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Dunmore Hard Rock Quarry Annual Review

1 July 2019 – 30 June 2020

Document Control Sheet

Document Control				
Ref	Prepared by	Approved by	Date	Distribution
v1.0	Ben Williams Environmental Coordinator Dunmore Operations			Initial draft for internal distribution for review
v1.1	Ben Williams Environmental Coordinator Dunmore Operations			• Department of Planning, Industry and Environment • Environmental Protection Agency • Shellharbour City Council • Dunmore Quarry CCC • Online at https://www.boral.com.au/locations/boral-dunmore-operations

Dunmore Hard Rock Quarry Annual Review Title Block

Name of operation	Boral Dunmore Hard Rock Quarry
Name of operator	Boral Resources (NSW) Pty Ltd
Development consent	DA-470-11-2003
Name of holder of development consent	Boral Resources (NSW) Pty Ltd
Water licence number	WAL#25152 Ref# 10AL103610
Name of holder of water licence	Boral Resource (NSW) Pty Ltd
Annual Review start date	1 July 2019
Annual Review end date	30 June 2020

I, James Collings, certify that this audit is a true and accurate record of the compliance statues of the Dunmore Hard Rock Quarry for the period of the 2020 Financial Year and that I am authorised to make this statement on behalf of Boral Resources (NSW) Pty Ltd.

Note

The annual review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provdes 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.

Name of authorised reporting officer	James Collings
Title of authorised reporting officer	Metropolitan Operations Manager - Quarries NSW/ACT
Signature	James Collings
Date	07/10/2020

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Tables and Figures

List of Abbreviations

ACHMP	Aboriginal and Cultural Heritage Management Plan
ANZECC	Australian and New Zealand Environment Conservation Council
AQMP	Air Quality Management Plan
AR	Annual review
AS	Australian Standard
BFMP	Bushfire Management Plan
BMP	Blast Management Plan
BOS	Biodiversity Offset Strategy
CCC	Community Consultative Committee
DA 470-11-2003	The development application for the Dunmore Hard Rock Quarry operated by Boral Resources (NSW) Pty Ltd
DO	Dissolved Oxygen
DPIE	Department of Planning, Industry and Environment
DRG	Department of Resources and Geoscience
Dunmore Hard Rock Quarry	DQ
EPA	Environmental Protection Authority
EPA&A Act	Environmental Planning and Assessment Act 1979
EPL 77	Environmental Protection Licence for the Dunmore Hard Rock Quarry operated by Boral Resource (NSW) Pty Ltd
FFMP	Flora and Fauna Management Plan
current reporting period	Financial Year 2020 (1 July 2019 – 30 June 2020)
HVAS	High Volume Air Sampler
IEA	Independent Environmental Audit
LOR	Limit of Reporting
ML	Megalitres
NATA	National Association of Testing Authorities
NMP	Noise Management Plan
NRAR	Natural Resource Access Regulator
NTU	Nephelometric Turbidity Units

PIRMP	Pollution Incident Response Management Plan
PM_{10}	Particulate Matter (10 microns in diameter)
$PM_{2.5}$	Particulate Matter (2.5 microns in diameter)
POEO Act	Protection of the Environment Operations Act 1997
S5.C9	Used to refer to a particular condition in DA-470-11-2003 (in this case Schedule 5, Condition 9).
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
WMP	Water Management Plan
WQO	Water Quality Objectives
$\mu g/m^3$	Micrograms per cubic metre

1. Purpose and Scope

In addition to determining compliance of the Dunmore Hard Rock Quarry (DQ) operation with the conditions of relevant licenses and approvals, DA 470-11-2003, namely Schedule 5 Condition 9 (S5.C9) requires that the Annual Review (AR) reports on specific components of the operation.

Condition S5.C9 of the consent, and all other relevant conditions required to be addressed as part of the AR, are outlined in Table 1 below with reference to the section of this report where each has been addressed. The timeframe for the annual review reporting period is the 2020 Financial Year (current reporting period), which includes the dates 1 July 2019 – 30 June 2020.

Table 1 Annual Review Consent Requirements

Condition	Condition Requirements	Location within this report
S4.C29	In each Annual Review, the Applicant must:	
	(a) recalculate the site water balance for the development; and	Section 6.5.4
	(b) provide information on evaporative losses, dust suppression, dam storage levels and implications of obtaining any water supplies from off-site; and	Section 6.5.4
	(c) evaluate water take against licensing requirements	Section 6.5.4
S4.C50	The Applicant must include a progress report on the implementation of the Flora and Fauna Management Plan in the Annual Review.	Section 6.7, Appendix F
S4.C57	The Applicant must include a progress report on the implementation of the Flora and Fauna Management Plan in the Annual Review.	Section 6.7, Appendix F
S4.C71	The Applicant must describe what measures have been implemented to minimise the amount of waste generated by the development in the Annual Review	Section 6.9
S4.C77	The Applicant must:	
	a. provide annual production data to the DRG using the standard form for that purpose; and	Section 3
	b. include a copy of this data in the Annual Review.	Section 3

S5.C9	By the end of September each year, or other timing as may be agreed by the Secretary, the Applicant must submit a report to the Department reviewing the environmental performance of the development to the satisfaction of the Secretary. The review must: a) Describe the development (including rehabilitation) that was carried out in the previous financial year, and the development that is proposed to be carried out over the current financial year; b) Include a comprehensive review of the monitoring results and complaints records of the development over the previous financial year, which includes a comparison of these results against the: • Relevant statutory requirements, limits or performance measures/criteria; • Requirements of any plan or program required under this consent; • Monitor results of previous years; and • Relevant predictions in the document listed in condition 2 of schedule 3; c) Identify any non-compliance over the last financial year, and describe what actions were (or are being) taken to ensure compliance; d) Identify any trends in the monitoring data over the life of the development; e) Identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and f) Describe what measures will be implemented over the current financial year to improve the environmental performance of the development. The Applicant must ensure that copies of the Annual Review are submitted to Council and are available to the Community Consultative Committee (see condition 6 of Schedule 5) and any interested person upon request.	Section 6.7, Appendix F Section 6, Section 7.1 Section 1.1 Section 6 Section 6 Section 6

1.1. Statement of Compliance

The statement of compliance for the current reporting period (1 July 2019 – 30 June 2020) is detailed in Table 2 below

Table 2 Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	
DA-470-11-2003	No

The non-compliances identified in the reporting period are detailed in Table 3 below. Each non-compliance has been risk assessed as per the DPIE Annual Review Guidelines Compliance Status key outlined in Table 3.

Table 3 Non- Compliances Risk Assessment

Condition #	Condition Description	Compliance Status	Comments	Section addressed
DA 470-11-2003 S3.C7A	The Applicant must not dispatch more than: a) 33 laden trucks from the site in any hour between 6 am and 9 am; b) 40 laden trucks from the site in any hour between 9 am and 3 pm; c) 23 laden trucks from the site in any hour between 3 pm and 6 am; and d) a total of 400 laden trucks from the site per day.	Non-compliant Low Risk	No exceedances with respect to the limit of 400 laden trucks from the site per day. Note that the highest number of trucks leaving site on any given day was 298. 11 exceedances in hourly limits (totalling 27 additional truck movements) recorded as follows: During the 7am to 8am window: 39 trucks on 20/04/2020 35 trucks on 30/04/2020 During the 3pm to 4pm windows: 27 trucks on 05/12/2019 25 trucks on 12/12/2019 25 trucks on 10/03/2020 25 trucks on 12/03/2020 25 trucks on 18/03/2020 25 trucks on 06/04/2020 26 trucks on 08/04/2020 24 trucks on 15/04/2020 24 trucks on 23/04/2020 Please refer to the show cause response letter sent by Boral to the DPIE on 29 September 2020 for further details.	Section 3.1

Condition #	Condition Description	Compliance Status	Comments	Section addressed
DA 470-11-2003 S4.C32	By 18 May 2008, or as otherwise agreed to by the Secretary, the Applicant must: (a) modify the existing dam at the site to create increased capacity offline from Rocklow Creek; (b) construct dams within the site of sufficient capacity to ensure that the water quality criteria in condition 29 can be met for all rainfall events up to and including the 5-day duration 95th percentile rainfall event; (c) ensure the discharge and overflow points of the dams do not cause erosion at the point of discharge/overflow; (d) rehabilitate and stabilise the banks of the dams; and (e) ensure the integrity of the dams would not be compromised by flooding; to the satisfaction of the EPA and the Secretary.	Non-compliant Low Risk	The updated Water Management Plan is currently under review by DPIE Water, who have previously advised that a backlog has caused a delay in the review of the plan. The WMP details the dam upgrade works designed to meet this condition. Section 5 details the proposed changes and Appendix G describes the preliminary engineering designs The Lower Dam upgrades cannot proceed without the approval of the WMP plan under condition S4.C35A, which is currently under assessment, hence the increased holding capacity cannot be achieved until approval of the WMP is received.	Section 6.5
DA 470-11-2003 S4.C72	The Applicant must ensure that the storage, handling, and transport of dangerous goods is done in accordance	Non-Compliant Low Risk	During the IEA, the storage and handling of dangerous goods appeared to be mostly	Section 6.11

Condition #	Condition Description	Compliance Status	Comments	Section addressed
	with the relevant Australian Standards, particularly AS1940 and AS1596, and the Dangerous Goods Code.		occurring appropriately on site. Oil drums were not being storage appropriately within the bounds of the bunded areas. Environmental Coordinator and Quarry Manager note this is a delivery issue they have raised with the relevant contractors	
DA 470-11-2003 S4A.C1	As soon as practicable and no longer than 7 days after obtaining monitoring results showing an exceedance of any criteria in Schedule 4 the Applicant must: (a) provide to any affected landowners and tenants; and, (b) publish on its website the full details of the exceedance. Any exceedance of any criteria in Schedule 4 is an incident that must be notified to the Department in accordance with condition 7 of Schedule 5 of this consent. For any exceedance of the air quality criteria or air quality measures in Schedule 4, the Applicant must also provide to any affected landowners and tenants a copy of	Non-compliant Administrative	A "Publication of Pollution Monitoring Data – Exceedance Notification Report" has been developed to trigger the review of this requirement internally, before formal notification is made to the Department in accordance with the consent. Note that the monitoring data is currently published on the Boral website https://www.boral.com.au/our-commitment/environmental-reporting where details of the monitoring data are presented, including any exceedances.	N/A addressed in Table 3

Condition #	Condition Description	Compliance Status	Comments	Section addressed
	the fact sheet entitled Mine Dust and You (NSW Minerals Council, 2011) fact sheet (as may be updated from time to time).			
DA 470-11-2003 S5.C7	The Applicant must immediately notify the Secretary and any other relevant agencies of any incident. Within 7 days of the date of the incident, the Applicant must provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.	Non-compliant Administrative	The internal "Immediate Notification Report" is to be completed by staff and reviewed by senior management when immediate notification to the Secretary is required. Details will be kept on file. A "Publication of Pollution Monitoring Data – Exceedance Notification Report" has been created to trigger the review of this requirement internally before formal notification is made to the Department in accordance with the consent.	N/A addressed in Table 3
DA 470-11-2003 S4.C22	The applicant must ensure that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 7 at any privately-owner land	Development was carried out in compliance with conditions of consent. Exceedances are attributed to external events not associated with the Development.	On 28 November 2019 the recorded PM_{10} at the DLSP HVAS (Monitoring Point 5) was 52.57 µg/m^3 On 10 December 2019 an elevated reading of 70.23 µg/m^3 was recorded DLSP HVAS (Monitoring Point 5). The elevated levels for both of these events has been attributed to the large Currowan bushfire which was burning in the region at the time and not caused by DQ operations. This fire caused the regional air quality to be	Section 6.2.4 and 6.2.6

Condition #	Condition Description	Compliance Status	Comments	Section addressed
			above the thresholds described in the DQ consent and the Environment Protection Licence EPL 77. Note (d) of condition S4.C22 states that Table 7 criteria excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity as agreed by the secretary.	

Risk Assessment of Non Compliances

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: • 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: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental

		consequences, but is likely to occur
Administrative	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)

Copies of the AR will be submitted to the DPIE and made available to the public at on the Dunmore Quarry website.

https://www.boral.com.au/locations/boral-dunmore-operations

1.2. Contacts Relevant to Dunmore Quarry Operations

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

Table 4 Contacts Relevant to Dunmore Quarry Operations

Contact	Position	Contact Details
Brodie Bolton	Dunmore Quarry Manager	Tel: (02) 4237 2000 Email: brodie.bolton@boral.com.au
James Collings	Metropolitan Operations Manager	Tel: (02) 9033 5155 Email: james.collings@boral.com.au
Ben Williams	Environmental Coordinator Dunmore	Tel: (02) 4237 8414 Email: ben.williams@boral.com.au
Paul Jackson	Stakeholder Relations Manager	Tel: (02) 9033 5215 Email: paul.jackson@boral.com.au

2. Dunmore Quarry Operations

The Dunmore Hard Rock Quarry (DQ), owned and operated by Boral Resources (NSW) Pty Ltd, is located at Tabbita Road Dunmore, approximately 12 kilometres north-west of Kiama in the Shellharbour Local Government Area. The Quarry produces hard rock from Bumbo Latite Member, a fine-grained intermediate volcanic rock similar to basalt, which is crushed to produce coarse aggregates, road construction materials and fines.

Development Consent (DA 470-11-2003), issued 19 November 2004 by the Minister for Infrastructure and Planning, allows Boral to produce up to 2.5 million tonnes of quarry product a calendar year (Mtpa), and transport it offsite by road and rail to local and regional markets.

Dunmore Hard Rock Quarry (the site) covers approximately 248 hectares and is surrounded by private property, predominantly agricultural grazing land and tracts of remnant native vegetation, to the south, north and west (The Boral owned and operated Dunmore Lakes Sand Project adjoins the site to the east).

The extraction method involves drilling and blasting to produce broken rock, that is transported to the primary crusher feed bin. The primary-crushed rock is further reduced in size in a series of crushers, before being conveyed to the tertiary screen house where the crushed rock is sized according to product specifications. The sized products are then stockpiled within the various stockpile areas on site, until they are transported to local and regional markets.

During the reporting period, extraction has occurred in the area known as the Croome West Pit. Approval of the most recent modification, MOD 11, was granted in March 2019. The site layout is shown below in Figure 1.

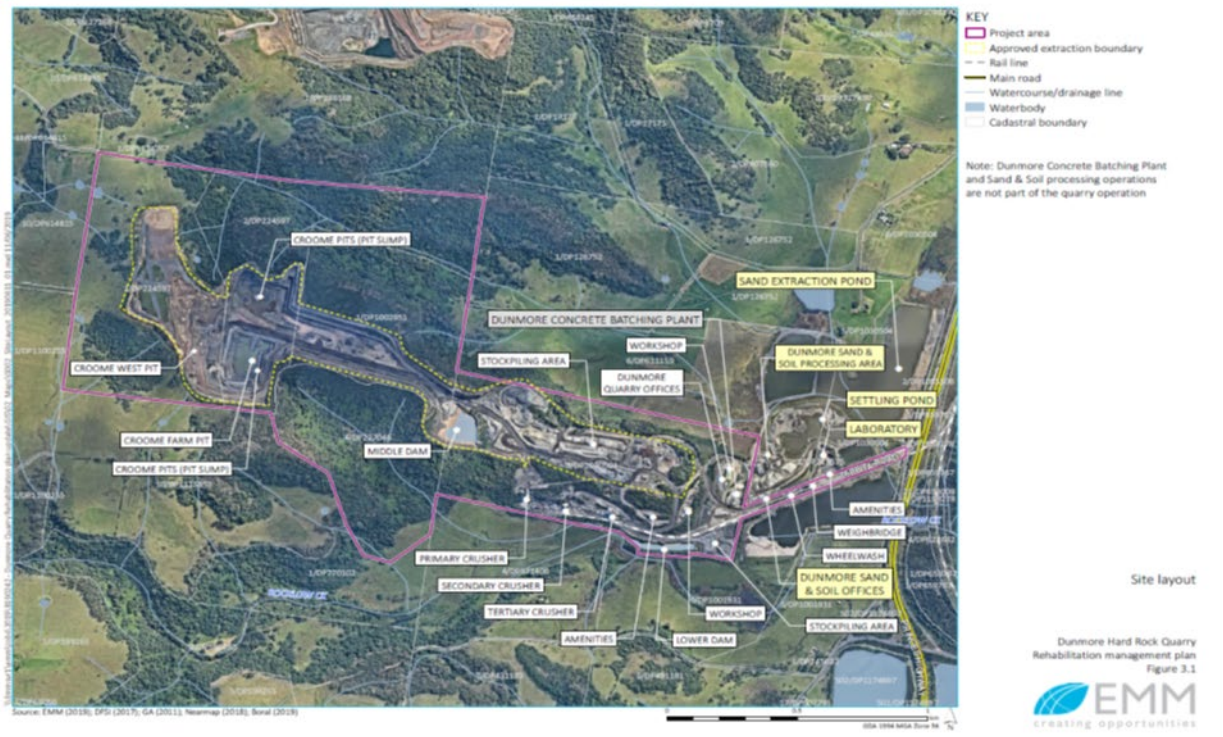

Figure 1 Dunmore Site Layout

2.1. Operations the last 12 months

During the current reporting period, extraction at DQ has continued in the Croome West Pit. An overburden ramp has been constructed, which has reduced travel times from the pit face to the processing area. In addition, larger on-hire Heavy Machinery Equipment (HME) have been used with a larger payload to further reduce travel times. This has led to more efficient use of HME, reducing diesel consumption, and associated emissions, as well as minimising dust generation on haul roads and wear and tear on roads and equipment.

The new blend plant approved under MOD 7 of DA 470-11-2003 has been commissioned and is now operational. This blend plant is used to turn quarry fines (which is typically a low value product) into products like road base, which then decreases the quantities of quarry fines needing to be stockpiled at the site, effectively reducing risks associated with dust generation and water use that would be needed to wet supress the stockpiles.

Vehicle Pedestrian Safety measures have been a major focus in the last 12 months with parking areas, office and major roads being redesigned to eliminate pedestrian /vehicle interactions. No modifications to DA 470-11-2003 were approved in the last 12 months

2.2. Operations the next 12 months

During the next reporting period, operations will continue in the Croome West Pit. Production will be tied to demand, which is currently forecast to be 1.2 to 1.6 Mt for the next reporting period. Overarching safety and environmental management systems will be continuously reviewed.

2.3. Licences and Approvals

Dunmore Quarry operates under a number of regulatory approvals and licences that are summarised in Table 4 below.

Table 5 Relevant Licences and Approvals at Dunmore Quarry

Approval	Detail	Regulatory Authority
DA 470-11-2003 Modification 11	Quarry operating conditions as granted by DPIE. The current consent has been updated to remove the restriction of road transport within this reporting period. The current modification (MOD 11) was granted in March 2019.	NSW Department of Industry, Planning and Environment
EPL 77	The EPL is issued for the scheduled activity of: Crushing, Grinding, Separation and Extractive activities for tonnages up to 2 million tonnes per annum as defined by the EPA anniversary date of 31 August.	NSW Environmental Protection Authority
Water Access Licence WAL#25152 Ref# 10AL103610	Extraction of water from the Lower Dam. This allows for 227ML per annum to be extracted from Rocklow Creek. Since 2008 the Lower Dam has been taken offline from Rocklow Creek as part of MOD 2 of DA 470-11-2003	NSW Office of Water

A copy of DA 470-11-2003 and EPL 77 are available on request or can be accessed through the Boral Dunmore website:

https://www.boral.com.au/locations/boral-dunmore-operations

3. Production, Sales and Transport

Production in the current reporting period was forecast to be below the previous reporting period's figures for material intended for use in the Sydney market with a slight increase forecast for local infrastructure works in the Illawarra.

However, bushfires occurring in November 2019 through to February 2020 caused disruptions to planned infrastructure works in the South Coast. Further disruptions arose from flood impacts occurring in late February, 2020 which caused closure of the DQ site.

Disruptions due to the COVID-19 pandemic also affected demand, and as a result production was supressed in April 2020 to adjust to uncertainties in demand. Table 6 and Table 7 details the production data in both a monthly breakdown and the format submitted to the Department of Resources and Geoscience (DRG) as required under condition S4.C77.

Table 6 Monthly Production Data

Month	Production (t)	Sales (t)	
		Road	Transfers
Jul-2019	149,535	195,819	9,522
Aug-2019	143,251	145,697	9,590
Sep-2019	134,733	171,308	8,908
Oct-2019	181,541	162,686	19,181
Nov-2019	130,941	145,926	2,806
Dec-2019	80,620	98,275	5,954
Jan-2020	88,217	76,053	6,002
Feb-2020	89,696	72,452	1,850
Mar-2020	83,504	160,058	245
Apr-2020	26,423	140,594	0
May-2020	82,346	104,346	0
Jun-2020	66,037	85,126	0
FY 20 Total	1,256,844	1,558,340	64,058
		1,622,398	

Table 7 DRG Production Data

Total Sales/Disposals			
Product	Type of Material	Quantity (Tonnes)	$ Value of Sale*
Virgin Materials			
Crushed Coarse Aggregates			
Over 75mm	Latite	57,189	*

Over 30mm to 75mm	Latite	17,524	*
5mm to 30mm	Latite	785,963	*
Under 5mm	Latite	138,268**	*
Natural sand		0	*
Manufactured Sand	Latite	68	*
Construction Sand		0	*
Prepared Road Base & Sub Base	Latite	522,221	*
Other Unprocessed Materials	Latite	36,569	*
Total		1,557,798	*

Note: This data is an approximation of the current reporting period production data and is subject to change.

*This information is commercially sensitive and has been omitted.

** This product is not part of the total sales

3.1. Transport Dispatch Data

Transport numbers are extracted from the transport monitoring system, which uses a docket tracking system to calculate the dispatch number that is then automatically migrated over to the transport dispatch monitoring sheet.

The independent environmental audit (IEA) conducted by EPS of the DQ site in August 2020, as described in Section 5 of this report, identified a number of exceedances related to the hourly transport dispatch limits described under condition S3.C7A of the consent.

Specifically the IEA identified 11 exceedances of the hourly transport limits described in the relevant condition (or, put another way, 27 additional truck movements in total) that were associated with the 7am and 3pm hourly periods as follows:

During the 7am to 8am window (hourly limit of 33 trucks):

- 39 trucks on 20/04/2020
- 35 trucks on 30/04/2020

During the 3pm to 4pm windows (hourly limit of 23 trucks):

- 27 trucks on 05/12/2019
- 25 trucks on 12/12/2019
- 25 trucks on 10/03/2020
- 25 trucks on 12/03/2020
- 25 trucks on 18/03/2020
- 25 trucks on 06/04/2020
- 26 trucks on 08/04/2020
- 24 trucks on 15/04/2020
- 24 trucks on 23/04/2020

Please refer to the show cause response letter sent by Boral to the DPIE on 29 September 2020 for further details.

No exceedances occurred with respect to the limit of 400 laden trucks from the site per day. Note that the highest number of trucks leaving site on any given day was 298.

4. Actions Required from Previous Annual Review

Table 8 details the actions required from the previous reporting period's Annual review and describes the relevant section where each item is discussed

Table 8 Actions Required from Previous Annual Review

Proposed Activities from current reporting period AR	Status	Where discussed
Complete Independent Environmental Audit	The independent audit was completed and made available online at https://www.boral.com.au/locations/boral-dunmore-operations A summary of the IEA is found in Section 5 of this review and the recommendations arising from the IEA are incorporated in actions to be completed in next Annual Review, as described in Section 8	Section 5 and Section 8
Complete dilapidation report for conservation of heritage values associated with the MacParland Residence	Dilapidation report was completed May 2020.	Section 6.3.1
Upgrade Weather Station with real-time monitor installations	Weather Station and real-time monitors have been installed.	Section 6.1
Investigate the use of cameras on Rocklow Road to deter illegal dumping	Shellharbour Council installed cameras around the surrounds of Dunmore Quarry and Dunmore Lakes Sand Project. Council indicated that two successful prosecutions have resulted from illegal dumping investigations that were aided by the installation of the cameras.	Section 6.9
Continue rehabilitation works in offset areas as per Annual Report from Goodbush	Rehabilitation works are ongoing with licenced bush regenerator Goodbush.	Section 6.7, Appendix F
Continue hydroseeding of the Croome West Bund	Extended unusually dry periods during spring resulted in a delay to the growing season. Follow up works will be	Section 6.7

	completed this spring under improved growing conditions.	
Begin works to upgrade the Lower Dam depending on status/approval of Water Management Plan	The Water Management Plan was submitted for review by DPIE Water. Currently the plan is still under review with DPIE Water before it can be submitted to DPIE. After DPIE has approved the plan, the upgrades to the Lower Dam can commence	Section 6.5.5
Update metering to align with new regulations rolling out in December 2019	Non-urban water metering framework upgrades have been delayed. WaterNSW has delayed rollout of new metering framework for non-urban water take for coastal regions until 1 December 2023.	Section 6.5.4
Finalise draft salvage report and publish on website	Salvage report was finalised in December 2019.	Section 6.8
Commence long term strategies relating to storage of Aboriginal Artefacts as per Aboriginal and Cultural Heritage Management Plan and finalised salvage report	Artefacts will be stored at the Australian Museum as per the salvage report.	Section 6.8

5. Independent Environmental Audit

The overall environmental performance of the site during the reporting period was considered satisfactory, which is based the low number of non-compliances and their classification, along with the low number of complaints. A total of 22 opportunities to promote improvement in terms of regulatory compliance and environmental performance were included in the findings of IEA and will be actioned in the upcoming reporting period. These responses are summarised below in Table 9.

Table 9 Independent Environmental Audit Recommendations

Reference	Consent Condition /Issue	Recommendation	Response	Boral Actions
DQ1/20	DQ3/17	Finalise revised Water Management Plan (WMP).	Updated WMP is currently under review with DPIE Water	Boral to follow up on status of the review and approval of the WMP with DPIE Water. Previous advice from DPIE (Water) is that the plan won't be reviewed for a month due to backlog. Once review by DPIE (Water) has been completed then Boral will submit the plan to DPIE for approval.
DQ2/20	DQ5/17	Follow up approval of works required under S4, C38 from DPIE.	EPA have approved works as completed. A letter describing the completion of the works to be drafted by Boral and sent to DPIE to confirm completion to satisfaction to the secretary.	Boral to draft letter and send to DPIE via the major projects portal.
DQ3/20	DQ6/17	Determine whether 'regional' monitoring that has been completed is satisfactory and the regional monitoring program can therefore be suspended.	Boral to correspond with DPIE to clarify the definition of 'regional' monitoring and propose cessation of monitoring as a function of the satisfactory	Boral to draft letter and send to DPIE via the major projects portal.

Reference	Consent Condition /Issue	Recommendation	Response	Boral Actions
			completion of the monitoring program.	
DQ4/20	DQ7/17	Update of WMP to include measures to prevent mud tracking onto public roads from the site.	It was determined that the appropriate location for managements measures to address sediment tracking is via the updated Water Management Plan, which includes an Erosion and Sediment Control Plan that is located in Section 6 of the document. The effectiveness of the controls described in the plan are monitored via the site environmental checklist (monthly checklist and EPP)	Procedures for managing sediment tracking onto the road are to be addressed as part of the Erosion and Sediment Control Plan and monitored via existing environmental inspection tools.
DQ5/20	DQ8/17	Confirm tyre numbers stored on site are less than 500, and if there is a requirement for more than 500 tyres, consult with EPA regarding a licence.	Boral confirms that less than 500 tyres are stored on the premises A contract is currently being tendered for the removal of the tyres not currently being utilised for re-use onsite by an appropriately licensed external contractor	Boral to finalise contract for removal of excess tyres. Boral to update the onsite tyre register.
DQ6/20	DQ8/17	Finalise revised Bushfire Management Plan and ensure it covers safe storage of tyres in accordance with “Tyre stewardship Australia Best Practice Guidelines	The Bushfire Management Plan will be updated by Boral in accordance with the requirements of these guidelines	Boral to update Bushfire Management Plan to address relevant industry and NSW Fire and Rescue guidelines.

Reference	Consent Condition /Issue	Recommendation	Response	Boral Actions
		for Tyre Storage and Emergency Preparedness (March 2019)" guidelines and "Fire & Rescue NSW Fire Safety Guideline – Guideline for bulk storage of rubber tyres" (December 2014).		
DQ7/20	DQ10/17	Ensure all management plans are prepared and reviewed in accordance with the requirements of the conditions of consent It is suggested a review record/register is maintained.	A record will be created and attached to the applicable management plan	Environmental Coordinator to complete.
DQ8/20	Schedule 3, Condition 7A – Transport ation	A Traffic Management System should be developed to monitor and control truck dispatch movements in accordance with limitations	A reporting tool has been built for the Site's weighbridge and sales docketing system (APEX), which now allows the weighbridge operator to track dockets hourly. The morning sales loading shift has been brought forward by 30 minutes, to enable trucks to be despatched from 6am (rather than 6.30am) which is expected to result in less "bunching" into the 7am to 8am period. Similarly, the start of the afternoon shift has been brought forward 30 minutes, allowing	Boral is currently preparing a modification application, supported by a scoping report that will seek to remove Condition 7A which imposes these hourly / daily truck limits. We are seeking this removal on the basis that, in our view since our operation has direct access to the Princess Highway, the restrictions serve no purpose from an environmental protection or safety standpoint.

Reference	Consent Condition /Issue	Recommendation	Response	Boral Actions
			for a different shift handover, which is expected to result in less "bunching" into the 3pm to 4pm period. The Transport Management Plan (TMP) will be updated to reflect the updated management measures. Upon finalisation of the revised TMP, relevant staff will be presented with a toolbox session to educate them about the updated management plan requirements and a sign off sheet will be collected and filed.	
DQ9/20	Schedule 3, Condition 7a – Transport ation	If the hourly truck dispatch limitations are not practical for operations, consultation with DPIE should occur to understand if modification of this condition is appropriate.		Boral is currently preparing a modification application, supported by a scoping report that will seek to remove Condition 7A which imposes these hourly / daily truck limits.
DQ10/20	Schedule 3, Condition 1 – Operation of Plant and Equipment	Prioritise maintenance checks of bag houses in crushing and screening plans to ensure they are maintained in a proper and efficient condition.	A plant inspection checklist is undertaken daily by staff to ensure that plant components are working correctly and any corrective actions are completed. Maintenance is	Ensure plant inspection checklists are completed as per current processes

Reference	Consent Condition /Issue	Recommendation	Response	Boral Actions
			also scheduled in the electronic maintenance system.	
DQ11/20	Schedule 4, Condition 12 – Identification of Boundaries	Confirm survey plan has been submitted to the Secretary.	A letter will be drafted and submitted to DPIE to confirm receipt of the survey plan	Boral to draft letter to DPIE for submission to the portal
DQ12/20	Schedule 4, Condition 28 – Water Discharge Limits	Implement updated Water Management Plan (WMP) when approved to reconfigure storage on site and prevent uncontrolled discharge events.	The updated Water Management Plan is currently under review with the DPIE Water, which details the dam upgrade works designed to meet this condition.	Complete works in accordance with the approved plan, once the updated WMP is approved. Senior management to discuss capital requirement for completion of the works once the WMP has been finalised. Once works are completed a letter is to be drafted notifying EPA/DPIE of completion of the physical works.
DQ13/20	Schedule 4, Condition 29 – Site Water Balance	Ensure all future Annual Reviews address the reporting requirements in Schedule 4, Condition 29.	Boral to ensure requirements in Schedule 4, Condition 29 are met in the next Annual Review	Completed in this Annual Review in Section 6.5.4
DQ14/20	Schedule 4, Condition 33 – Offline Dam	Ensure Dam Upgrade Plan is updated or incorporated into the updated approved Water Management Plan (WMP).	The dam upgrade plan is included in Appendix G of the updated WMP currently under review by DPIE (Water)	Completed in draft WMP submitted to DPIE Water for review in May 2020.
DQ15/20	Schedule 4,	Ensure the approved updated Water Management	The dam transition plan is included in the Options	Addressed in draft WMP submitted to DPIE

Reference	Consent Condition /Issue	Recommendation	Response	Boral Actions
	Condition 35A – Lower Dam Transition Plan	Plan includes the Lower Dam Transition Plan.	Assessment (Section 5.3) of the updated WMP currently under review by DPI (Water)	Water for review in May 2020.
DQ16/20	Schedule 4, Condition 37 – Other Water Management Works	Bunded fuel drum storage area to be used correctly with all oil drums to be positioned within the bunded area.	Delivery drivers to sign in onsite to ensure that goods are delivered and correctly placed into the bund by directing the drivers to the appropriate storage area. One point lessons (OPL) to be created for bunded area to instruct storage requirements.	Boral to complete an inventory of the stored chemicals across the site to ensure bunds are available and capacity is adequate. Boral to create an OPL for bunded areas and training package for staff to complete, with a sign on sheet to be recorded and filed. Delivery drivers to sign in onsite to ensure that goods are delivered and placed into the bund
DQ17/20	Schedule 4, Condition 38 – Bunding	Ensure all fuel, oil and chemical storage areas occurs in appropriately bunded areas.	As above	As above
DQ18/20	Schedule 4, Condition 46 – Flora and Fauna Management Plan	Condition numbering references are incorrect throughout document (see Table 2.1 for an example). Update condition reference numbering in next review.	Condition references will be amended in the next review of the Flora and Fauna Management Plan document as per the recommendation.	Boral will update the update the condition reference numbering as part of the next review cycle of the Flora and Fauna Management Plan.
DQ19/20	Schedule 4, Condition 47 –	Vegetation Clearing Protocol (VCP) to be updated to address collecting seed from	The VCP will be updated in the next review of FFMP	Boral will update the VCP as per the recommendations

Reference	Consent Condition /Issue	Recommendation	Response	Boral Actions
	Flora and Fauna Management Plan (FFMP)	site and conserving and reusing topsoil.		as part of the next review cycle of the Flora and Fauna Management Plan.
DQ20/20	Schedule 4, Condition 54 – Rehabilitation and Conservation Bond	Rehabilitation Conservation Bond not lodged within the required timeframe. Boral to ensure timing requirements are met for obligations under this consent.	Rehabilitation Conservation Bond to be recalculated and lodged in accordance with the obligations under the consent.	Boral to lodge bond in accordance with the obligations.
DQ21/20	Schedule 4, Condition 62 – Road Haulage	It is recommended that sweeping increase to three times per week, the Water Management Plan (WMP) is updated to address this matter, and consideration of further mitigation measures is undertaken.	Sweeping of the Princes Motorway on ramp currently occurs two days per week. Tabbitta Rd is serviced daily Monday to Friday. Further mitigation methods will be investigated once extent of sediment being tracked onto the road is quantified and response measures evaluated. The updated WMP details Erosion and Sediment Controls in Section 6 of the document and these controls will be monitored via the site environmental checklist rather than the PIRMP, which is not considered the appropriate document for this activity due to the	Assess ongoing effectiveness of the wheel wash and implement improvements if necessary to address sediment tracking on access roads.

Reference	Consent Condition /Issue	Recommendation	Response	Boral Actions
			negligible risk for material environmental harm.	
DQ22/20	Schedule 5, Condition 4 – Revision of Strategies, Plans and Programs	The document control tables within the all the plans, strategies and programs required under this consent do not reflect the reviews that have occurred. Ensure all documents are reviewed in accordance with this condition of consent. Update the relevant management plans to contain information on timing of review.	Subsequent management plans to include a more accurate description of the document control process, include reviews that have been undertaken and then main focus of the review.	Boral to present a more detailed and accurate document control section in the relevant management plans as per the recommendations .

These recommendations have been incorporated into the actions required in the next Annual Review as detailed in Section 8.

6. Environmental Performance

Dunmore Quarry has comprehensive environmental management and monitoring programs that collect information and data for the assessment of environmental impacts, regulatory compliance and performance against continual improvement objectives. Specific Management Plans define the framework for measuring environmental performance and compliance with statutory requirements for each relevant aspect of environmental performance

6.1. Meteorological Monitoring

An onsite weather station is located at Dunmore, which collects a range on meteorological parameters. This system was upgraded as part of the transition to real time air quality monitoring. The location of the weather station is shown in Appendix A.

There is currently no prescribed impact assessment criteria associated with the weather station monitoring data, with the meteorological monitoring used to provide background information for the adaptive management of the site. A detailed summary of the current reporting period and historical rainfall data can be found in Appendix A.

6.1.1. Meteorological Monitoring Long Term Analysis and Trends

The current reporting period was drier than average, with 761mm of rain falling over the reporting period. Most of this rainfall fell in February 2020 where flooding impacted the region with 243mm of rainfall occurring in the seven days from the 7th February, 2020.

The Currowan bushfire that occurred from mid-November 2019 to early February 2020 caused periods of poor air quality throughout the Illawarra and South Coast regions, which subsequently led to increases in PM_{10} measurements at the on-site monitoring equipment that was observed to be outside of the normal parameters. The observed elevations are not attributable to the DQ development operations despite causing elevated readings at the onsite HVAS.

Typically winds during the reporting period originated from the W/WSW for the majority of the year, with the exception of summer, where the prevailing wind was from the North. This is in line with historical trends. In February 2020, there were above average wind speeds from the SE, which was unusual when compared with historical trends. Furthermore, the Currowan bushfire burned from November 2019 to February 2020, which affected air quality throughout the whole of the South Coast/Illawarra region.

6.1.2. Meteorological Monitoring Summaries and Opportunity for Improvement

The weather station is now capable of providing real time data via download, which is an upgrade from the previous station. The next reporting period will focus on continuing the processes established during the current reporting period.

6.2. Air Quality Monitoring

Two methods of monitoring air quality is used at Dunmore Quarry. Deposited dust gauges are used to measure the volume of deposited dust every 30 days (+/- 2 days). A High Volume Air Sampler (HVAS) is used to measure the fine particulate matter under 10 microns (PM_{10}) every 6 days.

The data collected from each of the monitoring points was below the required assessment criteria for deposited dust, PM_{10} and TSP for the current reporting period.

A real time monitoring system has been installed, which is used to guide day to day management and site responses to air quality monitoring. This system is currently in a transitional phase. Under the currently approved AQMP, the real-time monitoring network is proposed to eventually replace the deposited dust and HVAS monitoring, once the transitional phase is complete. During the transition phase, the existing HVAS monitor would continue to be operated and be used to validate the real-time monitoring network and assess the compliance of the project.

The location of the DQ air quality monitoring equipment is shown below in Figure 2.

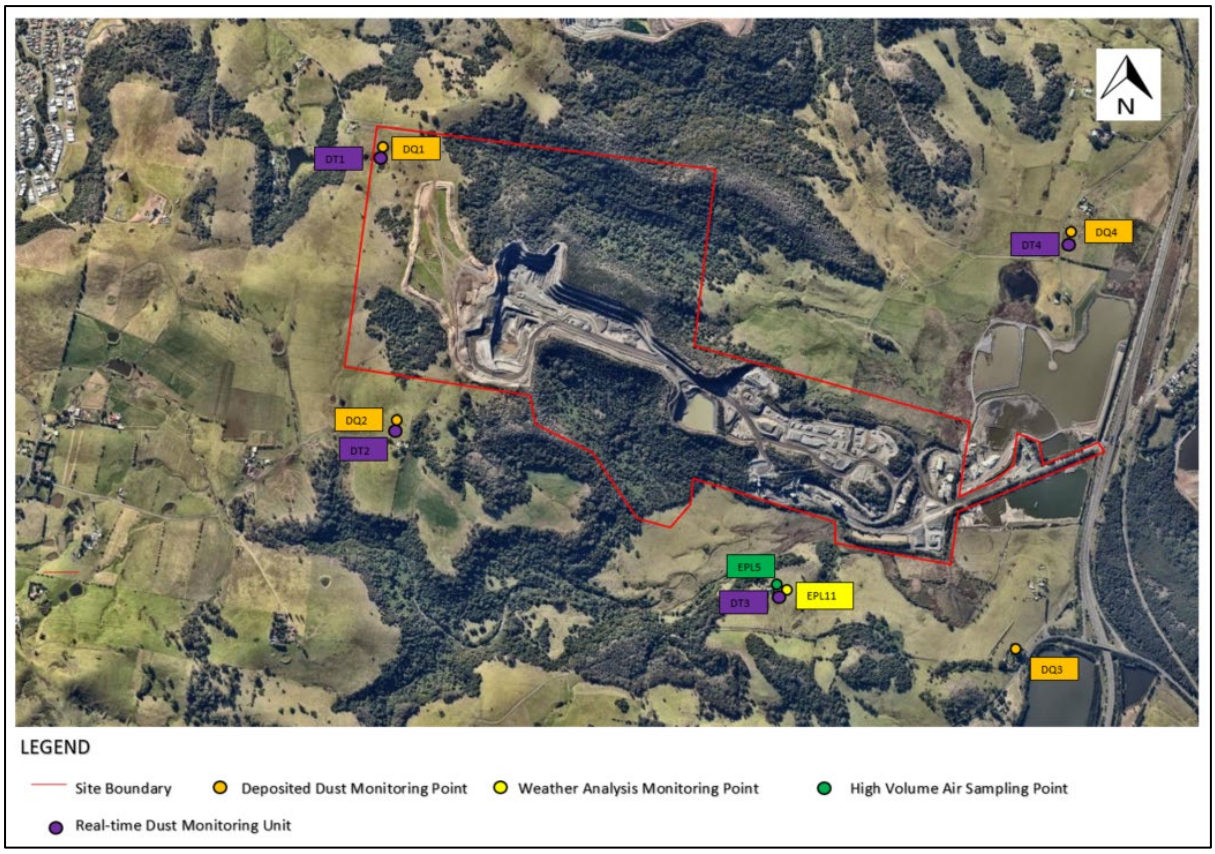

Figure 2 Location of Air Quality Monitoring Points

6.2.1. Deposited Dust Monitoring Assessment Criteria

Relevant deposited dust impact assessment criteria applies to a residence located on privately owned land. Monitoring points 1, 2 and 4 are not located in the direct vicinity of residences. It is important to note that the assessment criteria refers to an annual averaging period (i.e. a monthly average over the last 12 months), with the impact assessment criteria shown in Table 10 below.

Table 10 Deposited Dust Impact Assessment Criteria

Pollutant	Averaging Period	Criterion	
Deposited dust[c]	Annual	2g/m^2/month[b]	4g/m^2/month[a,d]

- [a] Cumulative impacts (i.e. increases in concentration due to development plus all other sources)
- [b] Incremental impact (i.e. increases in concentration alone, with zero allowable exceedances of criteria over the life of the development.

- [c] Deposited dust is defined as insoluble solids
- [d] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity as agreed by the Secretary.

6.2.2. Deposited Dust Monitoring Performance Review

All data collected from the air emission monitoring points during the reporting period were below the required assessment criteria for the rolling annual average of 4g/m^2/month for dust measured as insoluble solids.

All sites were also below 4g/m^2/month for the ash fraction which excludes the organic (combustible) component of the dust sample such as vegetation, bird droppings and insects. These organic contaminants within the sample are typically representative of the surrounding wetlands and farmland areas upon which the monitors are located.

A summary of results for each monitoring location is shown in Table 11 below. A monthly breakdown of each site and summary graphs is detailed in Figure 3 to 6.

Table 11 Deposited Dust Monitoring Results

Month	Site 1 grams/m^2/month		Site 2 grams/m^2/month		Site 3 grams/m^2/month		Site 4 grams/m^2/month	
	Insoluble Solids	Ash	Insoluble Solids	Ash	Insoluble Solids	Ash	Insoluble Solids	Ash
FY20 Average	2.61	1.76	3.45	2.43	2.66	1.94	2.10	1.51
Criterion	4	-	4	-	4	-	4	-

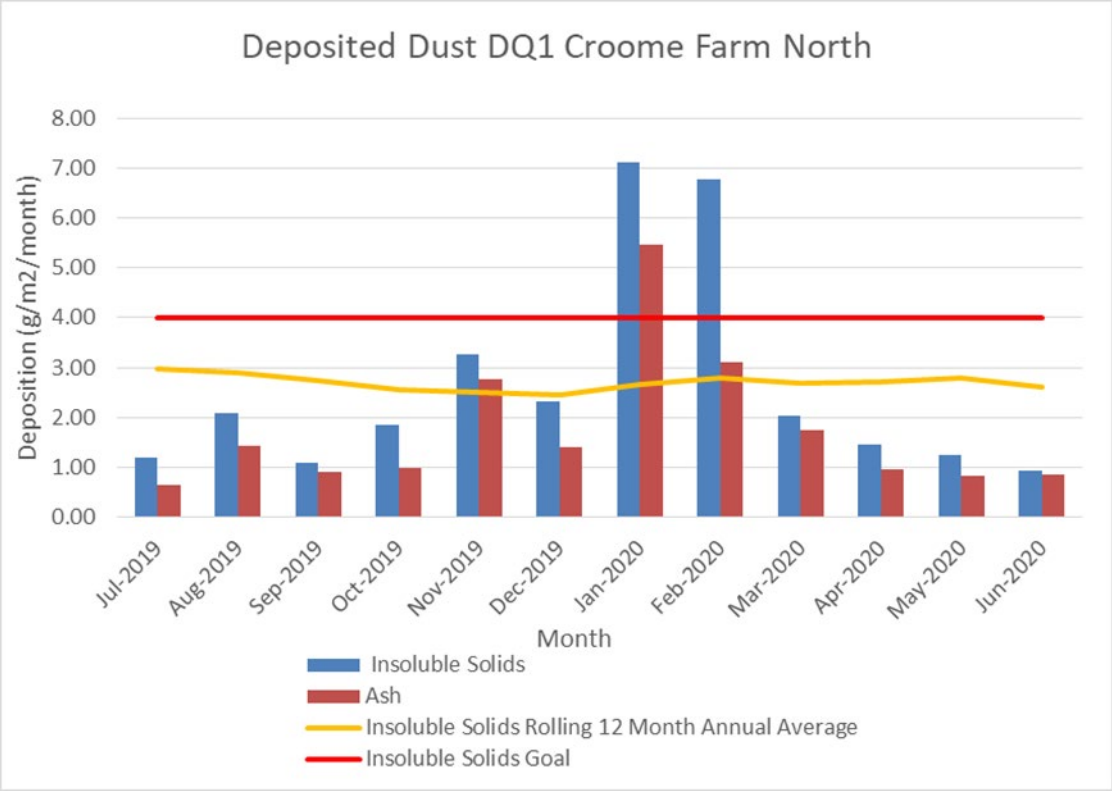

Figure 3 DQ1 Monthly Deposited Dust Data

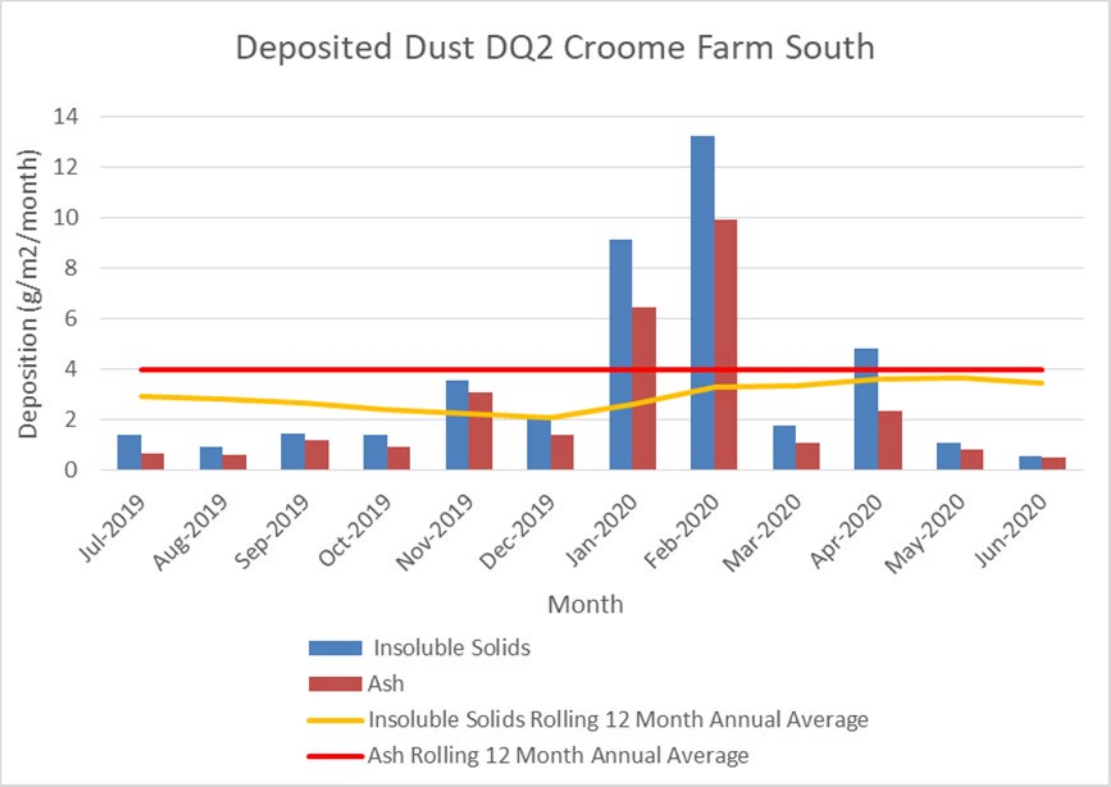

Figure 4 DQ2 Monthly Deposited Dust Data

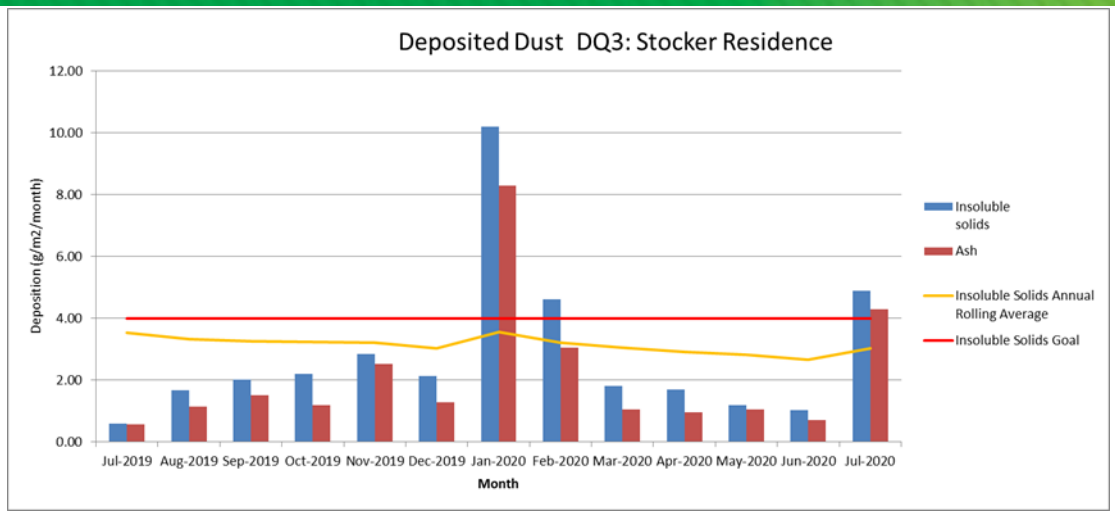

Figure 5 DQ3 Monthly Deposited Dust Data

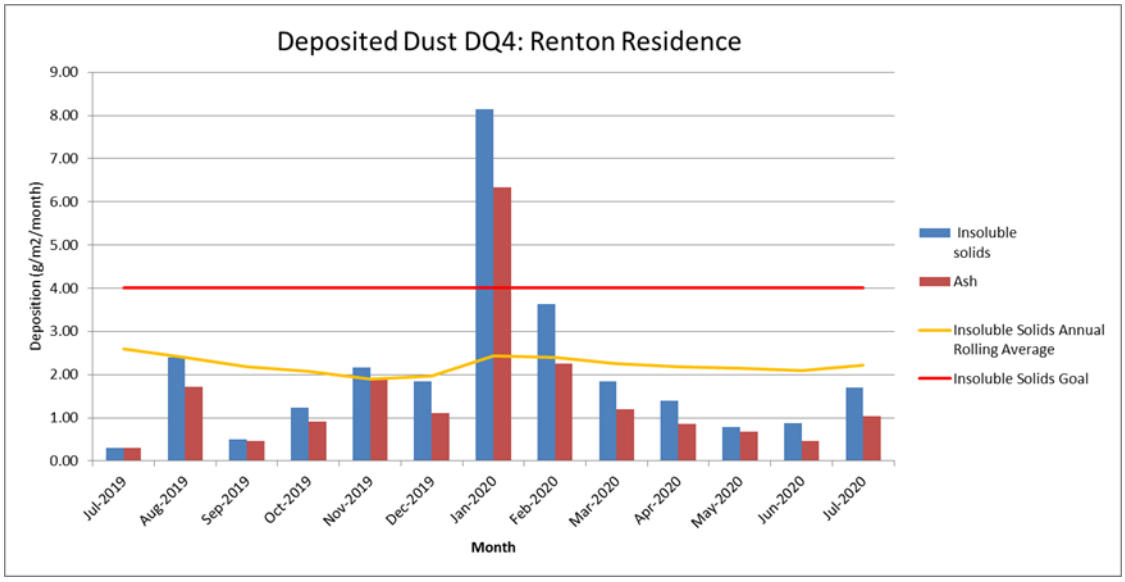

Figure 6 DQ4 current reporting period Monthly Deposited Dust Data

A state wide dust storm affected the region on 23 January 2020. This caused elevated readings at all monitoring sites for the month of January 2020 that was not attributed to the Dunmore Quarry operations. This dust storm is shown below in Figure 7.

Figure 7 January 2020 Dust Storm

6.2.3. Particulate Monitoring Assessment Criteria

The impact assessment criteria for Particulate Monitoring is shown below in Table 12.

Table 12 Particulate Matter Impact Assessment Criteria

Pollutant	Averaging Period	Criterion
PM_{10}	Annual	[a,d] 25 µg/m³
PM_{10}	24 hour	[b]50 µg/m³
TSP	Annual	[a,d] 90 µg/m³
$PM_{2.5}$*	Annual	[a,d] 8 µg/m³

- [a] Cumulative impacts (i.e increases in concentration due to development plus all other sources)
- [b] Incremental impact (i.e increases in concentration alone, with zero allowable exceedances of criteria over the life of the development.
- [d] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity as agreed by the Secretary.

6.2.4. Particulate Monitoring Performance Review

Particulate Monitoring and the sample data was affected by the Currowan bushfires that occurred from 26 November, 2019 to 9 February, 2020, along the south coast and Illawarra region. During the fire's duration, the region suffered periodic instances of reduced air

quality, which was not attributable to DQ operations. The PM_{10} readings from current reporting period can be seen below in Figure 8.

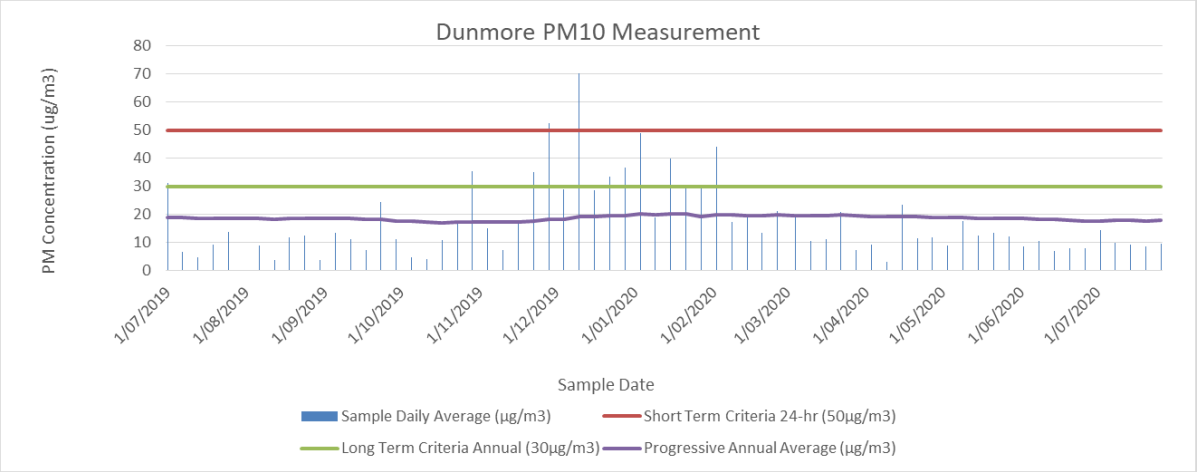

Figure 8 current reporting period PM_{10} Monitoring Data

There were two instances of PM_{10} elevations above the criteria, as recorded by the HVAS, which occurred on 28 November, 2019 and 10 December, 2019. During the period where the exceedances were observed, the Currowan bushfire was burning in the south coast area and smoke haze was clearly visible throughout the Illawarra and South Coast region.

On 28 November, 2019, the recorded PM_{10} value at the Dunmore Quarry HVAS (Monitoring Point 5) was 52.57 µg/m^3. OEH Monitors located at Albion Park and Kembla Grange did not record hourly readings, however the Kembla Grange monitor was working for the full 24 hour period and recorded an average hourly reading of 67.8 µg/m^3.

On Tuesday 10 December, 2019, an elevated reading of 70.23 µg/m^3 was recorded at the Dunmore Quarry HVAS (Monitoring Point 5). Air quality measured at the Albion Park monitor location by OEH on the same date was 72.8 µg/m^3. During this period, it was widely reported and visible that smoke haze had engulfed the region from bushfires in Sydney and the South Coast.

https://www.illawarramercury.com.au/story/6535064/thick-smoke-causes-hazardous-air-quality-levels-in-illawarra/

The elevated PM_{10} levels for both of these events has been attributed to the large Currowan bushfire, which was burning in the region at the time and were not associated with Dunmore Quarry operations. Although the fire caused the regional air quality monitoring results to be above the thresholds described in the Dunmore quarry consent and licence, the department acknowledges that prescribed limits in DA 470-11-2003 S4.C22 exclude extraordinary events such as local bushfires.

The annual average PM_{10} measurement for the reporting period, obtained from monitoring point 5, was below the impact assessment criteria of 50 µg/m³ for PM_{10} and 90 µg/m³ for TSP. PM_{10} measurements obtained for DQ were also similar to the annual averages recorded at the Albion Park OEH monitoring location. A summary of the particulate matter data obtained during current reporting period is shown below in Table 13.

TSP concentrations are not measured in the vicinity of the quarry, however annual average TSP concentrations can be derived based on typical ratios of PM_{10}:TSP. Rural areas (such as the Dunmore Quarry), typically experience a PM_{10}:TSP ratio of 0.4. This ratio has been

applied to the annual average PM_{10} concentrations recorded at DQ to derive a representative TSP background concentration in µg/m³. This methodology is in-line with the method used by Ramboll in the MOD 9 Environmental Assessment.

Four real-time monitors became operational in 24 January, 2020, therefore data only exists for the current reporting period from this date. For comparison purposes, DT3 is used as it is located in close proximity to the weather station and the HVAS.

Table 13 Summary of Particulate Monitoring Data

Pollutant	Dunmore Quarry current reporting period Average (µg/m³)	Albion Park current reporting period Average(µg/m³)	Dunmore Quarry Long Term Average (µg/m³)
Measured PM_{10}	17.6	19.5	13.3
Derived TSP	44.0	-	-
Real-time monitor DT3 TSP Average	19.6	-	-
Real-time monitor DT3 PM_{10} Average	16.8	-	-
Real-time Monitor $PM_{2.5}$ Average	3.7	-	-

6.2.5. Air Quality Monitoring Long Term Analysis and Assessment

The site has been collecting deposited dust data since FY02. A graph of long term trends can be found in Figure 9 below and shows that deposited dust values have typically decreased over time.

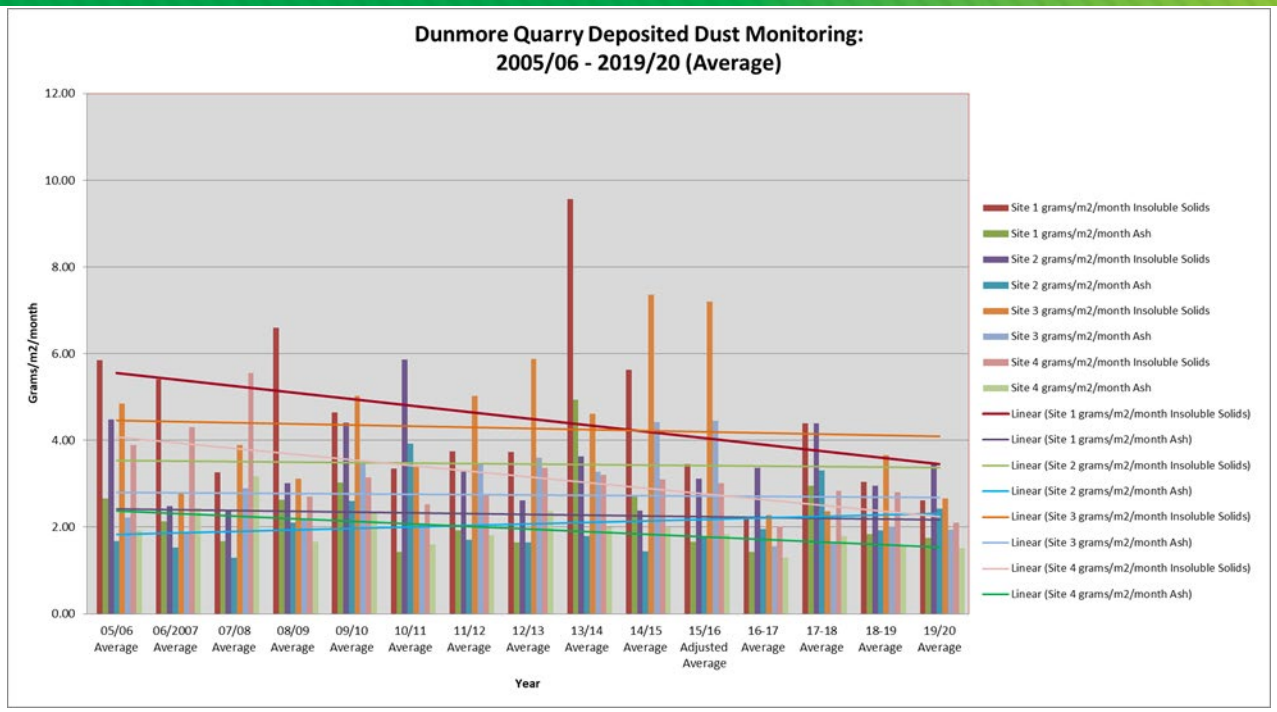

Figure 9 Dunmore Quarry Historical Dust Monitoring Data

A graph showing measured deposited dust versus production data is presented in Figure 49 to 52 in Appendix B. Since the cladding of the primary crusher was undertaken in 2010, there has been no correlation observed between production tonnages and the deposited dust measurements.

A general trend that has been observed, is that measured deposited dust is typically higher in the dry summer months when compared to the winter months, which is to be expected. This trend is also confirmed in the PM_{10} measurements and is generally reflective of regional conditions as a whole. Figure 10 shows a 90 day average moving average in black, which clearly visualises the seasonal fluctuations of measured PM_{10}.

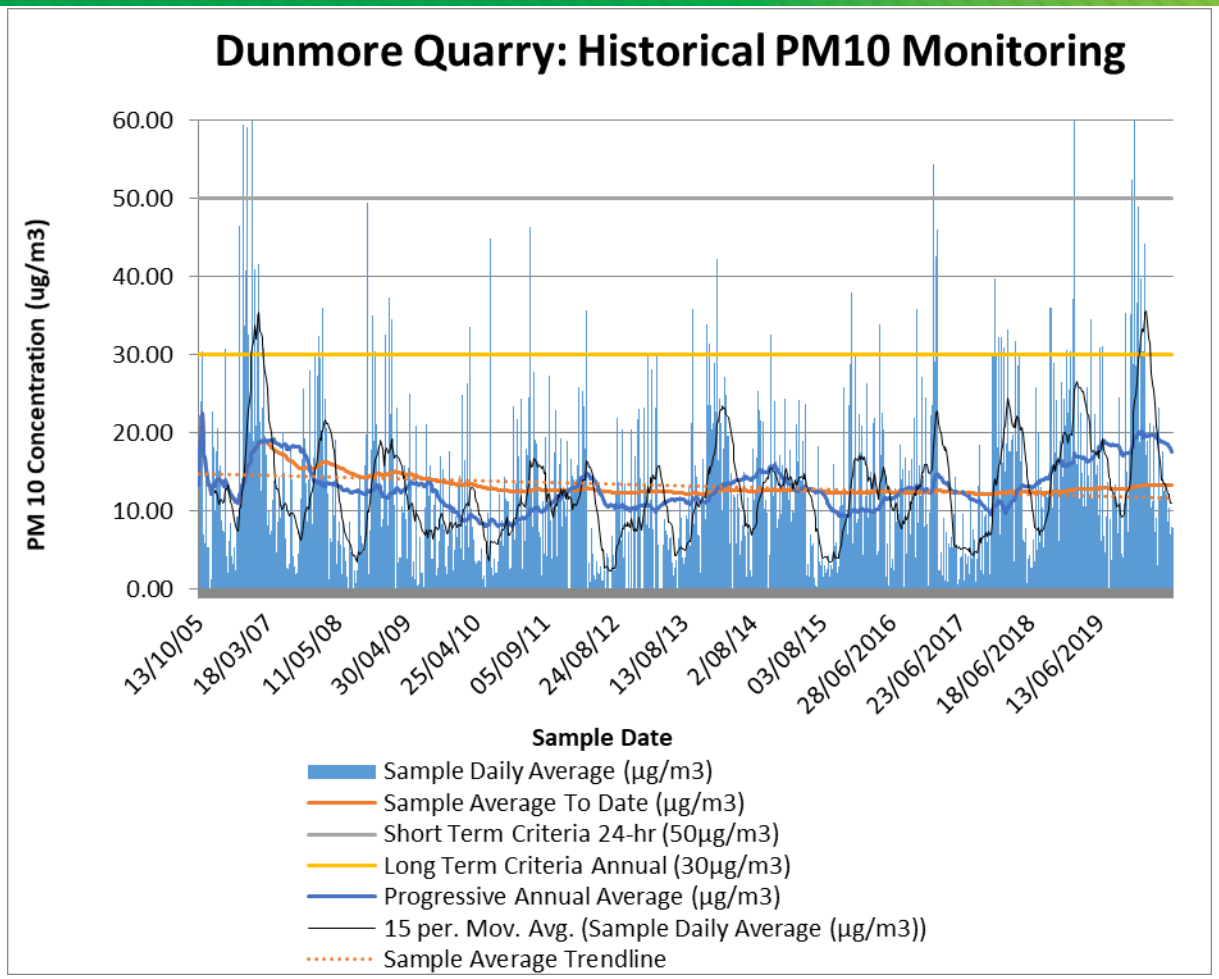

Figure 10 Dunmore Quarry Historical PM10 Monitoring Data

The seasonal fluctuations in PM_{10} measurements show a clear trend whereby PM_{10} values are typically higher during the dry summer periods and lower in winter. This fluctuation is mirrored by the Albion Park PM_{10} measurements available on the OEH website. https://www.environment.nsw.gov.au/AQMS/search.htm

The trends described above indicate that the measured PM_{10} and deposited dust values are typically influenced more from regional ambient local conditions than local quarry operations.

6.2.6. Air Quality Monitoring Summary and Opportunities for Improvement

The installation of real time monitors was completed in January 2020. The site is still in the transitional period with the TARP and alerting systems for the monitoring equipment being finalised. There were delays during the last financial year concerning sourcing of components and parts for the real-time monitors due to COVID-19 related embargos affecting supply of hardware from overseas. The next reporting period will focus on fine tuning the alerting systems along with continuing the operation of the real time monitoring units.

6.3. Blast Monitoring

Conditions S4C16 and S4.C17 of the consent outline the blast monitoring parameters, which are assessed at the nearest sensitive receiver located at the Benny Residence. Monitoring at the Benny residence through the current reporting period indicated compliance with all

relevant blast parameters during the reporting period. Monitoring Points are shown in Figure 11.

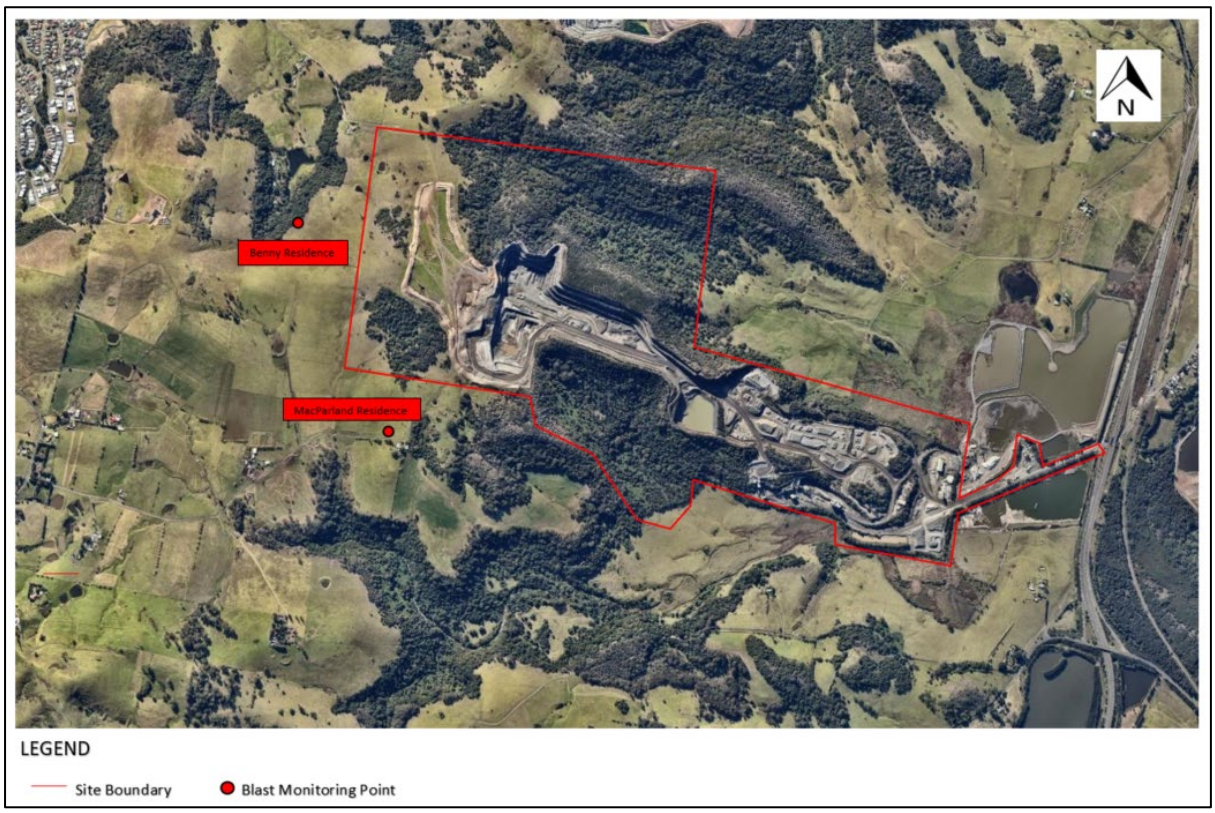

Figure 11 Blast Monitoring Locations

6.3.1. Blast Monitoring Impact Assessment Criteria

Conditions S4C16 and S4.C17 of DA 470-11-2003 outline the blast monitoring parameters that are assessed at the nearest sensitive receiver, being the Benny Residence. These parameters are reproduced below in Table 14 and 15.

Table 14 Blast Impact Criteria

Airblast Overpressure	Allowable exceedances
120 ((dB(Lin Peak))	0 (absolute limit)
115 ((dB(Lin Peak))	5% of the total number of blasts over a period of 12 months
Ground Vibration	**Allowable exceedances**
10mm/s	0 (absolute limit)
5mm/s	5% of the total number of blasts over a period of 12 months

During the current reporting period, 25 blasts were undertaken. Therefore, no more than one (1) blast is allowable over the 95th percentile limits of 115 (dB(Lin Peak)) and 5 mm/s for airblast overpressure and ground vibration, respectively, at the Benny Residence, which is used for compliance reporting as per the approved Blast Management Plan.

In addition, the approved Blast Management Plan outlines monitoring that will be undertaken to preserve the heritage value of the old flour mill at the MacParlands residence. The following blast parameters were adopted.

Table 15 Heritage Conservation Blast Thresholds

Airblast Overpressure	Allowable exceedances
130 ((dB(Lin Peak))	5% of the total number of blasts over a period of 12 months
Ground Vibration	**Allowable exceedances**
30mm/s	5% of the total number of blasts over a period of 12 months

A dilapidation report has also been commissioned that details the condition of the MacParland Residence, specifically the condition of the structures of heritage value such as the flour mill, butter mill, hay shed and the primary residence. The first year of monitoring of these structures was undertaken during the current reporting period, and forms the baseline condition against which subsequent monitoring will be compared.

6.3.2. Blast Monitoring Performance Review

Figure 12 and Figure 13 provides a visual representation of the blast monitoring data collected during the current reporting period.

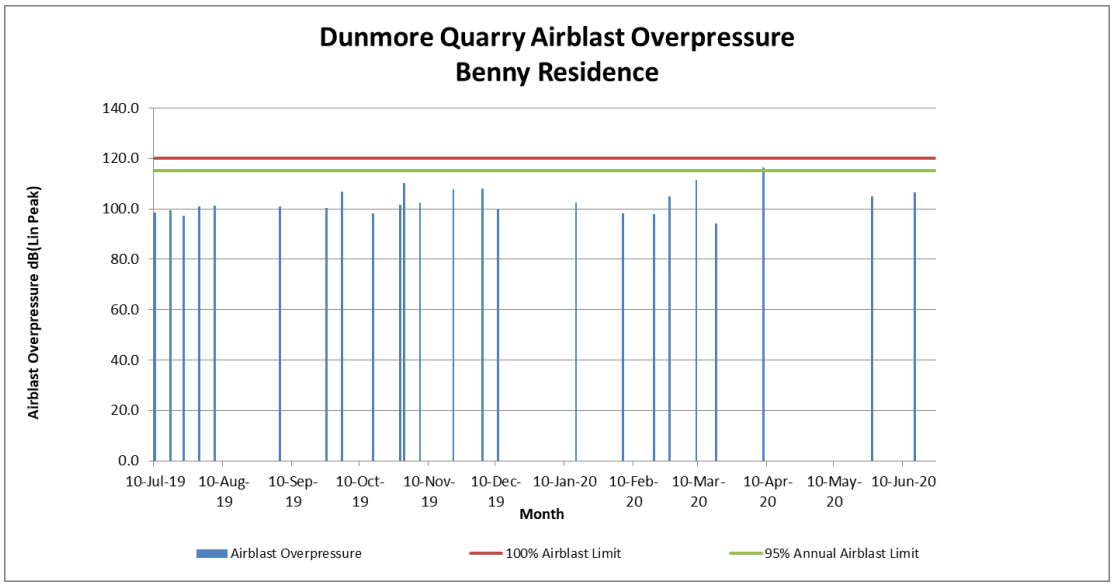

Figure 12 current reporting period Airblast Overpressure Monitoring Data

During the current reporting period, there was one blast that was measured above the 95th percentile limit with respect to the airblast overpressure criteria. On 8 April, 2020, a blast was measured at 116.3 dB(Lin Peak). Due to the total number of blasts (25), this blast was deemed compliant with condition S4.C13 as 96% of all blasts were below the 115 dB(Lin Peak) criteria.

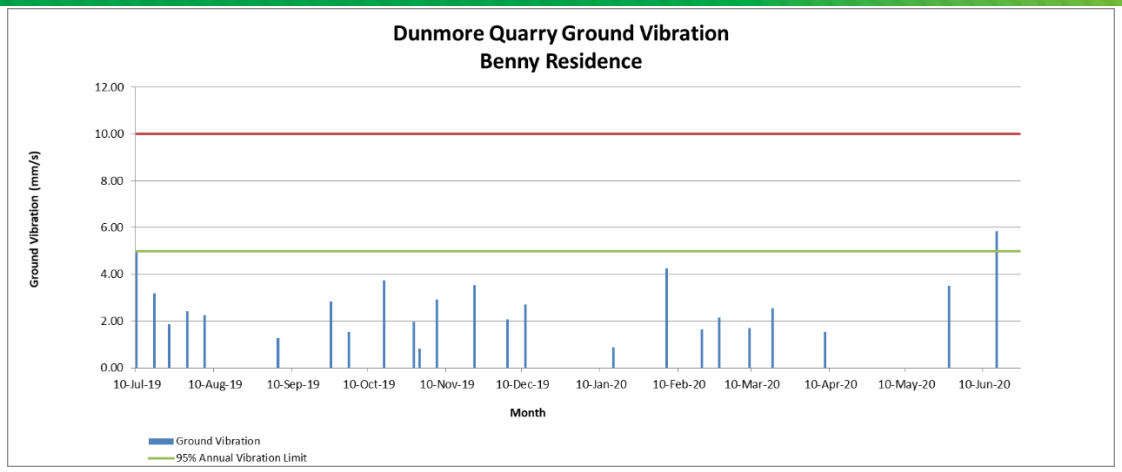

Figure 13 FY20 Ground Vibration Monitoring Data

During the current reporting period, there was one blast which was measured above the 95th percentile limit with respect to the ground vibration criteria. On 15 June, 2020, a blast was measured as 5.83mm/s for ground vibration. Due to the total number of blasts (25), this blast was deemed compliant with condition S4.C14 as 96% of all blasts were below the 5mm/s criteria.

There were no blasts above the 100% (absolute) limits during the current reporting period.

6.3.3. Blast Monitoring Long Term Analysis and Trends

A visual representation of historical blast monitoring data can be seen below in Figure 14 and 15.

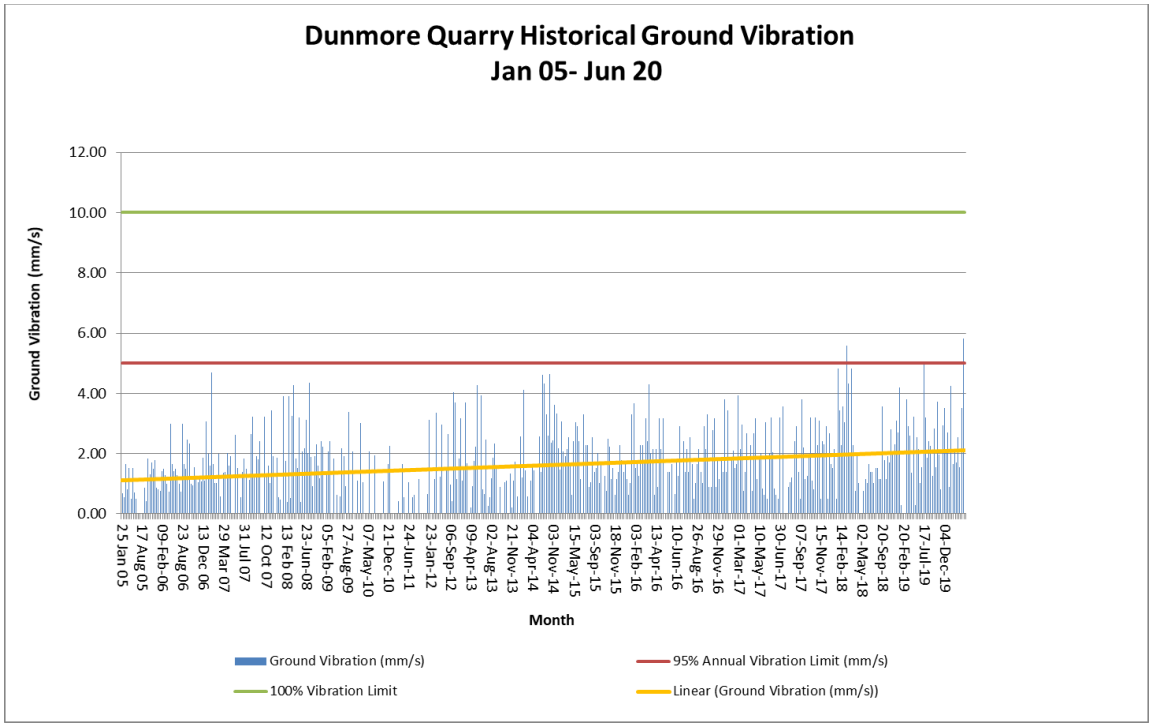

Figure 14 Historical Ground Vibration Monitoring Data

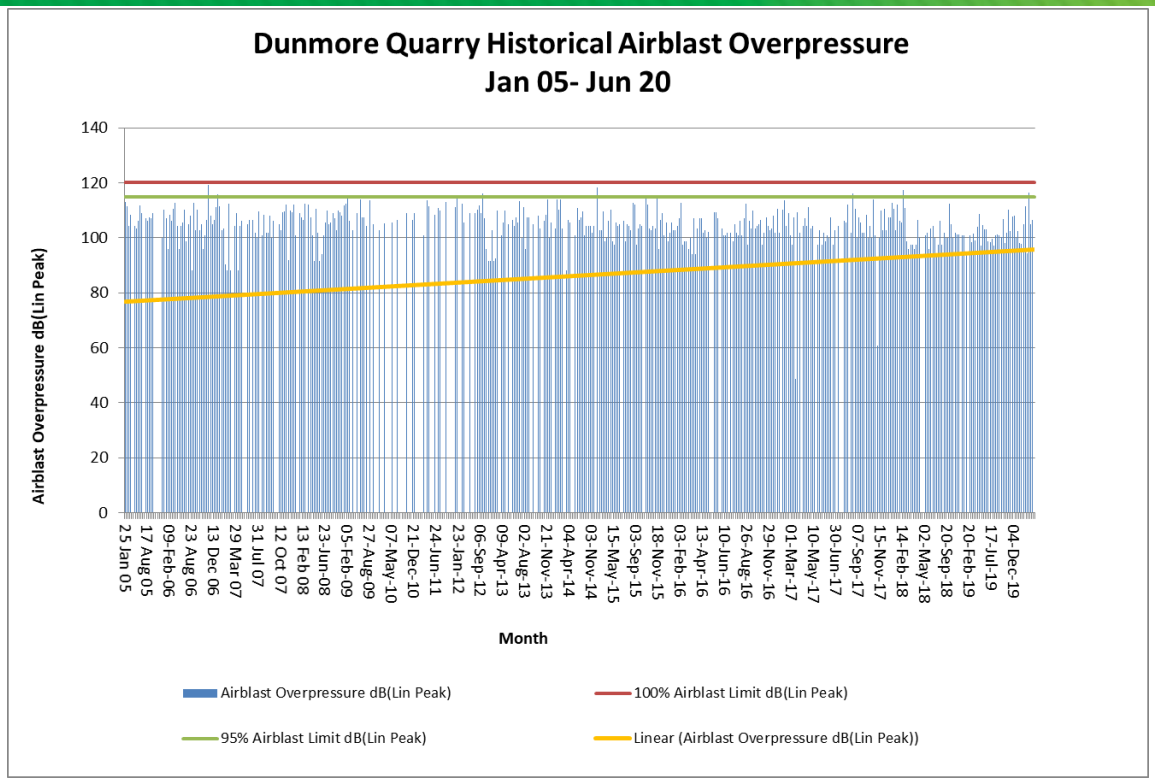

Figure 15 Historical Airblast Overpressure Monitoring Data

It can be seen from the above figures that there has been a steady increase in the value of the measured data as operations continue west, which is to be expected based on the location of the monitoring points.

6.3.4. Blast Monitoring Summary and Opportunities for Improvement

As a result of the ground vibration reading recorded on 15 June, 2020, where a blast was measured at 5.83mm/s, a site law has been developed that allows for better prediction of vibration in the blast design phase.

In addition, the blast monitoring equipment will be relocated and placed on permanent fixings on an exposed rock shelf, rather than on a concrete plinth buried into the soil. This will limit instances where the soil properties and wet weather conditions can affect the ground vibration reading at the monitor.

6.4. Noise Monitoring

Annual Noise Monitoring is undertaken each year during winter to determine the contribution of the quarry to noise levels at nearby private residence. The current reporting period was the second reporting period where the new monitoring points were assessed under the post-MOD 9 approval. The monitoring results demonstrated compliance with the prescribed assessment criteria during all monitored time periods.

6.4.1. Noise Monitoring Impact Assessment Criteria

Condition S4.C4 outlines the relevant noise assessment criteria adopted for the annual monitoring that is replicated in Table 16 below. The location of the monitoring points are represented by NM-1 to NM-5, as displayed in Figure 16.

Noise monitoring is completed in July each year, which is a period that typically represents the worst case meteorological conditions for noise propagation.

Table 16 Noise Monitoring Impact Assessment Criteria

Receiver Location	Noise Limits dB (A)					
	LAeq (15 minute)				LAeq (1 minute)	
	Day	Evening	Night	Shoulder	Night	Shoulder
Location K Stocker Residence	49	44	38	47	48	55
Location O Dunmore Lakes	49	44	38	47	48	55
Location J Creagan Residence	Negotiated Agreement in Place					
Location AA	38	38	38	38	45	45
Locations AB and T	36	36	36	36		
Location D,F,G and Z	40	40	40	40		
Location S	37	37	37	37		
Other privately owned residence	35	35	35	35		

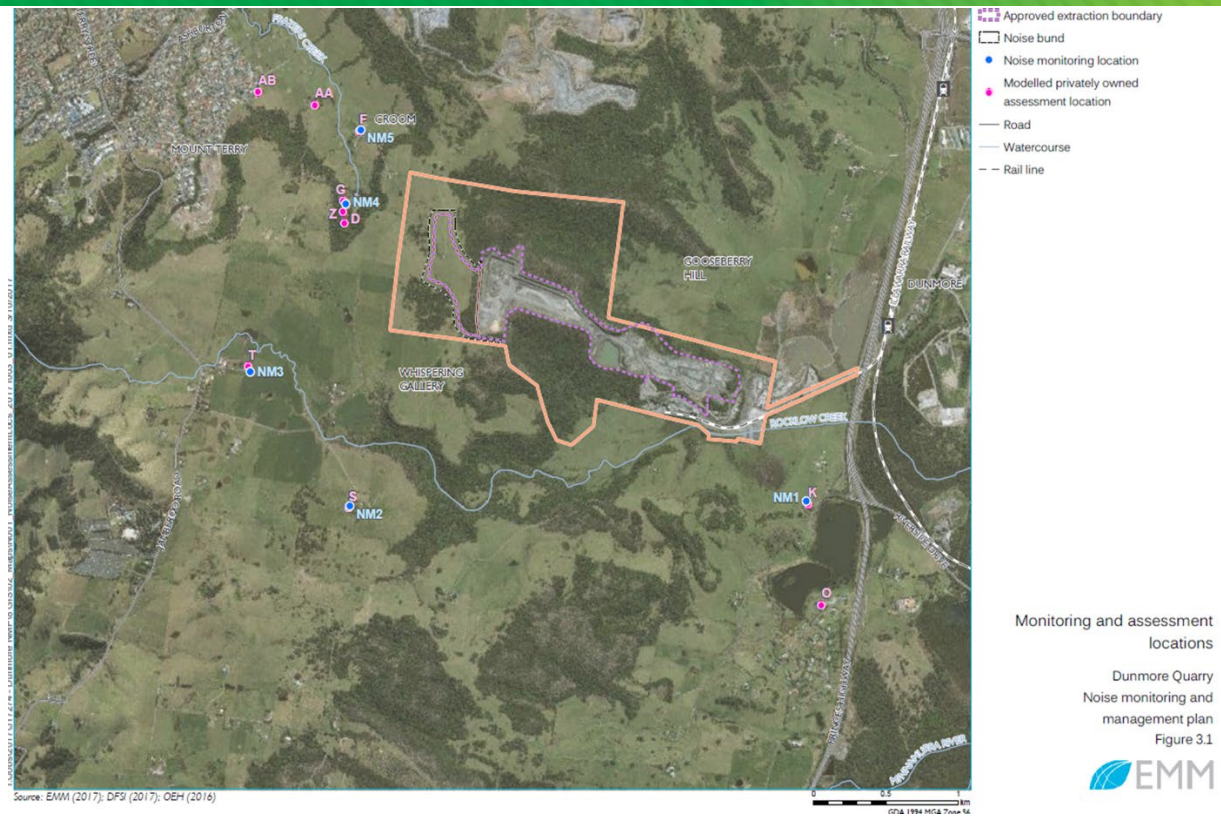

Figure 16 Noise Monitoring Locations

6.4.2. Noise Monitoring Performance Review

A summary of the attended noise monitoring results against the modelled MOD 9 quarry operations is shown below in Table 17.

Table 17 Summary of Noise Monitoring Data

Post Modification 9 Noise Monitoring Results NM1 (representative of resident K and O)				
	Day	Evening	Morning Shoulder	
Noise	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(1min)
Limit	49	44	47	55
Predicted	35	35	35	
2018	40	40	40	50
2019	45	41	47	55
Post Modification 9 Noise Monitoring Results NM2 (representative of resident S)				
	Day	Evening	Morning Shoulder	
	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(1min)
Limit	37	37	37	45
Predicted	35	35	35	

2018	30	30	30	32
2019	33	30	32	40
Post Modification 9 Noise Monitoring Results NM3 (representative of resident T)				
	Day	Evening	Morning Shoulder	
	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(1min)
Limit	36	36	36	45
Predicted	35	35	35	
2018	35	35	35	40
2019	32	30	31	40
Post Modification 9 Noise Monitoring Results NM4 (representative of resident G,D,Z)				
	Day	Evening	Morning Shoulder	
	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(1min)
Limit	40	40	40	45
Predicted	35	35	35	
2018	30	30	30	30
2019	33	30	31	40
Post Modification 9 Noise Monitoring Results NM5 (representative of resident F, AA,AB)				
	Day	Evening	Morning Shoulder	
	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(1min)
Limit	40	40	40	45
Predicted	35	35	35	
2018	30	30	30	30
2019	35	30	34	40

During the reporting period, the noise levels recorded at the monitoring points were compliant with the prescribed limits during all time windows. Prior to MOD 9, location K and O (now monitored under NM-1) had been monitored separately. Location A was acquired by Boral in 2016 and as such is no longer monitored.

6.4.3. Noise Monitoring Long Term Analysis and Trends

There has only been two years of monitoring under the current monitoring program, post-approval of MOD 9 operations, and over time, trends will become more apparent. NM-1 has been monitored for a number of years as part of the previously approved monitoring program. The trends of NM-1 over the last 13 years can be seen below in Figure 17. A

summary of the noise monitoring results post-MOD 9 approval can be seen in Figure 18 to 22 below.

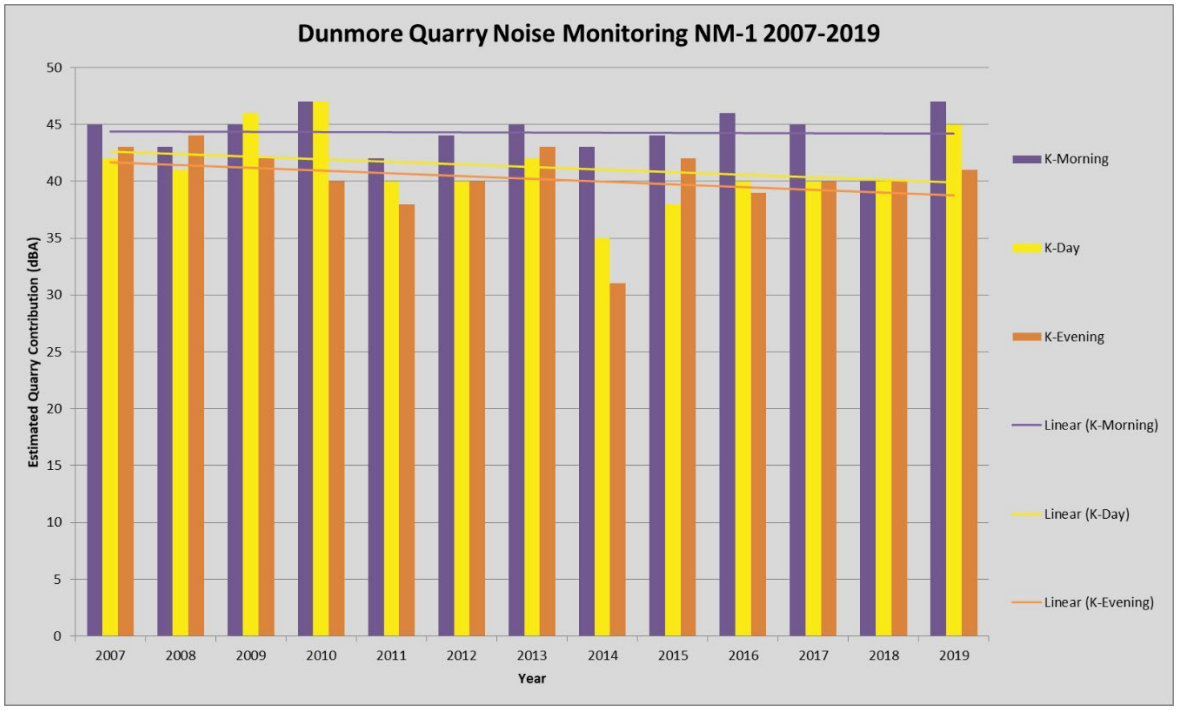

Figure 17 NM1 Historical Noise Monitoring Data

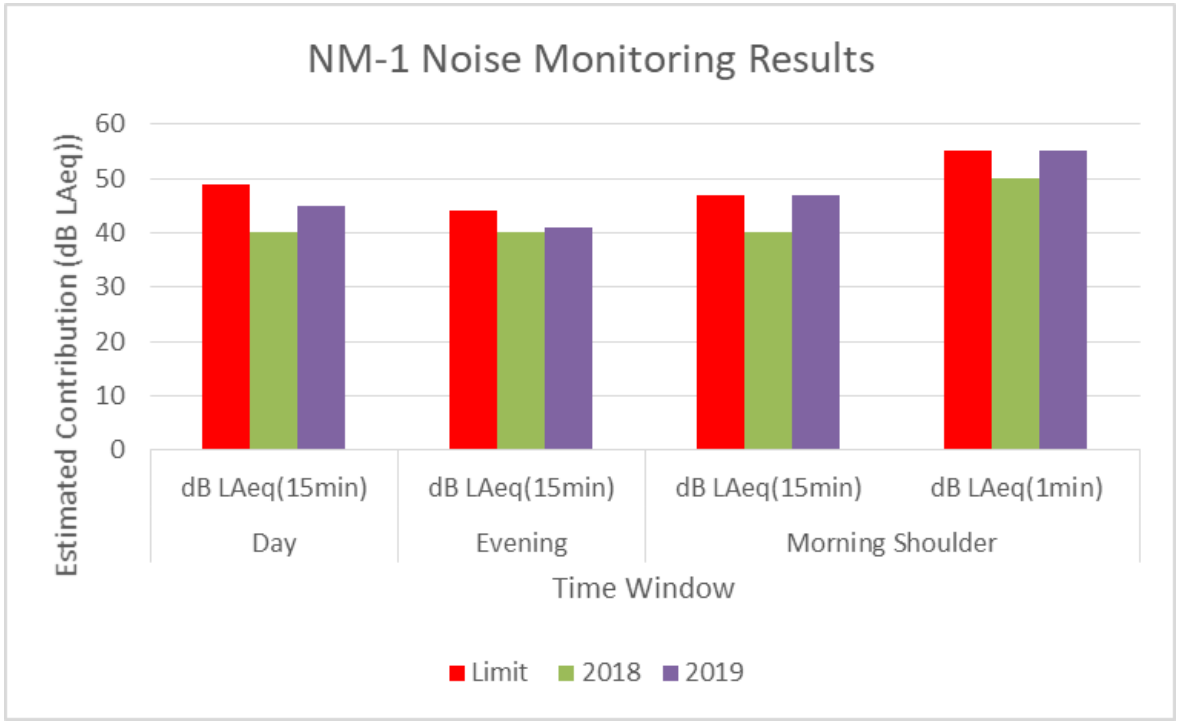

Figure 18 Post MOD 9 NM-1 Noise Monitoring Data

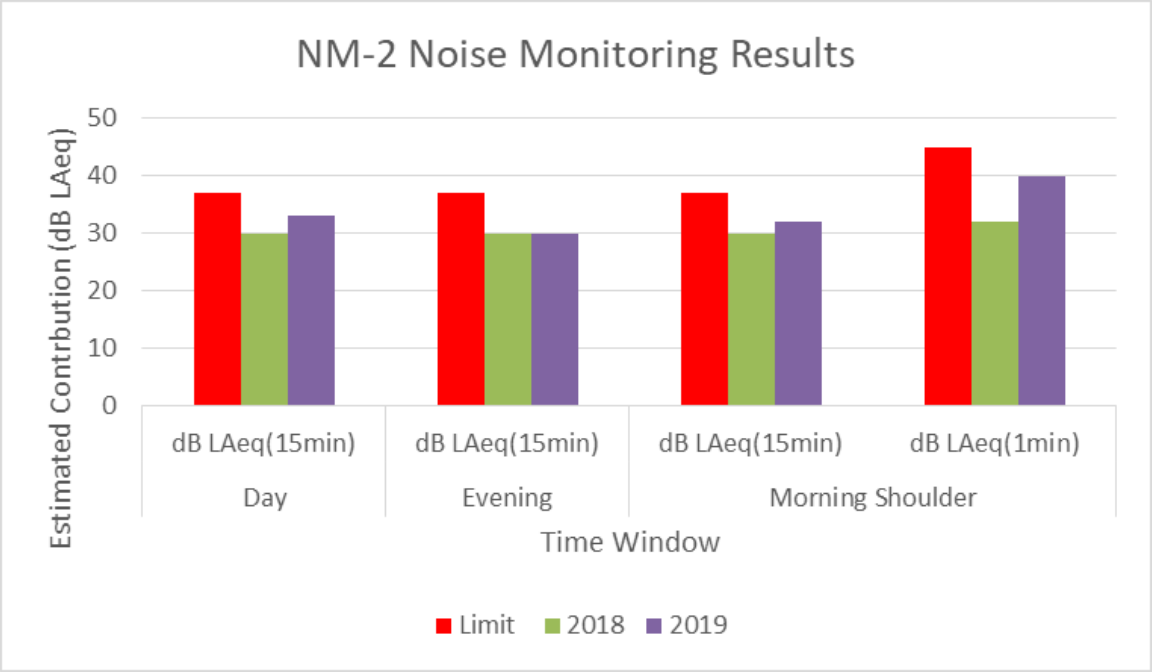

Figure 19 Post MOD 9 NM-2 Noise Monitoring Data

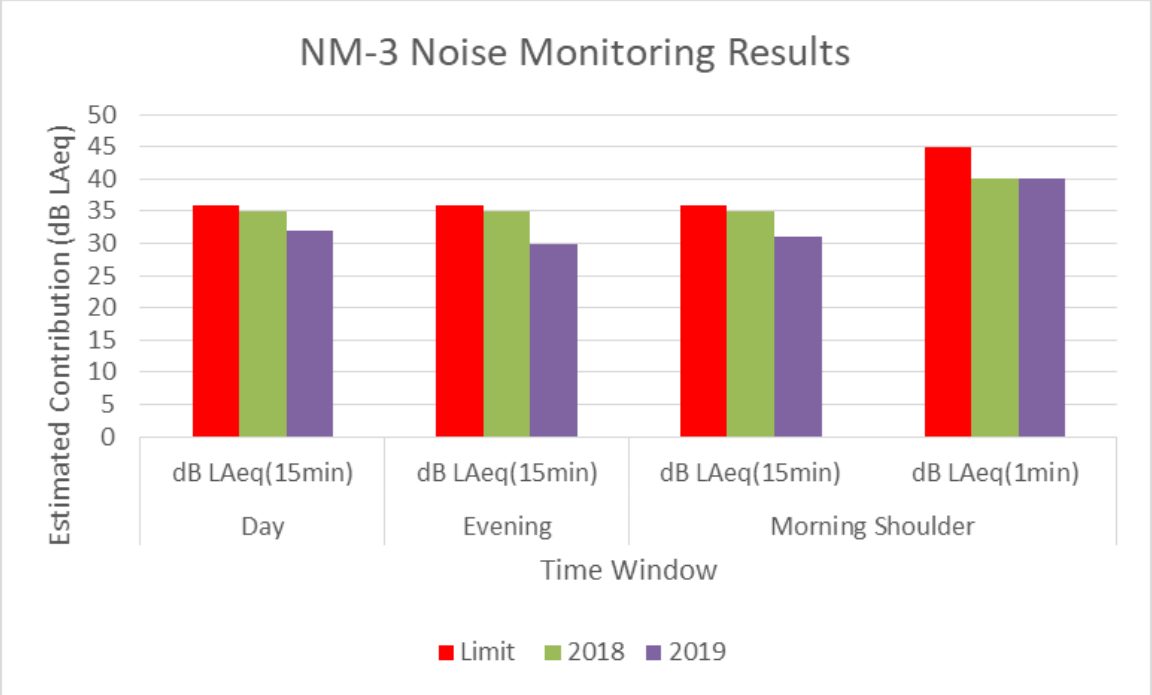

Figure 20 Post MOD9 NM-3 Noise Monitoring Data

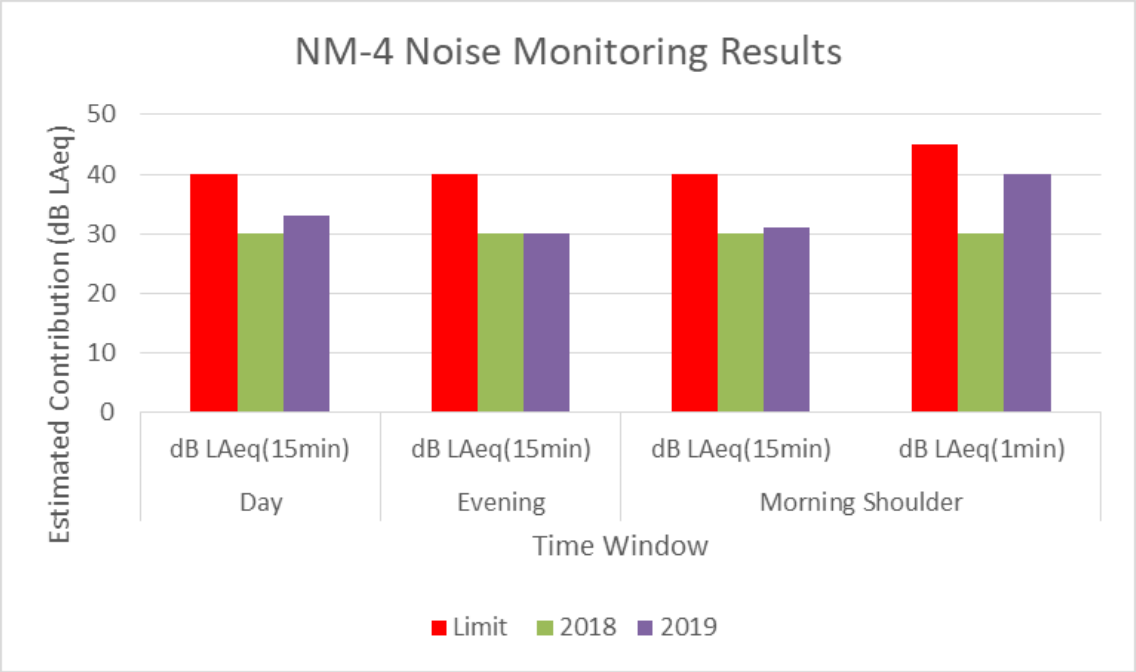

Figure 21 Post MOD 9 NM-4 Noise Monitoring Data

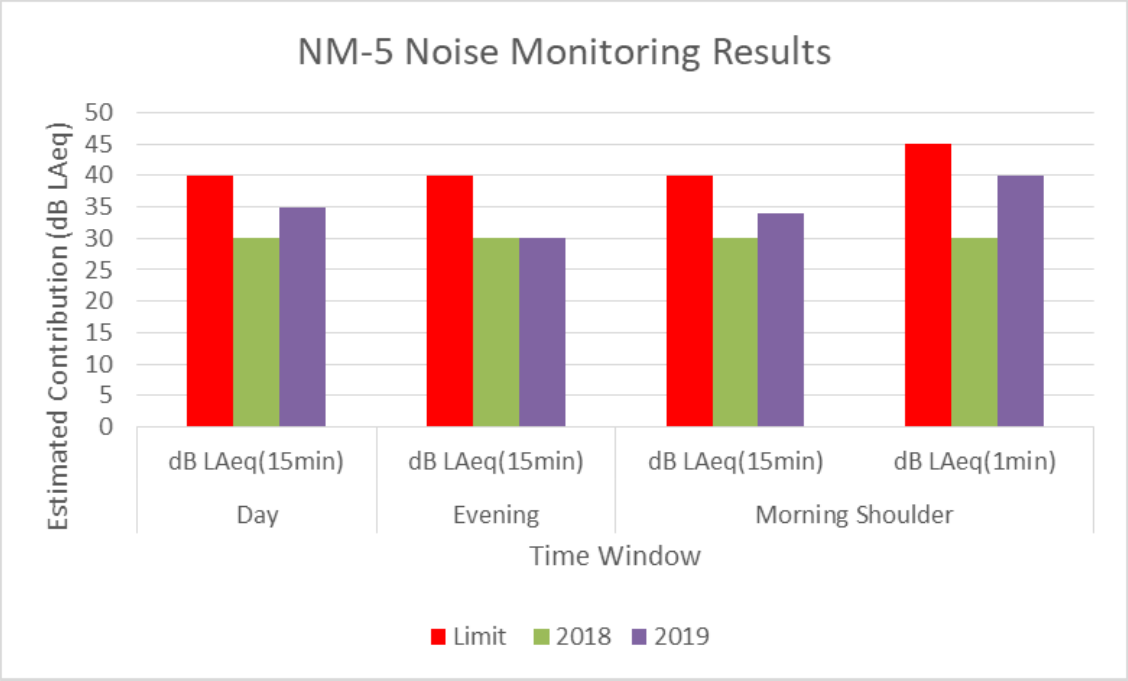

Figure 22 Post MOD 9 NM-5 Noise Monitoring Data

Typically at the NM-1 location, noise measurements values have decreased or remained stable over time. For the NM-1 to NM-5 locations, noise monitoring results for the current reporting period were higher than for the previous year but still below the compliance limits.

6.4.4. Noise Monitoring Summary and Opportunities for Improvement

As previously discussed, all data collected from the noise monitoring points were below the relevant limits in the consent. Noise monitoring will continue as per previous years, where it is expected that as operations move down the pit face, the measured noise values will

decrease for the western monitoring points. Access to real time weather data is expected to continue to assist and inform site operations.

6.5. Surface Water Monitoring

An updated Water Management Plan was submitted to the DPIE Water in the current reporting period but has yet to be approved. As a result, the monitoring and operations follow procedures outlined in the Arcadis Dunmore Quarry Water Management Plan (2016).

During normal operations, the Lower Dam is kept offline to Rocklow Creek, however in the case of high rainfall, there is potential for floodwaters to back up around the narrow bend of the creek and inundate the Lower Dam, causing it to fill and create a mixing zone with waters from Lower Dam, compromising its storage capacity. Upgrades described in the submitted Water Management Plan, currently pending approval, details a range of improvements to prevent such a phenomenon as described in Section 6.5.5.

Figure 23 outlines the water quality monitoring points for the most recently approved Aracadis WMP

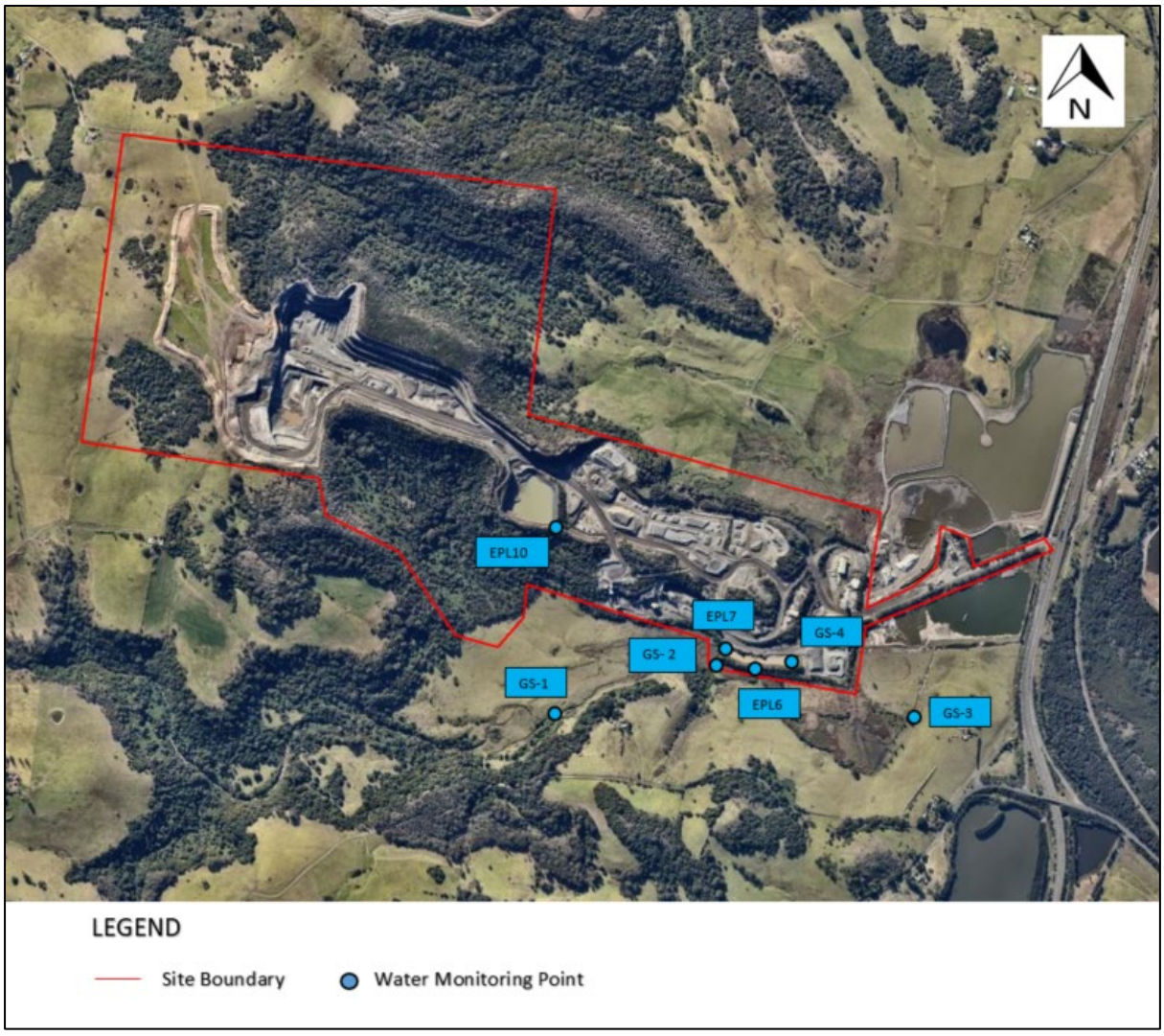

Figure 23 Surface Water Monitoring Locations

6.5.1. Surface Water Quality Impact Assessment

Conditions S4.C28 defers discharge limits under the consent to the limits imposed by EPL 77, which states that the site will comply with discharge limits from EPL 77 condition L2.4 and Section 120 of the POEO Act. EPL 77 describes discharge limits at the licenced

discharge point for controlled discharge at the site via the bio-filtration swale located at EPL6. Whereby, Total Suspended Solids must not exceed 50mg/L at this point. A second discharge point is nominated in EPL 77 for uncontrolled discharge at the spillway located at the Lower Dam at EPL7.

Monthly monitoring is undertaken at the Lower Dam at Rocklow Creek locations GS-1, GS-2 and GS-3 to determine the ambient conditions upstream, those in the immediate vicinity of the Lower Dam spillway and the downstream conditions, respectively.

Monitoring is also undertaken daily during any discharge event, either via the licenced controlled discharge point at EPL6, or the uncontrolled discharge point via the Lower Dam spillway at EPL7. Upstream and downstream monitoring points at Rocklow Creek are also sampled to determine if any impacts to water quality has occurred.

6.5.2. Surface Water Quality Performance Review

Monthly ambient water quality monitoring of the Lower Dam at GS-4/EPL#8 is shown below in Table 18. For comparison, monitoring points upstream (GS-1) and downstream (GS-2 and GS-3) of the Lower Dam are also shown to indicate the typical water quality along Rocklow Creek. Please note there are no discharge limits applicable to the ambient water quality of the dam as it is offline of Rocklow Creek during normal operations.

Table 18 current reporting period Surface Water Monitoring Summary

	GS-1 Upstream of Rocklow				EPL#8 Lower Dam				GS-2 Downstream of Rocklow Mixing Zone				GS-3 Downstream of Rocklow at Property Boundary			
Month	pH	Turbidity (NTU)	EC (µS/cm)	TSS(mg/L)	pH	Turbidity (NTU)	EC (µS/cm)	TSS	pH	Turbidity (NTU)	EC (µS/cm)	TSS(mg/L)	pH	Turbidity (NTU)	EC (µS/cm)	TSS(mg/L)
Jul-19	Site Dry	site dry	site dry	site dry	8.4	75.3	820	80	site dry	site dry	site dry	site dry	7	15.9	782	22
Aug-19	Site Dry	site dry	site dry	site dry	8.4	37	3160	33	site dry	site dry	site dry	site dry	site dry	site dry	site dry	site dry
Sep-19	Site Dry	site dry	site dry	site dry	8.2	65	1255	26	site dry	site dry	site dry	site dry	site dry	site dry	site dry	site dry
Oct-19	Site Dry	site dry	site dry	site dry	8.1	21	1090	14	site dry	site dry	site dry	site dry	site dry	site dry	site dry	site dry
Nov-19	6.6	310	546	558	7.7	95	1167	78	7.4	9	526	14	site dry	site dry	site dry	site dry
Dec-19	Site Dry	site dry	site dry	site dry	8.3	14	4530	12	site dry	site dry	site dry	site dry	site dry	site dry	site dry	site dry
Jan-20	Site Dry	site dry	site dry	site dry	8.2	37	3370	32	site dry	site dry	site dry	site dry	site dry	site dry	site dry	site dry
Feb-20	6.7	1.4	416	14	8.4	15	974	13	6.6	11	514	36	6.8	15	564	50
Mar-20	7.4	5.4	514	13	7.9	21	1099	22	7.2	2.7	651	7	6.8	12	637	44
Apr-20	7.5	4.4	452	11	8	24	995	22	7.6	6.1	628	33	7.8	14	610	21
May-20	6.8	2.4	443	3	8.1	85	898	37	7	8.3	609	8	7.2	5.8	633	5
Jun-20	7.1	5.5	624	< 0.1	7.1	2.3	488	15	8.2	32	969	2	7	4.1	615	149
FY20 Av	7.0	54.9	499.0	119.8	8.1	41.0	1653.0	32.0	7.3	11.5	650.0	16.7	7.1	11.1	640.0	48.5

Monthly monitoring results at Rocklow Creek indicate the following:

- Ambient conditions upstream of the Lower Dam at GS-1 are occasionally elevated compared to the WQOs and discharge limits. This is likely due to the area being utilised for active cattle grazing and agricultural purposes. Cattle tend to stir up water during grazing and are often observed within Rocklow Creek during monthly sampling events (see Figure 24 and 25). Water levels were very low or dry due to extended dry spells/drought conditions,
- Ambient conditions in the vicinity of the mixing zone at GS-2 were typically within discharge limits. Water levels were very low or dry due to extended dry spells/drought conditions,
- Ambient conditions at GS-3 located downstream of Rocklow Creek were generally within the discharge parameters. This location is sometimes dry, is affected by saline tidal inflow and impacted by cattle grazing. During dry periods, water levels tend to be quite low. Cattle tend to stir up water during grazing and are often observed within Rocklow Creek during monthly sampling events.

Figure 24 Cattle Grazing at GS-1

Figure 25 Cattle Grazing at GS-3

There was one major rainfall event in February 2020, which led to discharge from the Lower Dam via the spillway at EPL7. During this event, 220mm fell from 7 February to 10 February, 2020, which led to site closures due to regional flooding. This volume of rainfall was well outside the dam design capacity for the 95th percentile 5 day rainfall event (90.7mm). Responsive sampling was delayed until 11 February, 2020 as per the condition M2.3 note in EPL 77, due to safety and access concerns, with the EPA notified and satisfied with the arrangements.

On 16 and 17 February, 2020, a further 20.6mm of rainfall, causing the existing floodwaters from Rocklow Creek to rise up over the spillway and into the Lower Dam, which in turn,

overflowed and spilled over. The floodwaters of Rocklow Creek then formed a mixing zone with the waters from the Lower Dam. Turbid water was visible both downstream and upstream of the spillway near the mixing zone at GS-2. Improvements to the WMP, currently under assessment, address methods to reduce instances of floodwater from Rocklow Creek inundating the Lower Dam, compromising its storage capacity. These improvements are summarised in Table 20 in Section 6.5.5.

A summary of the wet weather sampling is shown below in Table 19.

Table 19 Wet Weather Surface Water Monitoring Summary

Wet Weather Discharge Monitoring					
Sample	**Date**	**pH**	**Turbidity (NTU)**	**Conductivity (µS/cm)**	**TSS (mg/L)**
GS-1	11/02/2020	7	4.4	314	5
EPL#7	11/02/2020	7.7	87.4	640	31
GS-2	11/02/2020	7.1	40.9	533	20
GS-3	11/02/2020	6.7	4.3	352	5
GS-1	12/02/2020	7.19	3.5	406	<5
EPL-7	12/02/2020	7.84	56.7	788	18
GS-2	12/02/2020	7.45	14.3	552	9
GS-3	12/02/2020	7.03	2.7	403	<5
GS-1	13/02/2020	6.6	1.6	378	<5
EPL#7	13/02/2020	7.8	89	681	30
GS-2	13/02/2020	7	40.7	498	16
GS-3	13/02/2020	6.6	1.8	381	<5
GS-1	14/02/2020	6.8	1.7	338	<5
EPL#7	14/02/2020	7.4	48	731	25
GS-2	14/02/2020	6.9	18	551	8
GS-3	14/02/2020	6.6	2.2	342	<5
GS-1	17/02/2020	7.1	2.2	386	6
EPL#7	17/02/2020	7.5	15.4	797	12
GS-2	17/02/2020	7.1	10.1	676	15
GS-3	17/02/2020	6.6	2.3	446	12

It can be seen that at the EPL#7 sampling location, the TSS value was below 50mg/L and pH was within 6.5-8.5 for all samples collected during the high rainfall event.

6.5.3. Surface Water Long Term Analysis and Trends

The Lower Dam ambient water quality throughout the current reporting period was below average for TSS and turbidity and relatively consistent for pH. Conductivity was slightly higher for the current reporting period when compared to the overall average. The increase in conductivity is likely due to the dry conditions experienced throughout the year where evaporation was typically greater than rainfall. These trends are visible in Figure 26 to Figure 29 below.

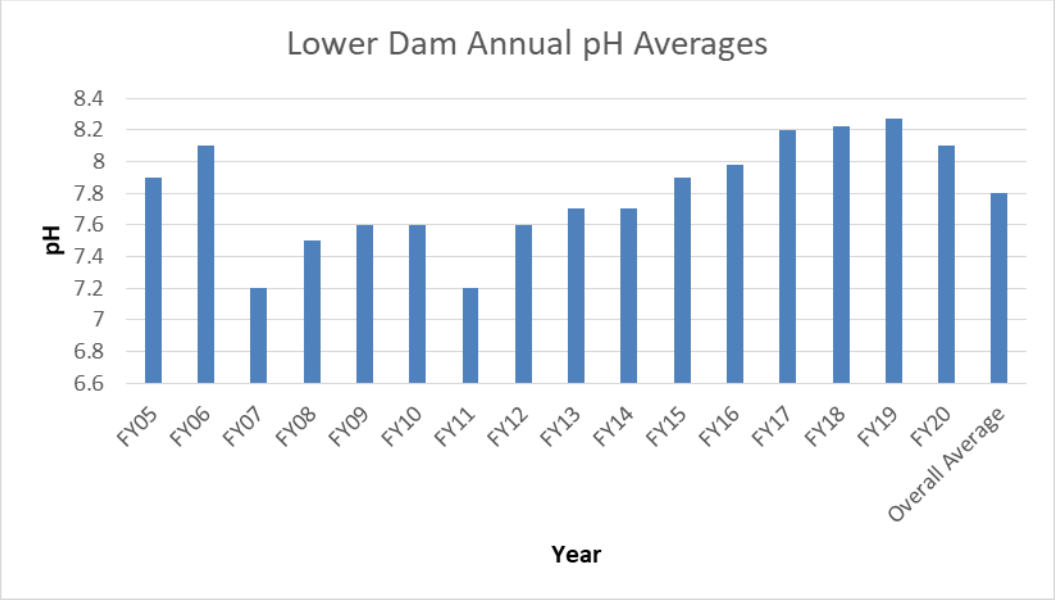

Figure 26 Lower Dam pH Historical Monitoring Summary

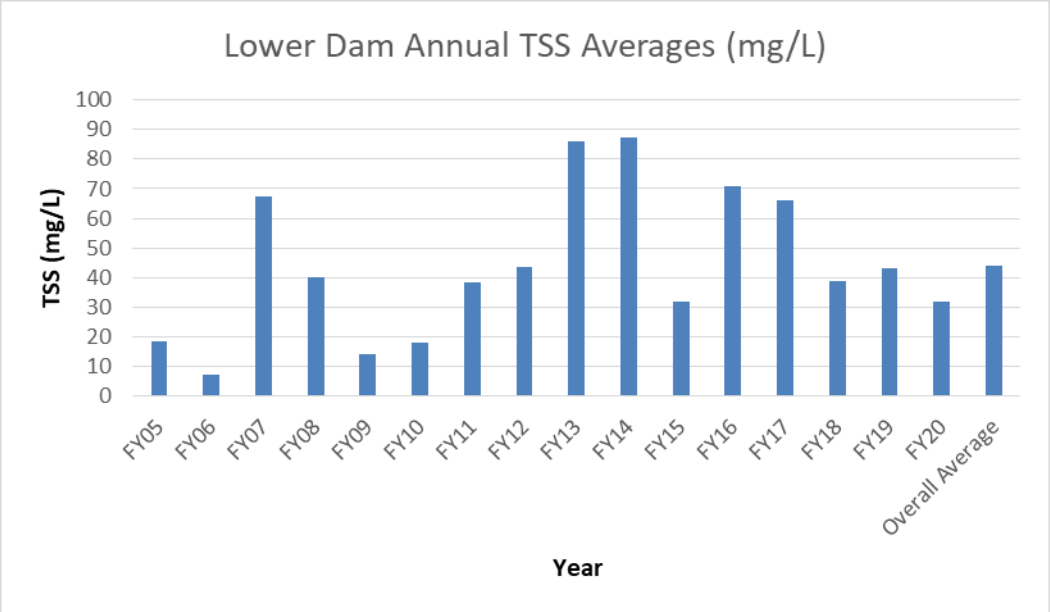

Figure 27 Lower Dam TSS Historical Monitoring Summary

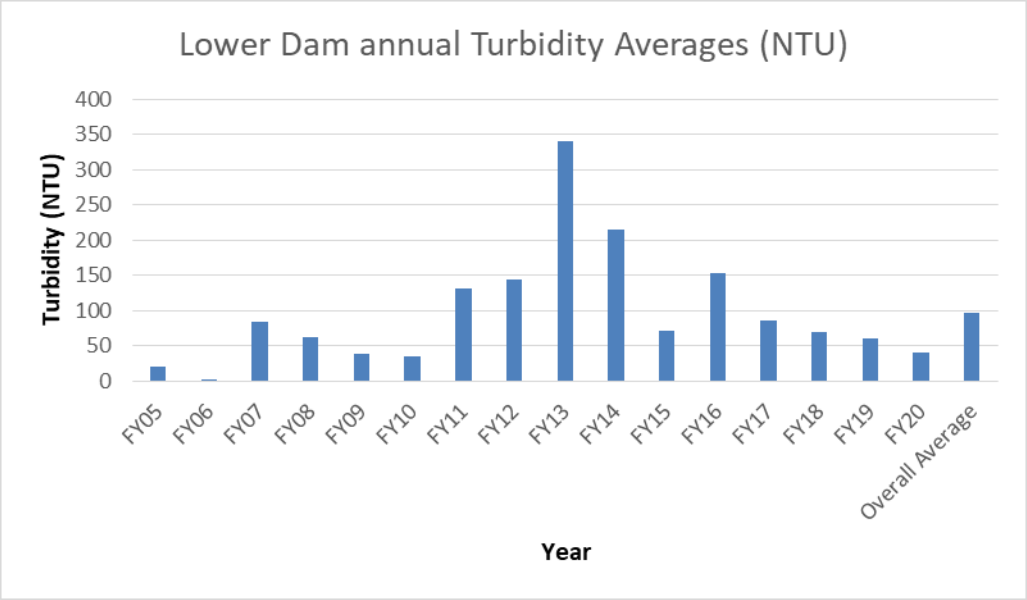

Figure 28 Lower Dam Turbidity Historical Monitoring Summary

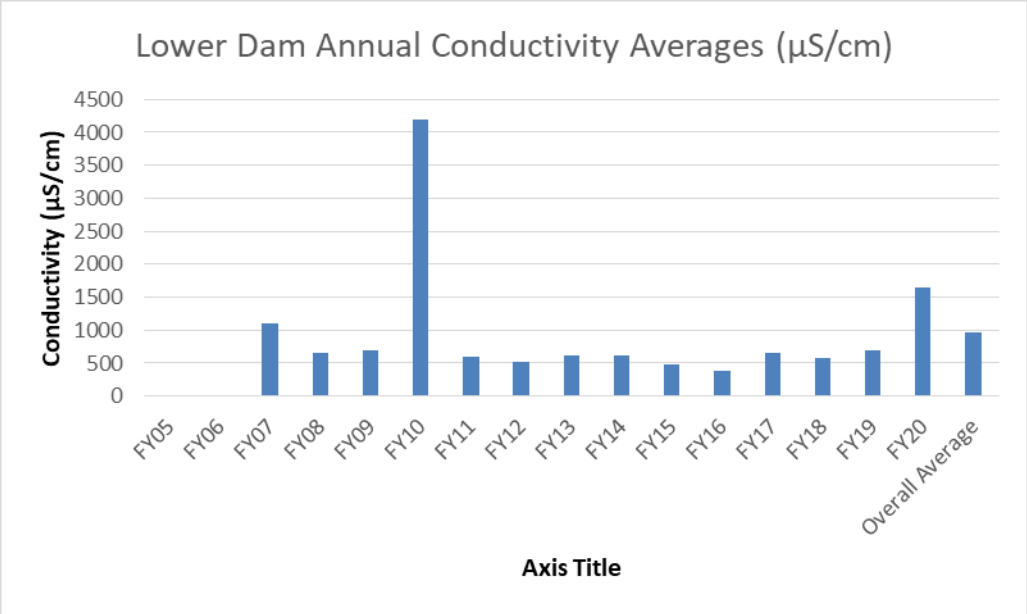

Figure 29 Lower Dam Conductivity Historical Monitoring Summary

6.5.4. Water Balance and Consumption

The majority of surface water runoff from the quarry is captured in the site water management dams. Captured surface water runoff is either reused as process water within the quarry operation, lost to evaporation or seepage, or discharged to receiving waters. Licenced surface water take from WAL#25152 is 227ML/year from Rocklow Creek via a 100mm centrifugal pump. No water take was initiated from Rocklow Creek during the reporting period. WaterNSW has delayed rollout of the new non-urban water metering framework for coastal regions until 1 December 2023 for pumps below 500mm.

All process water was sourced from either the Lower Dam, Middle Dam or Croome Sumps, which are offline from Rocklow Creek, as per the water management upgrades undertaken in 2008 under MOD 4 of DA 470-11-2003. The location of the water storage infrastructure is shown below in Figure 30.

Figure 30 Water Storage Areas at Dunmore Quarry

The updated WMP, currently under assessment, outlined a range of water balance scenarios based on different climatic conditions. The dry year scenario (10th percentile 791mm rainfall) best reflects rainfall for the current reporting period (annual rainfall was 761mm) as shown in Figure X. As a result the process water use was modelled to be 188ML for the reporting period with a change of storage of 2ML over the year.

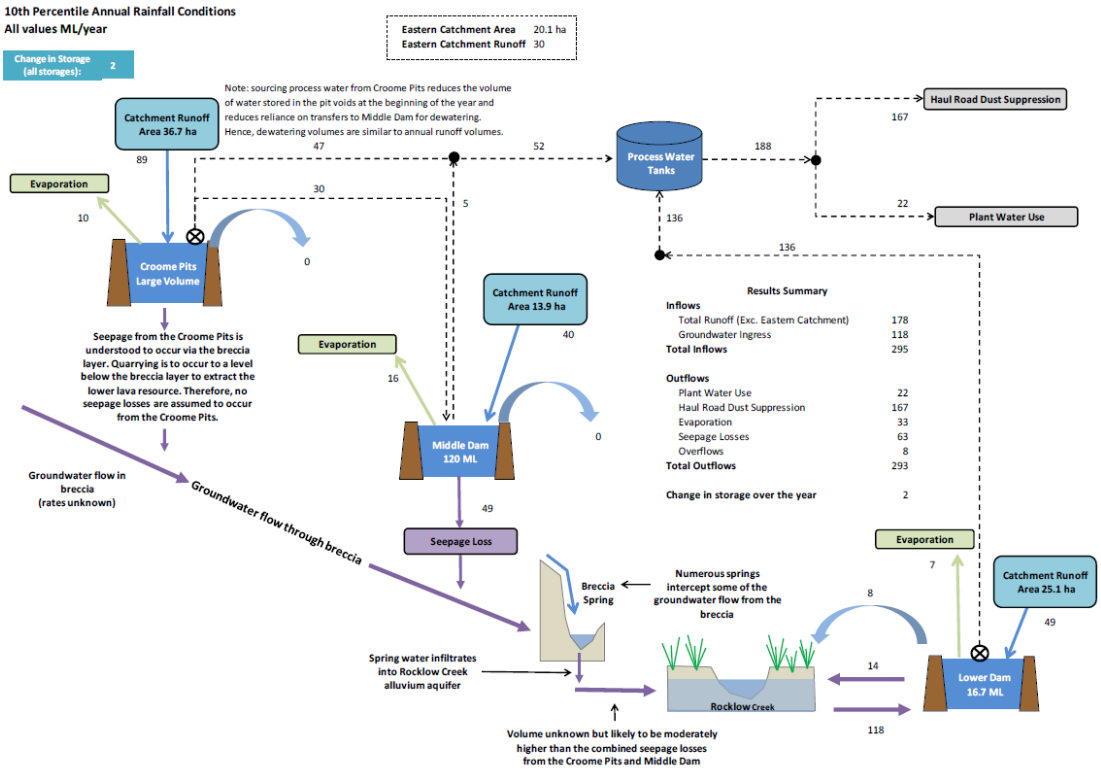

Figure 31 Existing Water Management System Typical Dry Year Water Balance

6.5.5. Surface Water Quality Summary and Opportunities for Improvement

A new water management system was devised as part of the MOD 9 Surface Water Assessment where a number of improvements were proposed. It is a requirement of condition S4C35A that the Lower Dam is not altered until approval of the Lower Dam Transition Plan is obtained. The improvements to the water management system outlined in the updated WMP, which is currently under assessment, will reduce the instances where Rocklow Creek inundates the Lower Dam causing it to fill up. A summary of these improvements is reproduced in Table 20 below.

Table 20 Proposed Water Management Upgrades in Water Management Plan, currently under assessment

Proposed Modification	Outcome
Relocate spillway to south-east side of the dam where Rocklow Creek levels are expected to be lower during large runoff events. Relocate primary sedimentation chamber to western end of dam. Raise embankment at existing spillway location from 2.8 to 4.0 m AHD.	• Significantly reduce the frequency of uncontrolled inflows from Rocklow Creek inundating the Lower Dam. • Improve water treatment function of Lower Dam during Rocklow Creek flood events. • Inflows will occur at the opposite end of the dam to outflows, resulting in longer residence time and improved sediment treatment function. • Provide vehicle access to primary sedimentation chamber to allow for sediment removal as required
Extend the dam footprint to the east by approximately 1,600m^2 and excavate to 2.0m AHD.	• Provide an additional 1.1 ML of storage above 2.0 m AHD. • Establish a macrophyte zone near the dam outlet.
The relocated spillway will have an invert level of 3.1m AHD, which will be 300 mm higher than the existing level (2.8 m AHD).	• Reduce the frequency of Rocklow Creek floodwaters inundating the Lower Dam. • Provide an additional 2.0 ML of storage above 2.0 m AHD.
Establish macrophyte zone within extended dam footprint area.	• Provide beneficial water quality treatment during significant rainfall (discharge) events.

6.6. Ground Water Monitoring

As a result of the Dunmore Quarry Western Expansion, EMM Consulting Pty Ltd has published an annual groundwater monitoring report. This report is included in full within Appendix X. The monitoring program uses the established down-gradient bores at Dunmore Sand and Soil (DG-31, DG-59 and BH-F and three established up-gradient bores at Dunmore Quarry (GW-1, GW-2 and GW-3). The locations of Groundwater monitoring bores are shown below in Figure 32.

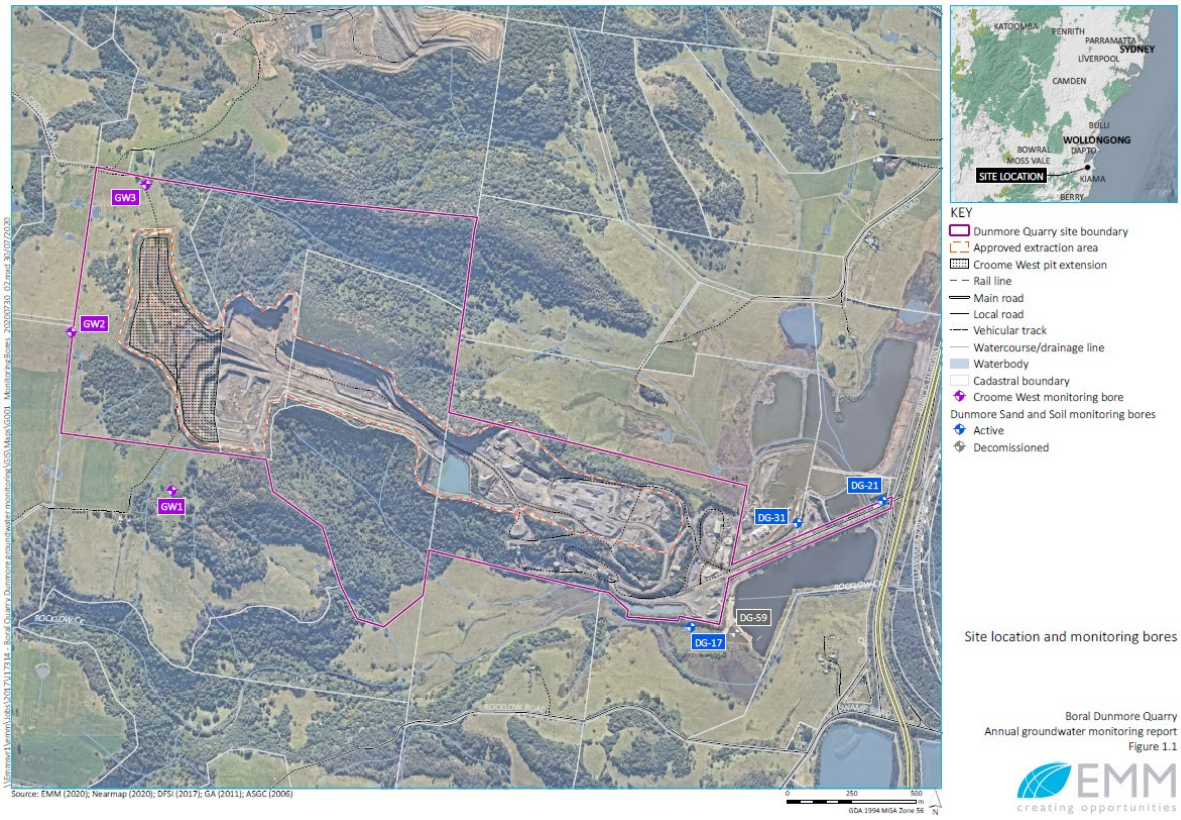

Figure 32 Groundwater Monitoring Locations

The GW monitoring bores are located at a higher hydraulic gradient than the current quarrying activities and are therefore considered representative of baseline conditions (for both water levels and quality). Groundwater monitoring activities undertaken for the up-gradient bores include six-hourly groundwater level measurements and six monthly groundwater sampling events.

6.6.1. Groundwater Monitoring Impact Assessment Criteria

Groundwater impacts relating to quality and water levels for the bores located in the down-gradient locations are assessed in relation to the up-gradient (baseline) conditions, located in bores GW-1, GW-2 and GW-3 and against the site conceptual model, which was formulated as part of the MOD 9 Croome West Expansion.

6.6.2. Groundwater Monitoring Performance Review

Groundwater levels are recorded every six-hours, allowing water level trends to be identified in the alluvium and the Bumbo Latite. Continued six monthly sampling of water quality at the Croome West sites and quarterly sampling at the DSS sites have established useful trends.

The main findings for the current reporting period regarding water levels are:

- Groundwater levels in the alluvium at the adjacent DLSP sites continue to show a direct response to rainfall, showing a decline during the dry conditions up to January 2020, and a recovery due to wet conditions in February 2020;
- Groundwater levels in the Bumbo Latite monitoring bores are steady at GW2 and GW3, and show some fluctuation associated with rainfall at GW1, particularly following rainfall in February 2020.

The main findings for the current reporting period regarding groundwater quality are:

- Groundwater quality at the alluvial monitoring sites was generally consistent with historical data, except for major ions showing a chloride influence at DG21 and DG31.
- Groundwater quality at the Croome West sites is consistent with previous monitoring years. Some metals concentrations were elevated in the December 2019 results, but returned to the typical range in the June 2020 results.

The results for the current reporting period are consistent with the conceptual model for the project. There does not appear to be any impact on groundwater levels or quality in the Bumbo Latite or Kiama Sandstone associated with the Croome West pit extension activities.

6.6.3. Groundwater Monitoring Summary and Opportunities for Improvement

It is recommended that groundwater level monitoring via data loggers continues at six-hourly intervals and that groundwater quality monitoring continues at the six-monthly frequency at the Bumbo Latite monitoring bores, and at approximately quarterly intervals at the DLSP sites in accordance with the GMP. As per condition S4.C43, upon the provision of two years of negligible impact on groundwater monitoring network, the Secretary may agree to suspend regional groundwater levels and/or quality monitoring activities.

6.7. Flora and Fauna Management and Rehabilitation

Most areas of the DQ site are currently operational and as such rehabilitation is not able to commence on the majority of areas within the quarry until the completion of extraction activities. When practical, progressive rehabilitation of the site will be undertaken in conjunction with on-going quarrying works. Rehabilitation activities undertaken to date have been in accordance with the updated Flora and Fauna Management by EMM (2019) and Rehabilitation Management Plan prepared by Arcadis (2016).

There are three (3) designated conservation areas for Dunmore Quarry as shown in Figure 33 below

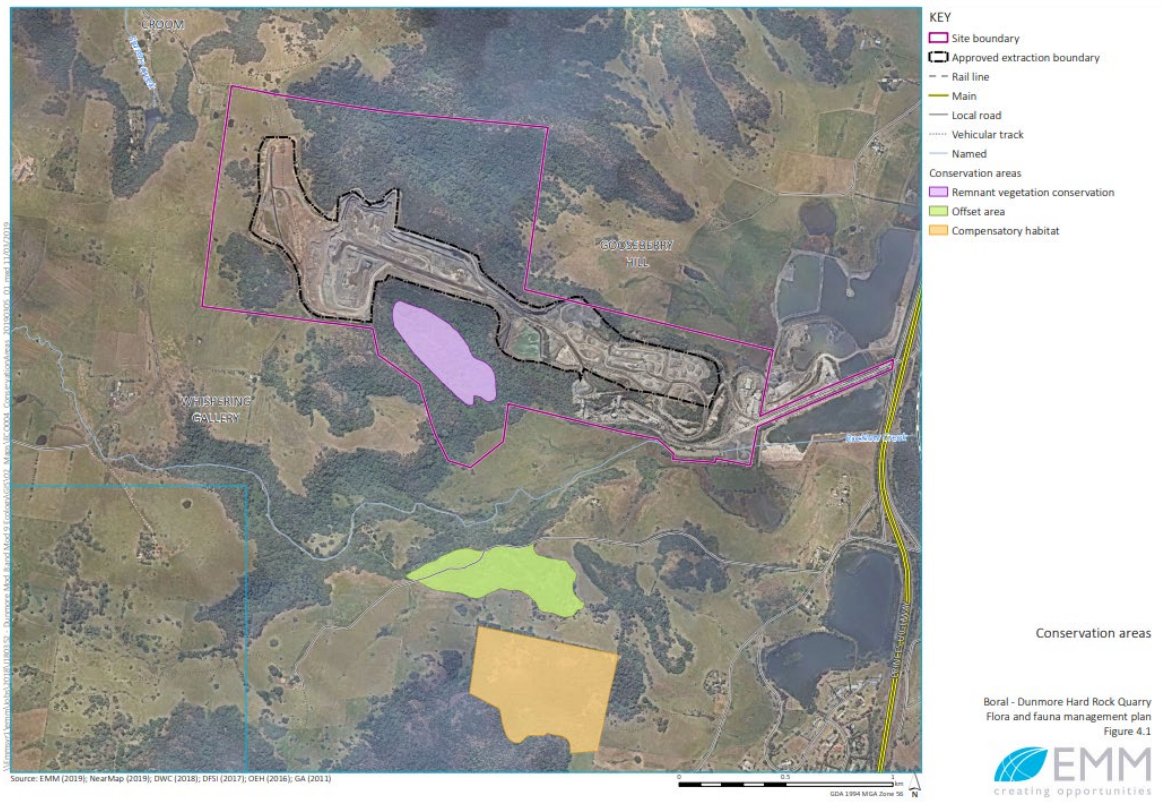

Figure 33 Location of Rehabilitation and Offset Areas

These are the Compensatory Habitat Area (CHA), Remnant Vegetation Conservation Area (RCVA) and Offset Area (OA). Works in the last reporting period focussed on the CHA and OA and is summarised in the Annual Monitoring report located in Appendix F.

In the last 12 months, rehabilitation within the quarry itself has continued on the Croome West amenity bund. Hydro-seeding took place in the northern section of the bund in 2018 and 2019 with more infill seeding to occur in the next reporting period.

6.7.1. Flora and Fauna Impact and Rehabilitation Assessment Criteria

Rehabilitation completion criteria was designed and presented in the updates to the FFMP, which was approved in June 2019.

The following completion criteria are outlined for the Compensatory Habitat Area:

- Establishment of a dominant native canopy cover across the Compensatory Habitat Area, as per below:

  - midstory canopy cover of 50% for areas of Melaleuca Armillaris Tall Shrubland; and
  - overstory canopy cover of 15% for areas of Illawarra Lowlands Grassy Woodland;
- Removal of woody weeds across the Compensatory Habitat Area; and
- Reduction in exotic groundcover to less than 30% over five consecutive monitoring periods.

Once the above completion criteria have been met, no further management of this area is required under this FFMP and Conditions 46(a) and 49 of DA 470-11-2003 are deemed to have been satisfied.

The following rehabilitation completion criteria are outlined for the Remnant Vegetation Conservation Area:

- Maintenance of high-quality intact remnants, with no significant change in cover of native species;
- Establishment of a dominant native canopy cover of 15% in the lower (south-eastern) portion of the Remnant Vegetation Conservation Area; and
- Establishment of a predominantly native (>50%) groundcover, with maintenance of this native groundcover over five consecutive monitoring periods.

Once these completion criteria have been met, no further management of this area is required under this FFMP, and Conditions 46(b) and 50 of DA 470-11-2003 are deemed to have been satisfied.

There is no completion criteria set for the offset area, as the area is managed through an in-perpetuity arrangement via a conservation agreement. A Conservation Agreement between the Minister administering the National Parks and Wildlife Act (1974) and Boral Resources for Dunmore Quarry was signed by NSW Minister for the Environment on February 2011. The NSW Minister for the Environment confirmed signing the Dunmore Quarry Conservation Agreement, and acknowledged that the Conservation Agreement satisfied condition 46A of DA 470-11-2003, for the long term security of the Offset Area.

For the bio-diversity offset strategy as part of the MOD 8 and 9 operations, Boral paid into BCT as per approved arrangements contained within the FFMP. This payment was processed in May 2020 and as such MOD 8 and 9 obligations has been marked as complete.

6.7.2. Flora and Fauna and Rehabilitation Performance Review

A summary of the bushland regeneration works undertaken within the three active bushland restoration zones is outlined in Bushland Restoration Project Final Report in Appendix X

6.7.2.1. Zone 1 Remnant Vegetation Conservation Area

Works within this zone consisted of primary weed control targeting woody weeds throughout the approximately 15 year old established revegetation. Large amounts of Wild Tobacco and Lantana were dominating the revegetation areas on the southern side of the creek, while encroachment of Kikuyu was impacting the plantings on the northern side of the creek. A total of 25,000m² of primary weed control was carried out within this zone.

Infill planting was scheduled for this zone but the fencing has fallen into disrepair. Cattle have accessed this site on a number of occasions. The hardwood stakes installed to monitor

the photo points were removed and lost and cow pats litter the floor throughout the worked areas.

6.7.2.2. Zone 2 Offset Area

During this contract period, bush regeneration works focused on secondary and primary weed control within the woodland remnants and the rainforest ecotone at the eastern extent of this zone. Rainfall has been adequate this year compared to last year and regeneration of weeds and natives has become more widespread. Mass regeneration of rainforest pioneer species as been a positive sign and several additional local native plants have appeared within this area over this past nine months.

Extensive primary weed control was carried out at the eastern extent of this zone during this contract period. Additional populations of the threatened plant species White Wax Flower (*Cynanchum elegans*) were located within the ecotone between the rainforest and woooland remnants. Mass regeneration of Illawarra Zieria (*Zieria granulata*) has been observed within some areas and *Homalanthus stillingiifolius* has emerged within the site having not been previously recorded.

6.7.2.3. Zone 3 Compensatory Habitat Area

Works within this contract period focused heavily on primary weed control throughout the established revegetation areas. Works commenced along the northern fence line that defines this zone and have continued south covering over 2ha. The western fence line defines the boundary of this work area and an old dry stone wall that divides the revegetation areas from the natural bushland was used to define the eastern boundary.

Work continued south focusing on primary weed control within the Melaleuca armillaris Tall Shrubland vegetation community and many individual plants of the threatened species Illawarra Zieria (*Zieria granulata*) were uncovered within this area.

Primary weed control works continued eastward from this point and a large subtropical rainforest remnant was reached that is dominated by several large and very old Moreton Bay Figs (*Ficus macrophylla*).

6.7.3. Flora and Fauna and Rehabilitation Summary and Opportunities for Improvement

Works will continue in line with completion criteria thresholds in the next reporting period. Repairs to the fence line of the RCVA is also scheduled for next reporting period to reduce instances of cattle intrusion.

6.8. Heritage Conservation

Kelleher Nightingale Consulting Pty Ltd was engaged by Boral to undertake a detailed Aboriginal archaeological assessment and prepare an Aboriginal Cultural Heritage Assessment Report (CHAR) to inform the Environmental Assessment to support Modification 9 of DA 470-11-2003.

An Aboriginal Cultural Heritage Management Plan was subsequently prepared for the project, detailing the required Aboriginal heritage management and mitigation measures. The plan was prepared in consultation with OEH and Registered Aboriginal Parties in accordance with condition 64 of the Modification 9 consent (approved September 2017) and is available on the Boral Dunmore website.

Archaeological salvage excavation and mitigation for the impact of the Croome Farm Pit expansion project on Aboriginal heritage has been completed for Croome West AFT 1 (AHIMS 52-5-0851) and Croome West AFT 2 (AHIMS 52-5-0850). Archaeological excavation and mitigation was not required for Croome West AFT 3 (AHIMS 52-5-0849).

The archaeological salvage program was completed in October 2017 (outside the current reporting period) in accordance with the MOD 9 conditions of approval, along with the requirements of the AHMP and approved salvage methodology outlined in the CHAR

Boral is committed to effective consultation with the local Aboriginal community regarding their activities and Aboriginal cultural heritage values. Registered Aboriginal Parties have been consulted and provided with an opportunity to participate in the assessment and management of Aboriginal heritage values. Consultation with Registered Aboriginal Parties has followed OEH consultation requirements as per the applicable “Aboriginal Cultural Heritage Consultation Requirements for Proponents” 2010 (DECCW 2010a). Registered Aboriginal stakeholders participated in the salvage excavations.

The salvage operations of these study areas has mitigated the identified Aboriginal heritage constraints prior to any pre-construction or construction activities, which may harm Aboriginal objects at these site locations. A total of 1,188 artefacts were recovered during the salvage excavation program undertaken in October 2017 (outside of this reporting period), with 76m^2 excavated across the two sites.

A draft report has been completed in September 2018 by Kelleher Nightingale and was finalised in the current reporting period and management actions are summarised below:

In accordance with the AHMP, salvaged Aboriginal objects will be managed at a temporary storage location for analysis and reporting purposes and lodged for long term management with the Australian Museum. Deposition of the significant archaeological assemblage at the Australian Museum ensures ongoing access and appreciation of the artefact assemblage for current and future generations.

The short term management of excavated Aboriginal objects is as follows:

- Any Aboriginal objects that are removed from the land by actions authorised by the project approval, must be moved as soon as practicable to the temporary storage location (see below) for analysis, reporting and preparation for the long term management of the Aboriginal objects.
- The temporary storage location is: Kelleher Nightingale Consulting Pty Ltd, Level 10, 25 Bligh Street, Sydney NSW 2000.
- Any Aboriginal objects stored at the temporary storage location must not be further harmed, except in accordance with the conditions of the approval.

The long term management of excavated Aboriginal objects is as follows:

- Once all analysis has been completed, recovered objects will be lodged with the Australian Museum in accordance with the Australian Museum Archaeological Collection Deposition Policy

6.9. Waste Minimisation

Boral is committed to continuing non-production waste management minimisation in accordance with the waste hierarchy, and minimising the amount of waste sent to landfill. To achieve this, all liquid and solid wastes are classified and sorted so they can be appropriately re-used or recycled. Waste is managed by appropriately licenced sub-contractors and entered into a waste tracking register.

To deter illegal dumping, Shellharbour Council installed cameras around the surrounds of Dunmore Quarry and Dunmore Sand and Soil. Council indicated two successful prosecutions have resulted from investigations aided by the installation of the cameras.

Boral is committed to ensuring its extraction and processing activities produce minimal waste rock material. Approximately 30% of the hard rock processed at Dunmore Quarry becomes material of less than 4mm in diameter, which is known as quarry fines. In the past, quarry fines were considered a waste product and stockpiled due to having no steady market, however the material is now used in manufactured sand (as opposed to natural sand) production. Dunmore Quarry transfers quarry fines to the Boral owned Dunmore Lakes Sand Project (DLSP) site for blending to produce manufactured sand.

During the reporting period 18,595 tonnes of quarry fines was transferred to the adjacent DLSP site for manufactured sand production, backfilling and progressive rehabilitation.

New recycling bins were commissioned in the crib rooms to encourage the recycling of applicable waste by employees and contractors. As a result recycling has increased within current reporting period as shown in the Waste Tracking Register in Section XX

6.9.1. Waste Tracking Register

A detailed breakdown of the waste collected on-site during the reporting period is shown below in Table 21. Yearly trends are shown in Table 22.

Table 21 Dunmore Quarry Waste Tracking Register

Month	General Waste (t)	Cardboard (t)	Commingle (t)	Timber (t)	Scrap Metal (t)	Oil & Oily Water (L)	Effluent (L)	Filter (t)*	Rags (t)**
Jul-19	1.066	0	0.225	0	16.8	3800	14000	0.032	0.08
Aug-19	3.273	0	0	1.96	21.64	13423	17000	0.032	0.08
Sep-19	1.387	0.295	0	0	0	3800	14000	0.032	0.08
Oct-19	2.996	0	0	0	7.14	4100	18000	0	0
Nov-19	2.281	0.48	0.5	1.88	0	3000	18000	0.064	0.16
Dec-19	3.174	0.26	0.5	1.66	5.96	3600	12000	0.032	0.08
Jan-20	3.348	0.16	0.4	0	6.96	3100	0	0	0
Feb-20	7.565	0.86	0.4	1.18	18.02	12300	27000	0.064	0
Mar-20	1.751	0.3	0.5	0	0	2700	16000	0.08	0
Apr-20	4.977	0.36	0.4	2.74	0	3600	22000	0.032	0
May-20	2.115	0.14	0.4	0.82	0	11760	16000	0.032	0.08

Jun-20	0.4648	0.5	0.5	0	3.12	3700	16000	0.032	0.08
Total	34.398	3.355	3.825	10.24	79.64	68883	190000	0.432	0.64

* Based on an average weight of 0.004 tonne per filter bin ** Based on an average weight of 0.04 tonne per rag bin.

Table 22 Dunmore Quarry Historical Waste Tracking

Waste Classification		FY17	FY18	FY19	current reporting period
Solid Waste	General Waste (t)	45.123	38.032	41.814	34.398
	Cardboard Tonnes (t)	2.152	1.531	0.93	3.355
	Timber Tonnes (t)	8.14	13	13.24	10.24
	Comingle Recycling (t)	ND	ND	0.63	3.825
	Used Oil Filters/ Rags (t)	ND	2.4	0.936	1.072
	Scrap Metal (t)	ND	ND	110	79.64
Liquid Waste	Oil/Oily Water Litres (L)	25,400	43,250	46,900	68,883
	Effluent Litres (L)	60,000	61,000	140,000	190,000
	Other Litres (L)	400	0	0	0

It can be seen that a significant increase of the percentage of waste recycled via cardboard or comingle recycling has occurred in the current reporting period. This is mostly due to the improvements to visibility and access to recycling bins during the reporting period as well as the improvements to the waste minimisation strategies.

6.9.2. Waste Minimisation Opportunities for Improvement

Further work will continue with subcontractors to optimise the record keeping for waste collection data. Work will continue to consolidate the recycling improvements undertaken in current reporting period. An audit of tyre re-use and storage is planned for current reporting period, as per independent audit recommendations.

6.10. Incident and Emergency Response

The following management actions were undertaken in regards to incident and emergency response.

- The Pollution Incident Response Management Plan was reviewed and updated in December 2019. The current version is available online at https://www.boral.com.au/our-commitment/environmental-reporting.
- Vehicle pedestrian safety upgrades were completed during the reporting period. Car park and traffic areas were refurbished to remove pedestrian and vehicle interactions wherever possible.

6.11. Dangerous and Hazardous Goods Storage

Storage of dangerous goods and hazardous material have continued as per established operations. All dangerous goods and chemicals are handled and transported in accordance with the AS1940 and AS25956 and the Dangerous Goods Code and S4.C72.

7. Community

The Dunmore Quarry Community Consultative Committee (CCC) continues to serve as a valuable dialogue between Boral and the local community with valuable input and feedback being provided by the community regarding quarry operations and plans. The CCC is run as per condition S5.C6 and the Departments Community Consultative Committee Guidelines for State Significant Developments (2016).

Members include:

- An independent chairperson
- At least 2 representatives from Boral (typically the environmental co-ordinator and quarry manager)
- A member from Shellharbour City Council
- Three local community representatives

Members are informed of the environmental performance of the site, provided with an update on operations and given a chance to tour the site and ask questions they may have regarding the operation. CCC members have also been diligent in disseminating the information from the meetings to other interested community members in the local area. The minutes of each meeting is published in the Boral website.

https://www.boral.com.au/locations/boral-dunmore-operations

The CCC met twice during the current reporting period (August 2019 and February 2020).

7.1. Environmental Complaints Management

There were three (3) complaints received during the reporting period, as per Table 231 below.

Table 23 Current reporting period Community Complaints Register

Date	Time	Reason	Description of Complaint	Action Taken
24/07/19	13:15	Visual /Dust	The EPA received an Environment Line Report regarding a cloud of visible dust over the Boral quarry at Dunmore at around 13:00 on Wednesday (details below). Caller stated that today they observed a large plume of dust from the Dunmore quarry. They stated that the plume appeared to be coming from the crusher and conveyor system at the quarry. He stated that he believes that dust is an	A review of plant maintenance checklists from the previous days indicated that a fitting supporting a dust spray located near the primary crusher boot bin was observed to be damaged, and as a result the sprays were not being directed effectively during the night shift of Tuesday 23rd July, 2019. This was reported and a replacement part

			issue from this site and that not enough is being done to ensure that it is managed. The caller advised that he had noticed the dust at approximately 13:15pm.	ordered the next morning, fitted the next day. All other sprays at transfer points and conveyors were working as normal. The site undertakes the practice of 'wetting the shot' as an additional dust control for the material entering the primary crusher. This involves watering down the blasted material in the quarry pit immediately prior to loading in haul trucks and feeding in to the jaw crusher to ensure that the material entering the jaw was moist and dust generation is minimised. Due to this practice it is not likely that the damaged fitting would have resulted in excessive dust generation. Dust and PM_{10} results for July were well within consent limits, which indicates no dust was transported off-site from DQ operations.
26/12/19	16:19	Truck Parking	Email from Bicycle User Group. Trucks have again been seen parked under the freeway bridge on Tabbitta Road in the bicycle lane. We fully understand and support the opportunity	Boral is fully supportive of the need to re-mark the road. In the interim, drivers, customers and subcontractors were instructed not to park on bicycle tracks and lanes

			taken by drivers to park in the shade under the bridge and hope Boral will support the need to remark the road to provide parking under the bridge as there is space for both cyclists and trucks.	under the bridge to the quarry.
24/03/20	10:51	Material Tracking	Email from Danny Benedetti Senior Network Safety Officer from Transport for NSW regarding loose stone located on the Princes Hwy North Bound, on the road shoulder, between Tabbitta Road to Shellharbour Road. "I understand Dunmore Quarry management arrange contractors to sweep this section, twice a week on Tuesday and Friday. Would you kindly confirm that this maintenance work is still being undertaken, and if so, would it be necessary to increase the sweeps along this section to three times a week?"	Boral can confirm that street sweeping is being undertaken twice weekly along northbound shoulder and daily on Tabbitta Rd itself. RMS maintenance had occurred the week prior. Drainage channels and nearby vegetation was cleared along the shoulder causing material to be tracked across the road. Current arrangements will continue twice weekly and the area will be monitored to ensure controls are working effectively.

The following actions are underway to address these complaints and these will be completed by the next reporting period

- The Plant Inspection Checklist prioritises the maintenance checks of bag houses in crushing and screening plans to ensure they are maintained in a proper and efficient condition. Maintenance and replacement of filters is scheduled via an electronic maintenance system.
- Further investigations of controls such as street sweeping frequencies and wheel wash effectiveness will be undertaken in the next reporting period. The IEA recommended that street sweeping be increased to three times per week, which will be completed in the next reporting period as per DQ20/21. The WMP was updated to detail additional checks to dust/mud tracking during wet conditions.

A graph showing the community complaints over time can be seen in Figure 34.

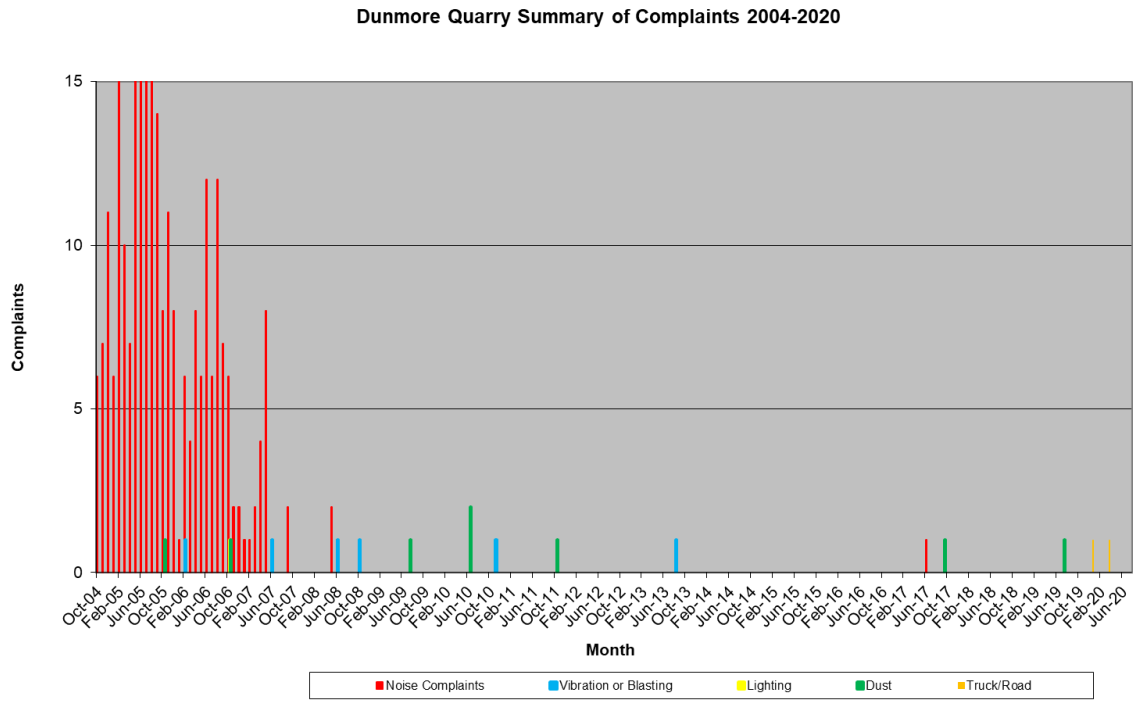

Figure 34 Historical Community Complaints Summary

7.2. Summary of Regulatory Notifications

One (1) regulatory notification was received during the current reporting period. A formal warning letter was issued by the EPA for a failure to publish within 14 days after obtaining final monitoring report data.

The EPA notified Dunmore Quarry on 28 October 2019, with the required documentation uploaded on the same day. The Environmental Permit Planner document has been updated to ensure that the POELA Report data is uploaded to the correct website to stop this happening in the future.

8. Activities to be completed by the Next Reporting Period

The next reporting period will contain a strong focus on addressing recommendations within the IEA and maintaining regulatory compliance and optimising management actions established in the current reporting period. Table 24 summarises these actions below.

Table 24 Activities to be completed in the Next Reporting Period

Reference	Description of Action	Actions to be Completed
DQ1/20	Finalise revised Water Management Plan (WMP).	Updated WMP is currently under review with DPIE Water
DQ2/20	Follow up approval of works required under S4, C38 from DPIE.	EPA have approved works as completed. A letter describing the completion of the works to be drafted by Boral and sent to DPIE to confirm completion to satisfaction to the secretary.
DQ3/20	Determine whether 'regional' monitoring that has been completed is satisfactory and the regional monitoring program can therefore be suspended.	Boral to correspond with DPIE to clarify the definition of 'regional' monitoring and propose cessation of monitoring as a function of the satisfactory completion of the monitoring program.
DQ4/20	Update of WMP to include measures to prevent mud tracking onto public roads from the site.	It was determined that a more appropriate location for these measures is in the updated WMP, currently under assessment, which includes an Erosion and Sediment Control Plan located in Section 6 of the plan. The effectiveness of the controls described in the plan are monitored via the site environmental checklist (monthly checklist and EPP)
DQ5/20	Confirm tyre numbers stored on site are less than 500, and if there is a requirement for more than 500 tyres, consult with EPA regarding a licence.	Boral confirms that less than 500 tyres are stored on the premises A contract is currently being tendered for the removal of the tyres not currently being utilised for re-use onsite by an appropriately licensed external contractor
DQ6/20	Finalise revised Bushfire Management Plan and ensure it covers safe storage of tyres in accordance with "Tyre stewardship Australia Best Practice Guidelines for Tyre Storage and Emergency Preparedness (March 2019)" guidelines and "Fire & Rescue NSW Fire Safety Guideline – Guideline for bulk storage of rubber tyres" (December 2014).	The Bushfire Management Plan will be updated by Boral in accordance with the requirements of these guidelines
DQ7/20	Ensure all management plans are prepared and	A record will be created and attached to the Environmental Permit Planner (EPP).

Reference	Description of Action	Actions to be Completed
	reviewed in accordance with the requirements of the conditions of consent It is suggested a review record/register is maintained.	
DQ8/20	A Traffic Management System should be developed to monitor and control truck dispatch movements in accordance with limitations	A reporting tool has been built for the Site's weighbridge and sales docketing system (APEX), which now allows the weighbridge operator to track dockets hourly. The morning sales loading shift has been brought forward by 30 minutes, to enable trucks to be despatched from 6am (rather than 6.30am) which is expected to result in less "bunching" into the 7am to 8am period. Similarly, the start of the afternoon shift has been brought forward 30 minutes, allowing for a different shift handover, which is expected to result in less "bunching" into the 3pm to 4pm period. The TMP will be updated to reflect the current traffic management measures on site. Upon finalisation of the revised TMP, relevant staff will be presented with a toolbox session to educate them about the updated management plan requirements and a sign off sheet will be collected and filed.
DQ9/20	If the hourly truck dispatch limitations are not practical for operations, consultation with DPIE should occur to understand if modification of this condition is appropriate.	Boral is currently preparing a modification application, supported by a scoping report that will seek to remove Condition 7A which imposes these hourly / daily truck limits
DQ10/20	Prioritise maintenance checks of bag houses in crushing and screening plans to ensure they are maintained in a proper and efficient condition.	A plant inspection checklist is undertaken daily by staff to ensure that plant components are working correctly and any corrective actions are completed.
DQ11/20	Confirm survey plan has been submitted to the Secretary.	A letter will be drafted and submitted to DPIE to confirm receipt of the survey plan
DQ12/20	Implement updated Water Management Plan, when approved, to reconfigure storage on site and prevent uncontrolled discharge events.	The updated Water Management Plan is currently under review with the DPIE Water, which details the dam upgrade works designed to meet this condition.

Reference	Description of Action	Actions to be Completed
DQ13/20	Ensure all future Annual Reviews address the reporting requirements in Schedule 4, Condition 29.	Boral to ensure requirements in Schedule 4, Condition 29 are met in the next Annual Review
DQ14/20	Ensure Dam Upgrade Plan is updated or incorporated into the updated approved Water Management Plan.	The dam upgrade plan is included in Appendix G of the updated WMP, currently under review by DPIE (Water)
DQ15/20	Ensure the approved updated Water Management Plan includes the Lower Dam Transition Plan.	The dam transition plan is included in the Options Assessment (Section 5.3) of the updated WMP, currently under review by DPIE (Water)
DQ16/20	Bunded fuel drum storage area to be used correctly with all oil drums to be positioned within the bunded area.	Delivery drivers to sign in onsite and directed to the appropriate storage location, to ensure that goods are delivered and correctly placed into the bund One point lessons (OPL) to be created for bunded area to instruct storage requirements.
DQ17/20	Ensure all fuel, oil and chemical storage areas occurs in appropriately bunded areas.	As above
DQ18/20	Condition numbering references are incorrect throughout document (see Table 2.1 for an example). Update condition reference numbering in next review.	Condition references will be amended in the next review of the Flora and Fauna Management Plan document as per the recommendation.
DQ19/20	Vegetation Clearing Protocol (VCP) to be updated to address collecting seed from site and conserving and reusing topsoil.	The VCP will be updated in the next review of FFMP
DQ20/20	Rehabilitation Conservation Bond not lodged within the required timeframe. Boral to ensure timing requirements are met for obligations under this consent.	Rehabilitation Conservation Bond to be recalculated and lodged in accordance with the obligations under the consent.
DQ21/20	It is recommended that sweeping increase to three times per week, the WMP has been updated to address this matter, and consideration of further mitigation measures is undertaken.	Sweeping of the Princes Motorway on ramp currently occurs two days per week. Tabbitta Rd is serviced daily Monday to Friday. Further mitigation methods will be investigated once extent of sediment being tracked onto the road is quantified and response measures evaluated. The updated WMP, currently under assessment, details Erosion and Sediment

Reference	Description of Action	Actions to be Completed
		Controls in Section 6 and these controls will be monitored via the site environmental checklist rather than the PIRMP, which is not considered the appropriate document for this activity given the low likelihood of material environmental harm.
DQ22/20	The document control tables within the all the plans, strategies and programs required under this consent do not reflect the reviews that have occurred. Ensure all documents are reviewed in accordance with this condition of consent. Update the relevant management plans to contain information on timing of review.	Subsequent management plans to include a more accurate description of the document control process, include reviews that have been undertaken and then main focus of the review.
AQMP 1	Alerting system for Real Time Dust Monitors	Finalise alerting system for Real Time Dust Monitors and correspond with DPIE/EPA in relating to timing of completion of Transition Period
FFMP1	Continue monitoring Croome West Bund	Continue monitoring status of rehabilitation and complete follow up seeding if required
FFMP2	Repair fence lines to reduce instances of cattle intrusion in rehab areas, specifically the RVCA.	Contractor engaged to repair fences
FFMP3	Continue works in active rehabilitation zones as per FFMP	Contractor (Goodbush) engaged to continue works to meet completion criteria thresholds

9. Conclusion

Dunmore Quarry has continued to focus on ensuring the environment and neighbouring community are not adversely impacted by quarry operations. Throughout this reporting period, extraction and processing of quarry materials has remained consistent with previous years.

The current reporting period revolved around enacting a number of major operational and procedural changes as part of the updated environment management plans for the MOD 9 and MOD 11 approvals. The Independent Environmental Audit was also completed during the reporting period.

The next reporting period will contain a strong focus on addressing recommendations within the IEA and maintaining regulatory compliance and optimising management actions established in the current reporting period.

10. Appendix A Meteorological Monitoring Locations Data and Graphs

The location of the onsite weather station is shown below in Figure 35.

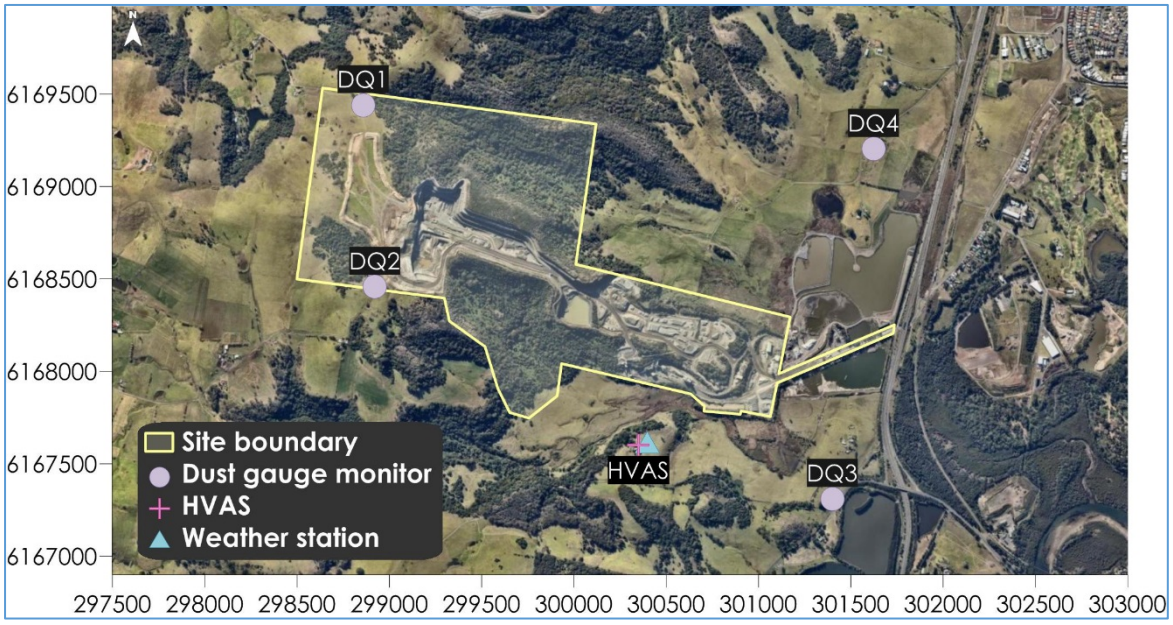

Figure 35 Location of Weather Stations

A monthly review of weather data is undertaken by the environmental co-ordinator. The meteorological conditions assessed are rainfall, wind speed direction and atmospheric stability.

Rainfall data has been collected since FY2003. A summary of the rainfall measured from the Dunmore Quarry weather station is shown below in Table 25. Historical summaries are shown in Table 26. Shown in red are the dates where rainfall was above the regional average.

Table 25 Dunmore Rainfall Summary

Rainfall (mm)			
Month	**current reporting period**	**Site Average**	**Regional Average**
July	20.5	52.2	49
August	39	64.5	53.5
September	59.5	49.7	42.7
October	38.5	70.2	64.5
November	25.5	89.9	83.1
December	2.5	84.3	67

January	65	79.6	72.9
February	272.5	147.8	140.5
March	65.5	133.2	122.3
April	85	88.7	73.8
May	52	64.7	55.8
June	35	118.6	93.7
Total	760.5	1043.5	925.6

Table 26 Dunmore Historical Rainfall

	Rainfall (mm)																			
Month	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	Site Average	Regional Average
July	20	23.5	54.2	41	96	30.5	63.5	35.5	78	194	39	61.7	5	48	97.5	25	6	20.5	52.2	49
August	13.5	38.5	23	3	42.5	58.5	39	0.5	72	85.5	4.5	17	252	327	76	39	31	39	64.5	53.5
September	14	7.5	40.6	33	101	39	56	19.5	146	58.5	11.5	85.5	48.7	82	51	1	41.5	59.5	49.7	42.7
October	6.5	49	245	48	0	17	79	126	126	125	83.5	6.5	103	36.5	32	14.5	128	38.5	70.2	64.5
November	17	150	127	145	39.5	162	46.5	65	198	164	25	173	24	48	33	85	92	25.5	89.9	83.1
December	70	40.5	136	36.5	54	120	113	80.5	148	63	32	70.5	234	117	58	53	90.5	2.5	84.3	67
January	68	30.5	129	90	0	65.5	9.5	79	59.5	50.5	183	43.5	193	156	32.5	36	144	65	79.6	72.9
February	112	70	180	87.1	187	352	108	198	48	258	143	59	113	29.5	283	129	35.5	272.5	147.8	140.5
March	121	84	118	43.5	67.5	36.5	39	74	363	196	23.5	326	57	145	441	41.5	157	65.5	133.2	122.3
April	91.5	200	24.4	8	145	90.5	106	63	37.4	87.5	136	64.5	305	37.5	40.5	26.1	48.5	85	88.7	73.8
May	428	43.5	85.6	65.5	23	8	20	80.5	58.3	9.5	81	13	53.5	35.5	51.5	44	13.5	52	64.7	55.8
June	74.5	42	84.4	124	319	85.5	67	52	92	89	239	34	76	429	57	134	103	35	118.6	93.7
Total	1036	779	1248	724	1074	1064	746	873	1425	1379	1001	954	1462	1490	1253	627	890	760.5	1043.5	925.6

Monthly wind roses and seasonal wind roses are shown in Figure 36 to Figure 48. Please note calm is defined as winds averaging less than 0.3m/s over the averaging period.

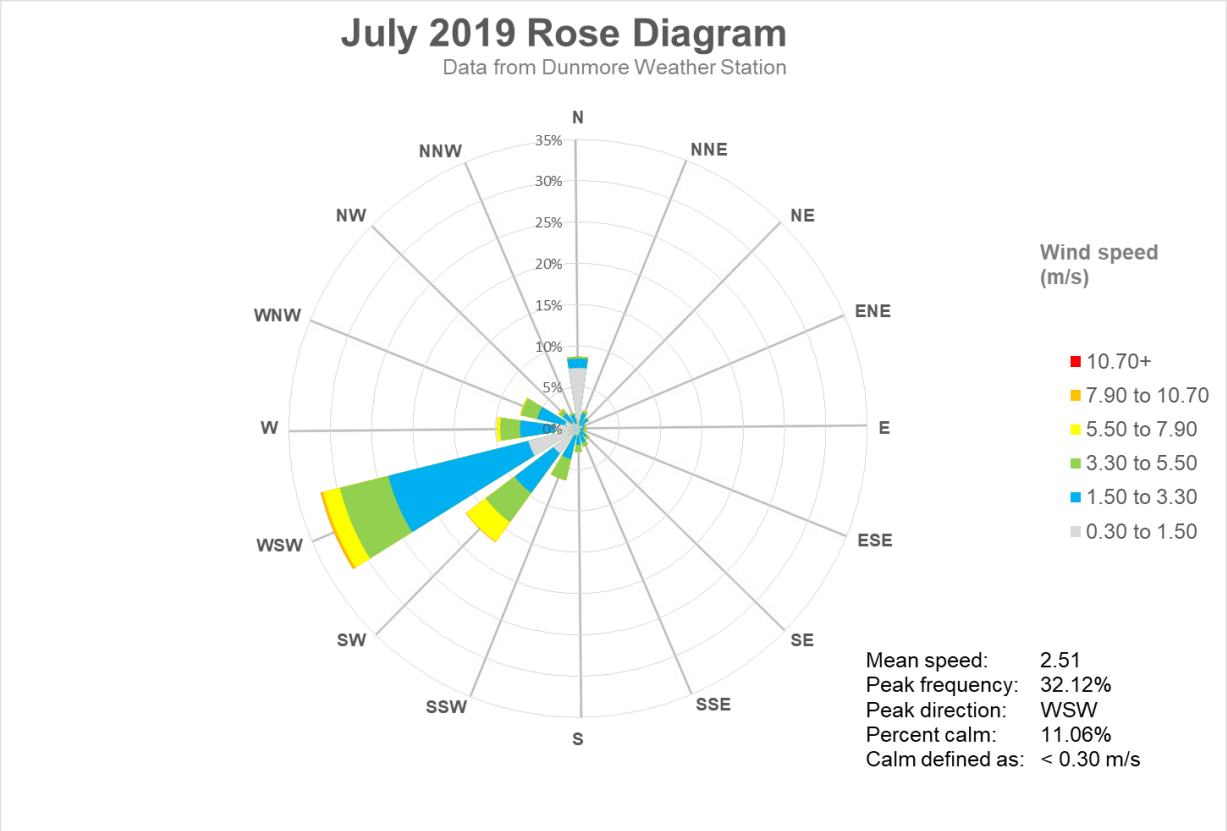

Figure 36 July 19 Wind Rose

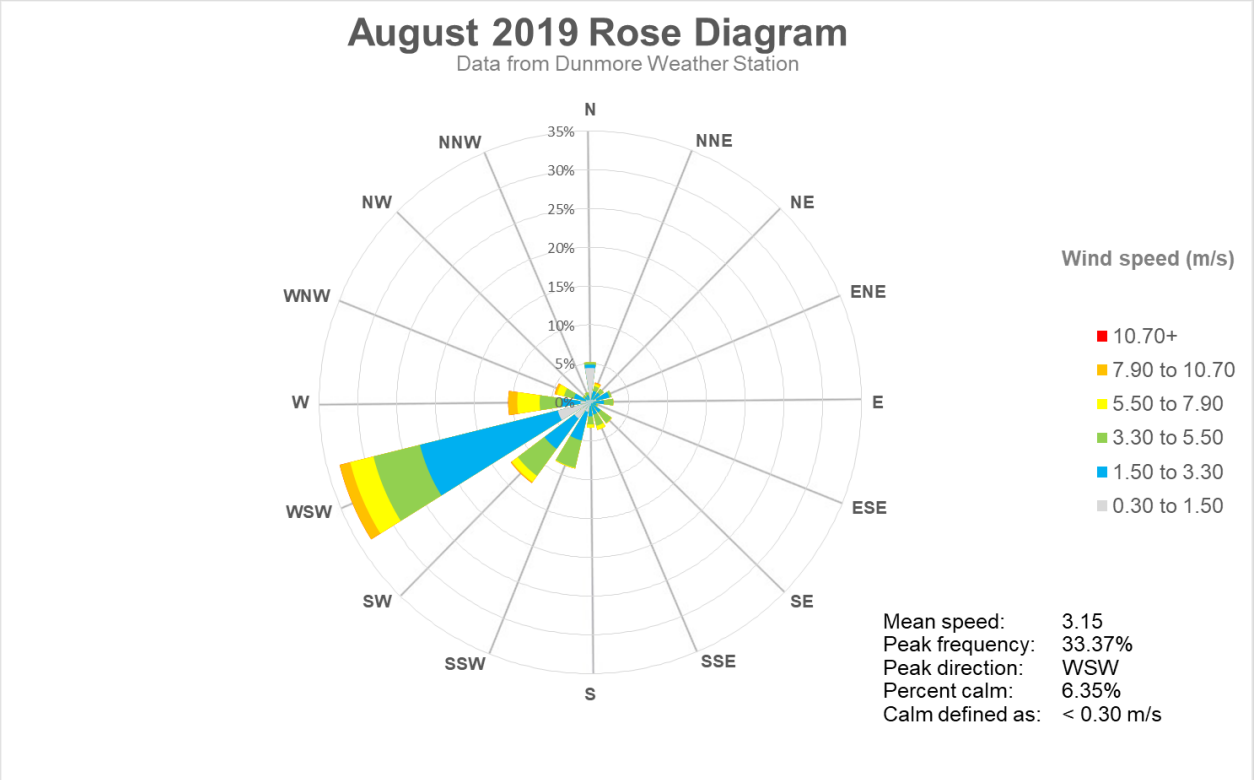

Figure 37 August 19 Wind Rose

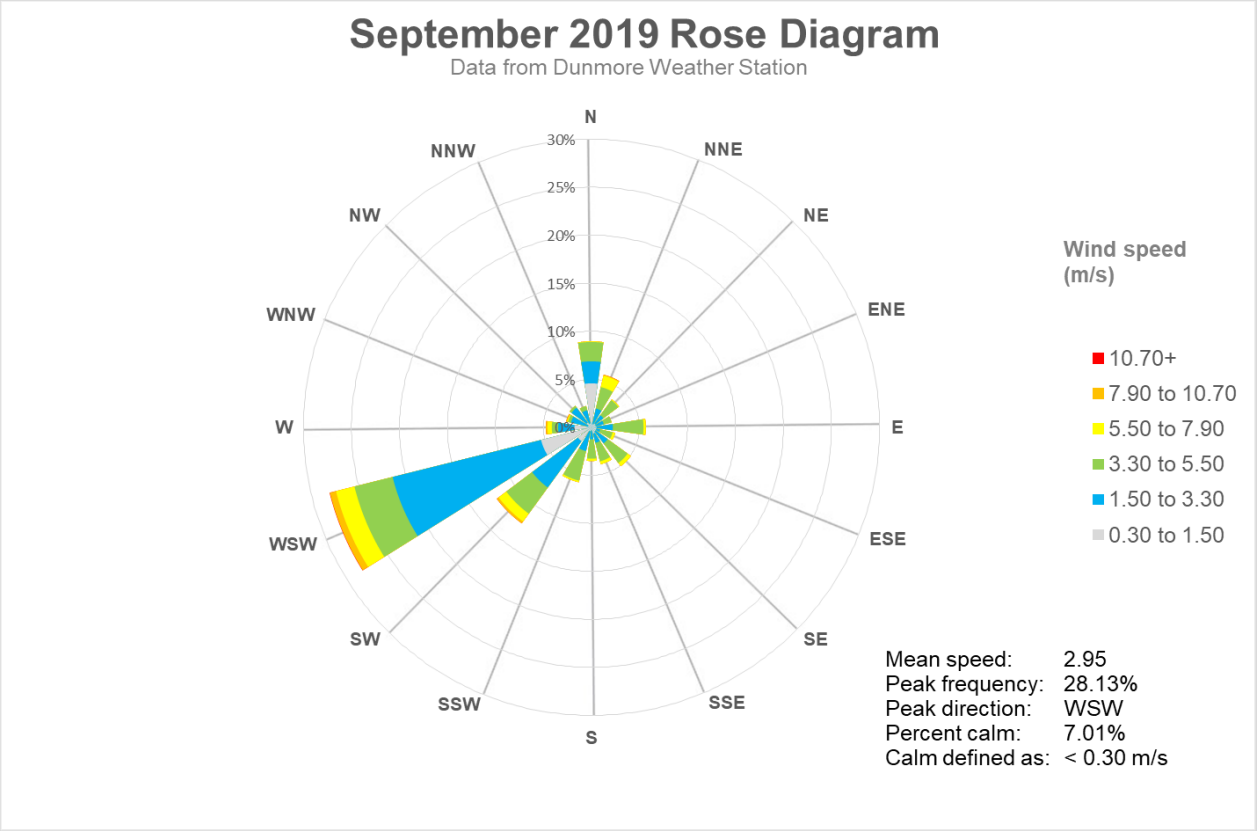

Figure 38 September 19 Wind Rose

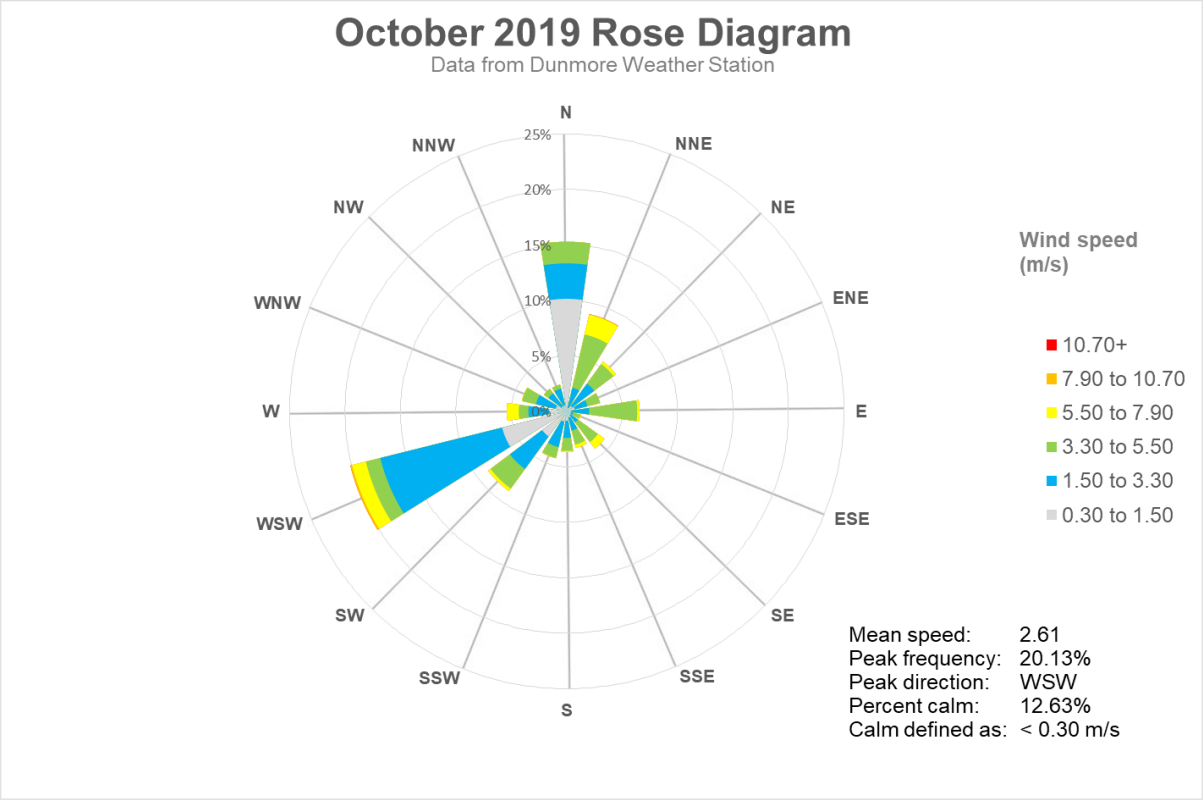

Figure 39 October 19 Wind Rose

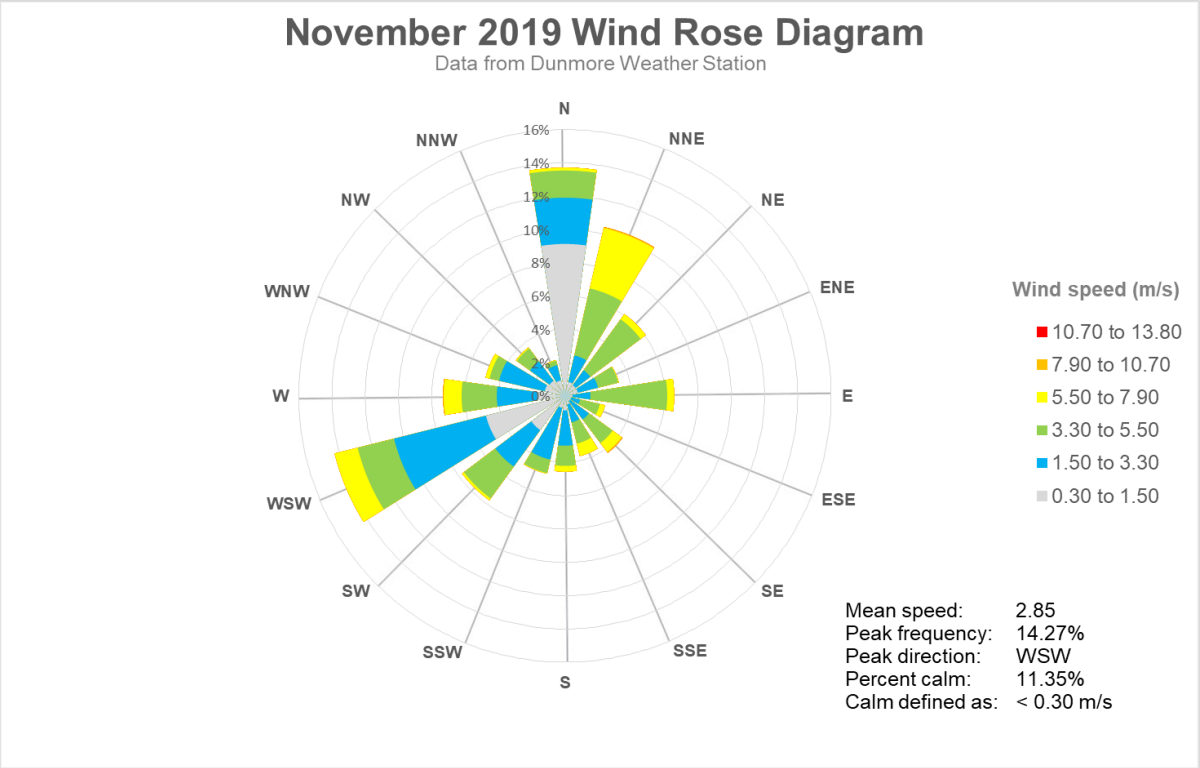

Figure 40 November 19 Wind Rose

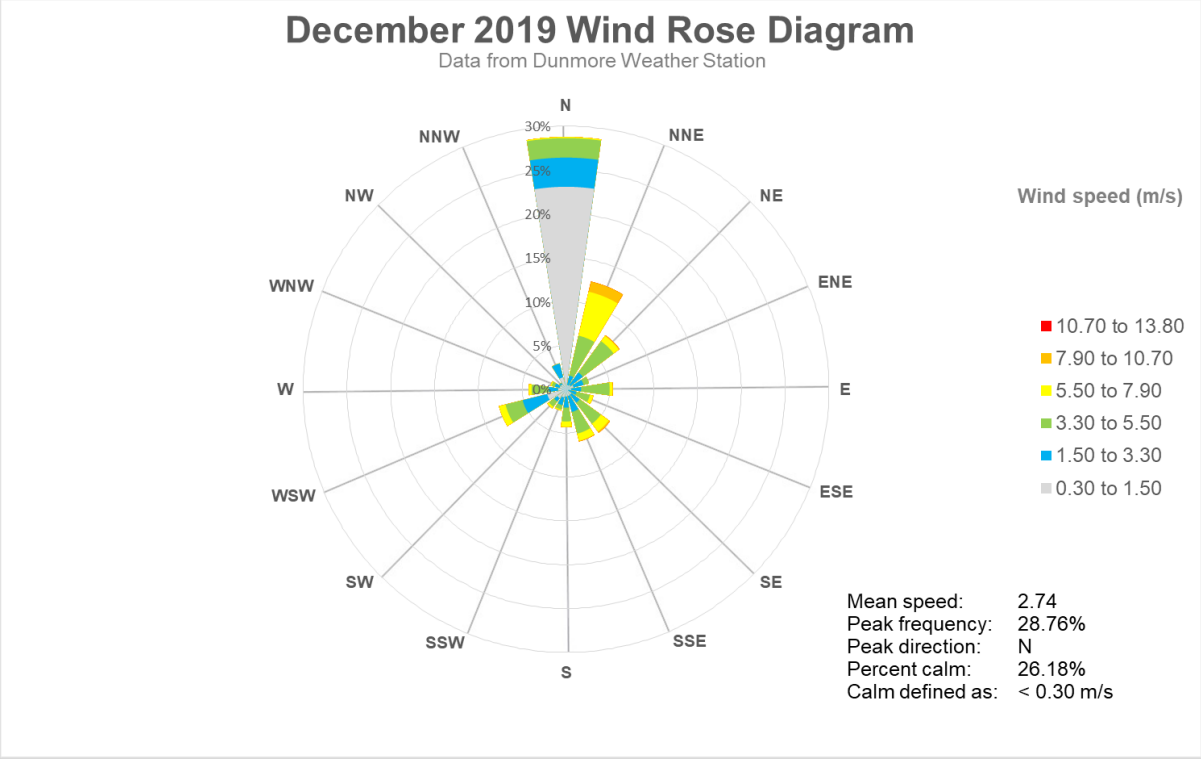

Figure 41 December 19 Wind Rose

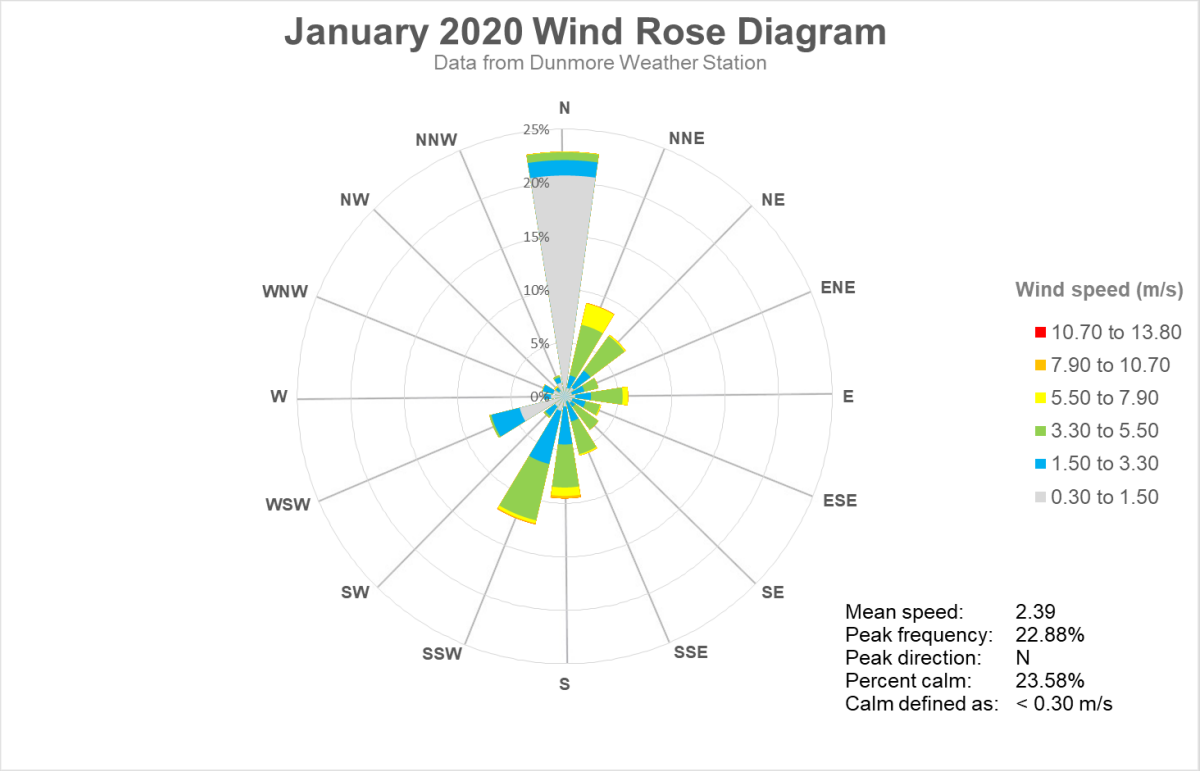

Figure 42 January 20 Wind Rose

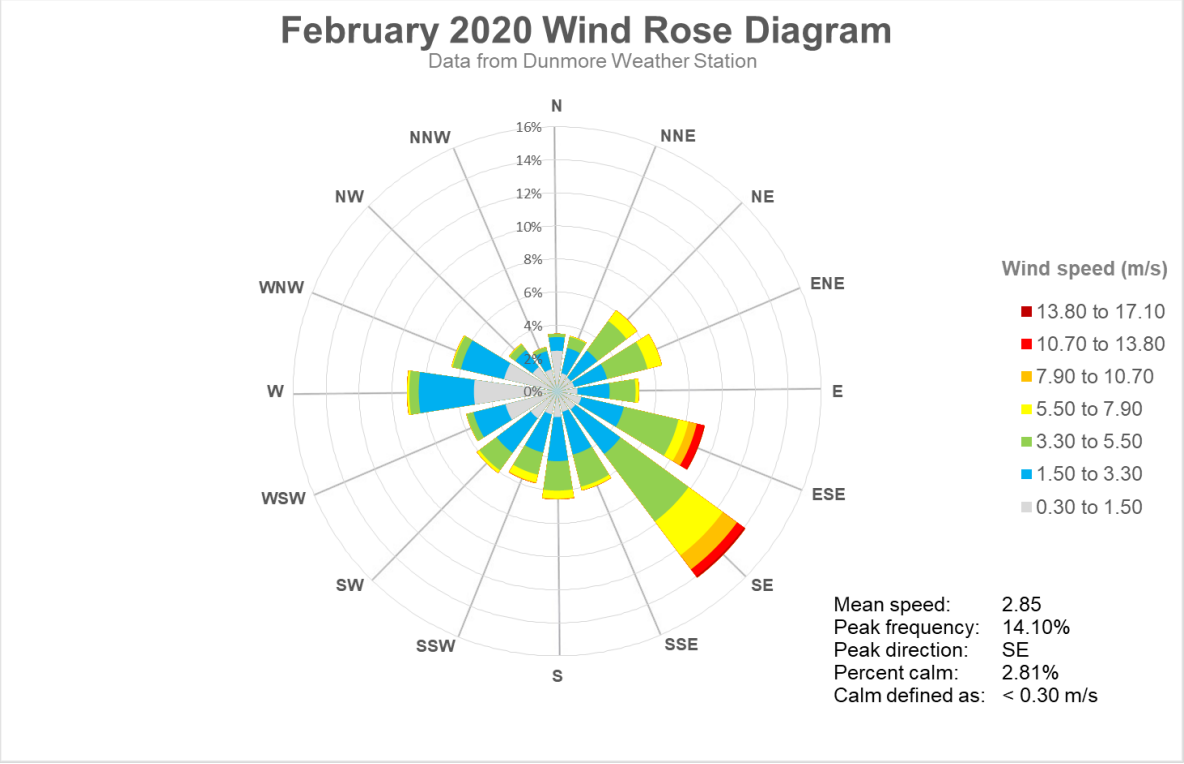

Figure 43 February 20 Wind Rose

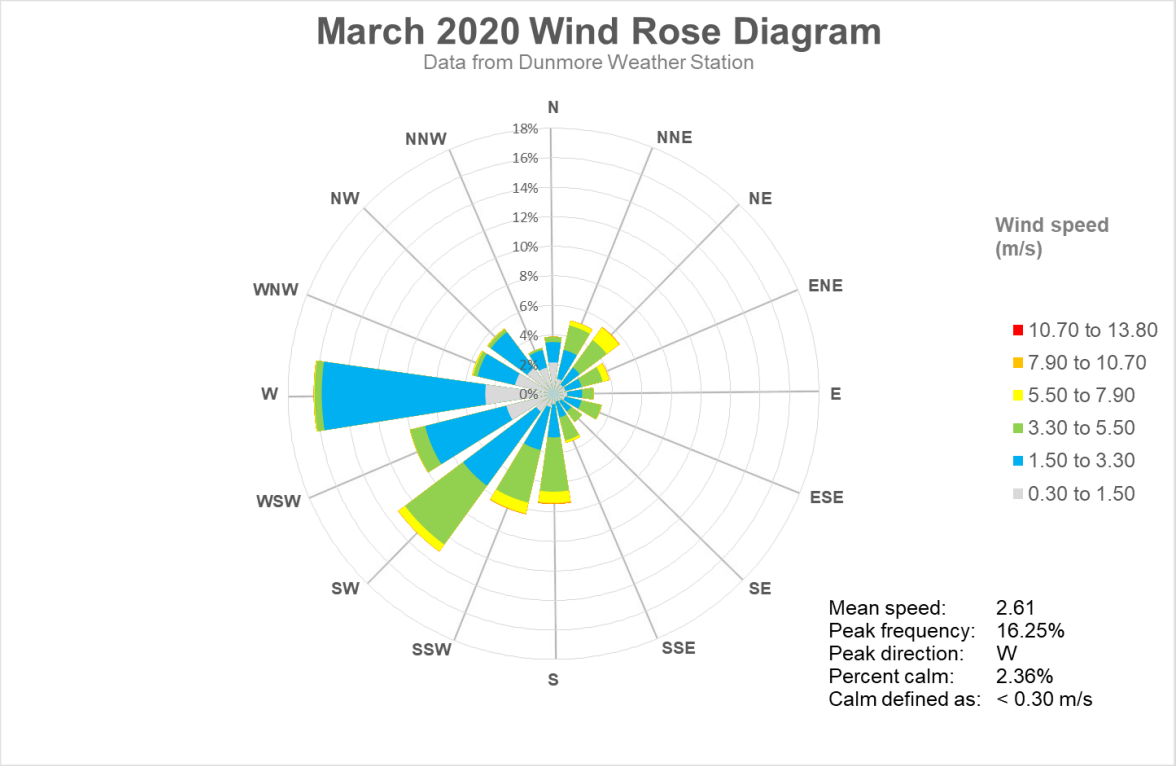

Figure 44 March 20 Wind Rose

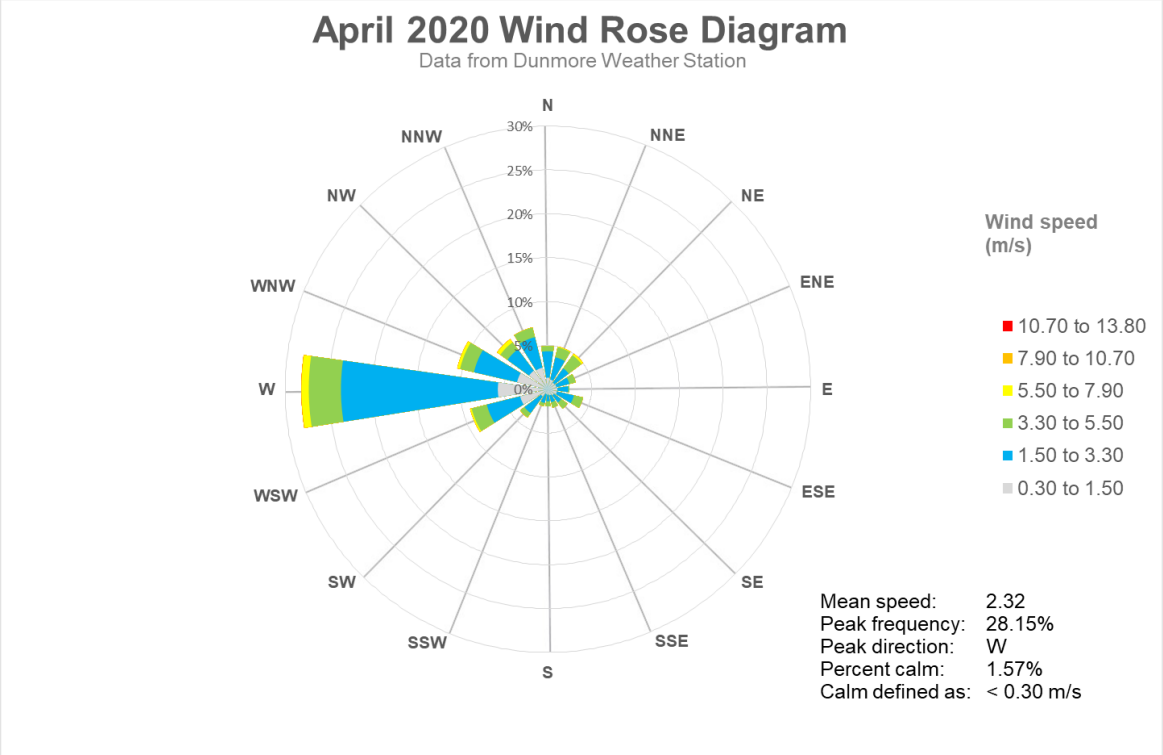

Figure 45 April 20 Wind Rose

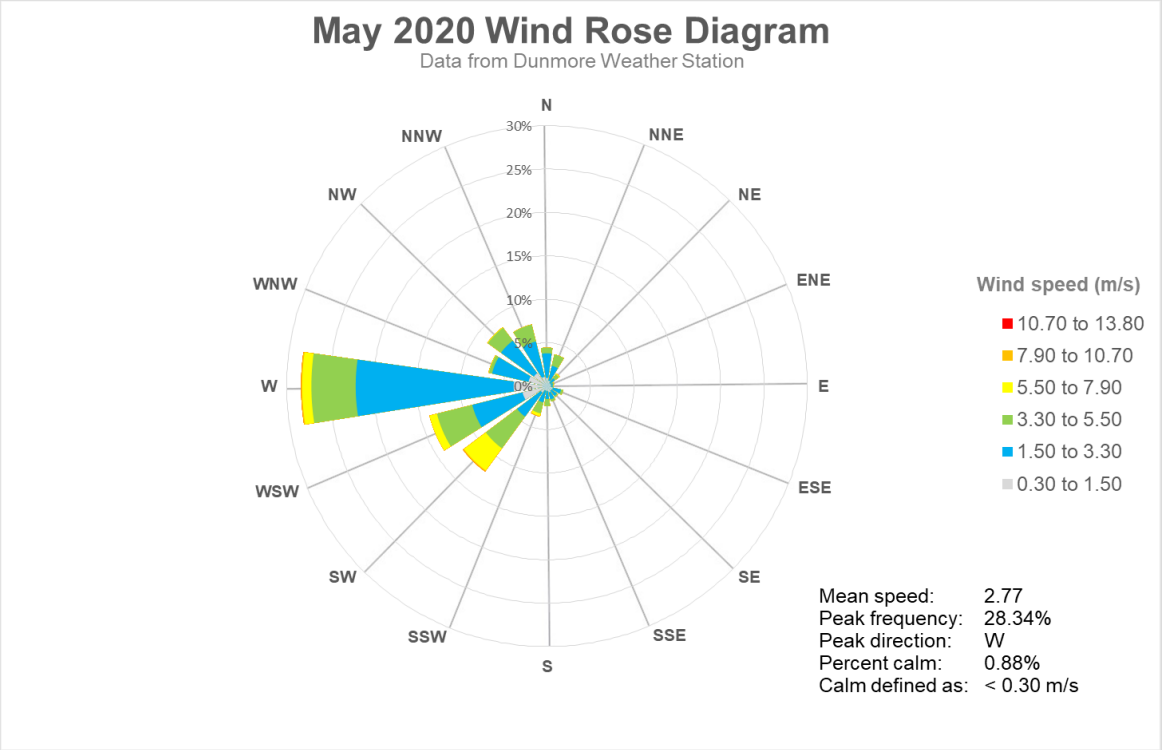

Figure 46 May 20 Wind Rose

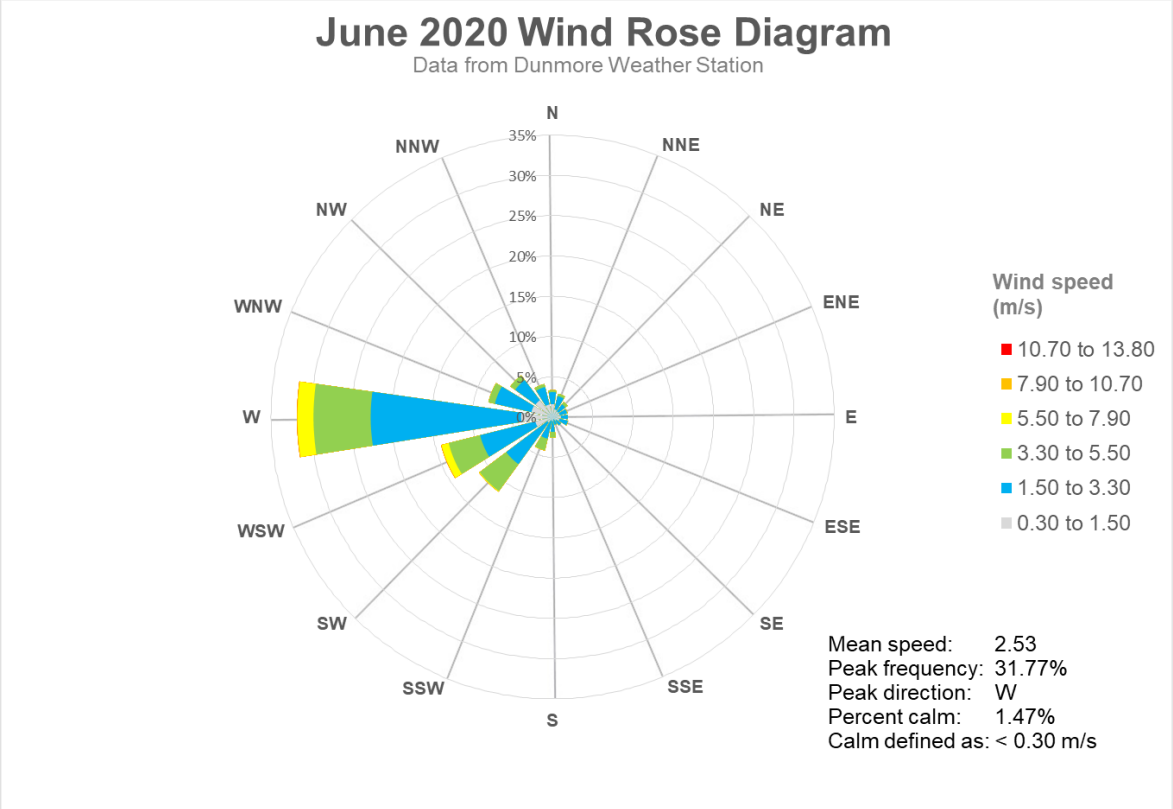

Figure 47 June 20 Wind Rose

Figure 48 Dunmore Seasonal Wind Roses

11. Appendix B Air Quality Monitoring Additional Data and Graphs

Monthly breakdown of deposited dust monitoring is shown below in Table 27. Dominant wind directions and production data are also shown within this table.

Table 27 Dunmore Historical Deposited Dust Summary

Month	Site 1 grams/m²/month		Site 2 grams/m²/month		Site 3 grams/m²/month		Site 4 grams/m²/month		Dominant Wind Direction	Direction of Strongest Winds	Production Tonnes
	Insoluble Solids	Ash	Insoluble Solids	Ash	Insoluble Solids	Ash	Insoluble Solids	Ash			(t)
05/06 Average	5.85	2.66	4.48	1.67	4.85	2.22	3.9	1.92			
06/07 Average	5.4	2.13	2.48	1.53	2.79	1.89	4.31	2.44			
07/08 Average	3.26	1.67	2.37	1.3	3.89	2.9	5.55	3.17			
08/09 Average	6.6	2.63	3.01	2.1	3.12	2.17	2.71	1.66			
09/10 Average	4.65	3.03	4.41	2.6	5.02	3.49	3.15	2.33			
10/11 Average	3.35	1.43	5.86	3.92	3.43	2.09	2.53	1.6			
11/12 Average	3.74	1.92	3.28	1.7	5.03	3.44	2.75	1.81			
12/13 Average	3.73	1.65	2.61	1.65	5.87	3.6	3.36	2.36			
13/14 Average	9.56	4.94	3.63	1.79	4.61	3.28	3.2	2			
14/15 Average	5.63	2.72	2.38	1.44	7.36	4.42	3.1	1.98			
15/16 Adjusted	3.46	1.66	3.12	1.77	7.2	4.45	3.01	1.84			
16/17 Average	2.2	1.42	3.36	1.96	2.28	1.56	2.01	1.3			
17/18 Average	2.93	2	4.2	3.14	2.36	1.65	2.84	1.79			
18/19 Average	3.05	1.84	2.95	1.92	3.66	2.01	2.81	1.59			
Jul-2019	1.19	0.65	1.43	0.69	0.60	0.57	0.31	0.30	WSW (32%)	WSW	149,535
Aug-2019	2.08	1.42	0.91	0.62	1.67	1.14	2.40	1.72	WSW (33%)	WSW	143,251
Sep-2019	1.10	0.92	1.44	1.20	2.01	1.51	0.50	0.46	WSW (28%)	WSW	134,733
Oct-2019	1.84	0.98	1.43	0.94	2.19	1.18	1.24	0.91	WSW (20%)	WSW	181,541
Nov-2019	3.27	2.76	3.55	3.10	2.84	2.52	2.16	1.91	WSW (14%)	WSW,NNE	130,941
Dec-2019	2.31	1.40	2.02	1.42	2.14	1.27	1.84	1.10	N (29%)	NNE	80,620
Jan-2020	7.11	5.45	9.12	6.44	10.20	8.28	8.14	6.33	N (23%)	NNE	88,217
Feb-2020	6.77	3.11	13.25	9.90	4.60	3.06	3.64	2.26	SE(14%)	ESE,SE	89,696
Mar-2020	2.03	1.75	1.75	1.11	1.81	1.05	1.85	1.20	W(16%)	NE	83,504
Apr-2020	1.45	0.95	4.84	2.36	1.69	0.95	1.40	0.85	W(28%)	W	26,423
May-2020	1.25	0.83	1.09	0.83	1.18	1.04	0.79	0.67	W(28%)	SSW	82,346
Jun-2020	0.93	0.85	0.56	0.51	1.03	0.70	0.87	0.46	W (32%)	WSW	66,037
19/20 Average	2.61	1.76	3.45	2.43	2.66	1.94	2.10	1.51			

A graph of the historical deposited dust values compared to production is shown in green for each deposited dust site in Figure 49 to 52.

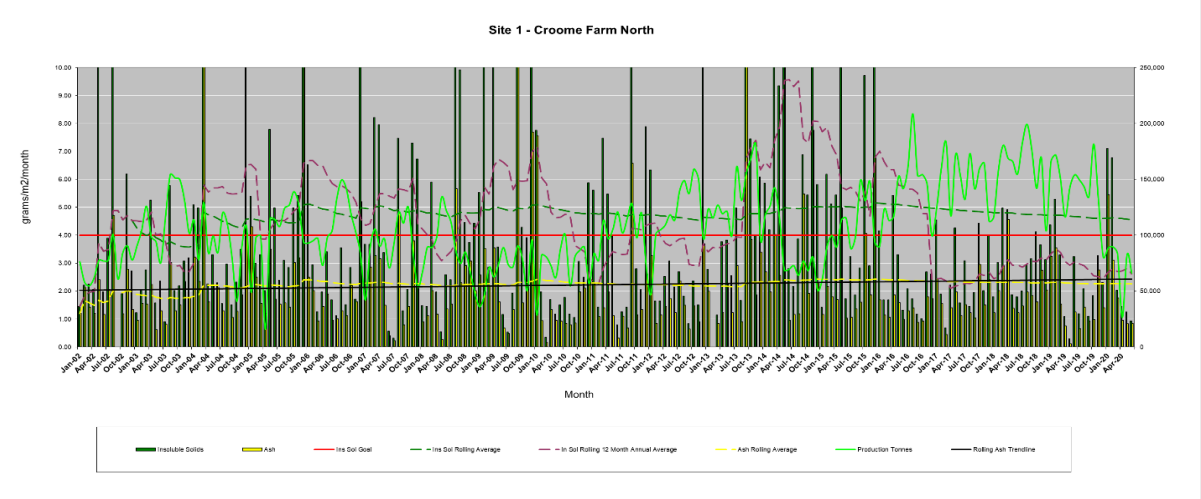

Figure 49 DQ 1 Production vs Dust Trends

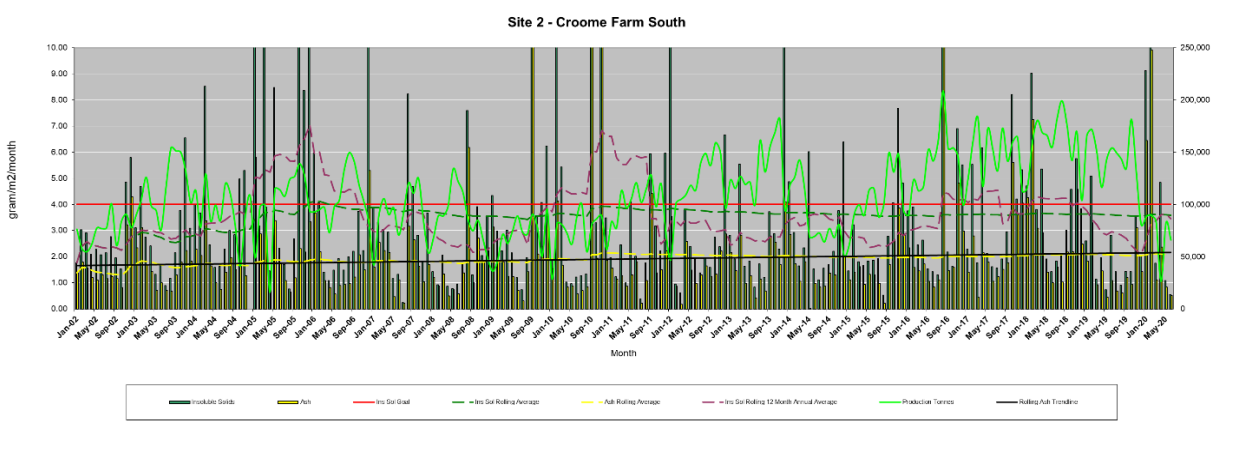

Figure 50 DQ 2 Production vs Dust Trends

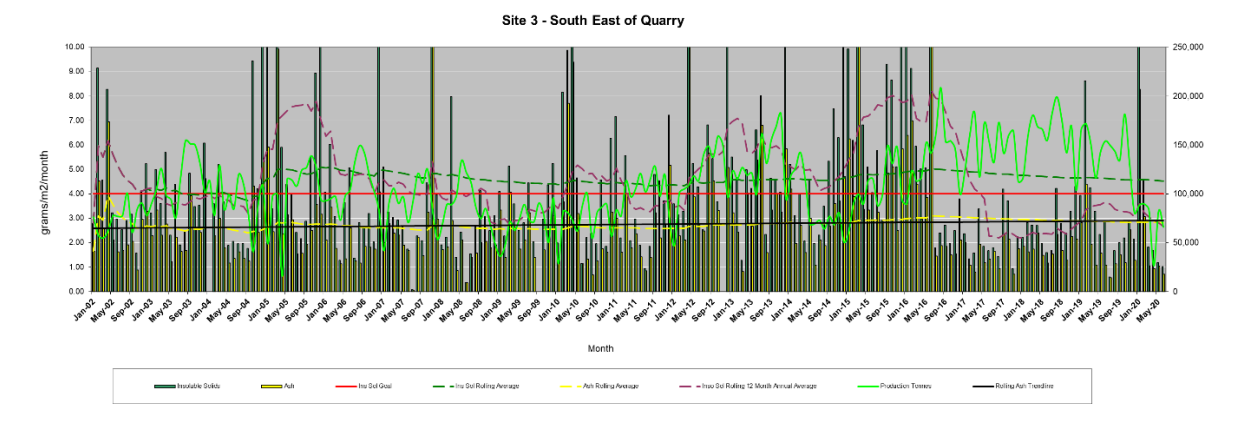

Figure 51 DQ 3 Production vs Dust Trends

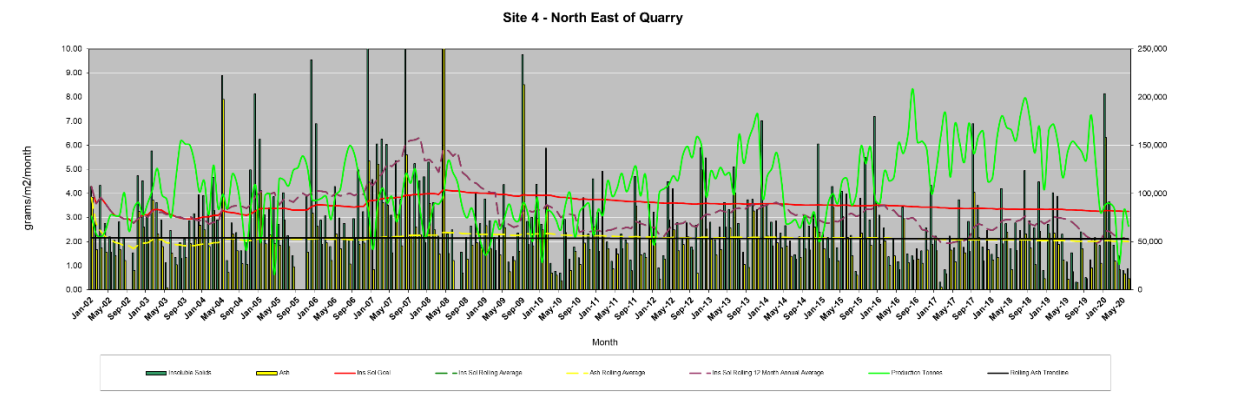

Figure 52 DQ 4 Production vs Dust Trends

Further details relating to Particulate Matter can be seen below in Table 28.

Table 28 Tabulated PM10 Monitoring Results for current reporting period

Date	Sample Daily Average (µg/m$^{3)}$	Short Term Criteria 24-hr (50µg/m$^{3)}$	Long Term Criteria Annual (30µg/m$^{3)}$	Progressive Annual Average (µg/m3)	Comments
1/07/2019	31.08	50	30	18.98	
7/07/2019	6.83	50	30	19.03	
13/07/2019	4.75	50	30	18.68	
19/07/2019	9.38	50	30	18.75	
25/07/2019	13.73	50	30	18.65	
31/07/2019	0	50	30	18.55	
6/08/2019	8.95	50	30	18.48	
12/08/2019	3.69	50	30	18.37	
18/08/2019	11.69	50	30	18.48	
24/08/2019	12.44	50	30	18.60	
30/08/2019	3.86	50	30	18.45	
5/09/2019	13.37	50	30	18.46	
11/09/2019	11.05	50	30	18.45	
17/09/2019	7.25	50	30	18.37	
23/09/2019	24.48	50	30	18.18	
29/09/2019	11.05	50	30	17.76	
5/10/2019	4.63	50	30	17.66	
11/10/2019	4.04	50	30	17.25	
17/10/2019	10.93	50	30	17.14	
23/10/2019	16.7	50	30	17.28	
29/10/2019	35.29	50	30	17.47	
4/11/2019	15.09	50	30	17.44	
10/11/2019	7.37	50	30	17.46	
16/11/2019	17.65	50	30	17.44	
22/11/2019	35.12	50	30	17.58	
28/11/2019	52.35	50	30	18.21	Currowan Bushfires
4/12/2019	28.82	50	30	18.29	Currowan Bushfires

10/12/2019	70.23	50	30	19.11	Currowan Bushfires
16/12/2019	28.7	50	30	19.40	Currowan Bushfires
22/12/2019	33.27	50	30	19.45	Currowan Bushfires
28/12/2019	36.6	50	30	19.68	Currowan Bushfires
3/01/2020	48.96	50	30	20.07	Currowan Bushfires
9/01/2020	18.84	50	30	19.88	Currowan Bushfires
15/01/2020	39.81	50	30	20.28	Currowan Bushfires
21/01/2020	30.5	50	30	20.16	Currowan Bushfires
27/01/2020	30.5	50	30	19.31	Currowan Bushfires
2/02/2020	44.15	50	30	19.78	Currowan Bushfires
8/02/2020	17.23	50	30	19.80	
14/02/2020	19.01	50	30	19.68	
20/02/2020	13.5	50	30	19.62	
26/02/2020	21.21	50	30	19.78	
4/03/2020	19.71	50	30	19.73	
10/03/2020	10.52	50	30	19.66	
16/03/2020	11.29	50	30	19.67	
22/03/2020	20.92	50	30	19.74	
28/03/2020	7.37	50	30	19.68	
3/04/2020	9.11	50	30	19.40	
9/04/2020	3.15	50	30	19.21	
15/04/2020	23.29	50	30	19.40	
21/04/2020	11.47	50	30	19.26	
27/04/2020	12	50	30	18.88	
3/05/2020	8.97	50	30	18.84	
9/05/2020	17.65	50	30	18.85	
15/05/2020	12.6	50	30	18.69	
21/05/2020	13.55	50	30	18.67	
27/05/2020	12.12	50	30	18.60	
2/06/2020	8.61	50	30	18.59	
8/06/2020	10.45	50	30	18.25	

14/06/2020	6.95	50	30	18.26	
20/06/2020	8.08	50	30	18.03	
26/06/2020	7.84	50	30	17.64	

12. Appendix C MAC Noise Monitoring Annual Compliance Report

13. Appendix D Blast Monitoring Tables

Tabulated blast monitoring data for the Benny Residence is shown below in Table 29.

Table 29 Benny Residence Tabulated Blast Monitoring Results

Date	Time	Airblast Overpressure	Ground Vibration	MIC	Distance to Monitor	EIS Predicted Ground Vibration (100 MIC)	EIS Predicted Ground Vibration (30 MIC)
		dB(Lin Peak)	(mm/s)	(kg)	(m)	(mm/s)	(mm/s)
10-Jul-19	14:58	98.5	4.95	272	934	4.2	3.5
17-Jul-19	12:17	99.5	3.19	140	940	4.2	3.5
23-Jul-19	12:14	97.2	1.85	155	887	4.2	3.5
30-Jul-19	12:26	100.8	2.41	155	811	4.2	3.5
06-Aug-19	14:20	101.1	2.26	133	1038	4.2	3.5
04-Sep-19	12:35	100.8	1.27	150	845	4.2	3.5
25-Sep-19	13:13	100.2	2.83	140	868	4.2	3.5
02-Oct-19	15:25	106.8	1.54	63	756	4.2	3.5
16-Oct-19	12:59	98.2	3.73	136	929	4.2	3.5
28-Oct-19	12:18	101.7	1.97	148	1041	4.2	3.5
30-Oct-19	10:55	110.2	0.82	97	1019	4.2	3.5
06-Nov-19	12:17	102.4	2.93	140	907	4.2	3.5
21-Nov-19	9:22	107.7	3.52	157	788	4.2	3.5
04-Dec-19	12:35	108.0	2.07	150	967	4.2	3.5
11-Dec-19	12:15	100.0	2.70	145	856	4.2	3.5
15-Jan-20	12:22	102.5	0.89	102	809	4.2	3.5
05-Feb-20	13:21	98.2	4.25	141	915	4.2	3.5
19-Feb-20	12:55	97.7	1.64	150	808	4.2	3.5
26-Feb-20	12:23	104.9	2.15	106	739	4.2	3.5
09-Mar-20	13:45	111.4	1.71	143	1049	4.2	3.5
18-Mar-20	12:40	94.2	2.55	151	952	4.2	3.5
08-Apr-20	16:02	116.3	1.55	43	731	4.2	3.5
27-May-20	13:49	104.8	3.50	132	1040	4.2	3.5
15-Jun-20	14:26	106.6	5.83	113	739	4.2	3.5

24-Jun-20	13:29	No Trigger	No Trigger	62	773	4.2	3.5

Blast monitoring results for the MacParland Residence is shown below in Table 30.

Table 30 MacParland Residence Tabulated Blast Monitoring Results

Date	Time	Airblast Overpressure	95th Percentile Annual Airblast Limit (5%)	Ground Vibration	95th Percentile Annual Airblast Limit (5%)	Distance to Monitor
		dB (Lin Peak)	dB (Lin Peak)	(mm/s)	(mm/s)	(m)
10-Jul-19	14:58	111.0	130	15.400	30	583
17-Jul-19	12:17	109.9	130	7.240	30	457
23-Jul-19	12:14	109.3	130	1.370	30	749
31-Jul-19	12:26	106.9	130	2.710	30	567
06-Aug-19	14:20	109.0	130	5.590	30	511
04-Sep-19	12:35	110.0	130	0.580	30	749
02-Oct-19	15:25	107.6	130	1.860	30	682
16-Oct-19	12:59	109.1	130	6.780	30	538
28-Oct-19	12:18	107.3	130	5.210	30	543
30-Oct-19	10:55	113.1	130	1.490	30	733
06-Nov-19	12:17	108.1	130	7.150	30	472
21-Nov-19	9:22	110.7	130	4.920	30	557
04-Dec-19	12:35	105.6	130	8.070	30	569
11-Dec-19	12:15	108.9	130	3.460	30	ND
15-Jan-20	12:22	109.6	130	1.140	30	758
05-Feb-20	13:21	111.0	130	11.200	30	527
19-Feb-20	12:55	108.0	130	0.889	30	ND
26-Feb-20	12:23	119.3	130	12.450	30	ND
09-Mar-20	13:45	109.2	130	4.190	30	ND
18-Mar-20	12:40	104.9	130	7.700	30	556
08-Apr-20	16:02	113.4	130	2.250	30	654
27-May-20	13:49	109.5	130	7.100	30	495

15-Jun-20	14:26	117.6	130	8.950	30	792
24-Jun-20	13:29	109.3	130	3.100	30	634

14. Appendix E EMM Ground Water Monitoring Annual Report

15. Appendix F Goodbush Bushland Restoration Annual Report