert levels is still being refined as to the appropriate trigger levels and the sensitivity of the Alerts. The procedure will be completed by early 2017 and staff trained in its use	January 2017	Environment advisor	4.0
MODIFICATION 4				
PTQ- NBMP -39	quarterly compliance monitoring, must include additional noise monitoring locations R4 and R17 and a more detailed low frequency noise assessment and reporting regime.	October 2016	Environment advisor	5.0, 6.0
NOISE AND BLAST MONITORING				
PTQ- NBMP -40	conduct noise measurements of acoustically significant plant and equipment, to ensure that they remain within the specified design levels.	annually	Environment advisor	6.0
PTQ- NBMP -41	Frequency of noise monitoring to be reviewed at the end of 2017 to determine future monitoring	December 2017	Environment advisor	6.0

	requirements			
PTQ-NBMP-42	Noise monitoring to be undertaken at R3, R2, R8, R4 and R17 and monitored as per standard in NBMP	Quarterly (January, April, July, October)	Environment advisor	6.0
PTQ-NBMP-43	Five blast monitors to be in place and monitored as per standard in NBMP. Remote online system to be in place	Every blast	Environment advisor	6.0
PTQ-NBMP-44	Weather station to be in place and monitored as per standard in NBMP	ongoing	Environment advisor	6.0
PTQ-NBMP-45	Operator attended noise measurements shall be conducted at each of the five R locations	quarterly	Environment advisor	6.0
PTQ-NBMP-46	Unattended noise monitoring shall be conducted at each of the five "R" locations	quarterly	Environment advisor	6.0
PTQ-NBMP-47	Low frequency noise assessment to be conducted at each of the five "R" locations	quarterly	Environment advisor	6.0
PTQ-NBMP-48	Individual blast design records and monitoring reports shall be maintained to assist in the design and optimisation of future events, planning and control of blasting emissions and to provide a traceable system of documentation in case of accident or complaint.	Every blast – 7 years	Environment advisor	7.0
PTQ-NBMP-49	adverse impact will be considered to exist where concentrations are above NBMP criteria with further investigation required	As results become available	Environment advisor	7.0
NOISE AND BLAST RESPONSE PLAN				
PTQ-NBMP-50	All exceedances or events to be reported within 7 days to the Department of Planning and Environment and any other relevant agencies	ASAP	Quarry Manager	8.0

PTQ-NBMP-51	Written report to be provided following investigation	ASAP	Quarry Manager	8.0
PTQ-NBMP-52	Exceedances or equipment failures to be investigated and appropriate remedial action undertaken	ASAP	Quarry Manager	8.0
PTQ-NBMP-53	Land acquisition protocol to be enacted if request received in writing from resident	ASAP	Quarry Manager	8.0
TRAINING				
PTQ-NBMP-54	During site inductions for all operators (e.g. truck drivers, mobile plant operators), identify the closest and potentially most affected noise sensitive receivers in the vicinity of current works, present the applicable noise criteria for the site and identify the site culture of best operational practice; induction to be reviewed to include	January 2017	Environment advisor	10.0
PTQ-NBMP-55	All personnel involved in the drilling and blasting operations are adequately trained to ensure that people are up to date with the most current product technology and blasting techniques.	ongoing	Quarry Manager	10.0
PTQ-NBMP-56	All staff and contractors to be inducted. The induction will cover management of potential noise sources	annually	Quarry Manager	10.0
REPORTING AND REVIEW				

PTQ-NBMP-57	(a) notify the landowner/occupier of any residence within 2 kilometres of the quarry pit who registers an interest in being notified about the blasting schedule on site; (b) operate a blasting hotline, or alternative system agreed to by the Secretary, to enable the public to get up-to-date information on blasting operations at the project; and (c) keep the public informed about this hotline (or any alternative system), to the satisfaction of the Secretary.	ongoing	Environment advisor	11.0
PTQ-NBMP-58	Include a NBMP progress report in the AEMR	Annual (March)	Environment advisor	11.0
PTQ-NBMP-59	Monthly internal report to be prepared which identifies criteria exceedances or equipment failures			11.0
PTQ-NBMP-60	In accordance with EPL No. 13088, all data associated with monitoring of dust, noise and blasting events is posted onto the dedicated website for the Quarry.	monthly	Environment advisor	11.0
PTQ-NBMP-61	An EPL Annual Return which provides a statement of compliance with the licence conditions within 60-days after the Anniversary Date.	Annually (September)	Environment advisor	11.0
PTQ-NBMP-62	Complete an environmental incident report in the event a non compliance is identified during monitoring	As required	Environment advisor	11.0

PTQ-NBMP-63	Undertake a review of the NBMP: • Every 3 years • Following an audit • Following approval of a modification • Following an incident • Or as otherwise deemed necessary	Review required within 3 months	Environment advisor	11.0
PTQ-NBMP-64	Within 3 years of the date of the commencement of construction and every 3 years thereafter, unless the Secretary directs otherwise, the Proponent must commission and pay the full cost of an Independent Environmental Audit of the project	2018	Environment advisor	11.0
PTQ-NBMP-65	Review the adequacy of site specific environmental safe guards and management measures on a regular basis	monthly	Environment advisor	11.0
PTQ-NBMP-66	Liaise with the local community regarding scheduled works which are predicted to have increased impacts.	As required	Environment advisor	11.0

13 REFERENCES

This NBMP has been prepared with consideration to:

NSW Environment Protection Authority (EPA) – NSW Environmental Noise Management – Industrial Noise Policy (INP), January 2000 and relevant application notes;

NSW Department of Environment and Conservation (DECC) – NSW Environmental Noise Management – Assessing Vibration: a Technical Guideline (the guideline), February 2006;

Standards Australia AS1055–1997™ (AS1055) – Description and Measurement of Environmental Noise, Parts 1, 2 and 3;

Standards Australia AS IEC 61672.1–2004™ (AS61672) – Electro Acoustics - Sound Level Meters Specifications; and

Standards Australia AS 2436–2010™ (AS2436) – Guide To Noise And Vibration Control On Construction, Demolition And Maintenance Sites;

International Organisation for Standardisation (ISO) 9613-2:1996 (ISO9613:2) - Acoustics - Attenuation Of Sound During Propagation Outdoors - Part 2: General Method Of Calculation;

The Marulan South Quarry – Environmental Assessment Report prepared by ERM, dated October 2006 (EA 2006); and

The Project Approval (06_0074) and subsequent modifications, and other relevant project information provided by Boral

Peppertree Quarry Modification Environmental Assessment (Element Environment, 2016)

14 APPENDICES

Appendix 1 EPA Correspondence

Appendix 2 Blast report

Appendix 3 – Applying the NSW INP

APPENDIX 1

EPA CORRESPONDENCE

Hi Sharon

Not too much to comment on with regard to the Noise and Blast Management Plan, except for detail regarding low frequency noise, which I think is a little sparse.

Measurement of dB(C) is mentioned in Chapter 6.1.8, but I'm wondering if it might be worthwhile considering mentioning a voluntary trigger value for which further investigation might take place (perhaps the 15dB (dBC-dBA) difference? This could be incorporated into Chapter 7 Assessment Criteria.

I understand that there are no LFN limits imposed by the Consent or EPL, and that the 6th paragraph of Chapter 5 mentions monitoring of low frequency noise, but there does not seem to be any attention given to excessive LFN in Chapter 8 Noise and Blast Response Plan. I guess it is generally covered Chapter 8.2, however the NBMP itself recommends a more detailed low frequency noise assessment and reporting regime.

Also - Page 41, Chapter 8.3.3 (6)(a), last sentence contains "Error! Reference source not found."

Michael Heinze

Regional Operations Officer – South East Region

South Branch, NSW Environment Protection Authority

+61 2 6229 7002 +61 0408 695 070

michael.heinze@epa.nsw.gov.au www.epa.nsw.gov.au @EPA_NSW

Report pollution and environmental incidents 131 555 (NSW only) or +61 2 9995 5555

APPENDIX 2

BLAST REPORT

Orica - Australia

Blast Journal

QSNSW01 - Boral - Peppertree

Blast number: PTQ17-02

Fired: 2017-02-23 13:58

General

Created by	Mark Yeadon
Shot firer	Mark Yeadon
Created	23/02/2017 21:13:25
Fired	23/02/2017 13:58:00
Timespan	300
Blast supervisor	Angus Shedden
Contract part	Production
Type of blast	Bench
Section	570

Hole

HoleSpacing [m]	Min:3.4 | Max:3.6
Burden [m]	Min:3.1 | Max:3.6
Number of holes	164
Holes per interval	1
Holes per row	Min:18 | Max:26
Hole Depth [m]	Min: | Max:
Hole Diameter [mm]	Min:0.89 | Max:
Number of rows	8
Subdrilling [m]	Min:0.8 | Max:

Initiation

Number of intervals	1
Initiation type	Exel

Placement

East	228234.4
North	6150104.6
Z	569.55

Charge

Number of boulders	
Charge per hole	1
Total amount of explosives [kg]	16035
MIC [kg]	321
Charge per detonator [kg]	Min:1 | Max:
Charge per hole [kg]	Min: | Max:
Charge per delay [kg]	Min: | Max:
Powder factor [kg/m³]	0.58
Stemming [m]	2.2
Type of explosive	Centra Gold

Size

SizeArea [m²]	
SizeBenchHeight [m]	
Volume [m³]	27583.056
Length [m]	
Width [m]	
SizeBlastedRock	

Cover

[ton]

CoverCount

CoverDuk

Cover type

Load event

Start time 23/02/2017 08:30:00

Stop time 23/02/2017 13:00:00

Note

Document 0

Measurementpoint for fired timestamp: 2017-02-23 13:58

Measurement Point	Placement	Date	Value	VPPV	Limit	Percentage of Limit	Distance	Remark
#1 Turkey Farm	Airblast	23/02/2017 13:58:08	111.10 dBL		115	97	991	
#1 Turkey Farm - L	Vibration	23/02/2017 13:58:08	0.75 mm/s	0.8 mm/s	5	15	991	
#1 Turkey Farm - T	Vibration	23/02/2017 13:58:08	0.60 mm/s	0.8 mm/s	5	12	991	
#1 Turkey Farm - V	Vibration	23/02/2017 13:58:08	0.45 mm/s	0.8 mm/s	5	9	991	
#2 Gas Pipeline	Airblast	23/02/2017 13:58:08	120.50 dBL		0	12	574	
#2 Gas Pipeline - L	Vibration	23/02/2017 13:58:08	1.50 mm/s	1.54 mm/s	0	12	574	
#2 Gas Pipeline - T	Vibration	23/02/2017 13:58:08	1.15 mm/s	1.54 mm/s	0	12	574	
#2 Gas Pipeline - V	Vibration	23/02/2017 13:58:08	0.90 mm/s	1.54 mm/s	0	12	574	
#3 Rail Line	Airblast	23/02/2017 13:58:08	115.60 dBL		0	12	1065	
#3 Rail Line - L	Vibration	23/02/2017 13:58:08	0.60 mm/s	0.74 mm/s	0	12	1065	
#3 Rail Line - T	Vibration	23/02/2017 13:58:08	0.65 mm/s	0.74 mm/s	0	12	1065	
#3 Rail Line - V	Vibration	23/02/2017 13:58:08	0.50 mm/s	0.74 mm/s	0	12	1065	
#5 M.Mgr House	Airblast	23/02/2017 13:58:09	99.20 dBL		0	0	1761	
#5 M.Mgr House - L	Vibration	23/02/2017 13:58:09	0.14 mm/s	n/a	0	0	1761	
#5 M.Mgr House - T	Vibration	23/02/2017 13:58:09	0.12 mm/s	n/a	0	0	1761	

#5 M.Mgr House - V	Vibration	23/02/2017 13:58:09	0.09 mm/s	n/a	0	0	1761

APPENDIX 3

APPLYING THE NSW INP

The NSW INP is used by Boral when determining mitigation measures required as a result of any potential non-compliance with the Project Approval noise criteria. The NSW INP takes into account both the level of exceedance and prevailing conditions or non-standard weather effects when assessing compliance with licence/consent conditions. As stated in the NSW INP:

'A development will be deemed to be in non-compliance with noise consent or licence condition if the monitored noise level is more than 2 dB above the statutory noise limit specified in the consent or licence condition. This may occur for two reasons:

- the noise from the development is excessive, in which case the development is truly not complying with its consent or licence condition; and/or

- The noise was increased by extreme, non-standard weather effects—in which case the development is not considered to be in non-compliance with its consent or licence condition. Non-standard weather effects can be considered to be present during monitoring if the cloud cover is less than 40 per cent and the wind speed (at 10 m height) is less than 1.0 m/s (represents an extremely adverse weather condition for noise)—during the period from 6 pm to 7 am in non-arid areas.

In this latter case, further monitoring at a later date is required to determine compliance under the meteorological conditions specified in the consent/ licence condition'.

ERM EA 2006 prepared for the Project Approval, used the methods specified in the NSW INP to predict noise levels from the development. The noise assessment predicted noise levels from prevailing winds as determined from previous studies.

Analysis of the Marulan South Meteorological Station for 2008 and 2009 in accordance with Section 3.2 of the INP Assessment of Prevailing Weather Conditions identified the prevailing wind conditions for the Marulan South area and are presented in Table 1 and Table .2**.** The Marulan South Meteorological Station meteorological station is located approximately 2 km west of the quarry and is representative of winds in the area.

Table 1 INP Prevailing Winds - 2008

	Winds ± 45° ≤3 m/s with Frequency of Occurrence ≥30%		
2008 Season	**Daytime**	**Evening**	**Night**
Summer	NE, ENE, E	NE, ENE, E	-
Autumn	ENE, E	ENE, E	-
Winter	-	-	-
Spring	-	NE, ENE,	-

Table .2 INP Prevailing Winds - 2009

	Winds ± 45° ≤3 m/s with Frequency of Occurrence ≥30%		
2009 Season	**Daytime**	**Evening**	**Night**
Summer	NE, ENE, E	NE, ENE, E	-
Autumn	ENE, E	ENE, E	-
Winter	-	-	-
Spring	-	-	-

Table 1 and Table *.2* identify the prevailing winds ranging from north-north easterly to east-south-easterly for wind speeds less than 3 m/s (within the wind speed range set in the Project Approval conditions).

Any exceedance of the noise impact assessment criteria of more than 2 dB during times of prevailing wind conditions identified in Table 1 and Table *.2* would be classified as non-compliance and would trigger reporting to the Department of Planning and Infrastructure (DoPI), OEH and affected landowners, and an investigation into the cause of the exceedance.

The results of the investigation will then be used to determine whether any further mitigation measures are required. These investigations and their implementation will be reported in the Annual Review.

Any exceedance of the noise impact assessment criteria of more than 2 dB and/or during times of wind conditions outside those identified in Table 1 and Table *.2* may trigger additional noise monitoring and/ or calculation to determine the extent or potential of a non-compliance with respect to the prevailing conditions shown in Table 1 and Table *.2* and in accordance with the methodology outlined in Chapter 5 of the NSW INP.

Should the investigation show that the contributed noise level exceeds the noise impact assessment criteria, the non-compliance shall be reported to the DoPI and affected landowners. Should the investigation determine compliance with the noise impact assessment criteria, no further action will be taken.

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