

Boral Peppertree Quarry
Annual Review
January – December 2020



Document Control

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Boral Peppertree Quarry

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DRAFT	27 th February 2021	Michael Higgins (Boral Peppertree Quarry Manager) Sharon Makin (Stakeholder and Environment Advisor)
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Boral Peppertree Quarry
Annual Review (Jan 2020 – Dec 2020)

Name of operation	Peppertree Quarry
Name of operator	Boral Resources (NSW) Pty Ltd
Development consent / project approval #	06_0074
Name of holder of development consent / project approval	Boral Resources (NSW) Pty Ltd
Mining lease #	Not applicable
Name of holder of mining lease	Not applicable
Water licence #	10WA102701 and 10WA116000
Name of holder of water licence	Boral Resources (NSW) Pty Ltd
MOP/RMP start date	Not applicable
MOP/RMP end date	Not applicable
Annual Review start date	1 st January 2020
Annual Review end date	31 st December 2020
<p>I, Michael Higgins, certify that this audit report is a true and accurate record of the compliance status of Peppertree Quarry for the period 2020 Calendar Year and that I am authorized to make this statement on behalf of Boral Resources (NSW) Pty Ltd .</p> <p><i>Note.</i></p> <p><i>a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, \$1 million and for an individual, \$250,000.</i></p> <p><i>b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or \$22,000, or both).</i></p>	
Name of authorised reporting officer: Michael Higgins	
Title of authorised reporting officer: Peppertree Quarry Operations Manager	
	
Signature of authorised reporting officer	
Date 31st March 2021	

Table of Contents

1	Statement of Compliance	7
2	INTRODUCTION	9
3	APPROVALS	12
4	QUARRY OPERATIONS	13
4.1	OPERATIONS LAST 12 MONTHS	13
4.2	OPERATIONS NEXT 12 MONTHS	13
4.3	PRODUCTION, SALES AND TRANSPORT LAST 12 MONTHS	13
4.4	PRODUCTION, SALES AND TRANSPORT NEXT 12 MONTHS	14
5	ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW	15
6	ENVIRONMENTAL PERFORMANCE	17
6.1	BORAL INTEGRATED MANAGEMENT SYSTEM	18
6.2	METEOROLOGICAL MONITORING	18
6.3	AIR QUALITY	18
6.3.1	Deposition Dust Monitoring	18
6.3.1.1	Deposited Dust – Performance Review (2020)	19
6.3.1.2	Long Term Trend Analysis and assessment (2014 – 2020)	19
6.3.1.3	Deposited Dust Summary and opportunities for improvements	19
6.3.2	PM10 and TSP High Volume Samplers (HVAS)	19
6.3.2.1	TSP and PM10 – Performance Review (2020)	20
6.3.2.2	Long Term Trend Analysis and assessment – TSP and PM10	20
6.3.2.3	PM10, TSP Summary and opportunities for improvements	21
6.4	NOISE	21
6.4.1	Noise Management Performance Review	22
6.4.2	Long Term Trend Analysis and Assessment	22
6.4.3	Noise summary and opportunities for improvement.	22
6.5	BLASTING	23
6.5.1	Blast Management Performance Review	23
6.5.2	Long Term Trend Analysis and Assessment	24
6.6	WASTE MANAGEMENT	24
6.7	DANGEROUS GOODS AND HAZARDOUS MATERIALS MANAGEMENT	26
6.8	BUSH FIRE MANAGEMENT	26
6.9	HERITAGE CONSERVATION	26

7	WATER MANAGEMENT	27
7.1	SURFACE WATER	27
7.1.1	Surface Water Monitoring Results	29
7.1.2	Surface Water Management Performance Review	29
7.1.3	Long Term Trend Analysis and Assessment	30
7.1.4	Environmental Flows	30
7.1.5	Surface water summary and opportunities for improvement	31
7.2	GROUNDWATER	31
7.2.1	Groundwater Management Performance Review	32
7.2.2	Long term trend and assessment	33
7.2.3	Ground water summary and opportunities for improvement	34
8	REHABILITATION	34
9	COMMUNITY	35
9.1	ENVIRONMENTAL COMPLAINTS MANAGEMENT	35
9.2	COMMUNITY CONSULTATION	37
9.3	COMMUNITY CONSULTATIVE COMMITTEE	37
9.4	COMMUNITY NEWSLETTERS	38
9.5	COMMUNITY EVENTS	38
9.6	BLAST LIAISON	38
9.7	ACCESS TO INFORMATION	38
10	INDEPENDENT AUDIT	38
11	INCIDENTS & NON COMPLIANCES DURING THE REPORTING PERIOD	39
11.1	INCIDENT MANAGEMENT AND RESPONSE	39
11.2	SUMMARY OF REGULATORY NOTIFICATIONS	39
12	ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD	40
	APPENDIX 1: Annual Return for Extractive Materials – FINANCIAL year 2020	41
		41
	APPENDIX 2 AIR QUALITY MONITORING INFORMATION	43
	APPENDIX 3 NOISE MONITORING	50
	APPENDIX 4 BLAST MONITORING INFORMATION	61
	APPENDIX 5 SURFACE AND GROUNDWATER MONITORING INFORMATION	67

Tables

Table 1: Statement of Compliance.....	7
Table 2: Non-Compliances	7
Table 3: Compliance Status Key	8
Table 4: Key Contact Details – Peppertree Quarry	10
Table 5: Approvals.....	12
Table 7: Actions Required from 2020 AR.....	15
Table 8: Summary of Environmental Performance.....	17
Table 9: PM ₁₀ and TSP Criteria	19
Table 10: Operational Noise Assessment Criteria	21
Table 11: Air-blast Overpressure Impact Criteria	23
Table 12: Ground Vibration Criteria.....	23
Table 13: Waste Management Methods for Peppertree Quarry	24
Table 14: Summary of Environmental Performance – Water Management.....	27
Table 15: Summary of Creek Water Quality Parameters.....	28
Table 16: Water Quality Trigger Values	29
Table 17: Environmental Flow Data (2020)	31
Table 20: Areas of Disturbance and rehabilitation	34
Table 21: Complaints	36
Table 22: Proposed Activities in 2021 AR Period.....	40

Figures:

Figure 1: Peppertree Quarry Location	11
Figure 2: Quarry Production Trends	15
Figure 3: Long term trend Complaints (2011 – 2020).....	37

Commonly Used Abbreviations and Acronyms

AR	Annual Review
AHMP	Aboriginal Heritage Management Plan
AMC	Aboriginal Management Committee
ANZECC	Australian and New Zealand Environment Conservation Council
AQMP	Air Quality Management Plan
AS	Australian Standard
EC	Electrical Conductivity
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPL	Environment Protection Licence
DO	Dissolved Oxygen
DPI&E	Department of Planning, Industry and Environment
Ha	Hectares
HSE	Health, Safety and Environment
HSEQMS	Health, Safety, Environmental Management System
HVAS	High Volume Air Sampler
kL	Kilolitres
LOR	Limit of Reporting
mgbf	metres below ground level
NATA	National Association of Testing Authorities
NBMP	Noise and Blast Management Plan
NSW	New South Wales
NTU	Nephelometric Turbidity Units
O&G	Oil & Grease
PIRMP	Pollution Incident Response Management Plan
PM ₁₀	Particulate Matter (10 microns in diameter)
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
RL	Reduced Level
TDS	Total Dissolved Solids
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
µg/m ²	micro grams per square metre
µg/m ³	micro grams per cubic metre
WMP	Water Management Plan

1 STATEMENT OF COMPLIANCE

The Statement of Compliance for the 2020 Reporting Period is contained in Table 1.

Table 1: Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	
Approval MP 06_0074	no
EPL 13088	no

The Non compliances identified during the reporting period are detailed in Table 2. Each Noncompliance has been risked ranked as per the DPIE Annual Review Guidelines Compliance Status key outlined in Table 3.

Table 2: Non-Compliances

Relevant Approval	Condition #	Condition description	Compliance status	Comment	where addressed in the Annual review
MP 06_0074	Part B Condition B36	The Surface Water Monitoring Program must include: (a) detailed baseline data on surface water flows and quality in Tangarang Creek and Barbers Creek.	Administrative non-compliant	Water Flow monitoring is not possible within Barbers Creek due to accessibility. Fossickers Flat is a monitoring site for Water NSW in the Shoalhaven River and downstream of the Quarry operations. This site will be used as an alternative with data reviewed regularly to identify any potential impacts.	Section 7
MP 06_0074	Part B Condition B20	The proponent must ensure that particulate matter emissions generated by the project do not cause exceedances of the criteria in Table 6 at any residence.....Deposited dust is to be assessed as insoluble solids as defined	Administrative non-compliant	On the 15 th February 2020, an extreme weather event occurred in the marulan area, resulting in Deposition gauge #1 being damaged. A result for the month of February 2020 was not able to be obtain. A replacement gauge was installed prior to the next	Section 6.3

		by Standards Australia AS/NZS 3580.101:2003		month's monitoring period. EPA and DPIE were notified of the issue.	
EPL 13088	M2 – M2.1 and M2.2	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:	Administrative non-compliant	On the 15 th February 2020, an extreme weather event occurred in the marulan area, resulting in Deposition gauge #1 being damaged. A result for the month of February 2020 was not able to be obtain. A replacement gauge was installed prior to the next month's monitoring period. EPA and DPIE were notified of the issue.	Section 6.3

Table 3: Compliance Status Key

Risk Level	Colour Code	Description
High	non - compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	non - compliant	Non-compliance with: <ul style="list-style-type: none"> • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur
Low	non - compliant	Non-compliance with: <ul style="list-style-type: none"> • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur
Administrative non compliance	non - compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

2 INTRODUCTION

Peppertree Quarry (the Quarry) is owned and operated by Boral Resources Pty Ltd (Boral). The hard rock quarry is located south-east of Marulan in the NSW Southern Tablelands, approximately 175 km south-west of Sydney (refer to Figure 1).

The Quarry was first granted planning approval in February 2007 under Part 3A of the *Environmental Planning and Assessment Act 1979* following the preparation and display of an Environmental Impact Assessment. The project has since been the subject of six separate modification applications which were approved in March 2009, November 2011, October 2012, August 2016, October 2019 and most recently in April 2020.

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

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

This Annual Environmental Management Report (AR) provides a summary of the Quarry's activities, environmental performance, statutory compliance and community relationships between the periods of 1st January 2020 to 31st December 2020 (the reporting period).

The AR has been prepared in accordance with the requirements of the Project Approval 06_0074 Modification 4 (Condition D11 - PART D), which requires:

- Details on works (including rehabilitation) conducted in the previous calendar year and the proposed works planned for the next 12 months;
- A review of monitoring results and community complaint records;
- A review of compliance with statutory requirements in relation to specified limits, plans, programs and performance criteria;
- A summary of corrective actions required to address any non-compliances identified during the AR reporting period;
- Reporting monitoring results with an analysis of trends from previous years' results;
- A review of discrepancies between predicted and actual environmental impacts and an analysis of the potential cause of any significant discrepancies; and
- Measures to be implemented in the next 12 months to improve environmental performance.

The AR has also been prepared in line with the DPIE Annual Review Guideline October 2015.

Copies of the AR will be submitted to:

- NSW Department of Planning, Industry and Environment.
- NSW Environment Protection Authority.
- Goulburn Mulwaree Shire Council.
- Water NSW;
- DPIE Water;

- Biodiversity Conservation Division
- The Peppertree Quarry Community Consultative Committee; and
- Aboriginal Heritage Management Committee.

The report will also be available at the Boral website:

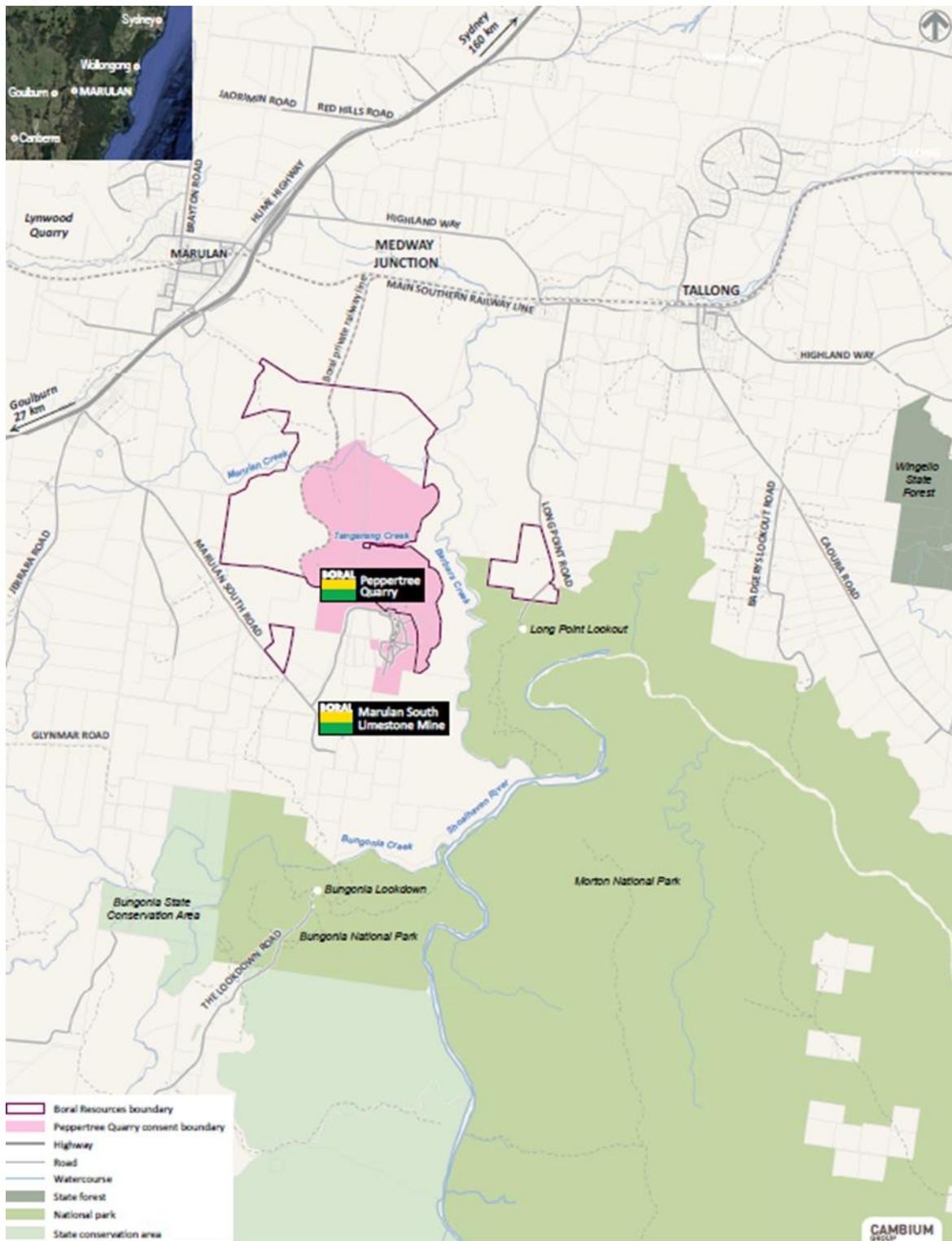
[https://www.boral.com.au/locations/boral-marulan-south-operations / reporting -Peppertree Quarry](https://www.boral.com.au/locations/boral-marulan-south-operations/reporting-Peppertree%20Quarry)

Key contacts associated with the management of the Quarry operations, environment, safety and stakeholder relationships are provided in Table 4.

Table 4: Key Contact Details – Peppertree Quarry

Contact Person	Position Title	Contact Details
Michael Higgins	Quarry Manager	Tel: (02) 4841 1701 Email: Michael.higgins@boral.com.au
Sharon Makin	Stakeholder and Environment Advisor	Tel: (02) 4841 1701 Email: sharon.makin@boral.com.au

Figure 1: Peppertree Quarry Location



3 APPROVALS

The Quarry operates under several regulatory approvals and licences which are summarized in Table 5 below.

Table 5: Approvals

Approval	Detail	Regulatory Authority
Project Approval 06_0074 Modification 6 (2020)	Quarry operating conditions updated for approval to Construct and Operate two Dust Collector Systems within the Existing Quarry Operations.	NSW Department of Planning, Industry and Environment
EPL No. 13088	The EPL is issued for the scheduled activity of: Crushing, Grinding, Separation and Extractive activities for tonnages greater than 2 million tonnes per annum. There have been no variations to the EPL during 2020.	NSW Environment Protection Authority
10WA102701	extraction of water from 110ML dam	NSW Office of Water
10WA116000	water bore licence allowing an annual extraction of up to 15 ML.	NSW Office of Water

A copy of the Project Approval is available on request or can be accessed through the following Boral website:

[https://www.boral.com.au/locations/boral-marulan-south-operations / General approval - Peppertree quarry](https://www.boral.com.au/locations/boral-marulan-south-operations/General%20approval%20-%20Peppertree%20quarry)

A copy of the EPL is available on request or can be accessed through the following Boral website:

[https://www.boral.com.au/our-commitment/environmental-reporting / Boral Quarries - NSW / Boral Peppertree Quarry](https://www.boral.com.au/our-commitment/environmental-reporting/Boral%20Quarries%20-%20NSW/Boral%20Peppertree%20Quarry)

Approval was granted of Modification 6 in April 2020 to modify Peppertree Quarry's operation allowing for the removal of existing air filtration systems and installation of two baghouse extraction units and ducting to remove excess particulate matter (i.e. fines) associated with the operation of crushing and screening plant.

This Annual Return reflects compliance of the operation to the Modification 6 Condition of Consent.

4 QUARRY OPERATIONS

4.1 OPERATIONS LAST 12 MONTHS

Over the last 12 months, the pit has continued to move in a south easterly direction.

The mobile primary crusher has been relocated to RL540 and remained there throughout the reporting period.

Operations occurred within the prescribed hours of operation.

No exploration activities were undertaken.

The western overburden emplacement continued to be used for emplacement.

The installation of the two Dust Extraction units was commenced with commissioning late in December 2020.

4.2 OPERATIONS NEXT 12 MONTHS

Over the next 12 months, the pit will continue to move in a south easterly direction.

The Western Overburden Rehabilitation works will commence 2021

The mobile crusher will relocate to RL525 later in the Year and operate there for the remainder of the year.

The Southern western overburden emplacement (Modification 5) activities will commence late in 2021.

4.3 PRODUCTION, SALES AND TRANSPORT LAST 12 MONTHS

During the reporting period, the Quarry produced 2 402 443 tonnes of aggregate, slightly below the forecasted 2.5 million tonnes for the 2020 period. (Refer to Figure 2).

The DRE Production results Form for the Financial Year ending 2020 is contained in Appendix 1.

Project Approval Condition A9 (Part A) requires all products to be transported from Peppertree by rail with a capped tonnage of 3.5 million tonnes per annum. For the 2020 calendar year, 2 780 811 tonnes of product was transported by rail to Boral terminals at Maldon, Enfield and St Peters. This volume included both Peppertree product, as well as Limestone sand.

Road transportation is allowed as per Condition A10, (Part A) – *The Proponent may Dispatch up to two laden trucks containing quarry products per calendar day. Any additional truck Dispatches of quarry products will require the written approval of the Secretary.*

Peppertree Quarry has an authorisation system in place, to manage the requirement for only 2 loads per day to be dispatched.

Road transportation for 2020 is summarised in Table 6.

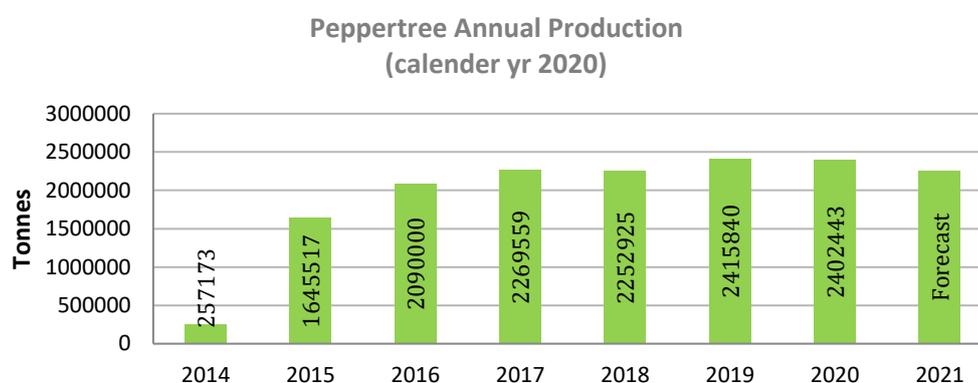
Table 6: Approval Requests for Road Transport

Date	Who	Material	Trucks
Jan 2020 (10 th)	Neighbour – Marulan south road	Scalps	2
Jan 2020 (3 rd & 4 th)	Neighbour – Marulan south road	Crusher Dust	4
April 2020 (23 rd & 25 th)	Neighbour – Marulan south road	Scalps	4
May 2020 (31 st)	PTQ Employee	Scalps	1
June 2020 (8 th)	PTQ Employee	Scalps	1
June 2020 (14 th)	PTQ Employee	Sand/Aggregate Mix	1
July 2020 (15 th , 16 th & 25 th)	Neighbour – Marulan south road	Scalps	8
July 2020 (23 rd)	PTQ Employee	Scalps	1
July 2020 (23 rd)	Neighbour – Glynmar Road, marulan	Scalps	2
August 2020 (5 th ,6 th ,11 th ,12 th ,13 th , 14 th ,17 th ,18 th ,19 th ,20 th , 21 st)	Neighbour – Glynmar Road, marulan	Scalps	22
September 2020 (8 th & 19)	PTQ Employee	Scalps	4
September 2020 (28 th)	PTQ Employee	Sand	2
September 2020 (26 th)	PTQ Employee	Surge Rock	1
October 2020 (6 th)	PTQ Employee	Sand/Aggregate Mix	1
October 2020 (2 nd & 7 th)	PTQ Employee	Scalps	4
October 2020 (19 th)	Marulan Chamber of Commerce	Overburden	2
December 2020 (15 th & 16 th)	Neighbour – Glynmar Road, marulan	Scalps	2

4.4 PRODUCTION, SALES AND TRANSPORT NEXT 12 MONTHS

The anticipated production for 2020, from Peppertree Quarry is 2.25 million tonnes. However, actual realised tonnage will be dependent on market demand and the production levels at other Boral hard rock quarries.

Figure 2: Quarry Production Trends



For 2021, all products will be transported via rail from the site. It is estimated that this will total 2.95 million tonnes, which will also include Limestone sand.

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

Table 7 lists specific actions from the 2019 AR that were required to have been undertaken during the 2020 reporting period.

Table 7: Actions Required from 2019 AR

Proposed Activities for 2019	Requested by	Status	Where Discussed
Obtain Modification 6 approval and install and operate permanent solution for dust extraction at the crusher	Operator	Modification 6 was approved April 2020 with Dust extraction commissioning at the end of 2020	Section 4
Undertake progressive Overburden stabilization and rehabilitation	Operator	Hydro mulching and overplanting of previously rehabilitated areas has been undertaken, to repair losses as a result of drought.	Section 8
Review and/or prepare management plans - NBMP, AHMP, AQMP, BRMP, WMP, EMS, BFMP as per modification 5 and 6 approval requirements	Operator	Management plan review commenced in line with Modification 5 and 6 approval. NBMP, AQMP, EMS and BFMP approved	Section 6.1
Undertake annual Rehabilitation Rapid Visual Assessments	Operator	Assessment was undertaken in November 2020	Section 8
Undertake audit of the surface water management system at the Southern Overburden	DPIE (mod 4 approval condition)	Audit yet to be undertaken as emplacement not yet completed., with final water management system yet to be completed.	Section 12

emplacement once system is installed			
Assess and implement flow monitoring in Barbers Creek if possible	Operator	An investigation into the feasibility of monitoring surface water flows in Barbers creek was undertaken by Hydrometric Consulting Services. Monitoring was not seen as feasible, due to the difficulty of access to the creek. A NSW Water's site has been identified "Fossickers Flat" which is downstream of the quarry and Barbers creek. This site monitors flow and a range of parameters in the Shoalhaven River. Data from this site will be reviewed to determine any potential impacts from quarry operations downstream.	Section 7
Install PM _{2.5} HVAS as per Modification 5 approval	Operator	PM _{2.5} High Volume Sampler was ordered in late 2020 with delivery and operation planned for February 2021	Section 6.3
install and operate Real time noise monitoring alert system	Operator	The real time noise monitoring system has been installed and is online. The weather station has been upgraded to provide data in line with the noise measurements. An alert system is to be trialled in the control room in 2021.	Section 6.4
Fence scar trees	Operator	Scar trees have been temporarily fenced. Permanent fencing to be installed in 2021.	Section 6.9
Artefact collation and review	Operator	Collation of artefacts commenced in early 2020 and will be completed in mid-2021, with return to country planned for the end of 2021	Section 6.9
Implement Stakeholder Engagement plan for 2020	Operator	Plan has been implemented where possible. CoVid 19 forced the cancellation of a number of events such as Tallong Apple day and Marulan Kite Festival.	Section 9
Pit expansion to the East and commence south western overburden as per Modification 5	Operator	Pit continued to the south east, however work on the south western overburden emplacement was placed on hold till late 2021.	Section 4
Review of Groundwater trigger levels and redevelopment of wells where required	Operator	Ground water trigger levels have been reviewed and will be updated in the revised Water Management plan. An investigation into the status of the wells was undertaken in 2020, with a report issued identifying the need for replacement for a number of the wells.	Section 7

6 ENVIRONMENTAL PERFORMANCE

The Quarry has a comprehensive management and monitoring program that collects information and data for the assessment of environmental impacts, regulatory compliance and performance against continual improvement objectives. Management and Monitoring is undertaken in accordance with the respective activity specific Management Plans, which define the framework for measuring environmental performance and compliance with statutory requirements.

Table 8 provides an overall summary of the environmental performance of the quarry across a number of parameters, with further details provided in the following sections.

Table 8: Summary of Environmental Performance

Aspect	performance during the reporting period	Trend / Key management implications	Implemented / proposed management actions
Deposition gauges	Quarry contribution complies with criteria at the neighbouring residence	Data collected over time is consistent with the EIS predictions, Modification 4 & 5 modelling and previous AR reporting	Continue to monitor and assess performance
PM10 HVAS	Quarry Contribution complies with criteria at the neighbouring residence	Data collected over time is consistent with the EIS predictions, Modification 4 & 5 modelling and previous AR reporting	Continue to monitor and assess performance
TSP HVAS	Quarry Contribution complies with criteria at the neighbouring residence	Data collected over time is consistent with the EIS predictions, Modification 4 & 5 modelling and previous AR reporting	Continue to monitor and assess performance
Noise	Quarry Contribution complies with criteria at the sensitive receivers	Data collected over time is consistent with the EIS predictions, Modification 4 & 5 modelling and previous AR reporting	Real time noise monitoring to be implemented to allow for management of potential noise impacts
Blast - vibration	complies with criteria at the nominated receivers	Data collected over time is consistent with the EIS predictions, Modification 4 & 5 modelling and previous AR reporting	Continue to operate as per NBMP and Blast Management procedures
Blast – over pressure	complies with criteria at the nominated receivers	Data collected over time is consistent with the EIS predictions, Modification 4 & 5 modelling and previous AR reporting	Continue to operate as per NBMP and Blast Management procedures
Waste	review of waste management undertaken with new suppliers. Waste management segregation system installed.	Waste minimization, recycling and tracking in Place	Continue to Implement waste management plan including review of recycling options and reduction at Waste to Landfill
Dangerous goods & Hazardous materials	complies with relevant requirements with systems in place	Database in place	Continue to maintain systems
Bush fire management	complies with relevant requirements with systems in place	Bush Fire management Plan in place and reviewed by the RFS	Continue to maintain systems and review bush fire management plan as required.
Heritage conservation	complies with AHMP requirements with unidentified finds and the completion of salvage works	Continue to work with AMC representatives. Monthly meeting established to ensure all actions are identified and communicated.	Undertake collation of the artefacts and plan to “return to Country” activities
Biodiversity and rehabilitation	Complies with BRMP	Rehabilitation continues to do well. Some erosion control needed at identified locations.	Implement recommendations of the Rapid Visual Assessment and Ecological review

6.1 BORAL INTEGRATED MANAGEMENT SYSTEM

Peppertree Quarry operates in accordance with the Boral integrated Health Safety, Environment and Quality Management System (HSEQ MS) which establishes a strategic platform for Regulatory compliance and continual improvement in environmental management. This system is documented in the Peppertree Quarry Environmental Management System plan approved by the DPIE in May 2020.

Management plans required by modified approvals are reviewed and / or prepared in line with conditions of consent as well as aligned with the Boral HSEQ requirements.

6.2 METEOROLOGICAL MONITORING

In accordance with Project Approval Condition B26 (Part B), the Quarry continues to utilize the onsite weather station established upon the commencement of the quarry development.

Information from the weather station is supplied in real time graphical form to the Quarry along with a monthly data report.

A monthly review of the Weather station data is undertaken by a consultant to confirm that the station and the data are within operational compliance limits.

In addition, a forecasting system via Weatherzone is in place to provide alerts to relevant site personnel on predicted significant weather events such as high winds and extreme rainfall events, so that appropriate actions and controls can be proactively implemented.

6.3 AIR QUALITY

The Quarry operates an air quality monitoring system in accordance with the Air Quality Management Plan (AQMP) approved in May 2020. Management actions have been accordingly developed and are outlined in the AQMP.

6.3.1 Deposition Dust Monitoring

There are three dust deposition gauges used for monitoring of larger dust particles (typically >50µm) that settle out from the air and are referred to as depositional dust. All gauges are located on Boral owned land (refer Appendix 2).

The dust deposition gauges were sampled monthly (+/- 2 days) during the reporting period with the corresponding results from the gauges comprising insoluble (mineralogical) matter and ash residue (organic).

Condition B20 (Part B) of the Project Approval requires that long term deposited dust emissions do not exceed an annual average criterion of 4 g/m²/month at any neighbouring residence or privately owned land.

The criterion allows for consideration of extraordinary events such as fire incidents and dust storms, which may cause exceedances beyond the actual dust contribution of activities associated with the Quarry. To account for such events, the ash content of the monthly deposition gauge samples is also analysed to identify organic matter, which would not be typically be representative of the Quarry activities.

As all deposition gauges are located on Boral owned land, a review of the monitoring data and gauge locations was conducted by Todoroski Air Sciences during the reporting period. The monitoring data collected was interpolated to the neighbouring residences (in line with Condition B20 Part B) with no exceedances (with the exception of bushfire related events) recorded to occur above the criteria (Refer to Appendix 2 for results). As part of the review, it has been previously recommended that at least 2 of the gauges be relocated.

A discussion with the EPA has been undertaken to support the proposed change in the monitoring locations to be closer to the boundary and receivers. The EPA have recommended that monitoring occurs at both the current and proposed locations for a period of time to assess the data before ceasing monitoring at the previous locations and moving all monitoring to the new proposed locations. This will be assessed in 2021, with the installation of a Real Time Dust Sampler.

The monthly results and annual averages recorded during the reporting period from the three dust deposition gauges (D1, D2 and D3) are detailed in Appendix 2.

6.3.1.1 Deposited Dust – Performance Review (2020)

For the majority of the 2020 reporting period, Sites D1, D2 and Site D3, were below or just on the criteria of 4g/m²/month, with the exception of January 2020. These levels were above criteria due to smoke from Bushfires in the area. For most of the samples, the analysis shows the ash content, is at least half of the insoluble solids concentrations. This is an indication that the samples are likely to have had some level of organic matter, which is not generally representative of mineralogical based quarry dust.

All sites were below the criteria of 4g/m²/month when the recorded data was interpolated to the boundary.

6.3.1.2 Long Term Trend Analysis and assessment (2014 – 2020)

Dust Deposition modelling for the EA (2006) was based upon conservative assumptions and indicated that the annual average dust concentrations and deposition levels would be below relevant air quality criteria at the nearest residential properties.

The latest modification (April 2020) also modelled that the dust concentrations would remain below the relevant air quality criteria.

The Dust deposition results, when assessed at the boundary of the operations, have consistently been below the criteria, since operations commenced in 2014 and therefore are in line with the predictions of the EA and the latest Modification.

6.3.1.3 Deposited Dust Summary and opportunities for improvements

As the dust gauges are situated on Boral owned land and not at the Boundary, monthly interpolation of the data will continue to assess compliance. A Real Time dust sampler will be installed in 2021 with a view to gather information to support a relocation of gauges D1 and D2 to the boundary.

6.3.2 PM₁₀ and TSP High Volume Samplers (HVAS)

The two HVASs are on Boral owned land, situated together (refer to appendix 2) for the measurement of particulate matter less than 10 microns in diameter (PM₁₀) and Total Suspended Particulates (TSP.) They are programmed to operate on a continuous 24-hour period, on six in seven-day cycle. The HVAS sampler flows are subject to bi-monthly calibration and other parameters are calibrated on an annual basis.

Condition B20 (Part B) of the Project Approval requires that the operation of the Quarry must meet the PM₁₀ and TSP criteria presented in Table 9 at any neighbouring residence or privately owned land.

Table 9: PM₁₀ and TSP Criteria

Pollutant	Averaging period	Criteria
TSP	Annual average	90 µg/m ³
PM ₁₀	Annual average	30 µg/m ³ Changed to 25 µg/m in July 2020
	24-hour average (short term impact)	50 µg/m ³

It has been identified that the HVAS are not located at the boundary of the Peppertree Quarry and therefore data obtained from these samplers needs to be interpolated to determine compliance at the nearest receiver.

Regular reports are prepared by Todoroski Air Sciences with a review of the results that are then interpolated to the receivers. Details of the interpolated data are included in Appendix 2.

6.3.2.1 TSP and PM₁₀ – Performance Review (2020)

Graphical results for the annual average of TSP and PM₁₀ for the 2020 reporting period are contained in Appendix 2.

Results for TSP were within the Project Approval criteria of 90 µg/m³.

Results for PM₁₀ annual average have been above or on the criteria from January through to July 2020. Results were higher than normal due to smoke from local bushfires in December 2019 and January 2020.

As of July 2020, the PM₁₀ Annual average criteria was reduced to 25 µg/m³, as per Modification 6.

Levels have continued to be above the criteria, though decreasing.

On three occasions during the reporting period the short-term 24-hour average criteria of 50 µg/m³ for PM₁₀ emissions were above the criteria at the HVAS location. All 3 occasions were in January 2020 and related to bushfire activity. All other results are below the criteria.

On investigation, the PM₁₀ exceedances were not considered representative of the previous 24-hours of quarry activities. Investigations included assessing weather conditions and quarry operations.

When interpolated to the boundary the results were confirmed as being below the relevant criteria shown in Table 9.

Problems were experienced with the consistent operation of the PM₁₀ sampler at the end of 2020 with some improvement observed following maintenance of the machine.

6.3.2.2 Long Term Trend Analysis and assessment – TSP and PM₁₀

The TSP monitoring results have all been below the average annual criteria of 90ug/m³. These results indicate that TSP dust levels are well below the long-term impact assessment criteria, which has been consistent over the years, and consistent with the EA and Modification 6 predicted annual averages.

The PM₁₀ monitoring results have all been below the average annual criteria of 30ug/m³, until January 2020, where the impact of bushfire smoke was seen on the PM₁₀ levels measured. In July 2020, the criteria was reduced to 25ug/m³ and levels have remained above this annual average criteria, still reflecting the impact of the fires. The levels are however reducing.

The PM₁₀ results have all been under the 24 hour average criteria (50ug/m³) with the exception of a number of specific events in 2015, early in 2016, 2017, 2018, 2019 and again for 3 times during 2020.

However, when interpolated to the boundary, all results were determined to be below the relevant criteria in Table 9.

These results indicate that PM₁₀ dust levels are generally below the long-term impact assessment criteria, which has been consistent over the years, and consistent with the EA and Modification 6 predicted annual averages, taking into account the impact of smoke from bushfires.

6.3.2.3 PM10, TSP Summary and opportunities for improvements

As the HVAS are situated on Boral owned land and not at the Boundary, monthly interpolation of the data will continue to assess compliance with the relevant criteria shown in Table 9. The Modification 6 Consent Approval requires the measurement of PM_{2.5}. This HVAS will be installed in 2021 prior to the commencement of the associated overburden operations and will be a static sampler situated at the same location as the PM₁₀ and TSP HVAS. A Real Time air sampler will also be installed in 2021 to assess levels at the boundary with the potential for future relocation of the static HVASs.

6.4 NOISE

The Noise and Blast Management Plan May 2020 (NBMP) provides the framework and guidance for the Quarry activities to be conducted in a manner such that appropriate control measures are implemented to minimise the potential for adverse impacts on the amenity, property and safety of quarry neighbours and to ensure compliance with the Project Approval CoA requirements. A number of management actions have been put in place to assist in meeting these objectives with guidance on performance occurring through the implementation of a quarterly noise monitoring program.

The results and a general review of the quarterly noise monitoring program conducted during the reporting period are presented in Appendix 3.

In accordance with NBMP, operational noise assessments are conducted on a quarterly basis. During the reporting period noise assessments were conducted in March, April, July, and November.

Attended monitoring is conducted during both day and night time periods to enable measurement of operational noise from quarry activities conducted during the Project Approval permissible hours of operation. Unattended monitoring is generally continuous between the device deployment and collection, measuring noise levels for all assessment periods.

Operator attended noise measurements are conducted at or near the locations specified in Table 2 of Project Approval Condition B3 Part B. Appendix 3 shows the receiver locations required to be monitored.

Table 10 presents the criteria for receiver locations required to be assessed in accordance with Condition B3 (Part B) of the Project Approval and EPL Condition L2.

The Modification 6 Conditions of Consent has new criteria for each residential receiver based on modelling and the implementation of the Noise Policy for Industry guidelines.

Table 10: Operational Noise Assessment Criteria

Residential Receiver Locations	Noise Assessment Criteria			
	Day (7am to 7pm) LAeq (15 min)	Evening (7pm to 10pm) LAeq (15 min)	Night (10pm to 7am)	
			LAeq (15 min)	LA1 (1Min)
R3	40	35	35	52
R2	40	35	35	52
R8	40	35	35	52
Any other noise sensitive residential receiver location (R4 & R17)	40	35	35	52

A real time noise monitor has been installed and is in operation at the Residential Receiver R3. A procedure has been developed as to the management of quarry noise, based upon real time noise measurements and weather conditions. An alert system is to be investigated that is simple for control room operators to instigate.

6.4.1 Noise Management Performance Review

A summary of the maximum day and night time noise assessment measurements against the respective Project Approval compliance criteria for LAeq (15 minutes) noise levels (Condition 3B – Part B) is provided in Appendix 3.

The assessment results found that the Quarry LAeq (15minutes) noise levels were in compliance at all receiver locations with the measured results considerably lower than the respective limits prescribed by the Project Approval.

A summary of the maximum night time noise assessment measurements against the respective Project Approval compliance criteria for measured LA1 (1 minute) noise levels at all receiver locations is also provided in Appendix 3. The assessment results found that the LA1 (1 minute) noise levels were in compliance at all receiver locations, with the averaged levels being considerably lower than the respective prescribed limits under the Project Approval.

Furthermore, Low Frequency Noise was assessed as per the requirements of the Consent. Assessment of Low frequency noise was undertaken every quarter as part of the regular monitoring conducted at all receivers.

Tonal, low frequency, impulsive and intermittent noise characteristics were not found to present in the quarry noise emission results.

6.4.2 Long Term Trend Analysis and Assessment

Long term trend analysis has been undertaken on monitoring data for residential receivers R2, R5, R6 and R16 as monitoring commenced prior to operations in 2014. Analysis on residential Receivers R 4 and R17 has been undertaken since October 2016.

Extended hours of operation for in pit activities commenced in August 2016, however no noticeable variation has been identified in the noise monitoring.

Graphical representations of the noise monitoring results (estimated Quarry LAeq [15 minute and 1 min) contribution sourced from the quarterly monitoring reports) are contained in Appendix 3. The monitoring results have generally remained consistently below criteria since the commencement of operations at all locations.

Noise modelling for both the 2007 EA and Modification 6 indicated that all receiver locations will experience noise levels below the criteria. Sleep disturbance and cumulative noise impact due to the operations are not considered likely.

The quarterly noise monitoring data has found that the quarry achieved compliance with the approved operating noise criteria at all locations for the majority of the time and therefore is in line with the predicted models.

6.4.3 Noise summary and opportunities for improvement.

Implementation of a real time noise monitoring alert system to allow pit operations to be managed under temperature inversion conditions in order to reduce potential noise impacts on receivers, will be progressed in 2021.

6.5 BLASTING

All blasts are conducted in accordance with the Noise and Blast Management Plan May 2020.

Monitoring of overpressure and ground vibrations at four nominated sensitive receptors is conducted during every blast (refer to Appendix 4 for locations).

As part of every blast air, overpressure and ground vibration is monitored for compliance with the relevant assessment criteria in the Project Approval.

Conditions B12 and B13 (Part B) of the Project Approval requires that air-blast overpressure and ground vibration should not exceed the criteria in presented Tables 11 and 12, respectively, at any residence on privately-owned land.

Table 11: Air-blast Overpressure Impact Criteria

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

Table 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%

6.5.1 Blast Management Performance Review

Blast monitoring results for over pressure and ground vibration collected during the reporting period are presented in Appendix 4. The maximum measurements for over pressure and ground vibration were 115 (25/9/20 – B2) and 2.27 mm/sec (28/2/20 – B2), respectively.

The Quarry conducted 56 blasts during the reporting period, all of which complied with Project Approval criteria.

All blasts were performed in accordance with the following Environmental Performance Conditions under Part B of the Project Approval:

- Monitored for overpressure and ground vibration levels (Conditions B12 and B13 respectively);
- Best practice considerations associated with safety and minimisation of fumes and dust (Condition B16); and
- Notifications to neighbours and public information (Condition B16).

Late in December 2020, the DPIE advised the Quarry, that a complaint had been received from a local resident alleging vibration impacts on their property from blasting operations.

The Department requested information in relation to blasting measurements, any additional monitoring or the nature of blasting operations over the last 12 months.

This information was provided to the Department in January 2021.

6.5.2 Long Term Trend Analysis and Assessment

Graphical representations of the blast monitoring results since the commencement of operations are presented in Appendix 4.

For both parameters, the results for this reporting period are consistent with previous years. Additionally, trend analysis depicts that throughout the operational period, airblast overpressure and ground vibration has remained consistent.

Since the first AR reporting period in 2014, the Quarry has conducted 343 blasts. All blasts were found to be compliant with Airblast Overpressure and Ground Vibration blasting criteria as predicted in the EA and latest Modification 6.

6.6 WASTE MANAGEMENT

Boral is committed to continuing the minimisation of waste from its operations, in accordance with the waste hierarchy and minimizing the amount of waste sent to landfill. All liquid and solid wastes are classified and sorted so they can be appropriately reused and recycled.

Waste generated by the quarry operations is collected and segregated to allow the proper storage and end use of the waste material to be managed.

Waste is classified in accordance with the NSW EPA Waste Classification Guidelines thereby advising on the appropriate management and / or disposal.

A Waste Management Plan is in place, which outlines the management methods in place for each waste, with contracts in place with licensed contractors where appropriate, refer Table 13.

Table 13: Waste Management Methods for Peppertree Quarry

Waste	Waste Classification	Management Method	Contractor
Oil absorbent pads	Solid general waste	Once used, bagged and placed in bin for landfill providing no liquid oil present.	Cleanaway – local Council landfill
Food scraps	Solid general waste	Bagged and placed in bin for landfill	Cleanaway – local Council landfill
Disposable Coffee Cups	Solid general waste	Coffee cups are made of compostable materials rather than polystyrene. Currently cups are bagged and placed in the bin for landfill.	Cleanaway – local Council landfill
Screen mats	Solid general waste	Placed in nominated bin for recycling	Cleanaway – local Council landfill
Oil filters	Solid general waste once oil has been drained	Drained of oil, placed in bin for recycling	Cleanaway – local Council landfill
Oily rags / waste	Solid general waste	Oily rags are bagged and placed in bin for landfill	Cleanaway – local Council landfill
Plastic / Glass bottles / Aluminium cans	Solid general waste	Separated in the crib room and offices for recycling.	Endeavour Industries

Waste	Waste Classification	Management Method	Contractor
Office Paper and Cardboard	Solid General waste	Separated in the crib room and offices for recycling	Endeavour Industries
Cardboard	Solid general waste	Separated at the workshop and warehouse and placed in specific cardboard bins	Cleanaway – recycling
Conveyor belt	Solid general waste	Collected and stockpiled for reuse. Contract is in place with companies who repair the belts to remove the damaged belts.	Fenner Dunlop or Spice Tech with belt on sold for mainly agricultural uses
Oil drums	Solid general waste	Drained on site, stockpiled in designated area, and crushed for recycling	Fast Skips
Empty IBC Containers	Solid general waste	Stockpiled in designated area and returned to supplier	Polo Citrus
Steel	Solid general waste	Offcuts and parts are placed in designated steel skip bins for recycling	Fast Skips
Waste oil	liquid waste	Collected and stored onsite in purpose designed oil tank adjacent to the workshop. This tank is emptied on a regular basis with the oil taken for recycling by a licensed regulated waste transporter	Clean away
Tyres	solid general waste	There is very little storage of tyres on site. Tyres are replaced by designated contractors who take the damaged tyre for recycling or disposal.	Bridgestone, Premier Tyres
Timber pallets	Solid general waste	Pallets and timber waste are placed in designated timber skip bins for recycling. Pallets in good condition will be returned to the supplier where possible	Clean away
Photocopy toners	Solid general waste	Bagged and posted for recycling	Onsite management
Sewage Effluent	liquid waste	Above ground absorption trench on site.	Onsite management
Batteries	Solid general waste	Collected and recycled through regional facilities	Onsite management
Manganese Crusher liners	Solid General waste	Placed in designated skip bin and recycled	Fast Skips
Tungsten tips	Solid General waste	Placed in designated skip bin and recycled	Fast Skips
E Waste	General solid waste	Collected and recycled through regional facilities	Onsite management
General rubbish	General	General solid waste	General rubbish
Overburden	Virgin excavated natural material (VENM)	Emplaced within approved designated emplacements on site	Onsite management
Granodiorite Fines	Virgin excavated natural material (VENM)	Emplaced within approved designated emplacements on site	Onsite management

Waste	Waste Classification	Management Method	Contractor
Scalps	Virgin excavated natural material (VENM)	Stockpiled on site prior to sale	Onsite management

6.7 DANGEROUS GOODS AND HAZARDOUS MATERIALS MANAGEMENT

The Quarry has a Safety Data System (SDS) in place utilising the ChemAlert Program. A Hazardous and Dangerous Goods Register is in place, which identifies each chemical stored onsite. The register is electronically filed with a physical copy kept within the Site Office.

In accordance with Project Approval Condition B74 (Part B), all dangerous goods and chemicals are handled and transported in accordance with AS1940 and AS1596 and the Dangerous Goods Code.

The only Dangerous Goods Licence pertaining to the Quarry is for a 100 kL aboveground double skinned and banded diesel tank that is used for refuelling locomotives. The WorkCover Notification (NDG200221) was issued on behalf of an on-site contractor who operates and maintains the refuelling facility. The Contractor's operation and management of the facility is audited on a regular basis for compliance.

6.8 BUSH FIRE MANAGEMENT

Part B, condition B76 requires the quarry to:

- (a) Prepare a Fire management plan in consultation with NSW RFS Southern Tablelands District office, within six months of approval of Modification 5;
- (b) Ensure the project:
 - (i) Provides for asset protection in accordance with the relevant requirements in the *Planning for Bushfire Protection* (RFS, 2006) guideline 5;
 - (ii) Ensure that there is suitable equipment to respond to any fires on site; and
- (c) Assist the RFS and emergency services to the extent practicable if there is a fire in the vicinity of the site.

Peppertree quarry has in place an extensive fire management system, which is audited by independent experts on a quarterly basis.

Emergency response plans contain details for bush fire management and response.

As per Part B Condition B76 a Bush Fire Management plan was prepared and reviewed by NSW RFS Southern Tableland District Office, before being approved in May 2020.

6.9 HERITAGE CONSERVATION

The Aboriginal Heritage Management Plan (AHMP), updated in 2017, reflects management associated with the current quarry activities.

The AHMP continues to provide the framework for the identification, protection, conservation and presentation of Aboriginal cultural values at the Quarry with the primary objectives of the AHMP to identify, protect, conserve, present and transmit the Aboriginal heritage values associated with the land, on which the Quarry activities are conducted.

No site works were undertaken during 2020. The focus has been on cataloguing of the 90 000 artefacts, in preparation for their Return to Country.

Regular meetings have continued to be held with the Aboriginal Heritage Management Committee. The agenda covers future quarry operations, possible community projects and the implementation of the Boral Reconciliation Action Plan.

7 WATER MANAGEMENT

Surface and groundwater is managed in accordance with a Water Management Plan (WMP), approved by the DPIE in July 2017.

Table 14 provides an overall summary of the environmental performance of the quarry in regards to water management, with further details provided in the following sections.

Table 14: Summary of Environmental Performance – Water Management

Aspect	performance during the reporting period	Trend / Key management implications	Implemented / proposed management actions
Surface water quality	No results were over the trigger levels for 3 consecutive samples requiring detailed investigation	Data collected over time is consistent with the EIS predictions, Modification 4 & 5 modelling and previous AR reporting	Continue management and monitoring
Environmental flow	Complies with criteria	Data collected over time is consistent with the EIS predictions, Modification 4 & 5 modelling and previous AR reporting	Continue management and monitoring
Groundwater standing level	Complies with criteria	data over time is consistent with the EIS predictions, Modification 4 & 5 modelling and previous AR reporting	Continue management and monitoring
Groundwater quality	Results are consistent with trends and show no marked variations in water quality nor any impacts associated from quarry operations	Data collected over time has been consistent within each groundwater well.	Review trigger levels and re development of bores

In 2020, dam water levels at the Quarry, returned to normal after the site received significant rainfall in February 2020.

Continuing Rainfall caused water levels to return to pre drought conditions, so no further road deliveries of water was required.

7.1 SURFACE WATER

Surface water management at the Quarry is conducted in accordance with a Water Management Plan (WMP) that was revised and approved in 2017.

In accordance with Condition B33 (Part B) of the Project Approval, the WMP includes a surface water quality program that involves quarterly sampling from the Tangarang Creek, Dam 1, the upstream culvert, Marulan South Creek and overflow from any sediment ponds during extreme storm events. (Refer to Appendix 5 for sampling locations).

This condition also details that the Surface Water monitoring program includes...

“(a) detailed baseline data on surface water flows and quality in Tangarang Creek and Barbers Creek”

Tangarang Creek is sampled on a quarterly basis, with Barbers Creek sampled twice a year. Sampling is conducted either by Peppertree or Marulan South operations. Flow is measured in Tangarang creek as part of the Environmental flow requirements for Peppertree Quarry.

No surface water flow data is obtained from Barbers Creek. This area is difficult to access, and the use of solar powered flow monitoring equipment has been investigated and found not to be suitable. Flow data is available further downstream in the Shoalhaven River at a NSW Water monitoring site (Fossickers Flat). Data associated with this site is contained at Appendix 5.

The quarry has a practice to ensure sediment ponds associated with overburden emplacements are emptied within 5 days of a rain event, by pumping the water to the main pit, so there is sufficient capacity in the dams for the next rain event. No ponds overflowed, within their design capacity and required monitoring during 2020.

The Quarry’s main Dam provides environmental flows into the ephemeral Tangarang Creek and as such the downstream water quality is largely representative of the discharges, with some minor natural variations from the wider catchment influences.

The suite of parameters analysed for each water quality sample collected is listed in Table 15.

Table 15: Summary of Creek Water Quality Parameters

Laboratory Analysis of analytes		
Total Dissolved Solids (mg/L)	Potassium (K+)	Bicarbonate (HCO ₃ -)
Total Suspended Solids (mg/L)	Magnesium (Mg ²⁺)	Nitrate (NO ₃ -)
Turbidity – Laboratory (NTU)	Sodium (Na+)	Nitrite (NO ₂ -)
TPH C10-C36	Ammonia (NH ₄ ⁺)	Total Nitrogen
Benzo[a]pyrene	Chloride (Cl-)	Total Phosphorous
Naphthalene	Sulphate (SO ₄ ²⁻)	Faecal coliforms (cfu/100mL)
Calcium (Ca ²⁺)		

As part of the review and subsequent approval of the Water Management Plan in July 2017, trigger levels for the suite of analytes were developed in line with ANZECC guideline recommendations.

Table 16 summarises the trigger values used to assess any potential impacts on the water quality in creeks in the vicinity of the Quarry. However, it should be noted that observations to date indicate that while the water quality in the Shoalhaven River mostly meets the ANZECC ecosystem protection levels, the upstream contributing creeks do not. Therefore, the trigger values shown in Table 16 are adopted as benchmark goals, rather than performance or compliance criteria.

Table 16: Water Quality Trigger Values

Indicator	ANZECC Default Trigger for Ecosystem Protection ¹	WaterNSW Benchmarks for Catchment Streams	Proposed 'Triggers'
pH	6.5 – 7.5	6.5 – 8.0	6.5 – 8.5
EC (µS/cm)	30 – 350		<1.200
Total nitrogen (mg/L)	0.25	<0.25	1.1
Total phosphorus (mg/L)	0.02	<0.02	0.09
Turbidity (NTU)	2 - 25	0 - 25	

¹ Default trigger values for physical and chemical stressors for South-east Australia for slightly disturbed ecosystems (upland river)

The trigger values are applied as follows for ongoing monitoring in Tangarang Creek (both upstream and downstream of any influence from the Quarry):

- If the upper bound for pH, EC, total suspended solids or turbidity is exceeded for a period of three consecutive months downstream of the quarry but is not exceeded upstream of the quarry, this would be the trigger to undertake further assessment of potential sources within the Quarry.
- If the additional assessment finds that the change in water quality may be affected by quarry operations, then further investigation would be required to identify the source of the water quality impact, and review and revise practices to minimise the impact.

This further assessment would include investigation of the potential pathways for water quality impacts within the Quarry area in order to identify whether the change in water quality is attributable to quarry activities, and the nature of activity that has caused the change.

7.1.1 Surface Water Monitoring Results

The quarterly surface water quality monitoring data is presented in Appendix 5. Due to the ephemeral nature of Tangarang Creek, the upstream monitoring point (U1) only flowed for 3 of the monitoring events during the reporting period.

7.1.2 Surface Water Management Performance Review

The Quarry surface water quality trends are generally consistent over the 2020 reporting period with historic trends (refer to Appendix 5).

The results for pH were in the range of the trigger levels (i.e. pH 6.5 to 8.5).

Fluctuations in Total Dissolved Solids (TDS) during the reporting period were all in accordance with the ADWG guideline value of 500 mg/L (ANZECC (2000)).

Turbidity levels were generally consistent over the 4 sampling periods in 2020 and in most cases were below the ANZECC guideline for both the Dam and T1. For the February sampling period, turbidity results for U1, the Main Dam and T1 were higher than the trigger level due to a rain event. Turbidity levels were also high for the U1 site from the July sample while Marulan South Creek levels were high from the October sampling period. These levels would have been influenced by local activities not associated with quarry operations.

Total Nitrogen and Phosphorous are indicators of nutrient levels in water systems and results are depicted in Appendix 5.

Total Nitrogen levels recorded for the Dam, reflected rain events and fluctuated over the reporting period. Samples collected from the T1 location remained consistently low and below the Trigger criteria. All sites had higher than usual levels associated with the February 2020 rain event.

Total Phosphorus levels remained low and below trigger levels at T1 and the Dam, with the exception of higher than usual levels associated with the February rain event. Samples collected from Marulan South Creek and U1 remained higher than the trigger level for all samples.

All results for hydrocarbon and Polycyclic Aromatic Hydrocarbons (PAHs) were at concentrations below the Laboratory levels of reporting (LORs).

No results in the T1 Creek Samples for any of the above parameters were found to exceed the trigger levels for 3 consecutive samples, which were attributable to quarry operations and would require a detailed investigation.

7.1.3 Long Term Trend Analysis and Assessment

Long term trend analysis has been undertaken on pH, TDS, Turbidity, total Phosphorus and total Nitrogen with the results presented in Appendix 5.

pH is consistently between the range of 6.5 to 8.5, with some higher than usual levels occurring in the Dam in rain or low flow events. Levels at T1 downstream have consistently remained within the trigger levels. Barber Creek samples are also consistently below the trigger levels.

Long term TDS levels recorded at the Dam, T1 and U1 sites have remained below the ADWG guidelines, for the majority of the time since rain events in 2013. Barbers Creek levels have fluctuated over time and will be influenced by other factors rather than the quarry.

For the majority of time, Turbidity in both the Dam and for the T1 samples have been below the ANZECC criteria. Turbidity has been over the criteria at both sites in times of large rain events, when water from the catchment above enters the dam and downstream creek.

Total Phosphorus levels fluctuate over time at all sampling sites. For most of the time, levels were below the trigger criteria for all sites. Levels increased in the Dam and at Marulan south creek at the end of 2018, which may be attributed to outside activities associated with local farming practices. Levels were higher than usual in February 2020 in relation to a significant rain event.

Total Nitrogen levels have fluctuated over time. Samples collected from the T1 location have continued to be below trigger levels since 2014, with the exception of storm related events.

The initial EA and management plans predicted compliance with the appropriate ANZECC and ADWG criteria based on limited background sampling. With the exception of periods of storm events, the results obtained from surface water analysis has been in line with the EA predictions and the criteria.

Overall, there would appear to be no impact to T1 and Barbers Creek from quarry operations.

7.1.4 Environmental Flows

Under Project Approval Condition B31 (Part B), the supply of 10% of daily inflows into the Quarry main dam must be provided as environmental flows to Tangarang Creek. The monthly averages of inflow and outflow volumes in comparison with the required 10% of environmental flow requirement are presented in Table 17. The environmental flows were above the 10% requirement each month throughout the reporting period.

Overall for 2020 the quarry complied with the 10% environmental flow requirement.

No surface water flow data is collected from Barbers Creek. This area is difficult to access, and the use of solar powered flow monitoring equipment has been investigated and found not to be suitable. Flow data is available further downstream in the Shoalhaven River at a NSW Water monitoring site (Fossickers Flat). This site has been in operation since July 1977. Data associated with this site is contained in appendix 5.

Fossickers Flat data shows a consistent water level in the river with increases in water level and flow associated with rainfall events.

Table 17: Environmental Flow Data (2019)

Month (2020)	Inflow (Megalitres)	Outflow Requirement (10%)	Outflow (Megalitres)	Compliance
January	0	0	0.93	Yes
February	125	12.5	597	Yes
March	2	.2	36.55	Yes
April	2.6	0.26	2.37	Yes
May	5.7	0.57	2.88	Yes
June	2.2	0.2	2.65	Yes
July	12.2	1.22	3.57	Yes
August	49.67	4.96	696.78	Yes
September	0	0	3.11	Yes
October	32.91	3.2	148.71	Yes
November	10	1	379.5	Yes
December	17.1	1.7	55.68	yes
Total	259.38	25.09	1929.73	yes

7.1.5 Surface water summary and opportunities for improvement

Results over the operation of the Quarry show little detrimental impact on the downstream environment in Tangarang creek and Barbers Creek.

Water management strategies need to remain in place with ongoing quarterly monitoring at nominated sites. Flow monitoring data will continue to be reviewed from Fossickers Flat.

7.2 GROUNDWATER

The Quarry WMP includes a groundwater monitoring program aimed to be conducted quarterly of five shallow and seven deep piezometers ranging from between 15 m to 100 m in depth (refer to Appendix 5). The groundwater monitoring is undertaken in general accordance with AS 5667.11 – 1998 Water Quality Sampling – Guidance on Sampling of Groundwaters.

The groundwater monitoring program has been undertaken for 5 years since commencing in October 2015.

Indicative trigger values were proposed and included in the Water Management Plan (2017), to allow an assessment of potential impacts, with an aim to develop more specific targets once sufficient data had been gathered. New specific targets have been developed and are being included in the revision of the Water Management Plan.

Sampling in 2019 had shown several wells which required further development or repairs. Consultants undertook a detailed well inspection and, where possible, repairs in October 2020. It was identified that some wells were not repairable. An assessment of the overall groundwater well network is to be undertaken, early in 2021 to determine what wells need to be reestablished and the identification of any additional well sites.

Assessment of groundwater results is undertaken following each monitoring round with any analytes above trigger levels being noted. In instances where trigger levels are exceeded in two consecutive rounds of monitoring, further assessment is undertaken to determine whether the potential anomaly is the result of quarrying activities or due to natural variability.

Ground water flow has been mapped over the last 12 months and shows a pattern of very slow recharge due to the nature of the granodiorite and with a direction of flow towards the pit. RPS, groundwater consultants who undertake the monitoring and assessment have advised...

“Groundwater at the site appears to flow in the direction towards the pit, which is acting locally as a sink. Considering the low hydraulic conductivity of the aquifer, risks to the receiving environment from any contamination that may be present in groundwater are likely to be low. “

The groundwater field sampling measurements, standing water levels and the Laboratory analytical results from the quarterly groundwater sampling completed during the reporting period are presented in Appendix 5.

7.2.1 Groundwater Management Performance Review

Groundwater monitoring first commenced in October 2015. Groundwater results and trends presented in Appendix 5 and discussed below are in the early stages of a long-term monitoring program which will generate a greater data set from which more detailed and accurate interpretation of any potential or actual impacts on groundwater may be occurring through quarry activities.

pH trends have remained relatively stable in each piezometer for 2020. The pH levels vary considerably between the respective piezometers with a range of 6.89 (neutral) to 10.3.

Field measured Electrical Conductivity (EC) during the reporting period ranged from 354.3 to 2935 uS/cm, indicative of fresh to brackish water quality. EC trends are relatively stable and consistent between each of the piezometers.

Dissolved oxygen (DO) trends showed a high degree of variability in individual and between respective piezometers throughout the reporting period, but did not indicate any degradation in water quality.

Standing water levels remained relatively stable in each of the piezometers. PQ5 is identified as the sentinel water bore and over the last 12 months has shown an increase in water level, assumedly associated with increased rainfall.

Key findings from the analytical results were:

- Concentrations of nutrients (total nitrogen and total phosphorous) are above the trigger values in most of the piezometers throughout the reporting period, and as such it is believed that these levels are representative of background levels. In field filtering, has identified that the nitrogen is

accounted for by total Kjeldahl nitrogen (sum of ammonia and organic nitrogen) and supports that the nitrogen is more likely to represent an agricultural influence than quarry operations.

- Organic analyses (oil & grease, polycyclic aromatic hydrocarbons, volatile and semi-volatile total recoverable hydrocarbons and benzene, toluene, ethyl benzene, xylenes and naphthalene) were not detected at the majority of the piezometers. On a limited number of occasions, Oil and grease or TPH was detected in single bores. Follow up investigations have not identified any ongoing issues.

For all the other analytes, all piezometers across the site showed levels in line with the historic trends and below the trigger values.

7.2.2 Long term trend and assessment

pH trends have remained relatively stable in each piezometer since the commencement of the monitoring program in 2015. The pH levels have varied considerably between the respective piezometers with a range of neutral to alkaline. These levels occur in both in pit groundwater bores as well as those outside of any influence from quarry activities.

The early EC trends are relatively stable and consistent between each of the piezometers. Variations appear to occur consistently across most of the bores and are most likely in response to recharge rain events.

A rapid decrease in Dissolved Oxygen (DO) trends occurred from the development of the piezometers in 2015 through to 2016. Spikes in DO have occurred in several of the piezometers during 2017 and 2018 and are likely to have been influenced by recharge rain events. For 2019, a change was made in the measurement of the DO to better identify any issues within the groundwater. There has been no indication of water quality degradation through the variable DO results.

Standing water levels remained stable in each of the piezometers, with some fluctuation due to rainfall events. PQ5 is identified as the sentinel water bore and shows some reaction to rainfall events since 2015. The standing Water level has fallen less than 2metres since monitoring commenced, and therefore has not triggered any need for investigation, required if the level falls 5m or more.

Key findings from the analytical results were:

- Concentrations of nutrients (total nitrogen and total phosphorous) were above the trigger values in most of the piezometers, and as such it is believed that these levels are representative of background levels. In field filtering of samples was undertaken in 2020 and showed total Kjeldahl nitrogen (sum of ammonia and organic nitrogen), accounts for the Total Nitrogen and supports that the nitrogen is more likely to represent an agricultural influence than quarry operations
- Organic analyses (oil & grease, polycyclic aromatic hydrocarbons, volatile and semi-volatile total recoverable hydrocarbons and benzene, toluene, ethyl benzene, xylenes and naphthalene) have been detected at times in some of the piezometers. These have been one off occurrences and on investigation have not been associated with quarry operations. It is more likely to be associated with development of the piezometers or laboratory level of detections.

For all the other analytes, all piezometers across the site showed levels above the trigger values at times.

A review of these occurrences show that the results are consistent with previous trends and do not indicate marked variations or impacts in water quality.

7.2.3 Ground water summary and opportunities for improvement

A review of the data over the sampling rounds, since 2015 has shown results above trigger values.

A review of these results show that they are consistent with previous trends and do not indicate marked variations in water quality nor any impacts associated from the quarry operations.

A technical review will be undertaken in 2021 to assess and confirm the source of phosphate and nitrogen.

RPS, groundwater consultants who undertake the monitoring and assessment have advised....

“Groundwater at the site appears to flow in the direction towards the pit, which is acting locally as a sink. Considering the low hydraulic conductivity of the aquifer, risks to the receiving environment from any contamination that may be present in groundwater are likely to be low. “

Consultants undertook a detailed well inspection and repairs in October 2020. However, it was identified that some wells were not repairable. An assessment of the overall groundwater well network is to be undertaken in 2021 to determine what wells need to be reestablished, with a program for installation to be developed.

8 REHABILITATION

During the 2020 AR period, a total of 141.02 ha of Quarry land remained disturbed. This has remained the same from the 2019 Annual review period. All works have continued within the existing disturbed footprint. Rehabilitation works in 2020 have focussed on maintenance and repairs on existing areas.

Table 20 presents the total estimated areas of disturbance and rehabilitation.

Table 20: Areas of Disturbance and rehabilitation

Area Reference	Total Disturbed Area (ha)	Total rehabilitated Area (ha)	Disturbed Area during 2020 (ha)	Rehabilitated Areas as of the end of 2020 (ha)
1: Infrastructure area – (Primary, STQ and TLO)	25	0 (Not applicable till end of life)	0	0
2: Quarry extraction area	46.5	0 (Not applicable till end of life)	0	0
3: Eastern overburden emplacement	17.9	4.8	0	Areas overplanted with trees in 2020
4: west pad	0.3	0	0	0
5: Overburden emplacement / Noise bund	12	12.1	0	0
6: Dam and creek rehabilitation area	10	10.3	0	No further rehabilitation work required. Now in maintenance
7. Heritage salvage	13.2	0	0	0
8. Western overburden emplacement	4.6	0	0	0
9. Southern overburden emplacement	11.52	8.3	0	0 Areas overplanted with trees in 2020
Total area Disturbed / Rehabilitated as of the end of 2020	141.02	35.4	0	0

A Biodiversity and Rehabilitation management plan was prepared and approved by the DPIE in April 2017 in accordance with Development Consent Condition B60 (Part B).

As Part of the Quarry's rehabilitation monitoring program, the annual Rapid Visual assessment was undertaken in November 2020. This assessment was conducted by independent consultant Mark Nolan of Cambium Group.

The assessment recommended that the following be considered in the next 12 months of rehabilitation maintenance planning:

- Management of blackberry
- Continue to monitor and treat weeds along Tangarang Creek (RMU1b).
- Continue the feral goat control program.
- Rock armour identified slopes to improve slope stability and minimise potential for erosion
- Re-commence tube stock establishment program to increase species diversity on slopes currently revegetated with groundcover species.
- Maintain (but prevent further spread of) weed cover amongst the tube stock plantings on emplacements to facilitate stability,
- Continue the recovery and placement of rock piles and wooden debris on (or adjacent to) rehabilitated surfaces and landforms.
- Complete remedial repair works on the gully that has formed on the rock armoured drop structure that drains the eastern emplacement.
- Assess and manage real erosion on slopes on the eastern and southern slopes

A more detailed Ecological Assessment was undertaken in November 2020 by independent consultants, Land Eco Consulting. This Assessment is undertaken every 2 years to determine the status of the rehabilitation areas against the Closure completion criteria and to provide advice for improvements. A report is still pending.

The next assessment will be conducted in November 2022.

Part B, Condition B63 and B68 requires the payment and review of a Rehabilitation Bond following the Independent Audit that is conducted every 3 years. The Audit was undertaken in November 2018 with the Bond guaranteed in July 2019, based on previous calculation methodologies. However, with the Modification 5 Conditions of Consent, the Bond is required to be revised, using independent assessment, third party rates for rehabilitation and including the disturbance footprint of the South Western overburden over the next 3 years. This is to be submitted within 6 months of the approval of the Biodiversity and Rehabilitation Management Plan. The aim is for the Bond to be issued to the DPIE by the end of 2021.

9 COMMUNITY

9.1 ENVIRONMENTAL COMPLAINTS MANAGEMENT

The Quarry maintains an environmental complaint register that identifies actions required to resolve issues and concerns raised by the community. A 24-hour telephone complaints line is in place and advertised through the regular community newsletter and on the website. A list of the nature of any complaints is published to the Boral website on a regular basis.

The Quarry received four complaints, during the current reporting period. These complaints were investigated, and all appropriate actions taken at the time, with details shown in Table 21.

As part of an ongoing noise assessment program that was managed during the reporting period, text notifications have also been received from two residents regarding noise. A real time noise monitor is now in place at one residence. Information received from the residence is correlated with the real time noise measurements, Quarry operations occurring at the time, and the weather conditions, to allow the quarry to establish an operating procedure around the management of the noise. Additional noise monitoring is undertaken at the second residence as deemed necessary.

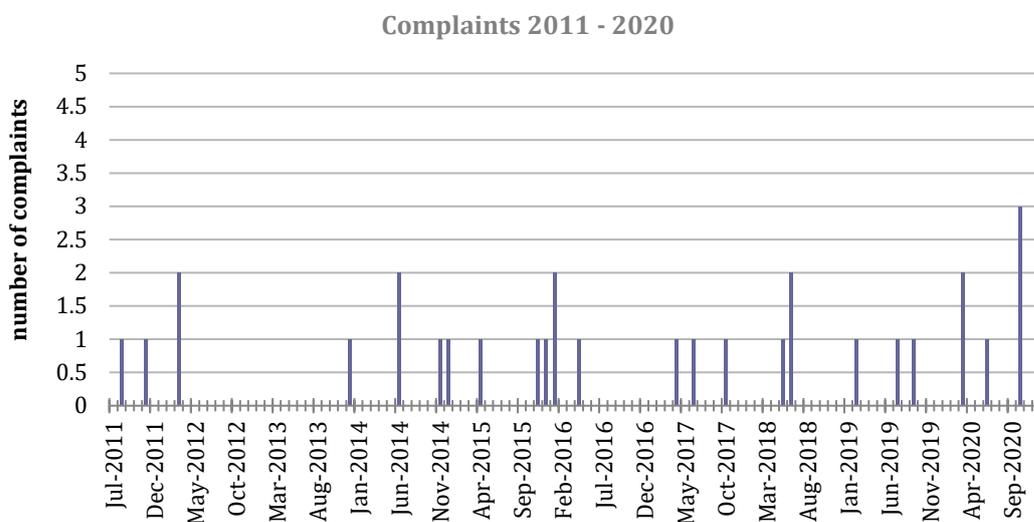
Boral will continue to develop and maintain relationships with the community and ensure their concerns are addressed to an acceptable outcome, wherever possible.

Complaints received since the Quarry commenced production are presented in Figure 3 (2011- 2020).

Table 21: Complaints

Date - 2020	Nature of Concern	Outcome of investigation
March 2020	Concern raised about feeling and hearing blasts from the quarry.	Monitor in place at the boundary of this residence shows no triggers and no exceedances of criteria from blasting activities. Additional monitoring and changes to the blasting pattern and size have been investigated.
9th March 2020	loud horns from the trains being heard over the past week at all hours	It was identified that train horns are blown when crossing rail lines and occasionally when the train moves during loading. Train operators were advised of the issue and use of horns has ceased unless necessary.
23 rd June 2020	Broken water pipe identified following a blast	Monitor in place at the boundary of this residence showed no exceedances of criteria associated with the blast. Additional monitoring and changes to the blasting pattern and size have been investigated.
4 th , 6 th and 18 th October 2020	Train horns blowing for a long time early in the morning	It was identified that trains are blowing the horns when approaching the rail crossings at Peppertree and Marulan South road. It is a WHS requirement by Pacific National. Pacific National were advised of the issue and have advised the drivers to minimise the amount of time they activate the horns. Alternatives were considered however, this is most likely flashing lights with associated bells, which would increase the noise.

Figure 3: Long term trend Complaints (2011 – 2020)



9.2 COMMUNITY CONSULTATION

The Quarry 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; and
- Maintenance of an environmental and community complaints register and actively managing and resolving community issues as they arise.

9.3 COMMUNITY CONSULTATIVE COMMITTEE

A Community Consultative Committee (CCC) has been established since 2011 in accordance with Condition A16 of Part A of the Project Approval. The CCC is comprised of:

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

Independently chaired, the role of the CCC is to offer the Quarry input from the community perspective on matters of environmental performance and stakeholder 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.

The timing of the meetings is determined by the CCC and generally undertaken at least 6 monthly. The CCC met four times during the 2020 calendar year – March, June, September and December

An Annual CCC report is being prepared, by the Chair (as per the Community Consultative Guidelines) and will be issued to the DPIE in July 2021.

9.4 COMMUNITY NEWSLETTERS

Community Newsletters are produced on a regular basis in order to inform local residents of the Quarry operations and activities as well as detailing Boral's involvement in local community events. These are distributed via the "Discover Marulan" newsletter issued to the local community. These can be found at:

<http://discovermarulan.com.au/newsletters/>

The newsletter is also posted on the Boral website. The first newsletter was circulated in 2011 and continued to be frequently issued during the reporting period.

9.5 COMMUNITY EVENTS

The Quarry staff are actively engaged with community events in the Marulan and Goulburn area. Community and stakeholder activities that occurred during the reporting period included:

- Charity Golf Day – Financial sponsorship, Quarry team representation and promotional goods giveaway;
- Tallong Apple Festival – Financial sponsorship; - Cancelled due to COVID-19
- Marulan Kite festival – Financial sponsorship and committee involvement; - Cancelled due to COVID-19
- Marulan Village Plan – Meeting and program support;
- Goulburn Mulwarre Council Community Bike ride as part of Bike week
- Marulan Christmas Fair
- Tallong Park Sculpture Display (supply of concrete)

9.6 BLAST LIAISON

In accordance with the Development Consent, Condition B16 (Part B), landowners and 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. Two parties are advised by email with one notified by phone.

9.7 ACCESS TO INFORMATION

Boral has a number of websites for each corporate division. Peppertree Quarry has its own site at:

<https://www.boral.com.au/locations/boral-marulan-south-operations>

The site contains all public information in relation to Statutory approvals and development activities.

10 INDEPENDENT AUDIT

In accordance with Project Approval Condition 5 (Schedule 5) an Independent Audit was conducted in November 2018.

A copy of the final audit report and a response to any recommendations was provided to the Department of Environment, Industry and Planning in March 2019, with details contained in the 2019 Annual Review.

The Next independent audit, as per Condition D13, Part D, is planned for mid-2021.

11 INCIDENTS & NON COMPLIANCES DURING THE REPORTING PERIOD

11.1 INCIDENT MANAGEMENT AND RESPONSE

In accordance with NSW EPA requirements, a Pollution Incident Response Management Plan (PIRMP) has been developed and implemented which details the:

- Risks and hazards associated with quarry operations, equipment and materials;
- Controls in place to reduce the risk in the occurrence of potential incidents;
- Inventory of pollutants and respective volumes stored on-site;
- Safety and incident response equipment;
- Communication strategy for the immediate notification of an incident to relevant government agencies and neighbours;
- Actions to be taken during or immediately after an incident; and
- Training and responsibilities of response staff.

The PIRMP was last reviewed and revised V12 in May 2020 and a copy can be accessed on the Boral website at: http://www.boral.com.au/Article/nsw_poela_environmental_reporting.asp

11.2 SUMMARY OF REGULATORY NOTIFICATIONS

One notification was provided to Department of Planning, Industry and Environment and EPA during the reporting period in regard to Peppertree Quarry operations. As a result of High winds, D1 dust Deposit gauge was broken. No results were able to be recorded for the month of Feb 2020.

12 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

The activities proposed to be undertaken during the 2021 AR reporting period are presented in Table 22. The activities have been selected and prioritized based on:

- Internal and Independent Audit findings and recommendations;
- Operational requirements; and
- Continual improvement objectives in accordance with Boral’s Environmental Policy and integrated HSEQ management System.

Table 22: Proposed Activities in 2021 AR Period

Proposed Activities in 2021	Objectives
Undertake progressive Overburden stabilization and rehabilitation and implement recommendations of the 2020 Rapid Visual Assessment and Ecological assessment	<ul style="list-style-type: none"> • Minimise erosion and sediment runoff • Move towards achieving biodiversity management plan goals of establishing vegetation corridors
Review and/or prepare management plans - NBMP, AQMP, BRMP, WMP, EMS, BFMP as per modification 6 approval requirements and audit findings	<ul style="list-style-type: none"> • Document management protocols for quarry operations
Undertake annual Rehabilitation Rapid Visual Assessment (November 2021)	<ul style="list-style-type: none"> • Move towards achieving biodiversity management plan goals of establishing vegetation corridors
Undertake audit of the surface water management system at the Southern Overburden emplacement once system is installed	<ul style="list-style-type: none"> • Surface water management
Implementation of the Real time noise monitoring alert system in the Control room	<ul style="list-style-type: none"> • Minimisation of noise in the community • Voluntary undertaking commitment
Fence scar trees	<ul style="list-style-type: none"> • Preservation of Culture
Finalise Artefact collation and review and return Artefacts to Country	<ul style="list-style-type: none"> • Preservation of culture
Implement Stakeholder Engagement plan for 2021	<ul style="list-style-type: none"> • Ongoing community engagement
Pit expansion to the East and commence south western overburden as per Modification 5	<ul style="list-style-type: none"> • Ongoing operations
Redevelopment of ground water wells in line with assessment report	<ul style="list-style-type: none"> • Management of groundwater
Undertake Independent Audit	<ul style="list-style-type: none"> • Independent review of performance against conditions of consent
Implement real time air monitoring and investigate relocation of air monitoring sampling locations to boundary locations	<ul style="list-style-type: none"> • Air quality management

APPENDIX 1: ANNUAL RETURN FOR EXTRACTIVE MATERIALS – FINANCIAL YEAR 2020

Extractive Materials Return 2019-2020 Form S1 – Period Ending 30 June 2020	 
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Quote RIMS ID in all correspondence

Quarry Id: Rims ID: 400960 Operators Name: BORAL RESOURCES (NSW) PTY LTD Address: PO BOX 6041 NORTH RYDE NSW 2113 Email: jon-paul.amodio@boral.com.au Quarry Name: PEPPERTREE QUARRY Quarry Address: MARULAN SOUTH RD, MARULAN NSW 2579	Inquiries please telephone: (02) 4083 6713 Completed or Nil Returns Email – mineral.royalty@planning.nsw.gov.au Postal Address (see below)
<i>Please amend name, postal address and location of mine or quarry if incorrect or incomplete.</i>	

The return should be completed and forwarded to **Senior Advisory Officer, RESOURCE ECONOMIC S, RESOURCE PLANNING & PROJECTS, DEPARTMENT OF REGIONAL NSW, PO BOX 344 HUNTER REGION MAIL CENTRE NSW 2310 on or before 31 October 2020**. If completion of the return is unavoidably delayed, an application for extension of time should be requested **before** the due date. If no work was done during the year, a **NIL** return must be forwarded.

The return should relate to the **above quarrying establishment** and should cover the operations of quarrying and treatment (such as crushing, screening, washing etc.) carried out at or near the quarry. A return is required even if the operations are solely of a developmental nature and whether the area being worked is held under a mining title or otherwise.

Director, Resource Planning & Projects

Please complete all the following information to assist in identifying the location of the Quarry

Typical Geology _____

Nearest Town to Quarry Marulan

Local Council Name Goulburn Mulwaree Council

Deposited Plan and Lot Number/s of Quarry _____

Email Address of Operator _____

Name of Owner or Licensee Boral Resources (NSW) Pty Ltd

Postal Address of Licensee _____

Licence/Lease Number/s (if any)
 From Mining, Exploration & Geoscience (NSW Mineral Resources) _____
 From Crown Lands or other NSW Department _____

If any output was obtained from land NOT held under licence from the above Departments, state the Name/s and Address/es of the Owners of the land _____

To the best of my knowledge, information entered in this return is correct and no blank spaces left where figures should have been inserted.

- SIGNATURE of PROPRIETOR or MANAGER Jon-Paul Amodio DATE 29/10/20
- CONTACT PERSON for this return _____
- NAME (Block letters) JON-PAUL AMODIO Telephone 90335416

Extractive Materials Return 2019-2020



Regional
 NSW

Form S1 – Period Ending 30 June 2020

Sales During 2019-2020

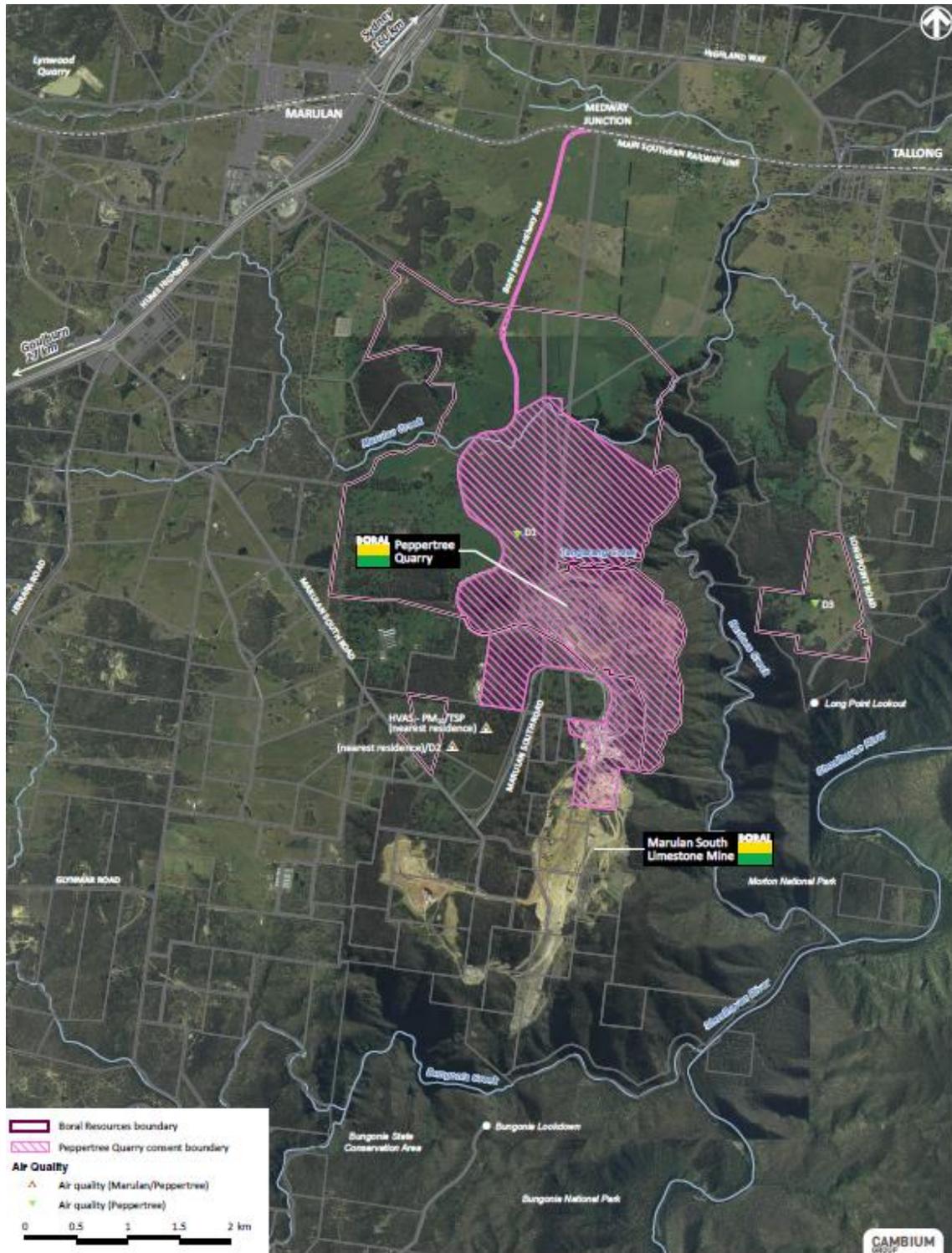
Production information may be published in aggregated form for statistical reporting. However, production data for individual operations is kept strictly confidential.

Product	Description	Quantity Tonnes
Virgin Materials		
Crushed Coarse Aggregates		
Over 75mm		
Over 30mm to 75mm		
5mm to 30mm		
Under 5mm		
Natural Sand		
Manufactured Sand		
Prepared Road Base & <u>Sub-Base</u>		
Other Unprocessed Materials		
Recycled Materials		
Crushed Coarse Aggregates		
Over 75mm		
Over 30mm to 75mm		
5mm to 30mm		1,430,446
Under 5mm		
Natural Sand		
Manufactured Sand		1,175,167
Prepared Road Base & <u>Sub-Base</u>		76,113
Other Unprocessed Materials		
River Gravel		
Over 30mm		
5mm to 30mm		
Under 5mm		
Construction Sand	Excluding Industrial	
Industrial Sand		
Foundry, Moulding		
Glass		
Other (Specify)		
Dimension Stone	Building, Ornamental, Monumental	
Quarried in Blocks		
Quarried in Slabs		
Decorative Aggregate	Including Terrazzo	
Loam	Soil for Topdressing, Garden soil, Horticultural purposes)	
TOTAL SITE PRODUCTION		2,745,184
Gross Value (\$) of all Sales		
Type of Material		
Number of Full-Time Equivalent (FTE) Employees	Employees FTE= 48	Contractors

Please Note: A return for clay-based products can be obtained by contacting the inquiry number.

APPENDIX 2 AIR QUALITY MONITORING INFORMATION

Air monitoring locations



Dust Deposition Results

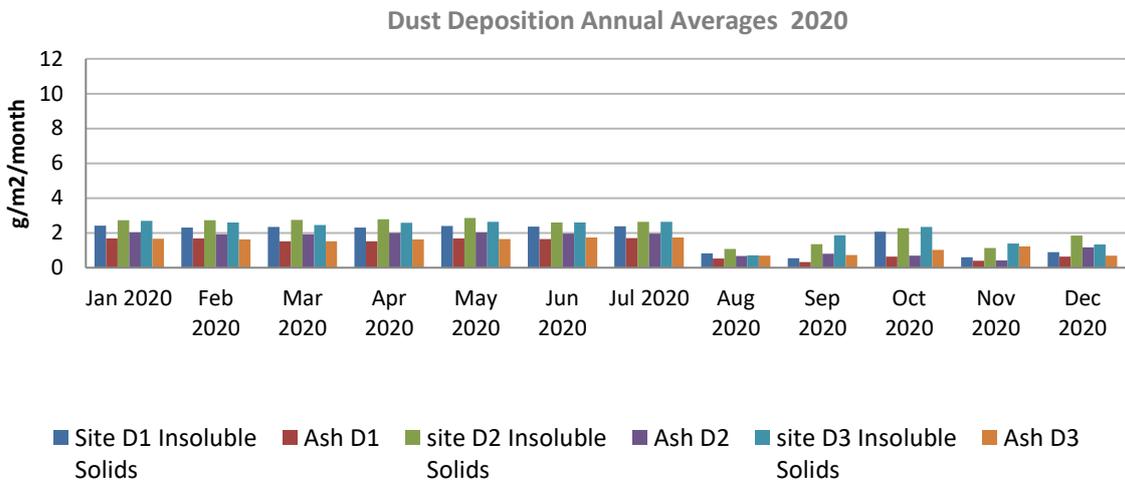
Sample Identification		Monthly Dust Deposition (Insoluble Solids g/m ² /month)												Annual Average Criteria: (4 g/m ² /m)
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
D1	Insoluble Solids	3.42	(1)	1.81	1.31	2.21	0.89	1.33	0.82	0.54	2.06	0.61	0.9	1.45
	Ash Content	3.09	(1)	1.04	1.17	1.67	0.51	1.03	0.52	0.33	0.64	0.4	0.64	1
D2	Insoluble Solids	11.09	4.65	1.41	1.75	1.73	0.91	0.94	1.07	1.36	2.27	1.13	1.85	2.51
	Ash Content	9.67	1.80	0.87	1.7	1.35	0.85	0.68	0.67	0.81	0.69	0.42	1.17	1.72
D3	Insoluble Solids	5.10	3.37	1.85	2.31	1.07	2.2	2.04	0.71	1.87	2.34	1.39	1.34	2.15
	Ash Content	3.69	2.01	0.63	1.75	0.71	1.74	0.92	0.69	0.73	1.03	1.22	0.7	1.32

Interpolated deposited dust levels - Todoroski Air Sciences

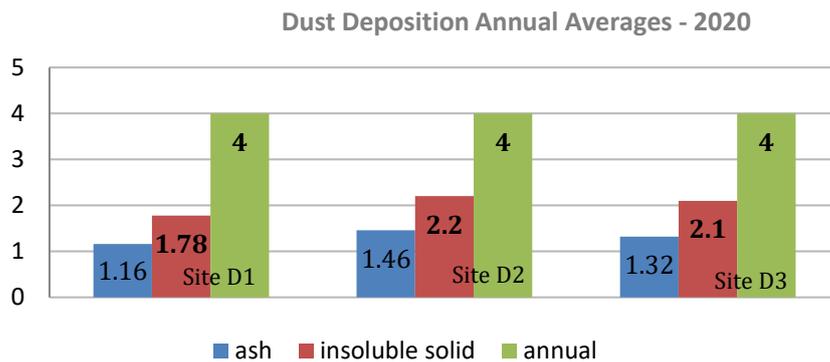
Sample Identification		Monthly Dust Deposition (Insoluble Solids g/m ² /month)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
D1	Insoluble Solids annual average (at the gauge)	2.42	(1)	2.34	2.30	2.39	2.36	2.38	2.09	1.95	1.94	1.73	(2)
	Insoluble Solids annual average (at the boundary)	0.5	(1)	0.6	0.6	0.6	0.6	0.5	0.5	0.4	0.4	0.3	(2)
D2	Insoluble Solids annual average (at the gauge)	2.72	2.72	2.74	2.79	2.86	2.6	2.63	2.59	2.62	2.66	2.63	(2)
	Insoluble Solids annual average (at the boundary)	1.6	1.8	1.8	1.9	1.7	1.8	1.7	1.7	1.7	1.7	1.16	(2)
D3	Insoluble Solids annual average (at the gauge)	2.70	2.6	2.46	2.59	2.64	2.6	2.64	2.62	2.64	2.67	2.51	(2)
	Insoluble Solids annual average (at the boundary)	1.6	1.6	1.7	1.8	1.7	1.7	1.8	1.7	1.7	1.7	1.4	(2)

- (1) No sample due to broken bottle
 (2) No data reported

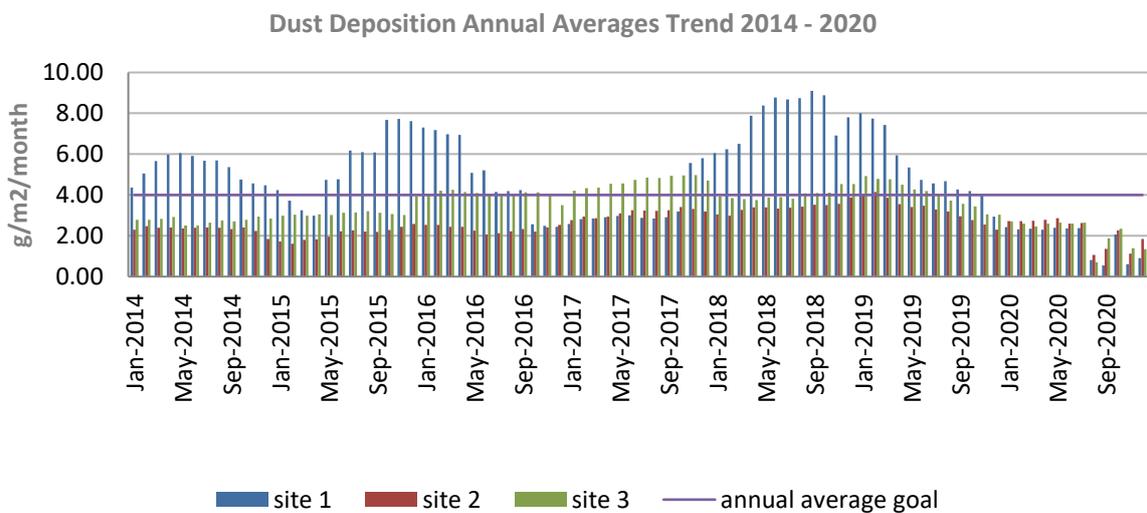
Dust Deposition Results – Annual Averages 2020



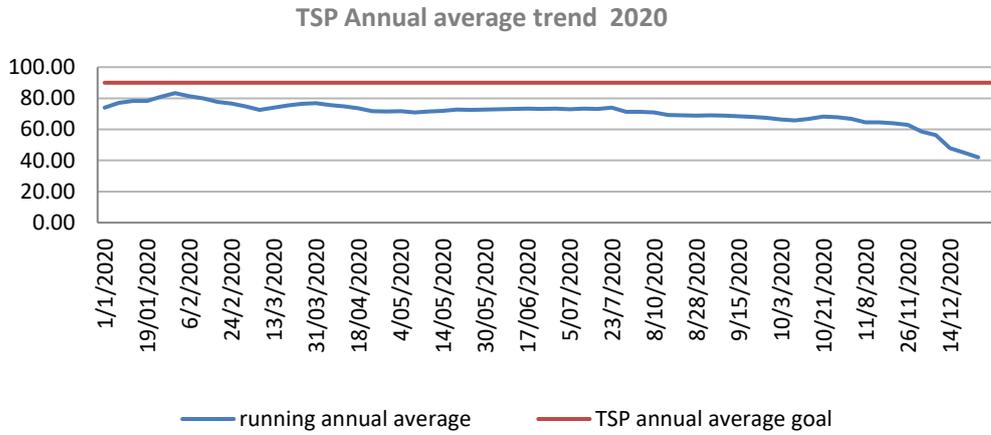
Dust Deposition Results – Annual Averages – Total 2020



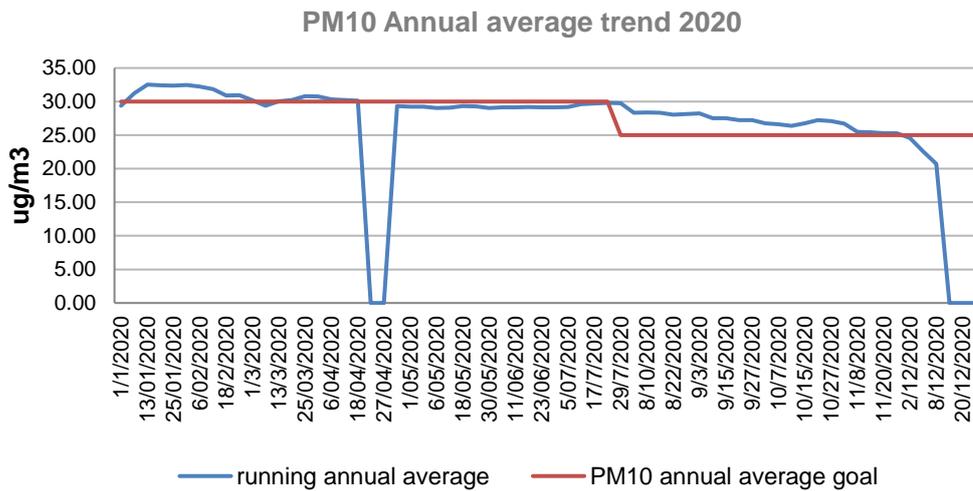
Dust Deposition Results – Annual Averages trend 2014 to 2020



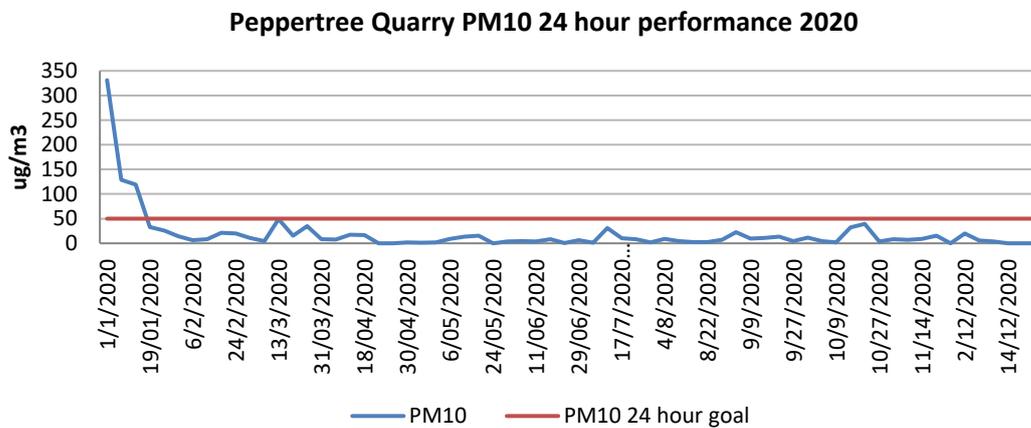
TSP - Annual Average results – 2020



PM₁₀ annual average results 2020



PM10 24 hour performance results – 2020



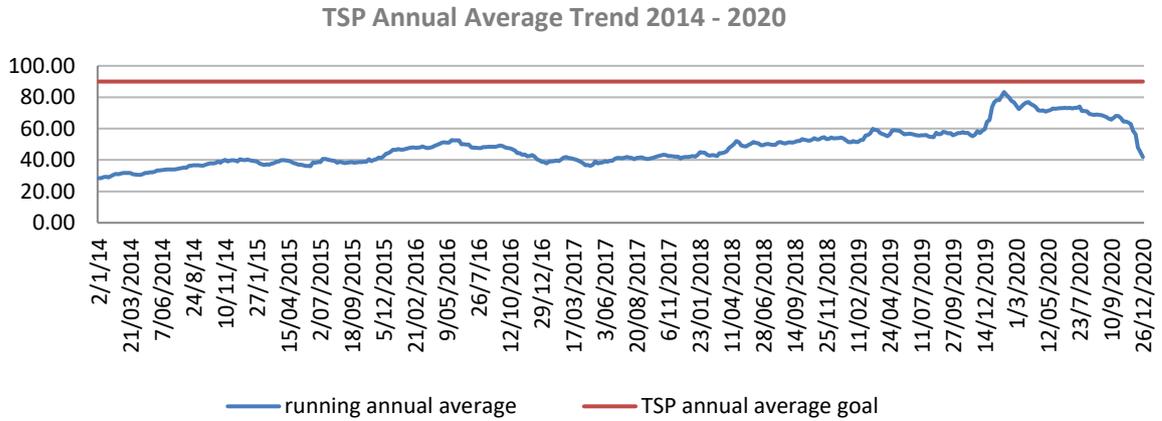
Interpolated HVAS dust levels - Todoroski Air Sciences

dates	PM10 (Measured)	PM10 (estimated contribution to receptor)
01/01/2020	331.13	Bush Fire Impact
07/01/2020	128.51	Bush Fire Impact
13/01/2020	119.22	Bush Fire Impact
19/01/2020	32.6	17
25/01/2020	25.65	13.4
31/01/2020	14.23	1.5
06/02/2020	6.14	3.2
12/02/2020	8.53	4.4
18/02/2020	21.29	0
24/02/2020	19.74	5.7
01/03/2020	10.61	0.4
07/03/2020	4.38	2.3
13/03/2020	49.2	0
19/03/2020	15.18	0
25/03/2020	34.91	11.9
31/03/2020	8.22	2.8
06/04/2020	7.86	1
12/04/2020	17.61	0.4
18/04/2020	16.81	0
24/04/2020	-	Machine Error
27/04/2020	-	Machine Error
30/04/2020	1.81	0
01/05/2020	1.07	0
04/05/2020	1.64	0.5
06/05/2020	9	0
12/05/2020	13.33	0
18/05/2020	15.51	5.8
24/05/2020	0.13	0.1
30/05/2020	3.45	0.1
05/06/2020	4.68	0
11/6/2020	3.72	0.8
17/6/2020	8.11	2.8

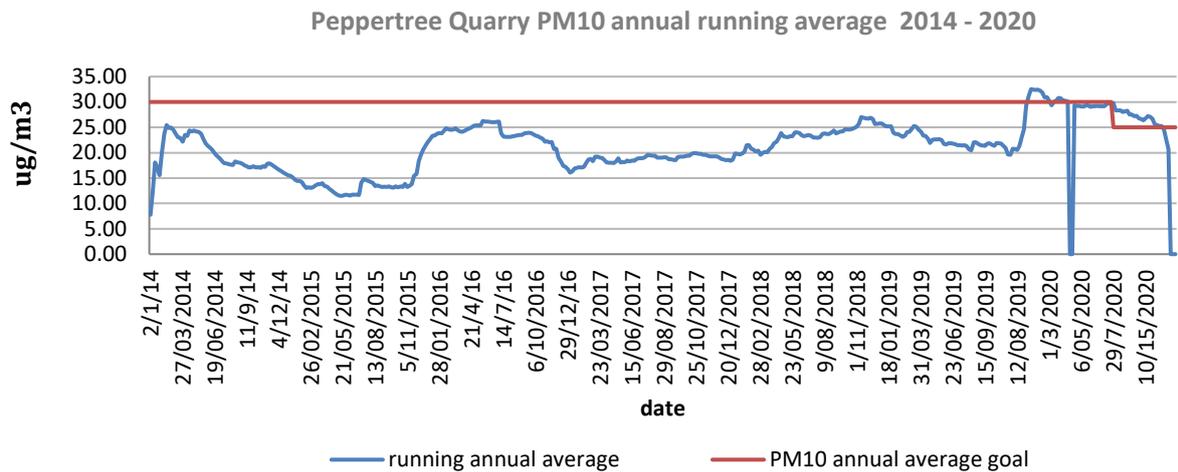
Boral Peppertree Quarry
 Annual Review
 1st January 2020 to 31st December 2020

dates	PM10 (Measured)	PM10 (estimated contribution to receptor)
23/6/2020	0.5	0
29/6/2020	6.51	3.0
05/07/2020	1.12	0
11/07/2020	31.05	7.6
17/07/2020	10.14	0
23/07/2020	8.32	2.7
29/07/2020	1.88	0
04/08/2020	9.21	0.2
10/08/2020	4.32	2.2
16/08/2020	2.5	0
22/08/2020	2.2	0
28/08/2020	7.19	0
03/09/2020	22.77	0
09/09/2020	9.64	4.2
15/09/2020	10.82	1.8
21/09/2020	13.71	0
27/09/2020	4.22	0.5
03/10/2020	11.59	0
07/10/2020	4.25	2
09/10/2020	1.88	0
15/10/2020	32.18	0.7
21/10/2020	39.59	5.2
27/10/2020	3.92	2
02/11/2020	8.22	3.7
08/11/2020	7.18	3.7
14/11/2020	8.97	0
20/11/2020	15.71	2.7
26/11/2020	No sample failure of HVAS	
02/12/2020	20.13	Awaiting Lab Results
04/12/2020	5.79	Awaiting Lab Results
08/12/2020	3.69	Awaiting Lab Results
14/12/2020	No sample failure of HVAS	
20/12/2020	No sample failure of HVAS	
26/12/2020	Awaiting Lab Results	

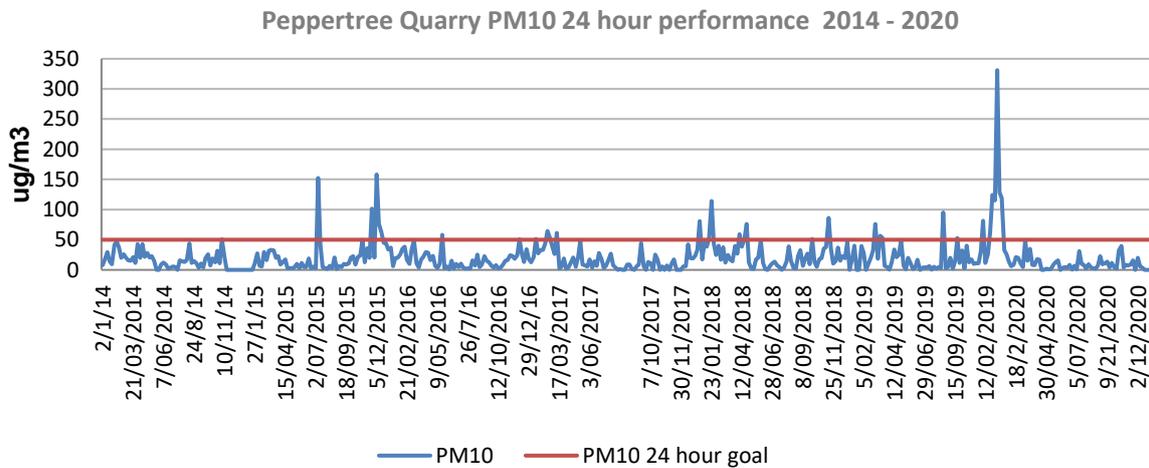
Long Term TSP Trend – 2014 to 2020



Long Term PM10 Trend – 2014 to 2020

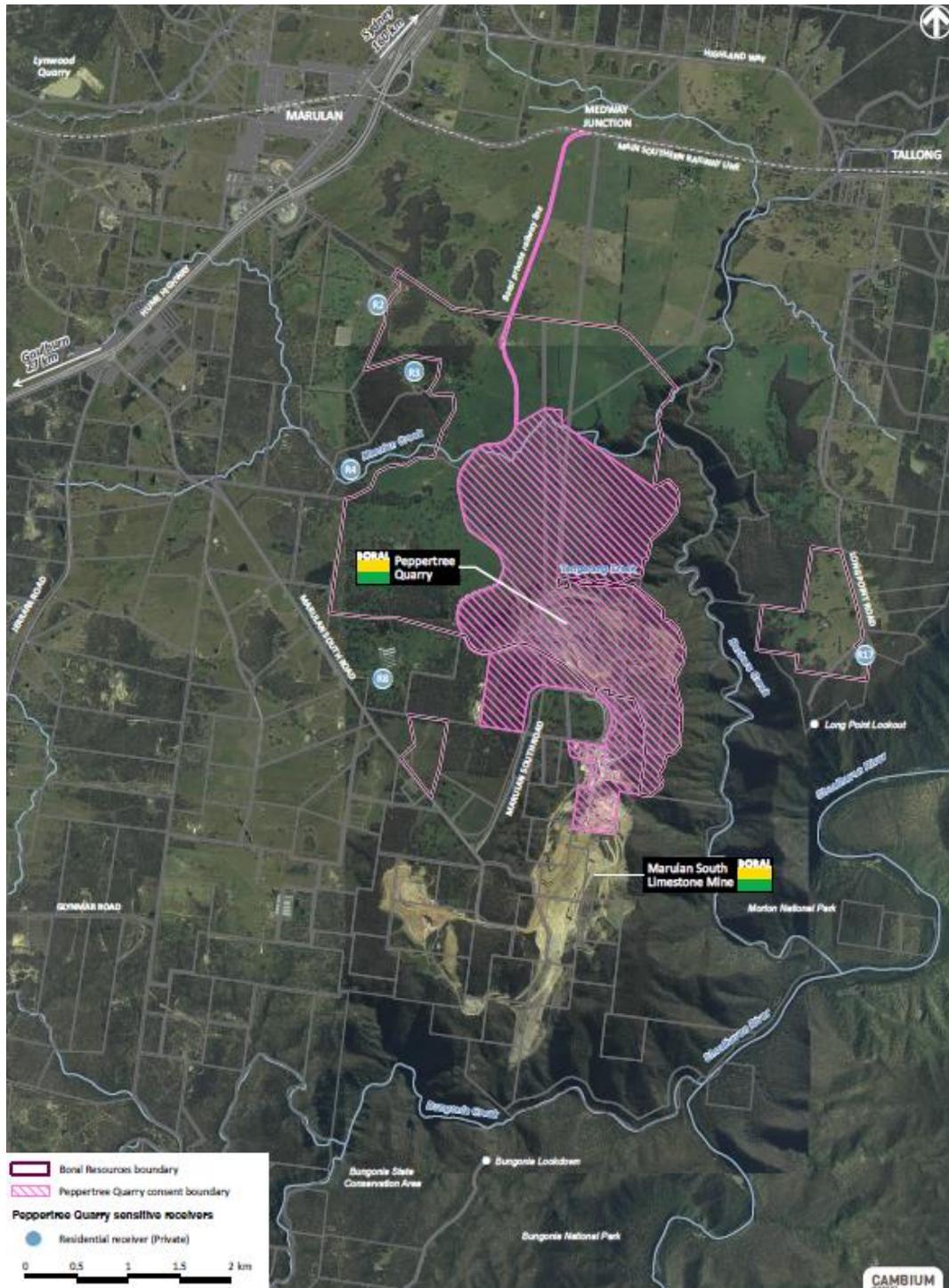


PM10 24 hour performance results - 2014 to 2020



APPENDIX 3 NOISE MONITORING

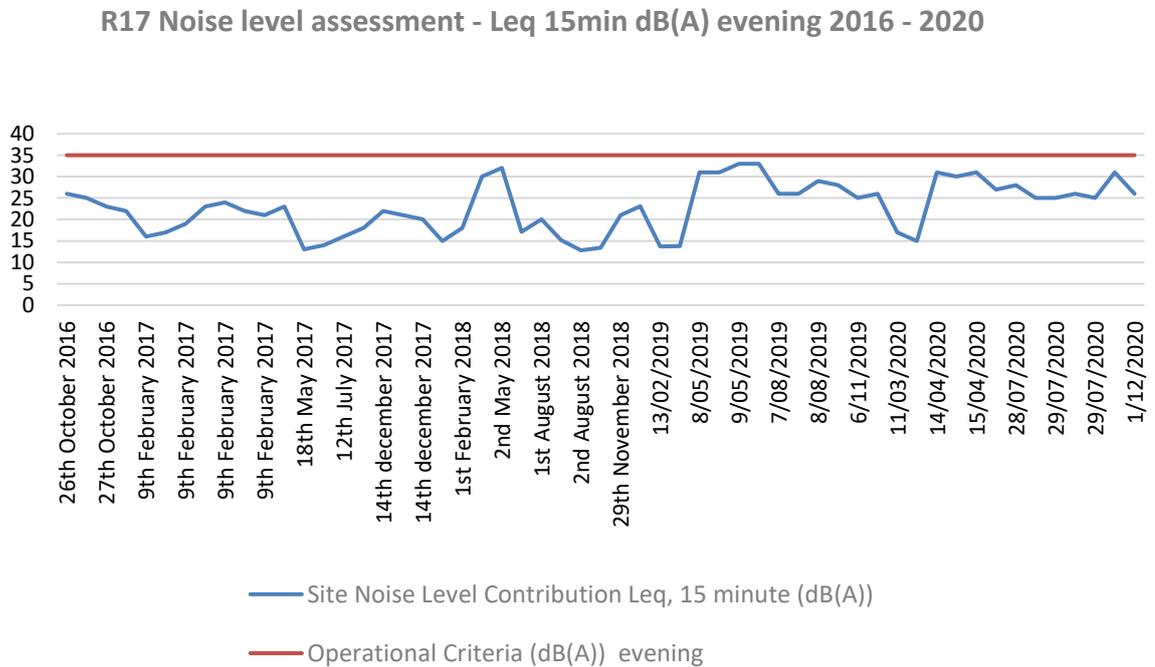
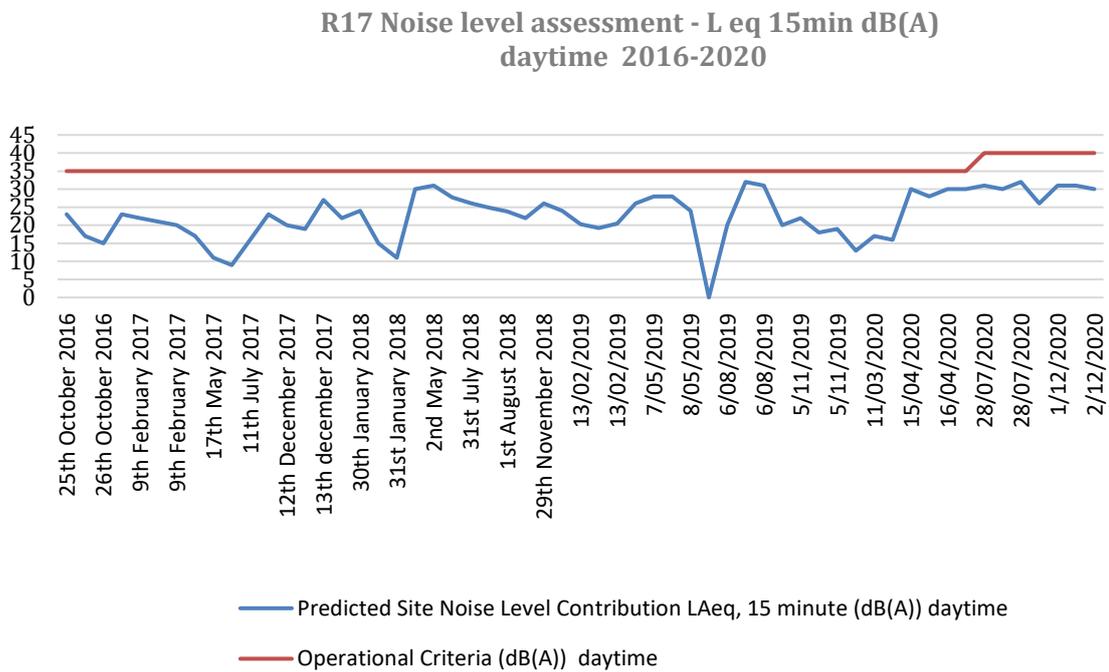
Residential receiver locations



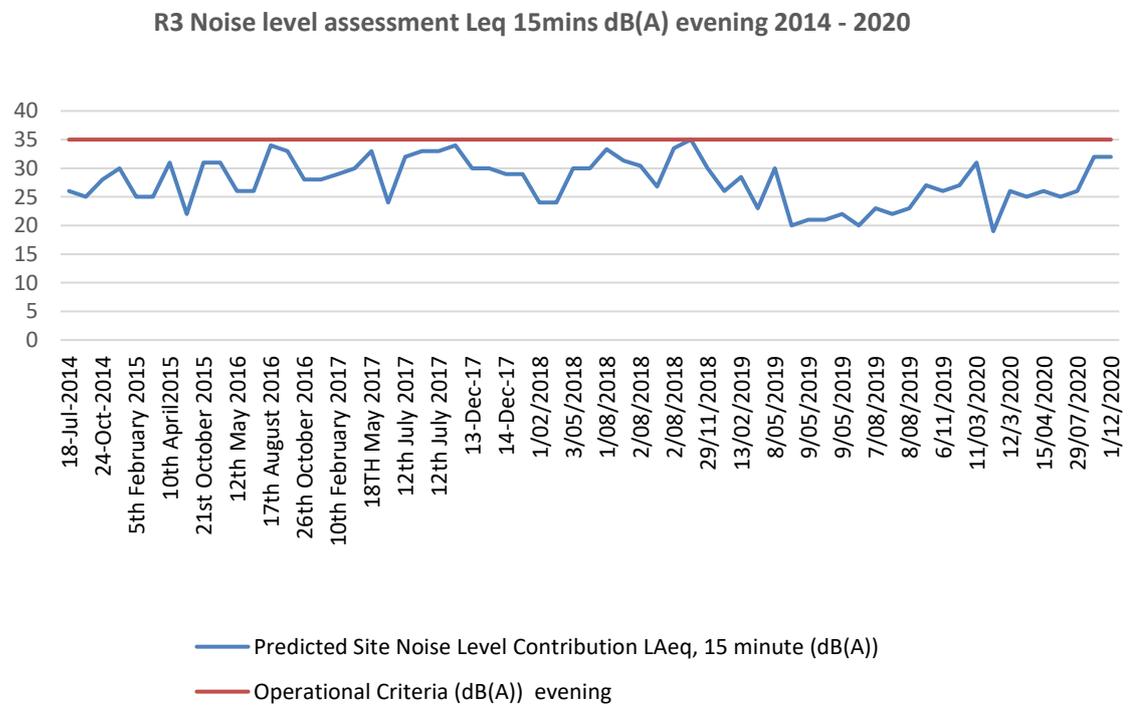
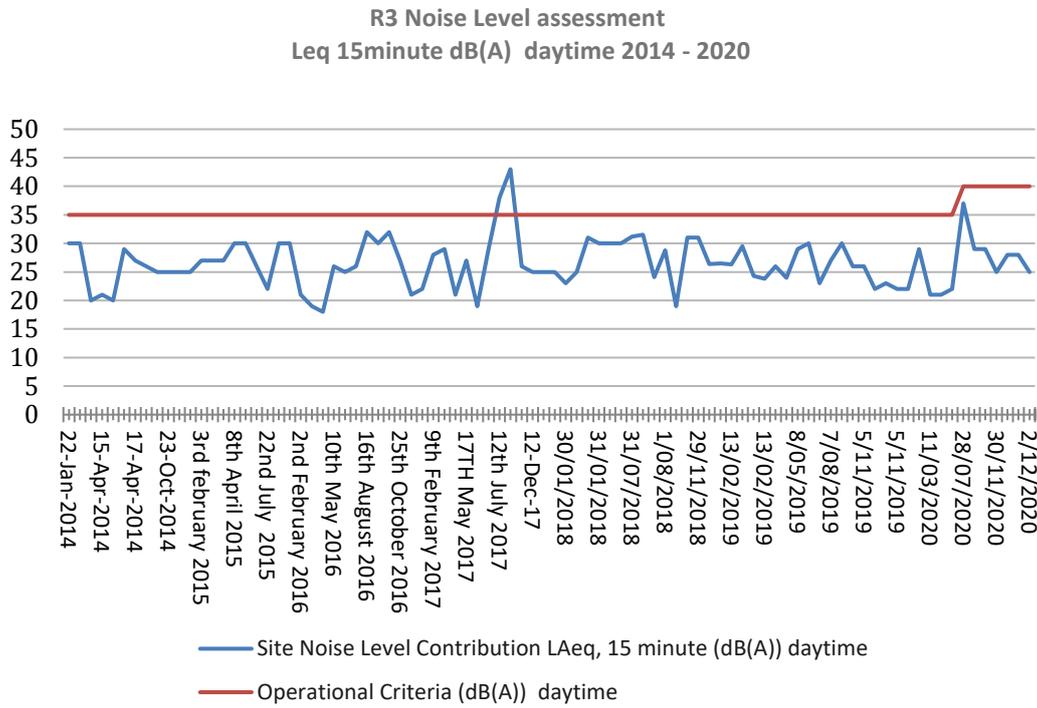
Noise Assessment Results (LAeq (15min))

Residential Receiver	Assessment Dates (2020)	Noise Level Assessment (LAeq (15min))		
		Compliance Criteria	Measured Noise Levels dB(A)	Compliance with Criteria
Receiver R3	March	Day: 40 Evening/Night: 35	22/29/21 31/19/26	Yes Yes
	April	Day: 40 Evening/Night: 35	21/22 25/26/25	Yes Yes
	July	Day: 40 Evening/Night: 35	37/29/29 26/32	Yes Yes
	November/December	Day: 40 Evening/Night: 35	25/28/28/25 32	Yes Yes
Receiver R2	March	Day: 40 Evening/Night: 35	16/22/21 25/26	Yes Yes
	April	Day: 40 Evening/Night: 35	27/25 29/29	Yes Yes
	July	Day: 40 Evening/Night: 35	24/30/29 27/29	Yes Yes
	November/December	Day: 40 Evening/Night: 35	23/30/34/26 25	Yes Yes
Receiver R8	March	Day: 40 Evening/Night: 35	27/27/23 35/34	Yes Yes
	April	Day: 40 Evening/Night: 35	23/25/26 26/21	Yes Yes
	July	Day: 40 Evening/Night: 35	33/21/21 26/21	Yes Yes
	November/December	Day: 40 Evening/Night: 35	36/34/34/34 24	Yes Yes
Receiver 4	March	Day: 40 Evening/Night: 35	26/24/23 25/31/33	Yes Yes
	April	Day: 40 Evening/Night: 35	21/23/25 28/31	Yes Yes
	July	Day: 40 Evening/Night: 35	34/33/24 25	Yes Yes
	November/December	Day: 40 Evening/Night: 35	36/36/32 34/28	Yes Yes
Receiver 17	March	Day: 40 Evening/Night: 35	13/17/16 17/15	Yes Yes
	April	Day: 40 Evening/Night: 35	31/30/31 30/28/30/30	Yes Yes
	July	Day: 40 Evening/Night: 35	31/30/32 27/28/25/25/26/25	Yes Yes
	November/December	Day: 40 Evening/Night: 35	26/31/31/30 31/26	Yes Yes

R 17 Off-Site Noise Level Trends (LAeq 15) 2016 – 2020

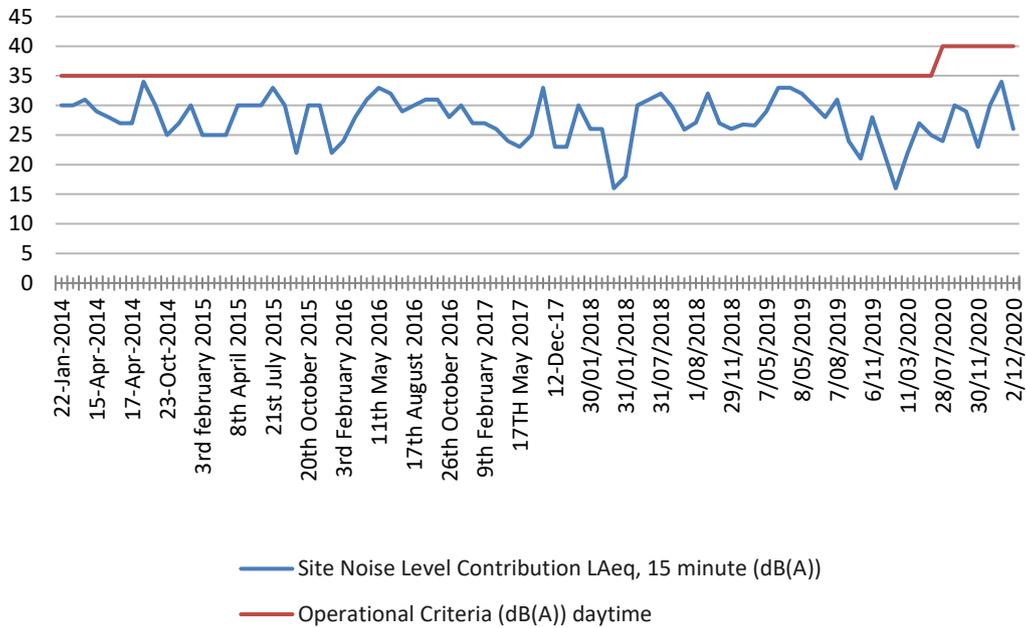


R 3 Off-Site Noise Level Trends (LAeq 15) 2014 – 2020

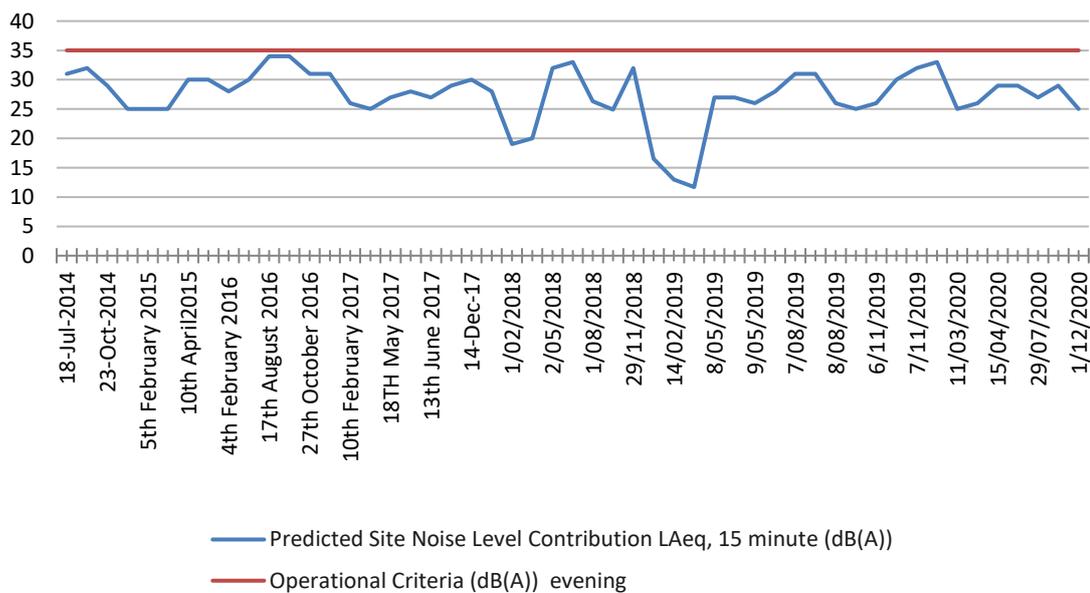


R2 Off-Site Noise Level Trends (LAeq 15) 2014 – 2020

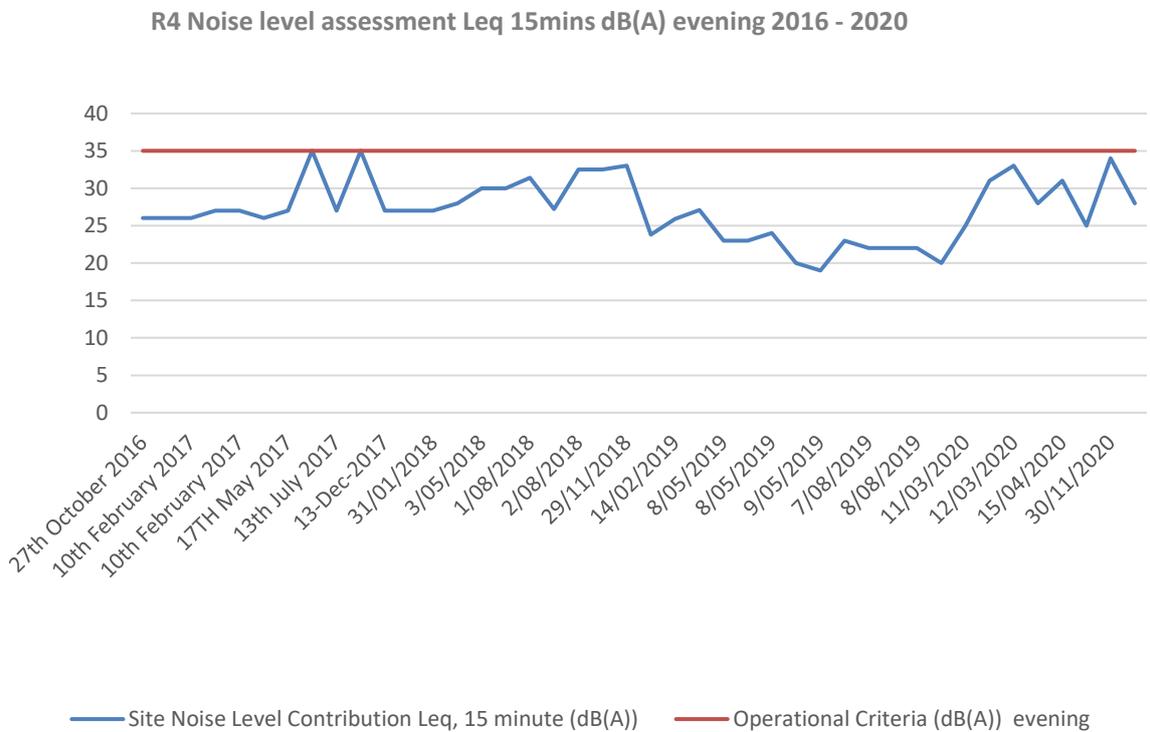
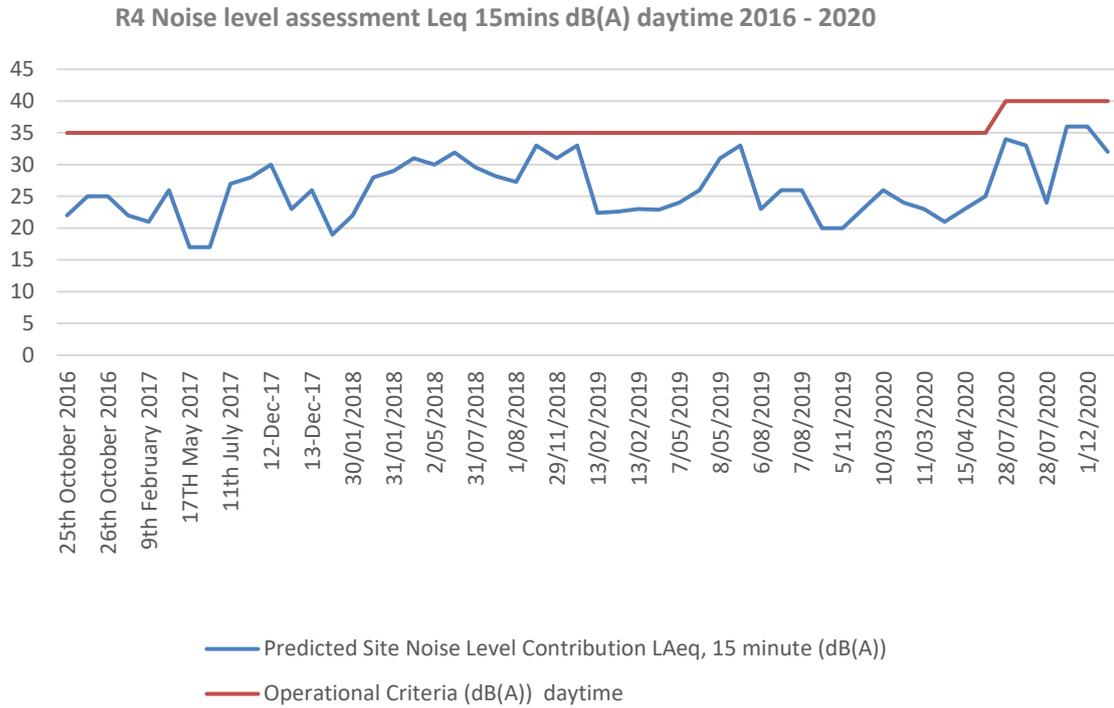
R2 Noise level assessment Leq 15mins dB(A) daytime 2014 - 2020



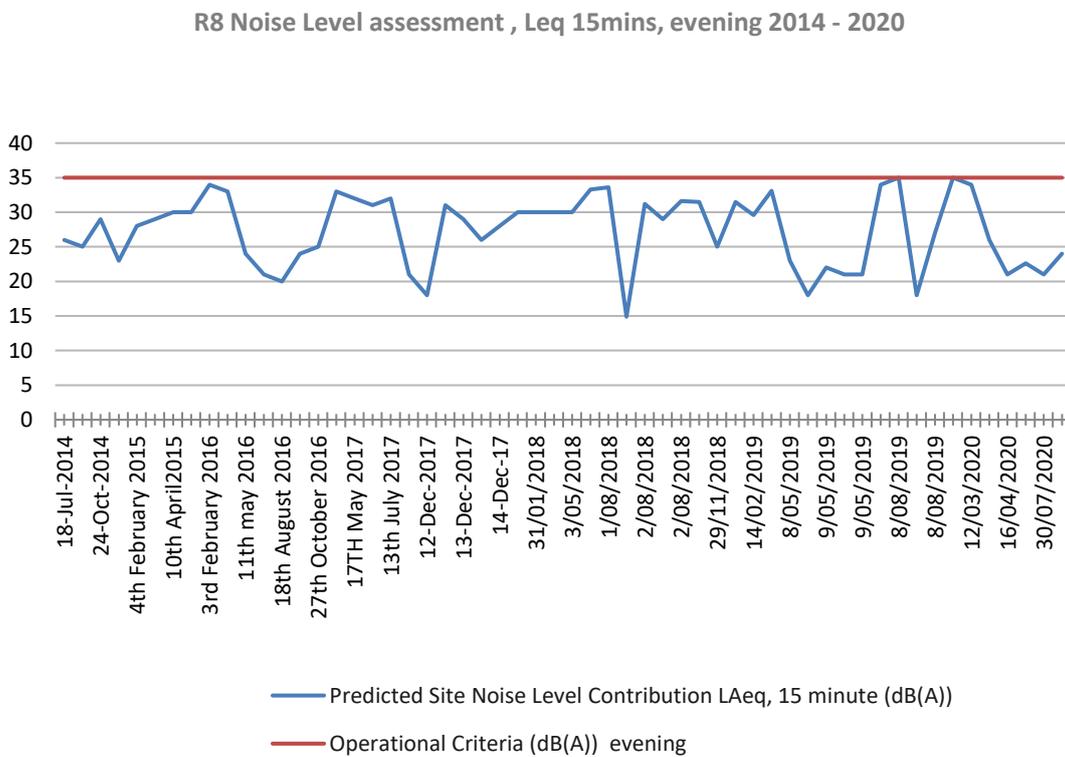
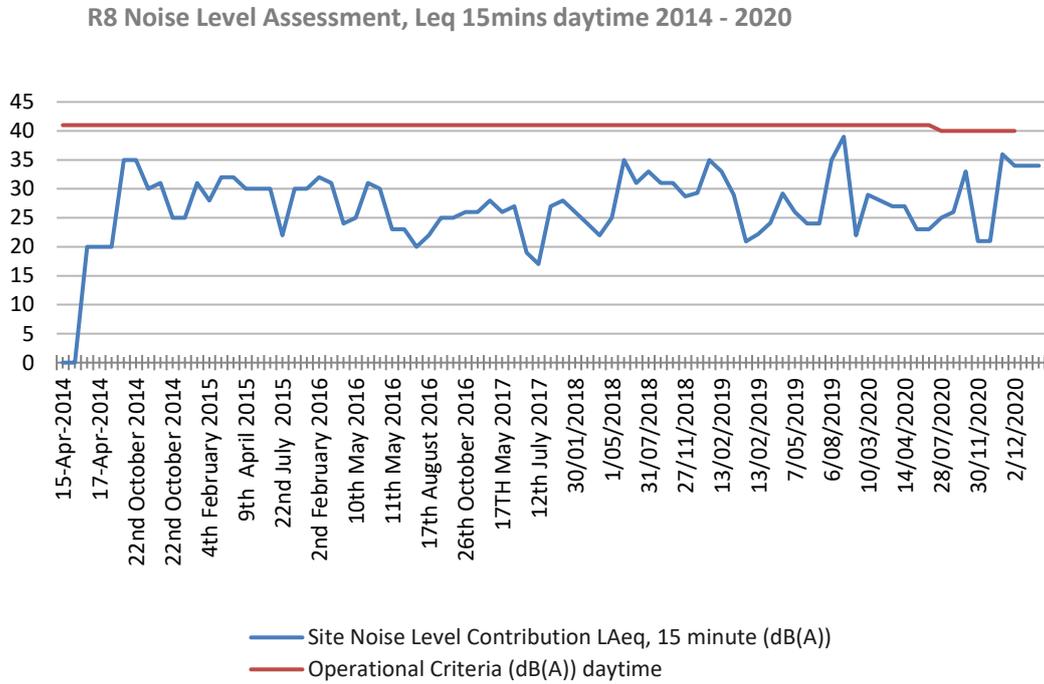
R2 Noise level assessment Leq 15mins dB(A) evening 2014 - 2020



R 4 Off-Site Noise Level Trends (LAeq 15) 2016 – 2020



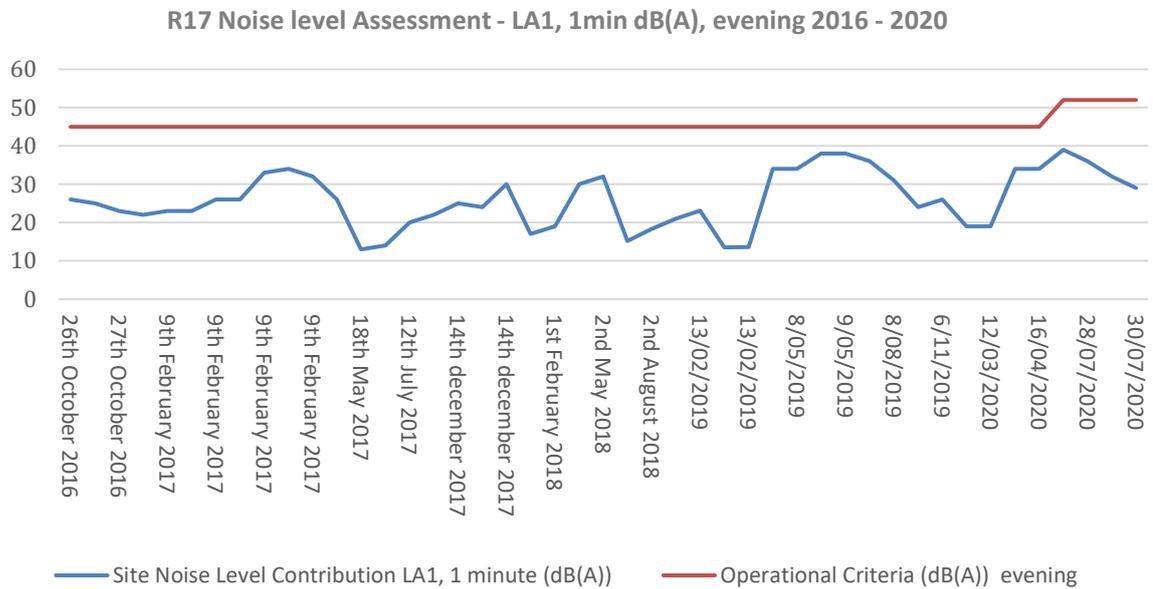
R8 Off-Site Noise Level Trends (LAeq 15) 2014 – 2020



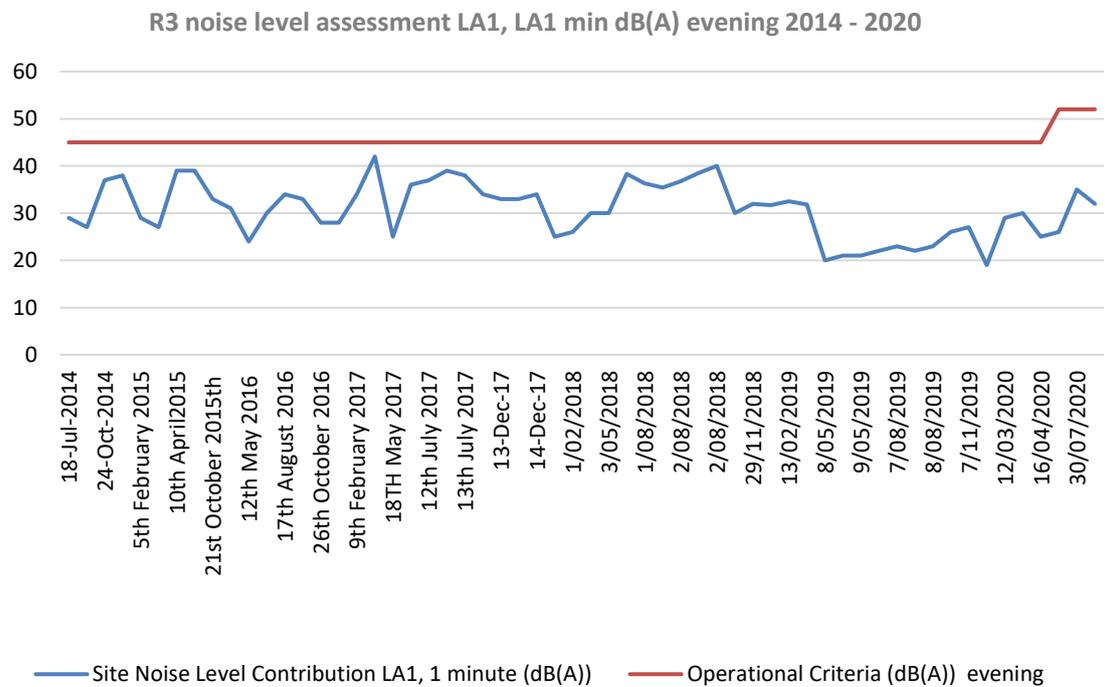
Noise Assessment Results (LA1 (1min))

Residential Receiver	Assessment Dates (2020)	Noise Level Assessment (LA1 (1min))		
		Compliance Criteria	Measured Noise Levels dB(A)	Compliance with Criteria
Receiver R3	March	52	19/29	Yes
	April	52	30/25	Yes
	July	52	26/35	Yes
	December	52	32	Yes
Receiver R2	March	52	25/26	Yes
	April	52	No Monitoring	Yes
	July	52	32/34	Yes
	December	52	No Monitoring	Yes
Receiver R8	March	52	40/38	Yes
	April	52	30/21	Yes
	July	52	33/30	Yes
	December	52	24	Yes
Receiver R4	March	52	34/32	Yes
	April	52	37/41	Yes
	July	52	25	Yes
	December	52	28	Yes
Receiver R17	March	52	19/19	Yes
	April	52	34/34	Yes
	July	52	39/36/32/29	Yes
	December	52	No Monitoring	Yes

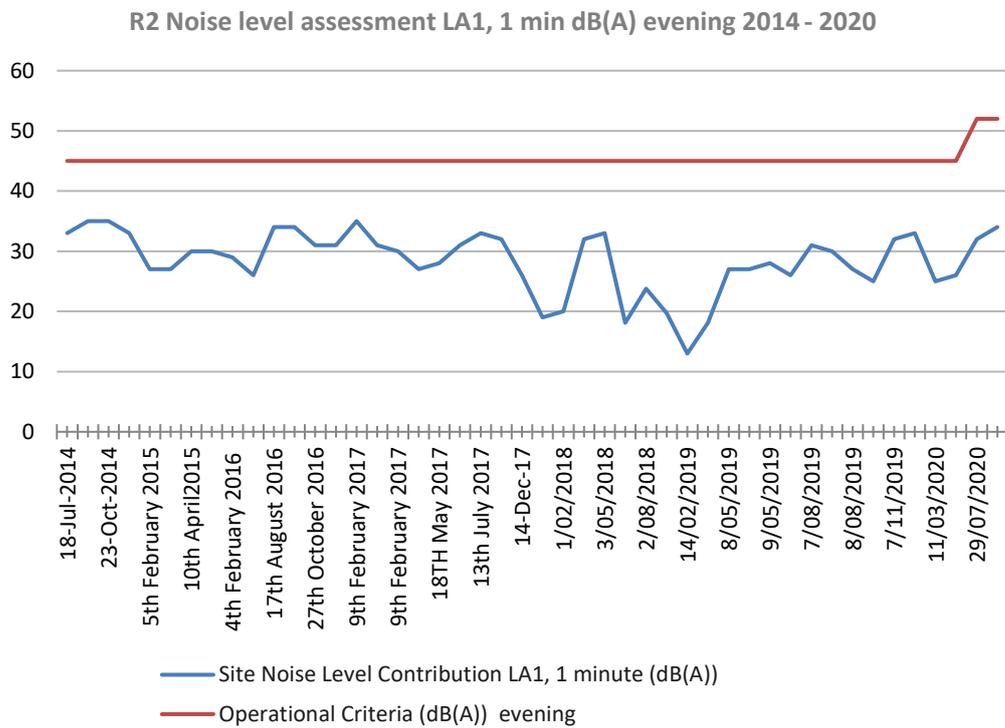
R 17 Noise Level Trends (LA1, 1minute) 2016 – 2020



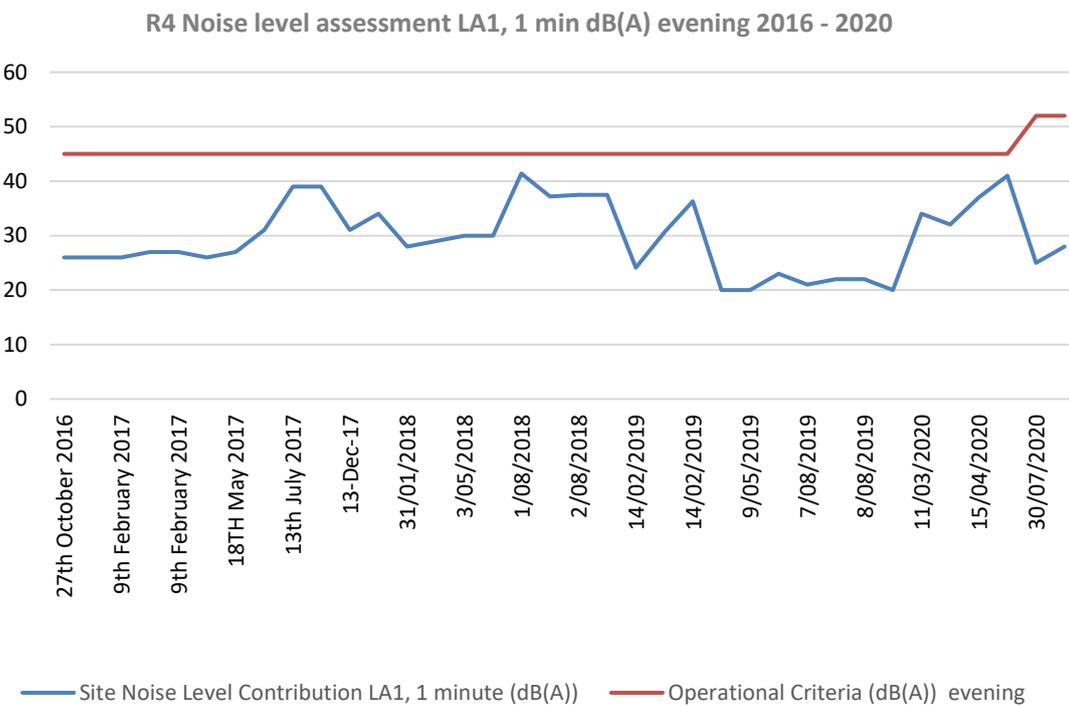
R3 Noise Level Trends (LA1, 1minute) 2014 – 2020



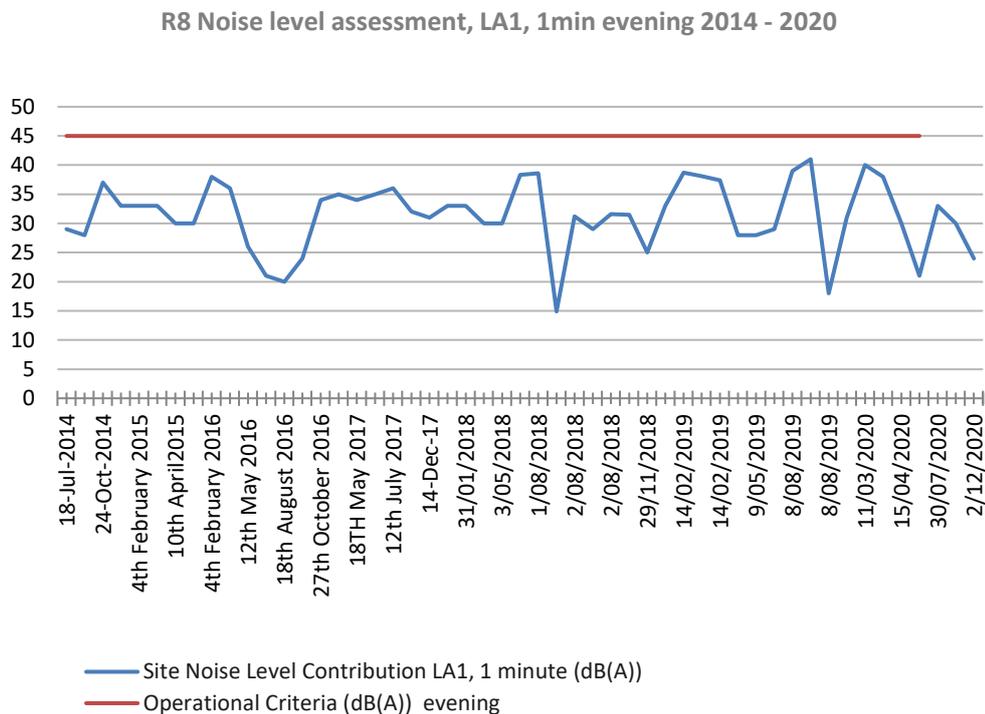
R2 Noise Level Trends (LA1, 1minute) 2014 – 2020



R4 Noise Level Trends (LA1, 1minute) – 2016 - 2020

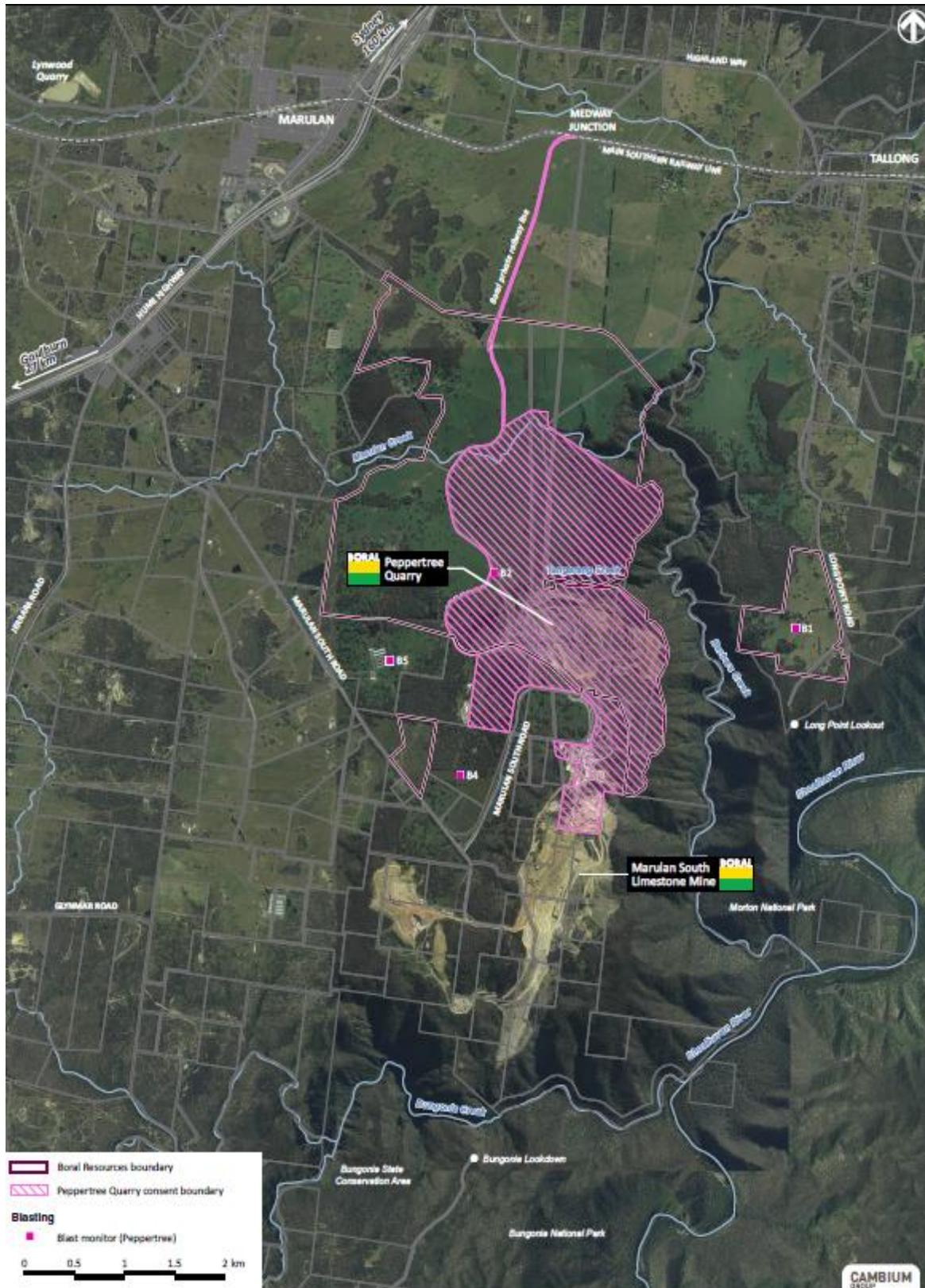


R8 Noise Level Trends (LA1, 1minute) – 2014 - 2018



APPENDIX 4 BLAST MONITORING INFORMATION

Blast monitoring locations



Blast Monitoring Results

Note 0 = no trigger

Blast Date	Over Pressure (db – Linear) Max Criteria: 120 5% Exceedance: 115				Ground Vibration (mm/sec) Max Criteria: 10 5% Exceedance: 5				Compliance
	Monitoring Locations				Monitoring Locations				
	B2 (north west)	B1 (north east)	B4 Marulan sth rd)	B5 (Residence)	B2 (north west)	B1 (north east)	B4 Marulan sth rd)	B5 (Residence)	
14/01/2020	100	No Trigger	102.3	96.2	1.15	No Trigger	0.09	1.29	YES
20/01/2020	97.6	No Trigger	104.7	100.8	1.03	No Trigger	0.08	1.08	YES
23/01/2020	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	0.86	YES
30/01/2020	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	0.88	YES
31/01/2020	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	YES
06/02/2020	100.3	No Trigger	No Trigger	101.9	1.3	No Trigger	No Trigger	1.62	YES
11/02/2020	100.9	No Trigger	No Trigger	101.9	1.3	No Trigger	No Trigger	1.51	YES
13/02/2020	103	No Trigger	99.8	102.9	1.09	No Trigger	0.08	1.7	YES
20/02/2020	99.7	No Trigger	99.8	103.6	1.26	No Trigger	0.08	No Trigger	YES
27/02/2020	100.7	No Trigger	No Trigger	No Trigger	1.18	No Trigger	No Trigger	No Trigger	YES
05/03/2020	100.5	No Trigger	No Trigger	No Trigger	1.48	No Trigger	0.57	No Trigger	YES
12/03/2020	98.6	No Trigger	101.5	No Trigger	1.21	No Trigger	0.08	No Trigger	YES
19/03/2020	100.3	No Trigger	100.7	99.7	1.62	No Trigger	0.07	1.44	YES
26/03/2020	102.4	No Trigger	No Trigger	No Trigger	1.11	No Trigger	No Trigger	No Trigger	YES
02/04/2020	99.6	No Trigger	99	99.8	1.09	No Trigger	0.07	0.67	YES
06/04/2020	97.6	No Trigger	No Trigger	No Trigger	1.35	No Trigger	No Trigger	No Trigger	YES
09/04/2020	99.5	No Trigger	No Trigger	100.6	0.95	No Trigger	No Trigger	0.86	YES
17/04/2020	102.4	No Trigger	No Trigger	109.3	1.04	No Trigger	No Trigger	1.19	YES
21/04/2020	98.6	No Trigger	No Trigger	No Trigger	1.04	No Trigger	No Trigger	No Trigger	YES
23/04/2020	101.1	No Trigger	No Trigger	No Trigger	0.82	No Trigger	No Trigger	No Trigger	YES

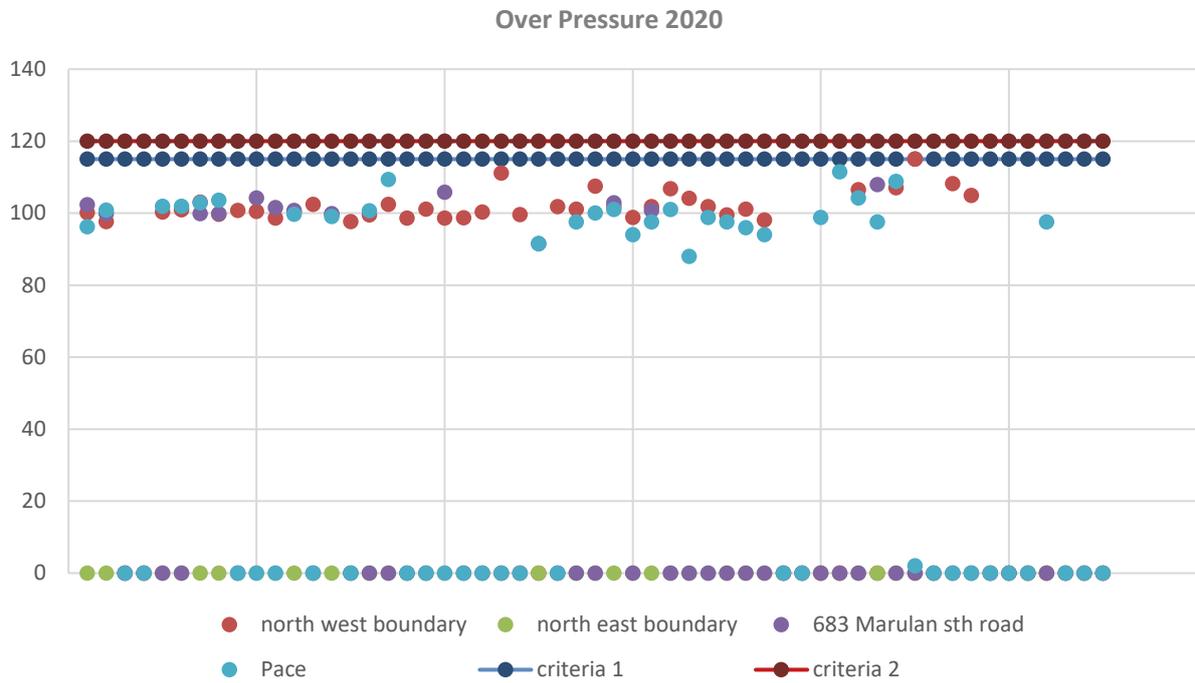
Boral Peppertree Quarry
Annual Review
1st January 2020 to 31st December 2020

Blast Date	Over Pressure (db – Linear) Max Criteria: 120 5% Exceedance: 115				Ground Vibration (mm/sec) Max Criteria: 10 5% Exceedance: 5				Compliance
	Monitoring Locations				Monitoring Locations				
	B2 (north west)	B1 (north east)	B4 Marulan sth rd)	B5 (Residence)	B2 (north west)	B1 (north east)	B4 Marulan sth rd)	B5 (Residence)	
28/04/2020	98.6	No Trigger	105.8	No Trigger	1.06	No Trigger	0.07	No Trigger	YES
30/04/2020	98.7	No Trigger	No Trigger	No Trigger	1.39	No Trigger	No Trigger	No Trigger	YES
05/05/2020	100.3	No Trigger	No Trigger	No Trigger	1.42	No Trigger	No Trigger	No Trigger	YES
07/05/2020	111.1	No Trigger	No Trigger	No Trigger	1.52	No Trigger	No Trigger	No Trigger	YES
12/05/2020	99.6	No Trigger	No Trigger	No Trigger	0.86	No Trigger	No Trigger	No Trigger	YES
21/05/2020	No Trigger	No Trigger	91.5	91.5	No Trigger	No Trigger	0.5	0.6	YES
02/06/2020	101.8	No Trigger	No Trigger	No Trigger	1.02	No Trigger	No Trigger	No Trigger	YES
04/06/2020	101.1	No Trigger	No Trigger	97.5	1.1	No Trigger	1	1.1	YES
18/06/2020	107.5	No Trigger	No Trigger	100	1.35	No Trigger	No Trigger	1.29	YES
23/06/2020	101.8	No Trigger	102.9	101	1.11	No Trigger	0.06	0.976	YES
25/06/2020	98.8	No Trigger	No Trigger	94	1.13	No Trigger	No Trigger	1.08	YES
30/06/2020	101.8	No Trigger	100.7	97.5	1.08	No Trigger	0.07	0.93	YES
09/07/2020	106.8	No Trigger	No Trigger	101	1.62	No Trigger	No Trigger	1.596	YES
14/07/2020	104.1	No Trigger	No Trigger	88	0.99	No Trigger	No Trigger	0.64	YES
16/07/2020	101.8	No Trigger	No Trigger	98.8	0.91	No Trigger	No Trigger	1.024	YES
21/07/2020	99.5	No Trigger	No Trigger	97.5	1.29	No Trigger	No Trigger	1.47	YES
28/07/2020	101.1	No Trigger	No Trigger	95.9	2.27	No Trigger	No Trigger	1.746	YES
30/07/2020	98.1	No Trigger	No Trigger	94	1.22	No Trigger	No Trigger	1.3	YES
12/08/2020	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	YES
20/08/2020	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	YES
25/08/2020	No Trigger	No Trigger	No Trigger	98.8	No Trigger	No Trigger	No Trigger	2.05	YES
03/09/2020	No Trigger	No Trigger	No Trigger	111.5	No Trigger	No Trigger	No Trigger	1.5	YES

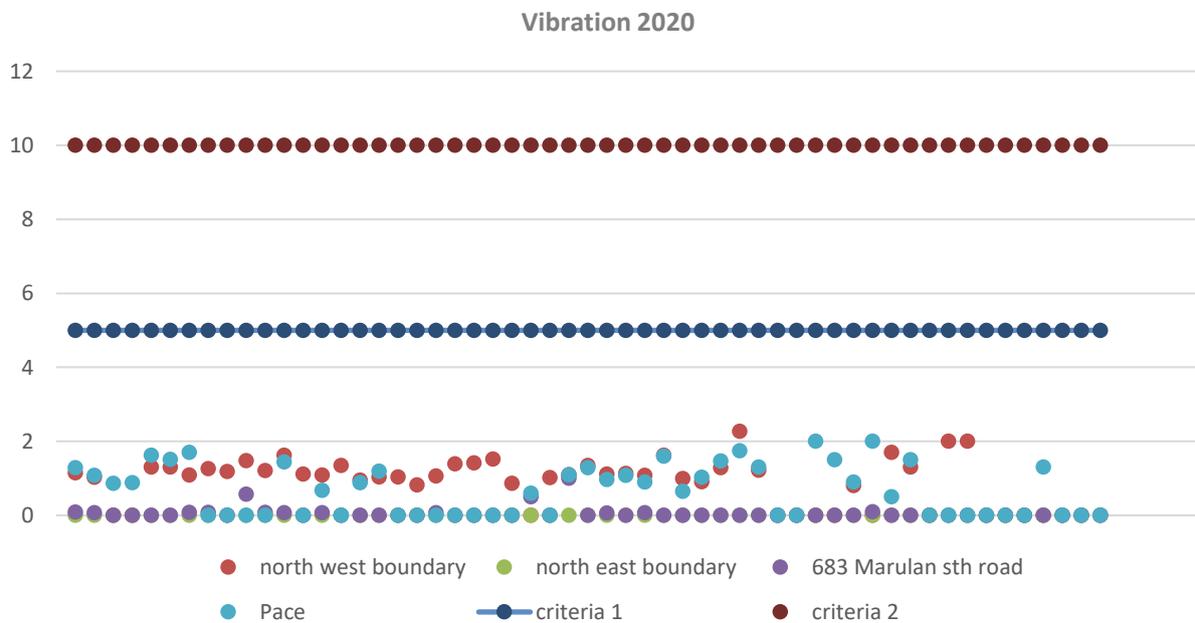
Boral Peppertree Quarry
 Annual Review
 1st January 2020 to 31st December 2020

Blast Date	Over Pressure (db – Linear) Max Criteria: 120 5% Exceedance: 115				Ground Vibration (mm/sec) Max Criteria: 10 5% Exceedance: 5				Compliance
	Monitoring Locations				Monitoring Locations				
	B2 (north west)	B1 (north east)	B4 Marulan sth rd)	B5 (Residence)	B2 (north west)	B1 (north east)	B4 Marulan sth rd)	B5 (Residence)	
10/09/2020	106.5	No Trigger	No Trigger	104.2	0.8	No Trigger	No Trigger	0.9	YES
17/09/2020	No Trigger	No Trigger	107.9	97.5	No Trigger	No Trigger	0.1	2	YES
22/09/2020	107	No Trigger	No Trigger	108.8	1.7	No Trigger	No Trigger	0.5	YES
25/09/2020	115	No Trigger	No Trigger	2	1.3	No Trigger	No Trigger	1.5	YES
27/10/2020	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	YES
29/10/2020	108.2	No Trigger	No Trigger	No Trigger	2	No Trigger	No Trigger	No Trigger	YES
05/11/2020	104.9	No Trigger	No Trigger	No Trigger	2	No Trigger	No Trigger	No Trigger	YES
12/11/2020	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	YES
17/11/2020	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	YES
19/11/2020	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	YES
26/11/2020	No Trigger	No Trigger	No Trigger	97.5	No Trigger	No Trigger	No Trigger	1.3	YES
01/12/2020	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	YES
10/12/2020	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	YES
17/12/2020	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	No Trigger	YES

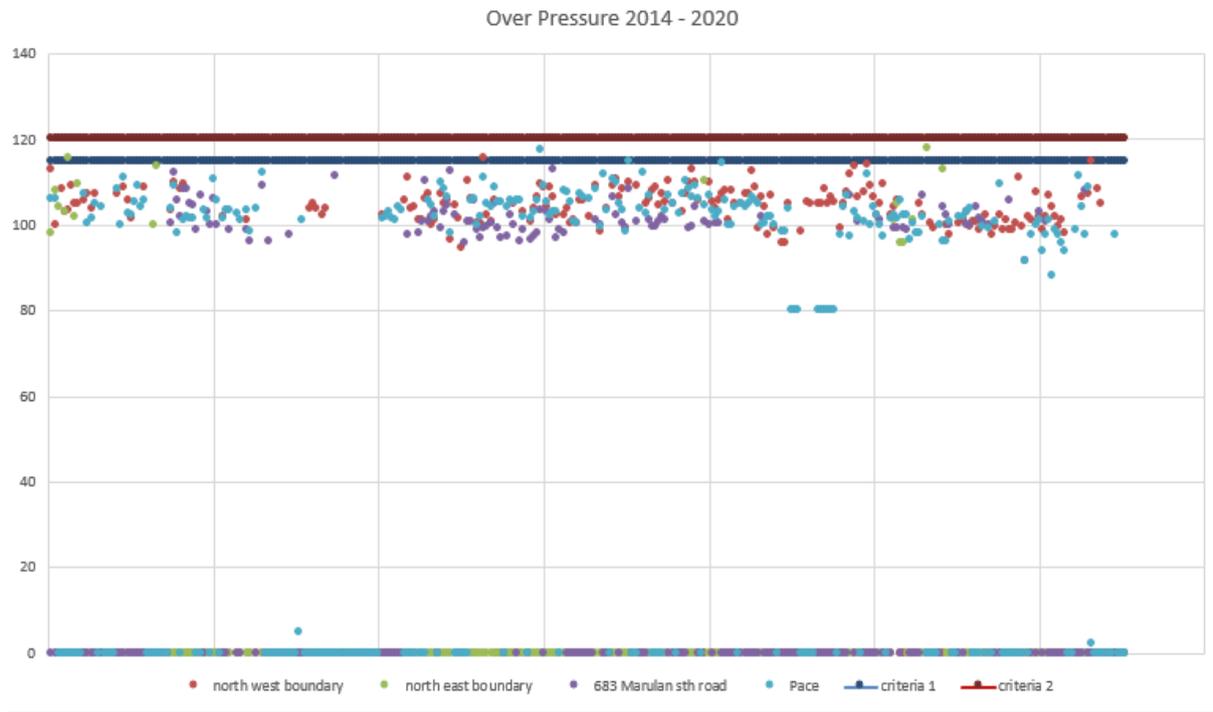
Blasting Overpressure Performance for 2020



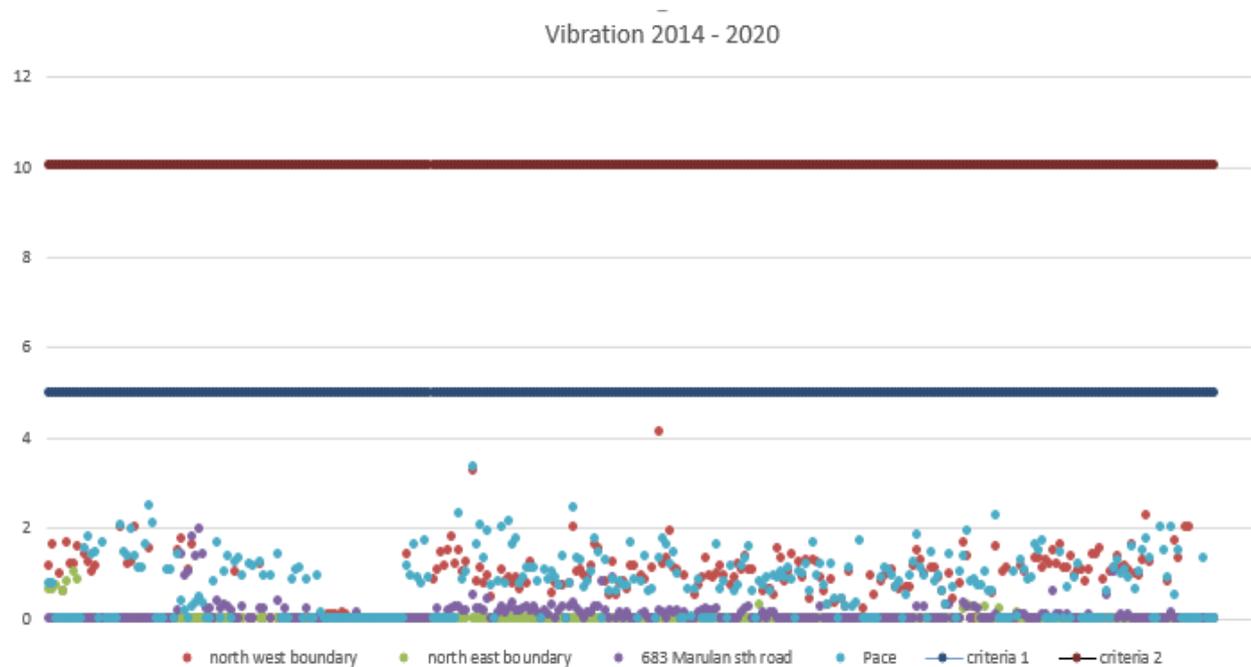
Blasting Ground Vibration Performance for 2020



Long Term Blast Trends – Overpressure

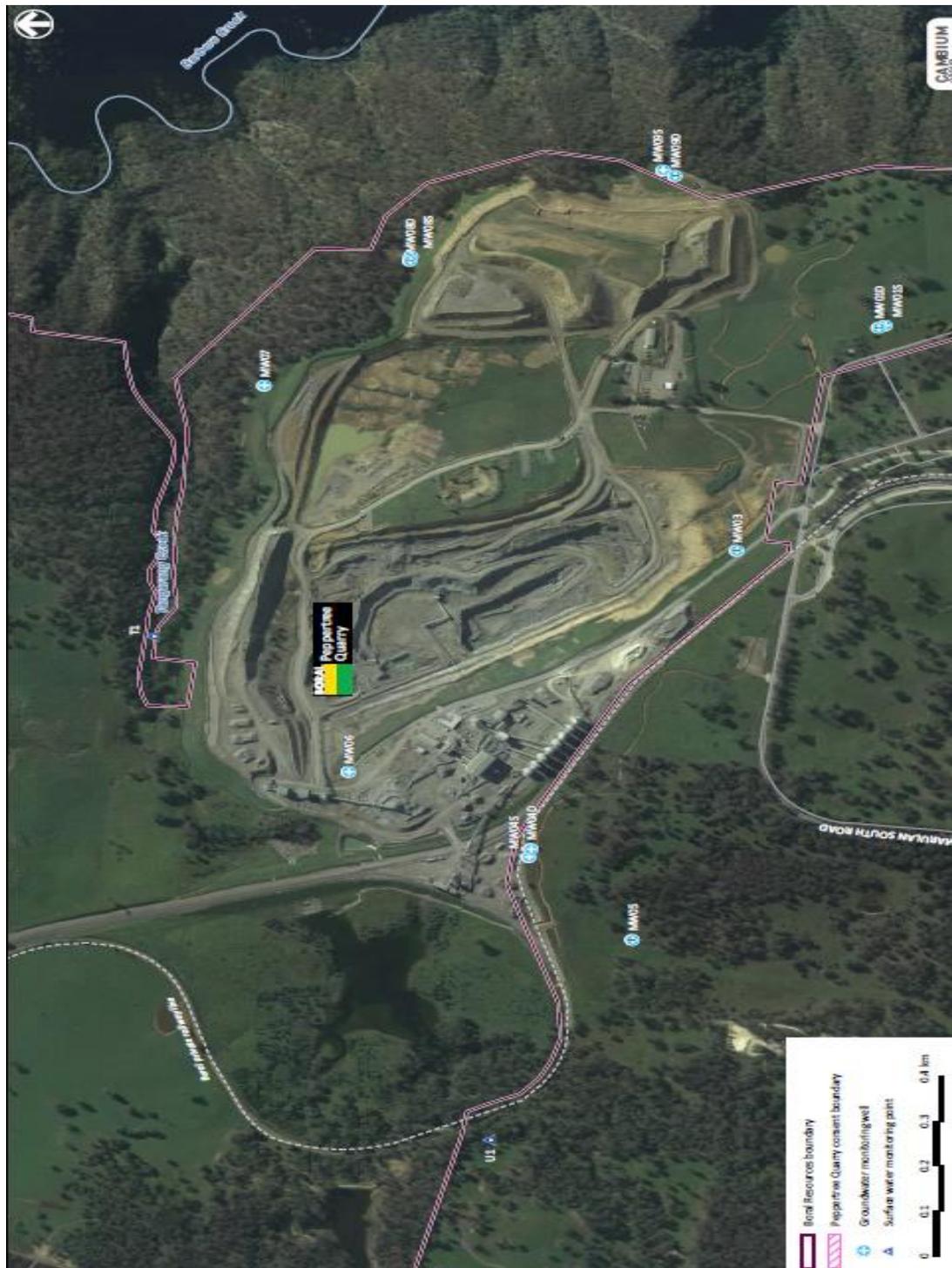


Long Term Blast Trends – Vibration



APPENDIX 5 SURFACE AND GROUNDWATER MONITORING INFORMATION

Surface and groundwater monitoring locations



Boral Peppertree Quarry
Annual Review
1st January 2020 to 31st December 2020

Surface Water Monitoring Results (2020)

Parameter	Dam				Tangarang Ck - Downstream				Tangarang Ck - Upstream				Marulan South Ck				Barbers creek 1		Barbers Creek 2	
	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	4 th	1 st	4 th
pH	7.3	7.8	8.1	8.1	6.9	8.1	8	8.2	8.4	NF	7.1	7.4	7.3	7.3	7.5	7.7	8	7.6	8.07	7.67
Total Suspended solids (mg/l)	67	<5	12	8	364	<5	<5	6	98	NF	30	18	21	20	7	14	6	6	6	<5
Total Dissolved solids (mg/l)	130	272	316	261	149	406	354	272	145	NF	302	108	178	456	264	274	444	409	502	429
Ammonia -N (mg/l)	0.05	0.14	0.13	0.14	0.11	0.05	0.03	0.02	0.01	NF	0.08	0.08	0.07	0.03	<0.01	<0.01	NA	NA	NA	NA
Nitrate-N (mg/l)	0.27	0.93	1.01	1.09	0.37	0.28	0.12	0.79	0.14	NF	0.94	<0.01	0.23	<0.01	<0.01	<0.01	NA	NA	NA	NA
Nitrite-N (mg/l)	0.02	0.04	0.01	0.04	0.02	0.01	<0.01	0.03	0.01	NF	<0.01	<0.01	0.02	0.01	<0.01	<0.01	NA	NA	NA	NA
Sulphate (mg/l)	<10	39	39	30	<10	15	13	28	<10	NF	15	<1	<10	39	22	1	<1	20	34	28
Chloride (mg/l)	10	57	85	37	12	114	82	39	5	NF	26	10	25	168	103	48	111	94	103	86
Turbidity (NTU)	66.4	6.9	8.2	7.8	269	1.5	3.4	8.9	50.5	NF	164	24.9	19.8	20.2	17.8	44.8	NA	NA	NA	NA
Calcium (mg/l)	11	40	48	30	13	51	48	31	20	NF	20	7	10	38	26	18	44	49	59	56
Potassium (mg/l)	4	5	5	4	4	3	3	3	4	NF	6	4	6	7	5	6	4	4	5	4
Magnesium (mg/l)	3	13	15	9	3	29	26	11	3	NF	7	3	4	25	17	11	28	24	30	24
Sodium (mg/l)	6	44	55	31	7	62	54	32	3	NF	45	9	12	60	14	31	42	35	42	34
Total phosphorus (mg/l)	0.38	0.02	0.03	0.03	0.42	0.02	0.03	0.02	0.14	NF	0.4	0.18	0.27	0.11	0.11	0.23	0.01	<0.01	<0.01	<0.01
total nitrogen	2.4	1.9	1.6	1.8	3	0.4	0.3	1.4	1.6	NF	4	1.2	2.2	1	0.9	1.3	0.5	0.5	0.6	0.4
Hardness (CaCo3) (mg/l)	44	142	142	112	51	231	227	125	73	NF	81	41	36	100	84	93	59	149	207	170
TKN (mg/l)	2.1	0.9	0.6	0.7	2.6	0.1	0.2	0.6	1.5	NF	3.1	1.2	1.9	1	0.9	1.3	0.5	0.3	0.6	0.2
Faecal Coliform (cfu/100ml)	5500	360	15	130	4200	50	9	310	1400	NF	84	1600	1800	420	300	2000	NA	NA	NA	NA
TPH C10-C14 (µg/l)	<50	<50	<50	<50	<50	<50	<50	<50	<50	NF	<50	<50	<50	<50	<50	<50	NA	NA	NA	NA

Boral Peppertree Quarry
Annual Review
1st January 2020 to 31st December 2020

TPH C15-C28 (µg/l)	<100	<100	110	110	<100	<100	<100	<100	<100	NF	<100	<100	<100	<100	<100	<100	NA	NA	NA	NA
TPH C29-C36 (µg/l)	<50	<50	<50	<50	<50	<50	<50	<50	<50	NF	<50	<50	<50	<50	<50	<50	NA	NA	NA	NA
sum TPH C10-C36 (µg/l)	<50	<50	110	110	<50	<50	<50	<50	<50	NF	<50	<50	<50	<50	<50	<50	NA	NA	NA	NA
Naphthalene	<1	<1	<1	<1	<1	<1	<1	<1	<1	NF	<1	<1	<1	<1	<1	<1	NA	NA	NA	NA
Acenaphthylene	<1	<1	<1	<1	<1	<1	<1	<1	<1	NF	<1	<1	<1	<1	<1	<1	NA	NA	NA	NA
Acenaphthere	<1	<1	<1	<1	<1	<1	<1	<1	<1	NF	<1	<1	<1	<1	<1	<1	NA	NA	NA	NA
Flourene	<1	<1	<1	<1	<1	<1	<1	<1	<1	NF	<1	<1	<1	<1	<1	<1	NA	NA	NA	NA
Phenanthrene	<1	<1	<1	<1	<1	<1	<1	<1	<1	NF	<1	<1	<1	<1	<1	<1	NA	NA	NA	NA
Anthracence	<1	<1	<1	<1	<1	<1	<1	<1	<1	NF	<1	<1	<1	<1	<1	<1	NA	NA	NA	NA
Fluoranthene	<1	<1	<1	<1	<1	<1	<1	<1	<1	NF	<1	<1	<1	<1	<1	<1	NA	NA	NA	NA
Pyrene	<1	<1	<1	<1	<1	<1	<1	<1	<1	NF	<1	<1	<1	<1	<1	<1	NA	NA	NA	NA
Benzo(a)anthracene	<1	<1	<1	<1	<1	<1	<1	<1	<1	NF	<1	<1	<1	<1	<1	<1	NA	NA	NA	NA
Chrysene	<1	<1	<1	<1	<1	<1	<1	<1	<1	NF	<1	<1	<1	<1	<1	<1	NA	NA	NA	NA
Benzo(b+k)fluoranthene	<1	<1	<1	<1	<1	<1	<1	<1	<1	NF	<1	<1	<1	<1	<1	<1	NA	NA	NA	NA
Benzo(a)pyrene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NF	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	<1	<1	<1	<1	<1	<1	<1	<1	<1	NF	<1	<1	<1	<1	<1	<1	NA	NA	NA	NA
Dibenzo(a,h)anthracene	<1	<1	<1	<1	<1	<1	<1	<1	<1	NF	<1	<1	<1	<1	<1	<1	NA	NA	NA	NA
Benzo(g,h,i)perylene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NF	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA

note NF – No flow NA – not analysed

Quarters

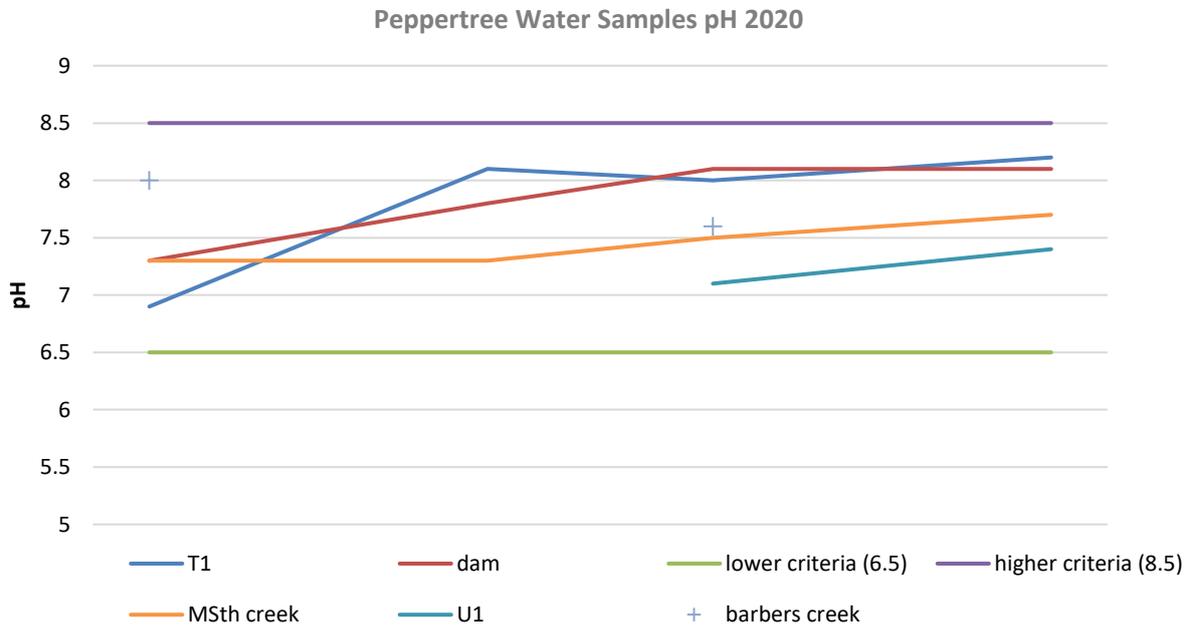
1st – 17th March 2020

2nd – 24 May 2020

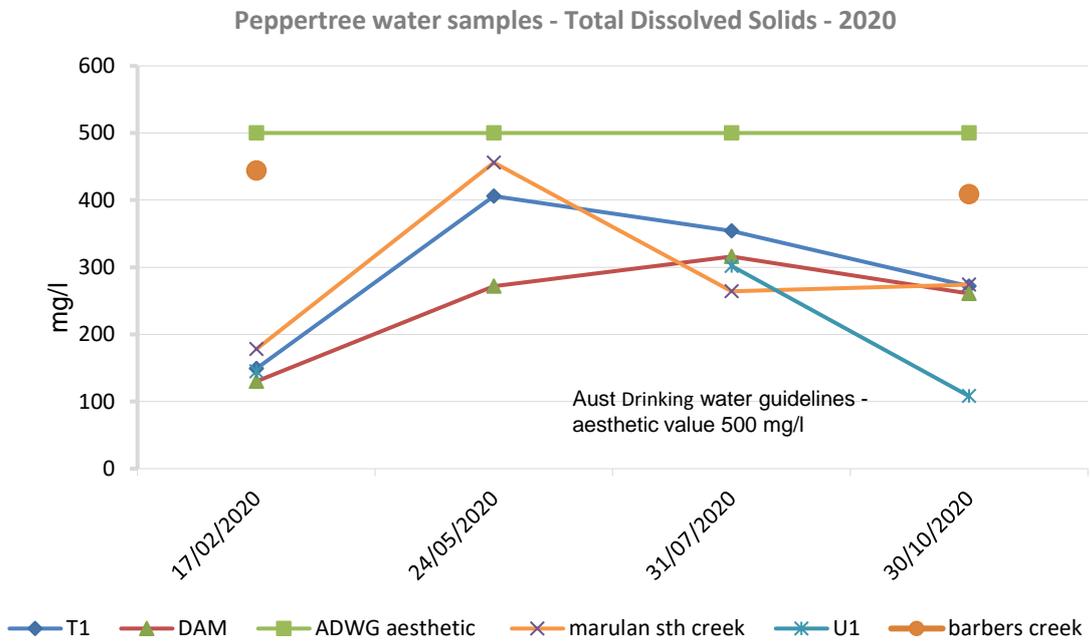
3rd – 31st June 2020

4th – 30 October 2020

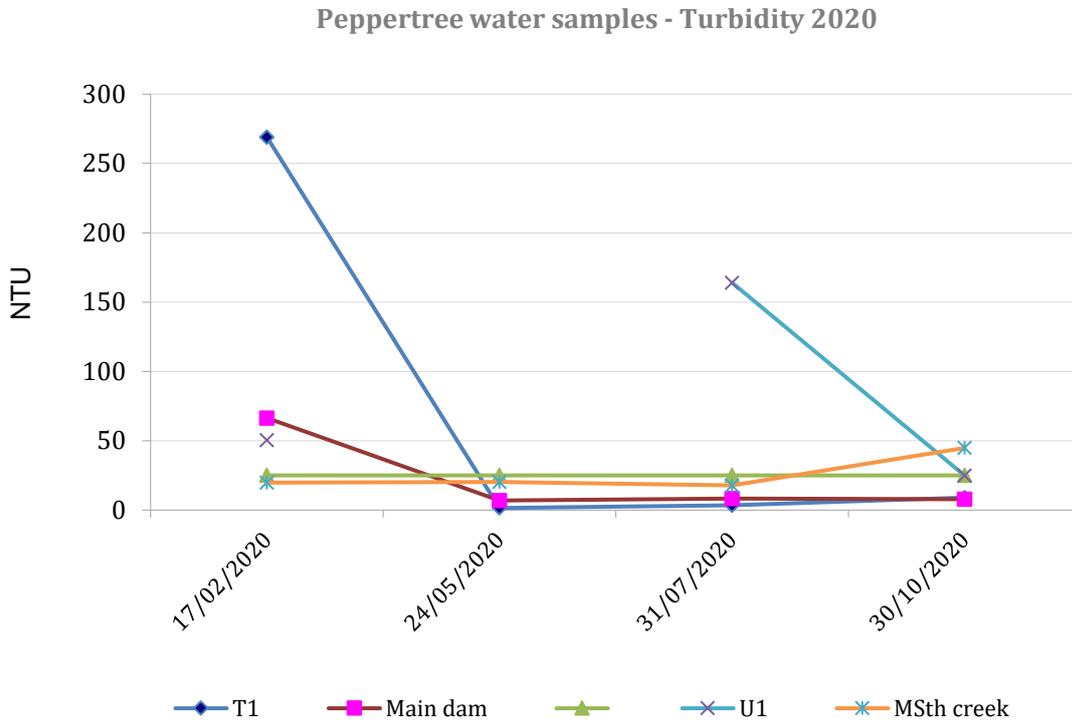
pH Surface Waters Trends 2020



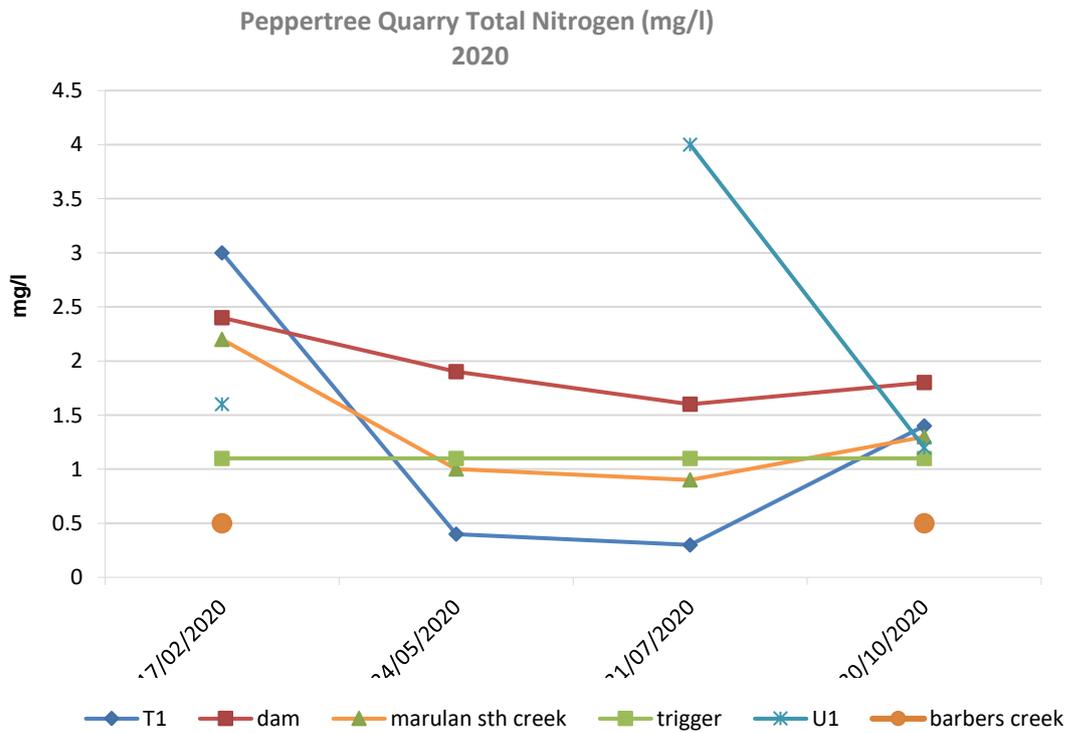
TDS surface water trends 2020



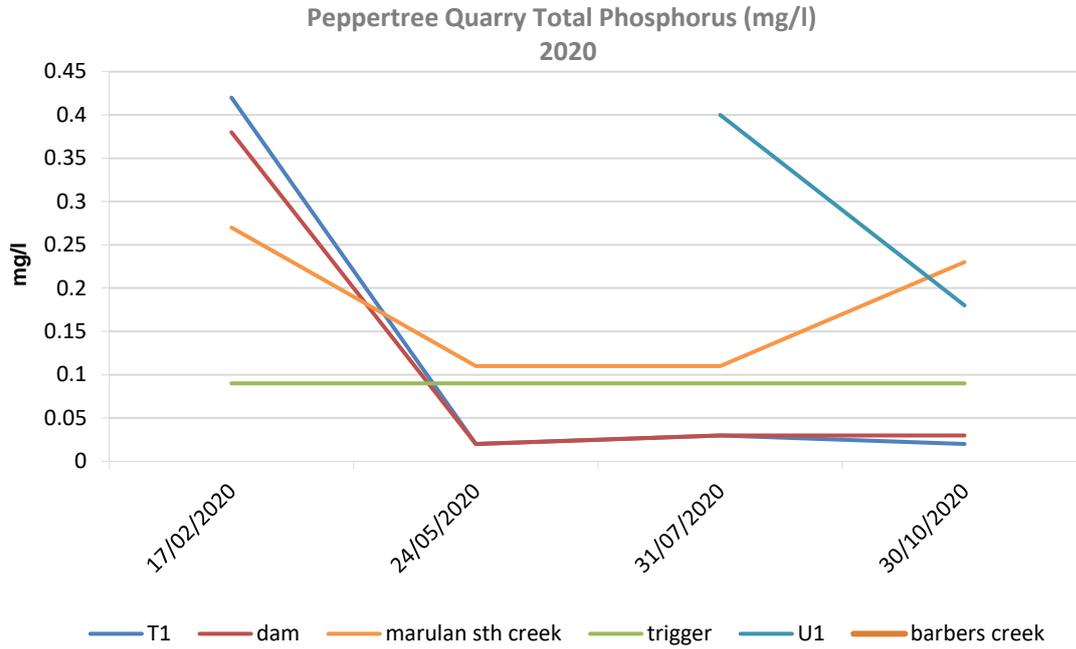
Turbidity surface water trends 2020



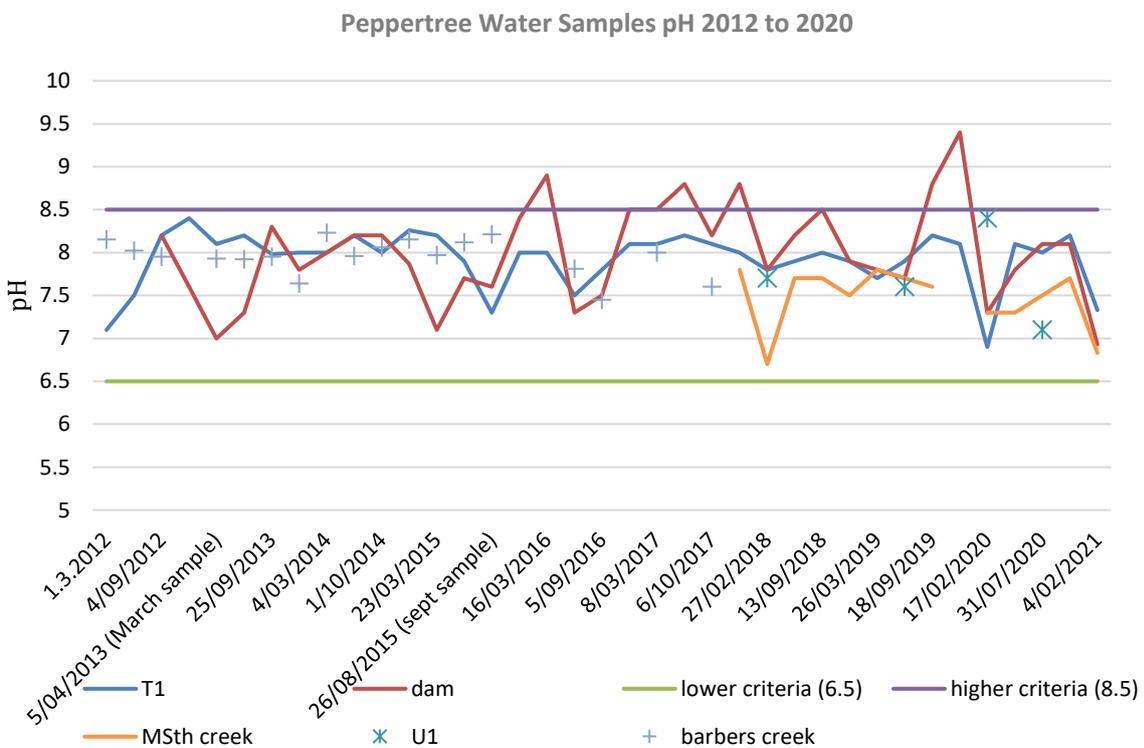
Nitrogen surface water trends 2020



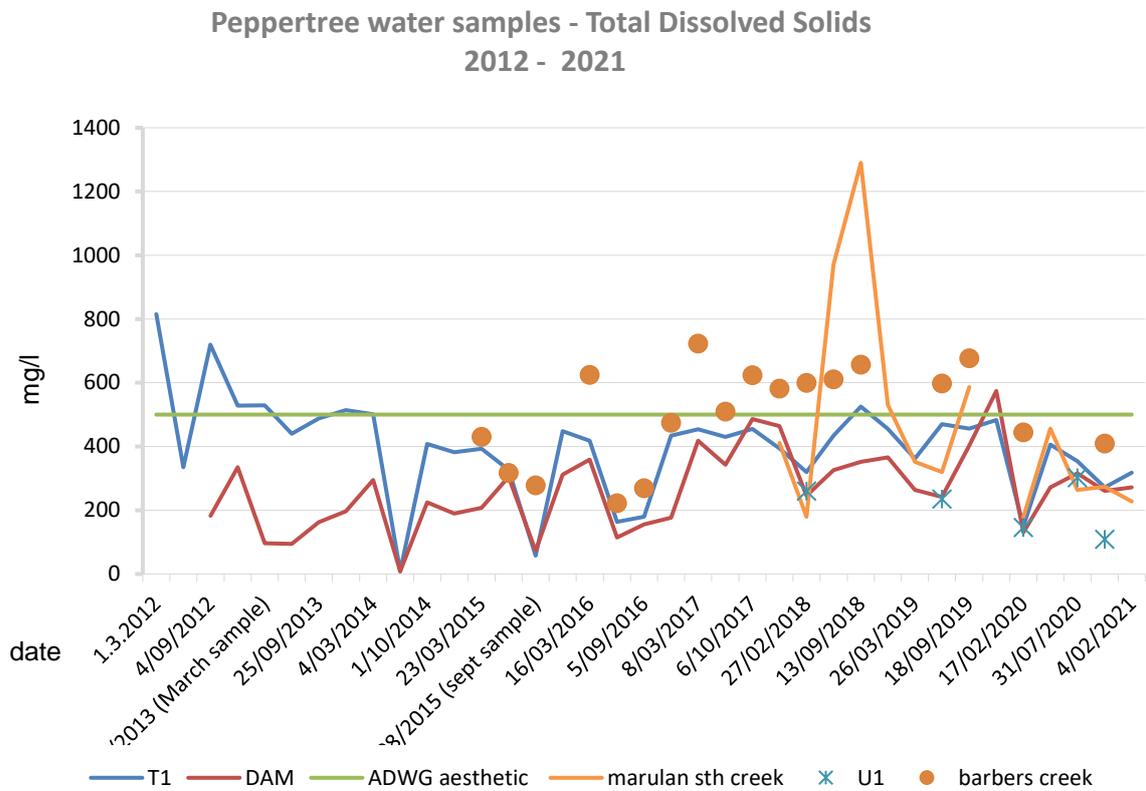
Total phosphorus surface water trends 2020



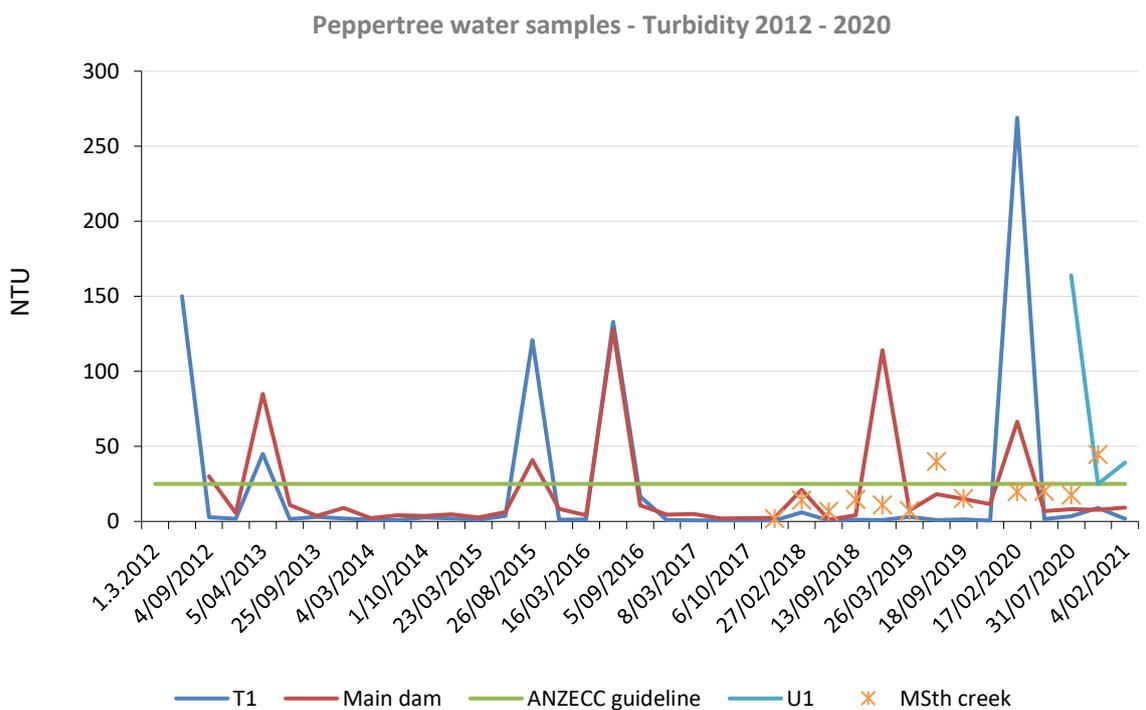
Long Term Water Quality - pH



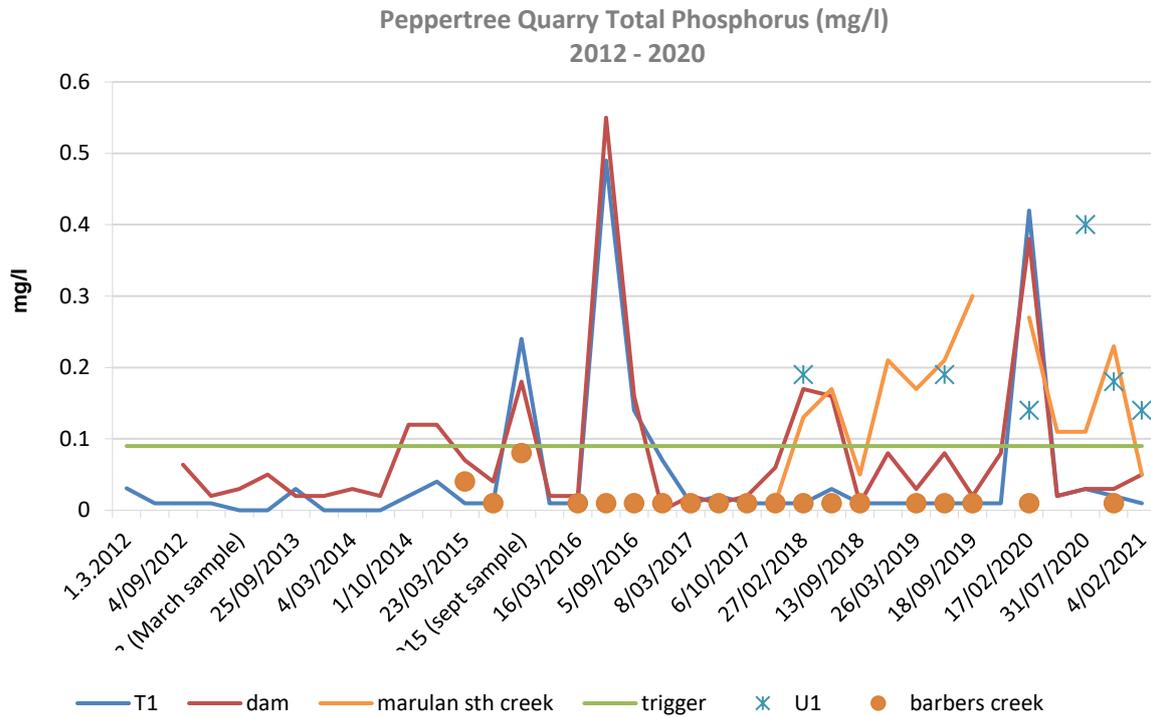
Long Term Water Quality – TDS



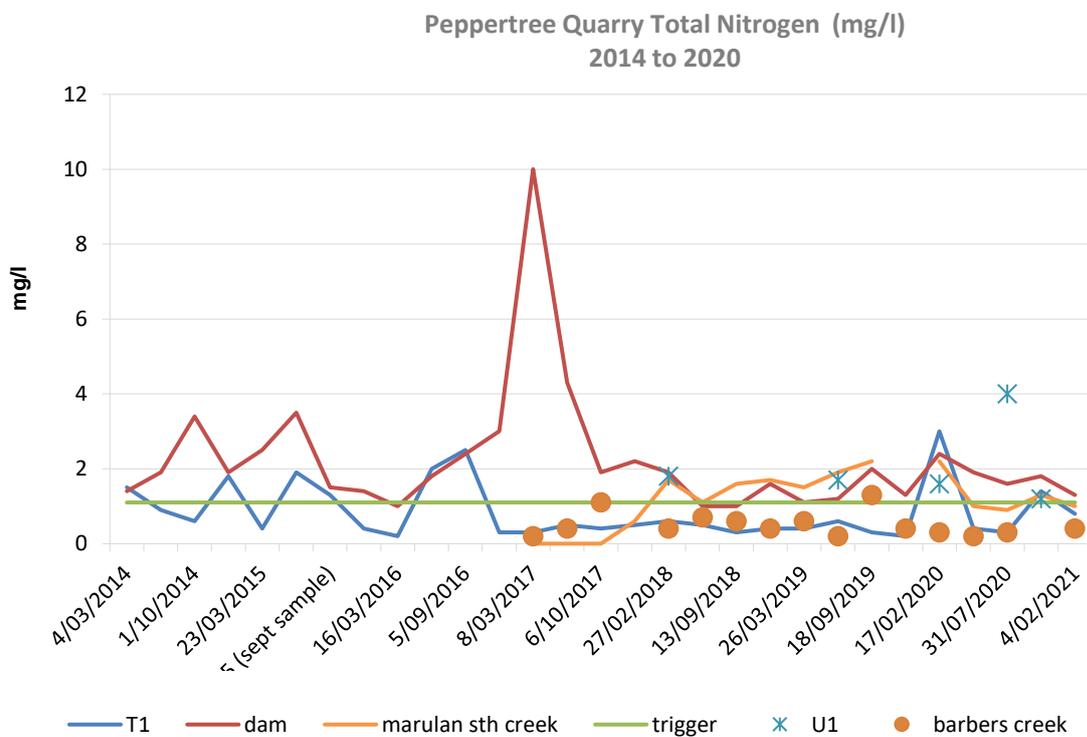
Long Term Water Quality – Turbidity



Long Term Water Quality – Total Phosphorus



Long Term Water Quality – total Nitrogen



Groundwater Field Parameters

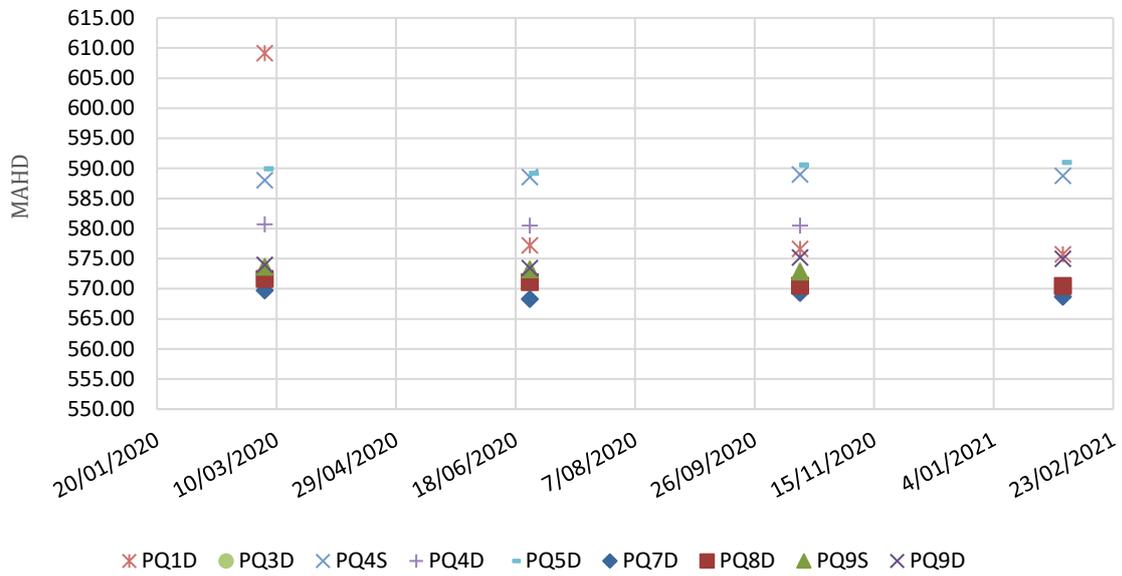
Bore ID	Field Parameters											
	pH				EC (µs/cm)				DO (%)			
	March	June	October	#	March	June	October	#	March	June	October	#
PQ01S	dry	dry	dry		dry	dry	dry		dry	dry	dry	
PQ01D	dry	dry	10.3		dry	dry	2935		dry	dry	36.6	
PQ03D	BLOCKAGE AT 30M NO SAMPLING POSSIBLE											
PQ04D	INTERIOR OF WELL CASING DAMAGED. NO SAMPLING POSSIBLE											
PQ04S	7.3	7.41	8.35		2522	2342	2687		9.3	25.2	25.9	
PQ5D	7.07	8.7	10.12		1569	1333	1613		17.7	27.6	42.5	
PQ6D	WELL CASING CRACKED											
PQ7D	8.11	8.2	8.97		570	445.7	354.3		18.3	52	39.6	
PQ8D	7.12	7.55	8.24		2335	2241	2762		18.1	39.1	28.2	
PQ8S	dry	dry	dry		dry	dry	dry		dry	dry	dry	
PQ9D	7.31	8.19	8.97		1442	1378	1660		27.2	27.3	25.1	
PQ9s	6.89	7.54	NS - BLOCKAGE		2007	1946	NS - BLOCKAGE		13.5	27.6	NS - BLOCKAGE	

NS: Not Sampled
 # 4th quarter sampled in 2021

Groundwater Standing Water Levels

Bore ID	Standing Water Levels (mAHD)			
	March 2020	June 2020	October 2020	#
PQ01D	dry	dry	576.57	
PQ01S	DRY	DRY	DRY	
PQ03D	DAMAGED			
PQ04D	580.66	580.46	580.46	
PQ04S	588	588.55	588.96	
PQ5D	589.9	589.17	590.53	
PQ6D	NS	576.44	NS	
PQ7D	569.72	568.24	569.27	
PQ8D	571.6	571.09	570.49	
PQ8S	DRY	DRY	DRY	
PQ9D	573.96	573.41	575.19	
PQ9s	573.6	573.2	572.84	

STANDING WATER LEVELS GROUNDWATER 2020



STANDING WATER LEVELS GROUNDWATER 2016 - 2020



Groundwater - Laboratory Analysis Results (2015 - 2020)

NOTES:

1. Shaded Cells: Exceedances of ANZECC (2000) threshold values
2. NA: Not Analysed
3. ND: Non-Detect

Boral Peppertree Quarry
Annual Review
1st January 2020 to 31st December 2020

Sample ID	Date	Inorganics																	
		Total Dissolved Solids	Suspended Solids	Turbidity	Total Alkalinity as CaCO ₃	Bicarbonate Alkalinity as CaCO ₃	Carbonate Alkalinity as CaCO ₃	Sulfate	Chloride	Calcium	Magnesium	Potassium	Sodium	Fluoride	Nitrate + Nitrite as N	Total Kjeldahl Nitrogen as N	Total Nitrogen as N	Reactive Phosphorous as P	Oil & Grease
		mg/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L N	mg/L N	mg/L N	mg/L P	mg/L
		<10	<1	<1	<20	<20	<10	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.2	<0.2	<0.01	<10
ANZG 2018 (95% Protection Values)			25												0.015	0.25	0.02		
PQ01D	19/01/2017	2570	294	52.7	156	-	-	70	1180	197	144	28	335	0.1	0.07	1.1	1.2	1.33	<5
PQ01D	27/04/2017	2230	10	5.3	36	-	-	92	972	210	6	30	313	<0.1	1.68	0.4	2.1	<0.01	<5
PQ01D	27/07/2017	2130	9	0.6	27	-	-	93	830	249	7	32	374	0.1	3.03	0.3	3.3	<0.01	<5
PQ01D	26/10/2017	2190	124	27.2	18	-	-	123	948	190	47	41	370	<0.1	3.64	0.4	4	0.01	<5
PQ01D	23/01/2018	2100	117	85.5	28	-	-	108	1060	228	44	38	370	<0.1	3.51	1.2	4.7	0.1	74
PQ01D	11/05/2018	1840	103	44.6	25	-	-	125	1070	216	32	22	330	<0.1	3.59	3.1	6.7	0.06	8
PQ01D	8/08/2018	1970	48	42.4	10	-	-	104	854	214	52	27	334	<0.1	3.45	0.8	4.2	0.01	<5
PQ01D	8/11/2018	2690	53	46.1	16	-	-	90	1010	236	45	52	344	<0.1	2.94	0.5	3.4	0.03	<5
PQ01D	26/02/2019	2130	-	-	10	-	-	104	1080	235	49	36	384	-	2.81	0.3	3.1	<0.01	<5
PQ01D	12/06/2019	2030	-	-	10	-	-	104	1000	262	42	26	341	-	3.06	0.5	3.6	<0.01	<5
PQ01D	23/07/2019	2080	-	-	<1	-	-	139	976	237	52	34	380	-	2.75	1.3	4	0.1	<5
PQ01D	16/10/2020	2200	1.6	<1	<20	<20	<10	76	910	180	77	32	300	<0.5	3.1	<0.2	3.1	<0.01	<10
PQ01D	2/02/2021	3200	3.2	<1	<20	<20	<10	80	1000	190	77	17	330	<0.5	2.6	1.6	4.2	<0.01	<10
PQ03D	19/01/2017	1110	123	91.3	556	-	-	13	224	64	<1	222	196	0.4	<0.01	1.2	1.2	0.01	<5
PQ03D	27/04/2017	1100	88	53.3	518	-	-	14	212	76	<1	160	159	0.3	<0.01	1.5	1.5	0.05	<5
PQ03D	27/07/2017	977	118	49.3	503	-	-	12	174	78	<1	171	176	0.5	0.02	1.1	1.1	<0.01	<5
PQ03D	26/10/2017	923	111	55.5	457	-	-	12	198	37	<1	148	175	0.4	<0.01	1.3	1.3	0.06	<5
PQ03D	23/01/2018	975	81	49	303	-	-	12	215	76	<1	141	178	0.4	<0.01	1.3	1.3	0.03	<5
PQ03D	11/05/2018	910	26	9.2	400	-	-	18	226	80	<1	111	162	0.4	<0.01	1.5	1.5	0.06	<5

Boral Peppertree Quarry
Annual Review
1st January 2020 to 31st December 2020

Sample ID	Date	Inorganics																	
		Total Dissolved Solids	Suspended Solids	Turbidity	Total Alkalinity as CaCO ₃	Bicarbonate Alkalinity as CaCO ₃	Carbonate Alkalinity as CaCO ₃	Sulfate	Chloride	Calcium	Magnesium	Potassium	Sodium	Fluoride	Nitrate + Nitrite as N	Total Kjeldahl Nitrogen as N	Total Nitrogen as N	Reactive Phosphorous as P	Oil & Grease
		mg/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L N	mg/L N	mg/L N	mg/L P	mg/L
		<10	<1	<1	<20	<20	<10	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.2	<0.2	<0.01	<10
ANZG 2018 (95% Protection Values)			25												0.015	0.25	0.02		
PQ03D	8/08/2018	956	32	32.7	482	-	-	18	197	87	<1	110	168	0.4	0.03	1.2	1.2	0.03	<5
PQ03D	8/11/2018	785	443	536	401	-	-	20	216	88	<1	106	172	0.4	0.02	1.9	1.9	0.19	<5
PQ03D	26/02/2019	886	-	-	377	-	-	24	201	90	<1	117	194	-	0.02	1.3	1.3	<0.01	<5
PQ03D	12/06/2019	1000	-	-	423	-	-	28	214	99	<1	122	179	-	0.26	2	2.3	0.01	<5
PQ04S	19/01/2017	1930	136	36.7	410	-	-	86	881	65	72	4	602	1.3	0.45	0.7	0.9	0.07	<5
PQ04S	27/04/2017	1950	61	21.5	368	-	-	89	865	58	63	3	444	0.9	0.21	1	1.2	0.07	<5
PQ04S	27/07/2017	1940	48	35.6	474	-	-	43	698	62	64	5	534	1	0.03	0.4	0.4	<0.01	<5
PQ04S	26/10/2017	1650	234	48	565	-	-	23	649	55	56	5	464	1	<0.01	0.5	0.5	0.13	6
PQ04S	24/01/2018	1400	110	28.6	504	-	-	50	654	69	62	4	437	0.9	0.08	0.5	0.6	0.1	11
PQ04S	11/05/2018	1390	78	5.2	580	-	-	39	641	71	57	4	417	0.9	0.11	1.2	1.3	0.1	<5
PQ04S	8/08/2018	1550	10	3	590	-	-	29	501	70	55	3	405	0.9	0.02	0.2	0.2	0.02	<5
PQ04S	8/11/2018	1650	48	13.7	486	-	-	44	570	74	59	3	409	0.9	0.02	0.3	0.3	0.03	<5
PQ04S	26/02/2019	1560	-	-	484	-	-	90	598	83	62	4	464	-	0.03	0.2	0.2	0.02	<5
PQ04S	26/06/2019	1160	-	-	406	-	-	195	206	23	<1	166	253	-	<0.01	2	2	<0.01	<5
PQ04S	23/07/2019	1690	-	-	450	-	-	106	756	110	76	4	536	-	0.44	0.6	1	0.33	<5
PQ04S	22/11/2019	1800	81	41	570	570	<10	110	620	90	66	4.5	450	-	<0.05	0.6	0.6		<10
PQ04S	5/03/2020	1820	39	14	485	485	<0.1	705	100	102	72	4.8	445	1	0.36	0.2	0.56	0.02	<1
PQ04S	24/06/2020	1600	600	370	700	700	<10	130	650	110	76	4.9	470	1.2	<0.05	<0.2	<0.2	0.11	12

Boral Peppertree Quarry
Annual Review
1st January 2020 to 31st December 2020

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		mg/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L N	mg/L N	mg/L N	mg/L P	mg/L
		<10	<1	<1	<20	<20	<10	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.2	<0.2	<0.01	<10
ANZG 2018 (95% Protection Values)			25											0.015	0.25	0.02			
PQ04S	16/10/2020	1200	2	1.4	680	650	26	100	510	69	59	5	430	0.9	0.09	0.2	0.29	< 0.01	< 10
PQ04S	2/02/2021	1600	9.8	1.8	990	960	32	74	460	86	61	5.5	450	1	0.07	0.5	0.57	< 0.01	< 10
PQ04D	19/01/2017	736	18	7.4	102	-	-	31	355	38	19	10	184	1.6	0.25	0.2	0.4	0.02	<5
PQ04D	27/04/2017	760	<5	2	93	-	-	33	365	33	18	10	148	1.3	0.27	0.1	0.4	0.16	<5
PQ04D	not sampled 2020	770	28	17.5	110	-	-	31	310	40	22	15	187	1.7	0.29	<0.1	0.3	0.08	<5
PQ05D	19/01/2017	1190	521	420	618	-	-	1	391	140	40	24	262	0.3	<0.01	0.6	0.6	0.19	<5
PQ05D	27/04/2017	1110	1490	622	504	-	-	4	390	110	32	7	218	0.2	<0.01	0.4	0.4	0.12	<5
PQ05D	27/07/2017	1120	48	98.9	460	-	-	7	320	125	35	8	232	0.3	0.02	0.6	0.6	0.08	<5
PQ05D	26/10/2017	984	78	154	529	-	-	<1	360	108	33	6	210	0.4	<0.01	<0.1	<0.1	0.02	<5
PQ05D	24/01/2018	992	1310	640	381	-	-	35	398	134	51	30	149	0.2	0.03	0.4	0.4	0.04	<5
PQ05D	11/05/2018	1150	3640	1780	478	-	-	6	410	137	36	5	184	0.3	0.01	0.6	0.6	0.16	22
PQ05D	8/08/2018	1080	42	148	490	-	-	16	334	140	43	15	172	0.2	<0.01	<0.1	<0.1	0.02	<5
PQ05D	8/11/2018	1200	183	138	383	-	-	5	376	139	42	13	174	0.3	0.04	0.5	0.5	0.18	<5
PQ05D	26/02/2019	1070	-	-	356	-	-	26	368	122	47	38	162	-	0.03	<0.1	<0.1	<0.01	<5
PQ05D	12/06/2019	981	-	-	332	-	-	42	367	133	52	49	132	-	<0.01	0.4	0.4	<0.01	<5
PQ05D	23/07/2019	1060	-	-	282	-	-	58	371	122	52	49	138	-	<0.01	0.6	0.6	0.01	<5
PQ05D	21/11/2019	110	38	31	410	410	<10	41	320	130	49	33	140	-	<0.05	0.3	0.3	-	-
PQ05D	5/03/2020	1150	43	101	406	406	<0.1	11.6	339	150	46.2	25.1	134	0.22	<0.01	0.15	0.24	<0.02	<1

Boral Peppertree Quarry
Annual Review
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		Total Dissolved Solids	Suspended Solids	Turbidity	Total Alkalinity as CaCO ₃	Bicarbonate Alkalinity as CaCO ₃	Carbonate Alkalinity as CaCO ₃	Sulfate	Chloride	Calcium	Magnesium	Potassium	Sodium	Fluoride	Nitrate + Nitrite as N	Total Kjeldahl Nitrogen as N	Total Nitrogen as N	Reactive Phosphorous as P	Oil & Grease	
		mg/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L N	mg/L N	mg/L N	mg/L P	mg/L	
		<10	<1	<1	<20	<20	<10	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.2	<0.2	<0.01	<10	
ANZG 2018 (95% Protection Values)			25												0.015	0.25	0.02			
PQ05D	24/06/2020	1200	50	100	540	540	< 10	10	370	160	55	27	150	< 0.5	< 0.05	0.4	0.4	0.01	< 10	
PQ05D	16/10/2020	990	< 1	< 1	250	190	63	55	320	25	40	200	150	< 0.5	0.3	0.8	1.1	< 0.01	46	
PQ05D	2/02/2021	770	5.9	< 1	380	300	76	62	340	10	38	210	160	0.6	< 0.05	2.1	2.1	< 0.01	< 10	
PQ06D	19/01/2017	1240	26	11.4	406	-	-	168	213	27	<1	204	252	0.6	<0.01	1.5	1.5	0.01	<5	
PQ06D	27/04/2017	1260	46	24.2	467	-	-	178	210	50	<1	166	208	0.5	<0.01	1.9	1.9	0.04	<5	
PQ06D	27/07/2017	1130	34	13.4	463	-	-	169	172	48	<1	189	253	0.6	<0.01	1.5	1.5	<0.01	<5	
PQ06D	26/10/2017	1120	57	22	421	-	-	198	190	17	<1	153	238	0.6	<0.01	2	2	0.02	<5	
PQ06D	24/01/2018	1110	64	33.4	351	-	-	174	211	23	<1	169	261	0.5	0.03	1.7	1.7	0.03	<5	
PQ06D	11/05/2018	1040	28	4.2	422	-	-	181	218	49	<1	147	235	0.5	<0.01	1.9	1.9	0.02	<5	
PQ06D	8/08/2018	1190	157	90.6	469	-	-	163	185	23	<1	162	244	0.5	0.03	1.7	1.7	0.02	<5	
PQ06D	8/11/2018	1420	112	42.4	366	-	-	176	194	4	<1	164	256	0.5	<0.01	2.1	2.1	0.06	<5	
PQ06D	26/02/2019	1220	-	-	375	-	-	189	211	52	<1	158	283	-	0.05	1.3	1.4	<0.01	<5	
PQ06D	12/06/2019	1730	-	-	506	-	-	64	731	105	76	4	480	-	0.05	0.5	0.6	0.02	<5	
PQ07D	19/01/2017	937	33	13.7	86	-	-	124	331	106	<1	88	166	0.2	<0.01	0.4	0.4	<0.01	<5	
PQ07D	27/04/2017	892	24	22.8	150	-	-	123	333	79	<1	76	138	0.1	<0.01	0.6	0.6	0.02	<5	
PQ07D	27/07/2017	898	54	24.4	124	-	-	121	274	93	<1	86	164	0.2	0.02	1.6	1.6	2.1	<5	
PQ07D	26/10/2017	994	1210	540	99	-	-	140	302	66	<1	81	159	0.2	<0.01	0.6	0.6	0.02	<5	
PQ07D	24/01/2018	916	2720	1670	86	-	-	116	326	85	<1	81	164	0.2	0.02	0.5	0.5	0.04	<5	
PQ07D	11/05/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Boral Peppertree Quarry
Annual Review
1st January 2020 to 31st December 2020

Sample ID	Date	Inorganics																	
		Total Dissolved Solids	Suspended Solids	Turbidity	Total Alkalinity as CaCO ₃	Bicarbonate Alkalinity as CaCO ₃	Carbonate Alkalinity as CaCO ₃	Sulfate	Chloride	Calcium	Magnesium	Potassium	Sodium	Fluoride	Nitrate + Nitrite as N	Total Kjeldahl Nitrogen as N	Total Nitrogen as N	Reactive Phosphorous as P	Oil & Grease
		mg/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L N	mg/L N	mg/L N	mg/L P	mg/L
		<10	<1	<1	<20	<20	<10	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.2	<0.2	<0.01	<10
ANZG 2018 (95% Protection Values)			25											0.015	0.25	0.02			
PQ07D	8/08/2018	824	52	21.8	119	-	-	111	288	77	<1	72	157	0.2	0.02	0.5	0.5	0.06	<5
PQ07D	8/11/2018	652	58	12.6	66	-	-	77	319	36	27	55	135	0.1	<0.01	0.4	0.4	<0.01	<5
PQ07D	26/02/2019	482	-	-	80	-	-	80	220	23	15	65	114	-	0.07	1.3	1.4	0.09	<5
PQ07D	12/06/2019	472	-	-	137	-	-	43	115	18	9	76	82	-	0.67	1.1	1.8	0.02	<5
PQ07D	23/07/2019	625	-	-	52	-	-	83	284	24	15	74	145	-	0.04	0.8	0.8	0.02	<5
PQ07D	21/11/2019	760	120	75	85	77	<10	71	270	26	20	62	140	-	<0.05	0.9	0.9	-	-
PQ07D	5/03/2020	366	89	43.5	142	142	<0.1	37.1	37.6	24.6	10.7	46.9	56.1	0.16	18.5	0.2	18.7	0.04	<1
PQ07D	24/06/2020	440	120	67	180	180	<10	45	88	38	14	40	51	<0.5	11	1.6	12.6	0.02	<10
PQ07D	16/10/2020	250	1.2	1.2	160	150	<10	26	16	19	12	32	31	<0.5	1.8	<0.2	1.8	0.01	<10
PQ07D	2/02/2021	300	4.6	1.9	220	220	<10	33	16	24	17	22	26	<0.5	0.57	1.3	1.87	<0.01	<10
PQ08D	19/01/2017	2110	37	68.5	402	-	-	54	822	240	162	3	143	0.2	<0.01	<0.1	<0.1	<0.01	<5
PQ08D	27/04/2017	2260	23	52.4	371	-	-	55	823	217	141	2	113	0.2	<0.01	<0.1	<0.1	<0.01	<5
PQ08D	27/07/2017	2250	35	25	391	-	-	38	664	235	145	7	134	0.2	0.03	0.1	0.1	<0.01	<5
PQ08D	26/10/2017	2230	52	58	442	-	-	66	745	211	146	3	130	0.3	<0.01	<0.1	<0.1	0.02	<5
PQ08D	24/01/2018	2070	39	60.4	389	-	-	61	828	239	147	3	133	0.2	0.05	<0.1	<0.1	<0.01	<5
PQ08D	11/05/2018	1600	20	38.4	405	-	-	61	835	242	137	3	124	0.2	<0.01	<0.1	<0.1	0.01	<5
PQ08D	8/08/2018	1890	17	46.7	427	-	-	48	673	226	140	4	128	0.2	0.02	<0.1	<0.1	<0.1	<5
PQ08D	8/11/2018	2550	35	61.1	318	-	-	43	754	238	139	3	125	0.3	<0.01	<0.1	<0.1	0.02	<5
PQ08D	26/02/2019	2000	-	-	364	-	-	70	809	239	150	4	137		0.1	<0.1	0.1	0.02	<5

Boral Peppertree Quarry
Annual Review
1st January 2020 to 31st December 2020

Sample ID	Date	Inorganics																	
		Total Dissolved Solids	Suspended Solids	Turbidity	Total Alkalinity as CaCO ₃	Bicarbonate Alkalinity as CaCO ₃	Carbonate Alkalinity as CaCO ₃	Sulfate	Chloride	Calcium	Magnesium	Potassium	Sodium	Fluoride	Nitrate + Nitrite as N	Total Kjeldahl Nitrogen as N	Total Nitrogen as N	Reactive Phosphorous as P	Oil & Grease
		mg/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L N	mg/L N	mg/L N	mg/L P	mg/L
		<10	<1	<1	<20	<20	<10	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.2	<0.2	<0.01	<10
ANZG 2018 (95% Protection Values)			25											0.015	0.25	0.02			
PQ08D	12/06/2019	1860	-	-	371	-	-	46	767	247	150	5	132		<0.01	0.2	0.2	<0.01	
PQ08D	23/07/2019	1900	-	-	333	-	-	57	746	234	148	4	135		<0.01	0.3	0.3	0.03	<1
PQ08D	21/11/2019	2800	39	78	430	430	<10	60	1100	230	140	3.4	130		<0.05	2.2	2.2		<1
PQ08D	5/03/2020	1790	45	55.9	326	326	<0.1	46.2	747	224	139	4	124	0.2	<0.05	0.16	0.16	<0.02	<1
PQ08D	24/06/2020	2100	47	92	400	400	<10	55	770	240	150	5.2	140	<0.5	0.26	0.6	0.86	0.03	<1
PQ08D	16/10/2020	1600	7.3	35	370	370	<10	56	680	190	120	21	120	<0.5	0.21	0.4	0.61	<0.01	<1
PQ08D	2/02/2021	2700	10	2.3	500	500	<10	59	790	230	140	12	130	<0.5	0.08	0.6	0.68	0.01	<10
PQ09S	19/01/2017	1830	803	426	472	-	-	23	712	180	172	8	153	0.3	4.95	0.9	5.8	0.51	<5
PQ09S	27/04/2017	1870	601	253	443	-	-	23	685	160	144	6	122	0.2	3.58	1	4.6	1.14	<5
PQ09S	27/07/2017	1860	150	54.8	476	-	-	23	560	166	148	7	139	0.3	7.37	0.3	7.7	<0.01	<5
PQ09S	26/10/2017	1730	76	14.6	456	-	-	24	595	146	144	7	131	0.3	6.47	1	7.5	<0.01	<5
PQ09S	24/01/2018	1780	480	297	477	-	-	22	650	168	149	7	140	0.3	5.23	0.8	6	2.23	<5
PQ09S	11/05/2018	1280	200	88.4	490	-	-	26	653	154	134	5	125	0.3	6.4	0.5	6.9	0.08	<5
PQ09S	8/08/2018	1550	1047	61.4	515	-	-	24	531	154	138	6	130	0.3	6.82	0.4	7.2	0.04	<5
PQ09S	8/11/2018	2040	121	68.1	422	-	-	23	597	149	145	6	136	0.3	6.57	1.9	8.5	0.09	5
PQ09S	26/02/2019	1660	-	-	436	-	-	29	632	163	152	8	140		6.67	0.3	7	0.01	<5
PQ09S	12/06/2019	1420	-	-	470	-	-	18	590	170	151	7	136		6.76	1.2	8	0.21	<5
PQ09S	23/07/2019	1500	-	-	412	-	-	21	585	162	150	7	141		6.3	1.7	8	0.12	<5
PQ09S	21/11/2019	1700	690	430	520	520	<10	37	580	150	140	6.1	130		5.1	<0.2	5.1		<10

Boral Peppertree Quarry
Annual Review
1st January 2020 to 31st December 2020

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		mg/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L N	mg/L N	mg/L N	mg/L P	mg/L
		<10	<1	<1	<20	<20	<10	<5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.2	<0.2	<0.01	<10
ANZG 2018 (95% Protection Values)			25												0.015	0.25	0.02		
PQ09S	5/03/2020	1670	324	140	483	483	<0.1	19.8	538	149	137	6.5	122	0.27	3.67	<0.05	3.48	<0.02	<1
PQ09S	24/06/2020	1500	940	430	600	600	<10	29	570	170	150	7.1	140	<0.5	2.5	<0.2	2.5	0.29	<10
PQ09D	19/01/2017	1010	382	201	360	-	-	25	352	120	95	4	101	0.3	<0.01	<0.1	<0.1	0.07	<5
PQ09D	27/04/2017	868	686	285	425	-	-	21	354	118	86	3	82	0.2	<0.01	0.1	0.1	0.37	<5
PQ09D	27/07/2017	1070	117	52.2	432	-	-	24	294	118	98	4	105	0.3	0.02	<0.1	<0.1	0.01	<5
PQ09D	26/10/2017	1020	49	29.9	513	-	-	20	320	106	89	4	94	0.4	<0.01	0.1	0.1	0.03	<5
PQ09D	24/01/2018	1060	66	42.6	496	-	-	9	349	122	93	5	100	0.2	0.03	0.1	0.1	<0.01	<5
PQ09D	11/05/2018	906	59	11	482	-	-	30	367	113	91	3	93	0.2	<0.01	<0.1	<0.1	0.06	<5
PQ09D	8/08/2018	970	23	18.3	535	-	-	12	301	117	92	7	97	0.2	0.1	0.2	0.3	0.01	<5
PQ09D	8/11/2018	1180	28	18	425	-	-	10	326	108	94	6	98	0.3	<0.01	0.3	0.3	0.04	<5
PQ09D	26/02/2019	1110	-	-	445	-	-	12	337	122	97	10	98	-	<0.01	<0.1	<0.1	<0.01	<5
PQ09D	12/06/2019	1050	-	-	467	-	-	10	336	131	101	8	103	-	<0.01	0.2	0.2	<0.01	<5
PQ09D	23/07/2019	988	-	-	397	-	-	11	342	123	99	9	101	-	0.01	0.4	0.4	0.02	<5
PQ09D	21/11/2019	1200	24	14	540	540	<10	19	300	120	94	8.2	99	-	<0.05	0.3	0.3		<10
PQ09D	5/03/2020	1050	30	6.9	465	465	<0.1	13.1	284	115	87.6	20.5	90.8	0.24	<0.05	0.37	0.37	<0.02	<5
PQ09D	24/06/2020	1100	47	32	490	490	<10	15	310	120	100	22	110	<0.5	<0.05	0.3	0.3	<0.01	<10
PQ09D	16/10/2020	920	13	<1	470	450	13	15	310	110	95	32	94	<0.5	<0.05	<0.2	<0.2	<0.01	<10
PQ09D	2/02/2021	1200	6.6	3.7	620	620	<10	30	550	100	89	24	100	<0.5	<0.05	0.7	0.7	<0.01	<10