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Peppertree Quarry

Boral Resources Pty Limited

Peppertree Quarry
Annual Environmental Review
2014

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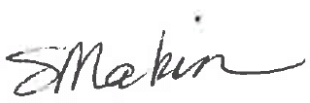
Annual Environmental Review

Prepared in accordance with Schedule 5 Condition 4 of Project Approval 06_0074

1 January 2014 to 31 December 2014

Reporting Officer: Sharon Makin

Title: Stakeholder and Environment Advisor

Signature: 

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1. Introduction

1.1 Scope

This Annual Environmental Review (AER) covers the operations at Peppertree Quarry for the period 1 January 2014 to 31 December 2014 in accordance with Schedule 5 Condition 4 of Project Approval 06_0074. This period covered the commencement of operations of the quarry.

This report has been prepared in accordance with Condition 4, Schedule 5 of Project Approval 06_0074 and includes:

- Environmental management procedures during the construction program;
- Environmental initiatives implemented during detailed design;
- Monitoring activities and results during the reporting period and analysis of ay trends;
- Current compliance with statutory provisions and identification of any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies.
- Rehabilitation progress; and
- Proposed operations for the next reporting period including additional measures that will be implemented to improve the environmental performance of the project.

1.2 Background

Peppertree Quarry is owned and operated by Boral Resources Pty Ltd, a fully owned subsidiary of Boral Limited. The Quarry is Boral's newest and largest hard rock quarry development in Australia. The Boral Peppertree Quarry is located 10 kilometres south-east of Marulan in the NSW Southern Tablelands, approximately 175 km south-west of Sydney, as shown on Figures 1 to 3. The specific site lies directly to the north of the Boral Marulan South Lime Works and Mine.

Peppertree Quarry was originally approved in March 2009 under Part 3A of the Environmental Planning and Assessment Act 1979 following the preparation and display of an Environmental Assessment. The project however, was the subject of three separate modifications which were approved in March 2009, November 2011 and October 2012.

Work commenced on the quarry in 2009 with the development of a test pit in order to refine the design of the processing plant and equipment. This work assisted in the design of the crushing and screening plant. The second modification allowed for the construction of separate rail loop rather than use the existing rail siding to the Limestone Mine. The rail loading facilities, tertiary processing plant and stockpiling area were then relocated to the eastern side of the new rail line placing them around 250 m further away from the most affected residential receptor.

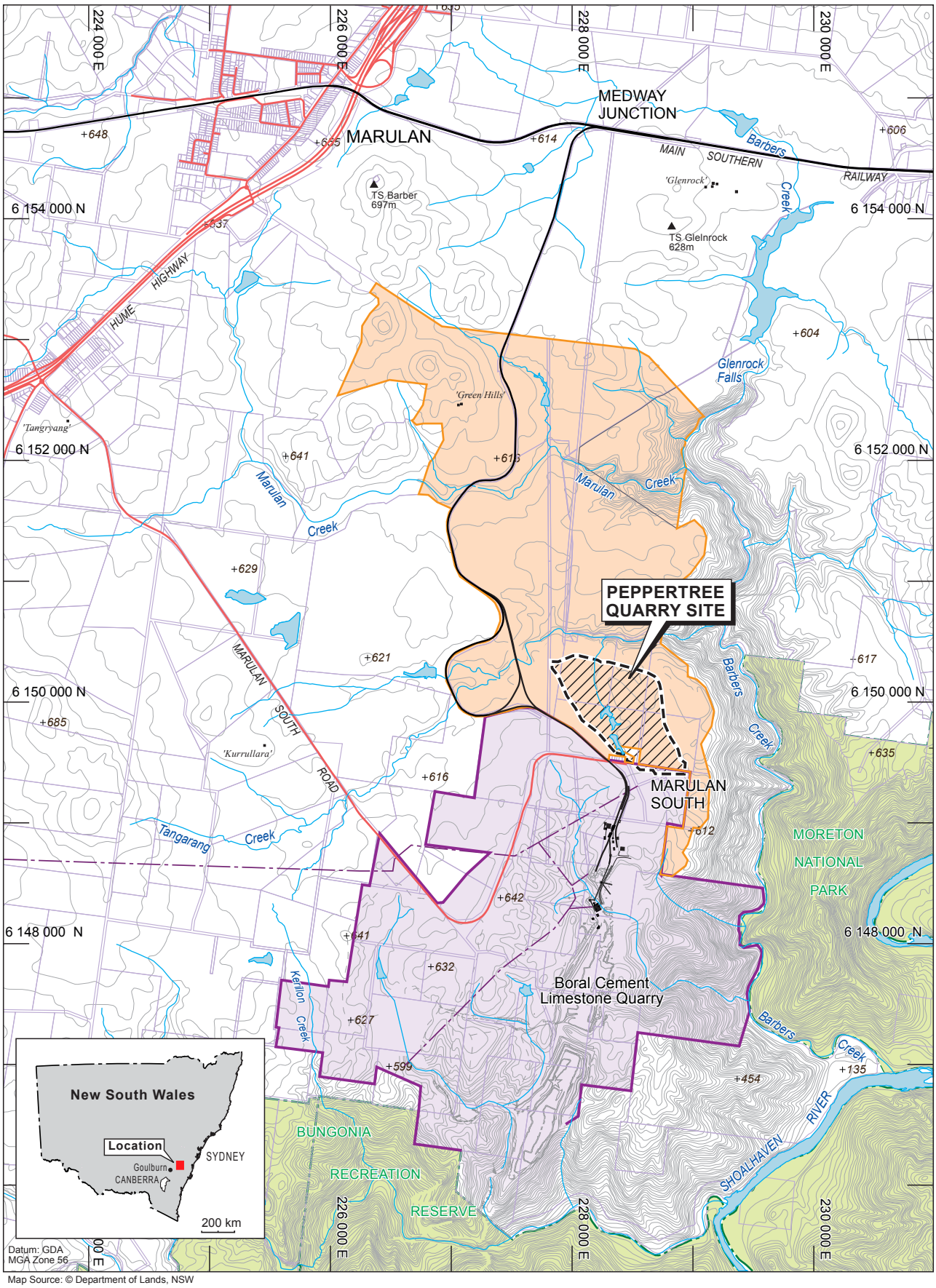

FIGURE 1
Boral Peppertree Quarry
Regional Location

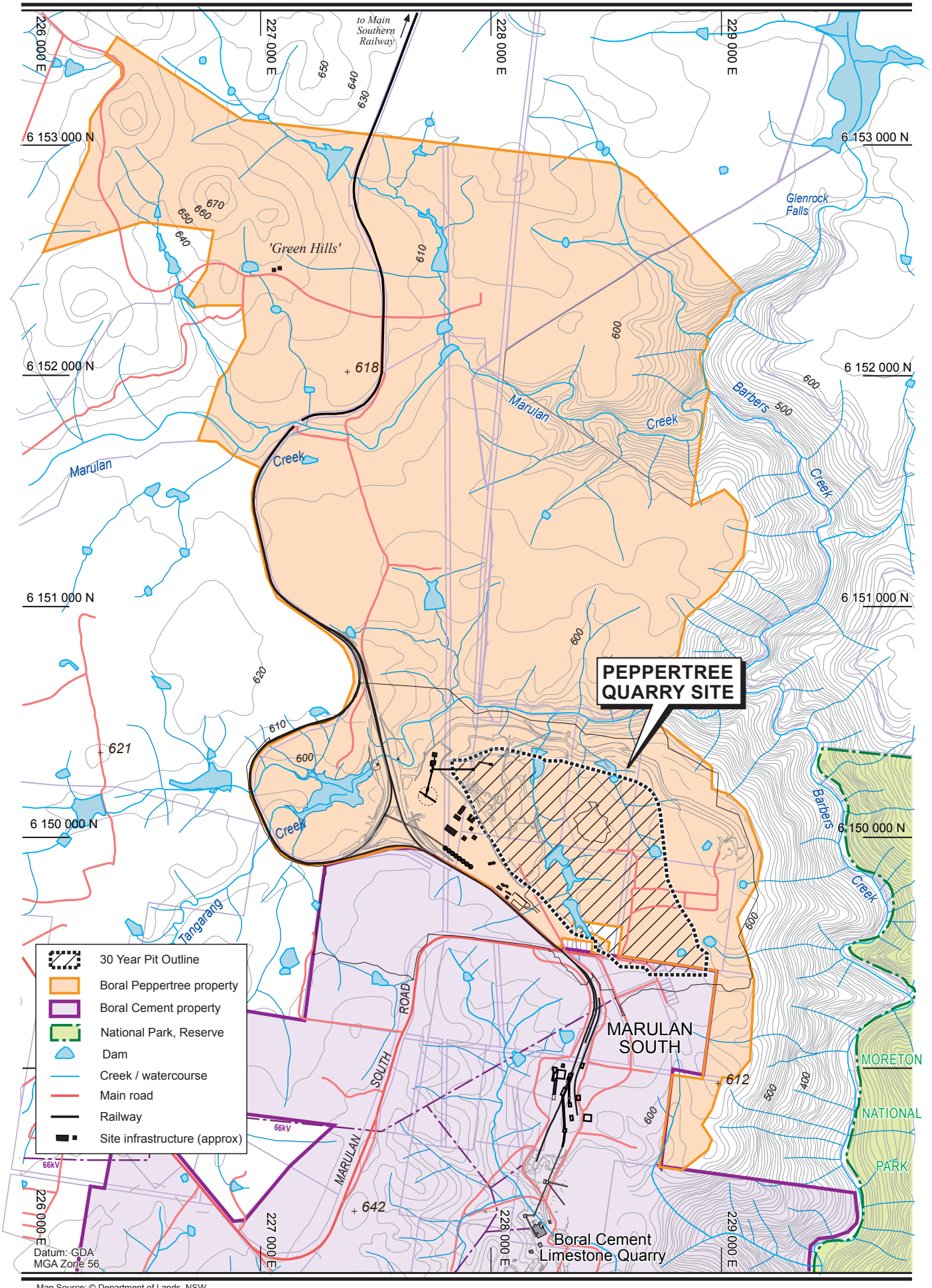

FIGURE 2
Boral Peppertree Quarry
Site Location

0 100 200 300 400 500 metres

N

FIGURE 3
Boral Peppertree Quarry
Airphoto

Construction commenced in July 2011 however a further modification was lodged in August 2012 to construct a High Voltage power line from an existing substation to the processing plant and extend the existing railway passing line near the junction with the Main Southern Railway Line. The passing line was extended to enable loaded trains to pass waiting empty trains accessing either the limestone mine or the hardrock quarry.

Construction was completed in late 2013 while first production occurred in early 2014.

1.2.1 Product and Market

Peppertree Quarry supplies the greater Sydney area with graniodorite aggregate products and manufactured sand. The quarry will replace the existing quarry at Emu Plains which will be redeveloped and rehabilitated as part of the Penrith Lakes Program.

At full production, Peppertree will produce up to 3.5 million tonnes of quarry products per annum for a period of 30 years. All extractive materials and product will be transported by rail to a new rail terminal being established at the Boral Maldon Cement Works, near Picton. From here, trucks will distribute products into the Sydney metropolitan area.

The use of rail allows significantly less dependence on the local and regional road network around Marulan and through the Southern Tablelands and Highlands.

During the reporting period 257,000 tonnes of aggregate was transported by rail to Boral road rail interchange sites. From here, the material is transported to various Sydney markets.

1.2.2 Mine Contacts

Contacts details for responsible site personnel are as follows:

Quarry Manager	Angus Shedden
Safety and Training Officer	Rob Lasker
Environment and Community	Sharon Makin

Boral Resources are the owner and operator of the quarry and is responsible for all aspects of the quarry operation, processing and dispatch as well as health safety and environmental obligations.

1.2.3 Corporate Environmental Goals

Boral embraces the principle of sustainable development, ie. development which meets the needs of the present without compromising the ability of future generations to meet their own needs. Boral is committed to pursuing industry specific best practice in environmental performance

Specifically Boral is committed to:

- Conducting our operations to minimise environmental risk and, wherever practicable, eliminate adverse environmental impacts.
- Continual improvement of our environmental performance including regular review and the setting of rigorous environmental objectives and quantified targets – particularly with regards to:

  - efficient use of energy (including appropriate use of alternative fuels);

  - conservation of water; - minimisation and recycling of wastes;

  - Prevention of pollution; and - effective use of virgin and recovered resources and supplemental materials.
- Open, constructive engagement with communities surrounding our operations.
- Reducing the greenhouse gas emissions from our processes, operations and facilities.
- Protecting and, where possible, enhancing biodiversity values at and around our facilities.
- Complying with environmental legislation, regulations, standards and codes of practice relevant to the particular business as the absolute minimum requirement in each of the communities in which we operate.
- Conducting business with suppliers and contractors who have a commitment to the values and objectives contained in this Environmental Policy.
- Remediating our contaminated sites to standards internationally acceptable for the site purpose.

Through communication and training, our employees will be encouraged and assisted to enhance Boral's environmental awareness and performance. The Policy has been endorsed by the Company's Managing Director and therefore commits the Company to achieving its objectives of environmental excellence.

1.3 Status of Licences and Approvals

Peppertree Quarry holds Project Approval 06_0074 which was granted by the Minister for Planning to Boral Resources (NSW) Pty Ltd (Boral) under Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act) on 28 February 2008 and which expires on 31 December 2038. The Project Approval is subject to three modifications and the combined approval document is attached as Appendix A.

The first modification was approved in 2009 which allowed for a pre-construction exploratory test pit in order to verify the design of the processing plant. The second modification occurred in 2011, which related to:

- the construction of a new rail loop off the existing privately owned Boral Cement rail line;
- the relocation of the loading facilities and processing plant within the site;
- a new overburden emplacement to the west of the quarry pit;

- the reduction in the size of the water storage dam; and
- a new residential receptor.

The third modification was approved in November 2012 which allowed for the installation and operation of a High Voltage Power line and an extension to an existing rail siding near the junction of the private rail spur and the main Southern Railway Line, referred to as the Medway Junction. This modification enabled the shunting of a full train adjacent to the private rail line which improved the logistics of train paths to the site. This modification also enabled a general update and revision to the Project Approval, which consolidated relevant aspects of March 2009, November 2011 and the November 2012 modifications.

The quarry also holds Environment Protection Licence 13088 administered by the Environment Protection Authority. The Licence anniversary date is 23rd July and the licence was reviewed in March 2011 when Variation Notice 1125628 was approved allowing for full operation of the quarry. The licence allows for Crushing, Grinding, Separation and Extractive activities for tonnages greater than 2 Million per annum.

Peppertree Quarry also holds Water Licence (10SL056926) granted by the NSW Office of Water for the period 31/3/2011 to 31/3/2016 for the construction and use of a 110ML dam and also holds a water bore water licence (IOBLI59860) allowing an annual extraction of 15 ML. All current water licences are required for the ongoing operation and will be renewed as they fall due.

1.4 Consent Requirements

Table 1.2 also references the Condition of Consent and its discussion in the AER.

Table 1.2: Compliance Table

Approval Conditions	Condition Number	Section of Environmental Review
Schedule 3 – Environmental Performance Conditions	1: Identification of boundaries	Section 1
	2 to 11: Noise	Section 3.4
	12 to 16: Blasting and Vibration	Section 3.4
	17 to 20: Air Quality	Section 3.3
	21 Meteorological Monitoring	Section 3.2
	22 to 30: Surface and Groundwater	Sections 3.5, and 3.7
	31: Traffic and Transport	Section 2
	32: Aboriginal Heritage	Section 3.11
	33 to 36: Flora and Fauna	Section 5.4
	37 to 39: Visual Impact	Section 3.10
	40: Advertising	Section 4.7
	41 to 42: Waste Management	Section 3.8
	43 to 45: Emergency and Hazards Management	Section 3.9, Chapter 6
	46: Production Data	Section 1.2.1
	47: Quarry Exit Strategy	Section 5.1
Schedule 4 -	1: Notification of landholders	Section 4.4

Approval Conditions	Condition Number	Section of Environmental Review
Additional Procedures		
	2 to 5: Independent Review	Section 4.8
	6 to 9: Land Acquisition	Sections 4.8 and 4.9
Schedule 5 – Environmental Management and Monitoring conditions	1. Environmental Management Strategy	Chapter 3
	2. Environmental Monitoring Program	Chapter 3
	3. Incident Reporting	Section 3.12
	4. Annual Review.	This Report
	(a) describe the development that was carried out in the previous calendar year. Describe the development that is proposed to be carried out over the coming year.	Chapter 2 Chapter 7
	(b) include a comprehensive review of the monitoring results and complaints records of the project over the previous calendar year and measure these results against the • relevant statutory requirements, limits or performance measures/criteria • the monitoring results from previous years; and • the relevant predictions in the EA.	Chapter 3 Section 4.6
	(c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance	Chapter 3
	(d) identify any trends in the monitoring data over the life of the project	Chapter 3
	(e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies	Chapter 3
	(f) describe what measures will be implemented over the next year to improve the environmental	Chapter 7

Approval Conditions	Condition Number	Section of Environmental Review
	performance of the project.	
	5.-6. Independent Environmental Audit	Section 4.10
	7. Revision of strategies, plans and programs	Chapter 3
	8.-9. Community Consultative Committee	Section 4.2
	10. Access to Information	Section 4.7

Pursuant to the Development Consent, copies of this report will be submitted to:

- ❒ NSW Department of Planning and Environment (DoP&E);
- ❒ NSW Department of Trade and Investment (T&I NSW);
- ❒ NSW Environment Protection Authority (EPA);
- ❒ NSW Office of Water (NOW);
- ❒ Goulburn Mulwaree Shire Council (MWSC); and
- ❒ The Peppertree Quarry Community Consultative Committee (CCC)
- ❒ Aboriginal Heritage Management Committee (AHMC)

The report will also be available at the Boral website **www.boral.com.au/marulan**

2. Operations During the Reporting Period

This section describes the operational activities at Peppertree Quarry during the reporting period.

2014 was focussed on the efficient and effective operation of the quarry as it moved from commissioning into production. The main focus of operations was the removal of overburden to allow for the development of the pit. This was in an easterly direction with the overburden being emplaced on the south eastern boundary. The in-pit crusher remained on the upper bench but was moved as necessary to source rock.

Work commenced on the preparation of the drop cut to allow the development of the next bench level. Blasting became more regular to assist in the removal of overburden and the sourcing of rock.

During the reporting period the manufacturing of limestone and granodiorite sands for incorporation into a blended product continued to be developed.

2.1 Land Preparation

Prior to extraction of the rock, the topsoil is first stripped and stockpiled for later use in rehabilitation work. Although the target resource is a high quality granodiorite, the quarry operation needs to extract some overlying sedimentary and volcanic rock as well as weathered granodiorite in order reach the target resource. This overlying material, referred to as overburden, is separately stripped and used for bund construction and ultimately out of pit emplacement. The areas used for external bunding and overburden emplacement, however, do not undergo the same stripping process. Overburden is placed directly on the undisturbed ground surface to minimise any impacts to heritage and to minimise the amount of topsoil to be handled. Fauna and heritage reviews were undertaken prior to disturbance of the new areas.

In the reporting period, 68.88 ha of land was disturbed as shown in the table below. 20.22 ha of land has been rehabilitated.

Table 2.1 - Area of Disturbance During the Reporting Period.

Disturbed areas	As of end Dec 2014 (ha)
Infrastructure area – Rail, Primary , STQ and TLO	25
Quarry extraction area	30.4
Active overburden emplacement	10.338
Test pit / west pad	1.41
Haul roads	1.74
Overburden emplacement / Noise bund (revegetated)	9.89
Dam and creek rehabilitation area	10.33
Total area rehabilitated	20.22

2.2 Quarry Extraction and Processing

Extraction involves four main stages:

- topsoil and overburden removal and emplacement;
- blasting and crushing of raw feed in-pit;
- final crushing, screening and stockpiling out-of-pit; and
- loading, transport and distribution.

The layer of soil and overburden is stripped in progressive stages and hauled to emplacement areas. A major campaign to remove and emplace overburden in 2014 was undertaken with 1,000,000m^3 BCM of material being emplaced onsite.

After overburden stripping, rock is drilled, blasted and loaded directly into the in-pit primary crushing plant. A total of 24 blasts occurred during the reporting period. Boral has implemented an innovative in-pit crushing solution at its new Peppertree Quarry. The use of a mobile primary crushing plant in-pit avoids the need to haul rock from the pit to a fixed primary crusher, in turn assisting in the abatement of noise and dust.

From here, the crushed rock is conveyed to the out-of-pit processing plant for final crushing, screening, blending and stockpiling. The processing plant has been fully enclosed to control noise and dust.

From the primary crusher, rock is delivered to the fixed processing infrastructure. Depending on the product specification, rock is further crushed and screened prior to delivering into the eight product silos. These silos can feed the train loading bin by conveyor in a fully automated and centrally controlled system from the main control room.

An integrated control system covers the entire material handling and processing infrastructure. This system monitors the feed and delivery conveyors, crushing and screening plants. Faults are quickly detected and diagnosed and if required sections of the processing system can be shut down. This system allows production to be maximised in an inherently safe environment.

For the period ending June 2014, production levels were 257,173 tonnes as reported to the DPI.

2.3 Train Loading

All product from the quarry is transported by rail unless in the case of emergencies. At full production the Quarry will operate up to four trains per day which will transport product north to the Sydney market and other customers. The rail line and train loading operation can occur 24 hours per day, 7 days per week.

Product is conveyed directly from the product bins to the train loading facility by conveyor. Each bin contains different products and depending on the shipment, it can consist of the same or different products. The processing plant can produce blended products as well in

order to maintain complete flexibility in response to market demand. The train loading system has been designed to be fully automated and controlled by a central control room in the administration building. Once loaded, trains return to the main line via a rail loop. As of the end of 2014 four trains per day were being successfully loaded.

2.4 Hours of Operation

As stipulated in Schedule 3 Condition 11, the Quarry activities are limited to designated working hours. The operation of machinery and / or blast activity is strictly monitored according to the stipulations of the approval with the operating times logged automatically in the computer management systems.

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 (including drilling, extraction, processing, and transfer of material out of the pit)	Monday - Saturday	7:00 AM to 7:00 PM
Out-of-pit activities (including processing, stockpiling, train loading and distribution, and maintenance)	Any Day	24 hours

During the reporting period, the operation adhered to the above operating hours.

2.5 Employment

During the reporting period, the operating teams and maintenance crews have been established.

Operations are managed on site by 30 FTE employees. Contractors such as Coopers Earthmoving, Pearsons Engineering and Marulan Engineering support operations, while Burtons were the key contractors for the removal of overburden.

3. Environmental Management and Monitoring

This section identifies the main environmental issues and outlines the principle elements of the existing pollution control system. Background environmental data is also provided.

3.1 Environmental Risk Identification

Prior to and throughout the construction phase, Boral undertook regular risk assessments and environmental reviews. This work resulted in a number of changes made to the design and implementation process leading up to the commissioning phase. Key environmental risks identified during this processes included:

- Managing noise issues from the plant and equipment resulting in the implementation of acoustic controls and the design of the northern bund.
- Managing blasting including ground vibration and overpressure resulting in the development of a Blasting Protocol coupled with feedback mechanisms from monitoring data.
- Managing water during construction and operation which included the implementation of effective erosion and sedimentation controls, rehabilitation of completed batter slopes as soon as practicable and the construction of suitable pollution control systems.
- Managing dust emissions during construction and operation which saw the implementation of specific engineering controls such as enclosures and water sprays as well as dust extraction systems.
- Managing Archaeological and Heritage impacts of both known and potentially unknown sites within the quarry development footprint. This issue required the implementation of a comprehensive site assessment process involving the local Aboriginal community and other stakeholders.
- Managing community issues during the construction and operational phases resulting in an extensive and ongoing consultation process including regular newsletters, individual meetings and the establishment of a Community Consultative Committee.

A number of low risk issues were also investigated including waste management, rehabilitation, groundwater, traffic and transportation, flora and fauna, bushfire and visual impacts. Although considered low risk they are still included in the overall Environmental Management Strategy for the operation and addressed in ongoing monitoring and reporting systems.

The identification and assessment of environmental risks has allowed management plans and procedures to be developed to minimise the potential risk on the environment. Management controls are required for all items which have been assessed as either high or medium risk. Such environmental management controls are described in the following management plans which have been prepared in accordance with Schedule 2, Condition 1 and Schedule 5, Conditions 2, 3, 4 and 7 of the Project Approval. These plans were

submitted for initial approval in January 2011 while a revision of the plans occurred in August 2012, and include:

- Air Quality Monitoring Plan
- Noise and Blast Monitoring Program
- Construction Noise Management Plan
- Construction Traffic Management Plan
- Landscape and Rehabilitation Management Plan
- Water Management Plan
- Aboriginal Heritage Management Plan
- Environmental Monitoring plan

As the quarry is now in operation the Construction Noise Management Plan and the Construction Traffic Management Plan are now redundant.

A further revision of the Aboriginal Heritage Management Plan was undertaken and issued in October 2013.

3.2 Meteorological Monitoring

Meteorological data is obtained from the on site weather station. The weather station measures wind speed and direction, rainfall, relative humidity, temperature at 2 m and 10 m, as well as solar radiation and barometric pressure. Data is uploaded to a secure web page on a weekly basis. Data however can be obtained on a daily basis if required.

3.2.1 Rainfall

The total monthly rainfall and number of rainy days recorded is shown in Table 3.1. The monthly rainfall fluctuated throughout the year, with heavy rain experienced in August and December, and very little rainfall occurring in July.

Table 3.2 – Total Monthly Rainfall (mm) (2014)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot
4.6	92.9	114.2	37.2	26.8	33.8	8	167.4	26.0	36.6	13.6	204.2	765.3
Number of Rain Days (≥1mm)												
2	9	8	7	3	6	3	8	6	5	4	14	75

Rainfall for 2014 was slightly higher than the average annual rainfall reported in the EA being 691.3mm, and higher than the previous reporting period.

3.2.2 Temperature

Monthly temperatures recorded are shown in Table 3.2 below. Maximum and minimum temperatures were typically higher in the summer months, from November to February, while much cooler temperatures were recorded from May to August.

Table 3.2 - Minimum and Maximum Monthly Temperatures (°C) (2014)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min	7.0	8.5	6.8	3.1	1.6	-0.6	-3.2	-4.8	0.9	1.5	2.8	8.6
Max	38.2	38.1	27.5	26.0	20.5	16.0	16.9	17.3	24.2	30.2	39.2	32.2

3.2.3 Wind Speed

Maximum and mean maximum wind gusts are shown in Table 3.3 below. Generally the greatest average maximum wind gusts occur during late winter and early spring, with strong gusts observed in September and October. Gentler winds were observed for the autumn months from March to May.

Table 3.3 – Mean Maximum Wind Speed (m/s) (2014)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10	10	9	8	9	11	11	9	10	12	12	12
Maximum Wind Speed (m/s)											
15	15	17	15	17	23	20	23	17	23	21	18

3.3 Air Quality Management

The main area of concern relating to air quality is dust. Excessive generation of dust can result in nuisance to local neighbours and environmental prosecutions. The main sources of dust associated with operation of Peppertree Quarry are:

- ❒ drilling and blasting of rock;
- ❒ vehicles and mobile plant travelling on unpaved surfaces;
- ❒ loading and unloading of material to crushers, stockpiles, trains and trucks;
- ❒ crushing and screening of rock; and
- ❒ wind erosion from stockpiles and unpaved exposed areas.

In accordance with Condition 19, Schedule 3 of the Project Approval, Peppertree Quarry is developing a comprehensive air quality management system that uses a combination of predictive meteorological forecasting and air quality monitoring data to guide the day to day planning of quarrying operations and the implementation of both proactive and reactive air quality mitigation measures to ensure compliance with the air quality conditions of the approval. The key to this system is the controls available to shut down or change specific operations from a central point in the control room.

There are also specific management and engineering controls which form part of the design and management of the site, these include:

- ❒ covering of conveyors and transfer points;
- ❒ enclosure of crushing and screening plant with dust extraction system fitted;
- ❒ fitting of scrapers for cleaning conveyor belts;
- ❒ dust suppression sprays on the primary crusher;
- ❒ use of a mobile primary crusher in-pit which eliminates truck haulage of raw material to the primary crusher;
- ❒ moveable conveyors instead of truck haulage of aggregate from the main pit;
- ❒ fitting drills with either water sprays and/or dry dust collection devices;
- ❒ enclosure of train loading facilities;
- ❒ haul roads and processing areas are compacted and lined with aggregate;
- ❒ containment of aggregate materials within silos limiting the need to stockpile materials;
- ❒ The suspension of civil works is implemented where winds are in excess of 30km/hr;
- ❒ use of water tankers to dampen haul roads and bunds under construction;
- ❒ controlling stockpiles of fine material with water sprays;
- ❒ embankments are hydromulched on completion; and
- ❒ in 2014 as part of an ongoing review of the operations, polo citrus dust additive was commissioned in the Tertiary screening and crushing process. Water sprays were also added at the conveyor at the surge tunnel to ensure the rock was wet enough to be processed minimising the generation of dust.

3.3.1 Air Quality Assessment Criteria and Predictions

Condition 18, Schedule 3 of the Project Approval establishes the following air quality assessment criteria for the project.

Table 3.4 Long term Land Acquisition Criteria for Particulate Matter

Pollutant	Averaging Period	Criterion [d]
Total suspended particulate (TSP) matter	Annual	[a] 90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	[a] 30 µg/m^3

Table 3.5 Short term Land Acquisition Criteria for Particulate Matter

Pollutant	Averaging Period	Criterion [d a]
Particulate matter < 10 µm (PM_{10})	24 hour	[a] 150 µg/m^3
Particulate matter < 10 µm (PM_{10})	24 hour	[b] 50 µg/m^3

Table 3.6 Long term Land Acquisition Criteria for Deposited Dust

Pollutant	Average Period	Maximum increase in deposited dust level	Maximum total deposited dust level [d] [a]
[c] Deposited Dust	Annual	2 g/m^2/month	[a] 4 g/m^2/month

Notes:

[a] *Total impact (i.e. incremental increase in concentrations due to the project plus background concentrations due to all other sources);*

[b] *Incremental impact (i.e. incremental increase in concentrations due to the project on its own);*

[c] *Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method*

[d] *Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Director-General.*

Predicted dust levels were assessed in the 2006 Environmental Assessment which also modelled dust emissions from the adjacent Limestone Mine. The predicted dust levels showed compliance with the criteria provided in the Project Approval at all residences not owned by Boral.

3.3.2 Air Quality Monitoring Program

Peppertree Quarry has implemented an air quality monitoring program to sample air quality within the vicinity of the quarry operations. The program includes monitoring of coarse dust, particulate matter <10 microns (PM10) and Total Suspended Particulates (TSP) at nominated locations on neighbouring properties.

Management of dust levels during construction was considered a priority to ensure that neighbours were not affected by dust which may have been caused during the establishment of the quarry. As stipulated by Schedule 3 Condition 20 Boral has prepared and implemented an Air Quality Management Plan.

High volume air sampling, for Particulate Matter less than 10 microns (PM10) and Total Suspended Particulates (TSP) is undertaken over a 24 hour period every 6 days. The monitors are located at 683 Marulan South Road. The details of the operation and location of the monitors is available in the Air Quality Management Plan.

The standard operational procedure for the monitors requires calibration on a 2 monthly period for the key parameter of flow. Other parameters such as the time meter and the program of the clock are required on an annual basis. Calibration of the monitor is undertaken by Thomson Environmental Services every 2 months.

Dust deposition gauges measure the rate at which dust settles onto a surface. To provide an indication of dust deposited in the environment, each month, three dust deposition gauges are operated in the local area. Details of the gauges, their operation and location are available in the Air Quality Management Plan. Monitoring is undertaken on over a 30 day period plus or minus 2 days as per the Australian standard.

3.3.3 Dust Monitoring Results

Deposited Dust

The Peppertree Dust Deposition Gauge 1 is an onsite monitoring point located near to the processing plant and the rail line. It provides guidance on the operations so that the necessary control can be implemented to minimise dust impacts off site. Site 2 is located at 683 Marulan South Road while site 3 is located at 432 Long Point Road Tallong. These two monitoring locations are for compliance with the Development Consent. Results from monitoring are shown in Table 3.7 and in figures 4 to 6. It can be seen that concentrations for sites 1 and 3 have increased slightly over the previous reporting period, while the concentration for site 2 has decreased slightly. The annual average concentration for sites 2 and 3 remain below the background levels reported in the EA for the nearest sensitive receptors.

The annual average concentration for Site 1 is just in exceedance of the annual average criteria as shown in Figure 4. This was as a result of high readings in February and March 2014. Soluble solids were also very high, possibly indicating a source not from the quarry operations, as winds were generally not in the direction from the quarry. The annual averages for sites 2 and 3 were below the annual average criteria as shown in Figures 5 and 6.

Table 3.7 Annual Average Deposited Dust Concentration – Insoluble Solids (g/m²/month)

	2012	2013	2014	Background Levels in EA
Site 1	6.78	4.25	4.47	3
Site 2	1.92	2.21	1.84	3
Site 3	2.29	2.78	2.84	3

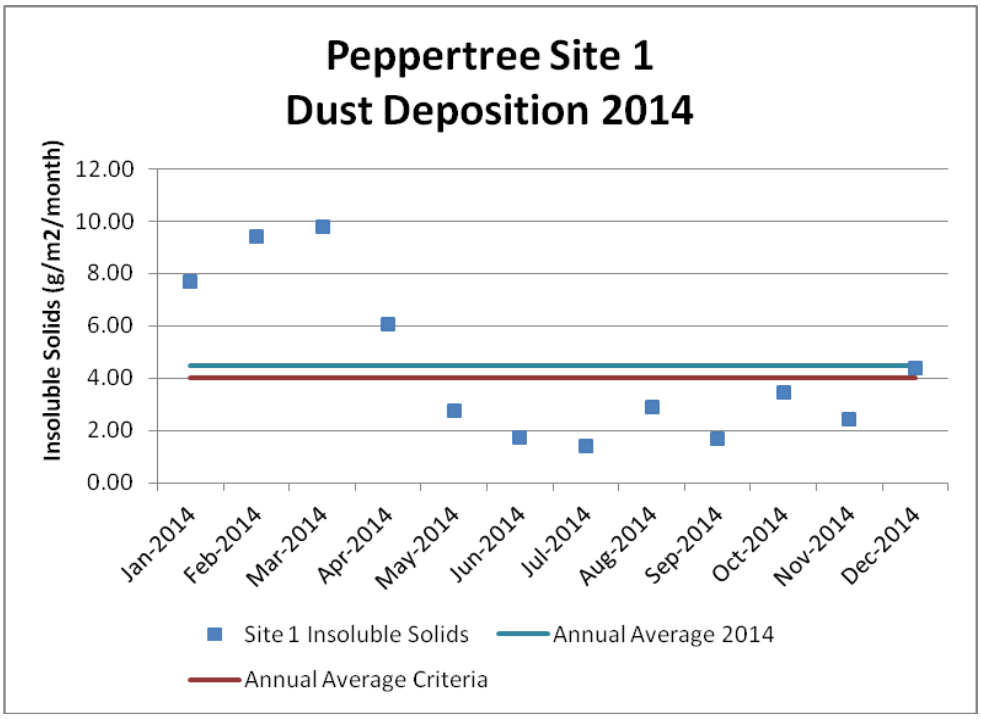

Figure 4 Deposited Dust: Site 1

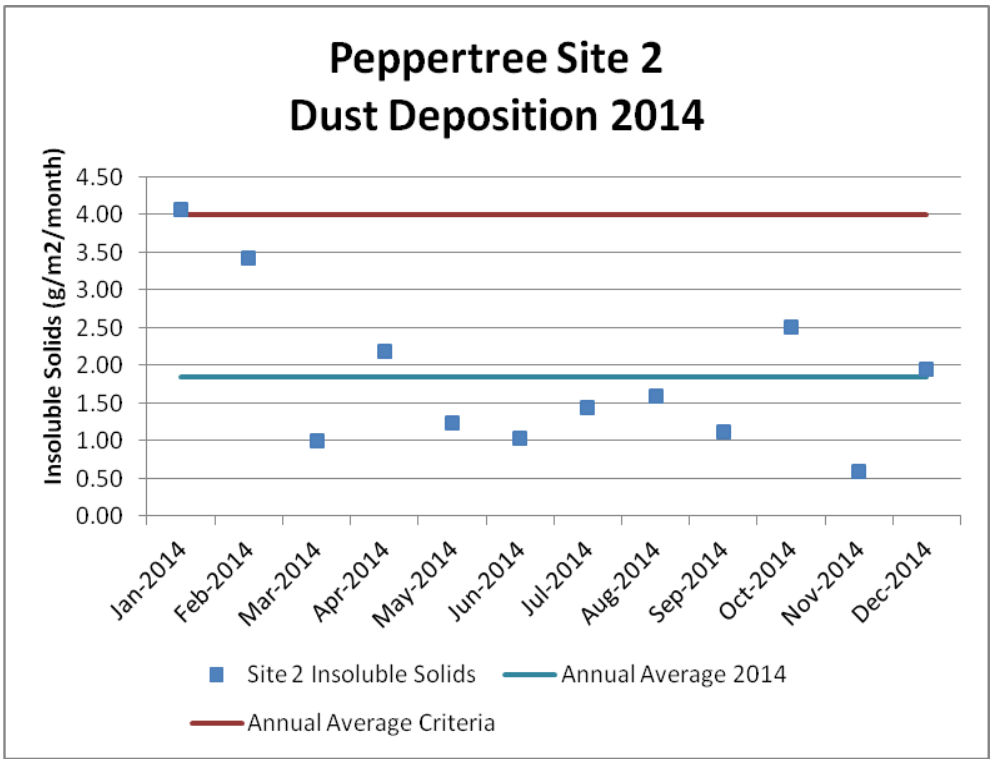

Figure 5 Deposited Dust: Site 2

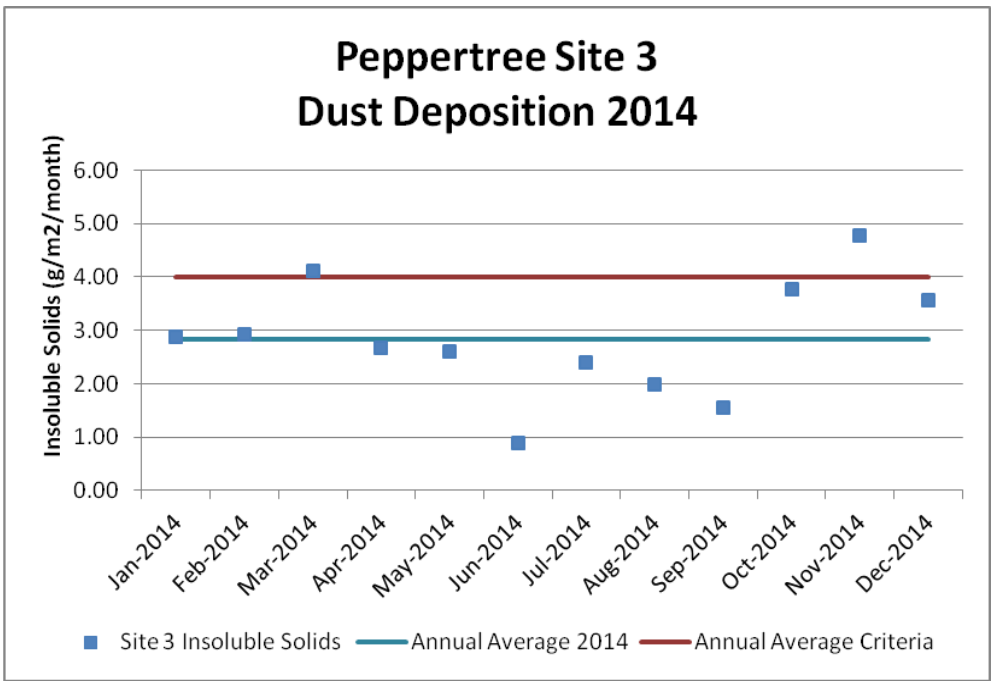

Figure 6 Deposited Dust: Site 3

Ambient Air Quality Monitoring

Results from the PM_{10} and TSP monitoring are shown in Table 3.8 and graphically in Figures 7 and 8.

Table 3.8 Annual Average PM10 and TSP (ug/m^3)

	2012	2013	2014	Background Levels in EA
TSP	33.34	26.5	38.55	25
PM10	16.46	13.32	17.89	16

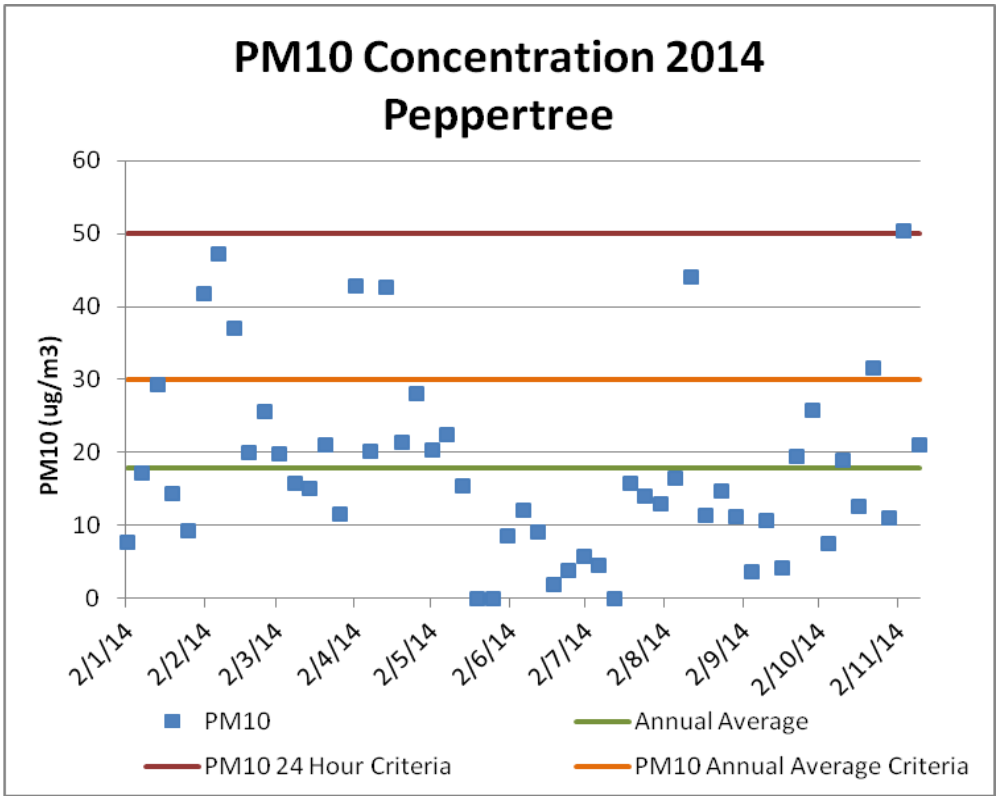

Figure 7 PM10 Concentration

Figure 7 shows that all PM10 24 hour average results were below the 24 hour criteria of 50 ug/m^3 during the reporting period with the exception of the result for 4th November which recorded a result off 50.46 ug/m^3. The annual average was 17.89 ug/m^3 which is well below the annual average criteria of 30ug/m^3, but a slightly higher annual average than the previous reporting period as can be seen in Table 3.8. This also shows a slight increase in PM10 concentration compared to the background levels calculated in the EA.

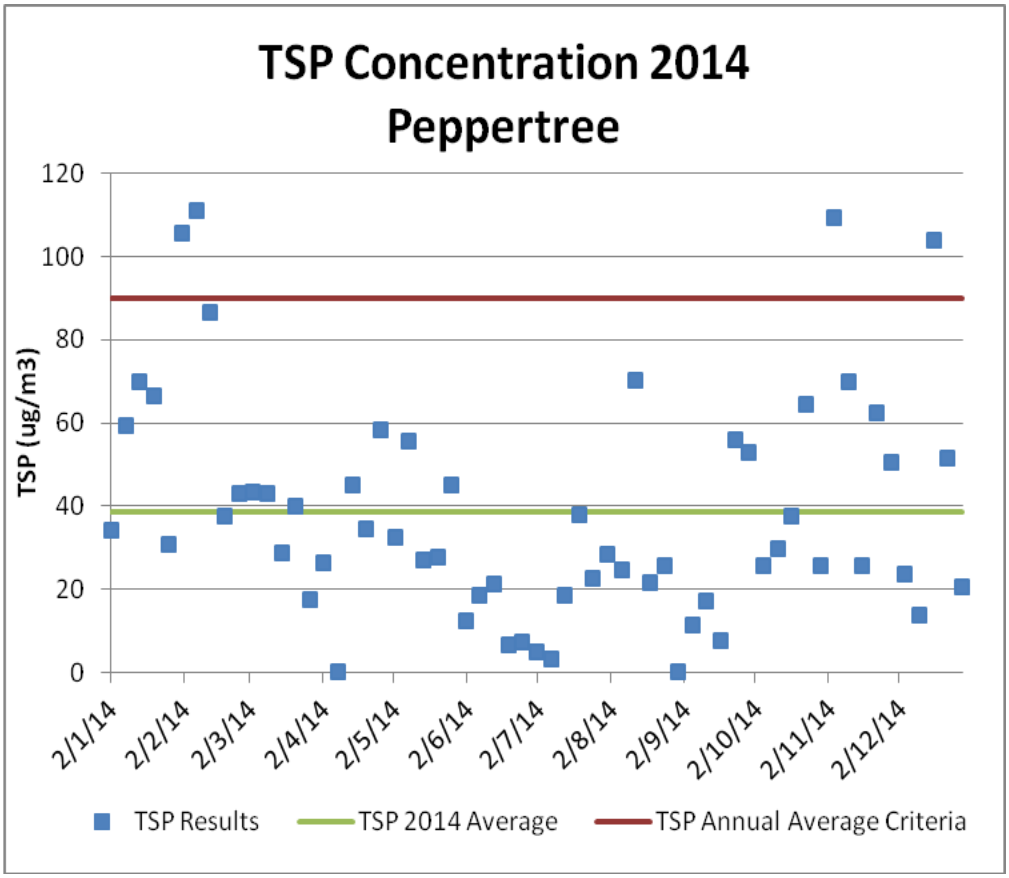

Figure 8 TSP Concentration

Dust levels have increased for both TSP and PM10 compared to 2013. Although there has been a slight increase in TSP compared to the previous reporting period and the background levels calculated in the EA, the average concentrations are still well below the annual criteria of 90 ug/m^3.

3.4 Noise and Blasting

The construction phase of the Peppertree Quarry development has now ceased and the ongoing operation is now controlled by a Noise and Blasting Management Plan (NBMP). The NBMP was prepared in accordance with the requirements of Condition 10, Schedule 3 of the Project Approval.

In 2014, 2 sensitive receivers were removed from the EPL and approval, as Boral had previously purchased the properties. These are receiver locations 1 and 4.

Quarterly monitoring continues to be undertaken at the remaining 4 sensitive receivers with spot monitoring occurring at the previous 2 sites.

A total of 4 Noise Audits were conducted during the reporting period, which are attached as Appendix D. These were undertaken in January, April, July and October.

Specific noise management initiatives include:

- Combination of predictive meteorological forecasting and noise monitoring data to guide the day to day planning of quarrying operations.
- Identification of temporary or infrequent noise-generating activities and/or sources and consider mitigation if required.
- Presentation of applicable noise criteria to contractors via tool box instructions.
- Ensuring all covers are in place and closed at all times when fixed and mobile plant is in operation.
- 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.
- Brief contractors / employees on the noise operational requirements to minimise noise via and regular inspection and maintenance of equipment to ensure optimum working order.
- Keep truck drivers informed of designated vehicle routes, parking locations, acceptable delivery hours or other relevant practices (for example, minimising the use of engine brakes).
- Diesel locomotives are split on the trains ie one on either end rather paired together.
- Enclosed processing operations.
- Noise cladding on the major crushing building.
- The Quarry operates within the working hours stipulated in Schedule 3 Condition 11..
- Plant and equipment is regularly inspected both in terms of noise management and as required by Schedule 2, Condition 11 to ensure proper maintenance and operation. Any defects are to be remedied immediately and equipment involved in incidents to be processed according to the WH&S Incident reporting protocols.

Weather conditions have the potential to increase noise levels at the residential receptors in the vicinity of the quarry. Routine monitoring of meteorological conditions is conducted, through the Bureau of Meteorology as well as reference to the on-site meteorological station.

As required by Condition 3 of Schedule 6, Peppertree takes all reasonable and feasible measures to ensure that the noise generated by the project combined with the noise generated by other extractive industries such as the neighbouring Marulan South Limestone Mine does not exceed the following amenity criteria on any privately owned land, to the satisfaction of the Department of Planning and Environment:

- LAeq(11 hour) 50 dB(A) during the day:
- LAeq(4 hour) 45 dB in the evening: and
- LAeq(9 hour) 40 dB during the night.

3.4.1 Noise and Blasting Assessment Criteria and Predictions

The criteria established in Conditions 4 and 5, Schedule 3 are provided in the following tables.

Table 3.9 Operational Noise Impact Assessment Criteria

Receiver Location	Description	Noise Impact Assessment Criteria, dB(A)		
		Daytime 7:00am to 7:00pm	Evening and Night 7:00pm to 7:00am	
		LAeq, 15min	LAeq, 15min	LA1, 1min
2	Ordasi	39	35	45
5	Cooper	35	35	45
6	Bartolo	35	35	45
16	Pace	41	35	45
Any other noise sensitive location		35	35	45

1. the identified 'Daytime' noise criteria apply throughout the period of the site's Day Shift (i.e. 7.00am to 7.00pm) on all days, despite the general definitions of 'Evening' and 'Night time' otherwise applying to the approval. The identified 'Evening' and 'Night time' criteria apply only during the period of the site's Night Shift (i.e. 7.00pm to 7.00am); and
2. noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW INP.

The Receiver Location numbers refers to the original identification scheme provided in the EA and subsequent modifications.

Table 3.10 Land Acquisition Noise Assessment Criteria

Receiver Location	Description	Land Acquisition Criteria, dB(A) LAeq, 15min	
		Day 7:00am to 7:00pm	Evening/ Night 7:00pm to 7:00am
2	Ordasi	44	44
5	Cooper	40	40
6	Bartolo	40	40
16	Pace	44	44

1. refer notes presented for *Table 2.1*.

Table 3.11 Airblast Overpressure Criteria

Airblast Overpressure Level (dB(Lin Peak))	Allowable Exceedance
115	5 % of the total number of blasts over a period of 12 months
120	0%

Table 3.12 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%

3.4.2 Noise and Blasting Monitoring Program

Noise measurements are conducted at four locations to quantify any noise impacts associated with the quarry operations. Both operator-attended measurements and unattended continuous noise monitoring is undertaken to quantify overall ambient noise levels resulting from quarry operations as well as other industrial noise sources in the area. Details of the equipment and methodology are detailed in the Noise and Blast Management Plan. Monitoring is undertaken by independent consultants on a quarterly basis.

Blast monitoring is undertaken at four locations, however remote online monitors have been installed. Data for each blast is now posted on line through a protected website.

3.4.3 Noise and Blasting Monitoring Results

During the reporting period, noise monitoring at each nominated noise receptor was undertaken. The monitoring included static noise loggers and attended noise monitoring in January 2014, April 2014, July 2014 and October 2014.

Each survey found that the operation complied with the operational site impact assessment criteria at all receiver locations. In most cases the predicted site noise level was significantly below the assessment criteria at each receiver location. The results showed that the site noise contributions are generally below 25 dB(A) and do not extend to influence any other know community receptors. Blast monitoring is undertaken at four locations and recorded in Tables 3.13 and 3.14. All zero records are no trigger.

Table 3.13 – Airblast Overpressure Level (dB(Lin Peak))

Blast Date	Northwest Boundary	Northeast Boundary	683 Marulan South Road	Pace	Criteria 1 (dbL)	Criteria 2 (dbL)
22/1/14	112.8	98	0	105.9	115	120
14/2/14	100	108.1	0	105.9	115	120
22/5/14	0	104.2	0	0	115	120
13/6/14	108.4	0	0	0	115	120
2/7/14	102.8	102.8	0	0	115	120
4/7/14	103.5	115.7	0	0	115	120
30/7/14	109.2	0	0	0	115	120
7/8/14	104.9	101.9	0	0	115	120
12/8/14	104.9	109.5	0	0	115	120
20/8/14	0	0	0	0	115	120
3/9/14	105.7	0	0	107.3	115	120
17/9/14	107.3	0	0	100.2	115	120
29/9/14	103.7	0	0	101.5	115	120
3/10/14	107	0	0	105	115	120
21/10/14	0	0	0	0	115	120

Table 3.13 – Airblast Overpressure Level (dB(Lin Peak))

Blast Date	Northwest Boundary	Northeast Boundary	683 Marulan South Road	Pace	Criteria 1 (dbL)	Criteria 2 (dbL)
29/10/14	0	0	0	104.2	115	120
7/11/14	0	0	0	0	115	120
13/11/14	0	0	0	0	115	120
21/11/14	0	0	0	0	115	120
26/11/14	0	0	0	0	115	120
3/12/14	107.3	0	0	108.2	115	120
4/12/14	0	0	0	99.8	115	120
11/12/14	108.7	0	0	111.1	115	120
15/12/14	105.5	0	0	102.5	115	120

Table 3.14 – Vibration - Peak Particle Velocity (mm/s)

Blast Date	Northwest Boundary	Northeast Boundary	683 Marulan South Road	Pace	Criteria 1 (dbL)	Criteria 2 (dbL)
22/1/14	1.14	0.62	0	0.74	5	10
14/2/14	1.6	0.64	0	0.74	5	10
22/5/14	0	0.73	0	0	5	10
13/6/14	0.976	0	0	0	5	10
2/7/14	0.582	0.586	0	0	5	10
4/7/14	1.67	0.813	0	0	5	10
30/7/14	1.2	0	0	0	5	10
7/8/14	1.19	1.03	0	0	5	10
12/8/14	1.58	0.823	0	0	5	10
20/8/14	0	0	0	0	5	10
3/9/14	1.4	0	0	1.55	5	10
17/9/14	1.25	0	0	1.8	5	10
29/9/14	1	0	0	1.4	5	10
3/10/14	1.15	0	0	1.45	5	10
21/10/14	0	0	0	0	5	10
29/10/14	0	0	0	1.65	5	10
7/11/14	0	0	0	0	5	10
13/11/14	0	0	0	0	5	10
21/11/14	0	0	0	0	5	10
26/11/14	0	0	0	0	5	10
3/12/14	2	0	0	2.05	5	10
4/12/14	0	0	0	1.45	5	10
11/12/14	1.2	0	0	1.35	5	10
15/12/14	1.25	0	0	1.95	5	10

There were no exceedances of the criteria outlined in Tables 3.13 and 3.14.

3.5 Surface Water Management

Peppertree Quarry has been developed with a sustainable water management system, with the operations aiming to be 100% self sufficient in water. The water management system has been developed based upon capturing stormwater run-off for use in the quarry processes, dust suppression and environmental controls.

The system has been based around obtaining the sites water supply from the construction of the Dam No. 1 located on Tangarang Creek. The water supply dam captures water

prior to being re-used on the site or released to Tangarang Creek catchment as environmental flows.

A site water balance was prepared as part of the Environmental Assessment and the Water Management Plan to define the size of the dam and needed supplies, as per Schedule 3, Condition 27.

Runoff from undisturbed and rehabilitated areas outside of the noise bund is diverted to sediment dams located around the boundary of the operations. These ponds prevent sediment from leaving the site.

All other water within the current quarry footprint is directed to a series of sediment dams located within the pit and around the site to prevent sediment laden or contaminated runoff leaving the site. Sediment traps and settling ponds form part of the site water management system which improves water quality at various points along both clean and dirty water drainage networks.

Treated water from site sediment dams is primarily used directly onsite. Excess water is drained or pumped to an internal storage dam before being discharged back into Dam No. 1.

There is no potable water supply on site so office needs are met with the water being transported to the site as required. Sewage treatment for the offices and amenities comprise package treatment unit with minimal demand for top-up water. The treated effluent is pumped to an absorption trench located to the south of the processing plant.

3.5.1 Water Quality Assessment Criteria and Predictions

Conditions 24 to 29 of Project Approval relate to water management and quality. Discharge of water from the quarry operations is limited to overflows via Dam No. 1 during large rainfall events. At this time, water has entered the Dam from approximately 753 ha of catchment upstream of the site. For this reason there are no limit conditions specified on the Environment Protection Authority Licence, however the overall criteria is that the operation must comply with Section 120 of the Protection of the Environment Operations Act 1997, meaning that operation should not pollute waters.

The 2006 Environmental Assessment and subsequent Peppertree Water Management Plan specified the design of the water management system. As such the 2006 Environmental Assessment predicted that with the implementation of the proposed water management system, including installation of the required pollution control storages and erosion and sedimentation controls, that the operation would protect offsite waterways by not discharging contaminated water.

Condition 24, Schedule 3 of the Project Approval also specifies that environmental flows to Tangarang Creek, from Dam No.1, should be equivalent to 10% of the average daily flows.

3.5.2 Tangarang Creek Environmental Flow

The Main Dam No 1 has three inflow creeks which provide water during large rainfall events only. The dam also receives storm water from the various pollution control ponds around the site. To assist in achieving the required environmental flow below the dam into Tangarang Creek, the dam was designed with a "chimney" drainage blanket which provides both stability within the wall as well as a continual flow downstream. A monitoring system has been established which estimates inflow and monitors outflow of the dam.

The results exceeded expectations as the downstream section of Tangarang Creek now has a more consistent and natural flow. The work also included rehabilitation of the creek banks.

Plate 7 - Water flow Measurement in Tangarang Creek

In order to confirm compliance with the Project Approval, an automatic flow monitor was installed downstream of the dam as shown in the photo above. This data is then compared with the water level in the dam.

Following table outlines the flow being discharged from the dam. Some data was not available for the several months at the end of the year. This is as a result of vegetation build up in the creek below causing ponding as well as leakage around the V notch weir.

Table 3.15 – Daily Dam Discharge to Tangarang Creek (ML/Day)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.04	0.04	0.11	0.03	0.05	0.05	ND	ND	ND	ND	ND	0.15
2	0.03	0.04	0.04	0.03	0.06	0.03	ND	ND	ND	ND	ND	ND
3	0.04	0.04	0.03	0.03	0.07	0.01	ND	ND	ND	ND	ND	0.15
4	0.03	0.02	0.03	0.04	0.06	0.01	ND	ND	ND	ND	ND	ND
5	0.02	0.03	0.03	0.03	0.06	ND*	ND	ND	ND	ND	ND	0.32
6	0.02	0.04	0.03	0.03	0.05	ND	ND	ND	ND	ND	ND	ND
7	0.03	0.04	0.03	0.03	0.05	ND	ND	ND	ND	ND	ND	ND
8	0.02	0.04	0.03	0.03	0.04	ND	ND	ND	ND	ND	ND	ND

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
9	0.02	0.03	0.03	0.03	0.05	ND	ND	ND	ND	ND	ND	1.58
10	0.03	0.03	0.03	0.05	0.05	ND	ND	ND	ND	ND	ND	1.25
11	0.03	0.04	0.03	0.09	0.05	ND	ND	ND	ND	ND	ND	1.2
12	0.02	0.04	0.03	0.03	0.04	ND	ND	ND	ND	ND	ND	ND
13	0.02	0.05	0.03	0.03	0.04	ND	ND	ND	ND	ND	ND	ND
14	0.03	0.05	0.03	0.03	0.05	ND	ND	ND	ND	ND	ND	1.32
15	0.03	0.04	0.03	0.03	0.05	ND	ND	ND	ND	ND	ND	0.47
16	0.02	0.18	0.03	0.03	0.05	ND	ND	ND	ND	ND	ND	0.1
17	0.03	0.03	0.03	0.03	0.05	ND	ND	ND	ND	ND	ND	0.05
18	0.04	0.02	0.02	0.03	0.05	ND	ND	ND	ND	ND	ND	0.03
19	0.05	0.1	0.03	0.04	0.05	ND	ND	ND	ND	ND	ND	0.03
20	0.04	0.03	0.04	0.04	0.06	ND	ND	ND	ND	ND	ND	0.03
21	0.04	0.04	0.04	0.04	0.06	ND	ND	ND	ND	ND	ND	0.03
22	0.04	0.04	0.03	0.04	0.06	ND	ND	ND	ND	ND	ND	0.03
23	0.04	0.04	0.03	0.04	0.05	ND	ND	ND	ND	ND	ND	ND
24	0.06	0.04	0.24	0.04	0.04	ND	ND	ND	ND	ND	ND	ND
25	0.05	0.03	0.22	0.04	0.05	ND	ND	ND	ND	ND	ND	ND
26	0.07	0.04	0.08	0.04	0.03	ND	0.02	ND	ND	ND	ND	ND
27	0.08	0.04	0.05	0.04	0.06	ND	0.02	ND	ND	ND	ND	ND
28	0.08	0.04	0.04	0.05	0.03	ND	0.02	ND	ND	ND	0.09	ND
29	0.06	NA	0.03	0.04	0.03	ND	ND	ND	ND	ND	0.08	1.05
30	0.06	NA	0.02	0.05	0.03	ND	ND	ND	ND	ND	0.33	0.6
31	0.04	NA	0.03	NA	0.03	NA	ND	ND	ND	ND	NA	0.4

*ND – no data

3.5.3 Surface Water Quality

Surface water quality monitoring is undertaken quarterly from Tangarang Creek, the Dam, culverts 1 to 3, and any overflow from sediment ponds T, U1, V1, V, W, W1, W2, X and K.

As the sediment dams were empty prior to the storms there were no over flows from the sediment dams during the reporting period. The results from monitoring Tangarang Creek and the Dam are shown in Table 3.16. At the time of the quarterly monitoring for March, June and September there were no flows into the dam from above the site therefore there are no results for the rail culverts upstream of the dam. Sampling in December followed a heavy rain event with water entering the dam from the above catchment and a sample from U1 was possible.

Table 3.16 Peppertree Surface Water Quality 2014

Parameter	Tangarang Ck				Dam				U1
	5/3/14	26/6/14	1/10/14	18/12/14	5/3/14	26/6/14	1/10/14	18/12/14	18/12/14
pH	8	8.2	8.2	8.26	8	8.2	8	7.87	7.85
Total Suspended solids (mg/l)	<5	<5	<5	<5	9	10	<5	<5	<5
Total Dissolved solids (mg/l)	501	432	408	3	295	355	225	190	186
Ammonia -N (mg/l)	<0.01	<0.01	0.04	0.08	0.22	0.07	0.11	0.18	0.04
Nitrate-N (mg/l)	0.2	0.7	0.15	0.1	0.66	2.84	1.73	0.74	<0.01
Nitrite-N (mg/l)	<0.01	<0.01	<0.01	<0.01	0.08	0.04	0.11	<0.01	0.08
Sulphate (mg/l)	8	10	7	3	4	14	6	<1	<5
Chloride (mg/l)	131	131	131	94	72	133	60	45	15

Parameter	Tangarang Ck				Dam				U1
	5/3/14	26/6/14	1/10/14	18/12/14	5/3/14	26/6/14	1/10/14	18/12/14	18/12/14
Turbidity (NTU)	1.2	1	1	1.9	2.2	4	4	4.8	7.5
Calcium (mg/l)	50	48	48	46	33	44	44	16	14
Potassium (mg/l)	2	2	2	4	6	6	6	7	14
Magnesium (mg/l)	38	37	37	31	15	22	22	9	4
Sodium (mg/l)	69	72	72	58	37	60	60	24	13
Total phosphorus (mg/l)	<0.01	<0.01	0.02	0.04	0.03	0.02	0.12	0.12	0.26
Hardness (CaCo3) (mg/l)	240		268	200	113		100	66	65
TKN (mg/l)	0.3	0.2	0.4	0.5	1.2	1	1.6	1.2	1.2
Faecal Coliform (cfu/100ml)	16		86	20	44		48	2300	76
TPH C10-C14 (ug/l)	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28 (ug/l)	<100	<100	<100	<100	<100	<100	<100	<100	<100
TPH C29-C36 (ug/l)	<50	<50	<50	<50	<50	<50	<50	<50	<50
naphthalene	<1	<1	<1	<1	<1	<1	<1	<1	<1
Acenaphthylene	<1	<1	<1	<1	<1	<1	<1	<1	<1
Acenaphthere	<1	<1	<1	<1	<1	<1	<1	<1	<1
Flourene	<1	<1	<1	<1	<1	<1	<1	<1	<1
Phenanthrene	<1	<1	<1	<1	<1	<1	<1	<1	<1
Anthracence	<1	<1	<1	<1	<1	<1	<1	<1	<1
Fluoranthene	<1	<1	<1	<1	<1	<1	<1	<1	<1
Pyrene	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzo(a)anthracene	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chrysene	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzo(b+k)fluoranthene	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzo(a)pyrene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-cd)pyrene	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibenzo(a,h)anthracene	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzo(g,h,i)perylene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

There is currently insufficient data to undertake an ANZECC assessment to determine site specific trigger values for receiving waters. As the monitoring database increases over the coming reporting periods site specific trigger values may be developed.

3.6 Erosion and Sediment Management

A key environmental risk identified at the commencement of the project was the management of erosion and sedimentation impacts.

In order to protect Dam 1, Tangarang Creek and further downstream Barbers Creek and the Shoalhaven River, from sediment and erosion impacts, Peppertree operates in accordance with a Water Management Plan which includes erosion and sedimentation controls that were implemented during the construction phase of the project. Specifically, the Water Management Plan includes:

- Implementation of the requirements set out in the publication "Managing Urban Stormwater: Soils and Construction Volume 1, 4th Edition, 2004 (Landcom, 2004)", referred to as the *'Blue Book'* and Volume 2E Mines and Quarries (DECC, 2008);

- detailing practices that have potential to cause erosion and generate sediment and what control measures will be adopted to minimise the impact of these practices; and

- detailing the location function and capacity of erosion and sediment control structures and how they will be maintained.

Sediment controls are inspected on a regular basis to ensure they are adequate to manage runoff in the event of large rainfall. During 2014, new sediment controls were installed to the east of the overburden area. This included an extension of the sediment dam and increased drainage channel. This was to ensure any runoff from the overburden would be captured.

To ensure the sediment pond would be empty when required, a pipeline was placed under the overburden which allows water to be pumped back into the quarry for management.

3.7 Groundwater

The groundwater monitoring program involves the monitoring of water levels and quality of various locations up and down gradient of the site. Monitoring will be required on a quarterly basis at 10 sites. Details of the ground water monitoring locations and methodology is contained in the Water Management Plan.

No ground water monitoring has been undertaken to date as it is planned to install the bores following construction so that they are not damaged. Background samples were undertaken prior to the commencement of the construction of the quarry. These were reported as part of the approval application.

3.8 Waste Management

During the reporting period, the waste produced from site consisted of normal domestic garbage and sewage from the offices and contractors compound. These wastes were managed by external contractors during the construction program. Towards the end of the reporting period, the packaged sewage treatment plant was installed for the offices and amenities buildings and the contractor's compound was decommissioned.

Recyclables such as paper, glass, metals and oils continues to be managed by an external contractor. These materials are stored in separate bins or scrap metal yards for disposal as required.

Waste is monitored via invoicing and docketing systems as stipulated in Condition 41 Schedule 3, and managed in accordance with Condition 42 which requires the classification, assessment and management of waste products according to the OEH's

Environmental Guidelines; Assessment, classification and Management of Liquid and non-liquid Waste.

During stripping, asbestos was identified in the footprint of the three houses which were part of the old Marulan South village. The area was identified and an asbestos removal company employed to collect and dispose of the materials. Clearance certificates were provided once the area was finalised and stripping was able to continue. Monitoring of the site occurred to ensure no further asbestos materials were identified.

3.9 Hazardous and Explosives Materials Management

Boral has a MSDS system in place via Chem Alert. Only limited chemicals and dangerous goods are located onsite. Minor quantities of diesel and oils were stored onsite and mobile refuelling systems were used by the contractors involved with processing and extraction during the reporting period.

However during 2014, Pacific National commissioned a 100 000 litre self-contained refuelling system for the locomotives attending the site. This has required the licensing of the facility with Work Cover. In line with the safety requirements, this paperwork is available to Emergency services at the front gate of the quarry site.

A Hazardous and Dangerous Goods Register is in place which identifies each chemical kept onsite. The register is physically kept in the "contacts" cupboard within the site office. Service workshops and sheds are appropriately located and adequately fenced to prevent unauthorised access.

Any dangerous goods or chemicals are handled and transported in accordance with the AS1940 and AS25956 and the Dangerous Goods Code. This fulfils the obligation stipulated at Schedule 3 Condition 43.

3.10 Visual Management and Lighting

Condition 37 of the Project Approval requires minimisation of all visual impacts. A Visual Impact Assessment formed part of the Environmental Assessment Modification issued in May 2011. Findings noted that impacts are minimised due to the location's topography.

Given the isolated nature of the site, visual impact at ground level is minimal. Some overburden placement is visible to trucks entering and exiting the Limestone Plant. Views of the quarry are extremely limited from public vantage points and neighbouring properties.

As rehabilitation progresses, particular of the outer bunding and batter slopes, visual access to the quarry will further reduce.

In accordance with Schedule 3, Condition 40, Boral do not provide for or allow advertising signage on any exterior property boundaries facing public roads with the exception of business identification, traffic management, and environmental and safety signage.

3.11 Heritage Conservation

An Aboriginal Heritage Management Plan was developed with the aim to identify, protect, conserve, present and communicate the Aboriginal heritage values associated with the land, on which Boral's Peppertree quarry will be excavated. The management plan satisfies the requirements of Condition 32 of the Project Approval.

The Aboriginal Heritage Management Plan (AHMP) was completed in January 2011 and was reviewed in October 2013.

During the reporting period and prior, members of the Aboriginal Management committee (AMC) have undertaken topsoil monitoring across a large area of the site including salvaging of artefacts during topsoil spreading. A number of high density sites were identified adjacent to a water way. An archaeologist was employed to assist with the salvage to ensure appropriate methods and data was collected.

Figure 9 outlines areas salvaged during 2014. Over 50,000 artefacts have been collected as of the end of the reporting period.

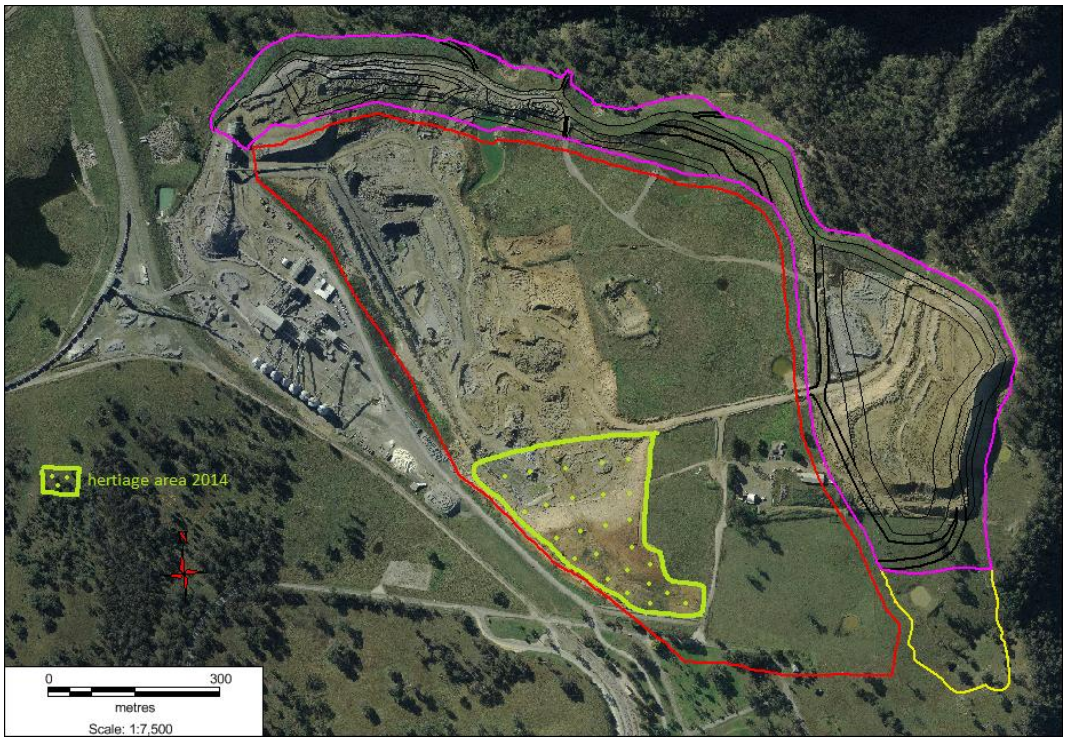

Figure 9 – Aboriginal Heritage Salvage Area 2014

3.12 Summary of Reportable Incidents

No reportable incidents occurred during the reporting period.

4. Community Relations

4.1 Community Engagement

Boral has actively engaged with the local community since the commencement of the 2006 Environmental Assessment for the project. The program has included:

- the establishment of a Community Consultation Committee;
- regular community newsletters;
- active participation in local events;
- arranging site inspections and one on one consultation;
- active engagement with key government and non-government organisations;
- maintenance of a environmental and community complaints register and actively managing and resolving community issues as they arise.

4.2 Community Consultative Committee

A Community Consultative Committee was established in 2011 in accordance with Condition 8 of Schedule 5 of the Project Approval. The committee comprises:

- Two representatives from Peppertree Quarry including the Environment and Community Adviser;
- One representative from Goulburn Malwaree Council (the Mayor); and
- Three Local Community Representatives

Independently chaired from JBA Planning, the role of the CCC is to offer Boral input from the community perspective on matters of environmental performance and community relations. Meetings include the review of environmental data and any feedback provided to the site from local community members. Issues of concern can be raised with the site by the CCC representatives.

Meeting during the reporting period were held on 10th July 2014 and 14th November 2014. The timing of the meetings are determined by the committee and are currently being undertaken at least a six monthly basis.

4.3 Community Newsletters

Community Newsletters are produced on a regular basis in order to inform local residents of progress with the project's construction and operation as well as detailing Boral's involvement in community events. These are distributed via the Focus on Marulan newsletter issued to the community of Marulan. The newsletter is also posted on the website. Six newsletters were produced in 2014. These are attached as Appendix C.

4.4 Blast Liaison

In accordance with Condition 15, landowners/occupiers of residences within 2 kilometres of the quarry pit are encouraged to register interest in order to be advised of any future blasts at the pit. During the reporting period, all residents were issued a formal letter notifying them of the process to register to be placed on a notification register. Three local residents have asked to be advised of blasting.

4.5 Community Events

Peppertree Quarry staff are actively engaged with community events in the Marulan and Goulburn areas.

In July 2012 a Stakeholder Engagement plan was developed. This plan outlines Boral's commitment to the community in which it operates in the Marulan South area.

Activities for the reporting period included:

- Tallong Apple Festival – key sponsor, May 2014;
- Marulan Kite Festival – key sponsor and organiser of a school's Design a Kite Competition, October 2014;
- Mayoral Charity Golf Day – sponsor and participant – November 2014
- secretary and convenor of the HASP – Heritage and Sustainable Parks Project community network
- Support and membership of the Marulan Chamber of Commerce;
- Goulburn Mulwaree Council – donation of HI Vis vests for two bike awareness programs – "Cycle safety for adults and kids with disabilities " (March) and the Community bike ride in Bike week (September)
- Towrang RFS – donation of concrete
- Marulan and district historical society – donation of concrete for the Archive Centre
- Goulburn PCYC – sponsorship of Mayor in Goal
- Outward Bound – Year 9 students Boral leadership program

4.6 Community Complaints

The quarry maintains a community complaints register that identifies actions required to resolve community issues. A 24 hour telephone complaints line has been established and advertised. The public have also been advised of this contact number via signage located at the site access point on Marulan South Road. The complaints register records the following details:

- Complainant name and contact details
- Nature of the complaint (noise, dust, traffic etc)
- Date of the complaint
- Specifics of the complaint
- Outcome of the investigation of the complaint

The complaints register is published on line but with names, addresses and other identifying remarks removed for privacy reasons. The current complaints register is provided in Table 4.1 below.

Table 4.1 Complaints Register

Date	Complaint received from	Nature of complaint	Outcome of investigation
No complaints have been received for January through to May 2014.			
13th June 2014	Public	Dust from train wagon	Application of water into the wagon was not operating correctly and insufficient water had been applied. System was modified and monitored.
28th June 2014	Public	Dust from train wagon	Material had been loaded above the wagon as a result of issues with automatic loading operations.
No complaints received for the months of July to November of 2014			
18 November 2014	Anonymous to EPA	Concern over dust while working in the quarry	Dust management reviewed and discussion held with staff as to any concerns
5 December 2014	Public	Noise coming from the quarry particularly late in the evening	Noise monitoring undertaken at premises during quarterly monitoring. No noise issues identified. Have asked to be contacted when issue arises so source and weather conditions can be identified

4.7 Access to Information

Boral has a number of websites for each corporate division. Peppertree Quarry has its own site at http://www.boral.com.au/Article/ACM_Marulan_Welcome.asp. The site contains all public information in relation to the quarry's approval and development including:

- About the Boral Peppertree Quarry and Sydney Aggregates Project;
- Planning and Approvals;
- Resource and Products;
- Operations;
- Work Health and Safety;
- Our Environment;
- Our Community (includes Latest News);
- Employment Opportunities at the Boral Peppertree Quarry; and
- Contact.

4.8 Independent Review

Conditions 2 to 5 of Schedule 4 of the Project Approval covers procedures available to the community should the impacts of the quarry be demonstrated to exceed the impact assessment criteria established for the quarry. These procedures involve the Department of Planning and Environment and potentially and independent reviewer to assess and verify the environmental performance of the quarry. The outcomes of this process could involve the Peppertree Quarry implementing additional environmental initiatives to control or mitigate the environmental impacts, or developing a negotiated agreement with the affected landholder, to the satisfaction of the Department of Planning and Environment. Ultimately, outright land acquisition may be required as described in the following section.

There were no requests or requirements for an Independent Review during the reporting period.

4.9 Land Acquisition

Conditions 6 to 9 of Schedule 4 outline the procedures for land acquisition should the impacts of the quarry be confirmed to exceed the acquisition criteria outlined in the Project Approval. The land acquisition process is initiated by a landholder following the review process outlined above. This process of land acquisition was not initiated or required to be initiated during the reporting period.

4.10 Independent Environmental Audit

As per Schedule 5, Condition 5, Boral will commission and pay the full cost of an independent audit of the Project within 3 years of the date of the commencement of construction, and every 5 years thereafter, unless the Director-General directs otherwise. This audit must:

- be conducted by a suitably qualified, experienced, and independent person(s) whose appointment has been approved by the Director-General;
- include consultation with the relevant agencies;
- assess the environmental performance of the project, and its effects on the surrounding environment;
- assess whether the project is complying with the relevant standards, performance measures and statutory requirements;
- review the adequacy of any strategy/plan/program required under this approval; and, if necessary,
- recommend measures or actions to improve the environmental performance of the project, and/or any strategy/plan/program required under this approval.

An independent audit was not due to be undertaken during the reporting period.

5. Rehabilitation and Land Management

This section describes land management within the Peppertree Quarry area and includes land use objectives, landscaping operations, and a review of the rehabilitation activities.

5.1 Rehabilitation of Disturbed Land

Peppertree Quarry operates in accordance with a Landscape and Rehabilitation Plan prepared in accordance with Condition 33, Schedule 3 of the Project Approval. The key objectives of this plan are:

- Rehabilitation of disturbed areas (bunds / overburden emplacements);
- Management of identified habitat management areas and effective management of remnant vegetation on site; and
- Final rehabilitation and closure (Quarry Exit Strategy as defined in Schedule 3, Condition 47).

Activities required to be conducted as per the management plan have been detailed in tables attached as Appendix E of this report. These tables identify the status of the activities undertaken during the reporting period.

Rehabilitation activities during the reporting period was limited to the maintenance of the plantings undertaken at the end of 2013. Contractors provide two staff, two days per week to undertake the required maintenance.

To date, Peppertree has met its stated objectives and the requirements of the 2007 Environmental Assessment.

5.2 Weeds and Feral Animals

Since Peppertree is surrounded by a number of rural and farming properties, stock proof fencing has been employed to define boundaries and restrain cattle from venturing on the property.

External professional contractors have been commissioned to control noxious weeds and pests such as thistle, blackberry and serrated tussock as required. Work is reviewed on a monthly basis and managed accordingly.

5.3 Bushfire Management

Peppertree has engaged with the rural fire authorities and provided location details of the site in the event their services are required. Representatives of the Marulan Rural Fire Service have attended site previously to assess Bushfire risk and possible mitigation procedures. Recommendations provided by the RFS have been implemented and maintained.

5.4 Flora and Fauna Management

The Landscape and Rehabilitation Plan outlines the treatment and consideration of Fauna and Flora on the site. Two designated Habitat Management Areas have been created and fenced as required in Schedule 3, Condition 33A. These areas protect the identified Endangered Ecological Community and *Solanum celatum* habitats.

Compliance tables are contained in Appendix E.

6. Work Health and Safety

6.1 Safety Management

Boral operates within its Safety Management Plan to ensure the occupational health and safety of staff, contractors and visitors. Weekly monitoring, and where necessary reporting of incidents, hazards and observations, is reported on the Boral "Site Safe" system.

With the move to operations in 2014, a review of the 1 Boral SMS has been undertaken to ensure appropriate procedures and controls are in place. In acknowledgement of the focus on WH&S, Boral Peppertree Quarry was awarded the "best safety performance "for the use of the management system at the CCAA awards in October 2014

A number of audits were also conducted in 2014 by the Department of Trade and Investment. These included:

- Electrical systems and management in March;
- Mobile plant management and usage in November; and
- A high level review of the Management system in November.

In accordance with Schedule 3, Condition 44, members of the public are not permitted on site without first having undergone a visitors induction and provisioning with PPE safety gear. Members of the public are escorted by Boral WH&S Staff during visits and required to sign in and out.

6.2 Safety in Design (Schedule 3 Condition 2)

With the quarry in operation, change management reviews are now conducted when processes or procedures are being modified. Safety in design is applied through this process as necessary.

6.3 Emergency Management (Schedule 3, Condition 44)

As part of the Peppertree quarry EMS and Safety Management Plan and in compliance with Schedule 3, Condition 44, an Emergency Response procedure was prepared to address emergencies that occur on site. All site employees, contractors and visitors are educated on the emergency via induction and regular Toolbox Talks with contractors. Key emergency controllers have been trained in their specific role and emergency drills are carried out at least once per year

7. Activities Proposed Next 12 Months

7.1 Quarry Development

The coming 2015 reporting period will see production continuing to ramp up in line with market demand. The quarry extraction area will increase to the east with overburden removal continuing.

With the completion of the drop cut, the in-pit crusher will be relocated a further 15 metres into the pit. This will necessitate the construction of fixed conveyors in the pit to reach the quarried rock.

7.2 Production, Sales and Transport

Production is anticipated to reach in the order of 2 Million tonnes for the 2015 reporting period however this will be entirely dependent on market conditions and demand. Transport off site will continue to be via rail unless there are unexpected and significant interruptions on the rail network.

7.3 Environmental Management and Monitoring

Environmental monitoring will continue to be conducted in compliance with the Development Consent and the EPL. To ensure compliance the Quarry will continue to operate in accordance with the following Environmental Management Plans:

- Environmental Management Strategy;
- Aboriginal Heritage Management Plan;
- Air Quality Monitoring Plan;
- Landscape and Rehabilitation Management Plan;
- Noise and Blast Monitoring Program;
- Water Management Plan; and
- Environmental Monitoring Plan.

The Environmental Management Strategy for the Peppertree Quarry provides and overarching management system whereby the component management plans are continually reviewed and updated in light of environmental performance. The EMS commits the site, as with all Boral operations, to continual improvement in environmental performance, and in particular:

- efficient use of energy (including appropriate use of alternative fuels);
- conservation of water;
- minimisation and recycling of wastes;
- prevention of pollution; and
- effective use of virgin and recovered resources and supplemental materials.

Specific activities for the next 12 months are described in the following sections.

7.4 Air Quality

Air quality will continue to be monitored as described in Section 3.3.2. The data will be reviewed on a monthly basis to assess the adequacy of current dust management controls.

A detailed review of operations at the Train load out, Filler silo and STQ as to the success of the dust suppression systems is to be undertaken in the coming reporting period.

In addition management of airborne dust from trafficked and open areas is to be reviewed and management through either a new water cart or dust suppression products investigated.

7.5 Noise and Blasting

The quarterly noise audits will continue over the coming reporting period. As the results to date have demonstrated compliance, it is not anticipated that additional noise controls will be required. The current noise mitigation strategy is detailed in Section 3.4 will be reviewed as necessary in light of ongoing noise monitoring data.

7.6 Water Management

The current water monitoring program will continue however it is proposed to monitor water volumes more closely in order to remodel the Water Balance. The environmental flow monitoring system will continue to be developed to ensure reliable data.

Groundwater has yet to be intercepted in the quarry void however groundwater monitoring is anticipated to commence in the coming reporting period.
Erosion and sedimentation controls will continue to be constructed as required and all existing structures and pollution control ponds will be maintained. Ponds will be desilted as required to maintain the required live storage. Revegetation works will be inspected following heavy rain and continue to be maintained as necessary.

7.7 Meteorological Monitoring

The weather station installed at Peppertree will also continue to be maintained and meteorological events recorded in an effort to forecast weather events and minimise the impact of particularly flooding and high dust generating winds.

A review of the weather station will be commissioned in regards to its performance and calibration requirements.

An online forecasting system to be investigated to proactively predict rain and wind to allow management prior to the weather pattern occurring.

7.8 Waste Management

The management of wastes will continue through the use of external contractors, both for disposal and recycling. An emphasis on minimising wastes and maximising recycling will however continue. The monitoring of wastes will continue via the invoicing and docketing system as outlined in Section 3.8.

A review of waste generation and disposal is to be undertaken as "new" wastes from the operations are identified.

A procedure for the management of oily wastes is to be developed for the site including a "landfarm" to reduce the usage of "absorbent pillows" and the need to landfill.

7.9 Hazardous and Explosives Materials Management

The current system as outlined in Section 3.9 will continue over the next 12 months. This system forms part of the normal Boral procedures for managing hazardous materials. Explosives are not stored on site.

7.10 Visual Management and Lighting

As per Condition 37 of Schedule 3 of the Approval a visual assessment will be undertaken of the site to ensure compliance with Australian Standard No. 4282.

7.11 Heritage Conservation

Members of AMC will continue to inspect topsoil removal in sensitive areas and retrieve any artefacts. These will be redistributed in protected areas once excavation is complete. An Archaeologist will continue to be commissioned as necessary to assist in the recoding of the salvage. Tool box talks will also continue to ensure that contractors understand the significance of the site and its heritage to its indigenous owners.

7.12 Community Relations

As documented in Chapter 4, Boral has implemented a comprehensive community and stakeholder engagement process that conforms to the current Boral corporate plan. The forms of communication, as outlined in Section 4.1 will continue during the coming reporting period. It should be noted however that as the quarry development matures, the form of communication may vary in response to community needs.

7.12.1 Community Engagement

Formal consultation will continue with the community through the CCC and regular newsletters, reporting, stakeholder briefings and community based activities will continue through the next reporting period. Newsletters will be prepared and published on the

Peppertree Quarry Website, as well as released in the Focus on Marulan publication to update the local community on progress.

Participation in the Tallong Apple Festival and the Marulan Kite Festival will see Boral representatives operate a stall, sponsorship and give-aways to the local Community and provide information and education on the progress of Peppertree Quarry construction and operation.

The Peppertree Website will be reviewed and updated on a regular basis and interested members of the community pointed to the site as a valuable source of information.

7.12.2 Blast Liaison

Blast liaison will continue as currently established.

7.12.3 Community Consultative Committee

The Community Consultative Committee will continue to meet during 2015.

7.12.4 Community Complaints Management

The community complaints management system will be maintained during the coming reporting period.

7.12.5 Access to Information

Access to information as currently provided will be maintained

7.13 Rehabilitation and Land Management

As the quarry moves into production, rehabilitation activity will be confined to new areas of disturbance, final batters of the overburden emplacement and maintenance of the rehabilitated Habitat Management Area.

The principals of the rehabilitation program as outlined in Chapter 5 will remain but will be limited over time to just represent completed batters of the out of pit emplacement area. Previous rehabilitation however will be maintained and inspected in accordance with the management initiatives described in Tables 5.1 to 5.10.

An audit of fencing will be undertaken to ensure that preserved areas remain isolated from operations.

Weed management will be undertaken to control noxious plants emerging on the site and where necessary planting of natives will be implemented to prevent erosion and as a rehabilitation measure after any disturbance works..

Appendix A - EPA Licence

Environment Protection Licence

Licence - 13088

Licence Details	
Number:	13088
Anniversary Date:	23-July

Licensee

BORAL RESOURCES (NSW) PTY LTD

PO BOX 42

WENTWORTHVILLE NSW 2145

Premises

PEPPERTREE QUARRY

MARULAN SOUTH ROAD

MARULAN SOUTH NSW 2579

Scheduled Activity

Extractive Activities

Fee Based Activity	Scale
Land-based extractive activity	> 2000000 T extracted, processed or stored

Region

South East - Queanbeyan

11 Farrer Place
QUEANBEYAN NSW 2620

Phone: (02) 6229 7002

Fax: (02) 6229 7006

PO Box 622 QUEANBEYAN

NSW 2620

Environment Protection Licence

Licence - 13088

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Environment Protection Licence

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Environment Protection Licence

Licence - 13088

Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act); and
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

Environment Protection Licence

The EPA publication "A Guide to Licensing" contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

BORAL RESOURCES (NSW) PTY LTD
PO BOX 42
WENTWORTHVILLE NSW 2145

subject to the conditions which follow.

Environment Protection Licence

Licence - 13088

1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the carrying out of the scheduled development work listed below at the premises listed in A2:
The licensee is permitted to undertake pre-constrcution exploratory test pit activities as described in modification application 06_0074 MOD 1 relating to the extraction and despatch of up to 9,000 tonnes of extracted material..

A1.2 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Extractive Activities	Land-based extractive activity	> 2000000 T extracted, processed or stored

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
PEPPERTREE QUARRY
MARULAN SOUTH ROAD
MARULAN SOUTH
NSW 2579
LOT 2 DP 106569, LOT 4 DP 106569, LOT 5 DP 111641, LOT 5 DP 203290, LOT 1 DP 216767, LOT 2 DP 216767, LOT 3 DP 216767, LOT 4 DP 216767, LOT 5 DP 216767, LOT 6 DP 216767, LOT 7 DP 216767, LOT 8 DP 216767, LOT 9 DP 216767, LOT 1 DP 261615, LOT 2 DP 261615, LOT 3 DP 261615, LOT 4 DP 261615, LOT 5 DP 261615, LOT 6 DP 261615, LOT 1 DP 371167, LOT 1 DP 557562, LOT 2 DP 557562, LOT 11 DP 570616, LOT 12 DP 570616, LOT 21 DP 657523, LOT 95 DP 750029, LOT 109 DP 750029, LOT 143 DP 750029, LOT 22 DP 867667, LOT 23 DP 867667, LOT 24 DP 867667
AUTO CONSOL 14488213

A3 Information supplied to the EPA

A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:

a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

2 Discharges to Air and Water and Applications to Land

P1 Location of monitoring/discharge points and areas

P1.1 The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.

Air

EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1	Dust Monitoring- TSP		High Volume Air Sampler labelled 'HV1' on Figure 3.1 'Air Quality Equipment Locations' in 'Peppertree Quarry Air Quality Management Plan' dated 2 August 2012
2	Dust Monitoring- PM10		High Volume Air Sampler labelled 'HV2' on Figure 3.1 'Air Quality Equipment Locations' in 'Peppertree Quarry Air Quality Management Plan' dated 2 August 2012
3	Dust Monitoring		Dust Deposition Gauge labelled 'D1' on Figure 3.1 'Air Quality Equipment Locations' in 'Peppertree Quarry Air Quality Management Plan' dated 2 August 2012
4	Dust Monitoring		Dust Deposition Gauge labelled 'D2' on Figure 3.1 'Air Quality Equipment Locations' in 'Peppertree Quarry Air Quality Management Plan' dated 2 August 2012
5	Dust Monitoring		Dust Deposition Gauge labelled 'D3' on Figure 3.1 'Air Quality Equipment Locations' in 'Peppertree Quarry Air Quality Management Plan' dated 2 August 2012

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Noise limits

L2.1 Noise generated at the premises must not exceed the noise limits presented in the table below:

Residential Receiver	Day Shift	Night Shift	Night Shift	Night Shift
	Day	Evening	Night	Night
	LAeq(15 minute)	LAeq(15 minute)	LAeq(15 minute)	LA1(1 minute)
2	39	35	35	45
5	35	35	35	45
6	35	35	35	45
16	41	35	35	45
Any other noise sentivie location	35	35	35	45

Note: *For the purposes of the above table, the following definitions apply:*

- *Day - the period from 7.00am to 6.00pm Monday to Saturday; or 8.00am to 6.00pm on Sundays and public holidays.*
- *Evening - the period from 6.00pm to 10.00pm.*
- *Night - the remaining periods*

The identified "Day" noise criteria apply throughout the period of the site's Day Shift (ie 7.00am to 7.00pm) on all days, despite the general definitions of Evening and Night otherwise applying to the approval. The identified "Evening" and "Night" criteria apply only during the period of the site's Night Shift (ie 7.00pm to 7.00am).

L2.2 Noise from the site is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of the dwelling where the dwelling is more than 30 metres from the boundary, to determine compliance with the identified noise limits, except where specified below.

Noise from the project is to be measured at 1 metre from the dwelling facade to determine compliance with the $L_{A1(1\ minute)}$ noise level.

Where is can be demonstrated the direct measurement of noise from the project is impractical, alternative means of determining compliance may be acceptable (see Chapter 11 of the NSW Industrial Noise Policy).

The modification factors presented in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise level where applicable.

The identified noise emission limits apply under meteorological conditions of wind speed up to 3m/s at 10 metres above ground level, and temperature inversions.

L3 Blasting

L3.1 The licensee must ensure that the airblast overpressure level from blasting at the project does not exceed the criteria in the below table at any residence on privately owned land:

Airblast overpressure level (dB(Lin Peak))	Allowable exceedance
115	5% of the total number of blasts over a period of 12 months
120	0%

L3.2 The licensee must ensure that the ground vibration level from blasting at the project does not exceed the criteria in the below table at any residence or senstive receiver on privately owned land.

Peak particle velocity (mm/s)	Allowable exceedance
5	5% of the total number of blasts over a period of 12 months
10	0%

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.

5 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must

be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
a) in a legible form, or in a form that can readily be reduced to a legible form;
b) kept for at least 4 years after the monitoring or event to which they relate took place; and
c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.

M2 Requirement to monitor concentration of pollutants discharged

M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

M2.2 Air Monitoring Requirements

POINT 1

Pollutant	Units of measure	Frequency	Sampling Method
Total suspended particles	micrograms per cubic metre	Special Frequency 1	AS/NZS 3580.9.3:2003

POINT 2

Pollutant	Units of measure	Frequency	Sampling Method
PM10	micrograms per cubic metre	Special Frequency 1	AS/NZS 3580.9.6:2003

POINT 3,4,5

Pollutant	Units of measure	Frequency	Sampling Method
Particulates - Deposited Matter	grams per square metre per month	Monthly	Australian Standard 3580.10.1-2003

Note: For the purpose of the above table(s), Special Frequency 1 means the collection of samples over a 24 hour period, every 6 days.

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M3 Testing methods - concentration limits

M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:
a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or
b) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or
c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

Note: The *Protection of the Environment Operations (Clean Air) Regulation 2010* requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".

M4 Recording of pollution complaints

M4.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M4.2 The record must include details of the following:
a) the date and time of the complaint;
b) the method by which the complaint was made;
c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
d) the nature of the complaint;
e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
f) if no action was taken by the licensee, the reasons why no action was taken.

M4.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M4.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M5 Telephone complaints line

M5.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M5.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M5.3 The preceding two conditions do not apply until 3 months after:
a) the date of the issue of this licence or
b) if this licence is a replacement licence within the meaning of the Protection of the Environment

Operations (Savings and Transitional) Regulation 1998, the date on which a copy of the licence was served on the licensee under clause 10 of that regulation.

6 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:
a) a Statement of Compliance; and
b) a Monitoring and Complaints Summary.
At the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

R1.3 Where this licence is transferred from the licensee to a new licensee:
a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

R1.5 The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

R1.7 Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
a) the licence holder; or
b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

R1.8 A person who has been given written approval to certify a certificate of compliance under a licence issued under the Pollution Control Act 1970 is taken to be approved for the purpose of this condition until the date of first review of this licence.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R2 Notification of environmental harm

R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
a) where this licence applies to premises, an event has occurred at the premises; or
b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:
a) the cause, time and duration of the event;
b) the type, volume and concentration of every pollutant discharged as a result of the event;
c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

7 General Conditions

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G1 Copy of licence kept at the premises or plant

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

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Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

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flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environmen t Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder describe d at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 mo nths. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.

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TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non-putrescible), special waste or hazardous waste

Mr Julian Thompson

Environment Protection Authority

(By Delegation)

Date of this edition: 22-July-2009

End Notes

1 Licence varied by notice 1125628, issued on 22-Mar-2011, which came into effect on 22-Mar-2011.

2 Licence varied by notice 1516534 issued on 23-Sep-2013

Appendix B – Project Approval

Project Approval

Section 75J of the *Environmental Planning & Assessment Act 1979*

I, the Minister for Planning approve the project referred to in schedule 1, subject to the conditions set out in schedules 2 to 5.

The reason for these conditions is to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the on-going environmental management of the project.

Frank Sartor MP
Minister for Planning

Sydney 2007 File No. 9040608

SCHEDULE 1

Project Application:	06_0074
Proponent:	Boral Resources (NSW) Pty Ltd
Approval Authority:	Minister for Planning
Land:	See Appendix 1
Project:	Marulan South hard rock quarry and associated infrastructure

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Blue type represents November 2011 Modification
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DEFINITIONS

Annual Review	The review required by condition 4 of schedule 5
BCA	Building Code of Australia
CCC	Community Consultative Committee
Council	Goulburn Mulwaree Council
Day	Day is defined as the period from 7.00am to 6.00pm, Monday to Saturday and 8.00am to 6.00pm Sundays and Public Holidays
Department	Department of Planning and Infrastructure
Director-General	Director-General of the Department (or nominee)
DPI	Department of Primary Industries
EA	Environmental Assessment for the project titled *Marulan South Quarry Environmental Assessment Report* Volumes 1 and 2 dated October 2006 prepared by ERM
EPA	NSW Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPL	Environment Protection Licence under the *Protection of the Environment Operations Act 1997*
Evening	Evening is defined as the period from 6.00pm to 10.00pm
Land	Land means the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at the Land Titles Office at the date of this approval
Night	Night is defined as the period from 10.00pm to 7.00am Monday to Saturday and 10.00pm to 8.00am Sundays and Public Holidays
Noise Bund	Bunds built for noise and visual mitigation purposes and which do not exceed 10 metres in height
NOW	NSW Office of Water, within the Department of Primary Industries
OEH	Office of Environment and Heritage
Project	Development to which the Project Approval applies
Proponent	Boral Resources (NSW) Pty Ltd
RMS	Roads and Maritime Services
Site	Land to which the Project Approval applies (see Appendix 1)
Submissions Report	*Marulan South Quarry Submissions Report* dated December 2006

SCHEDULE 2
ADMINISTRATIVE CONDITIONS

Obligation to Minimise Harm to the Environment

1. The Proponent shall implement all practicable measures to prevent or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the project.

Terms of Approval

2. The Proponent shall carry out the project generally in accordance with the:
   (a) EA;
   (b) submissions report;
   (c) modification application 06_0074 – MOD 1 and accompanying Statement of Environmental Effects entitled *Marulan South Quarry Statement of Environmental Effects for a Pre-commencement Exploratory Test Pit* dated 13 November 2008, and letter from Boral Resources Pty Ltd to the Department dated 13 February 2009;
   d) modification application 06_0074 – MOD 2 and the accompanying EA titled *Boral Peppertree Quarry Section 75W Modification Report*, dated June 2011, prepared by ERM Australia, and the responses to issues raised in submissions, including those titled *Peppertree Quarry Submissions Report*, dated 24 August 2011, *Response to OEH Submission*, dated 12 October 2011, and *Response to Armitt Submission*, dated 25 October 2011;
   e) modification application 06_0074 – MOD 3 and the accompanying EA titled *Peppertree Quarry Modification 3 Environmental Assessment*, dated August 2012, prepared by EMGA Mitchell McLennan Pty Limited, and the responses to issues raised in submissions titled *Response to Submissions Peppertree Quarry Modification 3*, dated 3 October 2012; and
   f) conditions of this approval.

   Note: The general layout of the project is shown in the figure in Appendix 2.

3. If there is any inconsistency between the above, either the most recent document or the conditions of this approval shall prevail to the extent of the inconsistency.

4. The Proponent shall comply with any reasonable requirement/s of the Director-General arising from the Department's assessment of:
   (a) any reports, plans, programs or correspondence that are submitted in accordance with this approval; and
   (b) the implementation of any actions or measures contained in these reports, plans, programs or correspondence.

4A. The proponent shall be permitted to undertake pre-construction exploratory test pit activities as described in modification application 06_0074 MOD 1.

Note: The commencement of test pit activities as described in modification application 06_0074 MOD 1 is not subject to the preparation of management plans.

Limits on Approval

5. This approval shall lapse at the end of 2038.

6. The Proponent shall not transport more than 3.5 million tonnes of product from the site in a year.

7. All extractive materials and products shall be transported from the site by rail. However, the Proponent may transport some product by road in an emergency with the written approval of the Director-General.

Structural Adequacy

8. The Proponent shall ensure that all new buildings and structures on the site are constructed in accordance with the relevant requirements of the BCA.

   Notes:
   - *Under Part 4A of the EP&A Act, the Proponent is required to obtain construction and occupation certificates for any building works.*
   - *Part 8 of the EP&A Regulation sets out the detailed requirements for the certification of development.*

Demolition

9. The Proponent shall ensure that all demolition work on site is carried out in accordance with *AS 2601-2001: The Demolition of Structures,* or its latest version.

Protection of Public Infrastructure

10. The Proponent shall:
    (a) repair, or pay all reasonable costs associated with repairing any public infrastructure that is damaged by the project; and
    (b) relocate, or pay all reasonable costs associated with relocating any public infrastructure that needs to be relocated as a result of the project.

Operation of Plant and Equipment

11. The Proponent shall ensure that all plant and equipment used at the site is:
    (a) maintained in a proper and efficient condition; and
    (b) operated in a proper and efficient condition.

12. With the approval of the Director-General, the Proponent may prepare and submit any management plan or monitoring program required by this approval on a progressive basis.

SCHEDULE 3
ENVIRONMENTAL PERFORMANCE CONDITIONS

GENERAL EXTRACTION AND PROCESSING PROVISIONS

Identification of Boundaries

1. Prior to the commencement of construction, or as otherwise agreed by the Director-General, the Proponent shall:
   (a) engage an independent registered surveyor to survey the boundaries of the approved limit of extraction;
   (b) submit a survey plan of these boundaries to the Director-General; and
   (c) ensure that these boundaries are clearly marked at all times in a permanent manner that allows operating staff and inspecting officers to clearly identify those limits.

Note: The limit of extraction is shown conceptually on the plan in Appendix 2.

NOISE

Construction of Bunds

2. In carrying out the construction of the noise bunds, the Proponent shall:
   (a) comply with the construction noise criteria in the *Environmental Noise Control Manual 1994* for the first three months of the construction work; and
   (b) thereafter, comply with the daytime operational noise criteria in condition 4.

Construction Noise Management Plan

3. The Proponent shall prepare and implement a Construction Noise Management Plan for the project to the satisfaction of the Director-General. This plan must be submitted to the Director-General for approval prior to the commencement of construction, and include:
   (a) a detailed description of the measures that would be implemented to achieve the construction noise limits in the *Environmental Noise Control Manual 1994* and the operational noise criteria in condition 4*;*
   (b) a community notification protocol for the proposed construction activities;
   (c) a description of the measures that would be implemented where the construction noise limits and/or operational noise limits are unlikely to be achieved or are not being achieved; and
   (d) details of who would be responsible for monitoring, reviewing and implementing the plan.

Operational Noise Impact Assessment Criteria

4. The Proponent shall ensure that the noise generated by the project does not exceed the noise impact assessment criteria in Table 1.

Residential Receiver	***Day Shift***	***Night Shift***		
	Day $L_{Aeq(15\ minute)}$	*Evening* $L_{Aeq(15\ minute)}$	*Night*	
			$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
2	39	35	35	45
5	35	35	35	45
6	35	35	35	45
16	41	35	35	45
Any other noise sensitive location	35	35	35	45

Table 1: Noise Impact Assessment Criteria

Notes:

- *The identified "Day" noise criteria apply throughout the period of the site's Day Shift (ie 7.00am to 7.00pm) on all days, despite the general definitions of Evening and Night otherwise applying to the approval. The identified "Evening" and "Night" criteria apply only during the period of the site's Night Shift (ie 7.00pm to 7.00am).*
- *Noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.*
- *Residential receiver locations are shown in Appendix 2A.*

Land Acquisition Criteria

5. If the noise generated by the project exceeds the criteria in Table 2, the Proponent shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in conditions 6-8 of Schedule 4.

Residential Receiver	***Day*** $L_{Aeq(15\ minute)}$	***Evening / Night*** $L_{Aeq(15\ minute)}$
2	44	44
5	40	40
6	40	40
16	44	44

Table 2: Land Acquisition Criteria

Note: The notes under Table 1 apply equally to Table 2.

Cumulative Noise Criteria

6. The Proponent shall take all reasonable and feasible measures to ensure that the noise generated by the project combined with the noise generated by other extractive industries does not exceed the following amenity criteria on any privately owned land, to the satisfaction of the Director-General:
   - $L_{Aeq(11\ hour)}$ *50 dB(A) – Day;*
   - $L_{Aeq(4\ hour)}$ *45 dB(A) – Evening; and*
   - $L_{Aeq(9\ hour)}$ *40 dB(A) – Night.*

Additional Noise Mitigation Measures

7. Upon receiving a written request from the owner of residential receiver 3 (except where a negotiated noise agreement is in place) the Proponent shall implement additional noise mitigation measures such as double glazing, insulation, and/or air conditioning at any residence on the land in consultation with the owner. These additional mitigation measures must be reasonable and feasible. If within 3 months of receiving this request from the landowner, the Proponent and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Director-General for resolution.

8. Within 3 months of this approval, the Proponent shall notify the owner of residential receiver 3 that he/she is eligible for additional noise mitigation measures.

Operating Conditions

9. The Proponent shall:
   (a) implement best practice noise management, including all reasonable and feasible noise mitigation measures to minimise the noise generated by the project;
   (b) investigate ways to minimise the noise generated by the project;
   (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;
   (d) minimise noise impacts during adverse weather conditions; and
   (e) report on these investigations and the implementation and effectiveness of these measures in the Annual Review,

   to the satisfaction of the Director-General.

Noise Management Plan

10. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must be prepared in consultation with EPA and submitted to the Director-General for approval 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;
   (b) describe the noise management system;
   (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; and
      - provides for the use of real-time and/or supplementary attended monitoring measures, if directed by the Director-General;
   (d) include a community notification protocol for the proposed construction activities; and

(e) detail who would be responsible for monitoring, reviewing and implementing the plan.

Hours of Operation

11. The Proponent shall comply with the hours of operation in Table 3.

Activity	*Day*	*Time*
Construction works	Monday-Friday	7.00am to 6.00pm
	Saturday	8.00am to 1.00pm
	Sunday and public holidays	None
Topsoil/overburden removal/emplacement	Any day	7.00am to 7.00pm
Blasting	Monday-Saturday	9.00am to 5.00pm
	Sunday and public holidays	None
In-pit activities (including drilling, extraction, processing, and transfer of material out of the pit)	Any day	7.00am to 7.00pm
Out-of-pit activities (including processing, stockpiling, train loading and distribution, and maintenance)	Any day	24 hours

Table 3 – Hours of Operation

BLASTING AND VIBRATION

Airblast Overpressure Criteria

12. The Proponent shall ensure that the airblast overpressure level from blasting at the project does not exceed the criteria in Table 4 at any residence on privately-owned land.

Airblast overpressure level (dB(Lin Peak))	*Allowable exceedance*
115	5% of the total number of blasts over a period of 12 months
120	0%

Table 4: Airblast Overpressure Impact Assessment Criteria

Ground Vibration Criteria

13. The Proponent shall ensure that the ground vibration level from blasting at the project does not exceed the criteria in Table 5 at any residence or sensitive receiver on privately-owned land.

Peak particle velocity (mm/s)	*Allowable exceedance*
5	5% of the total number of blasts over a period of 12 months
10	0%

Table 5: Ground Vibration Impact Assessment Criteria for Residences on Privately-owned Land

Operating Conditions

14. The Proponent shall 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 Director-General.

Public Notice

15. The Proponent shall:
    (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 Director-General, 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 Director-General.

Monitoring

16. The Proponent shall prepare and implement a Blast Monitoring Program for the project to the satisfaction of the Director-General. This program must:
    (a) be submitted to the Director-General for approval prior to the commencement of construction;
    (b) be prepared in consultation with the EPA; and
    (c) monitor the performance of the project against the relevant blasting criteria.

AIR QUALITY

Air Quality Impact Assessment Criteria

17. The Proponent shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the project do not exceed the criteria listed in Tables 6, 7 and 8 at any residence on privately owned land, or on more than 25 percent of any privately owned land.

Table 6: Long term impact assessment criteria for particulate matter

Pollutant	***Averaging period***	***[d] Criterion***
Total suspended particulate (TSP) matter	Annual	[a] 90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	[a] 30 µg/m^3

Table 7: Short term impact assessment criterion for particulate matter

Pollutant	***Averaging period***	***[d] Criterion***
Particulate matter < 10 µm (PM_{10})	24 hour	[a] 50 µg/m^3

Table 8: Long term impact assessment criteria for deposited dust

Pollutant	***Averaging period***	***Maximum increase[2] in deposited dust level***	***Maximum total[1] deposited dust level***
[c] Deposited dust	Annual	[b] 2 g/m^2/month	[a] 4 g/m^2/month

Notes to Tables 6-8

[a] Total impact (i.e. incremental increase in concentrations due to the project plus background concentrations due to all other sources);

[b] Incremental impact (i.e. incremental increase in concentrations due to the project on its own);

[c] Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method; and

[d] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Director-General.

Land Acquisition Criteria

18. If particulate matter emissions generated by the project exceed the criteria in Tables 9, 10, and 11 at any residence on privately-owned land, or on more than 25 percent of any privately owned land, then upon written request for acquisition from the landowner, the Proponent shall acquire the land in accordance with the procedures in conditions 6-7 of schedule 4.

Table 9: Long term land acquisition criteria for particulate matter

Pollutant	***Averaging period***	***[d] Criterion***
Total suspended particulate (TSP) matter	Annual	[a] 90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	[a] 30 µg/m^3

Table 10: Short term land acquisition criteria for particulate matter

Pollutant	Averaging period	[da] Criterion
Particulate matter < 10 µm (PM_{10})	24 hour	[a] 150 µg/m^3
Particulate matter < 10 µm (PM_{10})	24 hour	[b] 50 µg/m^3

Table 11: Long term land acquisition criteria for deposited dust

Pollutant	Averaging period	Maximum increase[2] in deposited dust level	Maximum total[1] deposited dust level
[c] Deposited dust	Annual	[b] 2 g/m^2/month	[a] 4 g/m^2/month

Notes to Tables 9-11

[a] Total impact (i.e. incremental increase in concentrations due to the project plus background concentrations due to all other sources);

[b] Incremental impact (i.e. incremental increase in concentrations due to the project on its own);

[c] Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method; and

[d] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Director-General.

Operating Conditions

19. The Proponent shall:
    (a) implement best management practice on site, including all reasonable and feasible measures to minimise the off-site odour, fume and dust emissions generated by the project;
    (b) minimise any visible air pollution generated by the project;
    (c) minimise the surface disturbance of the site generated by the project; and
    (d) operate a comprehensive air quality management system that uses a combination of predictive meteorological forecasting and air quality monitoring data to guide the day to day planning of quarrying operations and the implementation of both proactive and reactive air quality mitigation measures to ensure compliance with the relevant conditions of this approval;

    to the satisfaction of the Director-General.

Air Quality Management Plan

20. The Proponent shall prepare and implement a detailed Air Quality Management Plan for the project to the satisfaction of the Director-General. This plan must:
    (a) be prepared in consultation with EPA and submitted to the Director-General by the end of March 2012;
    (b) describe the measures that would need to be implemented to ensure compliance with the relevant conditions of this approval;
    (c) include a program for the implementation of the measures referred to in (b) above; and
    (d) include an air quality monitoring program that:
        - uses a combination of high volume samplers and dust deposition gauges to evaluate the performance of the project;
        - supports the air quality management system;
        - provides information to evaluate the performance of the project;
        - includes a protocol for determining exceedances of relevant conditions of this approval; and
        - provides for the use of real-time monitoring measures, if directed by the Director-General.

METEOROLOGICAL MONITORING

21. For the life of the project, the Proponent shall ensure that there is a meteorological station in the vicinity of the site that:
    (a) complies with the requirements in the *Approved Methods for Sampling of Air Pollutants in New South Wales* guideline; and
    (b) is capable of continuous real-time measurement of temperature lapse rate in accordance with the *NSW Industrial Noise Policy*.

SURFACE AND GROUND WATER

Water Supply

22. Prior to the commencement of construction, the Proponent shall obtain the necessary approvals for the project under the *Water Act 1912*.

Note: The Water Management Act 2000 may apply to the project. The Proponent shall consult with the NOW on the relevant approvals at the time the application is made.

Discharges

23. Except as may be expressly provided for by an EPL, the Proponent shall not discharge any dirty water from the quarry or ancillary operational areas.

23A. The Proponent shall prepare an onsite wastewater report for the proposed effluent management system consistent with the requirements of *Sydney Catchment Authority – "Developments in Sydney's Drinking Water Catchment" – Water Quality Information Requirements, 2011.* The effluent management system must be designed and constructed to be in accordance with this onsite wastewater report and its design must be approved by Council prior to construction.

Tangarang Creek Environmental Flow

24. The proponent shall provide an environmental flow to Tangarang Creek equivalent to 10% of average daily flows. Details of the management of these environmental flows shall be included in the Site Water Balance for the project (see below).

Sediment Dams

25. The Proponent shall ensure that:
    (d) critical structures such as "dirty water" dams are designed, constructed and maintained to a accommodate a 1 in 100 year ARI 24-hour event; and
    (e) other dams and water management structures are designed, constructed and maintained to accommodate a 1 in 20 year ARI 24-hour event.

Management and Monitoring

26. The Proponent shall prepare and implement a Water Management Plan for the project to the satisfaction of the Director-General. This plan must:
    (a) be submitted to the Director-General for approval prior to the commencement of construction;
    (b) be prepared in consultation with the NOW, EPA and Sydney Catchment Authority; and
    (c) include a:
        - Site Water Balance;
        - Erosion and Sediment Control Plan;
        - Surface Water Monitoring Program;
        - Ground Water Monitoring Program; and
        - Surface and Ground Water Response Plan to address any potential adverse impacts associated with the project.

Site Water Balance

27. The Site Water Balance shall
    (a) include details of all water extracted (including make up water), dewatered, transferred, used and/or discharged by the project; and
    (b) describe measures to minimise water use by the project.

Erosion and Sediment Control

28. The Erosion and Sediment Control Plan shall:
    (a) be consistent with the requirements of *Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition, 2004* (Landcom);
    (b) identify activities that could cause soil erosion and generate sediment;
    (c) describe measures to minimise soil erosion and the potential for the transport of sediment to downstream waters;
    (d) describe the location, function, and capacity of erosion and sediment control structures; and
    (e) describe what measures would be implemented to maintain (and if necessary decommission) the structures over time.

Surface Water Monitoring

29. The Surface Water Monitoring Program shall include:
    (a) detailed baseline data on surface water flows and quality in Tangarang Creek and Barbers Creek;
    (b) surface water impact assessment criteria;
    (c) a program to monitor surface water flows and quality;
    (d) a protocol for the investigation of identified exceedances of the surface water impact assessment criteria; and
    (e) a program to monitor the effectiveness of the Erosion and Sediment Control Plan.

Ground Water Monitoring Program

30. The Ground Water Monitoring Program shall include:
    (a) detailed baseline data on ground water levels, flows, and quality, based on statistical analysis;
    (b) groundwater impact assessment criteria for monitoring bores;
    (c) a program to monitor regional ground water levels and quality; and
    (d) a protocol for the investigation of identified exceedances of the ground water impact assessment criteria.

TRAFFIC AND TRANSPORT

31. The Proponent shall prepare and implement a construction traffic management plan for the project to the satisfaction of the RMS and Council.

ABORIGINAL HERITAGE

32. The Proponent shall prepare and implement an Aboriginal Heritage Management Plan for the project to the satisfaction of the Director-General. This plan must:
    (f) be submitted to the Director-General for approval prior to the commencement of construction;
    (g) be prepared in consultation with the OEH and relevant Aboriginal communities; and
    (h) include a:
    - description of the measures that would be implemented for the mapping, and salvage or relocation of the archaeological relics in the Tangarang Creek Dam 1 area;
    - description of the measures that would be implemented if any new Aboriginal objects or relics are discovered during the project; and
    - protocol for the ongoing consultation and involvement of the Aboriginal communities in the conservation and management of Aboriginal cultural heritage on the site.

32A If historical archaeological relics are unexpectedly discovered during works, all works must cease and a suitably qualified and experienced historical archaeologist be brought in to assess the find. Depending on the nature of the discovery, additional assessment and recording may be required prior to the recommencement of excavation in the affected area. The Heritage Council (or its Delegate) must be notified of this discovery in writing in accordance with section 146 of the *Heritage Act, 1977.*

FLORA AND FAUNA

33. The Proponent shall:
    (a) rehabilitate the site in a manner that is generally consistent with the conceptual rehabilitation principles in Chapter 2.8 of the EA; and
    (b) implement the Habitat Management Area in a manner that is generally consistent with the documents listed in condition 2 of schedule 3 (and shown conceptually in Appendix 3), including the establishment, conservation and maintenance of at least 13.5 hectares of vegetation species characteristic of Box Gum Woodland,
    to the satisfaction of the Director-General.

Threatened Species Protection

33A. The Proponent shall:
    (a) prior to clearing of vegetation and site preparation on the site of the Western Overburden Emplacement and extension, clearly and securely mark out the proposed boundary of the emplacement and extension;
    (b) avoid disturbance of *Box Gum Woodland* Endangered Ecological Community and other native vegetation adjacent to the site of the Western Overburden Emplacement and extension;
    (c) only undertake clearing of vegetation on the site of the Western Overburden Emplacement and extension following a recent fauna survey undertaken by a suitably qualified expert who has been approved by the Director-General; and
    (d) seek to avoid clearing of native vegetation on the site of the Western Overburden Emplacement and extension during the period August to November of any year.

Landscape and Rehabilitation Management Plan

34. The Proponent shall prepare and implement a Landscape and Rehabilitation Management Plan for the project to the satisfaction of the Director-General. This plan must:
    (e) be submitted to the Director-General for approval prior to the commencement of construction;
    (f) be prepared in consultation with the OEH and Council;
    (g) describe in general the short, medium, and long-term measures that would be implemented to:
    - rehabilitate the site;
    - implement the Habitat Management Area;
    - manage the remnant vegetation and habitat on the site; and
    - landscape the site (including the bunds and overburden emplacement areas) to mitigate any visual impacts of the project;

(h) describe in detail the measures that would be implemented over the next 5 years to rehabilitate and manage the landscape on the site;
(i) describe how the performance of these measures would be monitored over time; and
(j) set completion criteria for the rehabilitation of the site.

Rehabilitation Bond

35. Within 3 months of the first Independent Environmental Audit the Proponent shall lodge a rehabilitation bond for the project with the Director-General. The sum of the bond shall be calculated at $2.50/m^2 for the total area to be disturbed in each 5 year period, or as otherwise directed by the Director-General.

Notes:

- *If the rehabilitation is completed to the satisfaction of the Director-General, the Director-General will release the rehabilitation bond.*
- *If the rehabilitation is not completed to the satisfaction of the Director-General, the Director-General will call in all or part of the rehabilitation bond, and arrange for the satisfactory completion of the relevant works.*

36. Within 3 months of subsequent audits, the Proponent shall review, and if necessary revise, the sum of the bond to the satisfaction of the Director-General. This review must consider:
(a) the effects of inflation;
(b) any changes to the total area of disturbance; and
(c) the performance of the rehabilitation against the completion criteria of the Rehabilitation and Landscape Management Plan.

VISUAL IMPACT

Visual Amenity and Lighting

37. The Proponent shall:
(a) *minimise the visual impacts, and particularly the off-site lighting impacts, of the project;*
(b) *revegetate overburden emplacements, emplacement extensions and bunds as soon as practicable;*
(c) *take all practicable measures to further mitigate off-site lighting impacts from the project; and*
(d) *ensure that all external lighting associated with the project complies with* Australian Standard AS4282 (INT) 1995 - Control of Obtrusive Effects of Outdoor Lighting*,*
to the satisfaction of the Director-General.

38. *(Deleted)*

39. *(Deleted)*

Advertising

40. The Proponent shall not erect or display any advertising structure(s) or signs on the site without the written approval of the Director-General.

Note – This does not include business identification, traffic management and safety or environmental signs.

WASTE MANAGEMENT

41. The Proponent shall:
(a) monitor the amount of waste generated by the project;
(b) investigate ways to minimise waste generated by the project;
(c) implement reasonable and feasible measures to minimise waste generated by the project; and
(d) report on waste management and minimisation in the Annual Review.
to the satisfaction of the Director-General.

42. The Proponent shall ensure that all waste generated or stored on site is assessed, classified and managed in accordance with the EPA's *Environmental Guidelines: Assessment Classification and Management of Liquid and Non-Liquid Wastes*.

EMERGENCY AND HAZARDS MANAGEMENT

Dangerous Goods

43. The Proponent shall ensure that the storage, handling, and transport of dangerous goods are conducted in accordance with the relevant *Australian Standards*, particularly AS1940 and AS1596, and the *Dangerous Goods Code*.

Safety

44. The Proponent shall secure the project to ensure public safety to the satisfaction of the Director-General.

Bushfire Management

45. The Proponent shall:
    (a) ensure that the project is suitably equipped to respond to any fires on-site; and
    (b) assist the rural fire service and emergency services as much as possible if there is a fire on-site.

PRODUCTION DATA

46. The Proponent shall:
    (a) provide annual production data to the DPI using the standard form for that purpose; and
    (b) include a copy of this data in the Annual Review.

QUARRY EXIT STRATEGY

47. The Proponent shall prepare and implement a Quarry Exit Strategy for the project to the satisfaction of the Director-General. This strategy must:
    (a) be submitted to the Director-General for approval at least 5 years prior to the cessation of the project;
    (b) be prepared in consultation with the relevant agencies;
    (c) define the objectives and criteria for quarry closure;
    (d) investigate options for the future use of the site, including any final void/s;
    (e) describe the measures that would be implemented to minimise or manage the ongoing environmental effects of the project; and
    (f) describe how the performance of these measures would be monitored over time.

SCHEDULE 4
ADDITIONAL PROCEDURES

NOTIFICATION OF LANDOWNERS

1. If the results of monitoring required in Schedule 3 identify that impacts generated by the project are greater than the relevant impact assessment criteria, then the Proponent shall notify the Director-General 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.

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 Director-General is satisfied that an independent review is warranted, then within 2 months of the Director-General's decision, the Proponent shall:

   (a) commission a suitably qualified, experienced and independent expert, whose appointment has been approved by the Director-General, 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:
     - 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;
     - identify the measures that could be implemented to ensure compliance with the relevant criteria; and

   (b) give the Director-General 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 Director-General.

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 shall:

   (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 Director-General.

   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 shall 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 shall:

   (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 Director-General.

   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 shall 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.

LAND ACQUISITION

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

(i) 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;

(j) the reasonable costs associated with:
- relocating within the Goulburn Mulwaree local government area, or to any other local government area determined by the Director-General; and
- obtaining legal advice and expert advice for determining the acquisition price of the land, and the terms upon which it is required; and

(k) 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 Director-General for resolution.

Upon receiving such a request, the Director-General will request the President of the NSW Division of the Australian Property Institute to appoint a qualified independent valuer to:
- consider submissions from both parties;
- determine 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 shall 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 Director-General 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 Director-General 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 shall make a binding written offer to the landowner to purchase the land at a price not less than the Director-General'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 shall cease, unless the Director-General determines otherwise.

7. The Proponent shall 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. *(deleted)*

SCHEDULE 5
ENVIRONMENTAL MANAGEMENT AND MONITORING CONDITIONS

ENVIRONMENTAL MANAGEMENT STRATEGY

1. The Proponent shall prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Director-General. This strategy must be submitted to the Director-General for approval prior to the commencement of construction, and:
   (a) provide the strategic context for environmental management of the project;
   (b) identify the statutory requirements that apply to the project;
   (c) describe in general how the environmental performance of the project would be monitored and managed;
   (d) describe the procedures that would be implemented to:
      - keep the local community and relevant agencies informed about the construction, operation and environmental performance of the project;
      - receive, handle, respond to, and record complaints;
      - resolve any disputes that may arise during the life of the project;
      - respond to any non-compliance;
      - manage cumulative impacts; and
      - respond to emergencies; and
   (e) describe the role, responsibility, authority, and accountability of the key personnel involved in the environmental management of the project.

ENVIRONMENTAL MONITORING PROGRAM

2. The Proponent shall prepare an Environmental Monitoring Program for the project to the satisfaction of the Director-General. This program must be submitted to the Director-General prior to the commencement of construction, and consolidate the various monitoring requirements in Schedule 3 of this approval into a single document.

INCIDENT REPORTING

3. Within 7 days of detecting an exceedance of the goals/limits/performance criteria in this approval or an incident causing (or threatening to cause) material harm to the environment, the Proponent shall report the exceedance/incident to the Department and any relevant agencies. This report must:
   (a) describe the date, time, and nature of the exceedance/incident;
   (b) identify the cause (or likely cause) of the exceedance/incident;
   (c) describe what action has been taken to date; and
   (d) describe the proposed measures to address the exceedance/incident.

ANNUAL REVIEW

4. By the end of March each year, the Proponent shall prepare and submit a review of the environmental performance of the project to the satisfaction of the Director-General. This review must:
   (a) describe the development that was carried out in the previous calendar year, and the development that is proposed to be carried out over the next 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
      - the relevant statutory requirements, limits or performance measures/criteria;
      - the monitoring results of previous years; and
      - the relevant predictions in the EA;
   (c) identify any non-compliance over the last 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 next year to improve the environmental performance of the project.

INDEPENDENT ENVIRONMENTAL AUDIT

5. Within 3 years of the date of the commencement of construction, and every 5 years thereafter, unless the Director-General directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project. This audit must:
   (a) be conducted by a suitably qualified, experienced, and independent person(s) whose appointment has been approved by the Director-General;
   (b) include consultation with the relevant agencies;
   (c) assess the environmental performance of the project, and its effects on the surrounding environment;
   (d) assess whether the project is complying with the relevant standards, performance measures and statutory requirements;

(e) review the adequacy of any strategy/plan/program required under this approval; and, if necessary,
(f) recommend measures or actions to improve the environmental performance of the project, and/or any strategy/plan/program required under this approval.

6. Within 1 month of completion of each Independent Environmental Audit, the Proponent shall submit a copy of the audit report to the Director-General and relevant agencies, with a response to any of the recommendations in the audit report.

REVISION OF STRATEGIES, PLANS AND PROGRAMS

7. Within 3 months of:
- the submission of an incident report under condition 3 above;
- the submission of an Annual Review under condition 4 above;
- the submission of an audit report under condition 5 above; or
- any modification to the conditions of this approval, (unless the conditions require otherwise),

the Proponent shall review, and if necessary revise, the strategies, plans, and programs required under this approval to the satisfaction of the Director-General.

Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the project.

COMMUNITY CONSULTATIVE COMMITTEE

8. Prior to the commencement of construction, the Proponent shall establish a Community Consultative Committee (CCC) for the project. The CCC shall:
(a) be comprised of:
- 2 representatives from the Proponent, including the person responsible for environmental management at the quarry;
- 1 representative from Council (if available); and
- at least 3 representatives from the local community,

whose appointment has been approved by the Director-General;
(b) be chaired by an independent chairperson, whose appointment has been approved by the Director-General;
(c) meet at least twice a year;
(d) review the Proponent's performance with respect to environmental management and community relations;
(e) undertake regular inspections of the quarry operations;
(f) review community concerns or complaints about the quarry operations, and the Proponent's complaints handling procedures; and
(g) provide advice to:
- the Proponent on improved environmental management and community relations, including the provision of information to the community and the identification of community initiatives to which the Proponent could contribute;
- the Department regarding the conditions of this approval; and
- the general community on the performance of the quarry with respect to environmental management and community relations.

Notes
- *The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Proponent complies with this approval.*
- *The membership of the CCC should be reviewed on a regular basis (every 3 years).*
- *If possible, an alternate member should be appointed for each of the representatives from the local community.*

9. At its own expense, the Proponent shall,:
(a) ensure that 2 of its representatives attend CCC meetings;
(b) provide the CCC with regular information on the environmental performance and management of the project;
(c) provide meeting facilities for the CCC;
(d) arrange site inspections for the CCC, if necessary;
(e) take minutes of the CCC meetings;
(f) make these minutes available to the public;
(g) respond to any advice or recommendations the CCC may have in relation to the environmental management or community relations; and
(h) forward a copy of the minutes of each CCC meeting, including a response to any recommendations from the CCC, to the Director-General within a month of the CCC meeting.

ACCESS TO INFORMATION

10. By 31 January 2012, the Proponent shall:

(a) make copies of the following publicly available on its website:

- the documents referred to in condition 2 of schedule 2;
- all current statutory approvals for the project;
- all approved strategies, plans and programs required under the conditions of this approval;
- the monitoring results of the project, reported in accordance with the specifications in any conditions of this approval, or any approved plans and programs;
- a complaints register, updated on a monthly basis;
- minutes of CCC meetings;
- the annual reviews of the project;
- any independent environmental audit of the project, and the Proponent's response to the recommendations in any audit;
- any other matter required by the Director-General; and
- keep this information up-to-date,

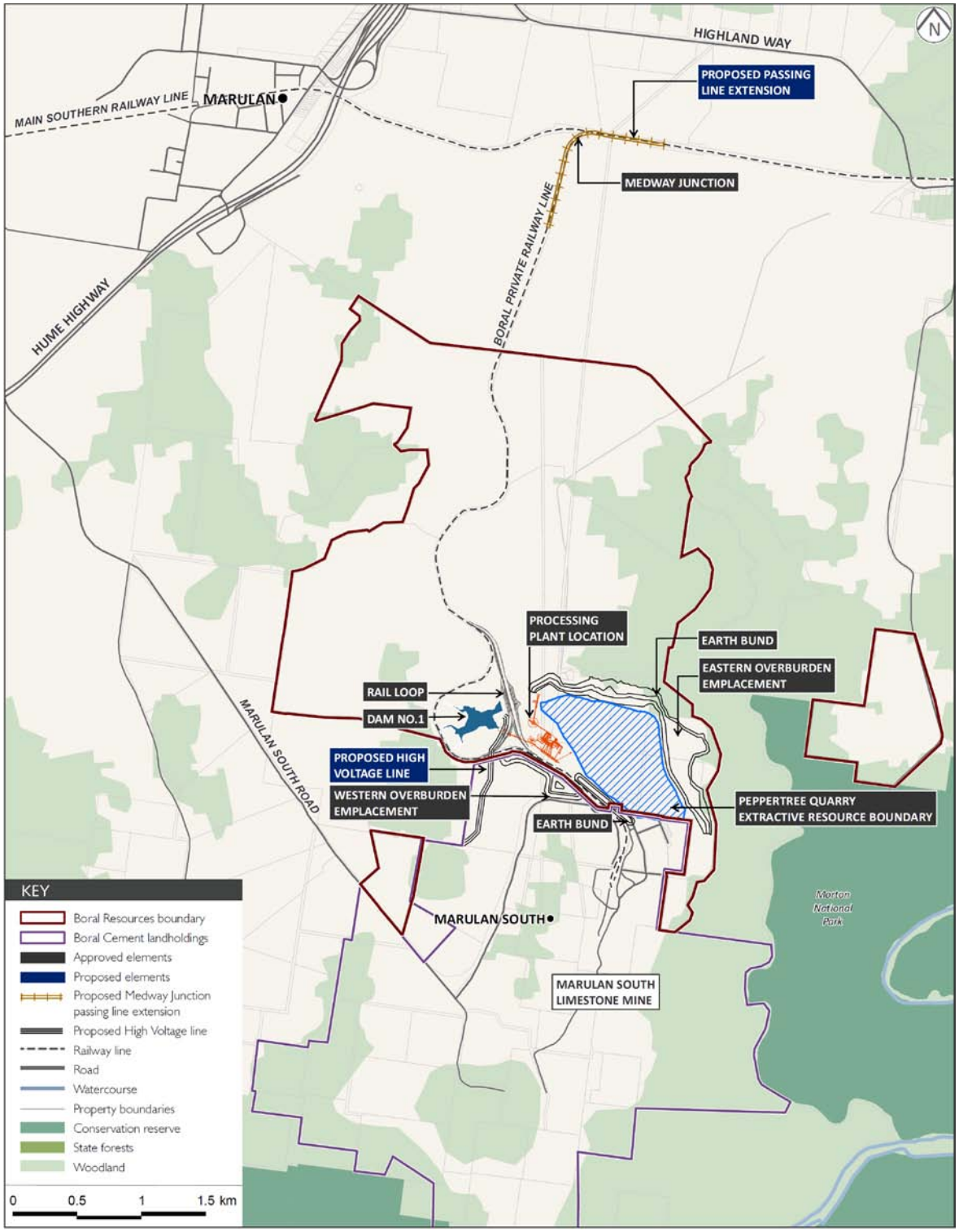
to the satisfaction of the Director-General.

13. *(deleted)*

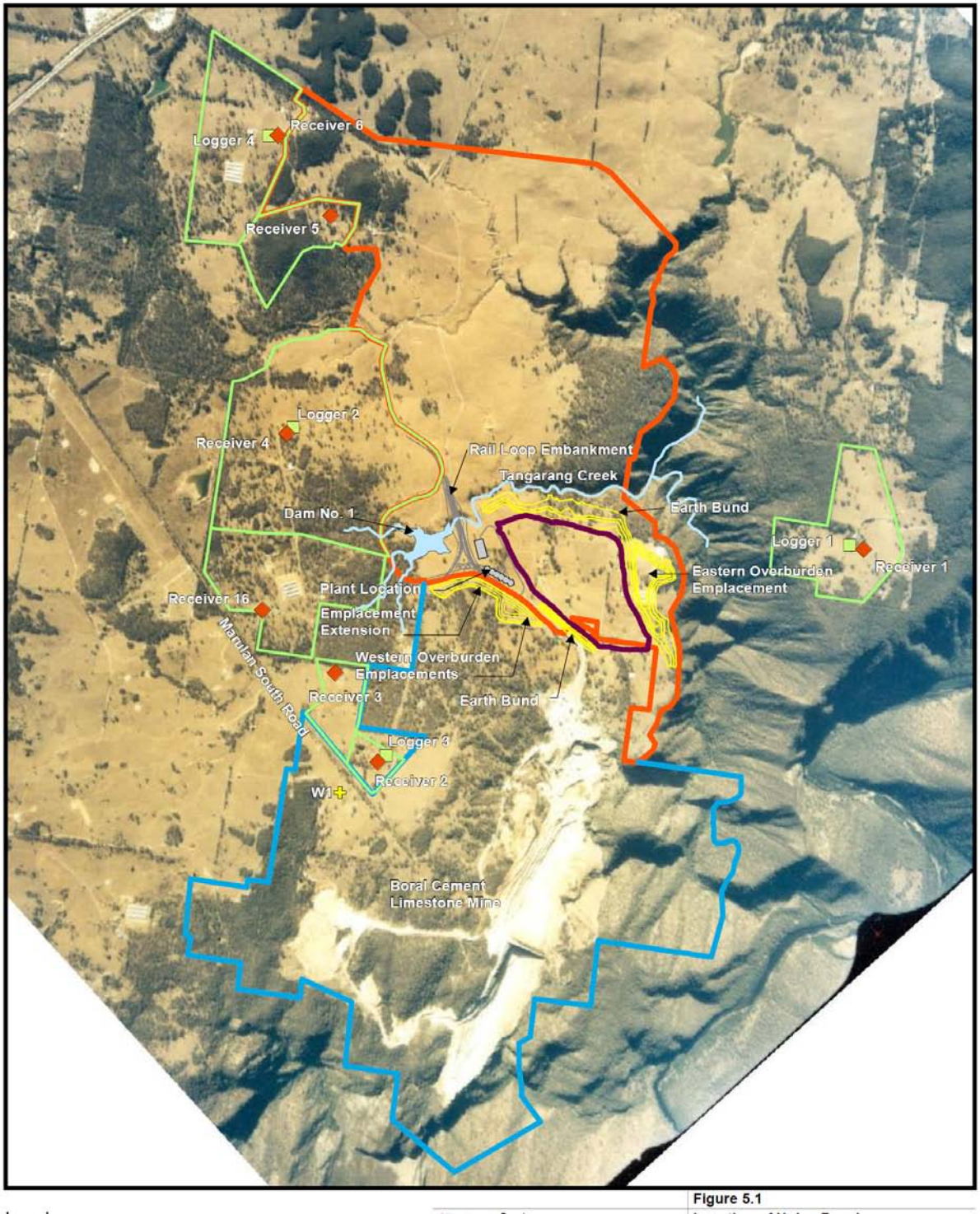
APPENDIX 1
SCHEDULE OF LAND

Lot	*DP*
23	867667
5	203290
95	750029
24	867667
109	750029
1	371167
1-6	261615
1	557562
143	750029
12	570616
2	557562
21	657523
100	1064794
4	106569
1-9	216767
11	570616
5	111641
22	867667
1	1124189
2	106569

APPENDIX 2
PROJECT SITE



APPENDIX 2A
NOISE RECEIVER LOCATION PLAN



Legend

- Receiver Locations
- Noise Logger Locations
- Weather Station
- Quarry Location
- Boral Cement Property Boundary
- Boral Peppertree Property Boundary
- Proposed Dam Location
- Proposed Plant Location
- Cadastre
- Tangarang Creek

Client:	Boral		
Project:	Peppertree Quarry		
Drawing	0118026s_Sect75W_G016_R0.mxd		
Date:	27/10/2011	Drawing Size:	A4
Drawn By:	SQW	Reviewed By:	RS
Projection:	GDA 1994 MGA Zone 56		
Scale:	Refer to scale bar		

N

0 250 500 750m

Maps and figures contained within this document may be based on third party data, may not be to scale and is intended for use as a guide only. ERM does not warrant the accuracy of any such maps or figures.

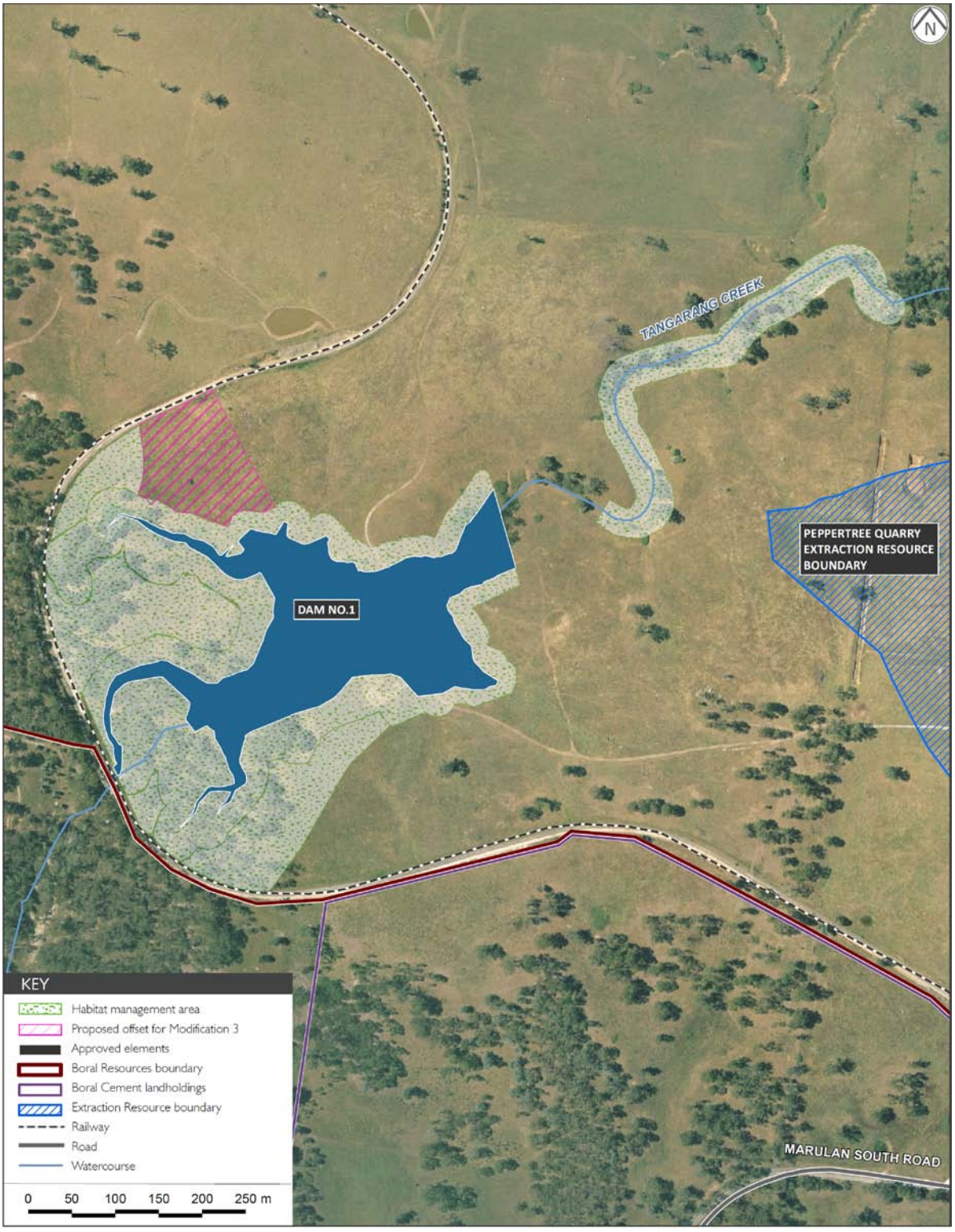
Figure 5.1
Location of Noise Receivers

Environmental Resources Management Australia Pty Ltd

Brisbane, Canberra, Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney

ERM

APPENDIX 3
HABITAT MANAGEMENT AREA



Appendix C – Community Newsletter

Building something great™

Boral Peppertree Quarry

Newsletter | Issue 12 | May 2014

Boral is pleased to present this issue of the Boral Peppertree Quarry newsletter.

The first few months of 2014 have been exciting for the Boral Peppertree team, our contractors and our customers as we reach a key project milestone by starting the supply of aggregates into the Sydney market. To date the switch to Peppertree Aggregates by the Sydney customers has been an overwhelming success and a real credit to all the employees and contractors involved in the project.

The completion of the Peppertree Construction Project was achieved safely, on time and on budget at the end of 2013 and the start of 2014 has seen the Peppertree site move through the different commissioning phases and thoroughly test the plant, equipment and systems prior to switching on the Sydney network to Peppertree Aggregates.

The Peppertree Project has been about much more than building a quarry and has set out with the aim of producing a world class operational site. To achieve this, the project looked for examples of best practice from all over the world to bring them together on one site. The result has been remarkable with significant improvements in safety as a result of the safety in design process, extremely high quality finished products and production rates that exceed the production targets set out at the start of the project. Environmental best practice has also been implemented with Peppertree being one of the few quarries in Australia designed to use very little water in its operation.

Peppertree Quarry is now fully operational and is supplying materials to some of the largest jobs in NSW such as Barangaroo the Darling Harbour. To make this possible the site is operating both day and night managed by a wonderful team of employees many of whom live in the local area including Tallong, Marulan, Goulburn and Towrang. In addition to the operational team the site is using over 30 different local suppliers for resources, parts and hospitality. We will be continuing to recruit further roles through the year and again urge anybody interested in applying for roles to keep a watch on ww.seek.com.au.

Over the coming months the site will be working with the Aboriginal Heritage Management Committee Representatives from Ngunawal People and Pejar local Aborigional Land Council as soil is moved allowing the pit to expand. Drilling and blasting activities will now continue on a more frequent basis as we aim to move over 2 million tonnes of material during our first year.

Our environmental monitoring will, of course, continue to measure our performance over this time.

Boral continues to play an active role within the community working with many local groups.

.During April we set the challenge for the Mayor Geoff Kettle to be chained to a Peppertree rock as part of our support of the Goulburn PCYC fundraising event. We were also keen supporters of the Goulburn Business Expo.

Keeping everyone on our sites safe is fundamental to how we work so we are also pleased to be able to provide high visibility vests to Council's Cycle Safety for Adults and Kids with Disabilities program.

This month we are also delighted to be the main sponsors once again for the Tallong Apple Day Festival

Keep in touch. We welcome your feedback and questions about the Boral Peppertree Quarry. You can call the site on 4841 1701. The site Environment Advisor, Sharon Makin, is also available on this number or via 0401 894 185. You can also call Boral's Stakeholder Relations Manager in Sydney, Paul Jackson, on 9033 5215. By email, write to sharon.makin@boral.com.au or paul.jackson2@boral.com.au . View the website at www.boral.com.au/peppertreequarry.

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Boral Marulan South Operations

Newsletter | Issue 12 | June 2014

Boral is pleased to present this issue of the Marulan South Operations newsletter.

This month's newsletter will update you on Peppertree's operations and community programs which the Boral Marulan South operations have been involved with over the last month.

The Peppertree Quarry is continuing through its commissioning program, testing the various elements of the plant and its systems. The site has received some great feedback from customers on the products being sent out via rail into the market. The plant is currently still going through its performance testing and again initial results are very positive, with production rates easily meeting those required through the design stages. The site is now looking to move into the next stage of its development as productivity continues to increase over the next nine months, with the aim of being at full capacity by Easter 2015. Over this period we will continue to recruit further employees for a variety of roles. The production team, a mix of both female and male operators, have already developed into a strong unit making Peppertree a really great place to work. Should you be interested in joining the team, please keep your eyes posted on www.seek.com.au for roles as they become advertised.

Environmental monitoring continues to measure our performance, with results available on the website (www.boral.com.au/peppertreequarry).

May was a busy month with our involvement in the Tallong Apple Festival, onsite fundraising with the Coopers Earthmoving pink McGrath Foundation grader, and participation in the Outward Bound program.

A number of local businesses assisted us with onsite fundraising by providing prizes for a raffle in support of the McGrath Foundation. The Coopers Earthmoving pink grader has been onsite for a couple of weeks assisting with heritage investigation works. Our thanks to Goulburn Produce, Blackwoods and the Post House Motor Lodge for their support.

Boral has been a partner of Outward Bound over a number of years and this year we have made the program available to Year 9 and 10 students from the Southern Highlands. Students from Goulburn, Mulwaree, Bowral and Moss Vale High Schools were sponsored for a leadership development program, with 18 Year 9 students attending the course for a week, camping in the Namadgi National Park. Guided by a Peppertree employee and Outward Bound leaders, the students learnt about goal setting, communication, how to challenge themselves and many other areas of life including cooking and cleaning for themselves! The feedback from the students at the end of the course was positive and enthusiastic. Through this program we support Boral values of leadership.

Congratulations must go to the Tallong Apple Festival Committee who held a successful event despite the cold on 4 May.

Boral is a member of the Concrete, Cement and Aggregates Association (CCAA) and has submitted a number of entries to the OHS and Environment Annual Awards. All nominations from both sites made it to the judging panel. Awards are presented in August.

We are also starting to prepare for the Kite Festival in October with the running of the Design-A-Kite competition once again. Letters will be heading out to the schools early next term to make arrangements for the delivery of the kites.

Keep in touch. We welcome your feedback and questions about the Boral Peppertree Quarry. You can call the site on 4841 1701. The site Environment Advisor, Sharon Makin, is also available on this number or via 0401 894 185. You can also call Boral's Stakeholder Relations Manager in Sydney, Paul Jackson, on 9033 5215. By email, write to sharon.makin@boral.com.au or paul.jackson2@boral.com.au . View the website at www.boral.com.au/peppertreequarry.

Building something great™

Boral Marulan South Operations

Newsletter | Issue 13 | September 2014

Boral is pleased to present this issue of the Marulan South Operations newsletter.

This month's newsletter will update you on Peppertree's operations, as well as community programs which the Boral Marulan South Operations have been involved with over the last month.

Work to remove overburden from the next phase of the quarry's development has started on site. The removal of this sandy material will enable access to the surface of the granite and allow the pit to expand as we move into a full operational phase. The overburden materials are being used to complete the next phase of the screening bund. We have started drilling the next bench down into the pit, providing the plant with very high quality materials for processing. As we reach the closing stages of commissioning, the site has been increasing the supply of materials to our customers in Sydney and the feedback has been great. With 18 trains leaving the site each week, the processing plant and train loading facility are now getting a thorough test and have performed well.

We are continuing to recruit further employees for a variety of roles. The production team, a mix of both female and male operators, has already developed into a strong unit making Peppertree a really great place to work. Should you be interested in joining the team, please keep your eyes on www.seek.com.au for new roles.

Environmental monitoring continues to measure our performance, with results available on our website (www.boral.com.au/peppertreequarry).

August was an exciting month for the Peppertree team, with our Safety Management Plan and its implementation being awarded as the Best Health and Safety Performance in the NSW industry by Construction, Concrete and Aggregate Australia (CCAA).

The Peppertree Quarry Safety Management Plan exemplifies Boral's commitment to best practice health and safety systems. It has resulted in the induction of over 5000 workers who have collectively clocked over 690 000 hours in two and a half years during construction. The plan has now been rolled over into an operational system.
The Executive General Manager for Boral Construction Materials (NSW/ACT), Greg Price, said "Boral has an unflagging commitment toward achieving zero harm for its employees and contractors on all our operating sites."

"This win for our Peppertree Safety Management plan is a testament to the hard work and focus placed on zero harm by our team. I congratulate the management and staff of the Peppertree Quarry."

The water management system at the Peppertree Quarry also received a highly commended in the Environmental Best Performance category.

Our Marulan South Operations have also started to prepare our next Stakeholder Engagement program. We previously made a commitment over 3 years to work with a number of community groups focussed on heritage and economic development. It is our view that we should continue with the programs we are currently involved with but we would be happy to receive feedback, positive or negative, as to our community involvement over this time. Comments can be directed to Sharon on 0401 894 185 or email sharon.makin@boral.com.au.

Feedback can also be made at any time about Boral operations via a simple on-line feedback survey which is now available at www.boral.com.au/feedback

Keep in touch. We welcome your feedback and questions about the Boral Peppertree Quarry. You can call the site on 4841 1701. The site Environment Advisor, Sharon Makin, is also available on this number or via 0401 894 185. You can also call Boral's Stakeholder Relations Manager in Sydney, Paul Jackson, on 9033 5215. By email, write to sharon.makin@boral.com.au or paul.jackson2@boral.com.au . View the website at www.boral.com.au/peppertreequarry.

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Boral Marulan South Operations

Newsletter | Issue 14 | October 2014

Boral is pleased to present this issue of the Marulan South Operations newsletter.

This month's newsletter will update you on Peppertree's operations, as well as community programs which the Boral Marulan South Operations have been involved with over the last month.

Over the last month work has continued in the further development of the pit such that the in pit crusher will be moved 50 metres below ground level sometime in November.

The milestone of 1 million tonnes of rock crushed in the primary was also achieved.

Recruitment of staff has been completed for the time being with 8 new staff members joining the Peppertree team. This now means Peppertree has moved to 12 hour rostered shifts and 24 hour seven day a week operations.

Marulan South Limestone mine has continued its operation in producing limestone for the cement and steel making markets. This site is the largest limestone mine in Australia and produces about 3milltion tonnes of limestone per annum. The operations date back to the 1870s. Recent changes to NSW Planning legislation means that Boral Marulan South Limestone will commence a process in the next 12 – 18 months to secure on going operational approval. The prescribed process is very detailed and involves consulting and understanding the views of the local community.

Boral now have in place a simple on-line feedback survey which is now available at www.boral.com.au/feedback where you can let us know how we are performing at any of our operations.

Any more detailed questions can be directed to either Paul or Sharon on the contact details below.

Environmental monitoring continues to measure our performance, with results available on our website (www.boral.com.au/peppertreequarry).

Safety is important to all Boral operations so we were proud to partner with Council and provide Hi Visibility vests for every participant for the Goulburn Challenge Community Bike ride and to help promote the message about "Share the Road".

October is also Kite Festival time and we were once more part of this exciting event in Marulan. Again we supported the Decorate a Kite competition with over a 150 entries to be judged. This year the Overall best decorated kite went to an entry from Marulan Public School with the school receiving an award of $500.

Congratulations to all those who decorated kites and to those who were successful with prizes. The judges had a hard time making the decisions.

Congratulations also to the Kite Festival Committee on yet another successful event.

We are also continuing to work as a member of the Heritage and Sustainability Park (HASP) project. After 12 months or so of planning and discussions, the HASP network is making progress. Discussions have been held with representatives from the University of Canberra who are keen to have final year graduates prepare park and museum designs fro community consideration. Representatives may be visiting in November with design available mid next year. Community consultation will be important and we hope to assist as a member of the network.

Keep in touch. We welcome your feedback and questions about the Boral Marulan South operations. You can call the Stakeholder & Environment Advisor, Sharon Makin, on 4841 1701 or via 0401 894 185. You can also call Boral's Stakeholder Relations Manager in Sydney, Paul Jackson, on 9033 5215. By email, write to sharon.makin@boral.com.au or paul.jackson2@boral.com.au . View the website at www.boral.com.au/peppertreequarry.

Building something great™

Boral Marulan South Operations

Newsletter | Issue 15 | November 2014

Boral is pleased to present this issue of the Marulan South Operations newsletter.

It is hard to believe that another year has passed and we are heading into Christmas.

With demand for our products from both quarries (Limestone and peppertree) our Christmas break will be short.

On reflection it has been a most successful year with the commissioning of Peppertree and continued quality materials leaving the Limestone operations.

We have also had a wonderful time supporting our local communities in various projects over the past 12 months.

As a local business we are proud to be members of the Chamber of Commerce to assist in how we might improve and drive economic development in the region.

This has lead us to participate in the Extractive Industries Expo earlier in the year and to continue working with Council and the Chamber on pathways into industry.

This year for the first time we partnered with Outward Bound running a program involving students from year 9 at Goulburn, Mulwaree, Bowral and Moss Vale High Schools. This was such a success we are currently planning another opportunity for students to be involved with Outward Bound.

Our limestone operations are adjacent to Bungonia National Park so this year we have assisted with erosion protection works at the Silica Mine site and donated materials for the new signs at the entrance to the park.

May and October saw us participating in the Tallong Apple Day Festival and Marulan Kite Festival respectively. Not only do we provide these festivals with financial support a number of Boral staff help out with the planning and set up on the day. We are already looking to working with the Tallong Apple Day committee for the 2015 Festival.

One of the themes of our Stakeholder Engagement plan is to support heritage themed projects in the local areas.

The Heritage and Sustainable Parklands Project (H.A.S.P) is one such project that we actively are involved in. This long term project will see the establishment of a Regional heritage trail from Tallong, Marulan, Bungonia through to Towrang with a central park and museum in Marulan on Council owned land. The project is in its initial stages with a partnership between HASP, Goulburn Mulwaree Council and the University of Canberra being put in place. Final year students from the Landscape Architecture course will be visiting Marulan in 2015 and meeting with the community. Following discussions they will design concept plans for the park with the community having a say on the final design.

We also congratulate the Marulan and District Historical society for being successful in the completion of the Archive heritage centre and that we could be involved in a small way with the provision of the concrete for the slab.

Making sure everyone who comes to a Boral site stays safe is very important to us so this year we have taken a couple of opportunities to support programs that reflect this. This involved partnering with Council with the Cycle safety for kids and adults with disabilities program and the Community Cycle Challenge.

In April, the Mayor was arrested and taken to goal with his bail going to support the Goulburn PCYC. It was a fun way for Boral to support this organisation so we offered to make a donation if the mayor would wear a “ball” and chain. In good spirits he agreed.

We finished the year with assisting the Harmony day committee with the replacement of flags and supporting the Christmas in Marulan festival. The RFS are an important organisation to all of us so helping to fund some of the evening means that all money raised from rides and gold coin donations goes to the RFS.

We are already preparing our next Stakeholder Engagement plan and look forward to once again supporting our local communities.

From the teams at our Marulan South Operations we wish you and yours a very safe and happy Christmas and New Year.

Keep in touch. We welcome your feedback and questions about the Boral Marulan South operations. You can call the Stakeholder & Environment Advisor, Sharon Makin, on 4841 1701 or via 0401 894 185. You can also call Boral’s Stakeholder Relations Manager in Sydney, Paul Jackson, on 9033 5215. By email, write to sharon.makin@boral.com.au or paul.jackson2@boral.com.au . View the website at www.boral.com.au/peppertreequarry.

Appendix D – Noise Audits

DRAFT REPORT

Boral Resources (NSW) Pty Ltd

Peppertree Quarry

Noise Compliance Monitoring

Monitoring Period: April 2014
Reporting Period: October 2016

Reference: 0210419RP06

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EXECUTIVE SUMMARY

General Overview

Environmental Resources Management Australia Pty Ltd has completed noise compliance monitoring for the current quarrying and associated works at Peppertree Quarry, located at Marulan South in the Southern Tablelands of New South Wales (NSW).

Monitoring was undertaken on behalf of Boral Resources (NSW) Pty Ltd, with due regard to, and in accordance with, local and international standards, guidelines and documents presented in this noise compliance monitoring report.

Assessment Findings

Daytime site noise emissions associated with quarry operations continue to comply with the relevant $L_{Aeq,\ 15\ minute}$ operational noise impact assessment criteria contained in Boral's November 2012 approval.

Night time site noise emissions comply with the relevant $L_{Aeq,\ 15\ minute}$ and $L_{1,\ 1\ minute}$ operational noise impact assessment criteria at all receiver locations that are not part of the overall Boral land ownership. Night time quarry operations generated noise levels that exceeded the $L_{Aeq,\ 15\ minute}$ night time operational noise impact assessment criteria contained in Boral's November 2012 approval at two receiver locations. These properties are both part of the overall Boral land ownership following land acquisition or negotiated agreement.

Daytime, evening and night time site noise level contributions ($L_{Aeq,\ period}$) are below the cumulative criteria applicable to unattended noise monitoring analysis. Furthermore, overall noise levels (inclusive of all other extractive industries) are considered unlikely to increase such that the daytime, evening or night time cumulative criteria will be exceeded.

ERM makes no additional recommendations and notes that Boral continues to manage noise generated by plant and equipment within the site, and continues to operate within the operational noise impact assessment criteria specified in the November 2012 Project Approval for the majority of works.

1 INTRODUCTION

This document has been prepared by Environmental Resources Management Australia Pty Ltd (ERM) on behalf of Boral Resources (NSW) Pty Ltd (Boral). It presents the methodology, findings and recommendations of noise compliance monitoring conducted at the Peppertree Quarry (the quarry), located at Marulan South in the Southern Tablelands of New South Wales (NSW) during April 2014.

1.1 RELEVANT DOCUMENTS, STANDARDS AND GUIDELINES

This report has been prepared with due regard to and in accordance with the following documents, standards and guidelines:

- Marulan South Consolidated Project Approval (06_0074) November 2012;
- the *Peppertree Quarry Construction Noise Management Plan* (CNMP), the *Peppertree Quarry Noise and Blast Monitoring Plan* (NBMP) and the *Peppertree Quarry Environmental Monitoring Program* (EMP);
- NSW Environment Protection Authority – NSW *Environmental Noise Management – Industrial Noise Policy* (INP), January 2000 and relevant application notes;
- NSW Department of Environment and Climate Change – NSW *Interim Construction Noise Guideline* (ICNG), July 2009;
- 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 Monitoring*;
- International Organisation for Standardisation (ISO) 9613-2:1996 (ISO9613:2) - *Acoustics - Attenuation of Sound During Propagation Outdoors - Part 2: General Method of Calculation*; and
- Standards Australia AS 2436–2010™ (AS2436) – *Guide To Noise and Vibration Control on Construction, Demolition and Maintenance Sites*.

A glossary of relevant acoustic concepts and terminology is presented as *Annex A*.

1.2 BACKGROUND

Boral was granted project approval (06_0074) to establish and operate the Peppertree Quarry (a granodiorite hard rock quarry, formerly called the Marulan South Quarry) including all in-pit quarrying activities and supporting infrastructure such as a rail siding and loading facility, processing plant and water supply dams, under Part 3A of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) in February 2007.

Under Section 75W of the *Environment Planning and Assessment Act 1979*, Boral subsequently applied for approval for a modification of the Peppertree Quarry Development in regards to rail line construction and operations. Boral received a 'Notice of Modification' for the Peppertree Quarry Project Approval (06_0074), dated Thursday, 3 November 2011. This notice approved the revised Project, consolidating relevant aspects of March 2009 and November 2011 modifications. A further modification was applied for in September 2012 for approval of the installation and operation of a High Voltage Power line to the Peppertree Quarry site and an extension of the existing Medway rail siding. This modification application was approved Friday, 2 November 2012.

1.2.1 *Noise and Vibration Management*

ERM was engaged to prepare the NBMP and CNMP for the quarry in accordance with the Project Approval and subsequent modifications; incorporating key components of the noise and blast monitoring programs for the quarry. Both NBMP and CNMP monitoring programs have been established and incorporated into the overall Environmental Monitoring Program (EMP), which consolidates the specific requirements of the abovementioned monitoring programs as well as other monitoring required by specific Project Approval conditions. The EMP provides an overall framework to assist with the implementation of monitoring for the project.

The purpose of the NBMP and CNMP is to fulfil the requirement of Schedule 3 of the Project Approval and the Statement of Commitments contained within the Part 3A Environmental Assessment. The NBMP, amongst other things, provides procedures for monitoring and assessing noise impacts from the quarry and methods to determine compliance with the operational noise impact assessment criteria. The CNMP, in addition to other things, provides: methods for managing construction noise; procedures for monitoring and assessing noise from construction; and methods to determine compliance with limits for residential receivers.

Quarry operations are currently in progress and generally include week day (7am to 6pm) and Saturday (7am to 1pm) works, with some approved night time works .

ERM has been engaged to conduct quarterly noise compliance monitoring on behalf of Boral in accordance with the CNMP, NBMP and Project Approval conditions for the quarry. This round of monitoring includes measurements during both the daytime and night time assessment periods.

Guidance Note

Under Section 75W of the Environment Planning and Assessment Act 1979 Boral received a 'Notice of Modification' for the (06_0074) Peppertree Quarry Project Approval. This notice, received on Thursday, 3 November 2011 also enabled a revised Project Approval to be prepared which consolidated relevant aspects of March 2009 and November 2011 modifications.

During this process and in consultation with the NSW Department of Planning and Infrastructure (DoPI), Boral received advice that construction noise criteria would remain valid through January 2012 and thereafter, the operational noise impact assessment criteria (as presented in Schedule 3, Section 4: Table 1 of the November 2011 modification) would apply. The subsequent approval in November 2012 does not alter the application of the operational noise criteria as outlined above; complying with DoPI advice the construction noise criteria are no longer valid for assessing quarry noise emissions.

This report presents the noise compliance assessment prepared with due regard to the November 2012 Operational Noise Criteria, which now apply for the quarry site, as the Project Approval required that construction noise criteria were complied with for the first three months of construction (valid to January 2012) and that thereafter, site construction noise emissions must meet the operational noise impact assessment criteria.

Guidance Note

Following land acquisition, three receiver locations (refer *Table 2.1*) are now part of the overall Boral land ownership, and hence monitoring to determine compliance is no longer required at these sites, as Boral have negotiated agreements in place. However, Boral continue to monitor at these locations to evaluate and manage any potential offsite impacts. Conservatively, the November 2012 criteria have been applied to assess noise at these locations however, in view of the negotiated agreements in place, exceedances are not considered to be non-compliances.

1.3 SITE UNDERSTANDING

The Peppertree Quarry is located in the Southern Tablelands of NSW, approximately 10 kilometres (km) southeast of Marulan and 175 km southwest of Sydney.

The site, the project-specific noise sensitive localities (including the unique identification number used to describe each location) and other items of acoustic importance relative to this assessment are visually presented in *Figure 1.1.*

Figure 1.1 Locality Map

A4

2 ASSESSMENT METHODLOGY

This section presents an overview of the noise compliance monitoring methodology for continuous unattended and operator attended noise monitoring undertaken in accordance with the NBMP and CNMP; and supplementary noise modelling completed to assist in determining compliance.

2.1 RECEIVER LOCATIONS

Monitoring locations representative of the receivers identified in the NBMP, CNMP and Project Approval for operations are used for evaluating and assessing noise emissions from quarry operations, as presented in *Table 2.1* below and visually presented on *Figure 1.1*.

Table 2.1 Nearest Potentially Affected Receiver Locations

Receiver ID	Description	MGA (Zone 56) Coordinates		Direction and Distance from Quarry Centre	
		Easting	Northing	Compass point	Distance, m
1[1]	Montgomery	230481	6150110	E	2730
2	Ordasi	226934	6148560	SSW	1730
3[1]	Brown	226623	6149210	SW	1410
4[1]	Armitt	226271	6150950	WNW	1480
5	Cooper	226592	6152540	NW	2520
6	Bartolo	226244	6153120	NW	3230
16	Pace	226094	6149665	WSW	1050

1. Following land acquisition or negotiated agreements, these receiver locations are now part of the overall Boral land ownership.

Guidance Note

Noise compliance monitoring was required to be undertaken at alternate locations for two receivers (Pace and Bartolo) as access was not available. The alternate locations were selected with due regard to the INP and as described in *Section 2.3.2*.

The alternate monitoring location selected for Receiver 16 (Pace) is situated at the resident's western property boundary; general quarry noise was audible at this location and site noise contributions were clearly detectable. The alternate monitoring location selected for Receiver 6 (Bartolo) is directly adjacent to the receiver location (~50m to the east) and is situated on the resident's eastern property boundary.

ERM notes that all noise compliance assessments and modelling predictions (refer *Section 3*) are made at the nearest potentially affected receiver locations described in *Table 2.1* above.

2.2 *ASSESSMENT CRITERIA*

This section summarises the operational noise impact assessment criteria (including values presented in Schedule 3, Condition 4; Table 1 of the November 2012 modification) as presented in the NBMP.

2.2.1 *Operational Noise*

The Project Approval required that Construction Noise Criteria were complied with for the first three months of construction (valid to January 2012) and thereafter, site construction noise emissions were required to meet the operational noise impact assessment criteria. These are reproduced in *Table 2.2*.

Table 2.2 Operational Noise Impact Assessment Criteria

Receiver ID	Description	Noise Impact Assessment Criteria, dB(A)[1,2]		
		Daytime 7:00am to 7:00pm	Evening and Night 7:00pm to 7:00am	
		LAeq, 15min	LAeq, 15min	LA1, 1min
1[3]	Montgomery	35	35	45
2	Ordasi	39	35	45
3[3]	Brown	42	35	46
4[3]	Armitt	37	35	46
5	Cooper	35	35	45
6	Bartolo	35	35	45
16	Pace	41	35	45
Any other noise sensitive location		35	35	45

1. The identified 'Daytime' noise criteria apply throughout the period of the site's Day Shift (i.e. 7.00am to 7.00pm) on all days, notwithstanding the general definitions of 'Evening' and 'Night time' otherwise applying to the approval. The identified 'Evening' and 'Night time' criteria apply only during the period of the site's Night Shift (i.e. 7.00pm to 7.00am);
2. noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW INP; and
3. Following land acquisition or negotiated agreements, these receiver locations are now part of the overall Boral land ownership.

2.2.2 *Cumulative Noise Criteria*

ERM has also considered Schedule 3, Condition 6 of the Project Approval which states:

The Proponent shall take all reasonable and feasible measures to ensure that the noise generated by the project combined with the noise generated by other extractive industries does not exceed the following amenity criteria on any privately owned land, to the satisfaction of the Director-General:

- $L_{Aeq,\ 11hr}$ *50 dB(A) – Day;*
- $L_{Aeq,\ 4hr}$ *45 dB(A) – Evening; and*
- $L_{Aeq,\ 9hr}$ *40 dB(A) – Night.*

These cumulative values are applied to the quarry to ensure that the overall amenity noise level of the area, inclusive of all other extractive industries, does not exceed an acceptable overall noise level during each assessment period: day, evening and night. Cumulative values are assessed as an additional requirement to the operational noise impact assessment criteria presented in *Table 2.2,* which are assessed over shorter (15 minute and one minute) periods.

2.3 *MEASUREMENT METHODOLOGY*

ERM (one operator) visited the quarry on Tuesday, 15 April; Wednesday, 16 April and Thursday, 17 April 2014 (three days) to conduct continuous unattended and operator attended noise monitoring. Attended monitoring was completed during the daytime and night time periods to enable the measurement of operational noise for works undertaken during approved daytime and night time assessment periods.

The monitoring methodology was determined with due regard to the relevant documents, standards and guidelines presented in *Section 1.1.*

Operator attended noise measurements were conducted at the locations specified in *Table 2.1* and alternate locations selected, if necessary. Continuous unattended noise monitoring was undertaken at the following four locations:

- Receiver 2 (Ordasi);
- Receiver 5 (Cooper);
- Receiver 6 (Bartolo, alternate off-site location); and
- Receiver 16 (Pace, alternate off-site location).

2.3.1 Measurement Equipment

All measurements were conducted by trained ERM personnel; with due regard to and in accordance with the relevant local and international standards for environmental noise monitoring.

The measurement instrumentation used to complete the assessment complied with the requirements of AS 61672.1 with current NATA calibration certificates, with certification at intervals not exceeding two years at the time of use.

The equipment used for this assessment was as follows:

- 1 x Brüel & Kjær 2250 Investigator (Type 1) Sound Analyser;
- 3 x ARL Ngara (Type 1) Environmental Noise Loggers;
- 1 x RION NL-42 (Type 2) Environmental Noise Logger; and
- 1 x Brüel & Kjær (Type 1) Sound Level Calibrator.

Instrument calibration was checked prior to monitoring and again at the conclusion with no difference noted between the two measurements. All data handling and analysis has been completed by a member of the Australian Acoustical Society, being at the grade of 'Associate Member' or higher.

2.3.2 Alternate Monitoring Locations

During previous noise monitoring events Boral identified a need to undertake monitoring works at alternate (publically accessible) locations instead of the potentially affected receiver locations (receiver locations) specified in *Table 2.1* of this report at the request of the residents.

The INP does allow for alternate approaches to establishing other measurement locations, if justification is provided. ERM first completed an acoustics survey at each resident's property; measurement locations in near proximity to each receiver location; and at the proposed alternate (publically accessible) locations for each receiver. This identified that the acoustic conditions were broadly similar to those at the potentially affected receiver locations.

ERM then completed a modelling assessment of site noise emissions at the nearest potentially affected receiver locations and at a range of alternate locations proposed for each receiver. The alternate locations were then optimised based on noise contour mapping data with the aim of ensuring the most affected accessible point was selected for each location. This process enabled ERM to determine a site noise level contribution at the selected alternate location and then extrapolate to the receiver location for comparison to criteria

2.4 *ADVERSE METEOROLOGICAL CONDITIONS*

Adverse meteorological conditions have the potential to increase noise levels, for example wind speeds up to 3m/s or temperature inversions, however wind speeds above 5m/s (and rainfall) have the potential to generate extraneous and erroneous noise events which reduce the accuracy and confidence in measured data.

These events also increase ambient noise levels, to the extent that a site's noise emission (which may be typically audible) is masked by these events, becoming inaudible.

2.4.1 *April 2014 Conditions*

During the April 2014 monitoring period adverse weather conditions (minimal rainfall only) were observed, however their effect did not impact the collection of reliable noise data at receiver locations attended during the monitoring event.

Wind speeds were generally calm or below 1m/s and thus did not increase ambient noise levels associated with wind-blown vegetation (a feature of the receiver areas). Wind direction during the monitoring was observed to generally occur from a westerly or south-west direction. Temperatures varied depending on the time of day that the monitoring occurred but cloud coverage was broadly similar, generally between one and three octas coverage.

There was no consistent trend in meteorological data throughout the month of April in 2014, this is shown in the monthly Bureau of Meteorology (BOM) weather summary data for the Goulburn Airport Automated Weather Station (AWS); included here as *Annex B*.

3 ASSESSMENT RESULTS

This chapter presents the results, findings and recommendations of the continuous unattended and operator attended noise monitoring conducted during three day monitoring period between Tuesday, 15 April and Thursday, 17 April 2014.

Attended noise monitoring was completed on the night of Wednesday, 16 April and early morning of Thursday, 17 April 2014 to measure operational noise for approved works undertaken during the night time (10pm to 7am) assessment period.

3.1 NOISE GENERATING ACTIVITIES

The April 2014 monitoring event included increased primary and processing test operations and rail movements. The METSO LT160 primary (mobile) crusher (and Hitachi 120T excavator; used to feed the crusher) were operational. Rail movements on the rail siding were also undertaken and a number of conveyors were in use.

Other general site noise emission sources (noise generating activities) were observed by ERM to include the processing buildings, limited use of motion alarms; heavy vehicles (articulated dump trucks etc.), front end loaders, hand tools, general site vehicles, locomotive engines and horns and occasional metal on metal contact. ERM understand that this is consistent with the current level of day to day activity associated with quarry operations.

The METSO LT160 primary crusher was previously identified to be the "loudest" item of machinery in use on site, however at the Receiver 16 (Pace) on-site noise monitoring location rail siding noise emissions were clearly "louder" and dominated the measurement data.

3.2 OPERATOR ATTENDED MEASUREMENTS

Measured overall ambient and background noise levels are presented in *Table 3.1*, *Table 3.2* and *Table 3.3* including all relevant statistical and acoustic parameters i.e. L_{Amax}, L_{Amin}, L_{Aeq}, L_{A1}, L_{A10} and L_{A90}. All measurements were of 15 minutes duration and all noise levels are expressed in dB(A) re: 2×10^{-5} Pa.

Table 3.1 Measured Overall Noise Levels – 15 April 2014

Receiver ID	Description	Start Time	Measured Noise Levels[1,2,3]					
			Lmax	Lmin	Leq	L1	L10	L90
16	Pace	11:28	64	29	46	59	48	32
16	Pace	11:43	68	29	39	49	41	32
6	Bartolo	12:46	60	37	45	52	50	39
6	Bartolo	13:03	72	38	52	58	56	44
5	Cooper	13:32	62	29	43	57	41	31
5	Cooper	13:48	62	28	43	56	45	30
2	Ordasi	14:38	58	35	44	53	47	38
2	Ordasi	14:53	63	36	44	52	47	39

Table 3.2 Measured Overall Noise Levels – 16 April 2014

Receiver ID	Description	Start Time	Measured Noise Levels[1,2,3]					
			Lmax	Lmin	Leq	L1	L10	L90
2	Ordasi	09:26	67	30	42	51	46	33
16	Pace	09:56	59	31	42	53	44	34
4	Armitt	10:21	54	35	43	50	45	39
4	Armitt	10:36	56	34	40	48	43	36
1	Montgomery	11:18	65	30	43	53	46	33
1	Montgomery	11:34	69	28	46	60	40	31
6	Bartolo	12:17	66	35	41	44	42	38
5	Cooper	12:37	56	29	36	45	38	32
2	Ordasi	23:24	52	30	35	42	36	33
2	Ordasi	23:42	44	28	34	39	37	30

Table 3.3 Measured Overall Noise Levels – 17 April 2014

Receiver ID	Description	Start Time	Measured Noise Levels[1,2,3]					
			Lmax	Lmin	Leq	L1	L10	L90
16	Pace	00:10	55	32	38	47	40	34
16	Pace	00:25	51	31	36	42	38	33
1	Montgomery	01:07	54	30	36	49	37	32
1	Montgomery	01:23	50	33	38	43	40	35
6	Bartolo	01:58	62	30	42	50	45	37
6	Bartolo	02:15	56	32	42	48	45	37
5	Cooper	02:36	43	26	31	35	32	28
5	Cooper	02:52	48	26	34	44	36	29
4	Armitt	03:25	53	34	39	44	41	36
4	Armitt	03:40	57	35	40	48	41	38

3.2.1 *Discussion*

Table 3.1 to *Table 3.3* provides the measured overall noise levels from monitoring completed between Tuesday, 15 April and Wednesday, 16 April 2014. Ambient noise levels represent the overall acoustic environment, a combination of site noise emissions and extraneous emissions. During the daytime assessment period quarry operations were just audible at the majority of receiver locations and did not dominate the acoustic environment, masked by extraneous noise emissions not associated with the site. During the night time assessment period quarry operations were clearly audible, with limited masking by extraneous noise emissions.

Observed extraneous noise sources (not associated with the site) included emissions associated with wind-blown vegetation, near-by fauna, aircraft noise, other industrial premises and some operator noise.

Observed Meteorological Conditions

Meteorological conditions during the daytime assessment period included temperatures of between approximately 12 and 22°C, average wind speeds of between 0m/s and 0.8m/s (generally from a south-west direction) and cloud coverage of approximately 2/8 octas. Meteorological conditions during the night time assessment period included temperatures of between approximately 10 and 11°C, no detectable winds (<0.1m/s) and cloud coverage of 1/8 octas.

3.2.2 *Daytime Compliance Assessment*

ERM has completed the noise compliance assessment comparing resultant site noise level contributions ($L_{Aeq,\ 15\ minute}$) to the operational noise impact assessment criteria, as presented in *Table 3.4*, *Table 3.5* and *Table 3.6*. All measurements were of 15 minutes duration and all noise levels are expressed in dB(A) re: 2×10^{-5} Pa. ERM considered INP modifying factor corrections for tonal, low-frequency or impulsive noise where necessary.

Table 3.4 Compliance Assessment – 15 April 2014

Receiver ID	Description	Operational Noise Impact Assessment Criteria[1]	Site Noise Level Contribution Leq, 15 minute	Comply with Criteria
16[1]	Pace	41	<20	Yes
16[1]	Pace	41	20	Yes
6	Bartolo	35	29	Yes
6	Bartolo	35	31	Yes
5	Cooper	35	21	Yes
5	Cooper	35	20	Yes
2	Ordasi	39	28	Yes
2	Ordasi	39	29	Yes

1. Includes deduction to extrapolate from the on-site location to the receiver location.

Table 3.5 Compliance Assessment – 16 April 2014

Receiver ID	Description	Operational Noise Impact Assessment Criteria[1]	Site Noise Level Contribution Leq, 15 minute	Comply with Criteria
2	Ordasi	39	<20	Yes
16[2]	Pace	41	<20	Yes
4	Armitt[1]	37	29	n/a
4	Armitt[1]	37	29	n/a
1	Montgomery[1]	35	31	n/a
1	Montgomery[1]	35	31	n/a
6	Bartolo	35	28	Yes
5	Cooper	35	<20	Yes
2	Ordasi	35	30	Yes
2	Ordasi	35	32	Yes

1. Following land acquisition or negotiated agreements, this receiver location is now part of the overall Boral land ownership; and
2. Includes deduction to extrapolate from the on-site location to the receiver location.

Table 3.6 Compliance Assessment – 17April 2014

Receiver ID	Description	Operational Noise Impact Assessment Criteria[1]	Site Noise Level Contribution Leq, 15 minute	Comply with Criteria
16[2]	Pace	35	35	Yes
16[2]	Pace	35	33	Yes
1[1]	Montgomery	35	33	n/a
1[1]	Montgomery	35	37	n/a
6	Bartolo	35	27	Yes
6	Bartolo	35	27	Yes
5	Cooper	35	27	Yes
5	Cooper	35	29	Yes
4[1]	Armitt	35	39	n/a
4[1]	Armitt	35	37	n/a

1. Following land acquisition or negotiated agreements, this receiver location is now part of the overall Boral land ownership; and
2. Includes deduction to extrapolate from the on-site location to the receiver location.

Discussion

The results presented in *Table 3.3* and *Table 3.4* identify that current quarry operations continue to comply with the relevant daytime operational noise impact assessment criteria contained in Boral's November 2012 approval, at all receiver locations.

Quarry operations comply with the relevant night time operational noise impact assessment criteria contained in Boral's November 2012 approval, at all receiver locations not part of the overall Boral land ownership. Night time quarry operations generated noise levels that exceeded the relevant night time operational noise impact assessment criteria at two receiver locations, these properties are both part of the overall Boral land ownership following land acquisition or negotiated agreements.

3.2.3 *Night Time Compliance Assessment*

Based on observed site noise events and further review of recorded audio files for each operator attended noise measurement, ERM has determined the highest resultant ($L_{A,\ 1\ minute}$) site noise level contribution for each night time measurement. These values are compared to the $L_{A,\ 1\ minute}$ operational noise impact assessment criteria applicable during the evening and night time period, as presented in *Table 3.7*. All noise levels are expressed in dB(A) re: 2 x 10^{-5} Pa.

Table 3.7 Night Time $L_{A1,\ 1minute}$ Compliance Assessment

Receiver ID	Description	Operational Noise Impact Assessment Criteria[1]	Site Noise Level Contribution L1, 1 minute	Comply with Criteria
2	Ordasi	45	33	Yes
2	Ordasi	45	40	Yes
16[2]	Pace	45	43	Yes
16[2]	Pace	45	38	Yes
1[1]	Montgomery	45	39	n/a
1[1]	Montgomery	45	45	n/a
6	Bartolo	45	29	Yes
6	Bartolo	45	29	Yes
5	Cooper	45	18	Yes
5	Cooper	45	20	Yes
4[1]	Armitt	46	46	n/a
4[1]	Armitt	46	28	n/a

1. Following land acquisition or negotiated agreements, this receiver location is now part of the overall Boral land ownership; and
2. Includes deduction to extrapolate from the on-site location to the receiver location.

3.3 *UNATTENDED MEASUREMENTS*

Overall ambient noise levels measured during the INP daytime ($L_{Aeq,\ 11hr}$, 7am to 6pm), evening ($L_{Aeq,\ 4hr}$, 6pm to 10pm) and night time ($L_{Aeq,\ 9hr}$, 10pm to 7am) assessment periods, and the estimated site noise level contribution determined from unattended noise monitoring are presented below. All noise levels are $L_{Aeq,\ period}$ and are expressed in dB(A) re: 2 x 10^{-5} Pa.

Unattended noise monitoring charts are presented in *Annex B*.

Table 3.8 Unattended Noise Monitoring Results

Receiver ID	Description	Cumulative Operational Noise Impact Assessment Criteria			Overall Ambient Noise Level			Estimated Site Noise Level Contribution			Comply with Criteria
		Daytime	Evening	Night	Daytime	Evening	Night	Daytime	Evening	Night	
2	Ordasi	50	45	40	41	41	40	<30	<30	32	Yes
5	Cooper	50	45	40	49	42	42	<30	<30	29	Yes
6	Bartolo	50	45	40	43	36	43	31	<30	27	Yes
16	Pace	50	45	40	54	36	42	<30	<30	35	Yes

3.3.1 Discussion

Unattended site noise level contributions were estimated based on observed noise events noted during noise logger deployment, review of ERM attended measurement results (including audio data analysis) and review of field logs. Site noise level contributions were estimated via calculation to exclude extraneous noise emissions, which were of influence during the unattended monitoring period.

Extraneous noise sources (not associated with the site) noted during noise logger deployment were similar to those of operator attended noise measurements and included emissions associated with wind-blown vegetation, near-by fauna, aircraft noise and other industrial premises. At each of these locations, quarry noise was typically inaudible (or just audible) during the daytime period and did not dominate the acoustic environment of the area, masked by extraneous noise.

Quarry Noise Compliance

$L_{Aeq,\ 11\ Hour}$ site noise level contributions are below the daytime cumulative criteria ($L_{Aeq,\ 11\ Hour}$ 50 dB(A)) applicable to unattended noise monitoring analysis. Works and associated noise emissions are assumed to be similar during the evening period, and as such, $L_{Aeq,\ 4\ Hour}$ site noise level contributions are below the evening cumulative criteria ($L_{Aeq,\ 4\ Hour}$ 45 dB(A) – Evening). Night time site noise emissions were more clearly detectable but remained below the $L_{Aeq,\ 9\ Hour}$ 40 dB(A) – Night criteria.

Cumulative Noise Compliance

It is important to note that Schedule 3, Condition 6 of the Project Approval requires that the noise generated by the project combined with the noise generated by other extractive industries does not exceed the amenity criteria. Other extractive industries were not always clearly audible at Receiver 5 (Cooper) and Receiver 6 (Bartolo), but were observed to be equal to, or marginally louder than, the quarry at Receiver 2 (Ordasi) and Receiver 16 (Pace). The contribution of the quarry and other extractive sites varied depending on the receiver's proximity to the various noise sources and the works being undertaken.

Assuming a representative worst-case scenario in which other extractive industries contribute an equal (or marginally higher) noise level to those from the quarry at the most affected receiver, overall noise levels are still unlikely to increase to be above the daytime, evening or night time amenity criteria. For example, if other extractive industries in the area were to generate a $L_{Aeq,\ 9\ Hour}$ night time level at Receiver 16 (Pace) approximately 1 dB(A) above that of the quarry, the combined noise levels would increase by approximately 3.5 dB(A) above the quarry alone contribution, but would remain below even the most stringent night time amenity criteria value.

4 *RECOMMENDATIONS*

ERM makes the following in-principle acoustics recommendations. These are designed to assist Boral in managing noise emissions from quarry operations and ensuring that all feasible and reasonable measures are considered for the quarry in complying with the operational noise impact assessment criteria, in accordance with the November 2012 Project Approval. It is recommended that Boral:

- continue to ensure that all significant noise generating plant and equipment are procured, maintained and managed to reduce noise and that mitigation is applied where feasible, reasonable and necessary;
- avoid concentrations of equipment in sensitive work areas e.g. on top of the dump or bund;
- avoid bunching of trucks along internal haul roads;
- continue monitoring of local meteorological conditions to manage the placement of equipment so that it is suitable for the best acoustic outcome for those conditions; and
- continue noise compliance monitoring at affected receiver(s) in accordance with *Section 2* of *(06_0074)* the November 2012 Project Approval, or at alternate monitoring locations, justified as per the requirements of the INP.

ERM makes no additional recommendations but notes that Boral continues to manage noise generated by quarry plant and equipment within the site, and generally continues to operate within the operational noise criteria specified in the November 2012 Project Approval.

5 CONCLUSION

ERM, on behalf of Boral Resources (NSW) Pty Ltd, has completed noise compliance monitoring for the current quarrying and associated works at Peppertree Quarry. The assessment was undertaken with due regard to and in accordance with local and international standards, guidelines and documents presented in this report.

Daytime site noise emissions associated with quarry operations continue to comply with the relevant $L_{Aeq,\ 15\ minute}$ operational noise impact assessment criteria contained in Boral's November 2012 approval.

Night time site noise emissions comply with the relevant $L_{Aeq,\ 15\ minute}$ and $L_{1,\ 1\ minute}$ operational noise impact assessment criteria, at all receiver locations not part of the overall Boral land ownership. Night time quarry operations generated noise levels that exceeded the $L_{Aeq,\ 15\ minute}$ night time operational noise impact assessment criteria at two receiver locations, these properties are both part of the overall Boral land ownership following land acquisition or negotiated agreements.

Daytime, evening and night time site noise level contributions ($L_{Aeq,\ period}$) are below the cumulative criteria applicable to unattended noise monitoring analysis. Furthermore, overall noise levels (inclusive of all other extractive industries) are unlikely to increase so as to be above the daytime, evening or night time cumulative criteria.

ERM makes no additional recommendations and notes that Boral continues to manage noise generated by plant and equipment within the site and continues to operate within the operational noise impact assessment criteria specified in the November 2012 Project Approval for the majority of works.

REFERENCES

Marulan South Consolidated Project Approval (06_0074) November 2012

Peppertree Quarry Noise and Blast Monitoring Plan, dated August 2012

Peppertree Quarry Construction Noise Management Plan, dated August 2012

Peppertree Quarry Environmental Monitoring Program, dated August 2012

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

NSW Department of Environment and Climate Change – **NSW Interim Construction Noise Guideline** (ICNG), July 2009

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 Monitoring**

International Organisation for Standardisation (ISO) 9613-2:1996 (ISO9613:2) - **Acoustics - Attenuation of Sound during Propagation Outdoors - Part 2: General Method of Calculation**

Standards Australia AS 2436–2010™ (AS2436) – **Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites**

Annex A

Acoustics Glossary

A.1 WHAT IS NOISE AND VIBRATION?

A.1.1 Noise

Noise is often defined as a sound, especially one that is loud or unpleasant or that causes disturbance* or simply as unwanted sound, but technically, noise is the perception of a series of compressions and rarefactions above and below normal atmospheric pressure.

A.1.2 Vibration

Vibration refers to the oscillating movement of any object. In a sense noise is the movement of air particles and is essentially vibration, though in regards to an environmental assessment vibration is typically taken to refer to the oscillation of a solid object(s). The impact of noise on objects can lead to vibration of the object, or vibration can be experienced by direct transmission through the ground, this is known as ground-borne vibration.

Essentially, noise can be described as what a person hears, and vibration as what they feel.

A.2 HOW TO MEASURE AND DESCRIBE NOISE?

Noise is measured using a specially designed 'sound level' meter which must meet internationally recognised performance standards. Audible sound pressure levels vary across a range of 10^7 Pascals (Pa), from the threshold of hearing at 20μPa to the threshold of pain at 200Pa. Scientists have defined a statistically described logarithmic scale called Decibels (dB) to more manageably describe noise.

To demonstrate how this scale works, the following points give an indication of how the noise levels and differences are perceived by an average person:

- 0 dB - represents the threshold of human hearing (for a young person with ears in good condition);
- 50 dB – represents average conversation;
- 70 dB – represents average street noise, local traffic etc;
- 90 dB – represents the noise inside an industrial premises or factory;
- 140 dB - represents the threshold of pain – the point at which permanent hearing damage may occur.

A.3 WHAT FACTORS CONTRIBUTE TO ENVIRONMENTAL NOISE?

The noise from an activity, like construction works, at any location can be affected by a number of factors, the most significant being:

- how loud the activity is;
- how far away the activity is from the receiver;
- what type of ground is between the activity and the receiver location e.g. concrete, grass, water or sand;
- how the ground topography varies between the activity and the receiver (is it flat, hilly, mountainous) as blocking the line of sight to a noise source will generally reduce the level of noise; and
- any other obstacles that block the line of sight between the source to receiver e.g. buildings or purpose built noise walls.

A.4 HOW TO CALCULATE OR MODEL NOISE LEVELS?

There are two recognised methods which are commonly adopted to determine the noise at particular location from a proposed activity. The first is to undertake noise measurements whilst the activity is in progress and measure the noise, the second is to calculate the noise based on known noise emission data for the activity in question.

The second option is preferred as the first option is largely impractical in terms of cost and time constraints, notwithstanding the meteorological factors that may also influence its quantification. Furthermore, it is also generally considered unacceptable to create an environmental impact simply to measure it. In addition, the most effective mitigation measures are determined and implemented during the design phase and often cannot be readily applied during or after the implementation phase of a project.

Because a number of factors can affect how 'loud' a noise is at a certain location, the calculations can be very complex. The influence of other ambient sources and the contribution from a particular source in question can be difficult to ascertain. To avoid these issues, and to quantify the direct noise contribution from a source/site in question, the noise level is often calculated using noise modelling software packages. The noise emission data used in each noise model of this assessment has been obtained from ERM's database of measured noise emissions.

A.5 ACOUSTIC TERMINOLOGY & STATISTICAL NOISE DESCRIPTORS

Environmental noise levels such as noise generated by industry, construction and road traffic are commonly expressed in dB(A). The A-weighting scale follows the average human hearing response and enables comparison of the intensity of noise with different frequency characteristics. Time varying noise sources are often described in terms of statistical noise descriptors. The following descriptors are commonly used when assessing noise and are referred to throughout this acoustic assessment:

- **Decibel (dB is the adopted abbreviation for the decibel) –** The unit used to describe sound levels and noise exposure. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure;

- **dB(A)** - unit used to measure 'A-weighted' sound pressure levels. A-weighting is an adjustment made to sound-level measurement to approximate the response of the human ear;

- **dB(C) –** unit used to measure 'A-weighted' sound pressure levels. C-weighting is an adjustment made to sound-level measurements which takes account of low-frequency components of noise within the audibility range of humans;

- **dB(Z) or dB(L) –** unit used to measure 'Z-weighted' sound pressure levels with no weighting applied, linear;

- **Hertz (Hz)** - the measure of frequency of sound wave oscillations per second. 1 oscillation per second equals 1 hertz;

- **Octave –** a division of the frequency range into bands, the upper frequency limit;

- **1/3 Octave –** single octave bands divided into three parts;

- **Leq** - this level represents the equivalent or average noise energy during a measurement period. The $L_{eq, 15min}$ noise descriptor simply refers to the L_{eq} noise level calculated over a 15 minute period. Indeed, any of the below noise descriptors may be defined in this way, with an accompanying time period (e.g. $L_{10, 15\ minute}$) as required;

- **Lmax** - the absolute maximum noise level in a noise sample;

- **LN -** the percentile sound pressure level exceeded for N% of the measurement period calculated by statistical analysis;

- **L_{10} -** the noise level exceeded for 90 per cent of the time and is approximately the average of the maximum noise levels;

- **L90** - the noise level exceeded for 90 per cent of the time and is approximately the average of the minimum noise levels. The L90 level is often referred to as the "background" noise level and is commonly used as a basis for determining noise criteria for assessment purposes;

- **Sound Power Level (L_W)** - this is a measure of the total power radiated by a source. The Sound Power of a source is a fundamental property of the source and is independent of the surrounding environment;

- **Sound Pressure Level (L_P)** - the level of sound pressure; as measured at a distance by a standard sound level meter with a microphone. This differs from L_W in that this is the received sound as opposed to the sound 'intensity' at the source;

- **Air-blast Overpressure –** a transient air pressure, such as the shock wave from an explosion that is greater than the surrounding atmospheric pressure;

- **Background noise** – the underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the L_{A90} descriptor;

- **Ambient noise** – the all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far;

- **Cognitive noise** – noise in which the source is recognised as being annoying; and

- **Masking** – the phenomenon of one sound interfering with the perception of another sound. For example, the interference of traffic noise with use of a public telephone on a busy street.

A.6 TERMS TO DESCRIBE THE PERCEPTION OF NOISE

The following concepts offer qualitative guidance in respect of the average response to changes in noise levels:

- differences in noise levels of less than approximately 2 dB(A) are generally imperceptible in practice;

- differences in noise levels of around 5 dB(A) are considered to be significant; and

- differences in noise levels of around 10 dB(A) are generally perceived to be a doubling (or halving) of the perceived loudness of the noise.

The following terms offer quantitative and qualitative guidance in respect of the audibility of a noise source:

- **Inaudible / Not Audible** - the noise source and/or event could not be heard by the operator, masked by extraneous noise sources not associated with the source. If a noise source is 'inaudible' its noise level may be quantified as being less than the measured L_{A90} background noise level, potentially by 10 dB or greater;

- **Barely Audible** – the noise source and/or event are difficult to define by the operator, typically masked by extraneous noise sources not associated with the source. If a source is 'barely audible' its noise level may be quantified as being 5 - 7 dB below the measured L_{A90} or L_{Aeq} noise level, depending on the nature of the source e.g. constant or intermittent;

- **Just Audible** – the noise source and/or event may be defined by the operator. However there are a number of extraneous noise sources contributing to the measurement. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator;

- **Audible** - the noise source and/or event may be easily defined by the operator. There may be a number of extraneous noise sources contributing to the measurement. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator; and

- **Dominant** – the noise source and/or event are noted by the operator to be significantly 'louder' than all other noise sources. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator.

The following terms offer qualitative guidance in respect of acoustic terms used to describe the frequency of occurrence of a noise source during an operator attended environmental noise measurements:

- **Constant** – this indicates that the operator has noted the noise source(s) and/or event to be constantly audible for the duration of the noise measurement e.g. an air-conditioner that runs constantly during the measurement;

- **Intermittent** – this indicates that the operator has noted the noise source(s) and/or event to be audible, stopping and starting intervals for the duration of the noise measurement e.g. car pass-by's; and

- **Infrequent** – this indicates that the operator has noted the noise source(s) and/or event to be constantly audible, however; not occurring regularly or at intervals for the duration of the noise measurement e.g. a small number of aircraft are noted during the measurement.

A.6.1 Industrial Noise Policy (INP Terminology)

- **Assessment Background Level (ABL)** - is defined in the INP as a single figure background level representing each assessment period (day, evening and night). Its determination is by the tenth percentile method (of the measured L_{A90} statistical noise levels) described in *Appendix B* on the INP; and

- **Rating Background Level (RBL)** - is defined in the INP as the overall single figure background level representing each assessment period (day, evening and night) over the whole monitoring period (as opposed to over each 24hr period used for the ABL). This is the level used for assessment purposes. It is defined as the median value of:

  - All the day assessment background levels over the monitoring period for the day;

  - All the evening assessment background levels over the monitoring period for the evening; or

  - All the night assessment background levels over the monitoring period for the night.

- **Extraneous noise –** noise resulting from activities that are not typical of the area. Atypical INP activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous;

- **Most affected location(s) –** locations that experience (or will experience) the greatest noise impact from the noise source under consideration. In determining these locations, one needs to consider existing background levels, exact noise source location(s), distance from source (or proposed source) to receiver, and any shielding between source and receiver;

- **Noise criteria –** the general set of non-mandatory noise level targets for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity (for example, noise levels for various land uses);

- **Noise limits –** enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action;

- **Project Specific Noise Levels –** target noise levels for a particular noise generating facility. They are based on the most stringent of the intrusive criteria or amenity criteria. Which of the two criteria is the most stringent is determined by measuring the level and nature of existing noise in the area surrounding the actual or propose noise generating facility;

- **Compliance** – the process of checking that source noise levels meet with the noise limits in a statutory context;

- **Non-compliance** – development is deemed to be in non-compliance with its noise consent/ licence conditions if the monitored noise levels exceed its statutory noise limit by more than 2 dB;

- **Feasible and Reasonable measures** – feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors:

  - noise mitigation benefits (amount of noise reduction provided, number of people protected);

  - cost of mitigation (cost of mitigation versus benefit provided);

  - community views (aesthetic impacts and community wishes); and

  - noise levels for affected land uses (existing and future levels, and changes in noise levels).

- **Meteorological Conditions** – wind and temperature inversion conditions;

- **Temperature Inversion** – an atmospheric condition in which temperature increases with height above the ground; and

- **Adverse Weather** – weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).

A.7 OPERATOR ATTENDED NOISE MEASUREMENTS

Noise level deductions that may be applied based on the percentage contribution of a noise source(s) are presented in *Table A.1* below.

Table A.1 Noise Level Deductions – Noted Percentile Contribution

Percentage Contribution	Noise Level Deduction, dB(A)
5%	-13.0
10%	-10.0
15%	-8.2
20%	-7.0
25%	-6.0
30%	-5.2
35%	-4.6
40%	-4.0
45%	-3.5
50%	-3.0
55%	-2.6
60%	-2.2
65%	-1.9
70%	-1.5
75%	-1.2
80%	-1.0
85%	-0.7
90%	-0.5
95%	-0.2
100%	0.0

1. **EXAMPLE:** the measured $L_{Aeq,\ 15\ minute}$ noise level is 49 dB and the site contribution was observed to be 10% of this level (extraneous noise sources were noted to dominate the measurement), therefore the $L_{Aeq,\ 15\ minute}$ noise level deduction is 10 dB, with a resultant noise level contribution of approximately 39 dB.

Noise level deductions that may be applied based on the percentage of time that a noise source(s) is audible during a 15 minute measurement are presented in *Table A.2* below.

Table A.2 Noise Level Deductions – Noted Time Contribution

Event Duration (minutes)	Noise Level Deduction, dB(A)
1	-11.8
2	-8.8
3	-7.0
4	-5.7
5	-4.8
6	-4.0
7	-3.3
8	-2.7
9	-2.2
10	-1.8
11	-1.3
12	-1.0
13	-0.6
14	-0.3
15	-0.0

1. **EXAMPLE:** the measured LAeq, 15 minute noise level contribution of an excavator was noted to be 56 dB, however it was only audible for 6 minutes during the 15 minute measurement period, therefore the LAeq, 15 minute noise level deduction is 4 dB, with a resultant noise level contribution of approximately 52 dB.

Annex B

Goulburn AWS Weather Data (April 2014)

Annex C

Unattended Noise Logging Charts

DRAFT REPORT

Boral Resources (NSW) Pty Ltd

Peppertree Quarry

Noise Compliance Monitoring

Monitoring Period: July 2014
Reporting Period: October 2016

Reference: 0210419RP07

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EXECUTIVE SUMMARY

General Overview

Environmental Resources Management Australia Pty Ltd has completed noise compliance monitoring for the current quarrying and associated works at Peppertree Quarry, located at Marulan South in the Southern Tablelands of New South Wales (NSW).

Monitoring was undertaken on behalf of Boral Resources (NSW) Pty Ltd, with due regard to, and in accordance with, local and international standards, guidelines and documents presented in this noise compliance monitoring report.

Assessment Findings

Daytime site noise emissions associated with quarry operations continue to comply with the relevant $L_{Aeq,\ 15\ minute}$ operational noise impact assessment criteria contained in Boral's November 2012 approval.

Night time site noise emissions comply with the relevant $L_{Aeq,\ 15\ minute}$ and $L_{1,\ 1\ minute}$ operational noise impact assessment criteria at all receiver locations.

Daytime, evening and night time site noise level contributions ($L_{Aeq,\ period}$) are below the cumulative criteria applicable to unattended noise monitoring analysis. Furthermore, overall noise levels (inclusive of all other extractive industries) are considered unlikely to increase such that the daytime, evening or night time cumulative criteria will be exceeded.

ERM makes no additional recommendations and notes that Boral continues to manage noise generated by plant and equipment within the site, and continues to operate within the operational noise impact assessment criteria specified in the November 2012 Project Approval for the majority of works.

1 INTRODUCTION

This document has been prepared by Environmental Resources Management Australia Pty Ltd (ERM) on behalf of Boral Resources (NSW) Pty Ltd (Boral). It presents the methodology, findings and recommendations of noise compliance monitoring conducted at the Peppertree Quarry (the quarry), located at Marulan South in the Southern Tablelands of New South Wales (NSW) during July 2014.

1.1 RELEVANT DOCUMENTS, STANDARDS AND GUIDELINES

This report has been prepared with due regard to and in accordance with the following documents, standards and guidelines:

- Marulan South Consolidated Project Approval (06_0074) November 2012;
- the *Peppertree Quarry Noise and Blast Monitoring Plan* (NBMP) and the *Peppertree Quarry Environmental Monitoring Program* (EMP);
- NSW Environment Protection Authority – NSW *Environmental Noise Management – Industrial Noise Policy* (INP), January 2000 and relevant application notes;
- Standards Australia AS1055–1997™ (AS1055) – *Description and Measurement of Environmental Noise*, Parts 1, 2 and 3; and
- Standards Australia AS IEC 61672.1–2004™ (AS61672) – *Electro Acoustics - Sound Level Meters Specifications Monitoring*.

A glossary of relevant acoustic concepts and terminology is presented as *Annex A*.

1.2 BACKGROUND

Boral was granted project approval (06_0074) to establish and operate the Peppertree Quarry (a granodiorite hard rock quarry, formerly called the Marulan South Quarry) including all in-pit quarrying activities and supporting infrastructure such as a rail siding and loading facility, processing plant and water supply dams, under Part 3A of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) in February 2007.

Under Section 75W of the *Environment Planning and Assessment Act 1979*, Boral subsequently applied for approval for a modification of the Peppertree Quarry Development in regards to rail line construction and operations. Boral received a 'Notice of Modification' for the Peppertree Quarry Project Approval (06_0074), dated Thursday, 3 November 2011. This notice approved the revised Project, consolidating relevant aspects of March 2009 and November 2011 modifications. A further modification was applied for in September 2012 for approval of the installation and operation of a High

Voltage Power line to the Peppertree Quarry site and an extension of the existing Medway rail siding. This modification application was approved Friday, 2 November 2012.

1.2.1 Noise and Vibration Management

ERM was engaged to prepare the NBMP for the quarry in accordance with the Project Approval and subsequent modifications; incorporating key components of the noise and blast monitoring programs for the quarry.

The NBMP monitoring program has been established and incorporated into the overall Environmental Monitoring Program (EMP), which consolidates the specific requirements of the abovementioned monitoring program as well as other monitoring required by specific Project Approval conditions. The EMP provides an overall framework to assist with the implementation of monitoring for the project.

The purpose of the NBMP is to fulfil the requirement of Schedule 3 of the Project Approval and the Statement of Commitments contained within the Part 3A Environmental Assessment. The NBMP, amongst other things, it provides procedures for monitoring and assessing noise impacts from the quarry and methods to determine compliance with the operational noise impact assessment criteria.

ERM has been engaged to conduct quarterly noise compliance monitoring on behalf of Boral in accordance with the NBMP and Project Approval conditions for the quarry. This round of monitoring includes measurements during both the daytime and night time assessment periods.

1.2.2 Hours of Operation

Quarry operations are currently in progress with site works and activities complying with the hours of operation presented in Condition 11; Table 3 of the November 2012 Project Approval. These approved hours of operation are reproduced below in *Table 1.1*.

Table 1.1 Approved Hours of Operation

Activity	Day	Time
Construction works	Monday-Friday	7.00am to 6.00pm
	Saturday	8.00am to 1.00pm
	Sunday and public holidays	None
Topsoil/overburden removal/emplacement	Any day	7.00am to 7.00pm
Blasting	Monday-Saturday	9.00am to 5.00pm
	Sunday and public holidays	None
In-pit activities (including drilling, extraction, processing, and transfer of material out of the pit)	Any day	7.00am to 7.00pm
Out-of-pit activities (including processing, stockpiling, train loading and distribution, and maintenance)	Any day	24 hours

Guidance Note

Under Section 75W of the Environment Planning and Assessment Act 1979 Boral received a 'Notice of Modification' for the (06_0074) Peppertree Quarry Project Approval. This notice, received on Thursday, 3 November 2011 also enabled a revised Project Approval to be prepared which consolidated relevant aspects of March 2009 and November 2011 modifications.

During this process and in consultation with the NSW Department of Planning and Infrastructure (DoPI), Boral received advice that construction noise criteria would remain valid through January 2012 and thereafter, the operational noise impact assessment criteria (as presented in Schedule 3, Section 4: Table 1 of the November 2011 modification) would apply. The subsequent approval in November 2012 does not alter the application of the operational noise criteria as outlined above; complying with DoPI advice the construction noise criteria are no longer valid for assessing quarry noise emissions.

This report presents the noise compliance assessment prepared with due regard to the November 2012 operational noise impact assessment criteria, that apply for the quarry site, as the Project Approval required that construction noise criteria were complied with for the first three months of construction (valid to January 2012) and that thereafter, site construction noise emissions must meet the operational noise impact assessment criteria.

1.3 SITE UNDERSTANDING

The Peppertree Quarry is located in the Southern Tablelands of NSW, approximately 10 kilometres (km) southeast of Marulan and 175 km southwest of Sydney.

The site, the project-specific noise sensitive localities (including the unique identification number used to describe each location) and other items of acoustic importance relative to this assessment are visually presented in *Figure 1.1.*

Guidance Note

Following land acquisition, three receiver locations that were identified in earlier project approvals documentation (Receiver 1, Receiver 3 and Receiver 4) are now part of the overall Boral land ownership, and hence monitoring to determine compliance is no longer required at these sites, as Boral have negotiated agreements in place.

The remaining project-specific noise sensitive localities from the November 2012 Project Approval, where noise has been measured and assessed, are presented in *Figure 1.1*.

Figure 1.1 Locality Map

A4

2 ASSESSMENT METHODLOGY

This section presents an overview of the noise compliance monitoring methodology for continuous unattended and operator attended noise monitoring undertaken in accordance with the NBMP.

2.1 RECEIVER LOCATIONS

Monitoring locations representative of the receivers identified in the NBMP and Project Approval for operations are used for evaluating and assessing noise emissions from quarry operations, as presented in *Table 2.1* below and visually presented on *Figure 1.1*.

Table 2.1 Nearest Potentially Affected Receiver Locations

Receiver ID	Description	MGA (Zone 56) Coordinates		Direction and Distance from Quarry Centre	
		Easting	Northing	Compass point	Distance, m
2	Ordasi	226934	6148560	SSW	1730
5	Cooper	226592	6152540	NW	2520
6	Bartolo	226244	6153120	NW	3230
16	Pace	226094	6149665	WSW	1050

Guidance Note

Noise compliance monitoring was required to be undertaken at alternate locations for two receivers (Pace and Bartolo) as access was not available. The alternate locations were selected with due regard to the INP and as described in *Section 2.3.2*.

The alternate monitoring location selected for Receiver 16 (Pace) is situated at an accessible point on the resident's western fence line within the property boundary. The alternate monitoring location selected for Receiver 6 (Bartolo) is directly adjacent to the receiver location (~50m to the east) and is situated on the resident's eastern property boundary.

ERM notes that all noise compliance assessments are made at the nearest potentially affected receiver locations described in *Table 2.1* above.

2.2 ASSESSMENT CRITERIA

This section summarises the operational noise impact assessment criteria (including values presented in Schedule 3, Condition 4; Table 1 of the November 2012 modification) as presented in the NBMP.

2.2.1 *Operational Noise*

The Project Approval requires that the operation of the quarry is to meet the operational noise impact assessment criteria. These are reproduced in *Table 2.2*.

Table 2.2 Operational Noise Impact Assessment Criteria

Receiver ID	Description	Noise Impact Assessment Criteria, dB(A)[1,2]		
		Daytime 7:00am to 7:00pm	Evening and Night 7:00pm to 7:00am	
		LAeq, 15min	LAeq, 15min	LA1, 1min
2	Ordasi	39	35	45
5	Cooper	35	35	45
6	Bartolo	35	35	45
16	Pace	41	35	45
Any other noise sensitive location		35	35	45

1. The identified 'Daytime' noise criteria apply throughout the period of the site's Day Shift (i.e. 7.00am to 7.00pm) on all days, notwithstanding the general definitions of 'Evening' and 'Night time' otherwise applying to the approval. The identified 'Evening' and 'Night time' criteria apply only during the period of the site's Night Shift (i.e. 7.00pm to 7.00am); and
2. Noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW INP.

2.2.2 *Cumulative Noise Criteria*

ERM has also considered Schedule 3, Condition 6 of the Project Approval which states:

The Proponent shall take all reasonable and feasible measures to ensure that the noise generated by the project combined with the noise generated by other extractive industries does not exceed the following amenity criteria on any privately owned land, to the satisfaction of the Director-General:

- $L_{Aeq,\ 11hr}$ *50 dB(A) – Day;*
- $L_{Aeq,\ 4hr}$ *45 dB(A) – Evening; and*
- $L_{Aeq,\ 9hr}$ *40 dB(A) – Night.*

These cumulative values are applied to the quarry to ensure that the overall amenity noise level of the area, inclusive of all other extractive industries, does not exceed an acceptable overall noise level during each assessment period: day, evening and night. Cumulative values are assessed as an additional requirement to the operational noise impact assessment criteria presented in *Table 2.2*, which are assessed over shorter (15 minute and one minute) periods.

2.3 *MEASUREMENT METHODOLOGY*

ERM (one operator) visited the quarry on Wednesday, 16 July; Thursday, 17 July and Friday, 18 July 2014 (three days) to conduct continuous unattended and operator attended noise monitoring. Attended monitoring was completed during the daytime and night time periods to enable the measurement of operational noise for works undertaken during approved daytime and night time assessment periods.

The monitoring methodology was determined with due regard to the relevant documents, standards and guidelines presented in *Chapter 1*.

Operator attended noise measurements were conducted at the locations specified in *Table 2.1* and alternate locations selected, if necessary. Continuous unattended noise monitoring was undertaken at the following four locations:

- Receiver 2 (Ordasi);
- Receiver 5 (Cooper);
- Receiver 6 (Bartolo, alternate off-site location); and
- Receiver 16 (Pace, alternate off-site location).

2.3.1 *Measurement Equipment*

All measurements were conducted by trained ERM personnel; with due regard to, and in accordance with, the relevant local and international standards for environmental noise monitoring.

The measurement instrumentation used to complete the assessment complied with the requirements of AS 61672.1 with current NATA calibration certificates, with certification at intervals not exceeding two years at the time of use.

The equipment used for this assessment was as follows:

- 1 x Brüel & Kjær 2250 Investigator (Type 1) Sound Analyser;
- 1 x ARL Ngara (Type 1) Environmental Noise Loggers;
- 3 x RION NL-42 (Type 2) Environmental Noise Logger; and
- 1 x Brüel & Kjær (Type 1) Sound Level Calibrator.

Instrument calibration was checked prior to monitoring and again at the conclusion with no difference noted between the two measurements. All data handling and analysis has been completed by a member of the Australian Acoustical Society, being at the grade of 'Associate Member' or higher.

2.3.2 *Alternate Monitoring Locations*

During previous noise monitoring events Boral identified a need to undertake monitoring works at alternate (publically accessible) locations instead of the potentially affected receiver locations (receiver locations) specified in *Table 2.1* of this report at the request of the residents.

The INP does allow for alternate approaches to establishing other measurement locations, if justification is provided. ERM first completed an acoustics survey at each resident's property; measurement locations in near proximity to each receiver location; and at the proposed alternate (publically accessible) locations for each receiver. This identified that the acoustic conditions were broadly similar to those at the potentially affected receiver locations.

ERM then completed a modelling assessment of site noise emissions at the nearest potentially affected receiver locations and at a range of alternate locations proposed for each receiver. The alternate locations were then optimised based on noise contour mapping data with the aim of ensuring the most affected accessible point was selected for each location. This process enabled ERM to determine a site noise level contribution at the selected alternate location and then extrapolate to the receiver location for comparison to criteria.

2.4 *ADVERSE METEOROLOGICAL CONDITIONS*

Adverse meteorological conditions have the potential to increase noise levels, for example wind speeds up to 3m/s or temperature inversions, however wind speeds above 5m/s (and rainfall) have the potential to generate extraneous and erroneous noise events which reduce the accuracy and confidence in measured data.

These events also increase ambient noise levels, to the extent that a site's noise emission (which may be typically audible) is masked by these events, becoming inaudible.

2.4.1 *July 2014 Conditions*

During the July 2014 monitoring period adverse weather conditions (minimal rainfall only) were observed. Average wind speeds did not exceed 5m/s however, gusts of wind generated speeds of up to 8m/s during some operator attended measurements.

ERMs operator noted any increase in noise levels due to wind effects on the microphone. Wind effects did impact the collection of reliable noise data during some measurements and this data has been excluded for assessing compliance for this monitoring event. The measured overall ambient noise

levels are however presented (for record keeping purposes only) and are clearly identified in *Chapter 3* of this report as wind affected data.

When wind speeds were generally calm or below 3m/s wind-blown vegetation was observed to be a feature of the receiver areas. Wind direction during the monitoring was observed to occur from a westerly direction.

Temperatures varied (between 2° and 10° Celsius (C)) depending on the time of day that the monitoring occurred but cloud coverage was broadly similar, generally between 3/8 and 8/8 octas coverage.

These high westerly winds were noted to be a trend in meteorological data throughout the month of July in 2014. This is shown in the monthly Bureau of Meteorology (BOM) weather summary data for the Goulburn Airport Automated Weather Station (AWS); included here as *Annex B*.

2.5 *DETERMINING COMPLIANCE*

This section outlines the approach adopted by ERM to determine site noise level contributions based on data and observations recorded during operator attended measurements and unattended noise monitoring.

2.5.1 *Operator Attended Measurements*

Site noise level contributions have been determined in the absence of any influential extraneous noise emission sources not associated with quarry operations.

During some measurements site noise levels could be directly measured as they were audible (and detectable) for the duration of the measurement. In this case the measured values are directly reported following consideration of any INP modifying (penalty) factors e.g. for tonality or low frequency content.

On other occasions, site noise emissions were infrequently audible due to the influence of extraneous sources that masked the sites emission. In this case site values have been calculated based on operator observations made during each measurement and review of audio files.

To account for the inaudible content, ERM has logarithmically added an estimated site background noise level contribution to any observed $L_{Aeq,\ 15minute}$ and $L_{A1,1\ minute}$ contributions. The inaudible content was estimated by deducting 10 dB from the measured overall L_{A90}, with a further deduction of 2 dB applied (12 dB total) to account for the estimated noise contribution from wind effects.

These additional steps were undertaken to ensure that site noise emissions are conservatively and comprehensively assessed for compliance despite being inaudible for the majority of the time. Where site noise level contributions remained inaudible for the duration of the measurement the site contribution

was estimated by again deducting 12 dB from the measured overall L_{A90}. All reported values for inaudible or infrequently audible site noise emissions again considered any INP modifying (penalty) factors.

To determine compliance the site noise level contributions ($L_{Aeq,\ 15minute}$ and $L_{A1,\ 1minute}$ dB) are compared to the criteria previously presented in *Table 2.2*.

2.5.2 *Unattended Noise Monitoring*

$L_{Aeq,\ period}$ site noise emissions have been estimated by assuming that they contributed up to 25% of the measured overall L_{A90} value, for each period. This is a conservative analytical method however it provides a simplified and robust way of demonstrating compliance. The 25% value was determined based on observed noise events noted during noise logger deployment, review of ERM attended measurement results (including audio data analysis) and review of field logs. Site noise level contributions were estimated via calculation to exclude extraneous noise emissions, which were of influence during the unattended monitoring period.

Technical Note

During this monitoring round a prevailing westerly wind was observed by the ERM operator whilst on site and at the surrounding receivers; consistent with meteorological data recorded at the BOM Goulburn Airport AWS as well as Boral on-site AWS data. Gusts from prevailing westerly winds exceeded 5m/s however average winds at the receivers were observed to be generally below this threshold, which is the value specified in the INP as the level above which noise data should be excluded from analysis and assessment.

In this case, data recorded during wind speeds of up to 10m/s was accepted for the daytime and up to 7.5m/s for the evening and night time to determine meaningful overall daytime, evening and night time ambient and background noise levels. ERM notes that this analytical approach does not fully comply with the requirements specified in the INP however it provides a conservative method by which overall values may be determined and then site noise level contributions estimated.

The requirement presented in the INP regarding wind affected data is focused on baseline data by which criteria are developed and is specified so that wind affected data does not enable elevated noise levels to be used for developing criteria that would be lower if the wind had not occurred. In this case the unattended noise monitoring data is used for the purposes of measuring site noise levels and determining compliance, such that the inclusion of higher wind speeds offer a conservative method by which site noise level contributions were estimated, and compliance demonstrated.

ERM also notes that due to device failure at Receiver 6 (Bartolo) only data for the evening period of Wednesday, 16 July 2014 was captured.

3 ASSESSMENT RESULTS

This chapter presents the results, findings and recommendations of the continuous unattended and operator attended noise monitoring conducted during the three day monitoring period between Wednesday, 16 July and Friday, 18 July 2014.

Attended noise monitoring was completed on the night of Thursday, 17 July and early morning of Friday, 18 July 2014 to measure operational noise for approved works undertaken during the night time (10pm to 7am) assessment period.

3.1 NOISE GENERATING ACTIVITIES

The July 2014 monitoring event included primary (in-pit) and processing (out-of-pit) operations; overburden removal and emplacement activities were also in progress. The approved in-pit activity includes drilling, extraction, processing, and transfer of material out of the pit; these were observed (no drilling noted) during the approved daytime period only. The approved out-of-pit activity includes processing, stockpiling, train loading and distribution, and maintenance); these were observed during the approved daytime, evening and night time periods.

No new Sound Power Level (L_W) test data was captured during this monitoring round. A site survey was completed prior to monitoring and no new plant, equipment, machinery or activities were in use or undertaken on site to those that had been previously tested by ERM.

The METSO LT160 primary (mobile) crusher (and excavator/s; used to feed the crusher) were operational. The METSO LT160 primary crusher was previously identified to be the "loudest" item of machinery in use on site. Rail movements on the rail siding were also undertaken and a number of conveyors were in use. Other site noise generating activities were observed by ERM to include the limited use of motion alarms; heavy vehicles (articulated dump trucks etc.), front end loaders, excavators, hand tools, general site vehicles and occasional metal on metal contact. ERM understand that this is consistent with the current level of day to day activity associated with quarry operations.

3.2 OPERATOR ATTENDED MEASUREMENTS

Measured overall ambient and background noise levels are presented in *Table 3.1*, *Table 3.2* and *Table 3.3* including all relevant statistical and acoustic parameters i.e. L_{Amax}, L_{Amin}, L_{Aeq}, L_{A1}, L_{A10} and L_{A90}. All measurements were of 15 minutes duration and all noise levels are expressed in dB(A) re: 2×10^{-5} Pa.

Table 3.1 Measured Overall Noise Levels – 16 July 2014

Receiver ID	Description	Start Time	Measured Noise Levels					
			Lmax	Lmin	Leq	L1	L10	L90
16	Pace	2:43 PM	73	39	53	65	55	42
6	Bartolo	3:34 PM	60	44	49	57	52	46
5	Cooper	4:04 PM	54	36	41	48	43	38
2	Ordasi	4:34 PM	59	33	41	49	44	36

Table 3.2 Measured Overall Noise Levels – 17 July 2014

Receiver ID	Description	Start Time	Measured Noise Levels					
			Lmax	Lmin	Leq	L1	L10	L90
2	Ordasi	9:11 AM	64	39	47	55	50	41
2	Ordasi	9:29 AM	66	39	49	58	51	41
16	Pace	9:59 AM[1]	71	44	54	63	57	47
16	Pace	10:15 AM[1]	73	46	56	64	59	49
4	Armitt	10:43 AM	62	44	50	56	52	46
4	Armitt	11:00 AM	63	42	49	57	52	44
1	Montgomery	11:37 AM	64	42	53	61	57	45
1	Montgomery	11:53 AM	72	45	58	66	62	50
6	Bartolo	12:25 PM[1]	71	54	61	69	65	57
6	Bartolo	12:41 PM[1]	72	56	63	68	66	59
5	Cooper	1:02 PM[1]	76	47	54	61	54	49
5	Cooper	1:21 PM[1]	68	46	53	61	55	49
2	Ordasi	11:15 PM	62	35	45	56	47	38
2	Ordasi	11:34 PM	59	35	43	52	46	38

1. Wind affected data, excluded for assessing compliance for this monitoring event.

Table 3.3 Measured Overall Noise Levels – 18 July 2014

Receiver ID	Description	Start Time	Measured Noise Levels					
			Lmax	Lmin	Leq	L1	L10	L90
4	Armitt	12:07 AM	61	33	42	49	45	36
4	Armitt	12:23 AM	65	38	47	58	48	40
16	Pace	12:49 AM	61	35	43	54	45	38
16	Pace	01:05 AM	61	35	44	54	46	36
1	Montgomery	01:40 AM	63	36	45	53	49	39
6	Bartolo	02:14 AM	57	40	46	51	48	43
6	Bartolo	02:29 AM	61	40	48	53	50	44
5	Cooper	02:49 AM	66	35	44	52	45	38
5	Cooper	03:05 AM	52	35	41	45	43	37

3.2.1 Discussion

Table 3.1 to *Table 3.3* provides the measured overall noise levels from monitoring completed between Wednesday, 16 July and Friday, 18 July 2014.

Ambient noise levels represent the overall acoustic environment, a combination of site noise emissions (if detectable) and extraneous emissions. During the daytime assessment period quarry operations were barely audible at the majority of receiver locations and did not dominate the acoustic environment, masked by extraneous noise emissions not associated with the site. During the night time assessment period quarry operations remained barely audible, again masked by extraneous noise emissions.

Observed extraneous noise sources (not associated with the site) included emissions associated with wind-blown vegetation, near-by fauna, aircraft noise, other industrial premises and some operator noise.

Observed Meteorological Conditions

Daytime – Meteorological conditions during the daytime assessment period included temperatures of between approximately 6° and 10°C, average wind speeds of between 1.5m/s and 4.8m/s (generally from a westerly direction), maximum wind speeds of up to 8m/s, and cloud coverage of between 3/8 and 8/8 octas.

Night time – Meteorological conditions during the night time assessment period included temperatures of between approximately 2° and 6°C, average wind speeds of between 0.8m/s and 3.5m/s (generally from a westerly direction), maximum wind speeds (infrequent gusts) of up to 5.6m/s (gusts exceeded 5m/s for a short period only during one measurement), and cloud coverage of between 3/8 and 8/8 octas.

ERM reiterates that any wind affected data noted in the tables above has been excluded for assessing compliance for this monitoring event.

3.2.2 Daytime Compliance Assessment

ERM has completed the noise compliance assessment comparing resultant site noise level contributions ($L_{Aeq,\ 15\ minute}$) to the operational noise impact assessment criteria, as presented in *Table 3.4*, *Table 3.5* and *Table 3.6*.

All measurements were of 15 minutes duration and all noise levels are expressed in dB(A) re: 2×10^{-5} Pa. ERM considered INP modifying factor corrections for tonal, low-frequency or impulsive noise where necessary.

Table 3.4 Compliance Assessment – 16 July 2014

Receiver ID	Description	Operational Noise Impact Assessment Criteria Leq, 15 minute	Site Noise Level Contribution Leq, 15 minute	Comply with Criteria
16[1]	Pace	41	≤30	Yes
6	Bartolo	35	≤34	Yes
5	Cooper	35	≤26	Yes
2	Ordasi	39	<25	Yes

1. Includes a noise level addition (+0.6 dB) to extrapolate from the measurement location (western fence line within the property boundary) to the receiver location.

Table 3.5 Compliance Assessment – 17 July 2014

Receiver ID	Description	Operational Noise Impact Assessment Criteria Leq, 15 minute	Site Noise Level Contribution Leq, 15 minute	Comply with Criteria
2	Ordasi	39	≤29	Yes
2	Ordasi	39	≤29	Yes
4	Armitt	37	≤36	Yes
4	Armitt	37	≤31	Yes
1	Montgomery	35	≤27	Yes
1	Montgomery	35	<25	Yes
2	Ordasi	35	≤26	Yes
2	Ordasi	35	≤26	Yes

Table 3.6 Compliance Assessment – 18 July 2014

Receiver ID	Description	Operational Noise Impact Assessment Criteria Leq, 15 minute	Site Noise Level Contribution Leq, 15 minute	Comply with Criteria
4	Armitt	35	<25	Yes
4	Armitt	35	≤31	Yes
16[1]	Pace	35	≤26	Yes
16[1]	Pace	35	≤25	Yes
1	Montgomery	35	≤29	Yes
6	Bartolo	35	≤31	Yes
6	Bartolo	35	≤32	Yes
5	Cooper	35	≤26	Yes
5	Cooper	35	≤25	Yes

1. Includes a noise level addition (+0.6 dB) to extrapolate from the measurement location (western fence line within the property boundary) to the receiver location.

Discussion

The results presented in *Table 3.5* to *Table 3.6* identify that current quarry operations continue to comply with the relevant $L_{Aeq,\ 15\ minute}$ operational noise impact assessment criteria contained in Boral's November 2012 Project Approval, at all receiver locations.

3.2.3 Night Time Compliance Assessment

Based on observed site noise events and further review of recorded audio files for each operator attended noise measurement, ERM has determined the highest resultant ($L_{A1,\ 1\ minute}$) site noise level contribution for each night time measurement. These values are compared to the $L_{A1,\ 1\ minute}$ operational noise impact assessment criteria applicable during the evening and night time period, as presented in *Table 3.7*. All noise levels are expressed in dB(A) re: 2 x 10^{-5} Pa.

Table 3.7 Night Time $L_{A1,\ 1minute}$ Compliance Assessment

Receiver ID	Description	Operational Noise Impact Assessment Criteria L1, 1 minute	Site Noise Level Contribution L1, 1 minute	Comply with Criteria
2	Ordasi	45	≤28	Yes
2	Ordasi	45	≤29	Yes
4	Armitt	46	≤27	Yes
4	Armitt	46	≤38	Yes
16[1]	Pace	45	≤29	Yes
16[1]	Pace	45	≤28	Yes
1	Montgomery	45	≤39	Yes
6	Bartolo	45	≤33	Yes
6	Bartolo	45	≤35	Yes
5	Cooper	45	≤29	Yes
5	Cooper	45	≤27	Yes

1. Includes a noise level addition (+0.6 dB) to extrapolate from the measurement location (western fence line within the property boundary) to the receiver location.

Discussion

The results presented in *Table 3.7* identify that current quarry operations continue to comply with the relevant $L_{A1,\ 1\ minute}$ operational noise impact assessment criteria contained in Boral's November 2012 Project Approval, at all receiver locations.

3.3 *UNATTENDED MEASUREMENTS*

Overall ambient noise levels measured during the INP daytime ($L_{Aeq, 11hr}$, 7am to 6pm), evening ($L_{Aeq, 4hr}$, 6pm to 10pm) and night time ($L_{Aeq, 9hr}$, 10pm to 7am) assessment periods, and the estimated site noise level contribution determined from unattended noise monitoring are presented in *Table 3.8* below.

Unattended noise monitoring charts (including Boral's on-site meteorological data, wind and rainfall) are presented in *Annex C*. All noise levels are $L_{Aeq, period}$ and are expressed in dB(A) re: 2×10^{-5} Pa.

Table 3.8 Unattended Noise Monitoring Results

Receiver ID	Description	Cumulative Operational Noise Impact Assessment Criteria (Leq, period)			Overall Ambient Noise Level (Leq, period)			Estimated Site Noise Level Contribution (Leq, period)			Comply with Criteria
		Daytime	Evening	Night	Daytime	Evening	Night	Daytime	Evening	Night	
2	Ordasi	50	45	40	54	43	46	32	≤30	28	Yes
5	Cooper	50	45	40	55	44	45	35	34	31	Yes
6	Bartolo	50	45	40	-	49	-	-	39	-	Yes
16	Pace	50	45	40	55	44	47	33	≤30	30	Yes

1. "-" identifies that data for this period was not recorded (due to device failure) and a site noise level was not able to be estimated.

3.3.1 Discussion

Extraneous noise sources (not associated with the site) noted during noise logger deployment were similar to those of operator attended noise measurements and included emissions associated with wind-blown vegetation, near-by fauna, aircraft noise and other industrial premises. At each of these locations, quarry noise was typically inaudible (or just audible), masked by extraneous noise and did not dominate the acoustic environment of the area,

$L_{Aeq, day}$ site noise level contributions are below the daytime cumulative criteria ($L_{Aeq, 11\ Hour}$ 50 dB(A)) applicable to unattended noise monitoring analysis. $L_{Aeq, evening}$ and $L_{Aeq, night}$ site noise level contributions are below the evening ($L_{Aeq, 4\ Hour}$ 45 dB(A)) and night time ($L_{Aeq, 9\ Hour}$ 40 dB(A)) cumulative criteria.

Cumulative Noise Compliance

It is important to note that Schedule 3, Condition 6 of the Project Approval requires that the noise generated by the project combined with the noise generated by other extractive industries does not exceed the amenity criteria. Other extractive industries were not always clearly audible at Receiver 5 (Cooper) and Receiver 6 (Bartolo), but were observed infrequently at Receiver 2 (Ordasi) and Receiver 16 (Pace). The contribution of the quarry and other extractive sites varied depending on the receiver's proximity to the various noise sources and the works being undertaken.

Assuming a representative worst-case scenario in which other extractive industries contribute an equal (or marginally higher) noise level to those from the quarry at the most affected receiver, overall noise levels are still unlikely to increase to values above the daytime, evening or night time amenity criteria. For example, if other extractive industries in the area were to generate a $L_{Aeq, 9\ Hour}$ night time level at Receiver 16 (Pace) approximately 1 dB(A) above that of the quarry, the combined noise levels would increase by approximately 3.5 dB(A) above the quarry contribution, but would remain below the most stringent night time amenity criteria value.

4 *RECOMMENDATIONS*

ERM makes the following in-principle acoustics recommendations. These are designed to assist Boral in managing noise emissions from quarry operations and ensuring that all feasible and reasonable measures are considered for the quarry in complying with the operational noise impact assessment criteria, in accordance with the November 2012 Project Approval. It is recommended that Boral continue to:

- ensure that all significant noise generating plant and equipment are procured, maintained and managed to reduce noise and that mitigation is applied where feasible, reasonable and necessary;
- avoid concentrations of equipment in sensitive work areas e.g. on top of the dump or bund;
- avoid bunching of trucks along internal haul roads;
- monitor local meteorological conditions to manage the placement of equipment so that it is suitable for the best acoustic outcome for those conditions; and
- undertake noise compliance monitoring at affected receiver(s) in accordance with *Section 2* of *(06_0074)* the November 2012 Project Approval, or at alternate monitoring locations, justified as per the requirements of the INP.

ERM makes no additional recommendations but notes that Boral continues to manage noise generated by quarry plant and equipment within the site, and operates within the operational noise criteria specified in the November 2012 Project Approval.

5 *CONCLUSION*

ERM, on behalf of Boral Resources (NSW) Pty Ltd, has completed noise compliance monitoring for the current quarrying and associated works at Peppertree Quarry. The assessment was undertaken with due regard to and in accordance with local and international standards, guidelines and documents presented in this report.

Daytime site noise emissions associated with quarry operations continue to comply with the relevant $L_{Aeq,\ 15\ minute}$ operational noise impact assessment criteria contained in Boral's November 2012 approval.

Night time site noise emissions comply with the relevant $L_{Aeq,\ 15\ minute}$ and $L_{A1,\ 1\ minute}$ operational noise impact assessment criteria, at all receiver locations.

Daytime, evening and night time site noise level contributions ($L_{Aeq,\ period}$) are below the cumulative criteria applicable to unattended noise monitoring analysis. Furthermore, overall noise levels (inclusive of all other extractive industries) are unlikely to increase so as to be above the daytime, evening or night time cumulative criteria.

ERM makes no additional recommendations and notes that Boral continues to manage noise generated by plant and equipment within the site and continues to operate within the operational noise impact assessment criteria specified in the November 2012 Project Approval for the majority of works.

REFERENCES

Marulan South Consolidated Project Approval (06_0074) November 2012

Boral Peppertree Quarry Noise and Blast Monitoring Plan, dated August 2012

Boral Peppertree Quarry Environmental Monitoring Program, dated August 2012

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

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 Monitoring**

Annex A

Acoustics Glossary

A.1 WHAT IS NOISE AND VIBRATION?

A.1.1 Noise

Noise is often defined as a sound, especially one that is loud or unpleasant or that causes disturbance* or simply as unwanted sound, but technically, noise is the perception of a series of compressions and rarefactions above and below normal atmospheric pressure.

A.1.2 Vibration

Vibration refers to the oscillating movement of any object. In a sense noise is the movement of air particles and is essentially vibration, though in regards to an environmental assessment vibration is typically taken to refer to the oscillation of a solid object(s). The impact of noise on objects can lead to vibration of the object, or vibration can be experienced by direct transmission through the ground, this is known as ground-borne vibration.

Essentially, noise can be described as what a person hears, and vibration as what they feel.

A.2 HOW TO MEASURE AND DESCRIBE NOISE?

Noise is measured using a specially designed 'sound level' meter which must meet internationally recognised performance standards. Audible sound pressure levels vary across a range of 10^7 Pascals (Pa), from the threshold of hearing at 20μPa to the threshold of pain at 200Pa. Scientists have defined a statistically described logarithmic scale called Decibels (dB) to more manageably describe noise.

To demonstrate how this scale works, the following points give an indication of how the noise levels and differences are perceived by an average person:

- 0 dB - represents the threshold of human hearing (for a young person with ears in good condition);
- 50 dB – represents average conversation;
- 70 dB – represents average street noise, local traffic etc.;
- 90 dB – represents the noise inside an industrial premises or factory;
- 140 dB - represents the threshold of pain – the point at which permanent hearing damage may occur.

A.3 WHAT FACTORS CONTRIBUTE TO ENVIRONMENTAL NOISE?

The noise from an activity, like construction works, at any location can be affected by a number of factors, the most significant being:

- how loud the activity is;
- how far away the activity is from the receiver;
- what type of ground is between the activity and the receiver location e.g. concrete, grass, water or sand;
- how the ground topography varies between the activity and the receiver (is it flat, hilly, mountainous) as blocking the line of sight to a noise source will generally reduce the level of noise; and
- any other obstacles that block the line of sight between the source to receiver e.g. buildings or purpose built noise walls.

A.4 HOW TO CALCULATE OR MODEL NOISE LEVELS?

There are two recognised methods which are commonly adopted to determine the noise at particular location from a proposed activity. The first is to undertake noise measurements whilst the activity is in progress and measure the noise, the second is to calculate the noise based on known noise emission data for the activity in question.

The second option is preferred as the first option is largely impractical in terms of cost and time constraints, notwithstanding the meteorological factors that may also influence its quantification. Furthermore, it is also generally considered unacceptable to create an environmental impact simply to measure it. In addition, the most effective mitigation measures are determined and implemented during the design phase and often cannot be readily applied during or after the implementation phase of a project.

Because a number of factors can affect how 'loud' a noise is at a certain location, the calculations can be very complex. The influence of other ambient sources and the contribution from a particular source in question can be difficult to ascertain. To avoid these issues, and to quantify the direct noise contribution from a source/site in question, the noise level is often calculated using noise modelling software packages. The noise emission data used in each noise model of this assessment has been obtained from ERM's database of measured noise emissions.

A.5 ACOUSTIC TERMINOLOGY & STATISTICAL NOISE DESCRIPTORS

Environmental noise levels such as noise generated by industry, construction and road traffic are commonly expressed in dB(A). The A-weighting scale follows the average human hearing response and enables comparison of the intensity of noise with different frequency characteristics. Time varying noise sources are often described in terms of statistical noise descriptors. The following descriptors are commonly used when assessing noise and are referred to throughout this acoustic assessment:

- **Decibel (dB is the adopted abbreviation for the decibel) –** The unit used to describe sound levels and noise exposure. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure;

- **dB(A)** - unit used to measure 'A-weighted' sound pressure levels. A-weighting is an adjustment made to sound-level measurement to approximate the response of the human ear;

- **dB(C) –** unit used to measure 'A-weighted' sound pressure levels. C-weighting is an adjustment made to sound-level measurements which takes account of low-frequency components of noise within the audibility range of humans;

- **dB(Z) or dB(L) –** unit used to measure 'Z-weighted' sound pressure levels with no weighting applied, linear;

- **Hertz (Hz)** - the measure of frequency of sound wave oscillations per second. 1 oscillation per second equals 1 hertz;

- **Octave –** a division of the frequency range into bands, the upper frequency limit;

- **1/3 Octave –** single octave bands divided into three parts;

- **Leq** - this level represents the equivalent or average noise energy during a measurement period. The $L_{eq, 15min}$ noise descriptor simply refers to the L_{eq} noise level calculated over a 15 minute period. Indeed, any of the below noise descriptors may be defined in this way, with an accompanying time period (e.g. $L_{10, 15\ minute}$) as required;

- **Lmax** - the absolute maximum noise level in a noise sample;

- **LN -** the percentile sound pressure level exceeded for N% of the measurement period calculated by statistical analysis;

- **L_{10} -** the noise level exceeded for 90 per cent of the time and is approximately the average of the maximum noise levels;

- **L90** - the noise level exceeded for 90 per cent of the time and is approximately the average of the minimum noise levels. The L90 level is often referred to as the "background" noise level and is commonly used as a basis for determining noise criteria for assessment purposes;

- **Sound Power Level (L_W)** - this is a measure of the total power radiated by a source. The Sound Power of a source is a fundamental property of the source and is independent of the surrounding environment;

- **Sound Pressure Level (L_P)** - the level of sound pressure; as measured at a distance by a standard sound level meter with a microphone. This differs from L_W in that this is the received sound as opposed to the sound 'intensity' at the source;

- **Air-blast Overpressure –** a transient air pressure, such as the shock wave from an explosion that is greater than the surrounding atmospheric pressure;

- **Background noise** – the underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the L_{A90} descriptor;

- **Ambient noise** – the all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far;

- **Cognitive noise** – noise in which the source is recognised as being annoying; and

- **Masking** – the phenomenon of one sound interfering with the perception of another sound. For example, the interference of traffic noise with use of a public telephone on a busy street.

A.6 TERMS TO DESCRIBE THE PERCEPTION OF NOISE

The following concepts offer qualitative guidance in respect of the average response to changes in noise levels:

- differences in noise levels of less than approximately 2 dB(A) are generally imperceptible in practice;

- differences in noise levels of around 5 dB(A) are considered to be significant; and

- differences in noise levels of around 10 dB(A) are generally perceived to be a doubling (or halving) of the perceived loudness of the noise.

The following terms offer quantitative and qualitative guidance in respect of the audibility of a noise source:

- **Inaudible / Not Audible** - the noise source and/or event could not be heard by the operator, masked by extraneous noise sources not associated with the source. If a noise source is 'inaudible' its noise level may be quantified as being less than the measured L_{A90} background noise level, potentially by 10 dB or greater;

- **Barely Audible** – the noise source and/or event are difficult to define by the operator, typically masked by extraneous noise sources not associated with the source. If a source is 'barely audible' its noise level may be quantified as being 5 - 7 dB below the measured L_{A90} or L_{Aeq} noise level, depending on the nature of the source e.g. constant or intermittent;

- **Just Audible** – the noise source and/or event may be defined by the operator. However there are a number of extraneous noise sources contributing to the measurement. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator;

- **Audible** - the noise source and/or event may be easily defined by the operator. There may be a number of extraneous noise sources contributing to the measurement. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator; and

- **Dominant** – the noise source and/or event are noted by the operator to be significantly 'louder' than all other noise sources. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator.

The following terms offer qualitative guidance in respect of acoustic terms used to describe the frequency of occurrence of a noise source during an operator attended environmental noise measurements:

- **Constant** – this indicates that the operator has noted the noise source(s) and/or event to be constantly audible for the duration of the noise measurement e.g. an air-conditioner that runs constantly during the measurement;

- **Intermittent** – this indicates that the operator has noted the noise source(s) and/or event to be audible, stopping and starting intervals for the duration of the noise measurement e.g. car pass-by's; and

- **Infrequent** – this indicates that the operator has noted the noise source(s) and/or event to be constantly audible, however; not occurring regularly or at intervals for the duration of the noise measurement e.g. a small number of aircraft are noted during the measurement.

A.6.1 Industrial Noise Policy (INP Terminology)

- **Assessment Background Level (ABL)** - is defined in the INP as a single figure background level representing each assessment period (day, evening and night). Its determination is by the tenth percentile method (of the measured L_{A90} statistical noise levels) described in *Appendix B* on the INP; and

- **Rating Background Level (RBL)** - is defined in the INP as the overall single figure background level representing each assessment period (day, evening and night) over the whole monitoring period (as opposed to over each 24hr period used for the ABL). This is the level used for assessment purposes. It is defined as the median value of:

  - All the day assessment background levels over the monitoring period for the day;

  - All the evening assessment background levels over the monitoring period for the evening; or

  - All the night assessment background levels over the monitoring period for the night.

- **Extraneous noise –** noise resulting from activities that are not typical of the area. Atypical INP activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous;

- **Most affected location(s) –** locations that experience (or will experience) the greatest noise impact from the noise source under consideration. In determining these locations, one needs to consider existing background levels, exact noise source location(s), distance from source (or proposed source) to receiver, and any shielding between source and receiver;

- **Noise criteria –** the general set of non-mandatory noise level targets for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity (for example, noise levels for various land uses);

- **Noise limits –** enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action;

- **Project Specific Noise Levels –** target noise levels for a particular noise generating facility. They are based on the most stringent of the intrusive criteria or amenity criteria. Which of the two criteria is the most stringent is determined by measuring the level and nature of existing noise in the area surrounding the actual or propose noise generating facility;

- **Compliance** – the process of checking that source noise levels meet with the noise limits in a statutory context;

- **Non-compliance** – development is deemed to be in non-compliance with its noise consent/ licence conditions if the monitored noise levels exceed its statutory noise limit by more than 2 dB;

- **Feasible and Reasonable measures** – feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors:

  - noise mitigation benefits (amount of noise reduction provided, number of people protected);

  - cost of mitigation (cost of mitigation versus benefit provided);

  - community views (aesthetic impacts and community wishes); and

  - noise levels for affected land uses (existing and future levels, and changes in noise levels).

- **Meteorological Conditions** – wind and temperature inversion conditions;

- **Temperature Inversion** – an atmospheric condition in which temperature increases with height above the ground; and

- **Adverse Weather** – weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).

A.7 OPERATOR ATTENDED NOISE MEASUREMENTS

Noise level deductions that may be applied based on the percentage contribution of a noise source(s) are presented in *Table A.1* below.

Table A.1 Noise Level Deductions – Noted Percentile Contribution

Percentage Contribution	Noise Level Deduction, dB(A)
5%	-13.0
10%	-10.0
15%	-8.2
20%	-7.0
25%	-6.0
30%	-5.2
35%	-4.6
40%	-4.0
45%	-3.5
50%	-3.0
55%	-2.6
60%	-2.2
65%	-1.9
70%	-1.5
75%	-1.2
80%	-1.0
85%	-0.7
90%	-0.5
95%	-0.2
100%	0.0

1. **EXAMPLE:** the measured $L_{Aeq,\ 15\ minute}$ noise level is 49 dB and the site contribution was observed to be 10% of this level (extraneous noise sources were noted to dominate the measurement), therefore the $L_{Aeq,\ 15\ minute}$ noise level deduction is 10 dB, with a resultant noise level contribution of approximately 39 dB.

Noise level deductions that may be applied based on the percentage of time that a noise source(s) is audible during a 15 minute measurement are presented in *Table A.2* below.

Table A.2 Noise Level Deductions – Noted Time Contribution

Event Duration (minutes)	Noise Level Deduction, dB(A)
1	-11.8
2	-8.8
3	-7.0
4	-5.7
5	-4.8
6	-4.0
7	-3.3
8	-2.7
9	-2.2
10	-1.8
11	-1.3
12	-1.0
13	-0.6
14	-0.3
15	-0.0

1. **EXAMPLE:** the measured LAeq, 15 minute noise level contribution of an excavator was noted to be 56 dB, however it was only audible for 6 minutes during the 15 minute measurement period, therefore the LAeq, 15 minute noise level deduction is 4 dB, with a resultant noise level contribution of approximately 52 dB.

Annex B

Goulburn AWS Weather Data (July 2014)

Annex C

Unattended Noise Logging Charts

DRAFT REPORT

Boral Resources (NSW) Pty Ltd

Peppertree Quarry

Noise Compliance Monitoring

Monitoring Period: October 2014
Reporting Period: November 2014

Reference: 0210419RP09

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EXECUTIVE SUMMARY

General Overview

Environmental Resources Management Australia Pty Ltd has completed noise compliance monitoring for the current quarrying and associated works at Peppertree Quarry, located at Marulan South in the Southern Tablelands of New South Wales (NSW).

Monitoring was undertaken on behalf of Boral Resources (NSW) Pty Ltd, with due regard to, and in accordance with, local and international standards, guidelines and documents presented in this noise compliance monitoring report.

Assessment Findings

Daytime site noise emissions associated with quarry operations continue to comply with the relevant $L_{Aeq,\ 15\ minute}$ operational noise impact assessment criteria contained in Boral's November 2012 approval.

Night time site noise emissions comply with the relevant $L_{Aeq,\ 15\ minute}$ and $L_{1,\ 1\ minute}$ operational noise impact assessment criteria at all receiver locations.

Daytime, evening and night time site noise level contributions ($L_{Aeq,\ period}$) are below the cumulative criteria applicable to unattended noise monitoring analysis. Furthermore, overall noise levels (inclusive of all other extractive industries in the area) are considered unlikely to increase such that the daytime, evening or night time cumulative criteria will be exceeded.

ERM makes no additional recommendations and notes that Boral continues to manage noise generated by plant and equipment within the site, and continues to operate within the operational noise impact assessment criteria specified in the November 2012 Project Approval for the majority of works.

1 INTRODUCTION

This document has been prepared by Environmental Resources Management Australia Pty Ltd (ERM) on behalf of Boral Resources (NSW) Pty Ltd (Boral). It presents the methodology, findings and recommendations of noise compliance monitoring conducted at the Peppertree Quarry (the quarry), located at Marulan South in the Southern Tablelands of New South Wales (NSW) during October 2014.

1.1 RELEVANT DOCUMENTS, STANDARDS AND GUIDELINES

This report has been prepared with due regard to and in accordance with the following documents, standards and guidelines:

- Marulan South Consolidated Project Approval (06_0074) November 2012;
- the *Peppertree Quarry Noise and Blast Monitoring Plan* (NBMP) and the *Peppertree Quarry Environmental Monitoring Program* (EMP);
- NSW Environment Protection Authority – NSW *Environmental Noise Management – Industrial Noise Policy* (INP), January 2000 and relevant application notes;
- Standards Australia AS1055–1997™ (AS1055) – *Description and Measurement of Environmental Noise*, Parts 1, 2 and 3; and
- Standards Australia AS IEC 61672.1–2004™ (AS61672) – *Electro Acoustics - Sound Level Meters Specifications Monitoring*.

A glossary of relevant acoustic concepts and terminology is presented as *Annex A*.

1.2 BACKGROUND

Boral was granted project approval (06_0074) to establish and operate the Peppertree Quarry (a granodiorite hard rock quarry, formerly called the Marulan South Quarry) including all in-pit quarrying activities and supporting infrastructure such as a rail siding and loading facility, processing plant and water supply dams, under Part 3A of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) in February 2007.

Under Section 75W of the *Environment Planning and Assessment Act 1979*, Boral subsequently applied for approval for a modification of the Peppertree Quarry Development in regards to rail line construction and operations. Boral received a 'Notice of Modification' for the Peppertree Quarry Project Approval (06_0074), dated Thursday, 3 November 2011. This notice approved the revised Project, consolidating relevant aspects of March 2009 and November 2011 modifications. A further modification was applied for in September 2012 for approval of the installation and operation of a High

Voltage Power line to the Peppertree Quarry site and an extension of the existing Medway rail siding. This modification application was approved Friday, 2 November 2012.

1.2.1 Noise and Vibration Management

ERM was engaged to prepare the NBMP for the quarry in accordance with the Project Approval and subsequent modifications; incorporating key components of the noise and blast monitoring programs for the quarry.

The NBMP monitoring program has been established and incorporated into the overall Environmental Monitoring Program (EMP), which consolidates the specific requirements of the abovementioned monitoring program as well as other monitoring required by specific Project Approval conditions. The EMP provides an overall framework to assist with the implementation of monitoring for the project.

The purpose of the NBMP is to fulfil the requirement of Schedule 3 of the Project Approval and the Statement of Commitments contained within the Part 3A Environmental Assessment. The NBMP, amongst other things, provides procedures for monitoring and assessing noise impacts from the quarry, and methods to determine compliance with the operational noise impact assessment criteria.

ERM has been engaged to conduct quarterly noise compliance monitoring on behalf of Boral in accordance with the NBMP and Project Approval conditions for the quarry. This round of monitoring includes measurements during both the daytime and night time assessment periods.

1.2.2 Hours of Operation

Quarry operations are currently in progress with site works and activities complying with the hours of operation presented in Condition 11; Table 3 of the November 2012 Project Approval. These approved hours of operation are reproduced below in *Table 1.1*.

Table 1.1 Approved Hours of Operation

Activity	Day	Time
Construction works	Monday-Friday	7.00am to 6.00pm
	Saturday	8.00am to 1.00pm
	Sunday and public holidays	None
Topsoil/overburden removal/emplacement	Any day	7.00am to 7.00pm
Blasting	Monday-Saturday	9.00am to 5.00pm
	Sunday and public holidays	None
In-pit activities (including drilling, extraction, processing, and transfer of material out of the pit)	Any day	7.00am to 7.00pm
Out-of-pit activities (including processing, stockpiling, train loading and distribution, and maintenance)	Any day	24 hours

Guidance Note

Under Section 75W of the Environment Planning and Assessment Act 1979 Boral received a 'Notice of Modification' for the (06_0074) Peppertree Quarry Project Approval. This notice, received on Thursday, 3 November 2011 also enabled a revised Project Approval to be prepared which consolidated relevant aspects of March 2009 and November 2011 modifications.

During this process and in consultation with the NSW Department of Planning and Infrastructure (DoPI), Boral received advice that construction noise criteria would remain valid through January 2012 and thereafter, the operational noise impact assessment criteria (as presented in Schedule 3, Section 4: Table 1 of the November 2011 modification) would apply. The subsequent approval in November 2012 does not alter the application of the operational noise criteria as outlined above; complying with DoPI advice the construction noise criteria are no longer valid for assessing quarry noise emissions.

This report presents the noise compliance assessment prepared with due regard to the November 2012 operational noise impact assessment criteria, that apply for the quarry site, as the Project Approval required that construction noise criteria were complied with for the first three months of construction (valid to January 2012) and that thereafter, site construction noise emissions must meet the operational noise impact assessment criteria.

1.3 SITE UNDERSTANDING

The Peppertree Quarry is located in the Southern Tablelands of NSW, approximately 10 kilometres (km) southeast of Marulan and 175 km southwest of Sydney.

The site, the project-specific noise sensitive localities (including the unique identification number used to describe each location) and other items of acoustic importance relative to this assessment are visually presented in *Figure 1.1.*

Guidance Note

Following land acquisition, three receiver locations that were identified in earlier project approvals documentation (Receiver 1, Receiver 3 and Receiver 4) are now part of the overall Boral land ownership, and hence monitoring to determine compliance is no longer required at these sites, as Boral have negotiated agreements in place.

Noise measurements were completed at Receiver 1 and Receiver 4 during this period of monitoring however the results presented in this report address receivers described in the November 2012 Project Approval.

The project-specific noise sensitive localities from the November 2012 Project Approval, where noise has been measured and assessed, are presented in *Figure 1.1* below.

Figure 1.1 Locality Map

A4

2 ASSESSMENT METHODLOGY

This chapter presents an overview of the noise compliance monitoring methodology for continuous unattended and operator attended noise monitoring undertaken in accordance with the NBMP.

2.1 RECEIVER LOCATIONS

Monitoring locations representative of the receivers identified in the NBMP and Project Approval for operations are used for evaluating and assessing noise emissions from quarry operations, as presented in *Table 2.1* below and visually presented on *Figure 1.1*.

Table 2.1 Nearest Potentially Affected Receiver Locations

Receiver ID	Description	MGA (Zone 56) Coordinates		Direction and Distance from Quarry Centre	
		Easting	Northing	Compass point	Distance, m
2	Ordasi	226934	6148560	SSW	1730
5	Cooper	226592	6152540	NW	2520
6	Bartolo	226244	6153120	NW	3230
16	Pace	226094	6149665	WSW	1050

Guidance Note

Noise compliance monitoring was required to be undertaken at alternate locations for two receivers (Pace and Bartolo) as access was not available. The alternate locations were selected with due regard to the INP and as described in *Section 2.3.2*.

The alternate monitoring location selected for Receiver 16 (Pace) is situated at an accessible point on the resident's western fence line within the property boundary. The alternate monitoring location selected for Receiver 6 (Bartolo) is directly adjacent to the receiver location (~50m to the east) and is situated on the resident's eastern property boundary.

ERM notes that all noise compliance assessments are made at the nearest potentially affected receiver locations described in *Table 2.1* above.

2.2 ASSESSMENT CRITERIA

This section summarises the operational noise impact assessment criteria (including values presented in Schedule 3, Condition 4; Table 1 of the November 2012 modification) as presented in the NBMP.

2.2.1 *Operational Noise*

The Project Approval requires that the operation of the quarry is to meet the operational noise impact assessment criteria. These are reproduced in *Table 2.2*.

Table 2.2 Operational Noise Impact Assessment Criteria

Receiver ID	Description	Noise Impact Assessment Criteria, dB(A)[1,2]		
		Daytime 7:00am to 7:00pm	Evening and Night 7:00pm to 7:00am	
		LAeq, 15min	LAeq, 15min	LA1, 1min
2	Ordasi	39	35	45
5	Cooper	35	35	45
6	Bartolo	35	35	45
16	Pace	41	35	45
Any other noise sensitive location		35	35	45

1. The identified 'Daytime' noise criteria apply throughout the period of the site's Day Shift (i.e. 7.00am to 7.00pm) on all days, notwithstanding the general definitions of 'Evening' and 'Night time' otherwise applying to the approval. The identified 'Evening' and 'Night time' criteria apply only during the period of the site's Night Shift (i.e. 7.00pm to 7.00am); and
2. Noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW INP.

Noise measurements were completed at two receiver locations (Receiver 1 – Montgomery and Receiver 4 – Armitt) that are now part of the overall Boral land ownership during this period of monitoring. The results presented in this report address the receivers described in the November 2012 Project Approval.

2.2.2 *Cumulative Noise Criteria*

ERM has also considered Schedule 3, Condition 6 of the Project Approval which states:

The Proponent shall take all reasonable and feasible measures to ensure that the noise generated by the project combined with the noise generated by other extractive industries does not exceed the following amenity criteria on any privately owned land, to the satisfaction of the Director-General:

- $L_{Aeq,\ 11hr}$ *50 dB(A) – Day;*
- $L_{Aeq,\ 4hr}$ *45 dB(A) – Evening; and*
- $L_{Aeq,\ 9hr}$ *40 dB(A) – Night.*

These cumulative values are applied to the quarry to ensure that the overall amenity noise level of the area, inclusive of all other extractive industries, does not exceed an acceptable overall noise level during each assessment period: day, evening and night. Cumulative values are assessed as an additional requirement to the operational noise impact assessment criteria presented in *Table 2.2*, which are assessed over shorter (15 minute and one minute) periods.

2.3 MEASUREMENT METHODOLOGY

ERM (one operator) visited the quarry on Wednesday, 22 October; Thursday, 23 October and Friday, 24 October 2014 (three days) to conduct continuous unattended and operator attended noise monitoring. Attended monitoring was completed during the daytime and night time periods to enable the measurement of operational noise for works undertaken during approved daytime and night time assessment periods.

The monitoring methodology was determined with due regard to the relevant documents, standards and guidelines presented in *Chapter 1*.

Operator attended noise measurements were conducted at the locations specified in *Table 2.1* and alternate locations selected, if necessary. Continuous unattended noise monitoring was undertaken at the following four locations:

- Receiver 2 (Ordasi);
- Receiver 5 (Cooper);
- Receiver 6 (Bartolo, alternate off-site location); and
- Receiver 16 (Pace, alternate off-site location).

2.3.1 Measurement Equipment

All measurements were conducted by trained ERM personnel; with due regard to, and in accordance with, the relevant local and international standards for environmental noise monitoring.

The measurement instrumentation used to complete the assessment complied with the requirements of AS 61672.1 with current NATA calibration certificates, with certification at intervals not exceeding two years at the time of use.

The equipment used for this assessment was as follows:

- 1 x Brüel & Kjær 2250 Investigator (Type 1) Sound Analyser;
- 1 x ARL Ngara (Type 1) Environmental Noise Loggers;
- 3 x RION NL-42 (Type 2) Environmental Noise Logger; and

- 1 x Brüel & Kjær (Type 1) Sound Level Calibrator.

Instrument calibration was checked prior to monitoring and again at the conclusion with no difference noted between the two measurements. All data handling and analysis has been completed by a member of the Australian Acoustical Society.

2.3.2 Alternate Monitoring Locations

During previous noise monitoring events Boral identified a need to undertake monitoring works at alternate (publically accessible) locations instead of the potentially affected receiver locations (receiver locations) specified in *Table 2.1* of this report at the request of the residents.

The INP does allow for alternate approaches to establishing other measurement locations, if justification is provided. ERM first completed an acoustics survey at each resident's property; measurement locations in near proximity to each receiver location; and at the proposed alternate (publically accessible) locations for each receiver. This identified that the acoustic conditions were broadly similar to those at the potentially affected receiver locations.

ERM then completed a modelling assessment of site noise emissions at the nearest potentially affected receiver locations and at a range of alternate locations proposed for each receiver. The alternate locations were then optimised based on noise contour mapping data with the aim of ensuring the most affected accessible point was selected for each location. This process enabled ERM to determine a site noise level contribution at the selected alternate location and then extrapolate to the receiver location for comparison to criteria.

2.4 ADVERSE METEOROLOGICAL CONDITIONS

Adverse meteorological conditions have the potential to increase noise levels, for example wind speeds up to 3m/s or temperature inversions, however wind speeds above 5m/s (and rainfall) have the potential to generate extraneous and erroneous noise events which reduce the accuracy and confidence in measured data.

These events also increase ambient noise levels, to the extent that a site's noise emission (which may be typically audible) is masked by them, making the site noise inaudible.

2.4.1 October 2014 Conditions

During the October 2014 monitoring period weather conditions were observed to be generally calm, with some light winds and no rain fall. Average and maximum wind speeds did not exceed 5m/s. Wind effects did not impact the collection of reliable noise data during this monitoring event.

When wind speeds were generally calm or below 3m/s wind-blown vegetation was observed to be a feature of the receiver areas. Wind direction during the monitoring was observed to occur from a westerly direction.

Temperatures varied (between 15° and 28° Celsius (C)) depending on the time of day that the monitoring occurred. Cloud coverage also varied between 0/8 and 7/8 octas coverage.

These westerly winds were noted to be a trend in meteorological data throughout the month of October in 2014. This is shown in the monthly Bureau of Meteorology (BOM) weather summary data for the Goulburn Airport Automated Weather Station (AWS); included here as *Annex B*.

2.5 DETERMINING COMPLIANCE

This section outlines the approach adopted by ERM to determine site noise level contributions based on data and observations recorded during operator attended measurements and unattended noise monitoring.

2.5.1 Operator Attended Measurements

Site noise level contributions have been determined in the absence of any influential extraneous noise emission sources not associated with quarry operations.

During some measurements site noise levels could be directly measured as they were audible (and detectable) for the duration of the measurement. In this case the measured values are directly reported following consideration of any INP modifying (penalty) factors e.g. for tonality or low frequency content.

On other occasions, site noise emissions were infrequently audible due to the influence of extraneous sources that masked the sites emission. In this case site values have been calculated based on operator observations made during each measurement and review of audio files.

To account for the inaudible content, ERM has logarithmically added an estimated site background noise level contribution to any observed $L_{Aeq,\ 15minute}$ and $L_{A1,1\ minute}$ contributions. The inaudible content was estimated by deducting 10 dB from the measured overall L_{A90}.

These additional steps were undertaken to ensure that site noise emissions are conservatively and comprehensively assessed for compliance despite being inaudible for the majority of the time. Where site noise level contributions remained inaudible for the duration of the measurement the site contribution was estimated by again deducting 10 dB from the measured overall L_{A90}. All reported values for inaudible or infrequently audible site noise emissions again considered any INP modifying (penalty) factors.

To determine compliance, the site noise level contributions ($L_{Aeq,\ 15minute}$ and $L_{A1,\ 1minute}$ dB) are compared to the criteria previously presented in *Table 2.2*.

2.5.2 Unattended Noise Monitoring

$L_{Aeq,\ period}$ site noise emissions have been estimated by assuming a likely percentile contribution to the measured overall L_{Aeq} value, for each period or based on observed noise events noted during noise logger deployment, review of ERM attended measurement results (including audio data analysis) and review of field logs. This approach has been adopted for this monitoring event as site noise emissions were typically inaudible and when audible, only detectable for short durations. This is a conservative analytical method however it provides a simplified and robust way of demonstrating compliance. Site noise level contributions were estimated via calculation to exclude extraneous noise emissions, which were of influence during the unattended monitoring period.

Technical Note

During this monitoring round a prevailing westerly wind was observed by the ERM operator whilst on site and at the surrounding receivers; consistent with meteorological data recorded at the BOM Goulburn Airport AWS as well as Boral on-site AWS data. In this case, data recorded during wind speeds of up to 7.5m/s have been accepted for the daytime, evening and night time periods to determine meaningful overall ambient and background noise levels. ERM notes that this analytical approach does not fully comply with the requirements specified in the INP however it provides a conservative method (because higher winds increase ambient noise levels) by which overall values may be determined and then site noise level contributions estimated.

The requirement presented in the INP regarding wind affected data is focused on baseline data by which criteria are developed and specified so that wind affected data does not enable elevated noise levels to be used for developing criteria that would be lower if the wind had not occurred. In this case, the unattended noise monitoring data is used for the purposes of measuring site noise levels and determining compliance, such that the inclusion of higher wind speeds (those greater than 5m/s) resulted in a conservative method by which site noise level contributions were estimated, and compliance demonstrated.

3 ASSESSMENT RESULTS

This chapter presents the results, findings and recommendations of the continuous unattended and operator attended noise monitoring conducted during the three day monitoring period between Wednesday, 22 October and Friday, 24 October 2014.

Attended noise monitoring was completed on the night of Thursday, 23 October and early morning of Friday, 24 October 2014 to measure operational noise for approved works undertaken during the night time (10pm to 7am) assessment period.

3.1 NOISE GENERATING ACTIVITIES

The October 2014 monitoring event included primary (in-pit) and processing (out-of-pit) operations; overburden removal and emplacement activities were also in progress. The approved in-pit activity includes drilling, extraction, processing, and transfer of material out of the pit; these were observed (no drilling noted) during the approved daytime period only. The approved out-of-pit activity includes processing, stockpiling, train loading and distribution, and maintenance; these were observed during the approved daytime, evening and night time periods.

No new Sound Power Level (L_W) test data was captured during this monitoring round. A site survey was completed prior to monitoring and no new plant, equipment, machinery or activities were in use or undertaken on site to those that had been previously tested by ERM.

The METSO LT160 primary (mobile) crusher (and excavator/s; used to feed the crusher) were operational. The METSO LT160 primary crusher was previously identified to be the "loudest" item of machinery in use on site. Rail movements on the rail siding were also undertaken and a number of conveyors were in use. Other site noise generating activities were observed by ERM to include the limited use of motion alarms; heavy vehicles (articulated dump trucks etc.), front end loaders, excavators, hand tools, general site vehicles and occasional metal on metal contact. ERM understand that this is consistent with the current level of day to day activity associated with quarry operations.

3.2 OPERATOR ATTENDED MEASUREMENTS

Measured overall ambient and background noise levels are presented in *Table 3.1*, *Table 3.2* and *Table 3.3* including all relevant statistical and acoustic parameters i.e. L_{Amax}, L_{Amin}, L_{Aeq}, L_{A1}, L_{A10} and L_{A90}. All measurements were of 15 minutes duration and all noise levels are expressed in dB(A) re: 2×10^{-5} Pa.

Table 3.1 Measured Overall Noise Levels – 22 October 2014

Receiver ID	Description	Start Time	Measured Noise Levels					
			Lmax	Lmin	Leq	L1	L10	L90
2	Ordasi	12:00 PM	65	33	40	49	43	36
16	Pace	12:30 PM	73	29	48	59	46	32
6	Bartolo	01:15 PM	62	36	45	54	47	40
5	Cooper	02:00 PM	57	29	38	48	41	31

Table 3.2 Measured Overall Noise Levels – 23 October 2014

Receiver ID	Description	Start Time	Measured Noise Levels					
			Lmax	Lmin	Leq	L1	L10	L90
2	Ordasi	09:00 AM	61	29	36	44	40	31
2	Ordasi	09:15 AM	55	27	37	46	41	30
16	Pace	09:45 AM	59	26	39	49	42	28
16	Pace	10:01 AM	57	26	40	50	43	29
6	Bartolo	12:30 PM	63	33	39	47	40	35
6	Bartolo	12:45 PM	71	36	44	48	42	37
5	Cooper	01:02 PM	58	27	35	47	36	28
5	Cooper	01:18 PM	61	26	34	43	33	28
6	Bartolo	11:30 PM	62	29	41	48	45	34
6	Bartolo	11:45 PM	60	28	40	48	43	33

Table 3.3 Measured Overall Noise Levels – 24 October 2014

Receiver ID	Description	Start Time	Measured Noise Levels					
			Lmax	Lmin	Leq	L1	L10	L90
5	Cooper	12:05 AM	63	34	39	44	41	37
5	Cooper	12:20 AM	54	35	42	48	45	38
16	Pace	01:30 AM	62	32	42	54	41	34
16	Pace	01:45 AM	49	30	34	39	36	32
2	Ordasi	02:10 AM	48	31	36	39	38	34
2	Ordasi	02:25 AM	49	32	35	38	36	34

3.2.1 Discussion

Table 3.1 to *Table 3.3* provides the measured overall noise levels from monitoring completed between Wednesday, 22 October and Friday, 24 October 2014.

Ambient noise levels represent the overall acoustic environment, a combination of site noise emissions (if detectable) and extraneous emissions. During the daytime assessment period quarry operations were barely audible at the majority of receiver locations and did not dominate the acoustic environment, masked by extraneous noise emissions not associated with the site. During the night time assessment period quarry operations remained barely audible, again masked by extraneous noise emissions.

Observed extraneous noise sources (not associated with the site) included emissions associated with wind-blown vegetation, near-by fauna, aircraft noise, other industrial premises and some operator noise.

Observed Meteorological Conditions

Daytime – Meteorological conditions during the daytime assessment period included temperatures of between approximately 18° and 28°C, average wind speeds of between 0.4m/s and 2m/s (generally from a westerly direction), maximum wind speeds of up to 2.5m/s, and cloud coverage of between 0/8 and 7/8 octas.

Night time – Meteorological conditions during the night time assessment period included temperatures of between approximately 15° and 17°C, average wind speeds of between 0.3m/s and 0.7m/s (generally from a westerly direction), maximum wind speeds of up to 1.7m/s, and cloud coverage of between 2/8 and 7/8 octas.

3.2.2 LAeq, 15 minute Compliance Assessment

ERM has completed the noise compliance assessment comparing resultant site noise level contributions to the ($L_{Aeq,\ 15\ minute}$) operational noise impact assessment criteria, as presented in *Table 3.4*, *Table 3.5* and *Table 3.6*.

All measurements were of 15 minutes duration and all noise levels are expressed in dB(A) re: 2×10^{-5} Pa. ERM considered INP modifying factor corrections for tonal, low-frequency or impulsive noise where necessary.

Table 3.4 LAeq, 15 minute Compliance Assessment – 22 October 2014

Receiver ID	Description	Assessment Period	Operational Noise Impact Assessment Criteria Leq, 15 minute	Site Noise Level Contribution Leq, 15 minute	Comply with Criteria
2	Ordasi	Daytime	39	35	Yes
16[1]	Pace		41	31	Yes
6	Bartolo		35	30	Yes
5	Cooper		35	≤25	Yes

1. Includes a noise level addition (+0.6 dB) to extrapolate from the measurement location (western fence line within the property boundary) to the receiver location.

Table 3.5 LAeq, 15 minute Compliance Assessment – 23 October 2014

Receiver ID	Description	Assessment Period	Operational Noise Impact Assessment Criteria Leq, 15 minute	Site Noise Level Contribution Leq, 15 minute	Comply with Criteria
2	Ordasi	Daytime	39	≤25	Yes
2	Ordasi		39	≤25	Yes
16[1]	Pace		41	≤25	Yes
16[1]	Pace		41	≤25	Yes
6	Bartolo		35	≤25	Yes
6	Bartolo		35	27	Yes
5	Cooper		35	≤25	Yes
5	Cooper		35	≤25	Yes
6	Bartolo	Night time	35	29	Yes
6	Bartolo		35	≤25	Yes

1. Includes a noise level addition (+0.6 dB) to extrapolate from the measurement location (western fence line within the property boundary) to the receiver location.

Table 3.6 LAeq, 15 minute Compliance Assessment – 24 October 2014

Receiver ID	Description	Assessment Period	Operational Noise Impact Assessment Criteria Leq, 15 minute	Site Noise Level Contribution Leq, 15 minute	Comply with Criteria
5	Cooper	Night time	35	28	Yes
5	Cooper		35	30	Yes
16	Pace		35	29	Yes
16	Pace		35	23	Yes
2	Ordasi		35	26	Yes
2	Ordasi		35	25	Yes

1. Includes a noise level addition (+0.6 dB) to extrapolate from the measurement location (western fence line within the property boundary) to the receiver location.

Discussion

The results presented in *Table 3.4* to *Table 3.6* identify that current quarry operations continue to comply with the relevant $L_{Aeq,\ 15\ minute}$ operational noise impact assessment criteria contained in Boral's November 2012 Project Approval, at all assessable receiver locations.

3.2.3 *LA1, 1 minute Compliance Assessment (Night time)*

Based on observed site noise events and further review of recorded audio files, ERM has determined the highest resultant ($L_{A1,\ 1\ minute}$) site noise level contribution for each night time measurement. These values are compared to the $L_{A1,\ 1\ minute}$ operational noise impact assessment criteria applicable during the evening and night time period, as presented in *Table 3.7*. All noise levels are expressed in dB(A) re: 2×10^{-5} Pa.

Table 3.7 $L_{A1,\ 1minute}$ Compliance Assessment (Night Time)

Receiver ID	Description	Operational Noise Impact Assessment Criteria L1, 1 minute	Site Noise Level Contribution L1, 1 minute	Comply with Criteria
6	Bartolo	45	35	Yes
6	Bartolo	45	33	Yes
5	Cooper	45	37	Yes
5	Cooper	45	38	Yes
16[1]	Pace	45	37	Yes
16[1]	Pace	45	33	Yes
2	Ordasi	45	35	Yes
2	Ordasi	45	34	Yes

1. Includes a noise level addition (+0.6 dB) to extrapolate from the measurement location (western fence line within the property boundary) to the receiver location.

Discussion

The results presented in *Table 3.7* identify that current quarry operations continue to comply with the relevant $L_{A1,\ 1\ minute}$ operational noise impact assessment criteria contained in Boral's November 2012 Project Approval, at all assessable receiver locations.

3.3 *UNATTENDED MEASUREMENTS*

Overall ambient noise levels measured during the INP daytime ($L_{Aeq,\ 11hr}$, 7am to 6pm), evening ($L_{Aeq,\ 4hr}$, 6pm to 10pm) and night time ($L_{Aeq,\ 9hr}$, 10pm to 7am) assessment periods, and the estimated site noise level contribution determined from unattended noise monitoring are presented in *Table 3.8* below.

Unattended noise monitoring charts (including Boral's on-site meteorological data, wind and rainfall) are presented in *Annex C*. All noise levels are $L_{Aeq,\ period}$ and are expressed in dB(A) re: 2×10^{-5} Pa.

Table 3.8 Unattended Noise Monitoring Results

Receiver ID	Description	Cumulative Operational Noise Impact Assessment Criteria (Leq, period)			Overall Ambient Noise Level (Leq, period)			Estimated Site Noise Level Contribution (Leq, period)			Comply with Criteria
		Daytime	Evening	Night	Daytime	Evening	Night	Daytime	Evening	Night	
2	Ordasi	50	45	40	44	45	44	≤30	≤30	<26	Yes
5	Cooper	50	45	40	45	45	45	≤31	≤31	<31	Yes
6	Bartolo	50	45	40	48	47	46	≤31	≤31	<31	Yes
16	Pace	50	45	40	46	44	44	≤27	≤27	<27	Yes

3.3.1 Discussion

Extraneous noise sources (not associated with the site) noted during noise logger deployment were similar to those of operator attended noise measurements and included emissions associated with wind-blown vegetation, near-by fauna, aircraft noise and other industrial premises. At each of these locations, quarry noise was typically inaudible (or just audible), masked by extraneous noise and did not dominate the acoustic environment of the area,

$L_{Aeq, day}$ site noise level contributions are below the daytime cumulative criteria ($L_{Aeq, 11\ Hour}$ 50 dB(A)) applicable to unattended noise monitoring analysis. $L_{Aeq, evening}$ and $L_{Aeq, night}$ site noise level contributions are below the evening ($L_{Aeq, 4\ Hour}$ 45 dB(A)) and night time ($L_{Aeq, 9\ Hour}$ 40 dB(A)) cumulative criteria.

Cumulative Noise Compliance

It is important to note that Schedule 3, Condition 6 of the Project Approval requires that the noise generated by the project combined with the noise generated by other extractive industries does not exceed the amenity criteria. Other extractive industries were not always clearly audible at Receiver 5 (Cooper), Receiver 6 (Bartolo) and Receiver 16 (Pace), but were observed infrequently at Receiver 2 (Ordasi). The contribution of the quarry and other extractive sites was approximately equal at this location but varied depending on the receiver's proximity to the various noise sources and the works being undertaken.

Assuming a representative worst-case scenario in which other extractive industries contribute an equal (or marginally higher) noise level to those from the quarry at the most affected receiver, overall noise levels are still unlikely to increase to values above the daytime, evening or night time amenity criteria. For example, if other extractive industries in the area were to generate a $L_{Aeq, 9\ Hour}$ night time level at Receiver 5 (Cooper) or Receiver 6 (Bartolo) approximately 1 dB(A) above that of the quarry, the combined noise levels would increase by approximately 3.5 dB(A) above the quarry contribution, but would remain below the most stringent night time amenity criteria value.

4 *RECOMMENDATIONS*

ERM makes the following in-principle acoustics recommendations. These are designed to assist Boral in managing noise emissions from quarry operations and ensuring that all feasible and reasonable measures are considered for the quarry in complying with the operational noise impact assessment criteria, in accordance with the November 2012 Project Approval. It is recommended that Boral continue to:

- ensure that all significant noise generating plant and equipment are procured, maintained and managed to reduce noise and that mitigation is applied where feasible, reasonable and necessary;
- avoid concentrations of equipment in sensitive work areas e.g. on top of the dump or bund;
- avoid bunching of trucks along internal haul roads;
- monitor local meteorological conditions to manage the placement of equipment so that it is suitable for the best acoustic outcome for those conditions; and
- undertake noise compliance monitoring at affected receiver(s) in accordance with *Section 2* of *(06_0074)* the November 2012 Project Approval, or at alternate monitoring locations, justified as per the requirements of the INP.

ERM makes no additional recommendations but notes that Boral continues to manage noise generated by quarry plant and equipment within the site, and operates within the operational noise criteria specified in the November 2012 Project Approval.

5 *CONCLUSION*

ERM, on behalf of Boral Resources (NSW) Pty Ltd, has completed noise compliance monitoring for the current quarrying and associated works at Peppertree Quarry. The assessment was undertaken with due regard to and in accordance with local and international standards, guidelines and documents presented in this report.

Daytime site noise emissions associated with quarry operations continue to comply with the relevant $L_{Aeq,\ 15\ minute}$ operational noise impact assessment criteria contained in Boral's November 2012 approval.

Night time site noise emissions comply with the relevant $L_{Aeq,\ 15\ minute}$ and $L_{A1,\ 1\ minute}$ operational noise impact assessment criteria, at all receiver locations.

Daytime, evening and night time site noise level contributions ($L_{Aeq,\ period}$) are below the cumulative criteria applicable to unattended noise monitoring analysis. Furthermore, overall noise levels (inclusive of all other extractive industries) are unlikely to increase so as to be above the daytime, evening or night time cumulative criteria.

ERM makes no additional recommendations and notes that Boral continues to manage noise generated by plant and equipment within the site and continues to operate within the operational noise impact assessment criteria specified in the November 2012 Project Approval for the majority of works.

REFERENCES

Marulan South Consolidated Project Approval (06_0074) November 2012

Boral Peppertree Quarry Noise and Blast Monitoring Plan, dated August 2012

Boral Peppertree Quarry Environmental Monitoring Program, dated August 2012

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

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 Monitoring**

Annex A

Acoustics Glossary

A.1 WHAT IS NOISE AND VIBRATION?

A.1.1 Noise

Noise is often defined as a sound, especially one that is loud or unpleasant or that causes disturbance* or simply as unwanted sound, but technically, noise is the perception of a series of compressions and rarefactions above and below normal atmospheric pressure.

A.1.2 Vibration

Vibration refers to the oscillating movement of any object. In a sense noise is the movement of air particles and is essentially vibration, though in regards to an environmental assessment vibration is typically taken to refer to the oscillation of a solid object(s). The impact of noise on objects can lead to vibration of the object, or vibration can be experienced by direct transmission through the ground, this is known as ground-borne vibration.

Essentially, noise can be described as what a person hears, and vibration as what they feel.

A.2 HOW TO MEASURE AND DESCRIBE NOISE?

Noise is measured using a specially designed 'sound level' meter which must meet internationally recognised performance standards. Audible sound pressure levels vary across a range of 10^7 Pascals (Pa), from the threshold of hearing at 20μPa to the threshold of pain at 200Pa. Scientists have defined a statistically described logarithmic scale called Decibels (dB) to more manageably describe noise.

To demonstrate how this scale works, the following points give an indication of how the noise levels and differences are perceived by an average person:

- 0 dB - represents the threshold of human hearing (for a young person with ears in good condition);
- 50 dB – represents average conversation;
- 70 dB – represents average street noise, local traffic etc.;
- 90 dB – represents the noise inside an industrial premises or factory;
- 140 dB - represents the threshold of pain – the point at which permanent hearing damage may occur.

A.3 WHAT FACTORS CONTRIBUTE TO ENVIRONMENTAL NOISE?

The noise from an activity, like construction works, at any location can be affected by a number of factors, the most significant being:

- how loud the activity is;
- how far away the activity is from the receiver;
- what type of ground is between the activity and the receiver location e.g. concrete, grass, water or sand;
- how the ground topography varies between the activity and the receiver (is it flat, hilly, mountainous) as blocking the line of sight to a noise source will generally reduce the level of noise; and
- any other obstacles that block the line of sight between the source to receiver e.g. buildings or purpose built noise walls.

A.4 HOW TO CALCULATE OR MODEL NOISE LEVELS?

There are two recognised methods which are commonly adopted to determine the noise at particular location from a proposed activity. The first is to undertake noise measurements whilst the activity is in progress and measure the noise, the second is to calculate the noise based on known noise emission data for the activity in question.

The second option is preferred as the first option is largely impractical in terms of cost and time constraints, notwithstanding the meteorological factors that may also influence its quantification. Furthermore, it is also generally considered unacceptable to create an environmental impact simply to measure it. In addition, the most effective mitigation measures are determined and implemented during the design phase and often cannot be readily applied during or after the implementation phase of a project.

Because a number of factors can affect how 'loud' a noise is at a certain location, the calculations can be very complex. The influence of other ambient sources and the contribution from a particular source in question can be difficult to ascertain. To avoid these issues, and to quantify the direct noise contribution from a source/site in question, the noise level is often calculated using noise modelling software packages. The noise emission data used in each noise model of this assessment has been obtained from ERM's database of measured noise emissions.

A.5 ACOUSTIC TERMINOLOGY & STATISTICAL NOISE DESCRIPTORS

Environmental noise levels such as noise generated by industry, construction and road traffic are commonly expressed in dB(A). The A-weighting scale follows the average human hearing response and enables comparison of the intensity of noise with different frequency characteristics. Time varying noise sources are often described in terms of statistical noise descriptors. The following descriptors are commonly used when assessing noise and are referred to throughout this acoustic assessment:

- **Decibel (dB is the adopted abbreviation for the decibel) –** The unit used to describe sound levels and noise exposure. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure;

- **dB(A)** - unit used to measure 'A-weighted' sound pressure levels. A-weighting is an adjustment made to sound-level measurement to approximate the response of the human ear;

- **dB(C) –** unit used to measure 'A-weighted' sound pressure levels. C-weighting is an adjustment made to sound-level measurements which takes account of low-frequency components of noise within the audibility range of humans;

- **dB(Z) or dB(L) –** unit used to measure 'Z-weighted' sound pressure levels with no weighting applied, linear;

- **Hertz (Hz)** - the measure of frequency of sound wave oscillations per second. 1 oscillation per second equals 1 hertz;

- **Octave –** a division of the frequency range into bands, the upper frequency limit;

- **1/3 Octave –** single octave bands divided into three parts;

- **Leq** - this level represents the equivalent or average noise energy during a measurement period. The $L_{eq, 15min}$ noise descriptor simply refers to the L_{eq} noise level calculated over a 15 minute period. Indeed, any of the below noise descriptors may be defined in this way, with an accompanying time period (e.g. $L_{10, 15\ minute}$) as required;

- **Lmax** - the absolute maximum noise level in a noise sample;

- **LN -** the percentile sound pressure level exceeded for N% of the measurement period calculated by statistical analysis;

- **L_{10} -** the noise level exceeded for 90 per cent of the time and is approximately the average of the maximum noise levels;

- **L90** - the noise level exceeded for 90 per cent of the time and is approximately the average of the minimum noise levels. The L90 level is often referred to as the "background" noise level and is commonly used as a basis for determining noise criteria for assessment purposes;

- **Sound Power Level (L_W)** - this is a measure of the total power radiated by a source. The Sound Power of a source is a fundamental property of the source and is independent of the surrounding environment;

- **Sound Pressure Level (L_P)** - the level of sound pressure; as measured at a distance by a standard sound level meter with a microphone. This differs from L_W in that this is the received sound as opposed to the sound 'intensity' at the source;

- **Air-blast Overpressure –** a transient air pressure, such as the shock wave from an explosion that is greater than the surrounding atmospheric pressure;

- **Background noise** – the underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the L_{A90} descriptor;

- **Ambient noise** – the all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far;

- **Cognitive noise** – noise in which the source is recognised as being annoying; and

- **Masking** – the phenomenon of one sound interfering with the perception of another sound. For example, the interference of traffic noise with use of a public telephone on a busy street.

A.6 TERMS TO DESCRIBE THE PERCEPTION OF NOISE

The following concepts offer qualitative guidance in respect of the average response to changes in noise levels:

- differences in noise levels of less than approximately 2 dB(A) are generally imperceptible in practice;

- differences in noise levels of around 5 dB(A) are considered to be significant; and

- differences in noise levels of around 10 dB(A) are generally perceived to be a doubling (or halving) of the perceived loudness of the noise.

The following terms offer quantitative and qualitative guidance in respect of the audibility of a noise source:

- **Inaudible / Not Audible** - the noise source and/or event could not be heard by the operator, masked by extraneous noise sources not associated with the source. If a noise source is 'inaudible' its noise level may be quantified as being less than the measured L_{A90} background noise level, potentially by 10 dB or greater;

- **Barely Audible** – the noise source and/or event are difficult to define by the operator, typically masked by extraneous noise sources not associated with the source. If a source is 'barely audible' its noise level may be quantified as being 5 - 7 dB below the measured L_{A90} or L_{Aeq} noise level, depending on the nature of the source e.g. constant or intermittent;

- **Just Audible** – the noise source and/or event may be defined by the operator. However there are a number of extraneous noise sources contributing to the measurement. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator;

- **Audible** - the noise source and/or event may be easily defined by the operator. There may be a number of extraneous noise sources contributing to the measurement. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator; and

- **Dominant** – the noise source and/or event are noted by the operator to be significantly 'louder' than all other noise sources. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator.

The following terms offer qualitative guidance in respect of acoustic terms used to describe the frequency of occurrence of a noise source during an operator attended environmental noise measurements:

- **Constant** – this indicates that the operator has noted the noise source(s) and/or event to be constantly audible for the duration of the noise measurement e.g. an air-conditioner that runs constantly during the measurement;

- **Intermittent** – this indicates that the operator has noted the noise source(s) and/or event to be audible, stopping and starting intervals for the duration of the noise measurement e.g. car pass-by's; and

- **Infrequent** – this indicates that the operator has noted the noise source(s) and/or event to be constantly audible, however; not occurring regularly or at intervals for the duration of the noise measurement e.g. a small number of aircraft are noted during the measurement.

A.6.1 Industrial Noise Policy (INP Terminology)

- **Assessment Background Level (ABL)** - is defined in the INP as a single figure background level representing each assessment period (day, evening and night). Its determination is by the tenth percentile method (of the measured L_{A90} statistical noise levels) described in *Appendix B* on the INP; and

- **Rating Background Level (RBL)** - is defined in the INP as the overall single figure background level representing each assessment period (day, evening and night) over the whole monitoring period (as opposed to over each 24hr period used for the ABL). This is the level used for assessment purposes. It is defined as the median value of:

  - All the day assessment background levels over the monitoring period for the day;

  - All the evening assessment background levels over the monitoring period for the evening; or

  - All the night assessment background levels over the monitoring period for the night.

- **Extraneous noise –** noise resulting from activities that are not typical of the area. Atypical INP activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous;

- **Most affected location(s) –** locations that experience (or will experience) the greatest noise impact from the noise source under consideration. In determining these locations, one needs to consider existing background levels, exact noise source location(s), distance from source (or proposed source) to receiver, and any shielding between source and receiver;

- **Noise criteria –** the general set of non-mandatory noise level targets for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity (for example, noise levels for various land uses);

- **Noise limits –** enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action;

- **Project Specific Noise Levels –** target noise levels for a particular noise generating facility. They are based on the most stringent of the intrusive criteria or amenity criteria. Which of the two criteria is the most stringent is determined by measuring the level and nature of existing noise in the area surrounding the actual or propose noise generating facility;

- **Compliance** – the process of checking that source noise levels meet with the noise limits in a statutory context;

- **Non-compliance** – development is deemed to be in non-compliance with its noise consent/ licence conditions if the monitored noise levels exceed its statutory noise limit by more than 2 dB;

- **Feasible and Reasonable measures** – feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors:

  - noise mitigation benefits (amount of noise reduction provided, number of people protected);

  - cost of mitigation (cost of mitigation versus benefit provided);

  - community views (aesthetic impacts and community wishes); and

  - noise levels for affected land uses (existing and future levels, and changes in noise levels).

- **Meteorological Conditions** – wind and temperature inversion conditions;

- **Temperature Inversion** – an atmospheric condition in which temperature increases with height above the ground; and

- **Adverse Weather** – weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).

A.7 OPERATOR ATTENDED NOISE MEASUREMENTS

Noise level deductions that may be applied based on the percentage contribution of a noise source(s) are presented in *Table A.1* below.

Table A.1 Noise Level Deductions – Noted Percentile Contribution

Percentage Contribution	Noise Level Deduction, dB(A)
5%	-13.0
10%	-10.0
15%	-8.2
20%	-7.0
25%	-6.0
30%	-5.2
35%	-4.6
40%	-4.0
45%	-3.5
50%	-3.0
55%	-2.6
60%	-2.2
65%	-1.9
70%	-1.5
75%	-1.2
80%	-1.0
85%	-0.7
90%	-0.5
95%	-0.2
100%	0.0

1. **EXAMPLE:** the measured $L_{Aeq,\ 15\ minute}$ noise level is 49 dB and the site contribution was observed to be 10% of this level (extraneous noise sources were noted to dominate the measurement), therefore the $L_{Aeq,\ 15\ minute}$ noise level deduction is 10 dB, with a resultant noise level contribution of approximately 39 dB.

Noise level deductions that may be applied based on the percentage of time that a noise source(s) is audible during a 15 minute measurement are presented in *Table A.2* below.

Table A.2 Noise Level Deductions – Noted Time Contribution

Event Duration (minutes)	Noise Level Deduction, dB(A)
1	-11.8
2	-8.8
3	-7.0
4	-5.7
5	-4.8
6	-4.0
7	-3.3
8	-2.7
9	-2.2
10	-1.8
11	-1.3
12	-1.0
13	-0.6
14	-0.3
15	-0.0

1. **EXAMPLE:** the measured LAeq, 15 minute noise level contribution of an excavator was noted to be 56 dB, however it was only audible for 6 minutes during the 15 minute measurement period, therefore the LAeq, 15 minute noise level deduction is 4 dB, with a resultant noise level contribution of approximately 52 dB.

Annex B

Goulburn AWS Weather Data (October 2014)

Annex C

Unattended Noise Logging Charts

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21 October, 2016

Sharon Makin
Boral Property Group
Greystanes House, Clunies Ross Road
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Our Reference: *0210419RP10 DRAFT*

Attention: **Sharon Makin**

Dear Sharon,

RE: NOISE MONITORING SUMMARY - BORAL OWNED PROPERTIES - OCTOBER 2014

1. OVERVIEW

Boral Resources (NSW) Pty Ltd (Boral) has been granted project approval to establish and operate the Peppertree Quarry (the quarry) located at Marulan South in the Southern Tablelands of New South Wales (NSW). The project approval includes all in-pit quarrying activities and supporting infrastructure such as a rail siding and loading facility.

Environmental Resources Management Australia Pty Ltd (ERM) has been engaged to conduct quarterly noise compliance monitoring at the quarry on behalf of Boral in accordance with the *Peppertree Quarry Noise and Blast Monitoring Plan* (NBMP) and November 2012 Project Approval (06_0074).

Following land acquisition, three receiver locations that were identified in earlier project approvals documentation (Receiver 1, Receiver 3 and Receiver 4) are now part of the overall Boral land ownership, and hence monitoring to determine compliance is no longer required at these sites, as Boral have negotiated agreements in place.

Boral continue however to measure noise levels at Receiver 1 (Montgomery) and Receiver 4 (Armitt) to better understand the site's noise emissions at these locations. This document has been prepared by ERM to summarise the findings of noise monitoring conducted at these two locations during October 2014.

Environmental Resources Management Australia Pty Ltd
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Offices worldwide

1.1 METHODOLOGY

A detailed description of the applicable documents, standards and guidelines, relevant acoustic concepts, terminology and noise compliance monitoring methodology for operator attended noise monitoring completed during October 2014 is available in the *0210419RP09_F01 - OCT 14 Noise* compliance monitoring report.

ERM notes that the same robust methodology is adopted at properties now part of the Boral land ownership as used for the assessable locations identified in the November 2012 Project Approval.

Technical Note

Daytime noise criteria apply throughout the period of the quarry day shift (7am to 7pm) on all days. Night time criteria apply only during the period of the quarry evening and night shift (7pm to 7am). Refer *Section 2.2* and *Section 2.3* for daytime and night time criteria considered in this document.

All noise levels presented in this document are expressed in dB(A) re: 2×10^{-5} Pa.

1.2 MEASUREMENT LOCATIONS

The Boral owned properties considered in this document, where noise has been measured, are described in *Table 1* below and presented in *Figure 1.1*.

Table 1 – Noise Measurement (Receiver) Locations

Receiver ID	Description	MGA (Zone 56) Coordinates		Direction and Distance from Quarry Centre	
		Easting	Northing	Compass point	Distance, m
1	Montgomery	230481	6150110	E	2730
4	Armitt	226271	6150950	WNW	1480

Figure 1 INSERT: 0210419s_NBMP_C001_R0_F1-1

2. RESULTANT NOISE LEVELS

This section presents the measured overall noise levels for October noise monitoring events and a comparison of site noise emissions to the project-specific $L_{Aeq,\ 15\ minute}$ and $L_{A1,\ 1\ minute}$ criteria. ERM reiterates that, following land acquisition and negotiated agreements being put in place, determining compliance is no longer required at Receiver 1 and Receiver 4; as such this comparison to criteria is indicative only.

2.1 OVERALL NOISE LEVELS

Measured overall ambient and background noise levels for October 2014 monitoring are presented in *Table 2* and *Table 3* including all relevant statistical and acoustic parameters i.e. L_{max}, L_{min}, L_{eq}, L_1, L_{10} and L_{90}.

Table 2 – Measured Overall Noise Levels – 23 October 2014

Receiver		Start	Measured Noise Levels					
ID	Description	Time	Lmax	Lmin	Leq	L1	L10	L90
1	Montgomery	11:20 AM	69	31	45	59	42	33
1	Montgomery	11:35 AM	59	31	40	49	43	34
1	Montgomery	11:50 AM	64	30	38	49	39	33
1	Montgomery	10:42 PM	56	36	42	47	45	39
1	Montgomery	10:58 PM	64	34	43	49	45	39
4	Armitt	03:36 PM	73	29	52	67	46	33
4	Armitt	10:25 AM	63	36	48	57	51	41
4	Armitt	10:41 AM	61	34	44	52	46	37

Table 3 – Measured Overall Noise Levels – 24 October 2014

Receiver		Start	Measured Noise Levels					
ID	Description	Time	Lmax	Lmin	Leq	L1	L10	L90
4	Armitt	12:52 AM	64	31	36	41	38	33
4	Armitt	01:07 AM	53	29	36	43	39	33

2.2 COMPARISON TO LEQ, 15 MINUTE CRITERIA

A comparison of resultant site noise level contributions to now non-applicable ($L_{eq,\ 15\ minute}$) operational noise impact assessment criteria is presented in *Table 4* and *Table 5*. These site noise level contributions have been determined from each measurement previously described in *Section 2.1*, in the absence of any influential source not associated with the site.

Table 4 – Comparison to $L_{eq,\ 15\ minute}$ Criteria – 23 October 2014

Receiver ID	Description	Assessment Period	Operational Noise Impact Assessment Criteria	Site Noise Level Contribution Leq, 15 minute	Comparison to Criteria
1	Montgomery	Daytime	35	27	-8
1	Montgomery		35	27	-8
1	Montgomery		35	27	-8
1	Montgomery	Night time	35	29	-6
1	Montgomery		35	29	-6
4	Armitt	Daytime	37	23	-14
4	Armitt		37	31	-6
4	Armitt		37	27	-10

Table 5 – Comparison to $L_{eq,\ 15\ minute}$ Criteria – 24 October 2014

Receiver ID	Description	Assessment Period	Operational Noise Impact Assessment Criteria	Site Noise Level Contribution Leq, 15 minute	Comparison to Criteria
4	Armitt	Night time	35	27	-8
4	Armitt		35	25	-10

2.3 COMPARISON TO $L_{1,\ 1\ minute}$ CRITERIA

A comparison of resultant site noise level contributions to now non-applicable ($L_{1,\ 1\ minute}$) operational noise impact assessment criteria is presented in *Table 6*.

Site noise levels are based on observed noise events and further review of recorded audio files for each operator attended noise measurement. These values are the highest resultant ($L_{1,\ 1\ minute}$) site noise level contribution (determined in the absence of any influential source not associated with the site) for all night time measurement previously described in *Section 2.1*.

Table 6 – Comparison to $L_{1,\ 1minute}$ Criteria (Night Time) – October 2014

Receiver ID	Description	Assessment Period	Operational Noise Impact Assessment Criteria[1]	Site Noise Level Contribution L1, 1 minute	Comparison to Criteria
1	Montgomery	Night time	45	39	-6
4	Armitt		46	35	-11

3. CONTACTS

ERM trust this information meets Boral's requirements. Any questions or queries regarding the data presented in this document please contact Nathan Lynch on (02) 8584 8888 or via email at nathan.lynch@erm.com.

Yours sincerely,
for Environmental Resources Management Australia Pty Ltd

Nathan Lynch	Steve Laister
Project Manager	Partner

Appendix E – Rehabilitation Management

Table E.1 Management Actions: Rehabilitation and Revegetation

Phase	Action	Purpose	Priority	Timeframe[1]	Responsibility
Preconstruction - construction	1. Retention of the existing Box-Gum Grassy Woodland The remnant of Box-Gum Grassy Woodland to be retained is to be defined by protection fencing to prohibit construction access. The area within must be kept free from all building materials, contaminants and other debris, and must not be used for storage of any building materials.	Minimise potential impact to endangered Box Gum Woodland	Priority 1 – High	At all times	Boral Quarries Construction Contractor. Fencing implemented July – December 2011. Ongoing management
Preconstruction	2.Collection of seed, vegetative material or trans locatable individuals within the development area to be grown or used in rehabilitation and reconstructive landscaping.	To ensure correct provenance of the species being used for revegetation and maximise survival rate	Priority 1 – High	Immediately Prior to clearing in all stages	Contractor. Seed collected in December 2011 – march 2012 for propagation of rehab trees.
Preconstruction	3.Contract a qualified rehabilitation and re-vegetation consultant to undertake on-ground planning for and rehabilitation works across the subject site	To ensure success and of rehabilitation works	Priority 1 - High	Immediate	Proposal December 2011 Southern Bushland Restorations. Rehabilitation work commenced July 2013.
Construction following dam construction)	4.Direct establishment of tree, shrub and groundcover species characteristic of Box-Gum Grassy Woodland surrounding a 20 metre buffer around the periphery of Dam No. 1 and on either side of Tangarang Creek providing a direct offset of 12.5 ha.	To minimise potential impact to endangered Box Gum Woodland and increase areas of woodland vegetation in the future	Priority 2 - Moderate	Within 1 month of dam completion or when practical dependent on seasonality	Rehabilitation planting work commenced July 2013. Direct seeding not possible due to grass cover, over planting undertaken rather than disturbance of soil.
Rehabilitation	5.Revegetation around the dams and the addition of semi-submerged rocky areas around the perimeter of the dams.	To create habitat for native frogs and reptiles	Priority 2 - Moderate	Within 1 month of dam completion or when practical dependent on growing season	Rehabilitation work commenced July 2013.

Phase	Action	Purpose	Priority	Timeframe[1]	Responsibility
Rehabilitation	6.Tubestock to be used in conjunction with direct seeding during establishment of the 20 metre buffer around the periphery of Dam No. 1, adjoining the remnant Box-Gum Grassy Woodland.	To ensure success and of rehabilitation works	Priority 2 - Moderate	Within 1 month of dam completion or when practical dependent on growing season	Seed collected and propagated for use. All tubestock utilised in the rehabilitation of the area. Rehabilitation planting work commenced July 2013.
Rehabilitation	7.Direct Seeding to be used on bunding, (consider jute matting for high erosion areas).	To ensure success and of rehabilitation works	Priority 2 - Moderate	Within 1 month of construction beginning or when practical dependent on growing season	Noise bund hydromulched progressively from October to December 2012.
Rehabilitation	8.Seedlings and small plants within newly established areas should be protected with tree guards.	To protect revegetation from feral browsers such as rabbits	Priority 2 - Moderate	Within 1 month of dam completion or when practical dependent on growing season	Not implemented. Decision made to increase density of plantings and to replace as necessary.
Rehabilitation	9.Install permanent fencing around HMA to prevent human, stock and vehicular access.	Minimise ongoing impacts of on vegetation	Priority 1 – High	At all times	Boral Quarries October to December 2011. Area fenced.
Rehabilitation	10.Signs indicating that rehabilitation work is occurring should be erected (e.g. 'No access –rehabilitation in progress') along HMA fence line.	To advise construction workers and other people accessing the site of works being carried out	Priority 1 – High	At all times	Boral Quarries October to December 2011. Area fenced.
Ongoing – progressive rehabilitation	11.Site maintenance to be carried out. This will include regular watering schedules, maintenance of tree guards, progressive re-vegetation / rehabilitation, halo spraying, and re-placement planting if required.	To ensure survival rate of revegetation	Priority 2 - Moderate	At all times	Contractor maintenance plan commenced in 2014. 2 staff, 2 days per week focussed on weed management of the rehabilitated habitat management areas

Where practical, feasible and reasonable.

Table E.2 Management Actions Relating To Native Vegetation

Phase	Action	Purpose	Priority	Timeframe[1]	Responsibility
Pre-Construction	1.Contractors to follow specific guidelines for vegetation removal, as follows: Construction vehicle access routes, soil stockpiles and machinery are to be located outside the Primary Root Zone (PRZ) of the remnant tree stands identified as being protected in the Environment Assessment (ERM 2006). The PRZ is generally defined as a radial offset 10 times trunk diameter. If stumps of felled trees are within the PRZ of the remnant vegetation stand, stumps are to be ground where practicable rather than completely grubbed or removed. This will enhance the long-term viability of the retained vegetation.	To avoid soil compaction and damage to the roots, stems and branches of trees to be retained	Priority 1 – High	3 months	Boral Quarries EO and or Independent Consultant October to December 2011 area fenced to ensure no disturbance.
Pre-Construction	2.Pre-clearance surveys of all trees to be removed, to be undertaken by an appropriately qualified person.	To ensure no fauna are in the trees when removed	Priority 1 – High	Immediately Prior to clearing in all stages	Boral Quarries ERM Consultants employed, site clearance surveys undertaken October to December 2011.
Construction	3.An appropriately qualified person to be on site while hollows bearing trees are removed so that any fauna inhabiting the trees can be captured and relocated.	To ensure survival of all fauna on site during clearing	Priority 1 – High	Immediately During clearing in all stages	Boral Quarries ERM Consultants employed, site clearance surveys undertaken October to December 2011.
Pre-Construction - construction	4.Retention of the existing Box-Gum Grassy Woodland. The remnant of Box-Gum Grassy Woodland to be retained is to be defined by protection fencing to prohibit construction access to the area. The area within must be kept free from all building materials, contaminants and other debris, and must not be used for storage of any building materials.	Minimise potential impact to endangered Box Gum Woodland	Priority 1 – High	At all times	Boral Quarries Construction Contractor October to December 2011 area fenced to ensure no disturbance
Construction	5.Manage protected trees throughout the construction process (particularly if a portion of the tree's root system has been disturbed by excavation).	Maintain health and maximise survival rate of vegetation to be retained	Priority 1 – High	At all times	Boral Quarries Construction Contractor October to December 2011 area fenced to ensure no disturbance

Phase	Action	Purpose	Priority	Timeframe[1]	Responsibility
Pre-Construction - construction	6.Majority of mature trees within the upper reaches of reservoir of Dam No. 1 to be retained, including all hollow bearing trees.	To retain existing habitats for local fauna	Priority 1 – High	At all times	Boral Quarries Construction Contractor October to December 2011 area fenced to ensure no disturbance
Construction	7.Minimise vegetation removal by trimming limbs rather than removing entire trees or bushes, where possible. Leave rootstock in the ground to stabilise the soil.	Minimise disturbance and damage to vegetation	Priority 1 – High	At all times	Boral Quarries Construction Contractor
Construction	8.Stockpile vegetative cuttings for respreading as mulch and soil protection and seed material for regeneration.	Aid in regeneration activities	Priority 1 – High	At all times	Boral Quarries Construction Contractor Material mulched January-March 2012 and utilised on bund wall.
Rehabilitation	9.Install permanent fencing around remnant bushland and re-vegetated area to prevent human, stock and vehicular access.	Minimise ongoing impacts of human activity on vegetation	Priority 1 – High	At all times	Boral Quarries October to December 2011 area fenced to ensure no disturbance s

Where practical, feasible and reasonable.

Table 3.3 Management Actions Relating To Habitat Corridors and Connectivity

Phase	Action	Purpose	Priority	Timeframe[1]	Responsibility
Pre-Construction	1.Contract a qualified rehabilitation and re-vegetation consultant to undertake rehabilitation activities.	To ensure success of rehabilitation works	Priority 1 - High	Prior to undertaking works	Boral Quarries Southern Bushland Restoration contracted to prepare plans, undertake planting and maintenance – December 2011.
Rehabilitation	2.Direct establishment of tree, shrub and groundcover species characteristic of Box-Gum Grassy Woodland on either side of Tangarang Creek to connect with remnant Box-Gum Grassy Woodland and nearby Bungonia State Recreation Area and Morton National Park.	To establish connectivity with vegetation and create a biodiversity corridor for endemic species	Priority 2 - Moderate	Within 1 month of construction beginning or when practical dependent on growing season	Rehabilitation planting work commenced July 2013. Direct seeding not possible due to grass cover, over planting undertaken rather than disturbance of soil.
Pre-construction	3.Clearly identify and demarcate (with markers or temporary fencing) the boundaries between area to be revegetated and construction area.	Minimise disturbance and creation of informal walkways	Priority 1 – High	Prior to clearing in all stages	Boral Quarries October – December 2011 Area fenced to ensure no disturbance.
Pre-construction	4.Collect seed from the development area to be grown for direct planting or used for direct seeding of the HMA.	To ensure correct provenance of the species being used for revegetation and maximise survival rate	Priority 1 – High	Prior to clearing in all stages	Contractor. Seed collected December 2011 to March 2012 for propagation of rehab trees.

Phase	Action	Purpose	Priority	Timeframe[1]	Responsibility
Rehabilitation – ongoing rehabilitation	5.Consideration of Jute matting to stabilize drainage channels or areas assessed to be a high erosion hazard to avoid run-off of top-soil and improve soil organic content.	Minimise soil erosion, and improve water retention and organic content in soil to maximise survival rate	Priority 2 - Moderate	When required post construction	
Rehabilitation – ongoing rehabilitation	6.Seedlings and small plants within newly established areas to be protected with tree guards.	To protect revegetation from feral predators such as rabbits	Priority 2 - Moderate	Upon establishment of seedlings and small plants or when required	Not implemented. Decision made to increase density of plantings and to replace as necessary.
Rehabilitation	7.Install permanent fencing around HMA to prevent human, stock and vehicular access.	Minimise ongoing impacts of on vegetation	Priority 1 – High	At all times	Boral Quarries October – December 2011 Area fenced to ensure no disturbance.
Rehabilitation	8.Signs indicating that rehabilitation work is occurring should be erected (e.g. 'No access –rehabilitation in progress') along HMA fence line	To advise construction workers and other people accessing the site of works being carried out	Priority 1 – High	At all times	Boral Quarries October – December 2011 Area fenced to ensure no disturbance.
Ongoing-progressive rehabilitation	9.Site maintenance to be carried out. This will include monthly watering schedules, maintenance of tree guards, progressive rehabilitation, halo spraying, and re-placement planting if required.	To ensure survival rate of revegetation	Priority 2 - Moderate	At all times	Contractor maintenance plan commenced in 2014. 2 staff, 2 days per week focussed on weed management of the rehabilitated habitat management areas

Where practical, feasible and reasonable.

Table E.4 Management Actions Relating To Significant Species

Phase	Action	Purpose	Priority	Timeframe[1]	Responsibility
Pre-Construction	1.Suitably qualified ecologist to conduct a survey (species specific) of known populations and potential habitat, to provide greater insight into the current status of the species, threats to its persistence and management actions.	To gain a greater understanding of the distribution of *Solanum celatum* within the area and its requirements for survival and to ensure no other plants will be impacted	Priority 1 – High	Immediately Prior to clearing in all stages	Boral Quarries and Consultant July – September 2011 (Onsite work December 2011)
Pre-Construction	2.Vegetation clearance strategy Construction vehicle access routes, soil stockpiles and machinery are to be located outside the Primary Root Zone (PRZ) of the remnant vegetation stand identified as being protected. The PRZ is generally defined as a radial offset 10 times trunk diameter. If stumps of felled trees are within the PRZ of the remnant vegetation stand, stumps are to be ground where practicable rather than completely grubbed or removed. This will enhance the long-term viability of the retained vegetation.	To ensure no impacts during clearance activities	Priority 1 – High	Immediately Prior to clearing	Boral Quarries and Consultant October – December 2011 Area Fenced.
Pre-Construction	3.An appropriately qualified person to conduct a survey of trees to identify any nesting species.	To ensure survival of species within the area	Priority 1 – High	Immediately Prior to clearing	Boral Quarries and Consultant July- September 2011 October-December 2011.

Phase	Action	Purpose	Priority	Timeframe[1]	Responsibility
Construction - ongoing	4.Engage qualified weed contractors to conduct weed removal of blackberry and all exotic species/garden escapes located within potential habitat areas of *Solanum celatum*	To suppress weed growth and decrease habitat degradation from invasive species	Priority 2 - Moderate	Within 1 month of construction beginning	April-June 2012 July-September 2012 July-September 2014 Wolfcon.
Pre-construction - ongoing	5.Protect areas of known and potential habitat of *Solanum celatum* from clearing and further fragmentation.	To ensure outbreaks of weeds do not occur, affecting native species growth	Priority 1 – High	At all times	Boral Quarries July-September 2011 Fenced.
Rehabilitation	6.Install permanent fencing around HMA to prevent human, stock and vehicular access.	To minimise on going impacts to the species	Priority 1 – High	At all times	Boral Quarries October – December 2011 Area fenced.
Pre-construction - Ongoing	7.Advise the NPWS and RFS of nesting parrots	To minimise potential impact from government activities, such as back-burning or clearing	Priority 1 – High	Immediately after survey is conducted	Boral Quarries No nesting parrots identified.
Rehabilitation – ongoing	8.Monitor weed populations by survey every six months and eradicate new weeds promptly. Weed distribution and abundance should be re-mapped and control methods and timing updated accordingly	To ensure outbreaks of weeds do not occur, affecting native species growth	Priority 1 – High	At all times	Contractor April-June 2012 July-September 2012 July-September 2013 Wolfcon. 2014 - monthly reports prepared on weed management as part of rehabilitation works

Phase	Action	Purpose	Priority	Timeframe[1]	Responsibility
Construction	9.Install fauna -sensitive lighting (high-pressure sodium lighting or luminare shields) to be installed should not be directed towards the HMA.	To avoid disruption to fauna species in adjacent areas	Priority 1 – High	Immediately	Boral Quarries Completed and assessed in 2014 inconjunction with the rail corridor.
Where practical, feasible and reasonable.					

Table E.5 Management Actions Relating to Supporting Actions

Supporting Action	Phase	Action	Purpose	Priority	Timeframe[1]	Responsibility
Earthworks - Topsoil	**Preconstruction - Construction**	1.Fertile topsoil when stripped will be, where feasible used for rehabilitation.	Maximise seed bank in rehabilitation areas	Priority 1 – High	Immediately Prior to and during clearing	Boral Quarries Construction Contractor Reapplied to noise walls and pit across life of the operation
	Rehabilitation – progressive rehabilitation	2.Most recently stripped topsoil will be used to top-dress emplacement areas and bunds to an average depth of 10 cm.	To achieve the greatest benefits from the seedbank and soil	Priority 1 – High	Immediately Prior to and during clearing	Boral Quarries Construction Contractor Reapplied to noise walls and pit across life of the operation
	Rehabilitation – progressive rehabilitation	3.Rehabilitation will include shaping of the bund and emplacement areas to provide drainage and irregular features for integration with the surrounding landscape.	Ensure minimal soil erosion throughout the site	Priority 1 – High	Immediately Prior to and during clearing	Boral Quarries Construction Contractor Bund built as designed – over life of operation
	Rehabilitation	4.Topsoil unable to be used immediately will be stockpiled for later rehabilitation of disturbed areas. These stockpiles will be kept to a limited size and seeded to ensure topsoil quality.	Ensure stabilisation and preservation of topsoil quality	Priority 1 – High	At all times	Boral Quarries Construction Contractor

Supporting Action	Phase	Action	Purpose	Priority	Timeframe[1]	Responsibility
	Pre-construction - Ongoing	5.Apply appropriate soil conservation measures when undertaking any earthworks that involve soil disturbance	Minimise soil degradation and erosion and damage to waterways	Priority 1 – High	At all times	Boral Quarries Construction Contractor Erosion controls implemented from commencement of noise bund works – July 2011 Sediment pond and fencing
Weed Control - General	**Post-construction - ongoing**	1.Engage qualified weed contractors to conduct weed removal of Blackberry (*Rebus furious), Acacia concurrent,* and all exotic species/garden escapes located in areas not proposed to be developed.	Suppress the growth of weed species and prevent spread throughout the quarry and associated infrastructure areas	Priority 1 - High	Within 1 month of construction	Boral Quarries April-June 2012 July-September 2012 July-September 2013 Wolfcon. 2014 - monthly reports prepared on weed management as part of rehabilitation works
	Post-construction	2.Undertake baseline weed survey and weed control program:	Ensure effective weed control is carried out with minimal impact to the environment	Priority 1 - High	Within 1 month of construction or when practically feasible due to seasonality	Contractor April – June 2012 July –September 2012 July –September 2013 and 2014 – Wolfcon
		a. Undertake weed control in a manner that minimises soil disturbance. This reduces opportunities for weeds to re-establish (thus reducing overall weed management costs.		Priority 1 - High		

Supporting Action	Phase	Action	Purpose	Priority	Timeframe[1]	Responsibility
		b. Minimise the use of herbicides. If herbicides are used, selective application (i.e. spot spraying) is preferable to broad scale spraying.		Priority 1 - High		Spot spraying undertaken at all times. Stripping required for heritage works prior to excavation. Timing such that areas are extracted as soon as cleared. Seeding and rehab as soon as practicable and weather permitting
		c. Minimise areas of bare soil and re-establish vegetation as soon as possible on bare ground to prevent conditions favouring weed establishment.		Priority 1 - High	Within 1 month of construction	
	Ongoing-progressive rehabilitation	3.Undertake short term monitoring of weed control success to identify any outbreaks following weed removal or suppression.	Ensure outbreaks of weeds do not occur, affecting native species growth	Priority 1 - High	Within 1 month Post weed control	Boral and Contractor Undertaken on a quarterly basis
	Ongoing-progressive rehabilitation	4.Monitor weed populations by survey every 6 months and eradicate new weeds promptly. Weed distribution and abundance should be re-mapped and control methods and timing updated accordingly.		Priority 1 - High	Every 6 months from completion of first weed control	Boral and Contractor Ongoing
Weed Control - HMA Specific	**Post Construction**	1.Provide contractors with a map showing the location of waterways and associated soaks and drains.	Ensure minimal impact to the environment whilst works are carried out.	Priority 1 – High	Within 1 month of construction	Boral Quarries Provided to maintenance and rehabilitation contractors

Supporting Action	Phase	Action	Purpose	Priority	Timeframe[1]	Responsibility
		a. Minimise the use of herbicides near waterways, take particular care in riparian areas to avoid herbicides entering watercourses.		Priority 1 – High	Within 1 month of construction	Contractor Rehabilitation site initially slashed in August 2013 prior to planting. Spot spraying only undertaken.
		b. Stage weed removal to minimise erosion and facilitate the successful establishment of native plant species.		Priority 1 – High		
		c. Use non-herbicide measures of weed control (e.g. manual removal) near waterways where possible.		Priority 1 – High		
		d. Treat weeds overhanging a waterway or growing within the channel as an aquatic situation.	Ensure minimal impact to the environment whilst works are carried out.	Priority 1 – High	Within 1 month of construction	Contractor Safe working method statement in place Competent licensed contractors
		e. Spray when heavy rain is not expected for some time (a minimum of several days).		Priority 1 – High		
		f. Choose the application method that minimises the amount of herbicide used and its dispersal.		Priority 1 – High		
		g. Carry herbicides in secure containers when undertaking weed management activities around waterways.		Priority 1 – High		
		h. Mix chemicals and rinse equipment well away from waterways and direct herbicide spray away from the waterway if at all possible.		Priority 1 – High		
		i. Apply the minimum amount of spray required to achieve the degree of wetting specified on the label.		Priority 1 – High		

Supporting Action	Phase	Action	Purpose	Priority	Timeframe[1]	Responsibility
		j.Move upwind when spraying to maximise dilution.		Priority 1 – High		
Rubbish Control	**Preconstruction**	1.implementation of rubbish removal program and control of illegal dumping	Ensure HMA is maintained for the protection of flora and fauna and not impacted by rubbish	Priority 2 - Moderate		Completion of construction, No illegal dumping has occurred. Area fenced and site operated 24/7Rubbish removed as found
Fire Management	**Preconstruction**	1.A bushfire management plan is to be prepared for the site. 2.Implement the bushfire management plan. a. The bushfire management plan will be prepared to protect biodiversity values of the HMA ensuring extensive consultation with NPWS and Marulan Rural Fire Brigade. b. The bushfire management plan will be written with consideration of the Morton National Park Fire Management Plan/Strategy and the Goulburn- Mulwaree District Bushfire Risk Management Plan. c. The bushfire management plan will detail steps to ensure coordination with Morton National Park. d. The bushfire management plan will aim to avoid fire regimes that potentially exceed biodiversity thresholds for vegetation communities and individual species known from the site.		Priority 1 - High	Within 6 months	Boral Quarries and Bushfire Consultant Drafted by local RFS fire captain Fire trails maintained

Supporting Action	Phase	Action	Purpose	Priority	Timeframe[1]	Responsibility
	Ongoing	3.Ensure fire is not deliberately introduced into the HMA for fuel management purposes without prior reference to the Bushfire Management Plan.		Priority 1 - High	Immediately	Boral Quarries and Contractor

Where practical, feasible and reasonable.