September 2025

Boral Dunmore Hard Rock Quarry Annual Review

1 July 2024 – 30 June 2025

Document Control Sheet

Document Control				
Ref	Prepared by	Approved by	Date	Distribution
V1.0	Ionut Ciobanu Oprea	Lauren Sibigtroth		• Department of Planning, Housing and Infrastructure • Environmental Protection Authority • 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 Resources (NSW) Pty Ltd
Name of holder of EPL	Boral Resources (NSW) Pty Ltd
Annual Review start date	1 July 2024
Annual Review end date	30 June 2025
I, Stuart McLean, 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 2025 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 provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual $250,000.	
Name of authorised reporting officer	Stuart McLean
Title of authorised reporting officer	Quarry Manager
Signature	
Date	30/09/2025

Contents

Tables

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
DPHI	Department of Planning, Housing and Infrastructure
DRG	NSW Division of Resources and Geoscience
EPA	Environmental Protection Authority
EPA&A Act	Environmental Planning and Assessment Act 1979
EPL 77	Environmental Protection Licence 77 for the Dunmore Hard Rock Quarry operated by Boral Resource (NSW) Pty Ltd
FFMP	Flora and Fauna Management Plan
FY21	Financial Year 2021 (1 July 2020 – 30 June 2021)
HVAS	High Volume Air Sampler
IEA	Independent Environmental Audit
LOR	Limit of Reporting
ML	Megalitres
MSDS	Material Safety Data Sheet
NATA	National Association of Testing Authorities
NMP	Noise Management Plan
NRAR	Natural Resource Access Regulator
NTU	Nephelometric Turbidity Units
OEH	Office of Environment and Heritage
PIRMP	Pollution Incident Response Management Plan

PM10	Particulate Matter (10 microns in diameter)
PM2.5	Particulate Matter (2.5 microns in diameter)
POEO Act	*Protection of the Environment Operations Act 1997*
RIC	Rail Infrastructure Corporation
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 operation, DA 470-11-2003 Schedule 5 Condition 9 (S5.C9) requires that the AR reports on specific components of the operation.

S5.C9 and all other relevant conditions required to be addressed as part of the AR are outlined in Table 1 with reference to the section of this report where each has been addressed. The timeframe for the annual review is the 2025 Financial Year which is 1 July 2024 –30 June 2025.

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 5.5.4
	(b) provide information on evaporative losses, dust suppression, dam storage levels and implications of obtaining any water supplies from off-site; and	Section 5.5.4
	(c) evaluate water take against licensing requirements	Section 5.5.4
S4.C50	The Applicant must include a progress report on the implementation of the Flora and Fauna Management Plan in the Annual Review.	Section 5.7, Appendix F
S4.C57	The Applicant must implement the Rehabilitation Strategy approved by the Planning Secretary.	Section 5.7, Appendix F
S4.C72	The Applicant must describe what measures have been implemented to minimise the amount of waste generated by the development in the Annual Review	Section 5.9
S4.C87	The Applicant must:	
	a. provide annual production data to the MEG using the standard form for that purpose; and	Section 3
	b. include a copy of this data in the Annual Review.	Section 3

Condition	Condition Requirements	Location within this report
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 5.7, Appendix F Section 5, Section 6.1 Section 1.1 Section 5 Section 5 Section 5

1.1. Statement of Compliance

The statement of compliance for the FY25 reporting period (1 July 2024 – 30 June 2025) is contained 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. Each non-compliance has been risk assessed as per the DPHI 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 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	Non-compliant Administrative	C32 (a) and (b) are still to be undertaken. A number of water improvement works have been implemented at the quarry site including • An increase in storage capacity of the Middle Dam and the improved spillway arrangement; • An upgraded drainage system between the Middle Dam and the Lower Dam; • An upgraded water recycling ability for the quarry; A revised water management plan was submitted to NRAR and DPHI water with comments received in October 2020 regarding	

Condition #	Condition Description	Compliance Status	Comments	Section addressed
	(e) ensure the integrity of the dams would not be compromised by flooding; to the satisfaction of the EPA and the Secretary.		the proposed changes to the operation and management of the dams, specifically in relation to items (a) and (b) of C32. Items (c), (d) and (e) are managed as part of ongoing operations. Modification 13 for Dunmore Quarry has since been approved by DPHI and a review of the Lower dam requirements were undertaken. The water management plan has subsequently been reviewed and includes all agency consultation. Submission to DPHI was completed in September 2025 and pending approval. Once approval is granted works as agreed will proceed. Water monitoring has continued at the dam overflows and is contained in this annual review.	

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; • 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 (eg 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
Stuart McLean	Dunmore Quarry Manager	Tel: (02) 4237 2000 Email: stuart.mclean@boral.com.au
Brodie Bolton	Metropolitan Operations Manager NSW/ACT	(02) 4237 2000 Email: brodie.bolton@boral.com.au
Ionut Ciobanu Oprea	Environment and Stakeholder Advisor Dunmore	Tel: (02) 4237 8414 Email: ionut.ciobanuoprea@boral.com.au
Kate Woodbridge	Stakeholder Relations Manager	Tel: (02) 4237 8414 Email: kate.woodbridge@boral.com.au

2. Dunmore Quarry Operations

The Dunmore Hard Rock Quarry, 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 previous reporting period extraction has occurred in the area known as the Croome West Pit. Approval of the most recent modification, MOD 13, was granted in June 2024. Extraction of the approved area under MOD13, known as the RIC, commenced in the current reporting period as of March 2025. Notification of commencement was submitted to DPHI. The site layout is shown below in Figure 1.

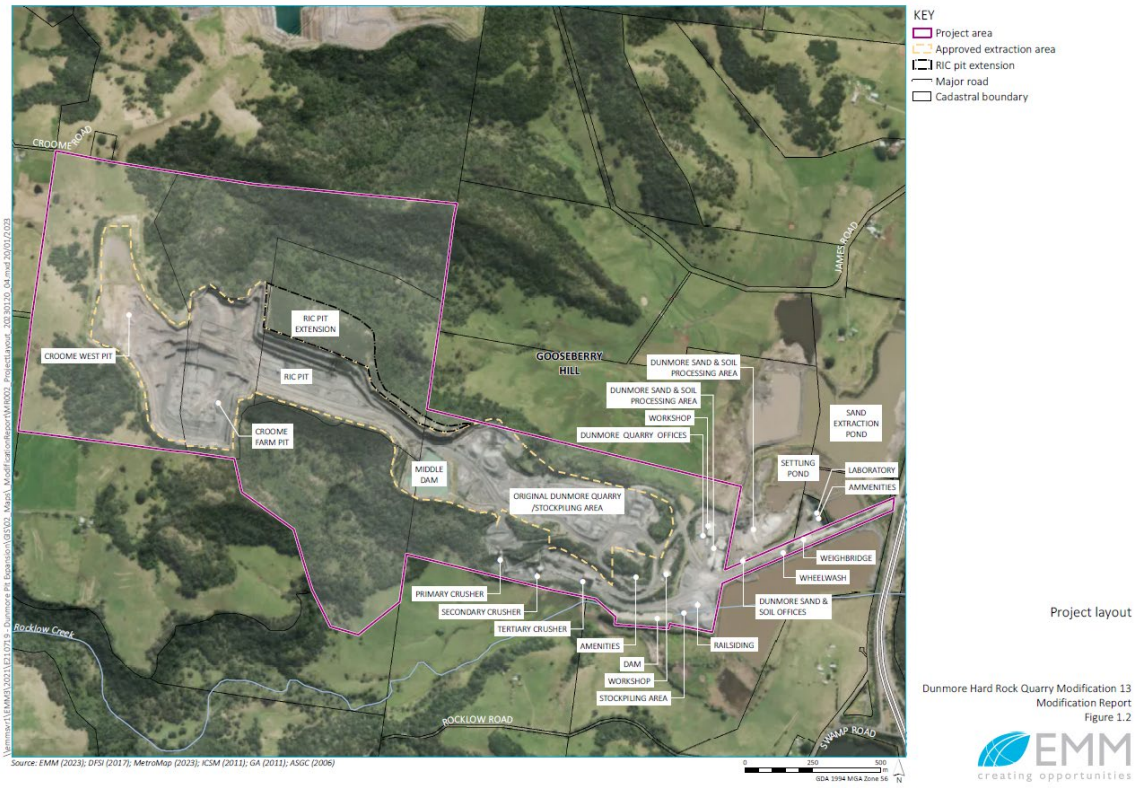


Figure 1 Dunmore Site Layout

2.1. Operations the last 12 months

Dunmore Quarry continued to support key infrastructure projects during the reporting period. Material supply included successful deliveries to HMAS Albatross and projects in and around Sydney Airport. Demand for stabilised materials has shown consistent growth over the past several months, reflecting strong market activity. Blasting, loading, and haulage activities commenced at the RIC reserve, with supply to the Mt Ousley upgrade. In May, the site commissioned a new Cat 395 (95t) excavator, with further fleet upgrades expected in the months ahead. These new machines will enhance operational efficiency, while providing improved fuel economy and reduced emissions compared to previous equipment.

MOD13 pre-clearance surveys were undertaken to assess potential habitat prior to vegetation clearance, followed by an audit of boundary pegs within the disturbance area. Vegetation was mulched, and translocation areas were established with baseline monitoring completed. In addition, seed and propagules of Zieria were collected with the aim of propagating them for future replanting within the translocation areas. Pre-clearance surveys of RIC area were completed by a qualified Ecologist prior to removal of vegetation. Rapid Visual Assessments were conducted at translocation areas prior to movement of material from RIC.

Work has commenced with the establishment of the Biodiversity Stewardship Agreement with EMM Consulting.

2.2. Operations the next 12 months

Access to the RIC reserve will continue in the next 12 months including translocation of material to translocation areas. Work will continue on the Biodiversity Stewardship Agreement. This will include aerial drone footage will be completed to identify areas for improvement and work will commence with a contractor to manage access and weed control, in the following reporting period. The quarry will continue to supply HMAS Albatross and The Mt Ousley Upgrades to the Princess Highway north, and other local projects.

2.3. Licences and Approvals

Dunmore Quarry operates under a number of regulatory approvals and licences which are summarised in Table 5 below.

Table 5 Relevant Licences and Approvals

Approval	Detail	Regulatory Authority
DA 470-11-2003 Modification 13	Approved in June 2024, MOD13 covered a 8ha extension of the RIC pit to allow for further extraction until 2043.	NSW Department of Planning, Housing and Infrastructure
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 01 July.	NSW Environmental Protection Authority
Water Access Licence WAL#25152 WSW# 10AL103610	Extraction of water from the Lower Dam. This allows for 227 ML 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	Water NSW
Water Access Licence WAL#44509	Extraction of water from the Greater Sydney Basin. This allows for 250 ML per annum to be extracted.	Water NSW

A copy of DA 470-11-2003 and EPL 77 is 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 was forecast to be lower than expected pending approval of MOD13 work. An increase in production was seen after commencement of extraction from RIC in May 2025.

Table 6 and Table 7 detail the production data in both a monthly breakdown and the format submitted to DRG as required by S4.C77.

Table 6 Production data

Month	Production (t)	Sales (t)
		Road
Jul-2024	122,386	80,524.5
Aug-2024	85,453	77,936.7
Sep-2024	89,602	75,264.7
Oct-2024	91,377	77,246.4
Nov-2024	71,675	83,207.0
Dec-2024	65,551	56,746.6
Jan-2025	65,632	49,253.5
Feb-2025	71,712	71,365.1
Mar-2025	81,665	69,527.8
Apr-2025	69,578	67,594.5
May-2025	110,660	70,607.9
Jun-2025	106,447	76,366.9
FY 25 Total	1,031,738	855,641.6

Table 7 Sales data for FY25 period

Total Sales/Disposals			
Product	**Type of Material**	**Quantity (Tonnes)**	**$ Value of Sale***
Virgin Materials			
Crushed Coarse Aggregates			
Over 75mm	Latite		*
Over 30mm to 75mm	Latite		*
5mm to 30mm	Latite		*
Under 5mm	Latite		*
Natural sand			*
Manufactured Sand	Latite		*
Construction Sand			*
Prepared Road Base & Sub Base	Latite		*
Other Unprocessed Materials	Latite		*
Total		1,031,738	*

Note: This data is an approximation of FY25 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, which is then automatically migrated over to the transport dispatch monitoring sheet.

No exceedances occurred with respect to the limit of 400 laden trucks from the site per day during the reporting period. The highest number of trucks leaving site on any given day was 294

3.1.1. Transport Options Review

A transport options review is required within three years of determination of Modification 11 and every five years after as per SC.C60C. The review has been completed and is available in Appendix E.

4. Actions Required from Previous Annual Review

Table 8 details the actions required from the FY24 Annual review and where each item is discussed.

Table 6 FY24 Annual review actions

Reference	Description of Action	Actions Completed	Section Addressed
AR1	Real time weather system to be underway.	Real time monitoring system currently fully functional.	Section 5.2
AR2	Rehabilitation Management Plan and Rehabilitation Strategy to be completed.	Rehabilitation Management Plan and Rehabilitation strategy is required for submission 6 months following commencement of RIC operations. This will be completed in the following reporting period.	Section 5.2
AR3	Translocation Site associated with new BSA to be established.	Translocation Sites have been partially established.	Section 5.4

5. Environmental Performance

Dunmore Quarry has comprehensive management and monitoring programs which 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

5.1. 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 no prescribed impact assessment criteria and meteorological monitoring is used to provide background information for management of the site. A detailed summary of the FY25 and historical rainfall data can be found in Appendix A.

5.1.1. Meteorological Monitoring Long Term Analysis and Trends

The FY25 period was close to the regional average with 944 mm falling over the reporting period. Rain events resulted in significant rainfall in short timeframes which contributed to exceeding the design capacity. There were two notable rain events during the reporting period, all of which exceeded the design capacity of the lower dam (90.7 mm over 5 days):

- 28-31 March 2025: 137 mm.
- 21-25 May 2025: 176.6 mm.

Typically winds during the reporting period originated from the west and west-south-west for the majority of the year. In summer, prevailing winds were also from the north-east. These results are mostly consistent with historic trends and generally had a greater concentration of winds from the west and north-east.

5.1.2. Meteorological Monitoring Summaries and Opportunity for Improvement

The weather station is 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.

5.2. Air Quality Monitoring

Three methods of monitoring air quality are used at Dunmore Quarry. Deposited dust gauges are used to measure 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. In parallel there is a real-time air quality monitoring system that tests continuous for PM10 and PM2.5. This system is capable of sending alerts when dust levels are exceeded, making it possible to take control measures in real time.

During the reporting period, 21 samples were not collected from the High-Volume Air Sampler (HVAS – PM10). These gaps were supplemented with data from the real-time air quality monitoring system. Elevated HVAS PM10 results recorded on 31/07/2024 and 11/09/2024 were attributed to filters not being replaced, resulting in the sampler operating on a 6-day cycle with the same filters. Due to incorrect sampling regime these results have been omitted and supplemented with the real-time air quality data.

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 real-time monitoring network and assess the compliance of the project. The alert system was tested on several occasions during the reporting period. These tests helped optimising the system, resulting in a TARP plan implemented in June 2025. It was also included in the EPL license variation August 2025.

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

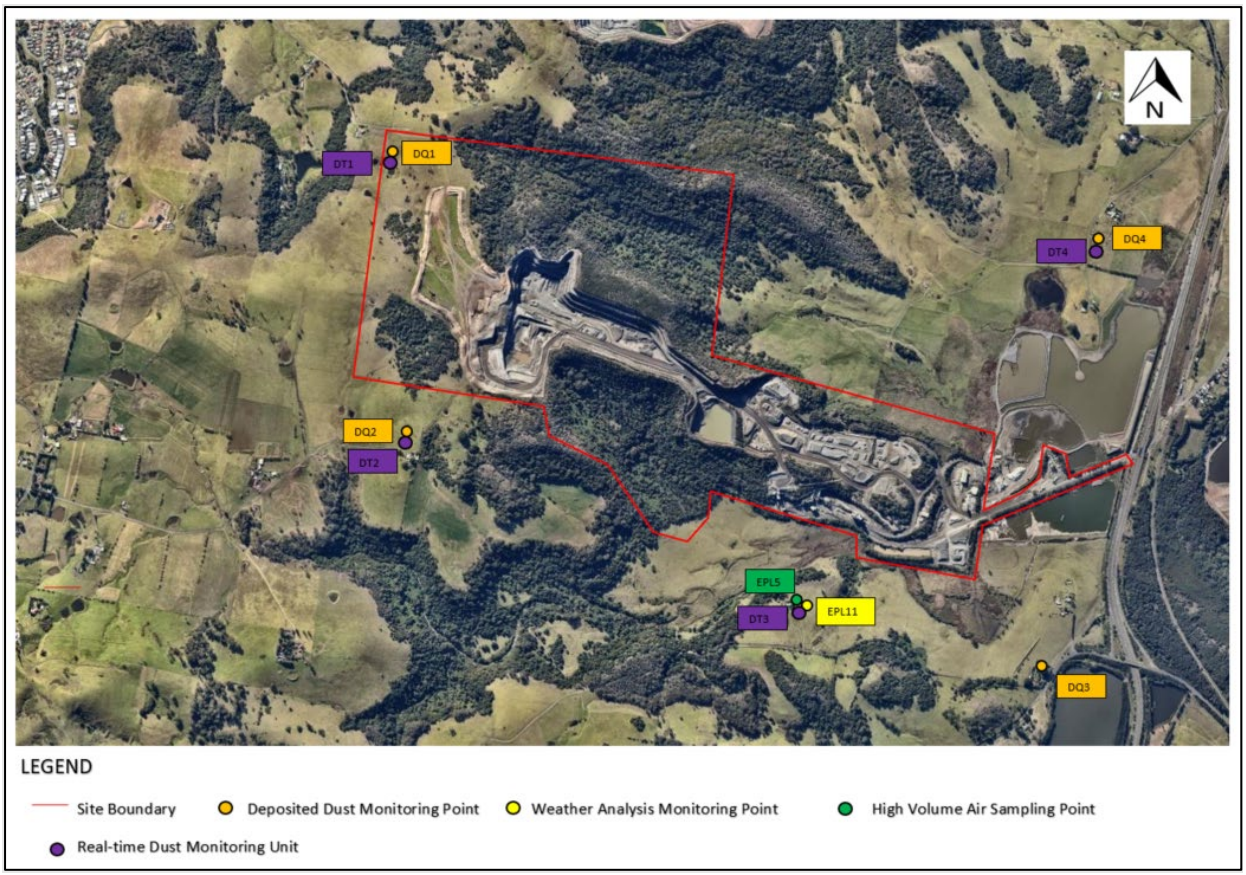


Figure 2 Air Quality Monitoring Locations

5.2.1. Deposited Dust Monitoring Assessment Criteria

The relevant deposited dust impact assessment criteria apply to a residence on privately owned land. Monitoring points 1, 2 and 4 are not located in direct vicinity of residences. It is important to note that the assessment criteria refer to an annual averaging period (i.e. a monthly average over the last 12 months). Impact assessment criteria is shown in Table 9 below.

Table 7 Deposited Dust Impact Assessment Criteria

Pollutant	Averaging Period	Criterion	
Deposited dust[c]	Annual	2g/m2/month[b]	4g/m^2/month[a,d]

[a] Cumulative impacts (ie increases in concentration due to development plus all other sources)

[b] Incremental impact (ie 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.

5.2.2. Deposited Dust Monitoring FY25 Performance Review

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

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

A summary of results for each monitoring location is shown in Table 10 below. A monthly breakdown of each site and summary graphs is located in Figures 3 to 6.

Table 8 Deposited Dust Monitoring Summary

	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	As4h
FY25 Average	2.09	0.89	1.30	0.67	1.66	0.75	2.03	0.95
Criterion	4	-	4	-	4	-	4	-

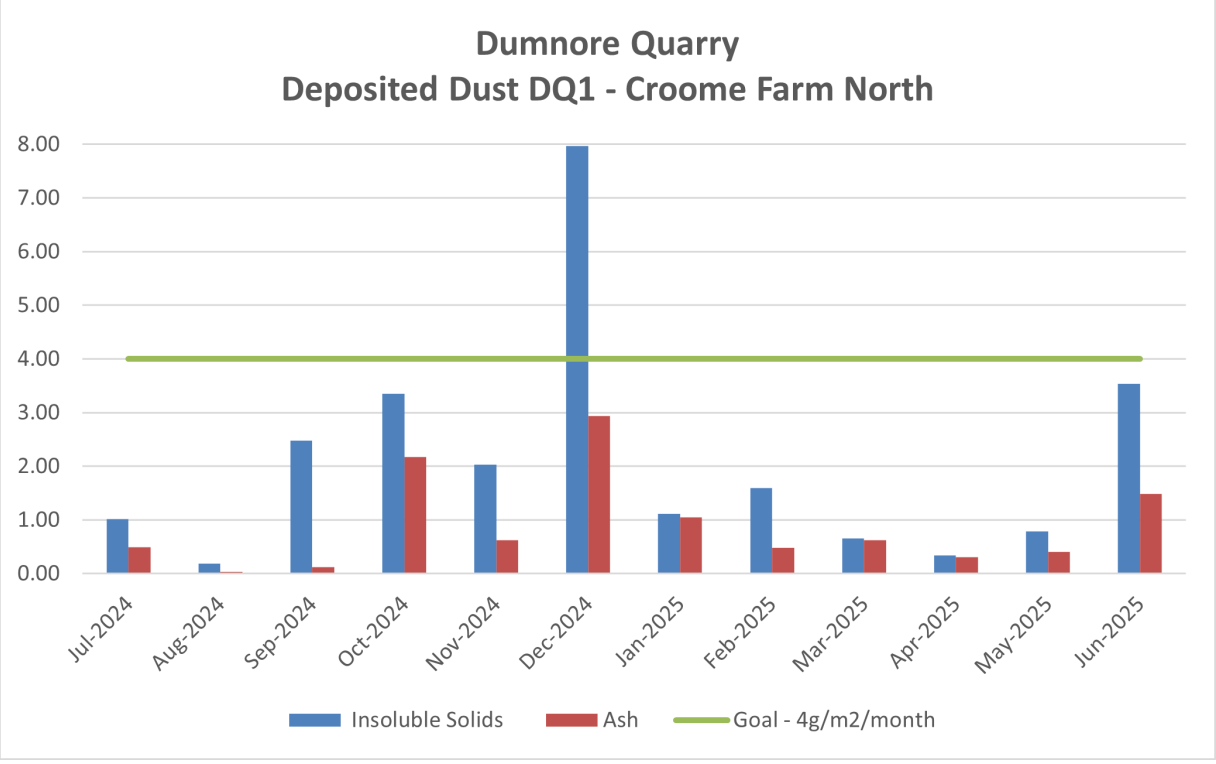


Figure 3 DQ1 Deposited Dust Results

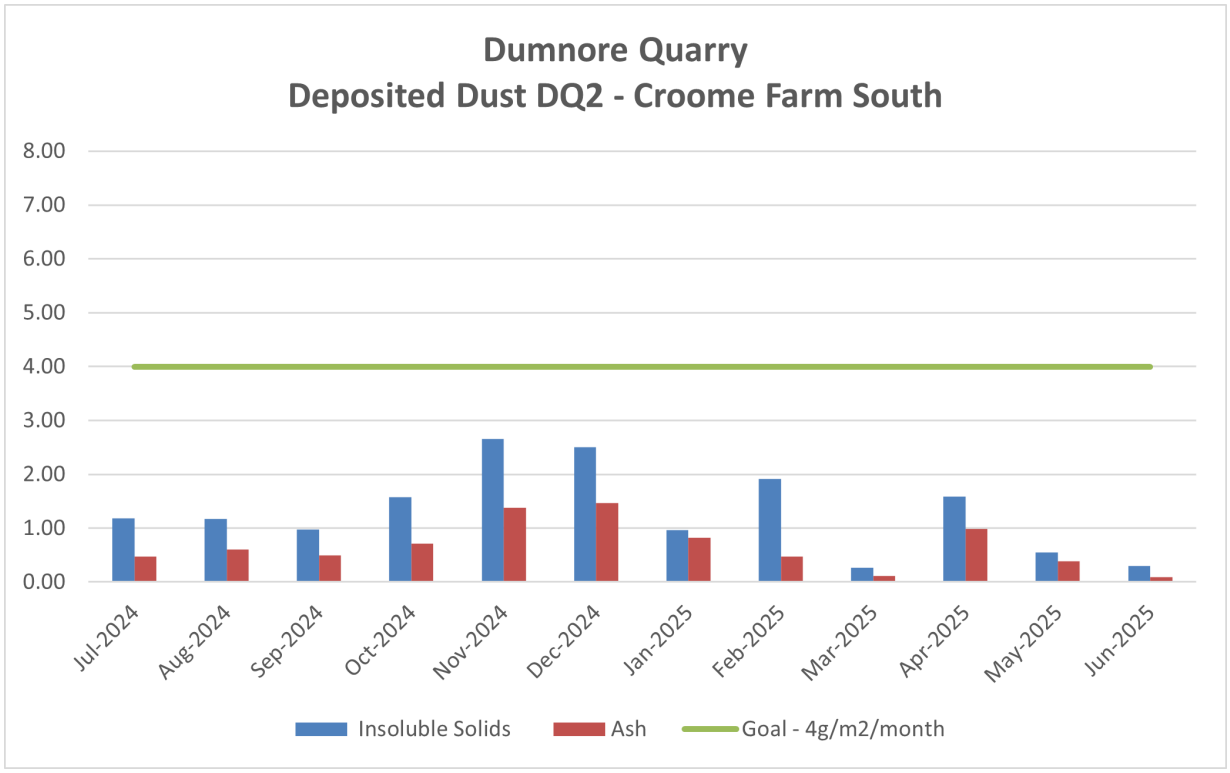


Figure 4 DQ2 Deposited Dust Results

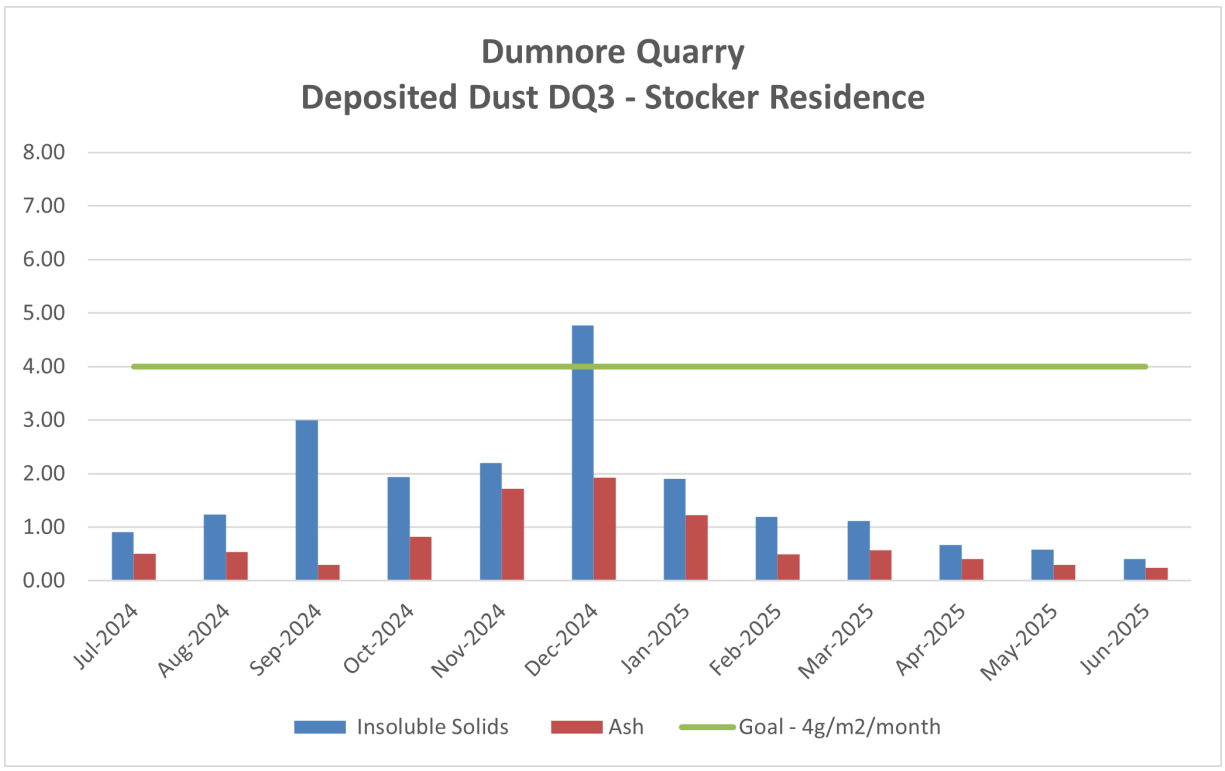


Figure 5 DQ3 Deposited Dust Results

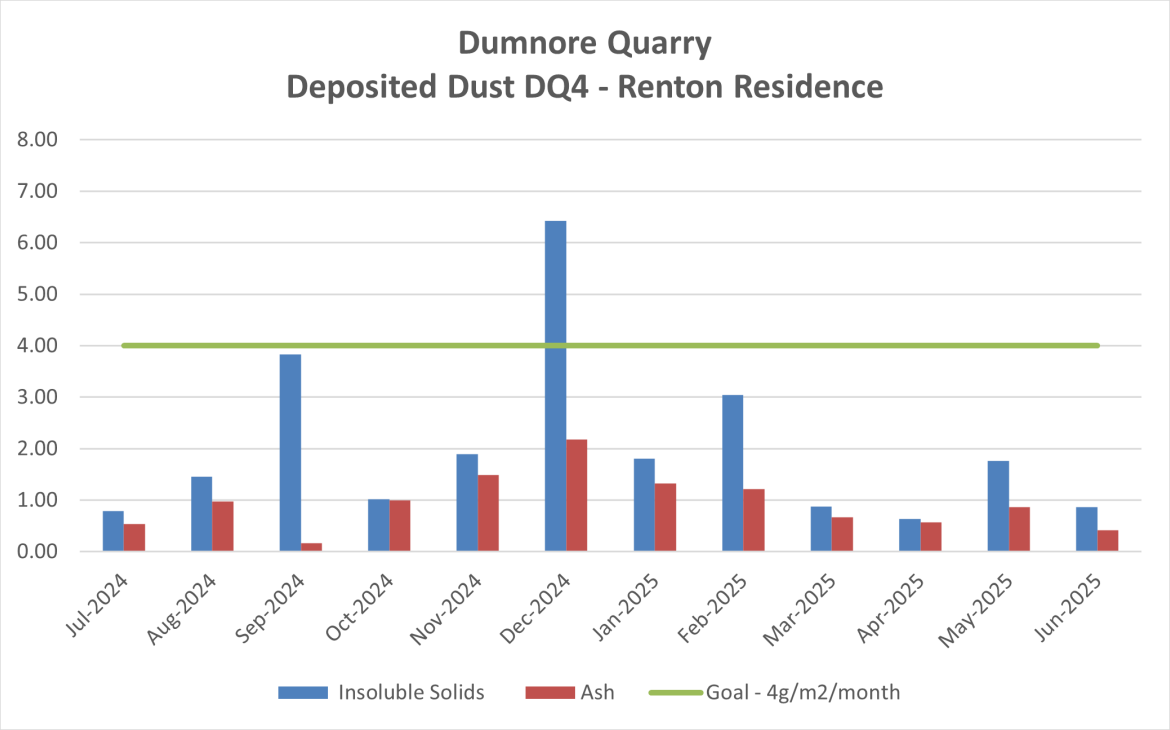


Figure 6 DQ4 Deposited Dust Results

5.2.3. Particulate Monitoring Assessment Criteria

The impact assessment criteria for Particulate Monitoring is provided below in Table 11.

Table 9 Particulate Monitoring 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.

5.2.4. Particulate Monitoring FY25 Performance Review

The PM_{10} readings from FY25 can be seen below in Figure 7.

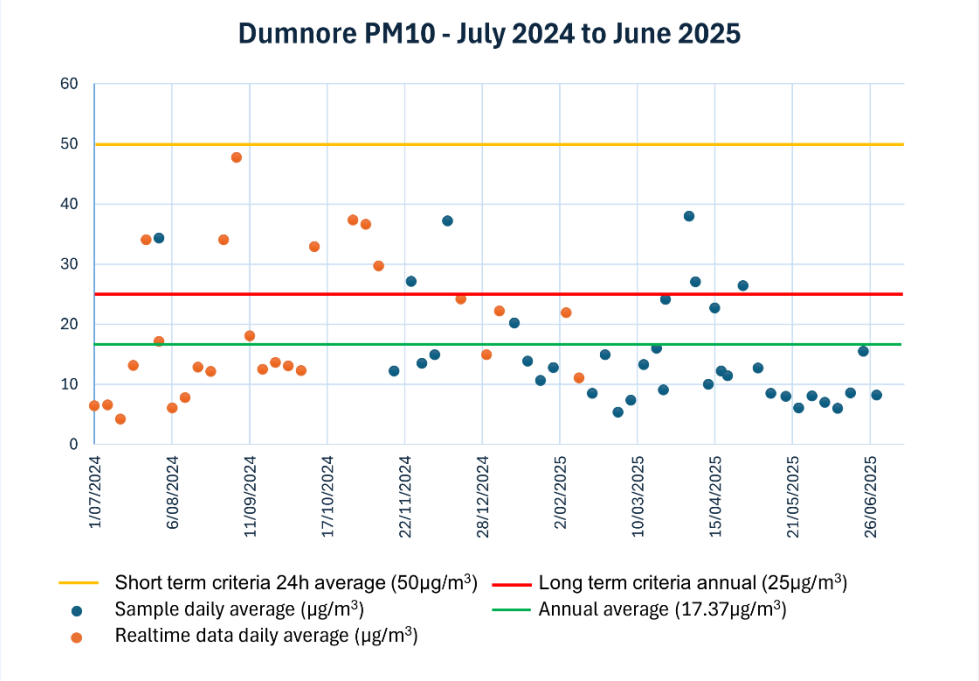


Figure 7 PM_{10} Measurements – FY23

The annual average PM_{10} measurement for the reporting period was below the impact assessment criteria of 25 µg/m³ for PM_{10} and 90 µg/m³ for TSP. The PM_{10} measurements were also similar to the Albion Park South air quality monitoring station's annual averages.

There were no readings recorded as occurring above the long-term criteria for PM_{10} of 50µg/m³ during the reporting period. As previously mentioned, incorrect sampling regime and associated results have been omitted and supplemented with the real-time air quality data. As seen in figure 7, results from the real-time monitoring system were within consent requirements of 50µg/m3 over a 24-hour period.

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 DQ), typically experience a PM_{10}:TSP ratio of 0.4. This ratio has been applied to the annual average PM_{10} concentrations 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 for the Dunmore Quarry.

Table 10 Summary of Particulate Monitoring Data

Pollutant	Dunmore Quarry FY25 Average (µg/m³)	Albion Park FY25 Average(µg/m³)	Dunmore Quarry Long Term Average (µg/m³)
Measured PM10	17.37	14.8	12.47
Derived TSP	43.43	37	31.17
Real time monitor TSP	22.65	-	-
Real time monitor PM10	21.04	-	-
Real time monitor PM2.5	6.11	-	-

5.2.5. Air Quality Monitoring Long Term Analysis and Assessment

The DQ site has been collecting deposited dust data since 2002. A graph of long-term trends can be found in Figure 8 below and shows that deposited dust has typically decreased over time.

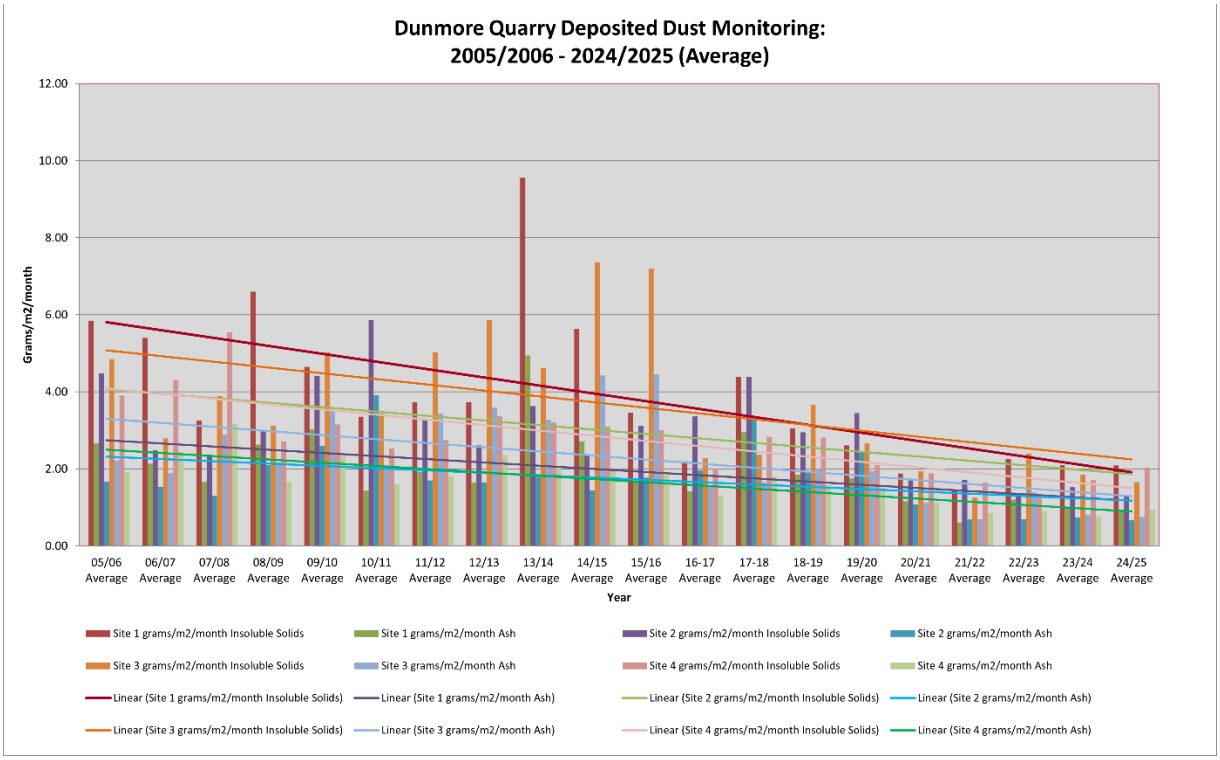


Figure 8 Historical Dust Monitoring Data

A general trend that has been observed is that measured deposited dust is typically higher in dry summer months than winter months, which is to be expected. This trend is also confirmed with the PM_{10} measurements and is generally reflective of regional conditions as a whole.

Figure 9 shows a 90 day average in black, which illustrates a seasonal fluctuation of measured PM_{10} values. A trend can be observed that PM_{10} values are typically higher during summer dry periods and are lower during the winter periods.

This fluctuation is mirrored in the Office of Environment and Heritage's (OEH) Albion Park PM_{10} measurements available on the OEH website (https://www.dpie.nsw.gov.au/air-quality/air-quality-data-services/data-download-facility)

These trends indicate the measured PM_{10} and deposited dust values are typically influenced by ambient local conditions rather than development operations at DQ.

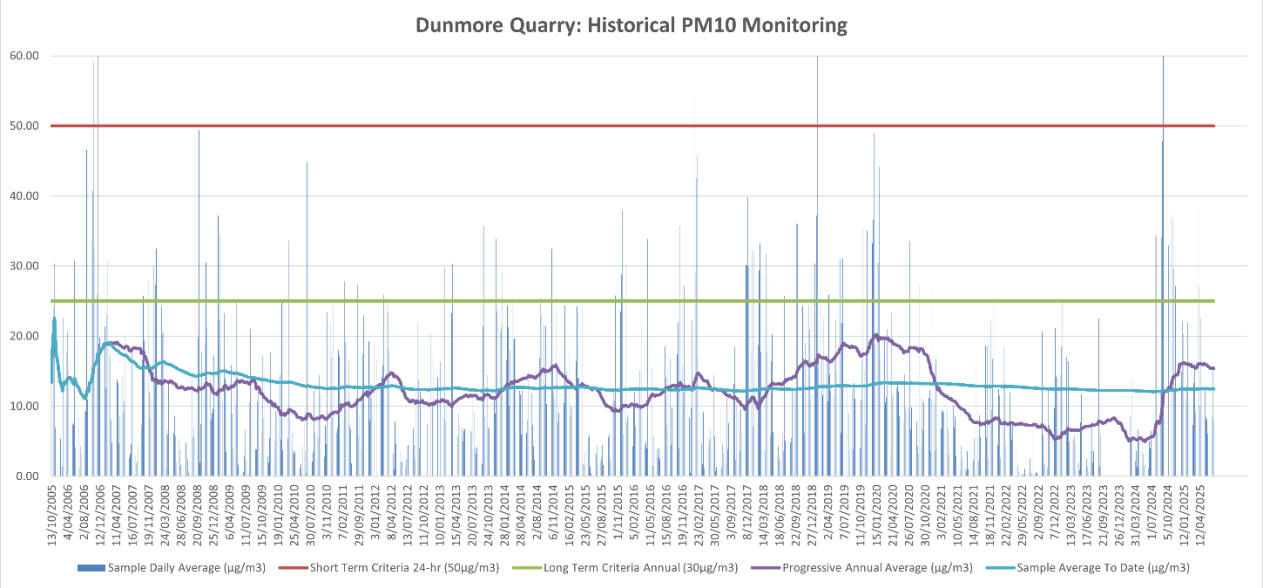


Figure 9 Historical PM_{10} Monitoring Data

5.2.6. Air Quality Monitoring Summary and Opportunities for Improvement

The site was still in the transitional period with TARP and alerting systems being finalised by the end of the reporting period. The alerting system has been redesigned to a web based format to allow greater access to data for operational staff. The next reporting period will focus on fine tuning alerting systems along with continuing the operation of the real time monitoring units.

5.3. Blast Monitoring

S4C16 and S4.C17 outline the blast monitoring parameters which are assessed at the nearest receiver, the Benny Residence. Monitoring at the Benny residence indicated compliance with all relevant blast parameters during the reporting period. Monitoring Points are shown in Figure 10.

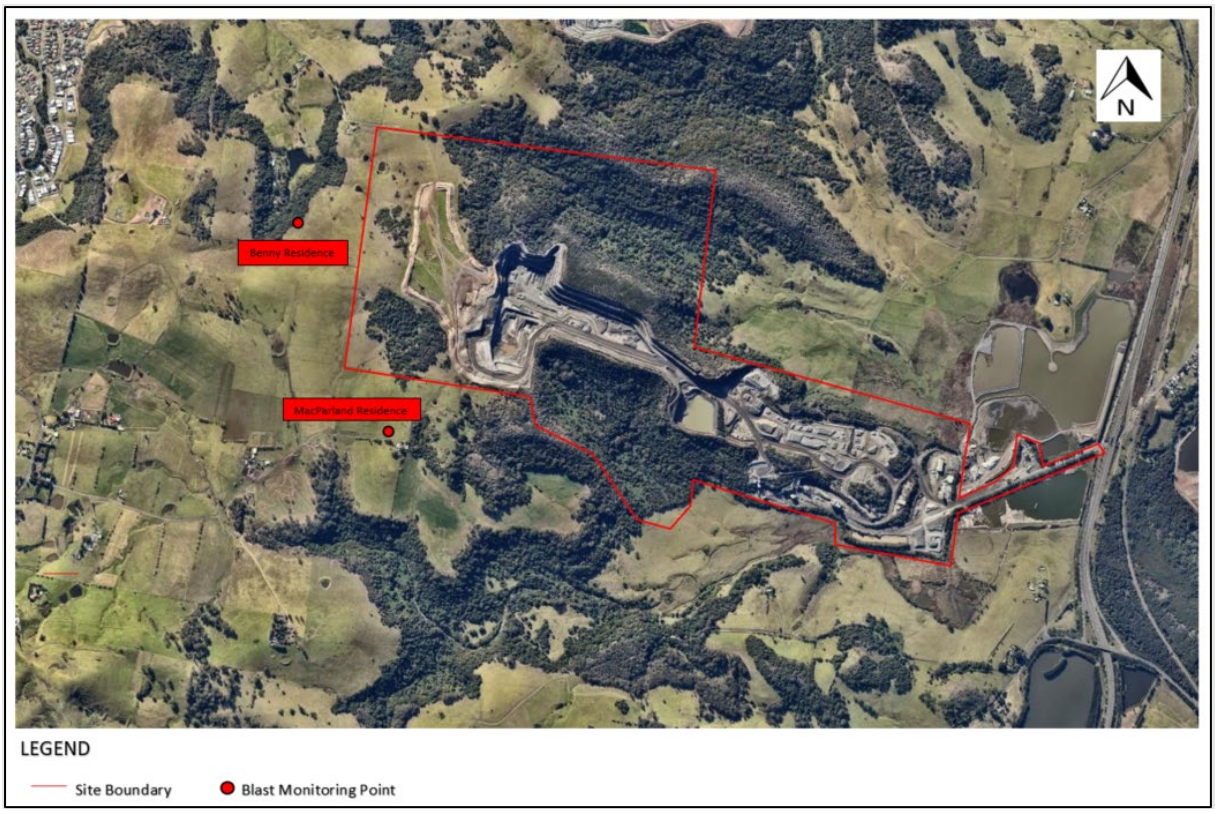


Figure 10 Blast Monitoring Locations

5.3.1. Blast Monitoring Impact Assessment Criteria

S4C16 and S4.C17 outline the blast monitoring parameters which are assessed at the nearest receiver at the Benny Residence. These parameters are reproduced below in Table 13.

Table 11 Blast Monitoring Parameters

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

In total there were sixteen (16) blasts undertaken during the reporting period, and 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 to ensure compliance with the criteria.

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

Table 12 Blast Monitoring Parameters – MacParlands Residence

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 was commissioned, detailing 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. Baseline monitoring was conducted in FY20. Monitoring during the FY25 period indicated no change to any of the observed structures on the property.

5.3.2. Blast Monitoring FY25 Performance Review

Figure 11 and Figure 12 details a visual representation of the blast monitoring in FY25. A number of blasts did not trigger and therefore aren't represented in the figures below. The data table associated with these can be found in Appendix D.

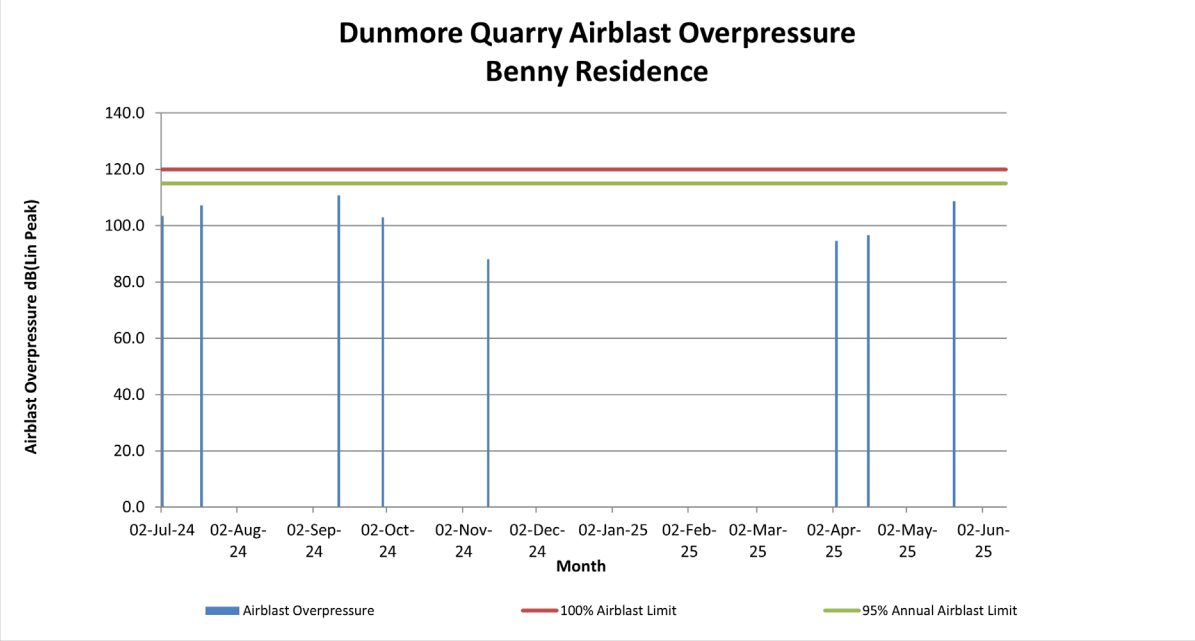


Figure 11 FY25 Overpressure Data

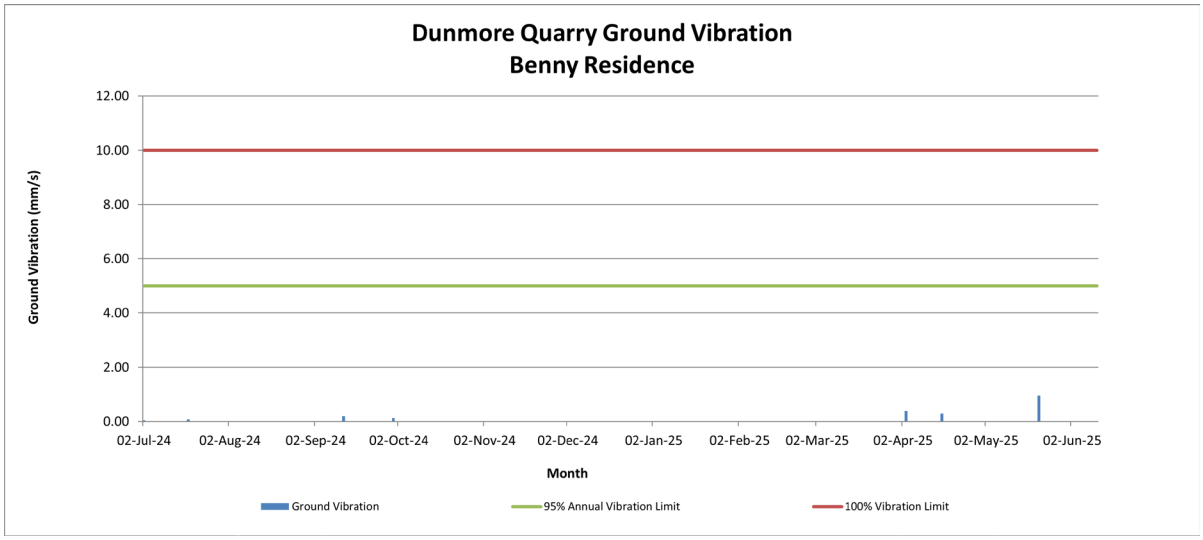


Figure 12 FY25 Ground Vibration Data

There were no blasts above the prescribed limits during the FY25 reporting period.

5.3.3. Blast Monitoring Long Term Analysis and Trends

A visual representation of historical blast monitoring data can be seen below in Figures 13 and 14.

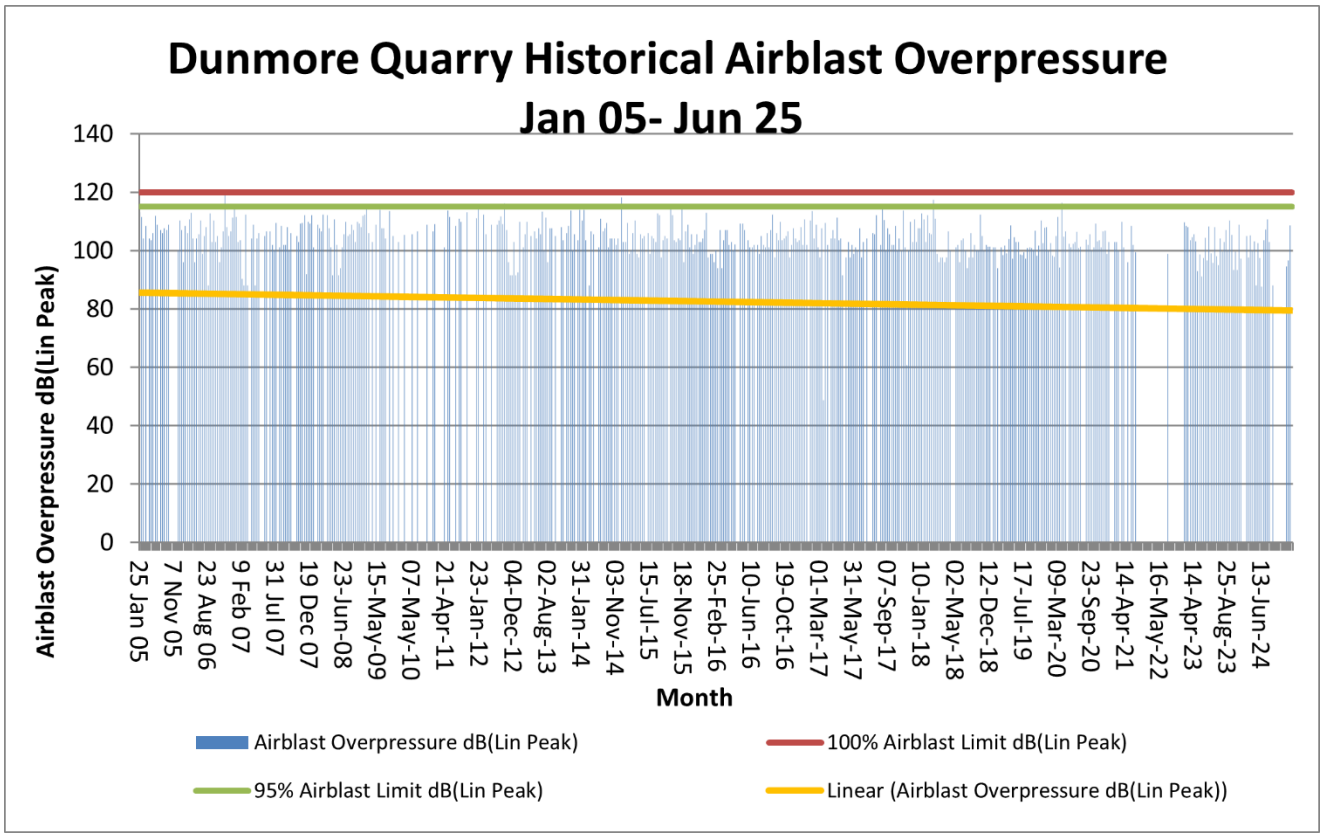


Figure 13 Historical Overpressure Data

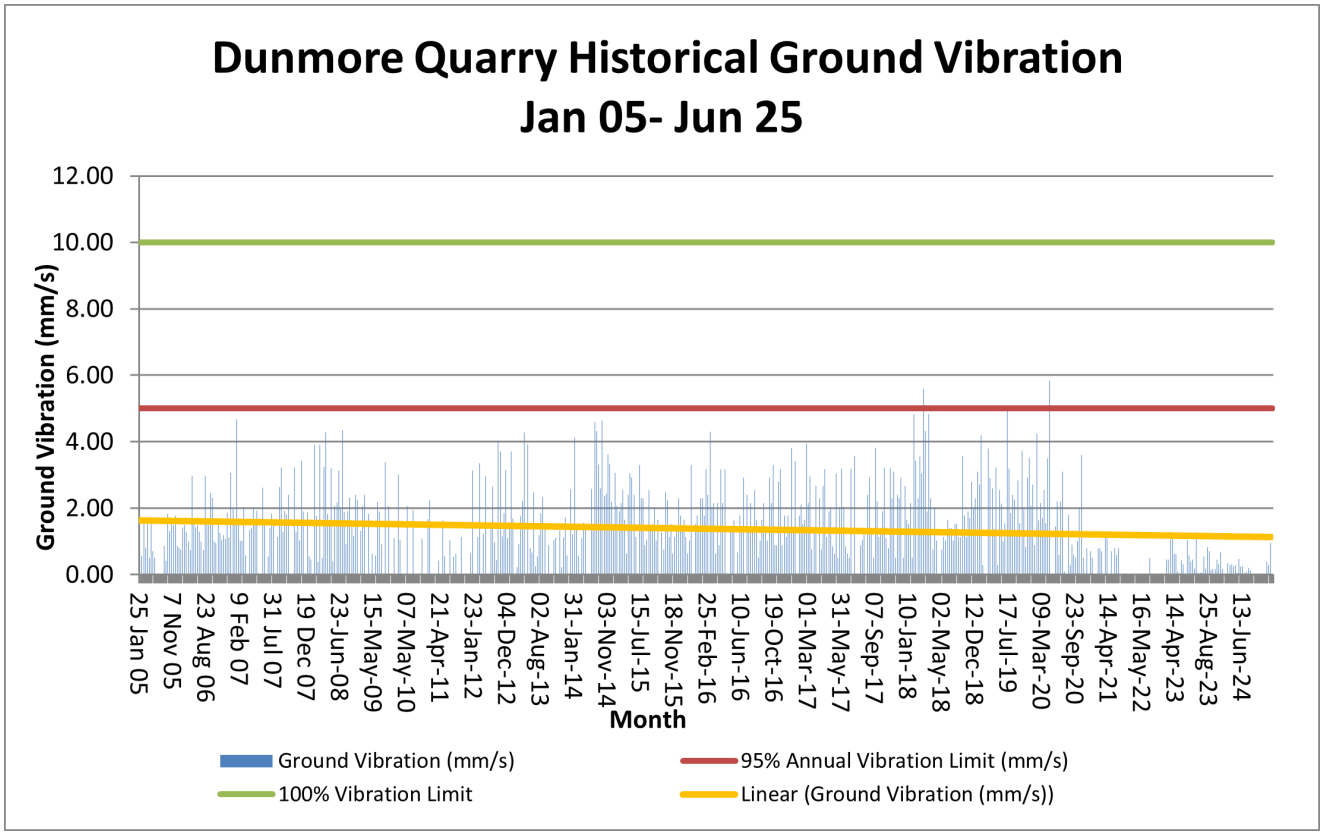


Figure 14 Historical Ground Vibration Data

5.3.4. Blast Monitoring Summary and Opportunities for Improvement

The blast data has confirmed compliance with the required assessment criteria but also indicate that blast management over recent years has resulted in an overall reduction in both overpressure and ground vibration at the nearest residential receptors. No additional blast management initiatives are therefore considered necessary.

5.4. Noise Monitoring

Annual Noise Monitoring is undertaken annually in winter to determine quarry contribution to noise at private residences. Monitoring results demonstrated compliance with prescribed assessment criteria during all monitored time periods.

5.4.1. Noise Monitoring Impact Assessment Criteria

S4.C4 outlines the relevant noise assessment criteria to be adopted for the annual monitoring, shown in Table 15 below. The locations of these monitoring points are represented by NM-1 to NM-5 as displayed in Figure 15.

Noise monitoring is generally completed in July each year which typically represents the worst-case meteorological conditions for noise propagation.

Table 13 Noise Monitoring Impact Assessment Criteria

Receiver Location	Noise Limits dB (A)					
	$LA_{eq\ (15\ minute)}$				$LA_{eq\ (1\ minute)}$	
	Day (7am - 6pm)	Evening (6pm - 10pm)	Night (10pm - 7am)	Morning Shoulder (6am - 7am)	Night (10pm - 7am)	Morning Shoulder (6am - 7am)
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		

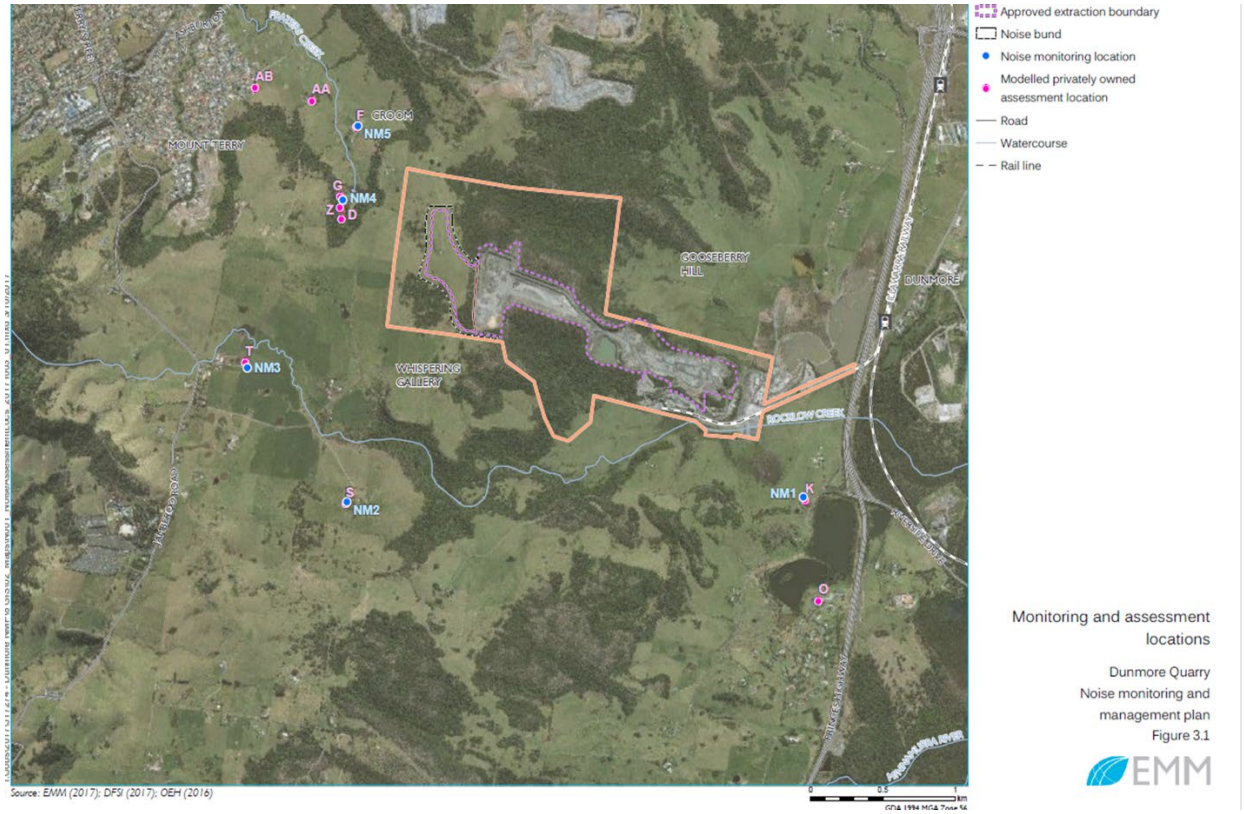


Figure 15 Noise Monitoring Locations

5.4.2. Noise Monitoring FY25 Performance Review

A summary of the attended noise monitoring results against the modelled MOD 9 quarry operations is shown below in Table 16. Noise monitoring is conducted at the end of each calendar year, consistent with previous review periods.

Table 14 Attended noise monitoring results

Post Modification 9 Noise Monitoring Results NM1 (representative of resident K and O)				
	Day	Evening	Morning Shoulder	
Noise	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$	dB $LA_{eq(1min)}$
Limit	49	44	47	55
Predicted	35	35	35	
2018	40	40	40	50
2019	45	41	47	55
2020	49	44	47	55
2021	45	40	40	45
2022	40	36	40	47
2023	45	40	45	55
2024	49	44	47	55
Post Modification 9 Noise Monitoring Results NM2 (representative of resident S)				
	Day	Evening	Morning Shoulder	
	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$	dB $LA_{eq(1min)}$
Limit	37	37	37	45
Predicted	35	35	35	
2018	30	30	30	32
2019	33	30	32	40
2020	36	35	37	45
2021	35	30	35	40
2022	33	31	31	45
2023	35	30	30	45
2024	37	37	37	45
Post Modification 9 Noise Monitoring Results NM3 (representative of resident T)				
	Day	Evening	Morning Shoulder	
	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$	dB $LA_{eq(1min)}$
Limit	36	36	36	45
Predicted	35	35	35	
2018	35	35	35	40
2019	32	30	31	40
2020	35	35	35	45
2021	35	30	30	35
2022	30	30	30	45
2023	35	30	30	45
2024	36	36	36	45
Post Modification 9 Noise Monitoring Results NM4 (representative of resident G,D,Z)				
	Day	Evening	Morning Shoulder	
	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$	dB $LA_{eq(1min)}$
Limit	40	40	40	45
Predicted	35	35	35	
2018	30	30	30	30
2019	33	30	31	40
2020	35	35	35	45

2021	35	30	30	35
2022	40	40	40	45
2023	35	30	30	45
2024	40	40	40	45
Post Modification 9 Noise Monitoring Results NM5 (representative of resident F, AA,AB)				
	Day	**Evening**	**Morning Shoulder**	
	dB $LA_{eq(15min)}$	**dB $LA_{eq(15min)}$**	**dB $LA_{eq(15min)}$**	**dB $LA_{eq(1min)}$**
Limit	40	40	40	45
Predicted	35	35	35	
2018	30	30	30	30
2019	35	30	34	40
2020	40	35	40	45
2021	30	30	30	35
2022	30	30	33	45
2023	30	30	35	45
2024	40	40	40	45

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

5.4.3. Noise Monitoring Long Term Analysis and Trends

There have been seven years of monitoring under the current monitoring program post 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 18 years can be seen below in Figure 16. A summary of the noise monitoring results post MOD 9 can be seen in Figures 17 to 21. The monitoring data, which is attached as Appendix C, demonstrates compliance with the noise assessment criteria.

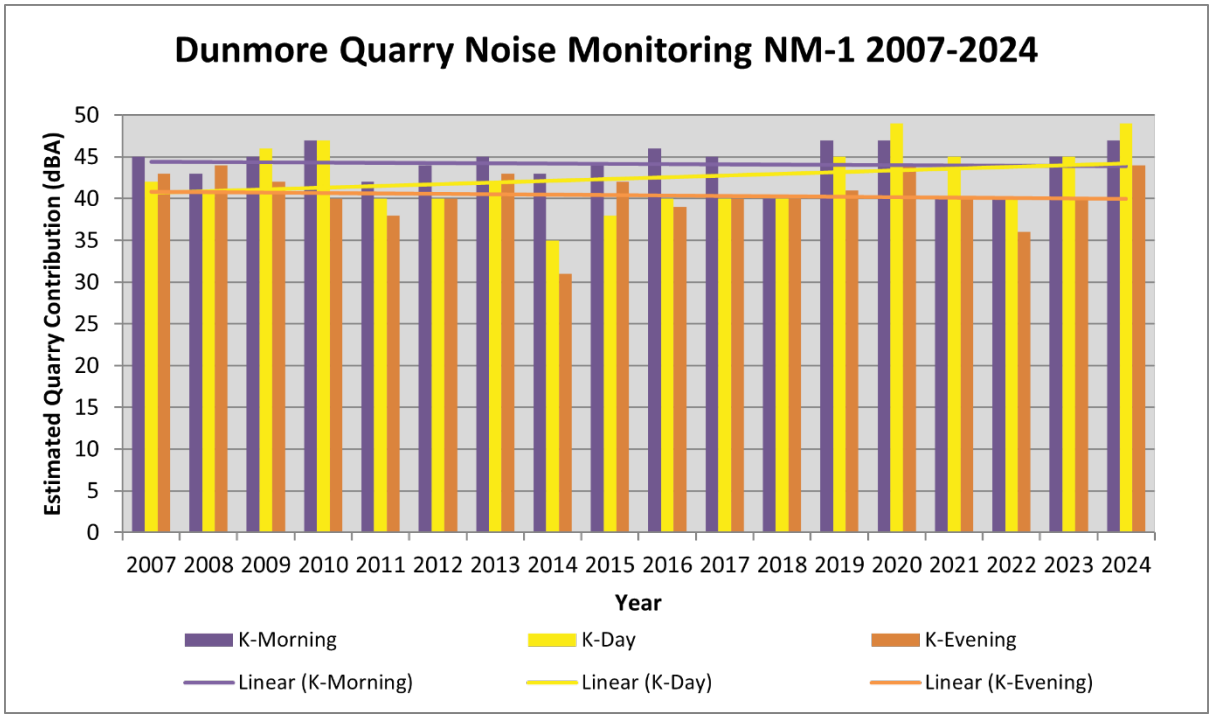


Figure 16 Long term noise monitoring at NM-1 results since 2007

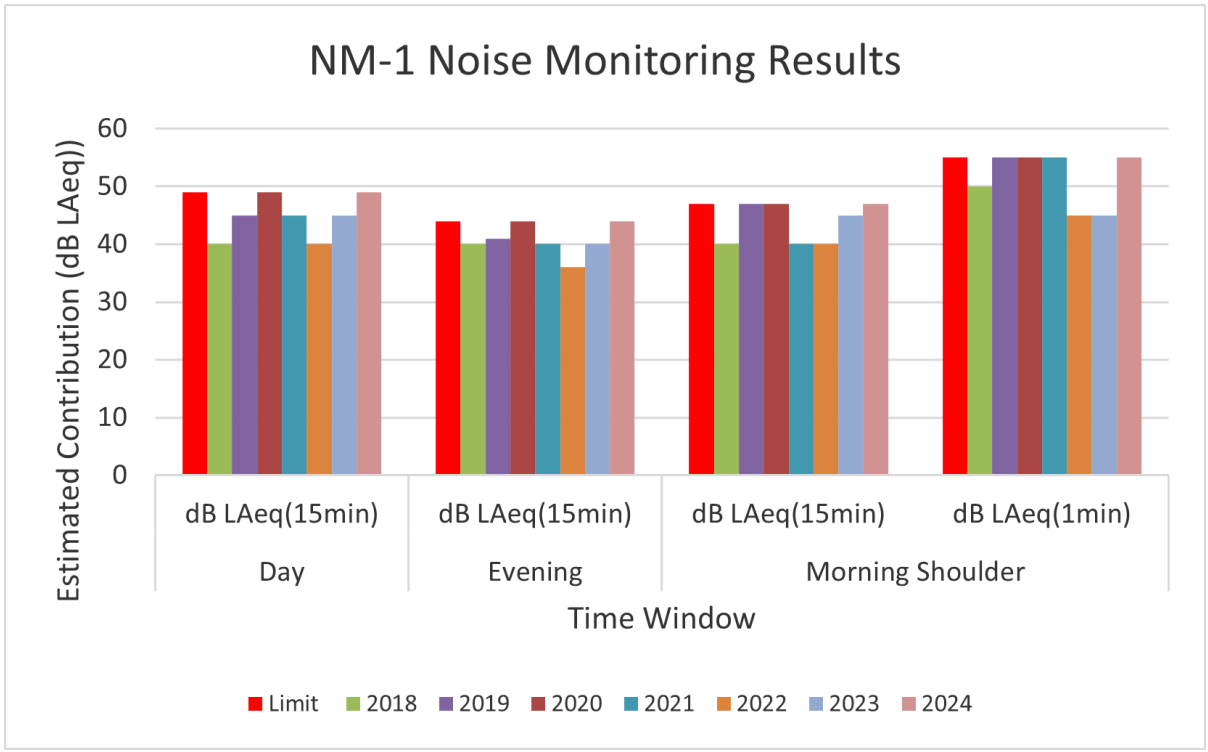


Figure 17 NM-1 Noise monitoring results since MOD-9

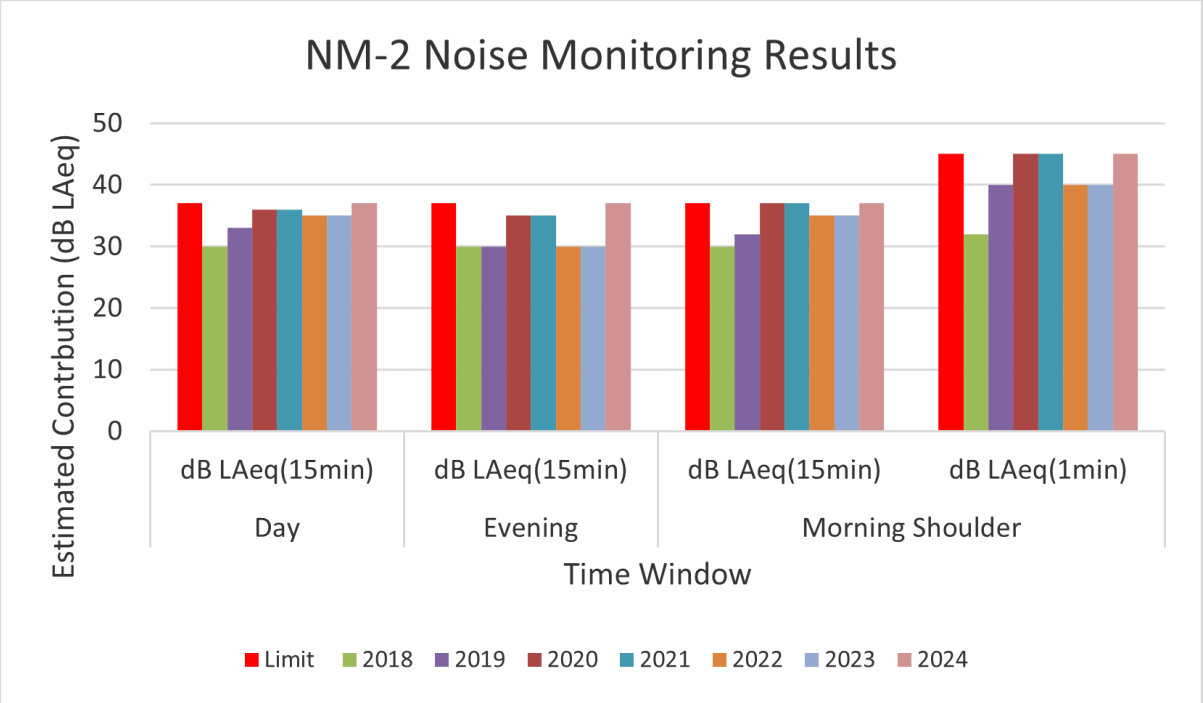


Figure 18 NM-2 Noise monitoring results since MOD-9

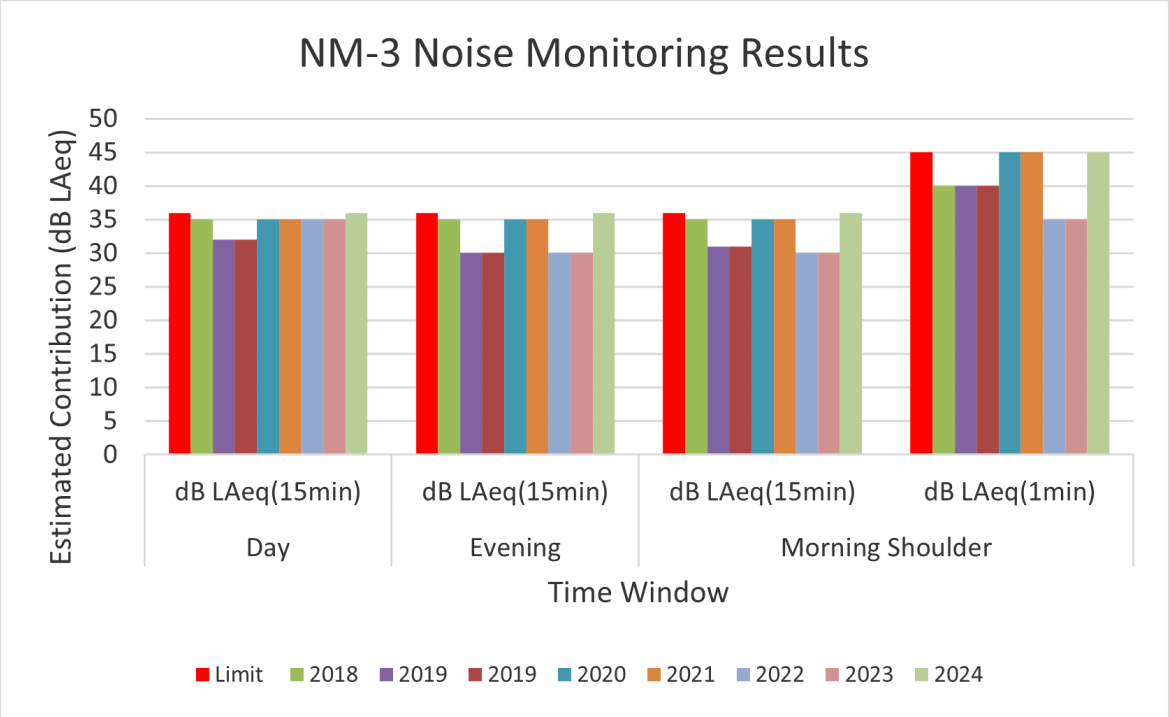


Figure 19 NM-3 Noise monitoring results since MOD-9

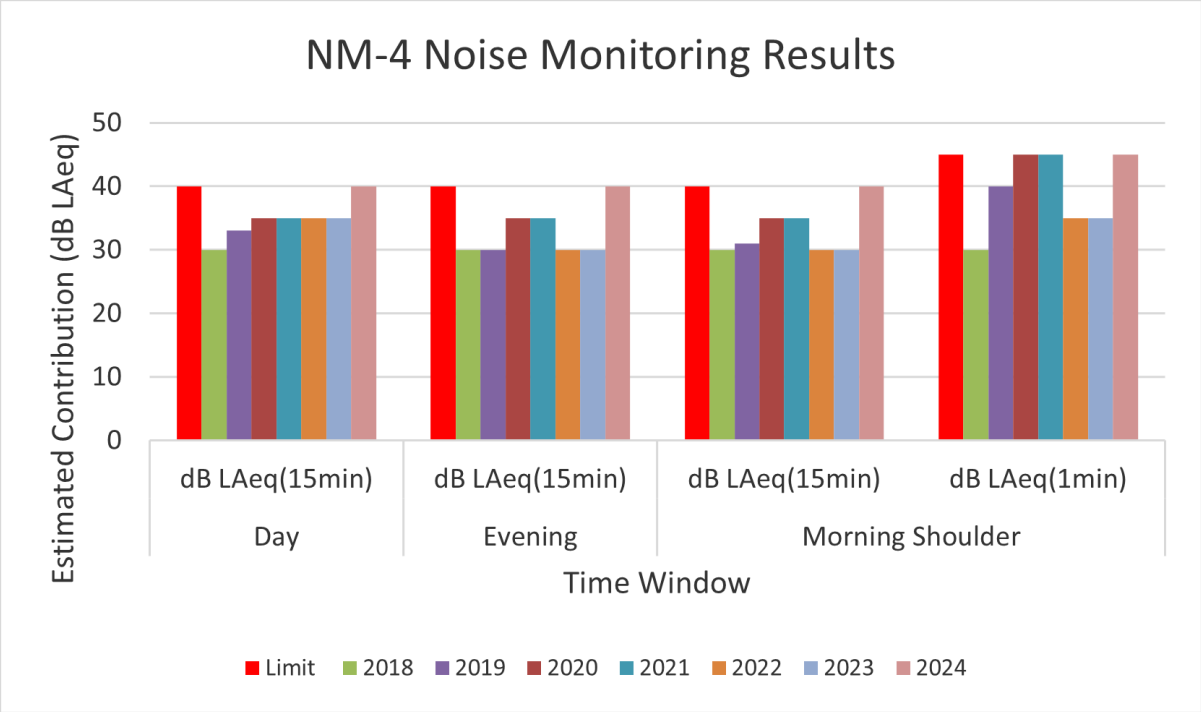


Figure 20 NM-4 Noise monitoring results since MOD-9

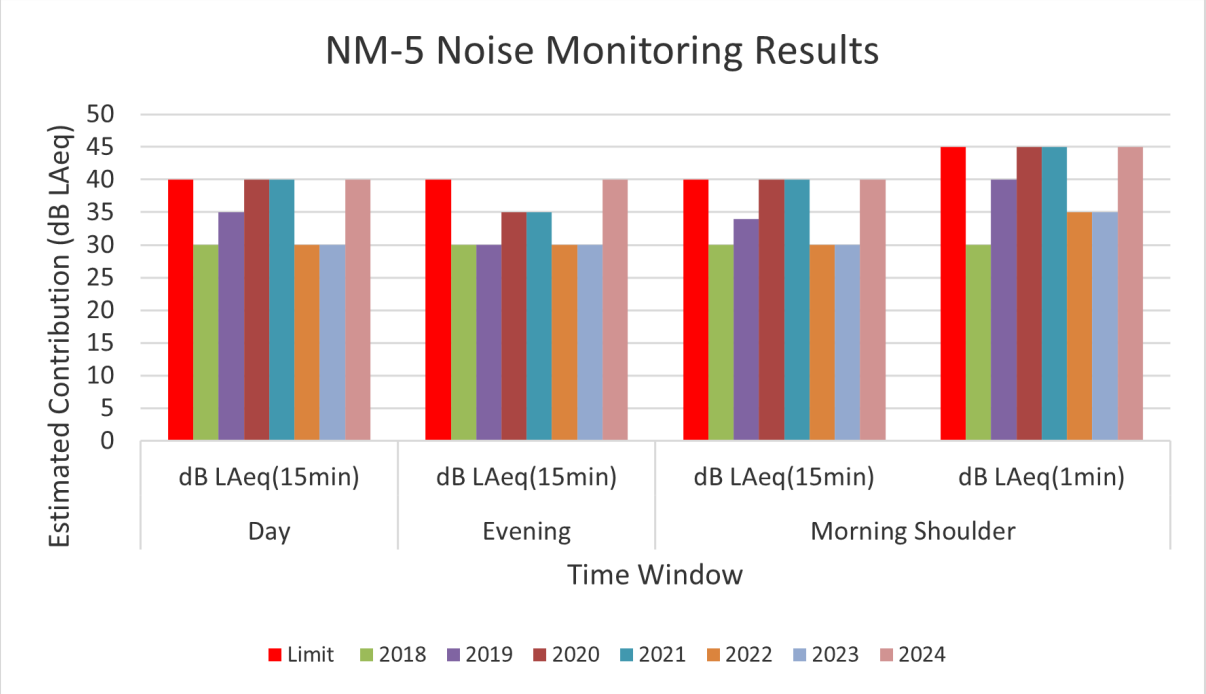


Figure 21 NM-5 Noise monitoring results since MOD-9

Typically noise measurements have decreased or remained stable over time at NM-1. Noise monitoring results at NM-1 to NM-5 were similar to the previous years and within compliance limits.

5.4.4. Noise Monitoring Summary and Opportunities for Improvement

As previously discussed, all monitoring points were measured below relevant limits. Noise monitoring will continue to be conducted annually.

5.5. Surface Water Monitoring

Dunmore Quarry operates under a well-established water management system which incorporates separation of clean water, largely through natural topographic features and the control of dirty water through a series of pollution control structures. The main pollution control structure is the Upper Dam which receives runoff from most of the extraction area. This is an in-pit sump constructed on the quarry floor and can only discharge via pumping to the Middle Dam. The Middle Dam discharges internally via channels and culverts to the Lower Dam which is licensed (EPL7) to discharge into Rocklow Creek.

Under normal weather conditions, the water management system is a closed circuit with contained water being recycled for quarry uses such as dust suppression. Excess water is only discharged through the licensed discharge point following prolonged rainfall events. The license also recognises that during prolonged wet weather or intense storm events, discharges will occur into Rocklow Creek and that additional background monitoring within the creek is required in order to determine if any offsite impacts occur. The additional monitoring occurs on a daily basis during such discharges.

Figure 22 outlines the current monitoring points. There are three offsite discharge points for the operation as described below:

- EPL6 which is a controlled discharge from the Lower Dam using a biofiltration swale to treat water prior to entering Rocklow Creek.
- EPL7 which is the spillway of the Lower Dam which only discharges during high rainfall events.
- EPL10 which is the upper emergency spillway of Middle Dam. Water spilling from the main spillway of Middle Dam flows into the Lower Dam.

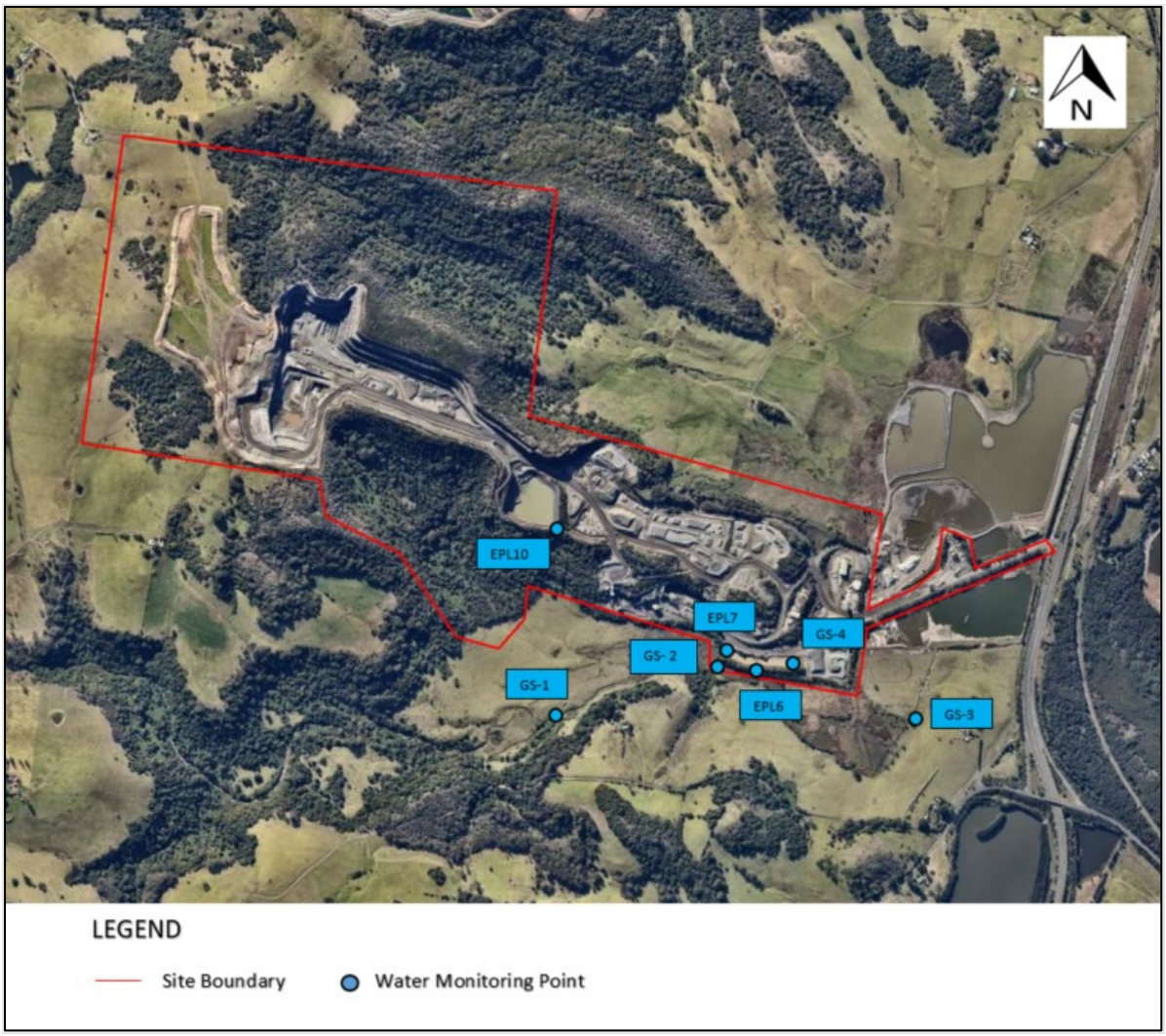


Figure 22 Surface water monitoring points

5.5.1. Surface Water Quality Impact Assessment

S4.C28 refers discharge limits to the limits imposed by EPL 77. This states that the site will comply with discharge limits from 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 at monitoring location EPL6. 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 at the Lower Dam at monitoring location EPL7. No TSS limits apply for EPL7 as it is a spillway, which only typically discharges if the dam design capacity (designed to hold 90.7mm in 5 days) is exceeded.

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

Monitoring is also undertaken daily during any discharge event via either the licenced discharge mechanism at EPL6, or via uncontrolled discharge via the Lower Dam spillway at EPL7. Upstream and downstream monitoring points at Rocklow Creek at GS3 are also sampled to determine if any impacts to water quality have occurred.

5.5.2. Surface Water Quality FY25 Performance Review

Monthly ambient water quality monitoring of the Lower Dam at GS-4/EPL#8 is shown below in Table 17. For comparison, monitoring points upstream (GS-1) and downstream (GS-2) 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 to Rocklow Creek during normal operations.

Monthly monitoring results at Rocklow Creek indicate the following:

- Ambient conditions upstream of the Lower Dam at GS-1 are generally lower values when compared to the WQOs and discharge limits. Despite this, the area is associated with water bodies that are impacted by active cattle grazing. Cattle tend to stir up water during grazing and are often observed within Rocklow Creek during monthly sampling events, especially during drought conditions.
- Ambient conditions in the vicinity of the mixing zone at GS-2 are typically within discharge limits. Occasional elevations can occur during high intensity flood events. Water levels can be low or dry during extended dry spells/drought.
- Ambient conditions at GS-3 downstream of Rocklow Creek are generally within the discharge parameters with the exception of TSS. This location is sometimes dry and affected by saline tidal inflow as well as being impacted by cattle grazing. During dry periods, water level tends to be quite low. Cattle tend to stir up water during grazing and are often observed within Rocklow Creek during monthly sampling events.

Table 15 Water quality monitoring results at GS-1, GS-4/EPL#8, and GS-2 over the reporting period.

GS-1 Upstream of Rocklow					EPL#8 Lower Dam			
Month	pH	Turbidity (NTU)	EC (µS/cm)	TSS (mg/l)	pH	Turbidity (NTU)	EC (µS/cm)	TSS (mg/l)
Jul-24	8.1	1.8	283	3	8	100	474	57
Aug-24	7.27	3.5	356	<5	7.26	118	439	5
Sep-24								
Oct-24	7.73	4.9	196	<5	8.35	181	410	132
Nov-24	7.51	7.9	354	<5	8.26	181	594	153
Dec-24	7.54	2	346	<5	8.21	136	533	82
Jan-25	7.19	2.1	349	<5	7.89	164	738	82
Feb-25	7.28	1.7	363	<5	8.14	97.3	566	57
Mar-25	7.13	2.4	383	6	8.19	161	549	87
Apr-25	6.96	1.1	347	<5	6.91	290	496	128
May-25	7.41	25	337	14	7.53	320	469	127
Jun-25	7.07	2.2	288	<5	8.13	82.1	536	32
FY25 Av	7.4	5.0	327.5	7.7	7.9	166.4	527.6	85.6

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 (mg/l)
Jul-24	7.9	85	471	54	7.7	40	438	26
Aug-24	7.85	88.4	438	26	7.27	55.3	470	26
Sep-24								
Oct-24	7.86	13.1	286	5	7.94	170	466	211
Nov-24	7.7	13.2	523	8	7.3	102	725	153
Dec-24	7.46	11.9	442	12	7.5	20.2	516	17
Jan-25	7.33	20.4	469	20	7	8.5	589	8
Feb-25	7.38	23.8	572	21	7.16	25	550	52
Mar-25	7.56	15.4	650	19	7.13	65.3	546	84
Apr-25	7.64	310	495	144	6.83	21.8	488	17
May-25	8.05	387	460	218	7.35	54.6	374	40
Jun-25	7.15	7.1	339	<5	7.27	41.6	387	12
FY25 Av	7.6	88.7	467.7	52.7	7.3	54.9	504.5	58.7

There were two major rain events in the reporting period which led to discharge from the Lower Dam via the spillway at EPL7. These events include:

- 28-31 March 2025: 137 mm.
- 21-25 May 2025: 176.6 mm.

These events were outside the dam design capacity, which are designed to hold a 95th percentile 5-day rainfall event (90.7mm). During instances where sampling points were inaccessible due to site flooding, sampling was delayed due to safety and access concerns and the EPA were notified and satisfied with the arrangements.

The results of wet weather discharge monitoring over the reporting period, is summarised in Table 16.

Table 16 Wet Weather Discharge Monitoring

Sample ID	Date	pH	Turbidity (NTU)	Conductivity (µS/cm)	TSS (mg/L)
EPL#7	31/03/2025	7.84	565	487	298
EPL#9	31/03/2025	7.07	40.1	18	340
GS-1	31/03/2025	7.19	12.5	<5	305
EPL#7	01/04/2025	7.95	355	186	327
EPL#9	01/04/2025	7.31	20.2	6	340
GS-1	01/04/2025	7.24	6.8	<5	339
EPL#7	02/04/2025	7.06	330	154	356
EPL#9	02/04/2025	6.97	24.8	23	360
GS-1	02/04/2025	6.97	4.4	<5	353
EPL#7	03/04/2025	7.47	139	68	373
EPL#9	03/04/2025	7.16	8	<5	372
GS-1	03/04/2025	7.08	3	<5	366
EPL#7	04/04/2025	8.14	275	109	415
EPL#9	04/04/2025	7.58	11.5	15	409
GS-1	04/04/2025	7.59	4.1	<5	378
EPL#7	26/05/2025	8.01	385	148	340
EPL#9	26/05/2025	7.28	20.5	6	234
GS-1	26/05/2025	7.25	12.1	<5	221
EPL#7	27/05/2025	8.13	270	137	365
EPL#9	27/05/2025	7.40	19	15	256
GS-1	27/05/2025	7.69	10.3	<5	231
EPL#7	28/05/2025	8.03	214	122	388
EPL#9	28/05/2025	7.61	20.4	19	281
GS-1	28/05/2025	7.49	9.2	<5	257
EPL#7	29/05/2025	8.03	136	71	407
EPL#9	29/05/2025	7.62	11.2	<5	283
GS-1	29/05/2025	7.51	6.1	<5	267
EPL#7	5/06/2025	8.02	74.6	64	469
EPL#9	5/06/2025	7.70	11.7	9	516
GS-1	5/06/2025	7.36	6.5	<5	318

Elevated TSS levels occurred after all significant rainfall events at EPL#7 as indicated in Table 16. As noted above both flood events were well above the dam holding capacity of 90.7mm causing discharge via the designed spillway. The spillway is designed with gabion rock and riparian zone reeds in the immediate vicinity. Downstream water levels at GS-3 were similar to upstream levels during all spillway discharge events. No breach of consent condition occurred as the rainfall event was outside of the design capacity of the dam as denoted by S4.C30.

5.5.3. Surface Water Long Term Analysis and Trends

The Lower Dam (GS-4/EPL#8) ambient water quality for FY25 exhibited readings that were above average for pH, above average for TSS, below average for Turbidity and below average for Conductivity. These trends are attributed to above average rainfall and extreme flooding events experienced throughout the reporting period. These trends are visible in Figures 23 to Figure 26 below.

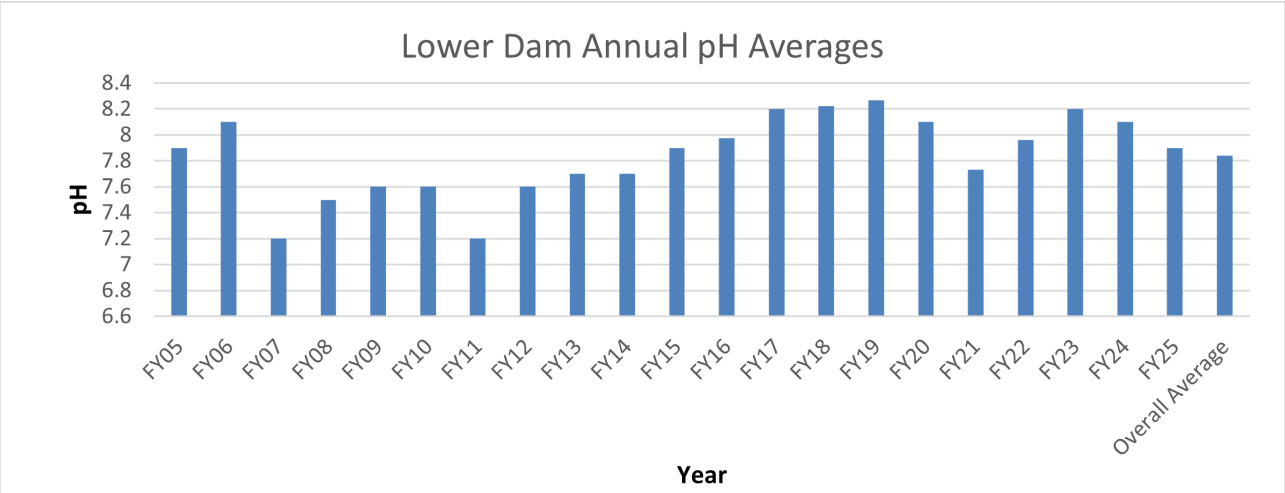


Figure 23 Lower Dam Annual pH Averages

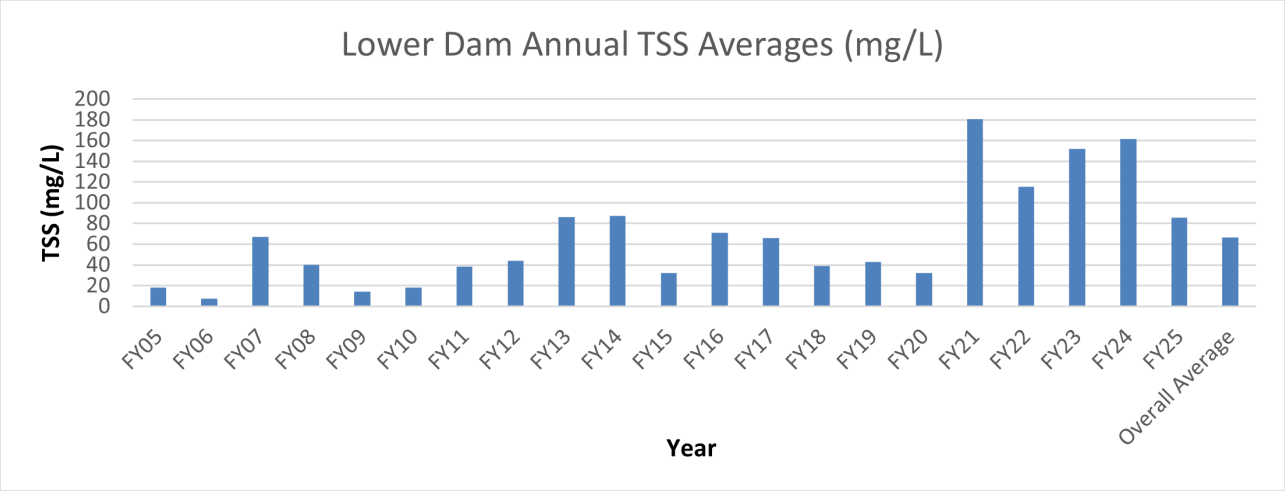


Figure 24 Lower Dam Annual TSS Averages

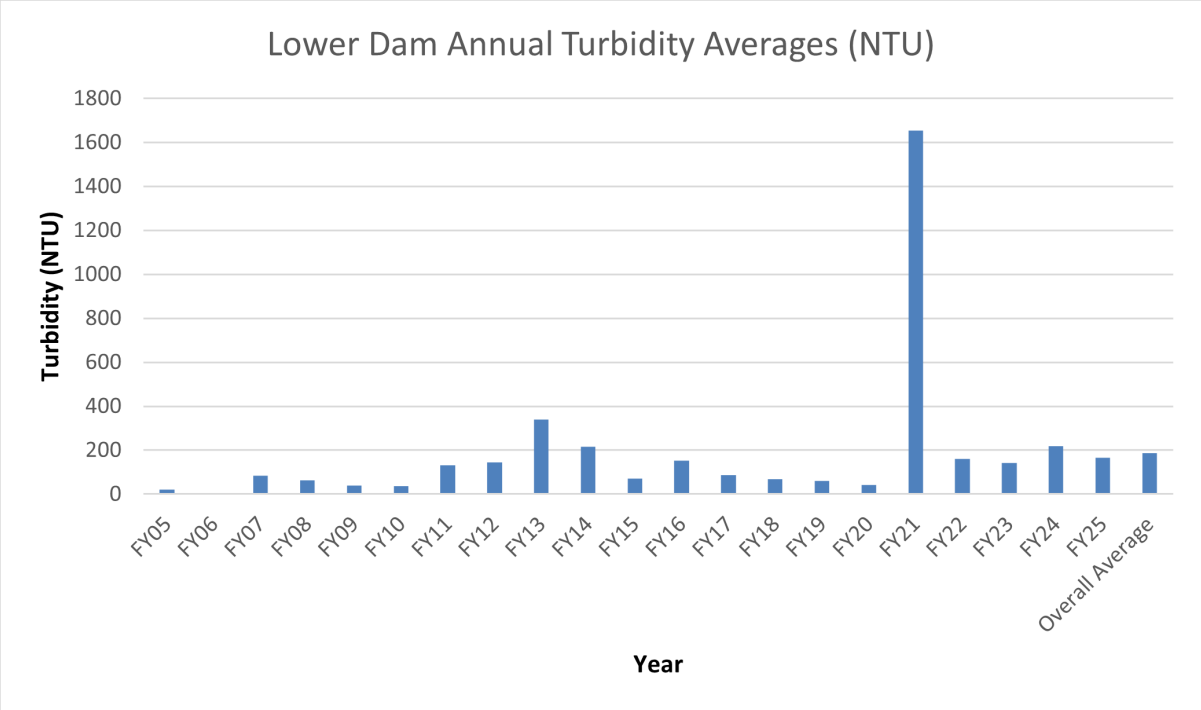


Figure 25 Lower Dam Annual Turbidity Averages

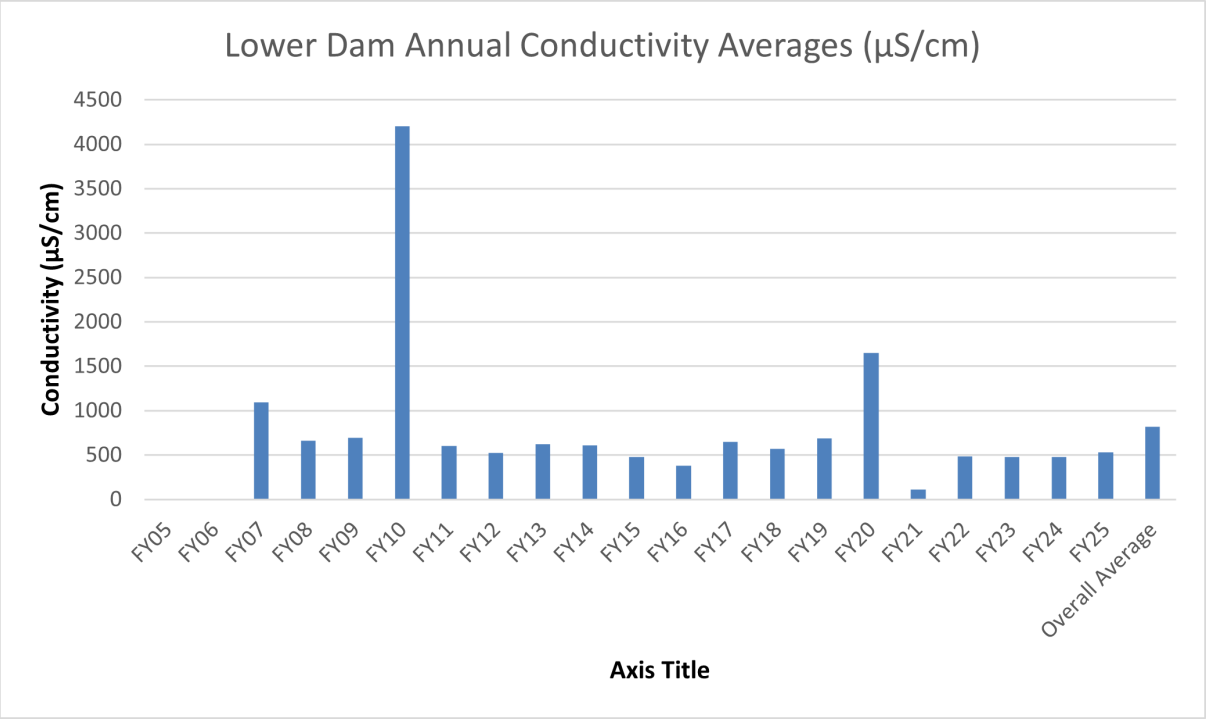


Figure 26 Lower Dam Annual Conductivity Averages

5.5.4. Water Balance and Consumption

The majority of surface water runoff from the quarry is captured in the sites' water management dams. Captured surface water runoff is either used as process water within the quarry operations (e.g. for dust suppression), lost to evaporation or seepage, or discharged to receiving waters.

The quarry is licenced to take surface water from Rocklow Creek. This allocation, under WAL#25152, is 227ML/year and is extracted via a 100mm centrifugal pump. No water take was initiated from Rocklow Creek during the reporting period.

All process water was sourced by either the Lower Dam, Middle Dam or Croome Sumps, which are offline from Rocklow Creek as per water management upgrades undertaken in 2008 under MOD 4. The Location of water storage infrastructure is shown below in Figure 27.

Figure 27 Water Storage Locations

The updated WMP outlines a range of water balance scenarios based on different climate conditions. The median rainfall scenario (1063mm rainfall) best reflects rainfall for the FY25 period (annual rainfall was 944mm) as shown in Figure 28. As a result, the process water use was modelled to be 114.7ML for the reporting period with a change of storage of +1ML over the year within the three dam storages, indicating that water take was well within licenced volumes.

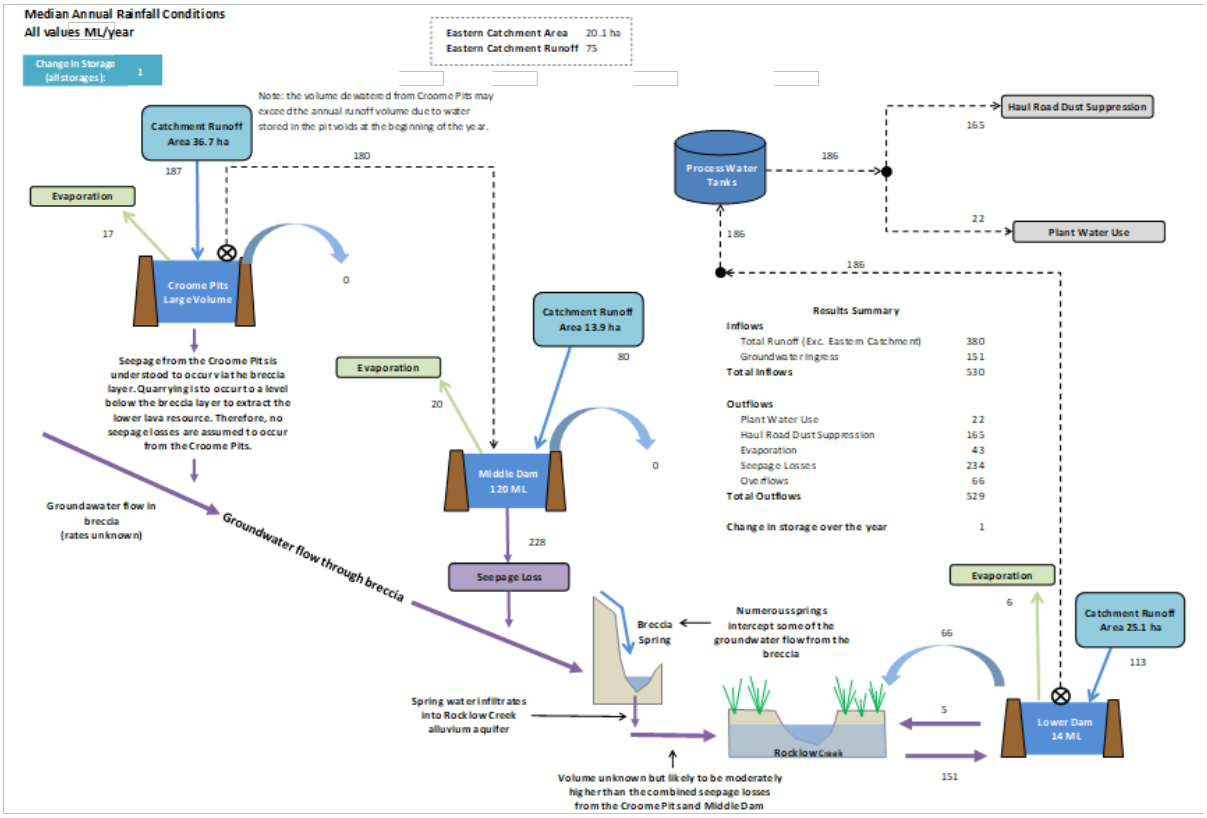


Figure 28 Existing water management system: typical wet year water balance

5.5.5. Surface Water Quality Summary and Opportunities for Improvement

The water management system has been progressively updated over the past few years. The main changes have included:

- An increase in storage capacity of the Middle Dam and the improved spillway arrangement;
- An upgraded drainage system between the Middle Dam and the Lower Dam;
- An upgraded water recycling ability for the quarry;
- An extended ambient water quality program.

The improvements to the water management system outlined in the updated WMP 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 17 below and have been addressed in the updated WMP. The Lower Dam upgrade is still in progress.

Table 17 Proposed Water Management System Improvements

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.	• 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

Raise embankment at existing spillway location from 2.8 to 4.0 m AHD. Lower Dam upgrade to include all the above.	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 2.0 m 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 3.1 m AHD1, 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.

5.6. Ground Water Monitoring

An annual groundwater monitoring report has been prepared by EMM Consulting Pty Ltd, in accordance with condition 44C. This report is included in full within Appendix E. The monitoring program uses the established down gradient bores at Dunmore Sand and Soil (DG-31, DG-59 and BH-F) and four established up gradient bores at Dunmore Quarry (GW-1, GW-2 and GW-3). Location of Groundwater monitoring bores are shown below in Figure 29.

Annual groundwater sampling, for background sites, was conducted by EMM in July 2025.

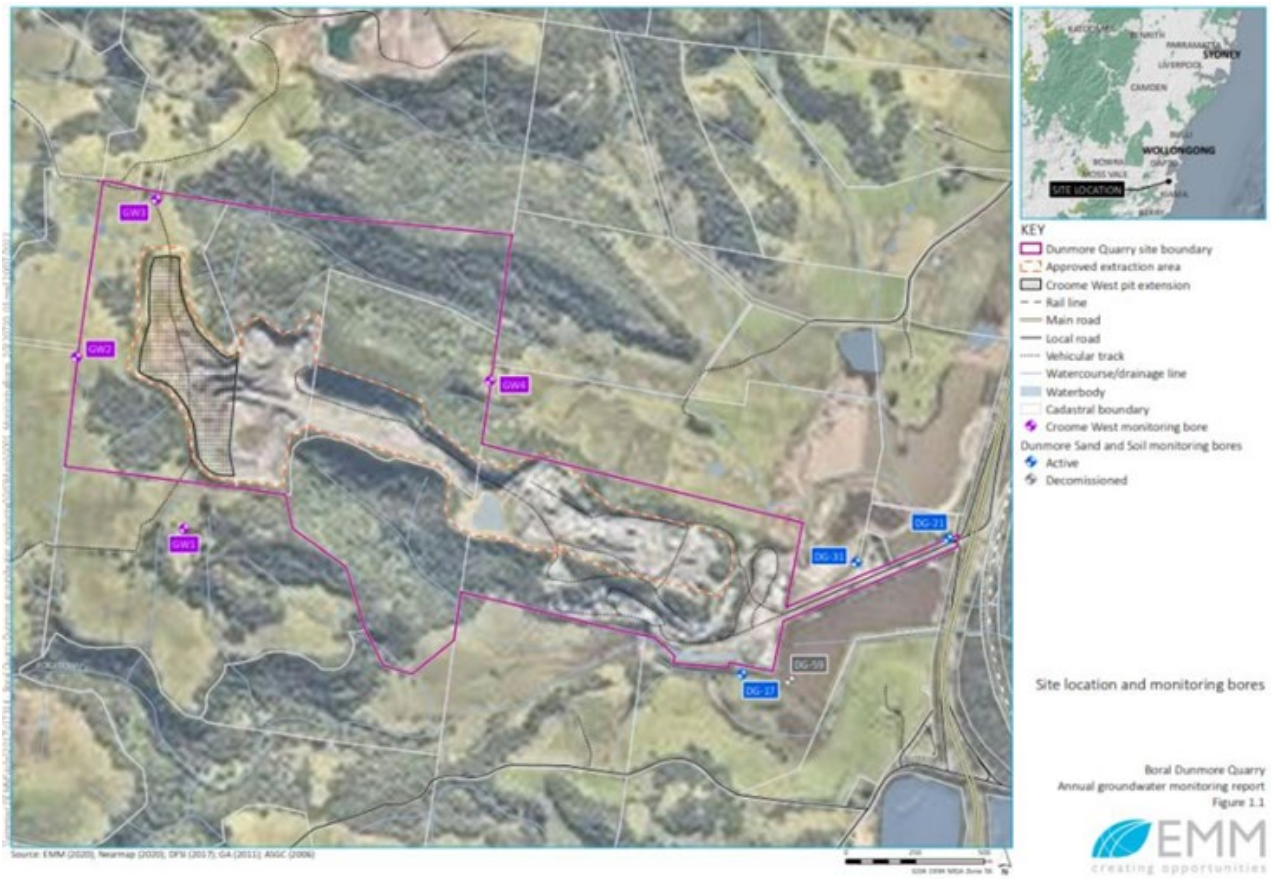


Figure 29 Groundwater Monitoring Bores

The monitoring bores are located up hydraulic gradient from current quarrying activities and are therefore considered representative of baseline conditions (both water levels and quality). Groundwater monitoring for the up-gradient bores includes six-hourly groundwater level measurements and typically consist of six-monthly groundwater sampling events. Testing was conducted in July 2025.

5.6.1. Groundwater Monitoring Impact Assessment Criteria

Groundwater impacts relating to quality and water levels downgradient are assessed in relation to the up-gradient (baseline) conditions located in bores GW-1, GW-2, GW-3 and GW-4 and against the site conceptual model which was formulated as part of the MOD 9 Croome West Expansion.

5.6.2. Groundwater Monitoring FY25 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 has also established useful trends.

The main findings for the FY25 monitoring year regarding water levels are:

- Groundwater level trends in the alluvium (DG-31S and DG-21) are comparable to the previous monitoring period. These shallow alluvial monitoring bores show a direct and immediate response to rainfall events with DG-21 and DG-31 showing the most pronounced responses. The highest groundwater level increase was observed at DG-

31S (approximately 1.3 m). During the reporting period, the water levels fluctuated corresponding to the prevailing rainfall conditions and were within historical observations. Manual dip data at DG-17 displays large variability across the period, a likely response of rainfall variability across the period (drier periods, followed by intense rain events).GW1 recorded a water level decline between July 2024 and March 2025 (about 13 m) corresponding to a period of below average monthly rainfall. The groundwater level recorded a low of 100.2 mAHD in late March 2025 which was still within the SSTVs. Groundwater levels recovered (approximately 13 m) during the wetter conditions from April 2025 onwards.

- • GW2 groundwater level declines observed in the logger data does not align with the manual measurement. Manual measurements show the groundwater level is stable and within the SSTVs. The logger was replaced in August 2025.
- • GW3 groundwater levels are stable and within the SSTVs. A subdued trend corresponding to prevailing rainfall conditions was observed.

• GW4 groundwater levels are generally stable and recorded a slight upward trend towards the end of the reporting period, aligning with prevailing rainfall conditions. Groundwater levels are within the SSTVs. The periodic drawdown at GW4 is a result of purging prior to groundwater quality sampling by Boral and is not representative of natural groundwater conditions. Groundwater chemistry findings for the reporting period are:

- Groundwater Electrical conductivity (EC) and pH in the alluvium at DG-17, DG-21, DG-31 were overall comparable to previous monitoring year. Groundwater Electrical conductivity (EC) from the Bumbo latite bores, GW1 to GW4, was significantly lower compared to previous year, while pH was comparable.
- Major ion concentrations measured at GW1 and GW2 are comparable to previous monitoring year, while major ions concentrations measured at GW3 and GW4 show some shifts. Water at GW3 remains a magnesium bicarbonate type but shows a shift towards chloride and sulfate type; GW4 shows a shift from a sodium bicarbonate mixed type water towards a more sodium-chloride mixed water type. The shift towards a chloride type may be influenced by increased rainfall recharge in a coastal environment where sea spray is depositing salt in the environment.
- Major ion concentrations measured at the alluvial monitoring sites show some changes compared to the previous year. DG-17 remains sodium bicarbonate dominant. DG-21 shows a shift from a sodium bicarbonate type towards a more sodium chloride type. DG-31 show a shift from a calcium bicarbonate type towards a more calcium sulphate water type.
- The results for the reporting period are consistent with historical observations. There were no changes to groundwater levels or water quality observed in the groundwater monitoring bores during the reporting period that could be associated with the RIC pit activities.

5.6.3. Groundwater Monitoring Summary and Opportunities for Improvement

As per S4.C43: *on the provision of two years of monitoring data that shows negligible impact on the regional groundwater network the Secretary may agree to suspend monitoring of regional groundwater levels and/or quality.* The two-year groundwater monitoring period has shown negligible impact to the monitored groundwater system.

However, in the interest of collecting additional groundwater site data and continuing groundwater monitoring whilst Boral are still continuing extraction in the Croome West pit, it is proposed to continue with the current monitoring regime at the quarry.

5.7. Flora and Fauna Management and Rehabilitation

Most areas of the 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. Hydroseeding of the Croome West Bund is now well established with trees as shown below in Figure 30.

Figure 30 Hydroseeding cover and trees over Croome West Bund

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 31 below. These areas are referred to as 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 are summarised in the Annual Monitoring report located in Appendix E.

In addition, following the approval of Modification 13, a Biodiversity Stewardship Agreement (BSA) is in the process of being set up, which will generate a new rehabilitation corridor. The exact parameters and completion criteria are currently being determined with assistance from an appropriate consultant.

In the last 12 months, rehabilitation within the quarry itself has continued on the Croome West amenity bund.

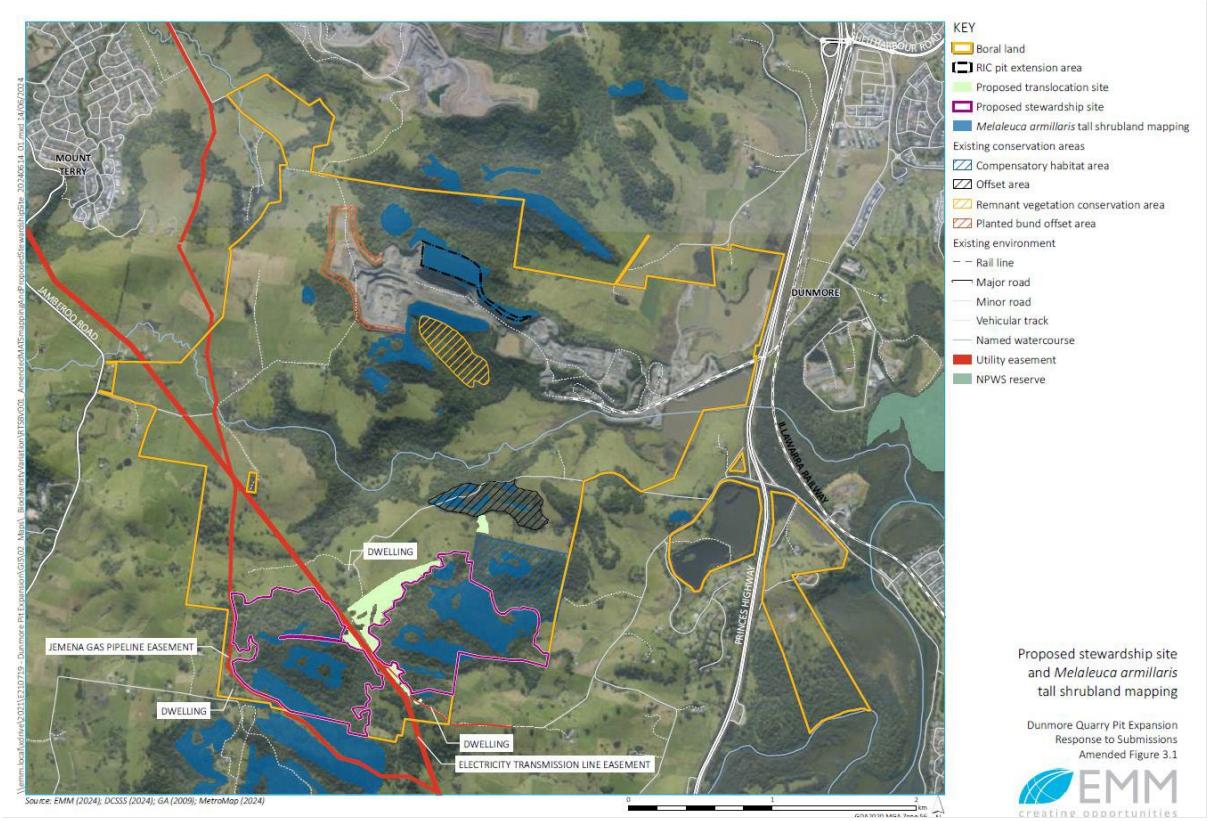


Figure 31 Conservation Areas

5.7.1. Flora and Fauna Impact and Rehabilitation Assessment Criteria

Completion criteria were designed in the updates to the FFMP, which was approved June 2019.

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

- 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 these completion criteria have been met, no further management of this area is required under this FFMP and Conditions 46(a) and 49 are deemed to have been satisfied.

The following completion criteria are outlined for the Remnant Vegetation Conservation Area (RCVA):

- 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 are deemed to have been satisfied.

There are no completion criteria set for the Offset Area (OA) as the area is managed via 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.

5.7.2. Flora and Fauna and Rehabilitation FY25Performance Review

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

5.7.2.1. Zone 1 Remnant Vegetation Conservation Area

Zone 1 consists of a large gully with a south easterly aspect and a drainage line that forms part of the Rocklow Creek catchment. The 15 hectare site contains a subtropical rainforest with a diverse range of canopy species including Sassafras (*Doryphora sassafras*), Myrtle Ebony (*Diospyros pentamera*) and all five of the local Fig (*Ficus sp.*) species. An abundance of vines also exist within this remnant vegetation area including Round Vine (*Legnephora moorei*), Kangaroo Grape (*Cissus Antarctica*) and Milk Vine (*Marsdenia spp.*), and many species of ferns are present as epiphytes, lithophytes and within the ground layer. Large amounts of woody weeds and Lanatana have invaded this area. Works within this zone consisted of primary weed control targeting woody weeds throughout established approximately 20 year old 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.

5.7.2.2. Zone 2 Offset Area

This contract period bush regeneration works focused on secondary and primary weed control within the woodland and rainforest remnants and the rainforest ecotone at the eastern extent of this zone. Regeneration of native canopy species within these areas this year has been rapid and a connected sub-canopy exists within the RF remnant.

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 woodland

remnants. Mass regeneration of Illawarra Zieria (Zieria granulata) has been observed within some areas and Homalanthus stillingiifolius has emerged within the site and is regenerating naturally and secondary populations of this regionally rare plant can be found throughout the site.

5.7.2.3. Zone 3 Compensatory Habitat Area

The CHA zone is located south of Rocklow Road and consists of a large bushland remnant on a hilltop with a small ephemeral creek line within a gully to the south of the hill. The total site area of this zone covers approximately 23.1 hectares. The majority of this zone is perched on the rocky hillside and supports the *Melalecua armillaris* tall shrubland vegetation community. The gully drops at the southern end of the zone, which is well defined by the presence of rainforest species and some very impressive land large Moreton Bay Fig (*Ficus macrophylla*) trees.

Extensive revegetation has been carried out within this zone within the southern gully and on the eastern and western edges of the zone. Hundreds of thousands of trees have been planted within this zone and are now reaching maturity. Many open areas that have been cleared of vegetation also exist within this zone with the majority of these clearings occurring on the rocky hill tops.

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

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

Works will continue in line with the completion criteria thresholds during the next reporting period.

A review of the fencing requirements will be undertaken for Zone 1. Fencing of translocation areas, following MOD13, has been partially completed and will continue in the next reporting period.

5.8. Heritage Conservation

Dunmore Quarry operate under an Aboriginal Cultural Heritage Management Plan which details the required Aboriginal heritage management and mitigation measures. The plan was prepared in consultation with OEH and Registered Aboriginal Parties and is available on the Boral Dunmore website. Archaeological salvage excavation and mitigation measures have been completed

5.9. 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 that two prosecutions have resulted from investigations aided by the installation of the cameras.

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

5.9.1. Waste Tracking Register

A detailed breakdown of the waste collected on-site during the reporting period is shown below in Table 28. Yearly trends are shown in Table 29.

Table 27 Waste Tracking Data

Month	General Waste (t)	Cardboard (t)	Commingle (t)	Timber (t)	Scrap Metal (t)	Oil & Oily Water (L)	Grease (t)	Filter (t)	Rags (t)
Jul-24	5.16	0.24	0.06	0	0	3000	0	0	0
Aug-24	1.11	0.15	0.04	0	0	0	2.05	0	0
Sep-24	4.06	0.15	0.03	0	0	1000	0	0	0
Oct-24	1.19	0.08	0.02	0	0	0	0	0	0
Nov-24	5.56	0.12	0.16	0.80		1700	0	0	0
Dec-24	1.04	0.04	0.04	0	0	0	0	0	0
Jan-25	4.0	0.14	0.01	0.68	0	0	0	0	0
Feb-25	3.41	0.08	0.04	0.74	0	1500	0	0	0
Mar-25	1.41	0.09	0.05	0	0	2000	0	4.19	0
Apr-25	3.94	0.03	0.01	0	0	0	0	0	0
May-25	1.55	0.06	0.04	0	0	0	0	0.41	0
Jun-25	1.05	0.08	0.07	0	0	500	0	0	0
Total	**33.48**	**1.16**	**0.57**	**2.22**	**0**	**9700**	**2.05**	**4.60**	**0**

Table 28 Historical Waste Data

Waste Classification		FY20	FY21	FY22	FY23	FY24	FY25
Solid Waste	General Waste (t)	34.398	37.237	36.951	55.89	40.10	30.87
	Cardboard Tonnes (t)	3.355	2.32	1.623	1.44	1.07	1.02
	Timber Tonnes (t)	10.24	10.24	1.16	4.60	8.64	2.22
	Comingle Recycling (t)	3.825	0.255	0.266	0.42	0.45	0.47
	Used Oil Filters/ Rags (t)	1.072	2.46	8.2	12.07	7.49	4.19
	Scrap Metal (t)	79.64	557.46	0	0	0	0
Liquid Waste	Oil/Oily Water Litres (L)	68,883	41,900	17,280	53,000	45,000	9,200
	Effluent Litres (L)	190,000	170,208	11,111	303,500	243,480	
	Other Litres (L)	0	0	0	0	0	0

The quantity of waste in FY25 was consistent with historical results across all categories, in accordance with Table 29.

We continue to track tyre management.

5.9.2. 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 FY24. A centralised waste management contract has been established with Cleanaway, which will assist in the tracking and reporting of waste.

5.10. Incident and Emergency Response

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

- The Pollution Incident Response Management Plan was reviewed and updated in June2025. The current version is available online at https://www.boral.com.au/our-commitment/environmental-reporting.

5.11. 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.

6. 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 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 are published on the Boral website.

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

The CCC met twice during the FY25 reporting period (August 2024 and February 2025).

6.1. Environmental Complaints Management

There was one environmental complaint received during the reporting period, relating to dust. This complaint was received from the community via the EPA.

A graph showing the community complaints over time can be seen in Figure 40.

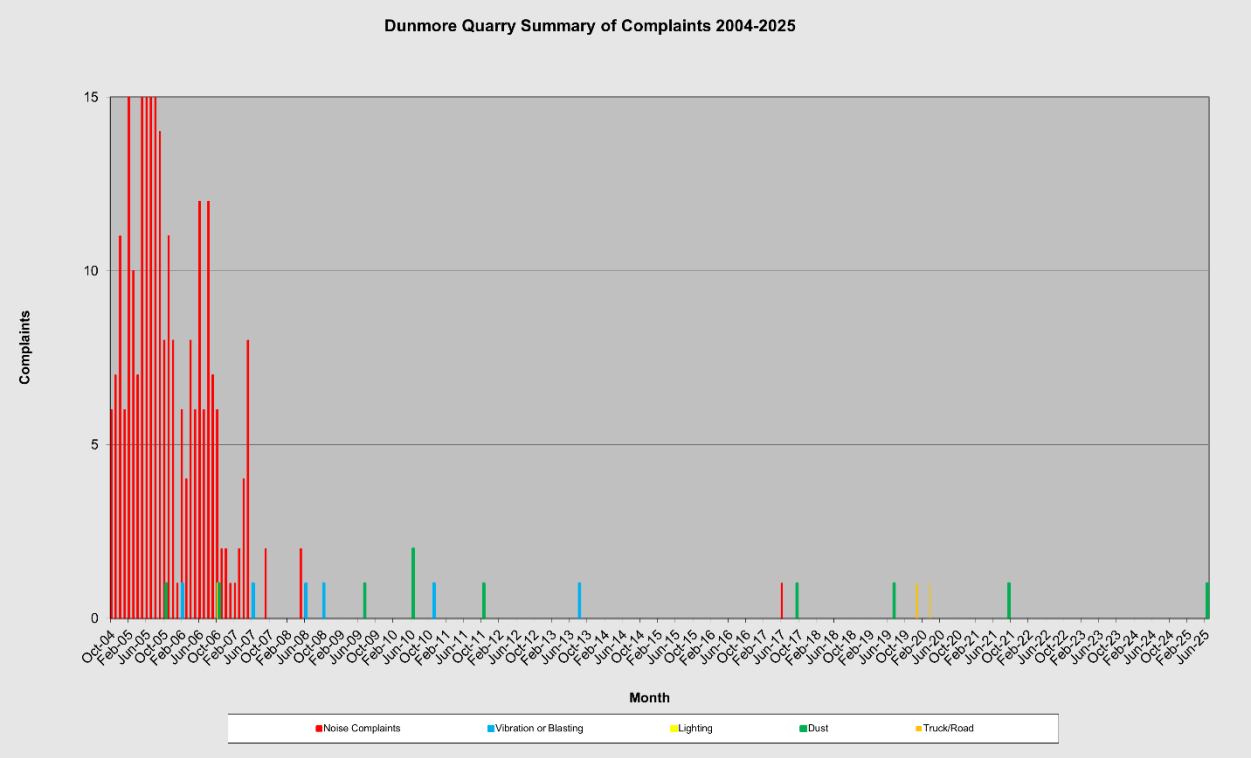


Figure 34 Historical Community Complaints

6.2. Summary of Regulatory Notifications

Zero regulatory notifications were received during the FY25 reporting period.

7. Activities to be completed by the Next Reporting Period

Table 29 Activities to be Completed by the Next Reporting Period (FY26)

Reference	Description of Action
AR 1	Planning for the Lower Dam upgrade will commence, with the aim of progressing to design and developing a proposal for approval.
AR 2	Monitoring and maintenance of translocation sites.
AR 3	On-going establishment of Biodiversity Stewardship Site.
AR 4	On-going review of real-time dust monitors and site training.
AR 5	Consultation and submission of Rehabilitation Management Plan and Rehabilitation Strategy.
AR 6	Update of Transport Management Plan and submission to DPHI.
AR 7	Update of Water Management Plan following consultation and submission to DPHI.

8. 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 FY25 period had a strong focus on maintaining regulatory compliance and optimising management actions established in the FY24 reporting period.

The next reporting period will continue to focus on continuing to ensure compliance and optimising processes to allow this.

9. Appendix A Meteorological Monitoring Locations Data and Graphs

The location of the onsite weather station is shown Figure 41 below.

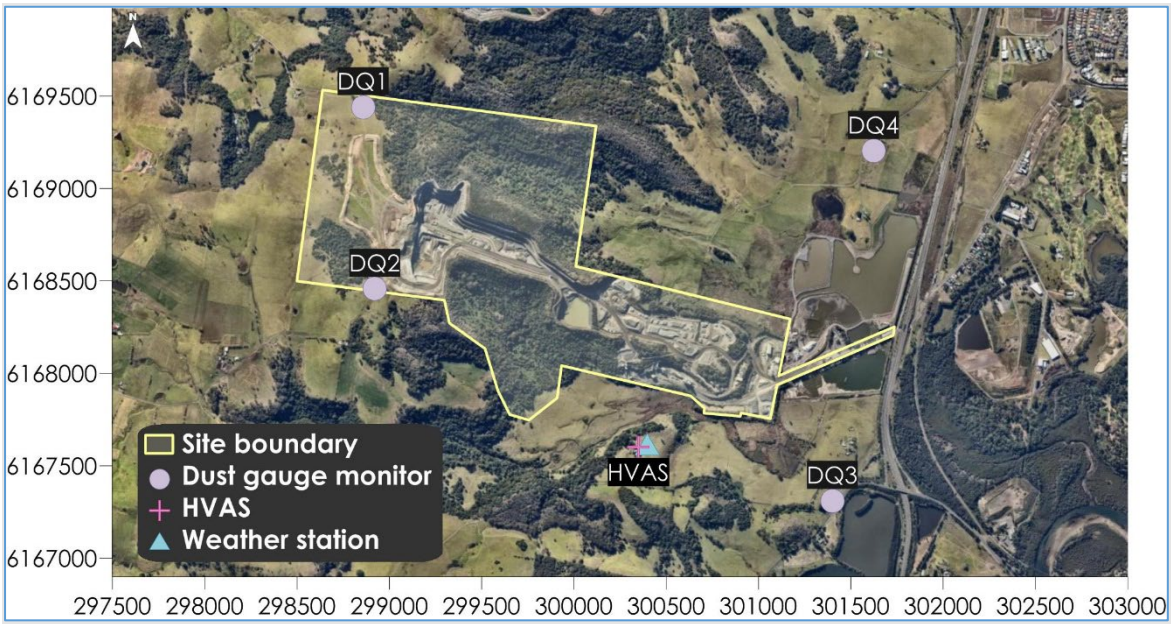


Figure 35 Meteorological Monitoring Locations

A monthly review of weather data is undertaken by the environmental co-ordinator. Important 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 32. Values shown in red relate to periods where rainfall was above the regional average.

Table 30 Rainfall Data Summary

Rainfall (mm)			
Month	**Current Reporting Period**	**Site Average**	**Regional Average**
July	67.8	77.9	49
August	27	67.7	53.5
September	45.8	52.1	42.7
October	21.2	75.1	64.5
November	122.4	98.4	83.1
December	41.6	85.7	67
January	125.8	90.5	72.9
February	41.2	147.1	140.5
March	177	163.4	122.3
April	63.8	99.3	73.8
May	207.8	93.7	55.8
June	2.6	105.3	93.7
Total	944	1156.1	925.6

Table 31 Historical Rainfall Data

	Rainfall (mm)																							
Month	**FY03**	**FY04**	**FY05**	**FY06**	**FY07**	**FY08**	**FY09**	**FY10**	**FY11**	**FY12**	**FY13**	**FY14**	**FY15**	**FY16**	**FY17**	**FY18**	**FY19**	**FY20**	**FY21**	**FY22**	**FY23**	**FY24**	**FY25**	**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	264.2	14.8	450	56.8	67.8	77.9	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	187.1	73.4	39.4	67.6	27	67.7	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	11.3	46.37	145.2	53.4	45.8	52.1	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	114.4	61.85	243.8	22.4	21.2	75.1	64.5
November	17	150	127	145	39.5	162	46.5	65	198	164	25	173	24	48	33	85	92	25.5	83	164.1	61.2	216.2	122.4	98.4	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	83.8	78.36	41.8	207.4	41.6	85.7	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	189.3	151	125	57.4	125.8	90.5	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	88.4	295.8	225.4	71.8	41.2	147.1	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	278.5	670.6	153	80.8	177	163.4	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	5.9	216.8	140.4	261	63.8	99.3	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	206.1	202.8	77.6	296	207.8	93.7	55.8
June	74.5	42	84.4	124	319	85.5	67	52	92	89	239	34	76	429	57	134	103	35	44	1.8	12.6	225	2.6	105.3	93.7
Total	1036	779	1248	724	1074	1064	746	873	1425	1379	1001	954	1462	1490	1253	627	890	760.5	1556	1978	1715	1616	944	1156.1	925.6

Monthly wind roses and seasonal wind roses are shown in Figure 42 to Figure 53. Please note calm is defined as winds averaging less than 0.3m/s over the averaging period.

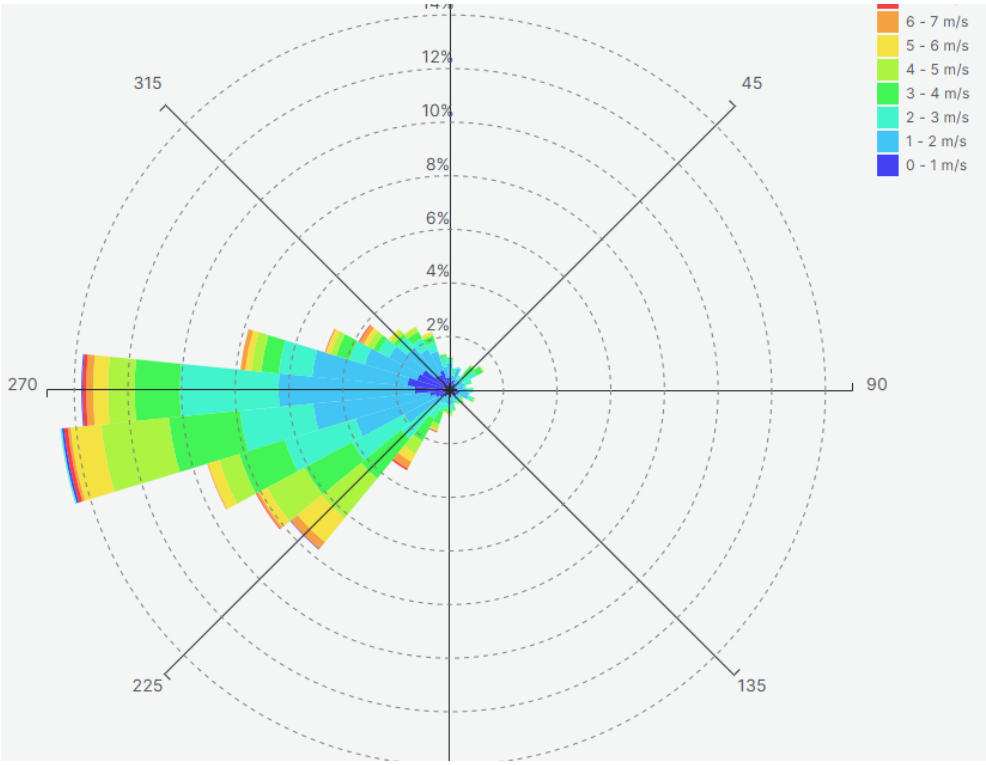


Figure 32 July 2024 Wind Rose

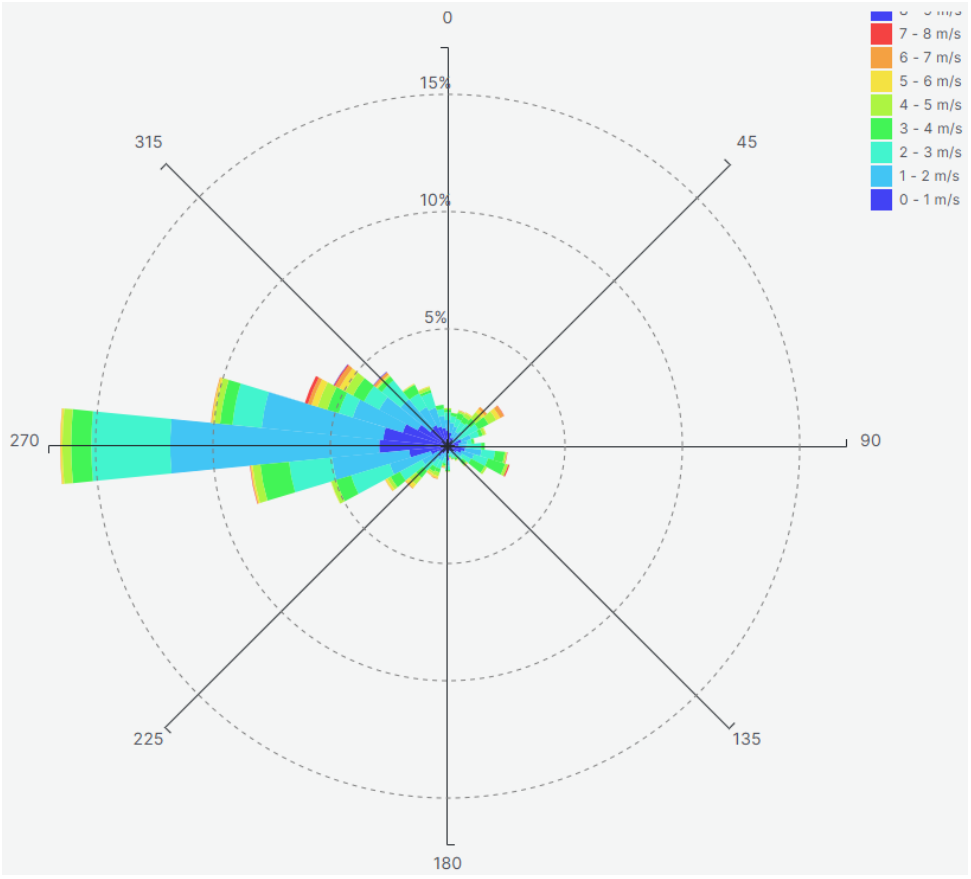


Figure 37 August 2024 Wind Rose

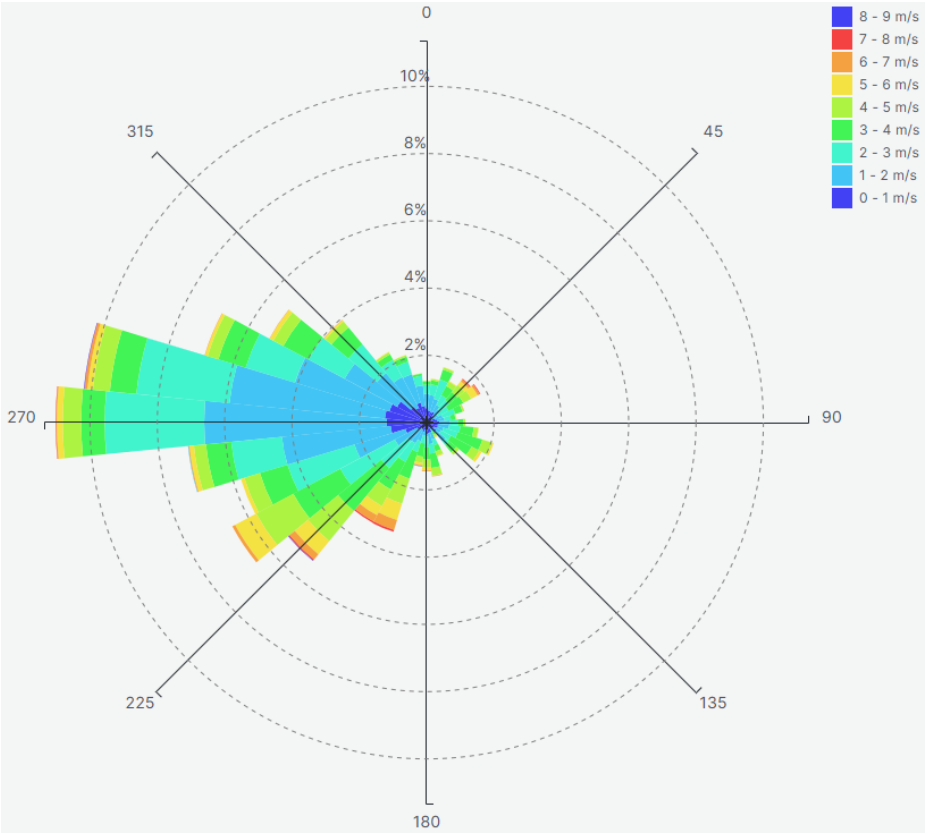


Figure 38 September 2024 Wind Rose

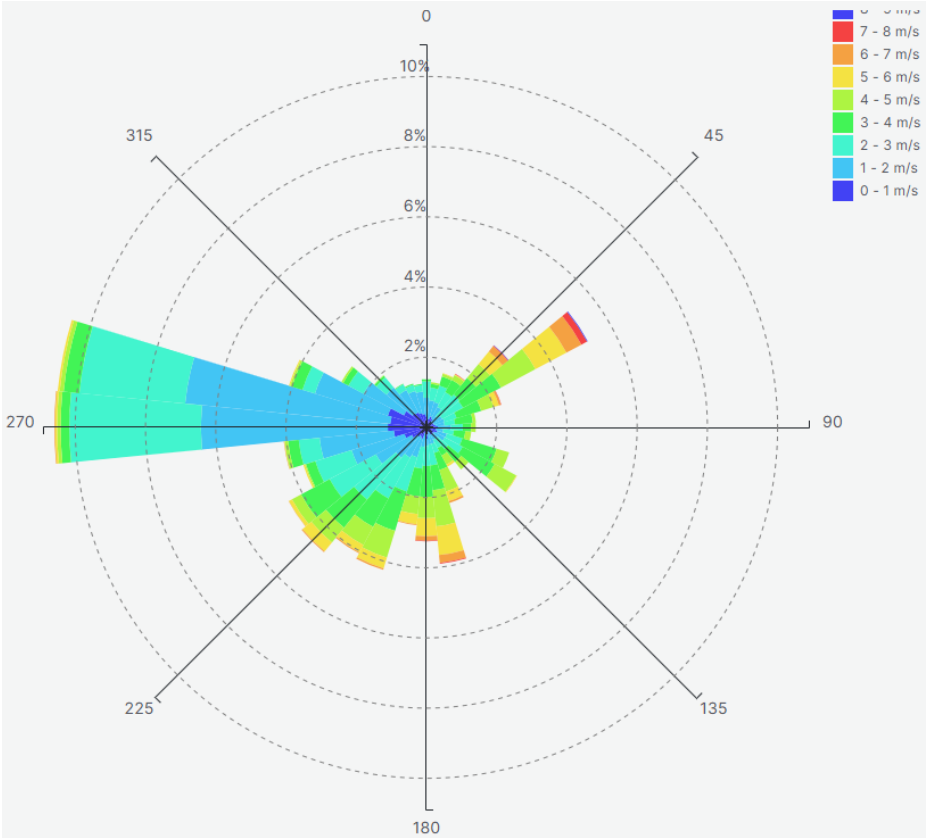


Figure 39 October 2024 Wind Rose

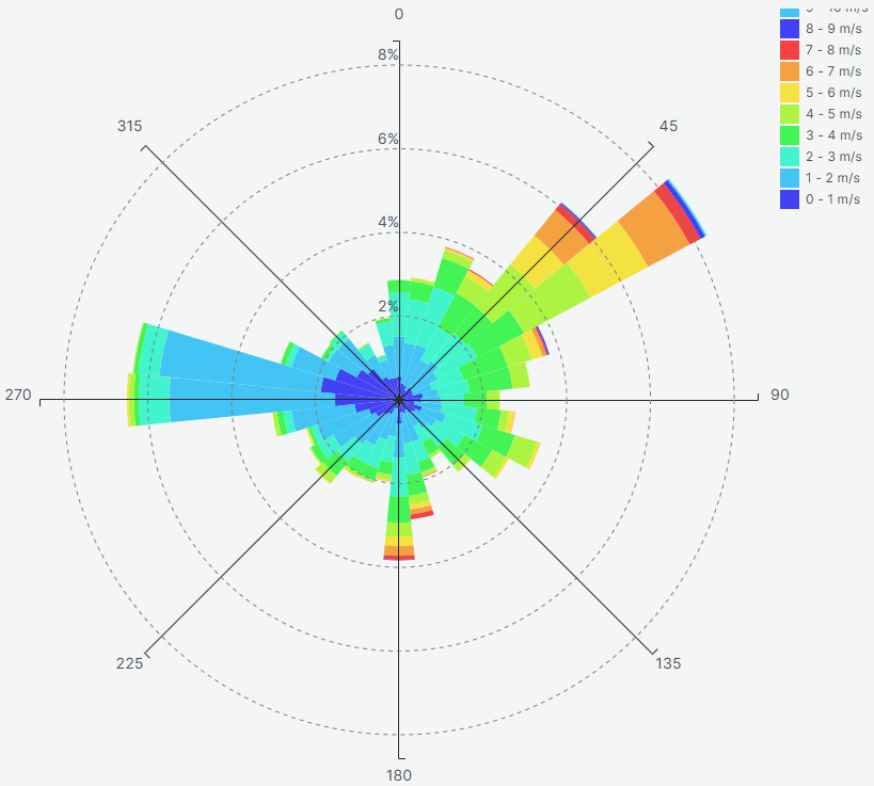


Figure 40 November 2024 Wind Rose

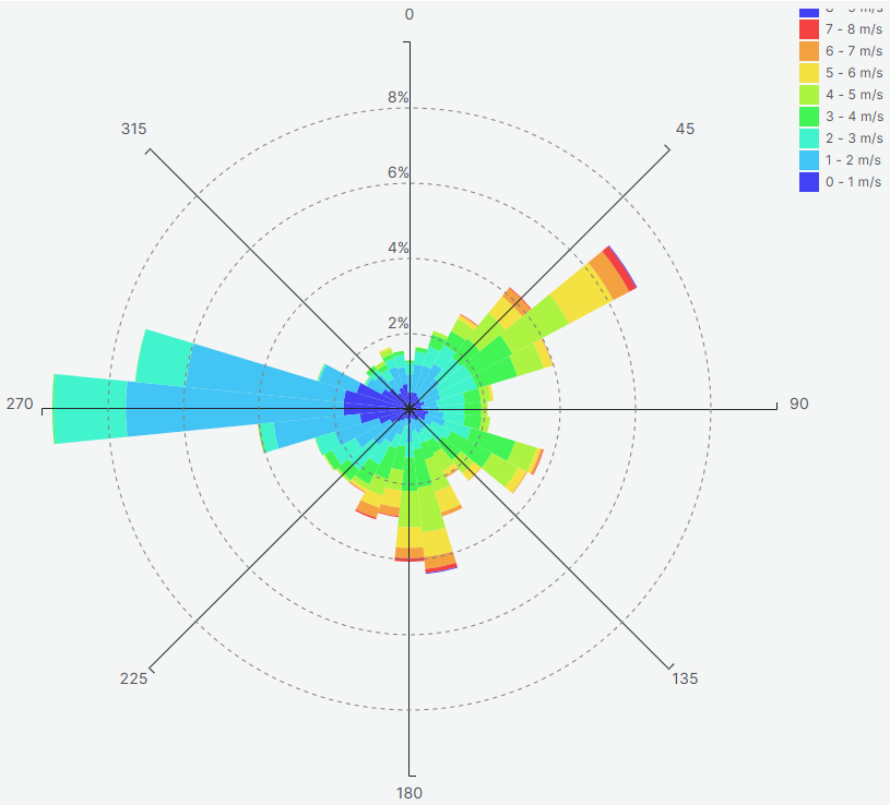


Figure 41 December 2024 Wind Rose

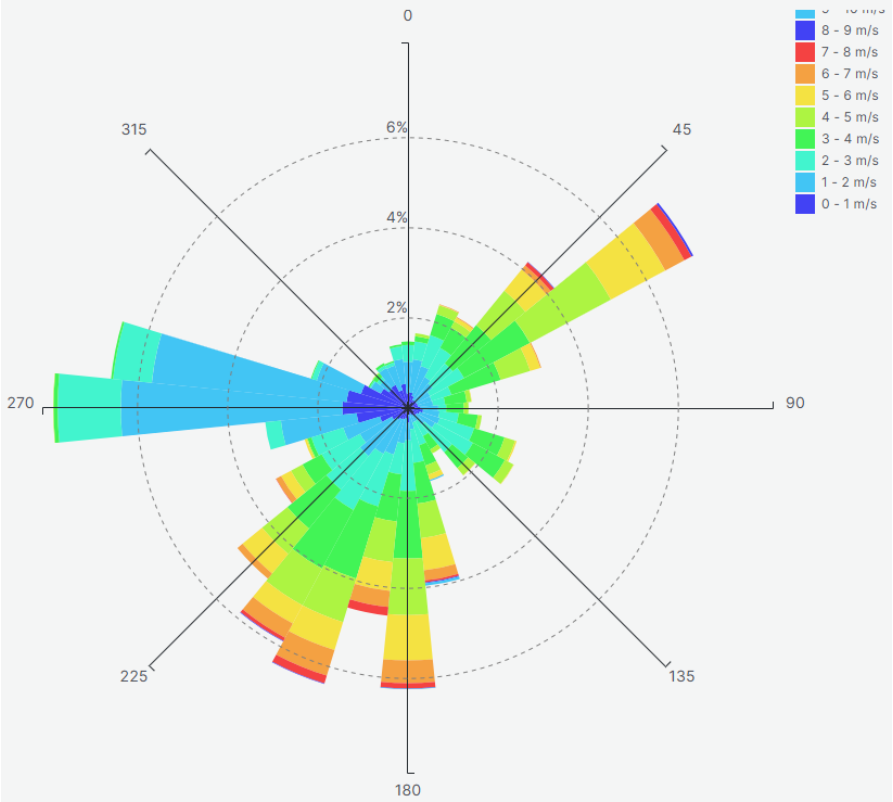


Figure 42 January 2025 Wind Rose

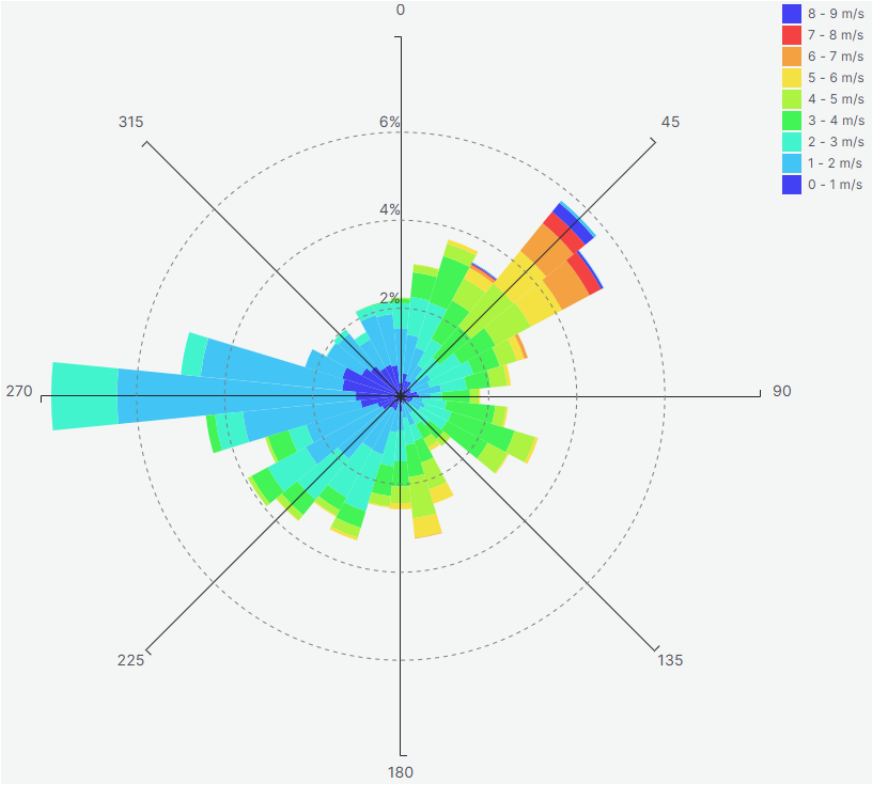


Figure 43 February 2025 Wind Rose

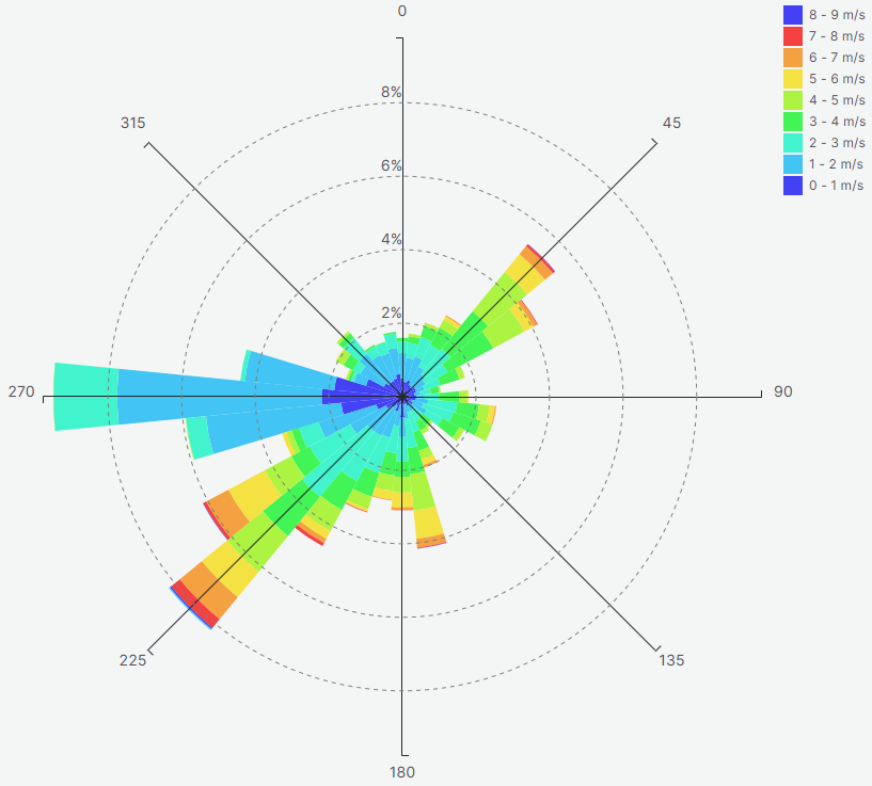


Figure 44 March 2025 Wind Rose

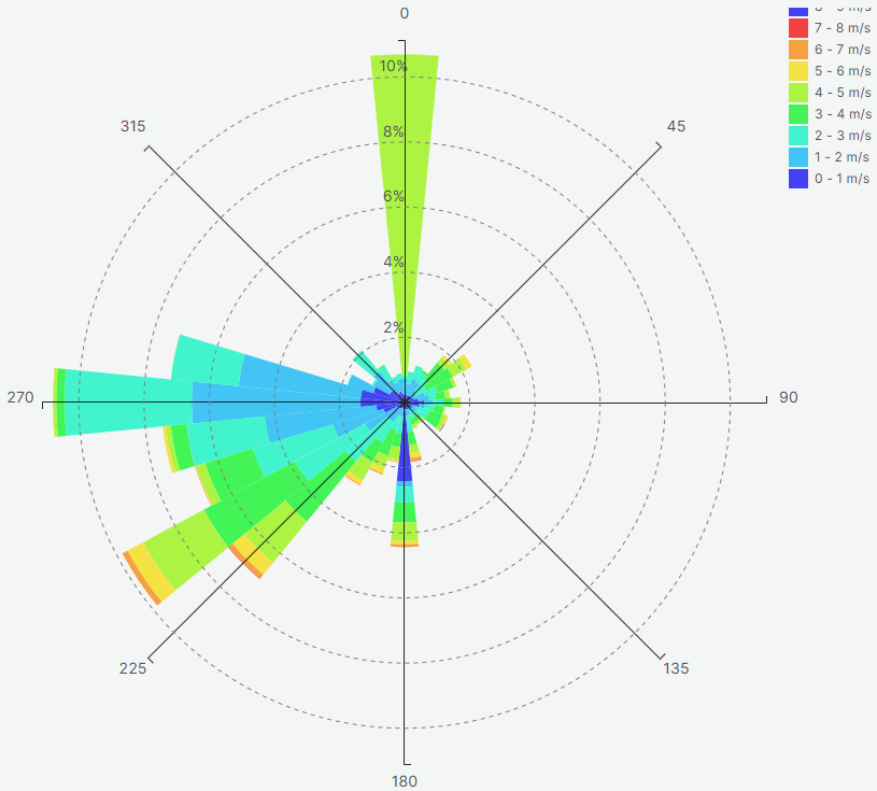


Figure 45 April 2025 Wind Rose

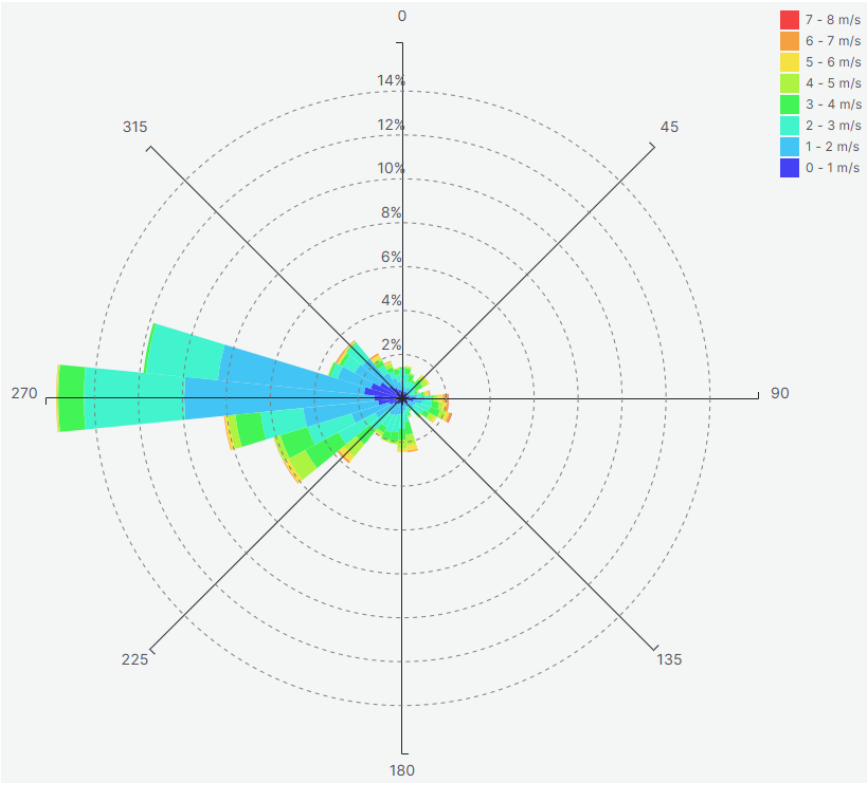


Figure 46 May 2025 Wind Rose

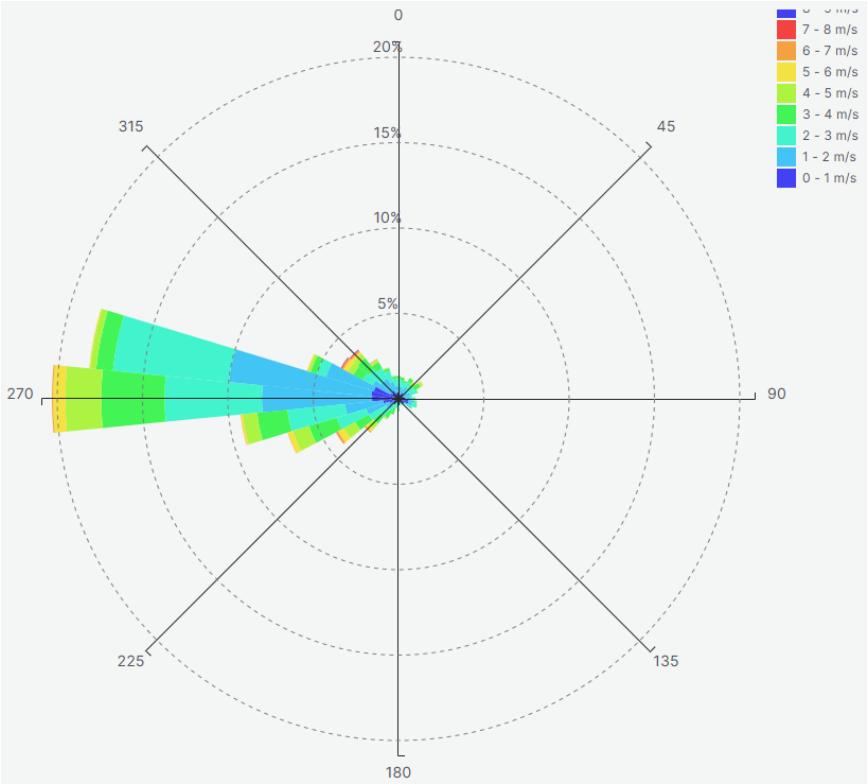


Figure 47 June 2025 Wind Rose

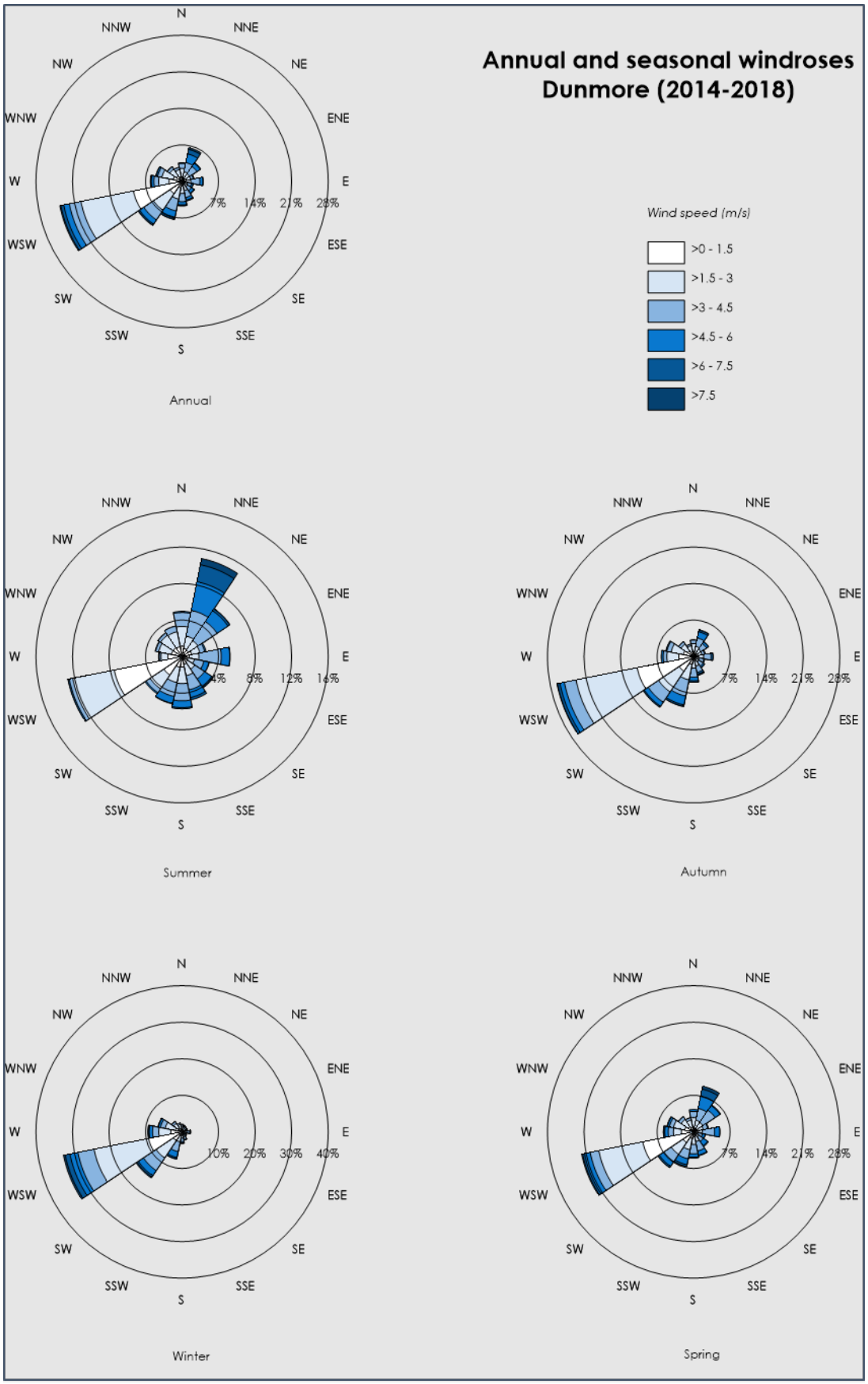


Figure 48 Dunmore Seasonal Wind Rose Data

10. Appendix B Air Quality Monitoring Additional Data and Graphs

Monthly breakdown of deposited dust monitoring is shown in Table 34. Dominant wind directions and production data are also shown within this table.

Table 32 Historical Deposited Dust Results

Month	Site 1 grams/m²/month		Site 2 grams/m²/month		Site 3 grams/m²/month		Site 4 grams/m²/month		Production Tonnes
	Insoluble Solids	Ash	Insoluble Solids	Ash	Insoluble Solids	Ash	Insoluble Solids	Ash	(t)
FY06 Average	5.85	2.66	4.48	1.67	4.85	2.22	3.9	1.92	106,583
FY07 Average	5.4	2.13	2.48	1.53	2.79	1.89	4.31	2.44	101,776
FY08 Average	3.26	1.67	2.37	1.3	3.89	2.9	5.55	3.17	98,983
FY09 Average	6.6	2.63	3.01	2.1	3.12	2.17	2.71	1.66	71,105
FY10 Average	4.65	3.03	4.41	2.6	5.02	3.49	3.15	2.33	72,892
FY11 Average	3.35	1.43	5.86	3.92	3.43	2.09	2.53	1.6	88,790
FY12 Average	3.74	1.92	3.28	1.7	5.03	3.44	2.75	1.81	102,395
FY13 Average	3.73	1.65	2.61	1.65	5.87	3.6	3.36	2.36	128,094
FY14 Average	9.56	4.94	3.63	1.79	4.61	3.28	3.2	2	127,787
FY15 Average	5.63	2.72	2.38	1.44	7.36	4.42	3.1	1.98	81,871
FY16 Average	3.46	1.66	3.12	1.77	7.2	4.45	3.01	1.84	120,595
FY17 Average	2.2	1.42	3.36	1.96	2.28	1.56	2.01	1.3	152,743
FY18 Average	2.93	2	4.2	3.14	2.36	1.65	2.84	1.79	152,404
FY19 Average	3.05	1.84	2.95	1.92	3.66	2.01	2.81	1.59	156,165
FY20 Average	2.61	1.76	3.45	2.43	2.66	1.94	2.1	1.51	104,737
FY21 Average	1.88	1.16	1.70	1.08	1.94	1.12	1.97	1.10	108,894
FY22 Average	1.42	0.61	1.71	0.69	1.25	0.70	1.64	0.85	92,333
FY23 Average	2.26	1.20	1.32	0.69	2.39	1.39	1.32	0.90	130,988
FY24 Average	2.11	0.99	1.53	0.74	1.84	0.80	1.71	0.76	108,222
Jul-24	1.01	0.49	1.18	0.47	0.91	0.50	0.79	0.54	122,386
Aug-24	0.19	0.03	1.17	0.60	1.23	0.53	1.46	0.97	85,453
Sep-24	2.48	0.12	0.98	0.49	3.00	0.29	3.83	0.16	89,602
Oct-24	3.35	2.17	1.58	0.71	1.93	0.82	1.02	0.99	91,377
Nov-24	2.03	0.62	2.66	1.38	2.20	1.72	1.89	1.49	71,675
Dec-24	7.97	2.94	2.50	1.47	4.77	1.92	6.43	2.18	65,551
Jan-25	1.11	1.05	0.96	0.82	1.90	1.22	1.80	1.32	65,632
Feb-25	1.59	0.48	1.91	0.47	1.19	0.49	3.04	1.21	71,712
Mar-25	0.65	0.62	0.27	0.11	1.12	0.57	0.87	0.67	81,665
Apr-25	0.34	0.30	1.59	0.99	0.67	0.40	0.63	0.57	69,578
May-25	0.79	0.40	0.55	0.39	0.58	0.30	1.76	0.86	110,660
Jun-25	3.54	1.48	0.30	0.09	0.40	0.24	0.86	0.41	106,447
FY25 Average	**2.09**	**0.89**	**1.30**	**0.67**	**1.66**	**0.75**	**2.03**	**0.95**	**85,978**

A graph of the historical deposited dust values compared to production is shown in green for each deposited dust site in Figures 55 to 58.

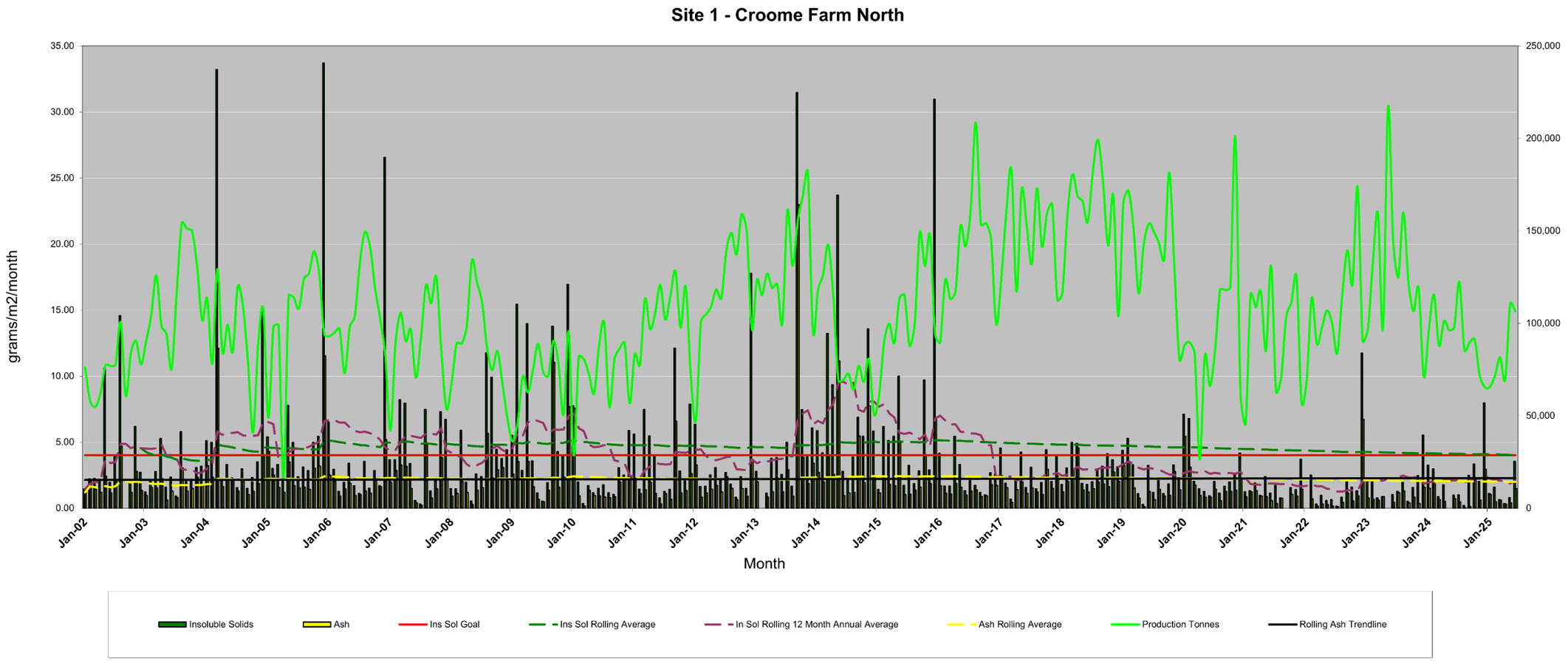


Figure 49 Historical Deposited Dust Values – DQ1

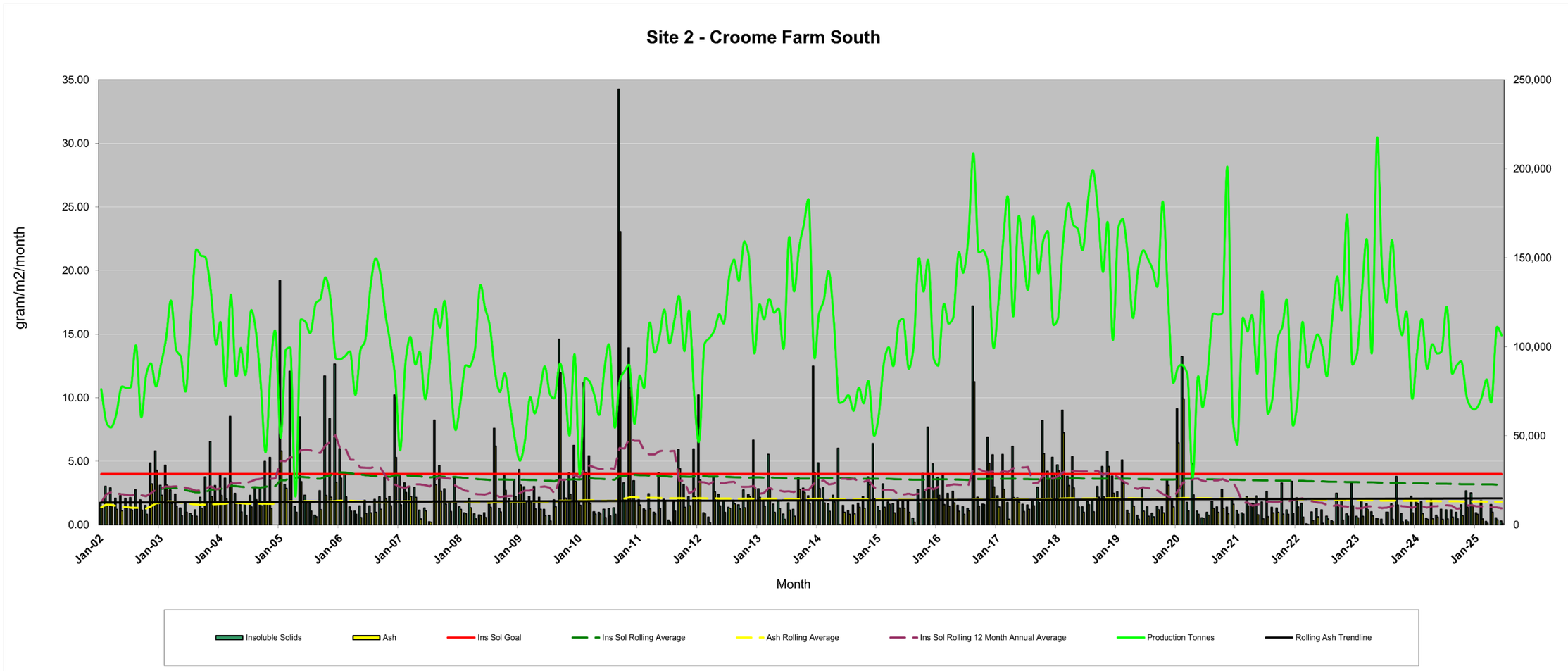


Figure 50 Historical Deposited Dust Values – DQ2

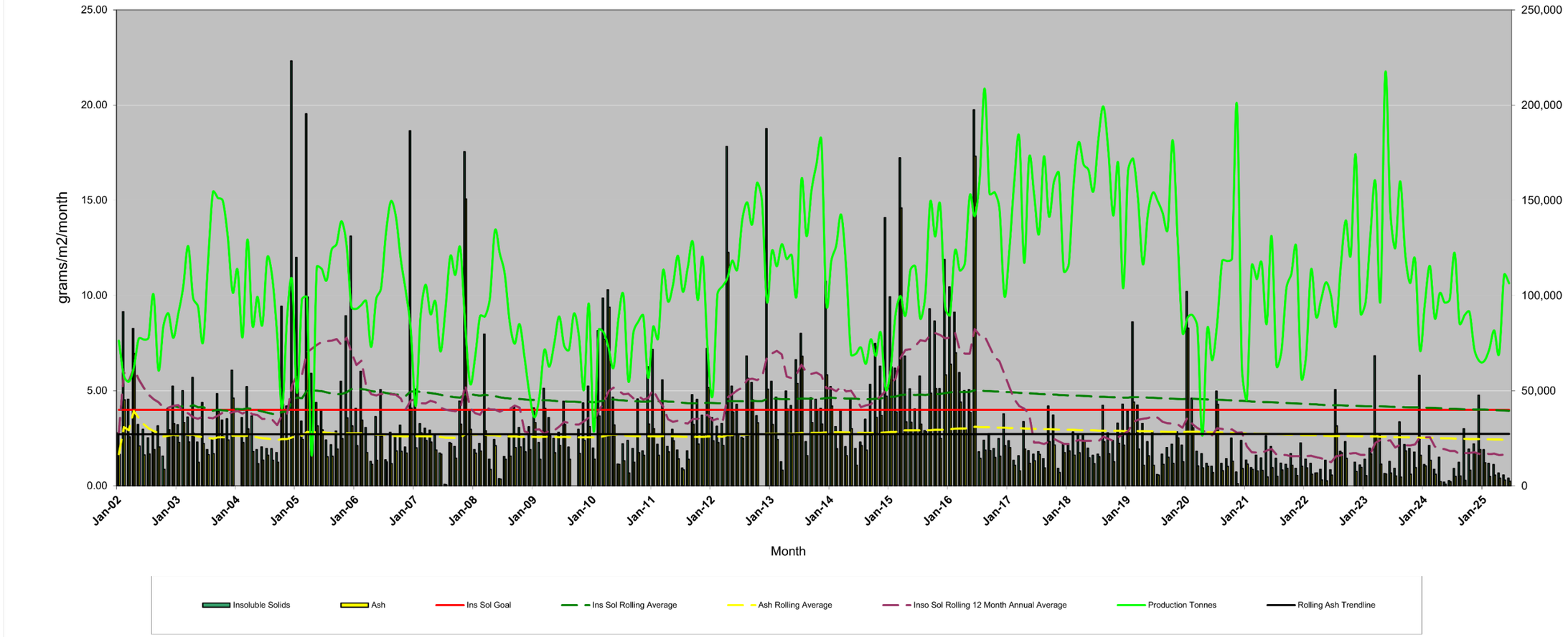


Figure 51 Historical Deposited Dust Values – DQ3

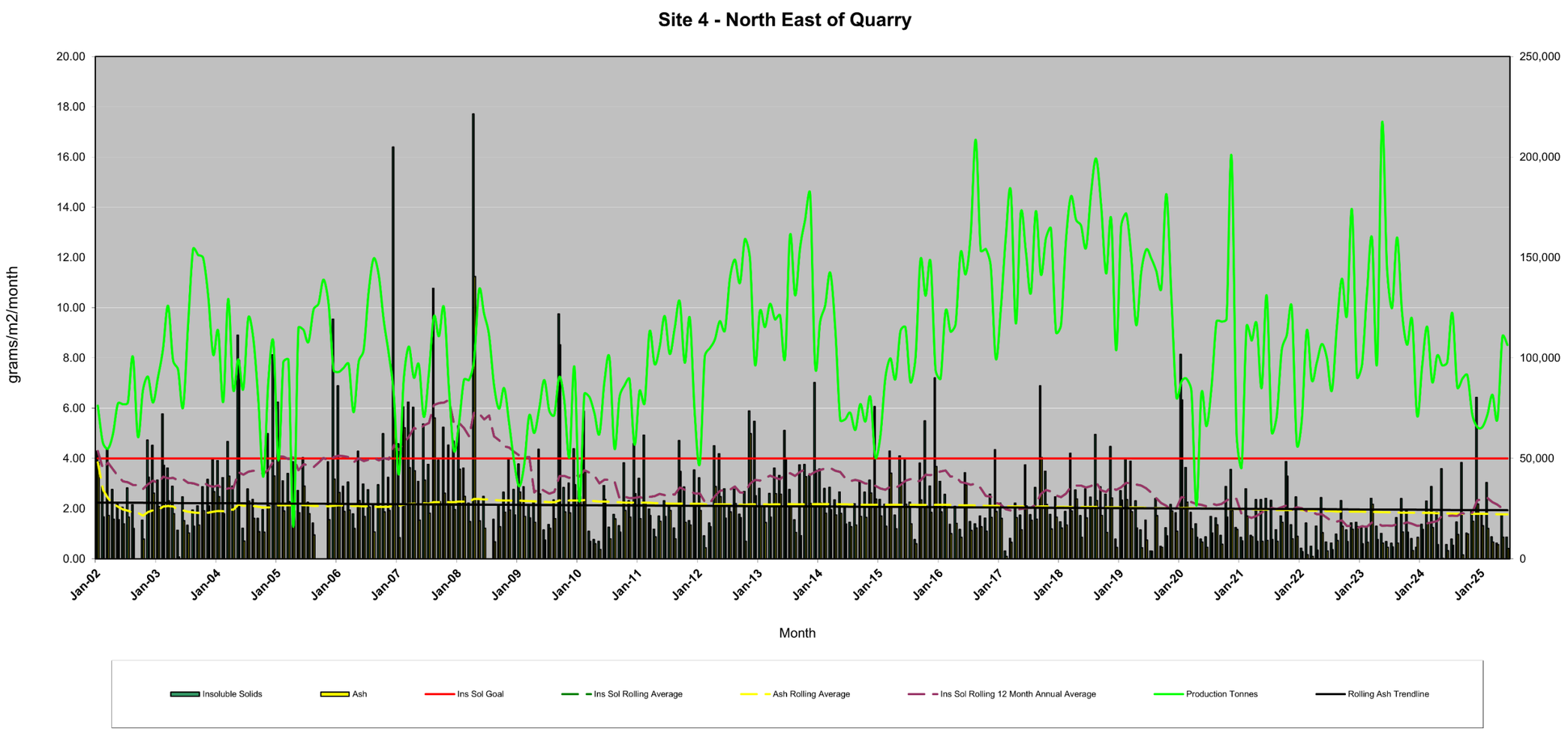


Figure 52 Historical Deposited Dust Values – DQ4

Table 33 Particulate Monitoring

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)
1/07/2024	6.47	50	30	5.66
7/07/2024	6.59	50	30	5.63
13/07/2024	4.26	50	30	5.70
19/07/2024	13.16	50	30	6.00
25/07/2024	34.07	50	30	6.77
31/07/2024	34.37	50	30	7.69
6/08/2024	6.09	50	30	7.79
12/08/2024	7.83	50	30	7.84
18/08/2024	12.85	50	30	7.54
24/08/2024	12.15	50	30	7.87
30/08/2024	34.06	50	30	8.76
5/09/2024	47.79	50	30	9.94
11/09/2024	18.04	50	30	12.05
17/09/2024	12.54	50	30	12.06
23/09/2024	13.68	50	30	12.11
29/09/2024	13.11	50	30	12.14
5/10/2024	12.32	50	30	12.14
11/10/2024	32.92	50	30	12.67
17/10/2024		50	30	12.67
23/10/2024		50	30	12.67
29/10/2024	37.34	50	30	13.29
4/11/2024	36.66	50	30	13.86
10/11/2024	29.7	50	30	14.24
17/11/2024	12.19	50	30	14.19
25/11/2024	27.14	50	30	14.48
30/11/2024	13.54	50	30	14.46
6/12/2024	14.96	50	30	14.47
12/12/2024	37.17	50	30	14.96
18/12/2024	24.22	50	30	16.01
24/12/2024		50	30	16.01
30/12/2024	14.91	50	30	15.99
5/01/2025	22.19	50	30	16.11
12/01/2025	20.24	50	30	16.19
18/01/2025	13.89	50	30	16.15
24/01/2025	10.68	50	30	16.05
30/01/2025	12.77	50	30	15.99
5/02/2025	21.93	50	30	16.09
11/02/2025	11.09	50	30	16.01
17/02/2025	8.49	50	30	15.87
23/02/2025	14.96	50	30	15.98
1/03/2025	5.4	50	30	15.68
7/03/2025	7.36	50	30	15.68
13/03/2025	13.3	50	30	15.68
19/03/2025	15.97	50	30	15.51
22/03/2025	9.09	50	30	15.41

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)
23/03/2025	24.17	50	30	15.55
3/04/2025	37.95	50	30	15.89
6/04/2025	27.05	50	30	16.06
12/04/2025	10.02	50	30	15.97
15/04/2025	22.72	50	30	16.07
18/04/2025	12.22	50	30	16.01
21/04/2025	11.45	50	30	15.95
28/04/2025	26.39	50	30	16.10
5/05/2025	12.69	50	30	16.05
11/05/2025	8.48	50	30	15.95
18/05/2025	8.01	50	30	15.84
24/05/2025	6.12	50	30	15.71
30/05/2025	8.07	50	30	15.61
5/06/2025	7	50	30	15.50
11/06/2025	6.05	50	30	15.38
17/06/2025	8.6	50	30	15.37
23/06/2025	15.48	50	30	15.50
29/06/2025	8.24	50	30	15.43

As noted in Section 5.2, 21 samples were not collected during the reporting period. These gaps were supplemented with data from the real-time air quality monitors. In Table 33, values sourced from the real-time monitors are highlighted in orange.

11. Appendix C MAC Noise Monitoring Annual Compliance Report

Annual Noise Monitoring Assessment 2024

Dunmore Quarry
Dunmore, NSW
August 2024

Prepared for: Boral Resources (NSW) Pty Ltd
September 2024
MAC180747-11RP1

Muller Acoustic Consulting

Document Information

Annual Noise Monitoring Assessment 2024

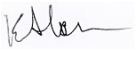
Dunmore Quarry

Dunmore, NSW

August 2024

Prepared for: Boral Resources (NSW) Pty Ltd

Prepared by: Muller Acoustic Consulting Pty Ltd
PO Box 678, Kotara NSW 2289
ABN: 36 602 225 132
P: +61 2 4920 1833
www.mulleracoustic.com

Document ID	Date	Prepared By	Signed	Reviewed By	Signed
MAC180747-11RP1	16 September 2024	Kristian Allen		Rod Linnett	

DISCLAIMER

All documents produced by Muller Acoustic Consulting Pty Ltd (MAC) are prepared for a particular client's requirements and are based on a specific scope, circumstances and limitations derived between MAC and the client. Information and/or report(s) prepared by MAC may not be suitable for uses other than the original intended objective. No parties other than the client should use or reproduce any information and/or report(s) without obtaining permission from MAC. Any information and/or documents prepared by MAC is not to be reproduced, presented or reviewed except in full.

CONTENTS

This page has been intentionally left blank

1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of Boral Resources (NSW) Pty Ltd for Dunmore Quarry (the quarry), Tabbita Road, Dunmore, NSW.

The monitoring has been conducted in accordance with the Dunmore Quarry Noise Management Plan (NMP V4, December 2017) during August 2024 and forms the annual noise monitoring program to address conditions outlined in the Development Consent (Ref: 470-11-2003).

This report summarises the operator-attended noise monitoring results measured at five receivers in comparison to the relevant noise limits contained in the Development Consent and NMP.

The assessment has been conducted in general accordance with the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Dunmore Quarry Noise Management Plan V4 (NMP), 2017 (EMM Consulting);
- Discussion Paper - Validation of Inversion Strength Estimation Method (EPA) 2014;
- NSW Environment Protection Authority (EPA's), Approved Methods for the measurement and analysis of environmental noise in NSW, 2022; and
- Standards Australia AS 1055:2018 - Acoustics - Description and measurement of environmental noise.

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

This page has been intentionally left blank

2 Noise Criteria

The Dunmore Quarry Noise Management Plan (NMP) outlines the applicable noise criteria for residential receivers surrounding the quarry and are presented in **Table 1**.

Table 1 Noise Limits

Description	Day (7am - 6pm)	Evening (6pm - 10pm)	Night (10pm - 7am)		Morning Shoulder (6am - 7am)	
	dB $L_{Aeq(15min)}$	dB $L_{Aeq(15min)}$	dB $L_{Aeq(15min)}$	dB $L_{A1(1min)}$	dB $L_{Aeq(15min)}$	dB $L_{A1(1min)}$
Location K Stocker	49	44	38	48	47	55
Location O Dunmore Lakes	49	44	38	48	47	55
Location J Creagan	Negotiated Agreement in place					
Location AA	38	38	38	45	38	45
Location AB and T	36	36	36	45	36	45
Locations D, F, G and Z	40	40	40	45	40	45
Location S	37	37	37	45	37	45

Source: Table 2 of Dunmore Quarry NMP.

This page has been intentionally left blank

3 Methodology

3.1 Locality

The quarry is located at Dunmore near Shellharbour, NSW. Receivers in the locality surrounding the quarry are primarily rural and residential. The quarry is surrounded by rural properties to the west, with the Princes Highway situated to the east of the site. Highway traffic is a dominant noise source for those receivers east of the quarry along with rural noise. The representative noise monitoring locations identified in Table 4.1 of the NMP with respect to the quarry are presented in the locality plan in **Figure 1.** **Table 2** presents the noise limits for each receiver as per the EPL.

Table 2 Attended Monitoring Locations and EPL Noise Limits

ID	Description	Day[1]	Evening[1]	Night[1]		Morning Shoulder[1]	
		dB, $L_{Aeq(15min)}$	dB, $L_{Aeq(15min)}$	dB, $L_{Aeq(15min)}$	dB, $L_{A1(1min)}$	dB, $L_{Aeq(15min)}$	dB, $L_{A1(1min)}$
NM1	Location K Stocker 40 Swamp Road Dunmore	49	44	38	48	47	55
NM2	Location S 86 Croome Vale Road Croom	37	37	37	45	37	45
NM3	Location T 1338 Jamberoo Road Croom	36	36	36	45	36	45
NM4	Location G[2] 318 Croome Road Croom	40	40	40	45	40	45
NM5	Location F[3] 316 Croome Road Croom	40	40	40	45	40	45

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods and the morning shoulder period is from 6am to 7am.

Note 2: Representative location for western residences G, D, Z.

Note 3: Representative location for northwestern residences F, AA, AB.

3.2 Assessment Methodology

The attended noise measurements were conducted in general accordance with the procedures described in Standards Australia AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise" and the Dunmore Quarry NMP. Noise measurements of 15-minutes in duration were conducted at five locations (NM1-NM5) using a Svantek Type 1, 971 noise analyser between Tuesday 20 August 2024 and Friday 23 August 2024 to satisfy the requirements of the NMP. All acoustic instrumentation used carries appropriate and current NATA (or manufacturer) calibration certificates with records of all calibrations maintained by MAC as per Approved Methods for the measurement and analysis of environmental noise in NSW (EPA, 2022) and complies with AS/NZS IEC 61672.1-2019- Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

To understand meteorological conditions during calm conditions, direct measurement of temperature profile was undertaken at Trevethan Reserve, Minnamurra on Tuesday 20 August 2024 and at Fuller Drive, Dunmore on Wednesday 21 August 2024, at 2m above ground level and at 50m above ground level using a weather balloon.

The results of the temperature measurements were used to determine the temperature lapse rate in general accordance with the Validation of Inversion Strength Estimation Method (2014). These measurements, in combination with the onsite weather station provide a reference to validate the relevant meteorological conditions under which compliance is assessed.

Extraneous noise sources were excluded from the analysis to determine the dB $LA_{eq(15min)}$ quarry noise contribution for comparison against the relevant criteria. In the event of quarry attributed noise being above criteria, prevailing meteorological conditions for the monitoring period are sourced from the onsite meteorological station and analysed in accordance with Fact Sheet A4 of the NPI to determine the stability category present at the time of each attended measurement.

Where the quarry is inaudible, the contribution is estimated to be at least 10dBA below the ambient noise level.

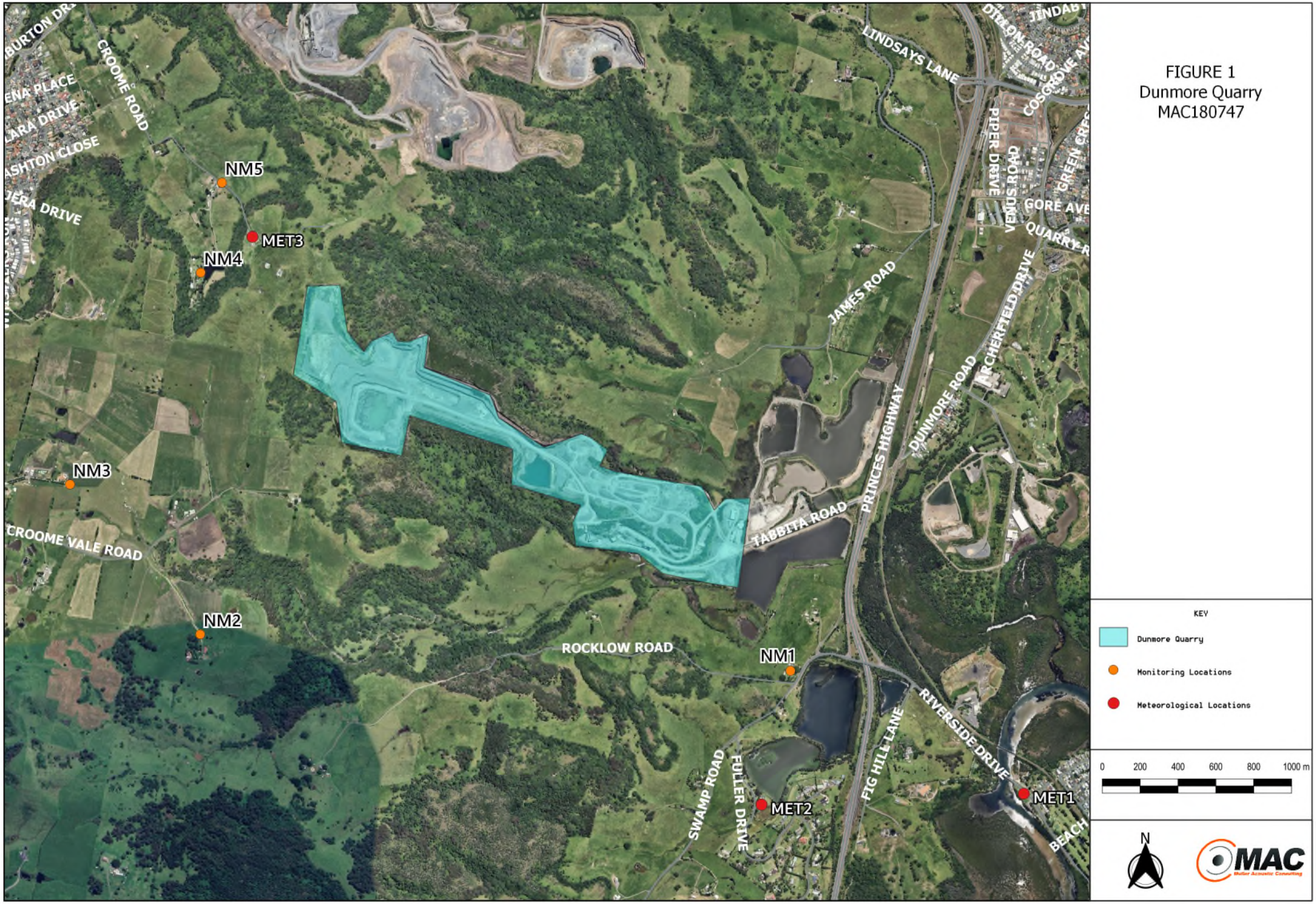


FIGURE 1
Dunmore Quarry
MAC180747
NM5
MET3
NM4
NM3
NM2
NM1
MET2
MET1
CROOME ROAD
LINDSAYS LANE
JAMES ROAD
PRINCES HIGHWAY
DUNMORE ROAD
TABBITA ROAD
CROOME VALE ROAD
ROCKLOW ROAD
SWAMP ROAD
FULLER DRIVE
FIG HILL LANE
RIVERSIDE DRIVE
ARCHERFIELD DRIVE
PIPER DRIVE
GORE AVE
KEY
Dunmore Quarry
Monitoring Locations
Meteorological Locations
0 200 400 600 800 1000 m
N
MAC

This page has been intentionally left blank

4 Results

A summary of the operator attended measurements at location NM1 to NM5 are presented **Table 3** to **Table 7** and provide the following information:

- Monitoring location;
- Date, time and assessment period;
- Observed Wind Speed (WS, m/s), Wind Direction (WD) and Temperature (Temp) in °C at 1.5m above the ground measured at the monitoring location;
- Measured Temperature (Temp) in °C at 2m and 50m above ground level at a representative location;
- Average Wind Speed (WS, m/s), Wind Direction (WD) and Temperature (Temp) in °C at 10m above ground level at the on-site weather station;
- Atmospheric stability class derived from the on-site weather station;
- Calculated temperature inversion strength;
- Ambient measured noise levels $LA_{eq(15min)}$ and $LA_{90(15min)}$ in dB re 20µPa;
- Quarry $LA_{eq(15min)}$ and $LA_{1(1min)}$ noise level contribution; and
- Noise Limit $LA_{eq(15min)}$ and $LA_{1(1min)}$.

Results of the attended noise survey identified that the quarry was generally inaudible during the measurement periods at all but one location during the morning shoulder measurement period, however extraneous sources such as traffic, insects, aircraft, birds, livestock, dogs barking, and local residential noise were audible during the survey period and dominated the results. Temperature data, from on-site measurements, was unavailable during most measurement periods due to high wind speeds at more than 10m above ground level (AGL).

Table 3 NM1 - Attended Noise Monitoring Summary													
Date & Period	Time (hrs)	1.5m WS WD Temp°C[3]	Descriptor		EPL Limits	Observed Meteorology							Description and SPL, dBA
			L_{Aeq}	L_{A90}	$L_{Aeq\ (15min)}$/ $L_{A1\ (1min)}$	WS (m/s)[1]	WD[1]	2m Temp°C	50m Temp°C	Delta Temp°C	Lapse Rate °C/100m[2]	Stability Class[1]	
22/08/2024	06:27 (Morning Shoulder)	0.1m/s SW 14°	64	55	47/55	0.9	W	11°	14°	3°	6°	G	Traffic 52-83 Birds 45-60 Quarry – Production <45-50 Quarry – Reverse Alarms <45 Quarry – Truck Movements <45-50
Quarry Contribution													<47dB LAeq(15min) <55dB LA1(1min)
21/08/2024	08:25 (Day)	0.1m/s W 15°	65	48	49	1.4	W	n/a	n/a	n/a	n/a	n/a	Traffic 44-83 Birds 40-62 Quarry Inaudible
Quarry Contribution													<49dB LAeq(15min)
20/08/2024	21:22 (Evening)	0.5m/s N 17°	55	45	44	0.9	ENE	n/a	n/a	n/a	n/a	n/a	Traffic 41-78 Insects <41 Quarry Inaudible
Quarry Contribution													<44dB LAeq(15min)

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 50m temperature.

Note 3: At operator position as per AS1055.

Table 4 NM2 - Attended Noise Monitoring Summary													
Date & Period	Time (hrs)	1.5m WS WD Temp°C[3]	Descriptor		EPL Limits	Observed Meteorology							Description and SPL, dBA
			L_{Aeq}	L_{A90}	$L_{Aeq\ (15min)}$/ $L_{A1\ (1min)}$	WS (m/s)[1]	WD[1]	2m Temp°C	50m Temp°C	Delta Temp°C	Lapse Rate °C/100m[2]	Stability Class[1]	
23/08/2024	06:31 (Morning Shoulder)	0.1m/s W 14°	41	35	37/45	1.4	SSW	n/a	n/a	n/a	n/a	n/a	Agricultural Noise 32-36 Traffic 30-38 Birds 30-63 Livestock 35-43 Quarry Inaudible
Quarry Contribution													<37dB $L_{Aeq(15min)}$ <45dB $L_{A1(1min)}$
21/08/2024	10:29 (Day)	1.0m/s NE 18°	58	28	37	1.3	NE	n/a	n/a	n/a	n/a	n/a	Traffic 25-86 Birds 26-64 Quarry Inaudible
Quarry Contribution													<37dB $L_{Aeq(15min)}$
20/08/2024	20:31 (Evening)	<0.5m/s SE 15°	36	34	37	1.5	SW	n/a	n/a	n/a	n/a	n/a	Insects 32-38 Traffic 30-39 Dogs Barking 30-42 Aircraft 30-46 Quarry Inaudible
Quarry Contribution													<37dB $L_{Aeq(15min)}$

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 50m temperature.

Note 3: At operator position as per AS1055.

Table 5 NM3 - Attended Noise Monitoring Summary													
Date & Period	Time (hrs)	1.5m WS WD Temp°C[3]	Descriptor		EPL Limits	Observed Meteorology							Description and SPL, dBA
			L_{Aeq}	L_{A90}	$L_{Aeq\ (15min)}$/ $L_{A1\ (1min)}$	WS (m/s)[1]	WD[1]	2m Temp°C	50m Temp°C	Delta Temp°C	Lapse Rate °C/100m[2]	Stability Class[1]	
23/08/2024	06:05 (Morning Shoulder)	0.1m/s W 14°	60	36	36/45	1.4	SSW	n/a	n/a	n/a	n/a	n/a	Traffic 30-79 Birds 28-60 Insects 30-39 Livestock 35-50 Quarry Inaudible
Quarry Contribution													<36dB $L_{Aeq(15min)}$ <45dB $L_{A1(1min)}$
21/08/2024	10:09 (Day)	<0.5m/s SW 19°	61	38	36	0.9	NW	n/a	n/a	n/a	n/a	n/a	Traffic 27-79 Birds 25-58 Aircraft 30-45 Quarry Inaudible
Quarry Contribution													<36dB $L_{Aeq(15min)}$
20/08/2024	20:10 (Evening)	<0.5m/s SE 15°	61	34	36	1.5	WSW	n/a	n/a	n/a	n/a	n/a	Traffic 30-81 Insects 31-36 Dogs Barking 35-48 Quarry Inaudible
Quarry Contribution													<36dB $L_{Aeq(15min)}$

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 50m temperature.

Note 3: At operator position as per AS1055.

Table 6 NM4 - Attended Noise Monitoring Summary													
Date & Period	Time (hrs)	1.5m WS WD Temp°C[3]	Descriptor		EPL Limits	Observed Meteorology							Description and SPL, dBA
			LA_{eq}	LA_{90}	$LA_{eq\ (15min)}$/ $LA_{1\ (1min)}$	WS (m/s)[1]	WD[1]	2m Temp°C	50m Temp°C	Delta Temp°C	Lapse Rate °C/100m[2]	Stability Class[1]	
23/08/2024	06:40 (Morning Shoulder)	0.5m/s SW 12°	47	35	40/45	1.8	W	n/a	n/a	n/a	n/a	n/a	Birds 32-65 Traffic 32-36 Residential Noise 36-44 Quarry Inaudible
Quarry Contribution													<40dB $LA_{eq(15min)}$ <45dB $LA_{1(1min)}$
21/08/2024	09:28 (Day)	<0.5m/s W 18°	44	34	40	0.6	NW	n/a	n/a	n/a	n/a	n/a	Birds 30-62 Traffic 31-34 Residential Noise 30-36 Aircraft 30-41 Quarry Inaudible
Quarry Contribution													<40dB $LA_{eq(15min)}$
20/08/2024	19:26 (Evening)	0.5m/s SE 16°	35	33	40	0.5	ESE	n/a	n/a	n/a	n/a	n/a	Insects 30-36 Traffic 32-36 Aircraft 30-42 Quarry Inaudible
Quarry Contribution													<40dB $LA_{eq(15min)}$

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 50m temperature.

Note 3: At operator position as per AS1055.

Table 7 NM5 - Attended Noise Monitoring Summary

Date & Period	Time (hrs)	1.5m WS WD Temp°C[3]	Descriptor		EPL Limits	Observed Meteorology							Description and SPL, dBA
			L_{Aeq}	L_{A90}	$L_{Aeq\ (15min)}$/ $L_{A1\ (1min)}$	WS (m/s)[1]	WD[1]	2m Temp°C	50m Temp°C	Delta Temp°C	Lapse Rate °C/100m[2]	Stability Class[1]	
23/08/2024	06:23 (Morning Shoulder)	0.5m/s S 12°	44	39	40/45	1.6	SSW	n/a	n/a	n/a	n/a	n/a	Birds 36-56 Traffic 36-39 Aircraft 38-44 Quarry Inaudible
Quarry Contribution													<40dB $L_{Aeq(15min)}$ <45dB $L_{A1(1min)}$
21/08/2024	09:10 (Day)	<0.5m/s SW 17°	42	34	40	0.6	W	n/a	n/a	n/a	n/a	n/a	Traffic 31-43 Birds 30-67 Aircraft 30-49 Quarry Inaudible
Quarry Contribution													<40dB $L_{Aeq(15min)}$
20/08/2024	19:46 (Evening)	0.5m/s SE 15°	36	32	40	0.5	ESE	n/a	n/a	n/a	n/a	n/a	Insects <30 Traffic 30-41 Aircraft 30-52 Quarry Inaudible
Quarry Contribution													<40dB $L_{Aeq(15min)}$

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 50m temperature.

Note 3: At operator position as per AS1055.

5 Discussion and Compliance Assessment

The compliance assessment summary for each monitoring location is presented in Table 8 for all assessment periods.

5.1 Discussion of Results - Location NM1

The noise monitoring survey identified that the acoustic environment at this location is dominated by road traffic noise from the Princes Highway, approximately 350m to the east. During the survey, quarry emissions were audible during the morning should period, inaudible during day and evening monitoring periods and quarry noise contributions were calculated (during short breaks in traffic) to be at or below the relevant noise criteria for all periods.

Quarry noise sources included rock processing noise, heavy vehicles movements and machinery reverse alarms. Extraneous sources audible during the survey included traffic, birds, aircraft, and other industrial noise.

5.2 Discussion of Results - Location NM2

The noise monitoring survey identified that the acoustic environment at this location is dominated by natural sounds such as insects and bird noise, and agricultural noise such as livestock. Occasional local traffic on Jamberoo Road, approximately 350m to the west was audible for short periods. During the survey, quarry noise emissions were inaudible, and quarry contributions were calculated to be below the relevant noise criteria for all periods.

5.3 Discussion of Results - Location NM3

Due to access restrictions at the NM3 location, measurements were conducted at the front fence line of the location approximately 300m to the west of the receiver. The noise monitoring survey identified that the acoustic environment at this location is dominated by natural sounds such as insects, and bird noise, and agricultural noise such as livestock. Traffic on Jamberoo Road, to the west was audible for short to medium periods. During the survey, quarry noise emissions were inaudible during all measurement periods. Quarry contributions were calculated to be below the relevant noise criteria for all periods.

5.4 Discussion of Results - Location NM4

The noise monitoring survey identified that the acoustic environment at these locations is dominated by natural sounds such as insects and bird noise, and agricultural noise such as livestock. Occasional distant traffic on the East-West Link Road, approximately 2km to the north was audible for short periods. During the survey, quarry noise emissions were inaudible, and quarry contributions were calculated to be below the relevant noise criteria for all periods.

5.5 Discussion of Results - Location NM5

The noise monitoring survey identified that the acoustic environment at these locations is dominated by natural sounds such as insects and bird noise, and agricultural noise such as livestock. Occasional distant traffic on the East-West Link Road, approximately 2km to the north was audible for short periods. During the survey, quarry noise emissions were inaudible, and quarry contributions were calculated to be below the relevant noise criteria for all periods.

Table 8 Noise Compliance Assessment Summary

Location	Estimated Quarry Noise Contribution[1]				Noise Limit[1]				Demonstrated Compliance			
	Day	Evening	Morning Shoulder		Day	Evening	Morning Shoulder		Day	Evening	Morning Shoulder	
			$LA_{eq(15min)}$	$LA_{1(1min)}$			$LA_{eq(15min)}$	$LA_{1(1min)}$			$LA_{eq(15min)}$	$LA_{1(1min)}$
NM1	<49	<44	<47	<55	49	44	47	55	Yes	Yes	Yes	Yes
NM2	<37	<37	<37	<45	37	37	37	45	Yes	Yes	Yes	Yes
NM3	<36	<36	<36	<45	36	36	36	45	Yes	Yes	Yes	Yes
NM4	<40	<40	<40	<45	40	40	40	45	Yes	Yes	Yes	Yes
NM5	<40	<40	<40	<45	40	40	40	45	Yes	Yes	Yes	Yes

Note 1: All levels are dBA.

This page has been intentionally left blank

7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of Boral Resources (NSW) Pty Ltd for Dunmore Quarry (the quarry), Tabbita Road, Dunmore, NSW.

Attended noise monitoring was undertaken between Tuesday 20 August 2024 and Friday 23 August 2024 at five representative monitoring locations. The assessment has identified that noise emissions generated by Dunmore Quarry were generally just audible throughout the morning shoulder period at NM1. The quarry was inaudible during all other remaining measurements. Quarry contributed noise emissions were below the relevant noise criteria at all locations during all measurement periods, thus satisfying the relevant noise limits.

This page has been intentionally left blank

Appendix A - Glossary of Terms

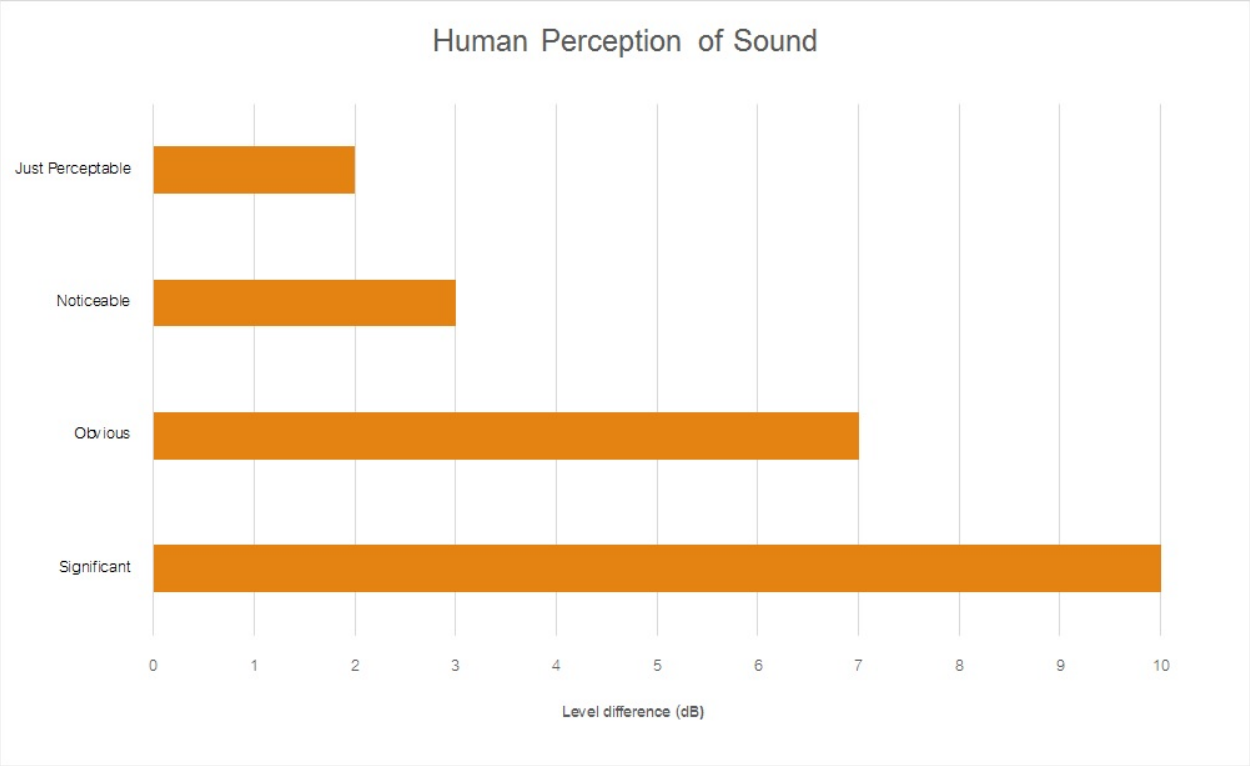
Table A1 provides a number of technical terms have been used in this report.

Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z), dB(L)	Decibels Linear or decibels Z-weighted.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAmax	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (LW)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by : = 10.log10 (W/Wo) Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts.

Table A2 provides a list of common noise sources and their typical sound level.

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA	
Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



Muller Acoustic Consulting Pty Ltd
PO Box 678, Kotara NSW 2289
ABN: 36 602 225 132
Ph: +61 2 4920 1833
www.mulleracoustic.com

MAC
Muller Acoustic Consulting

12. Appendix D Blast Monitoring Tables

Table 34 Benny Residence FY25 Compliance Blast Monitoring Results

Date	Time	Airblast Overpressure *dB(Lin Peak)*	100% Airblast Limit *dB(Lin Peak)*	95% Annual Airblast Limit *dB(Lin Peak)*	Ground Vibration *(mm/s)*	95% Annual Vibration Limit *(mm/s)*	100% Vibration Limit *(mm/s)*
02-Jul-24	9:35	103.5	120.0	115	0.05	5	10
18-Jul-24	13:38	107.1	120.0	115	0.08	5	10
12-Sep-24	13:55	110.7	120.0	115	0.20	5	10
30-Sep-24	12:14	102.9	120.0	115	0.13	5	10
22-Oct-24	13:43	No Trigger	120.0	115	No Trigger	5	10
12-Nov-24	12:37	88.0	120.0	115	No Trigger	5	10
09-Dec-24	12:35	No Trigger	120.0	115	No Trigger	5	10
15-Jan-25	12:19	No Trigger	120.0	115	No Trigger	5	10
31-Jan-25	14:06	No Trigger	120.0	115	No Trigger	5	10
03-Mar-25	14:01	No Trigger	120.0	115	No Trigger	5	10
07-Mar-25	11:47	No Trigger	120.0	115	No Trigger	5	10
12-Mar-25	12:51	No Trigger	120.0	115	No Trigger	5	10
03-Apr-25	11:13	94.6	120.0	115	0.39	5	10
16-Apr-25	14:59	96.6	120.0	115	0.29	5	10
21-May-25	16:07	108.7	120.0	115	0.95	5	10
11-Jun-25	14:17	No Trigger	120.0	115	No Trigger	5	10

13. Appendix E EMM Ground Water Monitoring

Annual Groundwater Monitoring Report 2024 - 2025

Dunmore Quarry

Prepared for Boral Resources (NSW) Pty Ltd

September 2025

Annual Groundwater Monitoring Report 2024 - 2025

Dunmore Quarry

Boral Resources (NSW) Pty Ltd

E250630 RP1

September 2025

Version	Date	Prepared by	Reviewed by	Comments
1	9 September 2025	Q Bui E Carroll	J Tait	Final

Approved by

Jonathon Tait
Associate Hydrogeologist
9 September 2025

Level 10 201 Pacific Highway
St Leonards NSW 2065
ABN: 28 141 736 558

This report has been prepared in accordance with the brief provided by Boral Resources (NSW) Pty Ltd and, in its preparation, EMM has relied upon the information collected at the times and under the conditions specified in this report. All findings, conclusions or recommendations contained in this report are based on those aforementioned circumstances. The contents of this report are private and confidential. This report is only for Boral Resources (NSW) Pty Ltd's use in accordance with its agreement with EMM and is not to be relied on by or made available to any other party without EMM's prior written consent. Except as permitted by the Copyright Act 1968 (Cth) and only to the extent incapable of exclusion, any other use (including use or reproduction of this report for resale or other commercial purposes) is prohibited without EMM's prior written consent. Except where expressly agreed to by EMM in writing, and to the extent permitted by law, EMM will have no liability (and assumes no duty of care) to any person in relation to this document, other than to Boral Resources (NSW) Pty Ltd (and subject to the terms of EMM's agreement with Boral Resources (NSW) Pty Ltd).

© EMM Consulting Pty Ltd, Level 10 201 Pacific Highway, St Leonards NSW 2065. 2025.
ABN: 28 141 736 558

TABLE OF CONTENTS

Appendices

Tables

Figures

1 Introduction

Boral Resources (NSW) Pty Ltd (Boral) owns and operates the Dunmore Hard Rock Quarry (the quarry) at the end of Tabbita Road. The quarry is approximately 8 kilometres (km) north-west of Kiama (Figure 1.1), in the Shellharbour local government area. The quarry supplies construction hard rock materials to markets in the Illawarra, Southern Highlands and Sydney regions. Quarry operations, comprising hard rock extraction from the Bumbo Latite commenced in the early 20th century.

EMM Consulting Pty Limited (EMM) were engaged by Boral to complete groundwater monitoring for the quarry, supporting Boral's own internal groundwater monitoring activities. Routine groundwater monitoring is completed to detect any potential impacts to groundwater resources from quarry operations.

This annual groundwater monitoring report has been prepared as per the Dunmore Hard Rock Quarry Water Management Plan (WMP) (EMM 2024) in compliance with condition 43 (c) of the quarry's approved Development Consent (DA 470-11-2003). The groundwater monitoring program (GPM) is required to monitor regional groundwater levels and quality, groundwater impact assessment criteria, and groundwater inflows for the monitoring period (1 July 2024 to 30 June 2025).

1.1 Site operations

The quarry comprises one elongated open cut pit with an approved disturbance area of approximately 100 hectares (ha) (Figure 1.1). The extraction area contains four pits; the Original Dunmore Quarry, Croome Farm Pit, Croome West Pit and Rail Infrastructure Corporation (RIC) Pit. Site infrastructure includes a crushing and screening plant, product stockpiles, workshop and site offices located to the east of the pit. East of the pit is the processing plant, the Dunmore concrete batching plant (CBP), and the Dunmore sand and soil quarry (DSS quarry). The blending plant is located between the processing plant and CBP. Currently, all production is from the RIC Pit.

Water management at the quarry comprises of a series of dams to control surface water runoff. Captured runoff is directed into dedicated water management dams for storage and subsequent treatment. Stored water is utilised for site operations such as dust suppression. Excess water within the excavated quarry pits is pumped to the Middle Dam, which has a holding capacity of 120 to 150 megalitres (ML) (EMM 2020).

1.2 Approvals history

The quarry is currently under Development Consent DA 470-11-2003. In 2017, approval was granted to expand extractive activities within the Croome West Pit. Due to a lower than expected resource volume, a modification was proposed to extend the life of the quarry and maintain operations. The proposed modification (MOD 13) to the Development Consent includes:

- increasing the approved extraction area by approximately 7.8 ha – the RIC Pit extension
- increasing the depth of approved extraction area
- increasing the approved period for quarry operations from 2034 to 2043.

Additionally, a revised (version 6) Water Management Plan (WMP) was issued in September 2024, detailing additional requirements relevant to groundwater management. These requirements include the proponent's responsibility to monitor the private landholder bore GW026848 if access permission could be gained by Boral.

1.3 Scope of works

The monitoring program includes analysis and interpretation of groundwater quality and level data from the groundwater monitoring network. The monitoring network consists of eight groundwater monitoring bores. Four monitoring bores (GW1–GW4) installed up gradient within the Bumbo Latite, three installed down gradient within alluvium (DG-12, DG-21, DG-37) and one private landholder bore GW026848.

The scope of works as defined in the WMP are to:

- complete a six-monthly groundwater sampling events at the Bumbo Latite monitoring bores monitoring bores
- analyse and interpret groundwater level and water quality data collected.

This report also includes a review of the current monitoring network design and provides any recommendations for ongoing monitoring.

1.4 Monitoring network changes

- The level logger and baro logger at GW2 was faulty and was replaced during the August 2025 monitoring event.
- The analytical suite has been updated to reflect the changes in the revised WMP.

KEY

- Dunmore Quarry site boundary
- Approved extraction area
- Croome West pit extension
- Rail line
- Main road
- Local road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Cadastral boundary
- Croome West monitoring bore

Dunmore Sand and Soil monitoring bores

- Active
- Decomissioned

Source: EMM (2020); Nearmap (2020); DFSI (2017); GA (2011); ASGC (2006)

0 250 500 m

GDA 1994 MGA Zone 56

N

\\emmsvr1\EMM\Jobs\2017\117314 - Boral Quarry Dunmore groundwater monitoring\GIS\Maps\G001_MonitoringBores_20220720_03.mxd 20/07/2022

Site location and monitoring bores

Boral Dunmore Quarry
Annual groundwater monitoring report
Figure 1.1

EMM
creating opportunities

2 Environmental setting

2.1 Site setting

The project area (Figure 1.1) is surrounded by small agricultural plots, with cattle and horse grazing, and rural residential properties. Historically the area has been used for dairy farming. Remnant native vegetation lines the top of the prominent ridge line and persists in isolated pockets in the lower lying areas.

The quarry is set on a north south-west trending range. The peak is named Locking Hill and is partially incised by the existing pit. The ridge extends along the current western quarry highwall and has an elevation of approximately 164 metres Australian Height Datum (mAHD). The elevation of the south-east processing area is 10 mAHD. The DSS quarry and the CBP are east of the quarry. Quaternary alluvial sediments associated with the Minnamurra River system are extracted and processed at the DSS quarry.

Other quarries are located near the project. Approximately 1.5 km to the north is the Cleary Bros Bombo Pty Ltd (Cleary Bros) Albion Park Quarry. The Cleary Bros quarry is approved to produce 900,000 tonnes per annum and has extracted and processed hard rock from the Bumbo Latite since the 1950s (MMJ 2013). Holcim Australia Pty Ltd (Holcim) operates the Readymix Albion Park Quarry immediately west of the Cleary Bros Albion Park Quarry. This quarry also extracts a hard rock resource from the Bumbo Latite.

2.2 Climate

The project area is part of the Illawarra region, which is characterised by a mild and temperate climate described as warm and humid. Rainfall and climate data was downloaded from the SILO Long Paddock database for Albion Park weather station (Bureau of Meteorology (BoM): 068241), which is situated approximately 10 km north of the quarry. Rainfall data has been collected at this monitoring station since 1999.

Evaporation data at this site has been interpolated by SILO from nearby weather stations.

The average annual rainfall is 1,015.9 millimetres (mm) (BoM 068241) with the most significant rainfall events generally experienced in February and March and the lowest rainfall in August and September.

The average annual evaporation is 1,456.6 mm (BoM 068241) which exceeds average annual rainfall. Evaporation follows a seasonal trend with the highest rates of evaporation occurring between October to February.

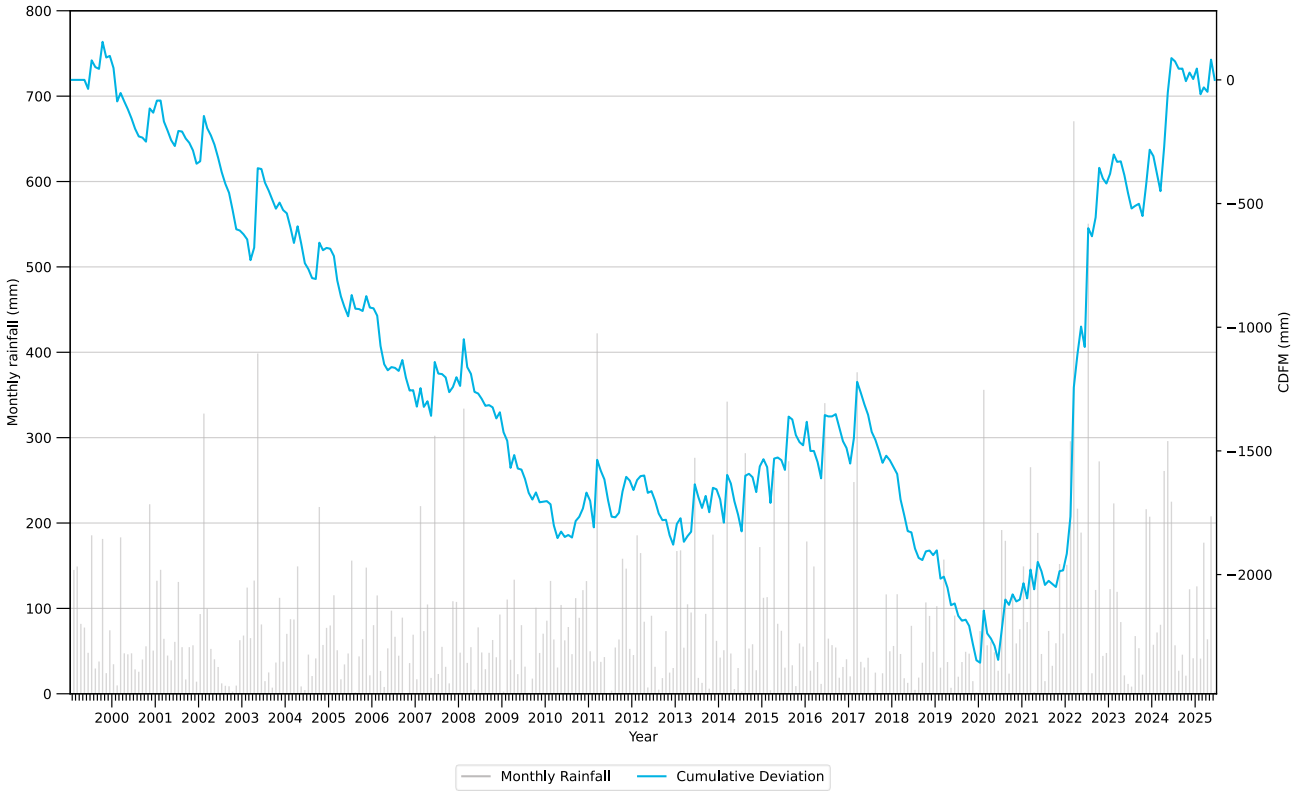
The cumulative deviation of monthly rainfall from the mean (CDFM) from 1999 to mid-2025 is presented in Figure 2.1. The long-term CDFM is generated by subtracting the long-term average monthly rainfall for the recorded period from the actual monthly rainfall and then accumulating these residuals over the assessment period. Periods of below average rainfall are represented by downward trending slopes while periods of above average rainfall are upward trending slopes.

The cumulative deviation plot for Albion Park shows a period of predominantly below average or average rainfall from 1999 until 2010, followed by a period of above average rainfall to 2017. Between 2017 and 2020, rainfall was generally below average. From July 2020 to the current reporting period (June 2025) rainfall has been above the long-term average.

The monthly rainfall over the 2024 to 2025 monitoring period is presented in Figure 2.2. During the reporting period 933.0 mm of average annual rainfall was recorded, compared to the annual average of 1,015.9 mm.

Monthly rainfall was generally average to below average in the first half of the reporting period, except for November 2024 which exceeded the long-term average by approximately 40%. In the second half of the reporting period, there was significant rainfall variation with May 2025 recording above average rainfall (207.8 mm compared to an average of 77.6 mm), and June 2025 recording an unseasonally low rainfall (2.6 mm compared to an average of 84.5 mm).

It is noted that above average rainfalls were recorded for July and August 2025 (175.8 and 267.4 mm respectively) and over 156 mm of rainfall was recorded seven days prior to the monitoring event.



Source: Data sourced from SILO at BoM station 068241 (Albion Park – Shellharbour Airport)

Figure 2.1 Cumulative deviation from long-term monthly mean rainfall

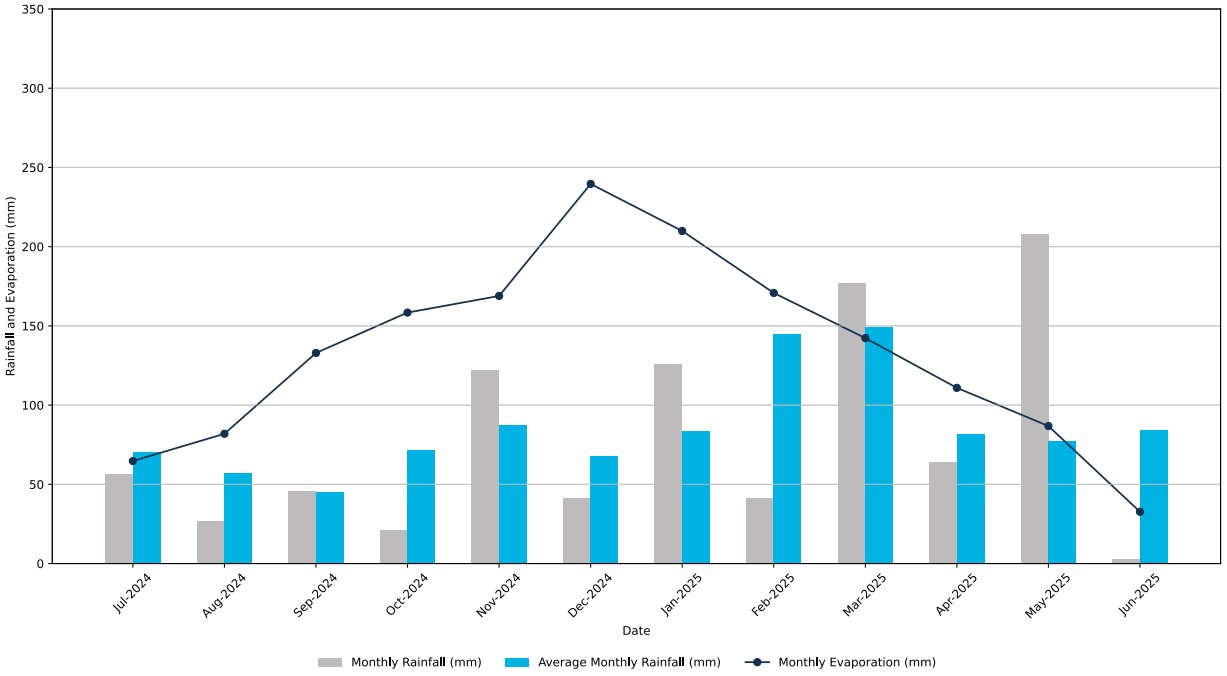


Figure 2.2 Monthly rainfall for July 2024 to June 2025 compared to average

2.3 Surface water

The quarry is located within the Rocklow Creek catchment area, which forms part of the Minnamurra River Catchment. Rocklow Creek is located to the south of the quarry, flowing to the east and draining to the Minnamurra River. The Minnamurra River discharges into the Pacific Ocean approximately 8 km south-east of the project area.

The Rocklow Creek catchment has an area of 21 km^2 and originates in the Illawarra Range, approximately 3 km west of the project area (Arcadis 2016). All clean water runoff from the project area flows into Rocklow Creek. Boral have a current surface water access licence (WAL 25152) to extract up to 227 ML per year of water from Rocklow Creek.

To the north of the project area is the Frasers Creek catchment area which drains to Lake Illawarra. Frasers Creek is an ephemeral system and forms disconnected pools during dry periods.

2.4 Geology

The project area is situated in the south-eastern corner of the Permo-Triassic Sydney Basin. The Sydney Basin predominantly comprises Permian and Triassic aged sedimentary rocks. Near the quarry, the Triassic and Late Permian sedimentary rocks have been eroded exposing the older early Permian aged Gerringong Volcanics of the Shoalhaven Group (Geology of the Wollongong, Kiama and Robertson 1:50,000 Sheet, Department of Mines 1974). The surface geology across the project area is presented on Figure 2.3.

Volcanic activity in the area has produced a series of flat lying lava flows interspersed with volcaniclastic sandstone members and breccias. The thickness of each successive flow decreases with distance from the volcanic origin, assumed to be off the current coastline to the south (Cohen 2006). At the quarry all geological units exhibit a gentle dip in an easterly direction (Evans and Peck 2006; MMJ 2013).

The Gerringong Volcanics facies comprise nine latite members and three volcanic sandstones or tuff members. The Gerringong Volcanics were deposited in a shallow marine environment, which was then uplifted above sea level. The area has since been eroded via river action to form the present landscape (Cohen 2006).

The Bumbo Latite is the areas greatest and most persistent lava flow and is the predominant geological unit at the quarry and has a maximum thickness of 150 metres (m). The Bumbo Latite Member is divided into three flows: upper, middle, and lower. The Bumbo Latite is a grey to dark grey, very hard dense rock with light coloured phenocrysts of feldspar (Cohen 2006). Weathered latite is generally softer with a brownish, yellow colour. The latite can be jointed and fractured, with the dominant jointing close to vertical, however jointing is not widespread (MMJ 2013). The Bumbo Latite Member overlies the Kiama Sandstone Member which outcrops to the west of the quarry.

A breccia layer was deposited between the middle and lower Bumbo Latite Member flows. This breccia layer, also comprising volcanic material, ranges in thickness between 5 to 22 m (Cohen 2006). It comprises a softer layer of fragmental, angular materials cemented in a fine grained matrix (Department of Mines 1974).

Further east, the low-lying floodplain area is dominated by Quaternary Alluvium, deposited during flooding events associated with the Minnamurra River and its tributaries. This alluvium comprises unconsolidated to loosely consolidated gravels, sands, silts and clays.

2.5 Hydrogeology

2.5.1 Overview

The regional groundwater system, within the Kiama Sandstone aquifer, flows south-east, controlled by the dip of the strata and topography (Cohen 2006). Recharge to the Kiama Sandstone is by rainfall where it outcrops and subcrops and by leakage from overlying sedimentary units to the west of the project area. The Kiama Sandstone aquifer discharges to the Pacific Ocean (Cohen 2006).

Local groundwater systems are present within the Bumbo Latite along the elevated ridgeline (Walker *et al* 2003). These systems are isolated and have limited connection to the regional flow system. The Bumbo Latite is characterised as 'tight' with a low primary and low to moderate secondary porosity (Cohen 2006) controlling groundwater flow. Groundwater flow within the Bumbo Latite is minimal, predominantly occurring along fractures and at contacts between volcanic rock and the underlying sandstone (MMJ 2013).

The local groundwater systems are recharged by rainfall with infiltration higher in areas where the Bumbo Latite outcrops on the ridgelines and hilltops of the landscape (i.e. areas with limited soil profile). Discharge from the local groundwater system occurs in the valleys and includes ephemeral springs.

There is no history of dewatering at the quarry and there is no visual evidence of groundwater seepages to the Croome Farm Pit with the rockface remaining dry throughout the year (Arcadis 2016). Cohen (2006) and Clearly Bros (2019) reports that there is no active mine dewatering at the two Albion Park quarries which also intersect the Bumbo Latite.

Information from Boral suggests that the breccia layer is partially saturated and more permeable than the surrounding Bumbo Latite. Breccia generally exhibits a variable porosity with areas of higher permeability common however they are generally limited in their extent.

The Quaternary alluvial sediments associated with the surface water courses form unconfined groundwater systems of varying storage. These systems are recharged by leakage from surface water courses during wet periods. The alluvial systems are depleted during dry periods and are not recharged by underlying porous and fractured rocks (Cohen 2006).

2.5.2 Conceptual hydrogeological model

i Groundwater flows

Groundwater within the Bumbo Latite flows from areas of high relief towards the valleys and low-lying plains where it discharges to the alluvium and surface watercourses. The bulk rock mass has a low primary permeability with groundwater flow occurring primarily through fractures and along the contacts between the latite flows and breccia. Hydraulic testing results indicate an average hydraulic conductivity of $5.5x10^{-7}$ metres per day (m/day) (EMM 2014) which is comparable to the reported hydraulic conductivity in fractured igneous rocks: $8x10^{-9}$ to $3x10^{-4}$ m/day (Domenico & Schwartz 1990).

In the vicinity of the quarry, groundwater flow is generally towards the south-east, discharging to Rocklow Creek and the Minnamurra estuary system. To the north of the quarry the landscape gives way to steep valleys that shed surface water and provide limited potential for groundwater recharge.

The deep groundwater system associated with the Kiama Sandstone typically flow along bedding planes towards the east and are coincident with the dip of the strata.

ii Recharge and discharge

The local groundwater systems within the Bumbo Latite are recharged by rainfall with infiltration in higher areas where the Bumbo Latite outcrops on the ridgelines and hilltops of the landscape (i.e. areas with limited soil profile).

The regional groundwater system is recharged by infiltration from overlying sedimentary units west of the project area and losses from surface watercourses. The steep relief increases runoff with a smaller percentage of rainfall infiltration in this steeper terrain.

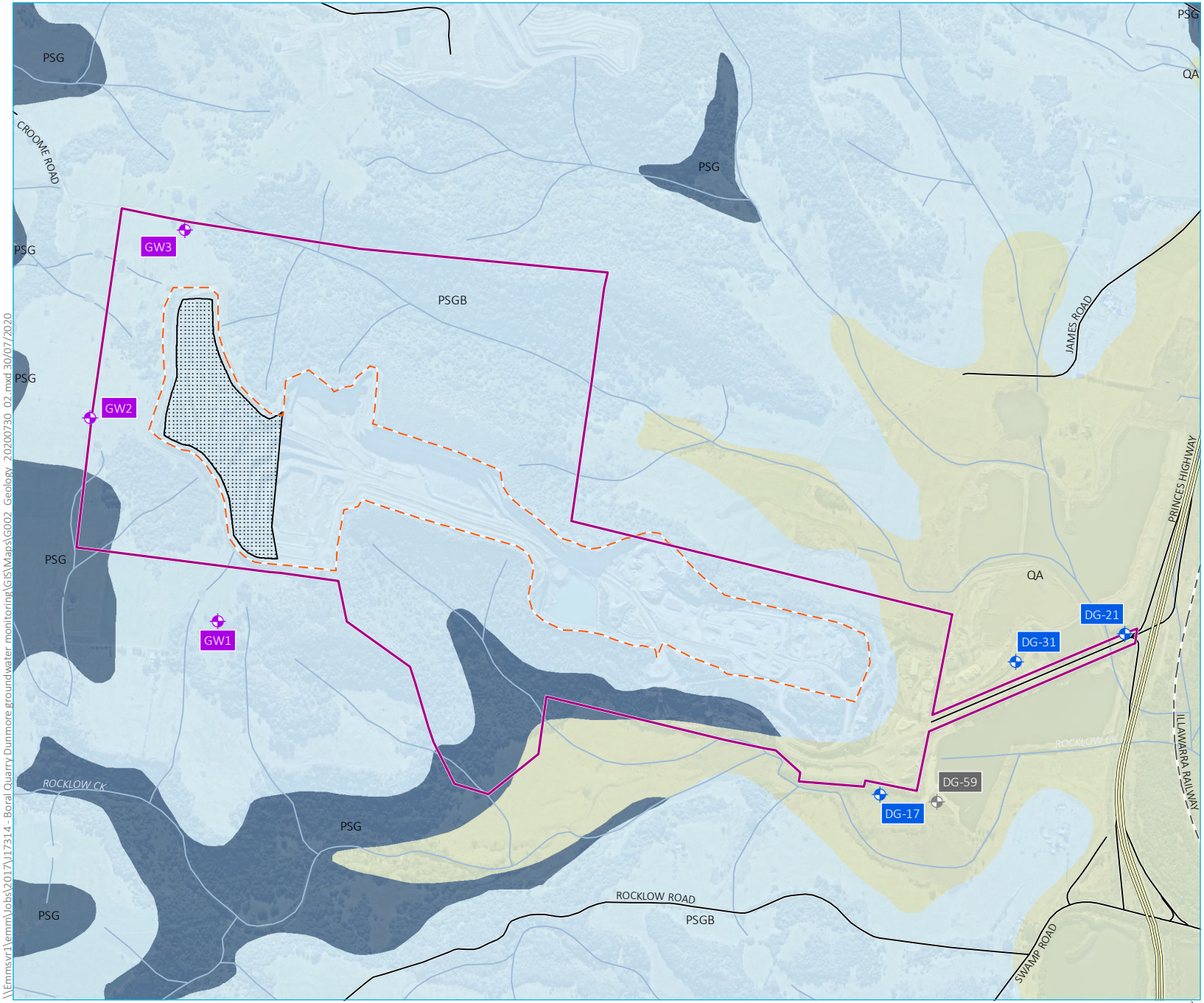
Groundwater from the shallow latite is largely thought to discharge to the Minnamurra River and Rocklow Creek, which form the main drainage systems in the vicinity of the quarry.

iii Groundwater-surface water connection

The surface watercourses in the elevated parts of the landscape are ephemeral in nature with the upper reaches drying out during periods of low rainfall. This ephemeral nature indicates that the surface watercourses are losing streams and are not fed by the underlying fractured rock groundwater systems.

The surface water systems to the east of the quarry in the lower parts of the landscape (Illawarra River, Minnamurra River and Rocklow Creek) are connected to shallow, marginal groundwater systems within surficial alluvial systems. Direct rainfall and surface water runoff recharges these shallow systems during wet periods which rapidly deplete during the drier periods, providing an important temporary source of baseflow for the surface watercourses.

Although groundwater within the shallow Bumbo Latite flows through to the alluvium in the east, the volume of this flux is likely to be insignificant in comparison to the recharge from the overlying rivers, restricted by the groundwater flow properties of the 'tight' rock matrix.



KEY

- Dunmore Quarry site boundary
- Approved extraction area
- Croome West pit extension
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Croome West monitoring bore

Dunmore Sand and Soil monitoring bores

- Active
- Decomissioned

Lithology

- Quaternary Alluvium (Qa)
- Shoalhaven Group, Bumbo Latite (Psgb)
- Shoalhaven Group, undifferentiated siltstone (Psg)

Source: EMM (2020); Nearmap (2020); DFSI (2017); DPE (1996)

\\Emmsvr1\emm\Jobs\2017\17314 - Boral Quarry Dunmore groundwater monitoring\GIS\Maps\G002_Geology_20200730_02.mxd 30/07/2020

Surface geology

Boral Dunmore Quarry
Annual groundwater monitoring report
Figure 2.3

EMM
creating opportunities

3 Groundwater monitoring program

3.1 Monitoring network design

The groundwater monitoring network has been designed to satisfy the requirements of Condition 40, Schedule 4 of the approved Development Consent. Four groundwater monitoring bores are installed into the fractured rock outside the quarry area, with a further three bores are installed into the alluvium outside the DSS dredge pond (refer Figure 1.1 and Table 3.1). One private bore (GW026848) is also part of the monitoring network. In summary:

- GW4 was installed in February 2022 as part of the proposed northern extension into the RIC area. GW4 is screened across the base of the latite and up gradient of current quarrying activities
- three deep monitoring bores (GW1, GW2 and GW3) targeting the Bumbo Latite (EMM 2014), were installed in July 2014. GW1 is screened across latite and the top of the underlying sandstone, GW2 is screened across latite, and GW3 is screened across latite and breccia. These bores are located up hydraulic gradient from current quarrying activities
- DSS installed and monitor bores as part of their operations. Three shallow monitoring bores (DG-17, DG-31 and DG-21) are screened in the alluvium overlying the regional fractured rock groundwater system
- DG-59, which was part of the 2018/2019 monitoring program, was demolished in August 2019 due to further expansion of the DSS dredge pond. DG-21 has been added to the network as a replacement to DG-59
- GW026848, a private landholder bore approved for stock use located approximately 1 km west of the quarry. Access permission has not been granted at this bore.

Table 3.1 Groundwater monitoring bore construction details

Bore ID	Easting MGA z55	Northing MGA z55	Ground level (mAHD)[2]	Total depth (mbgl)[1]	Screened interval (mbgl)[1]	Screened formation	Monitoring duration
GW1	298931	6168274	131.44	78.0	72.0–78.0	Bumbo Latite and Kiama Sandstone	July 2014 - present
GW2	298541	6168894	135.69	86.0	79.0–85.0	Bumbo Latite	July 2014 - present
GW3	298830	6169468	147.25	80.0	68.0–80.0	Bumbo Latite and Breccia	July 2014 - present
GW4	300040	6168808	57	29.0	20–26	Bumbo Latite	February 2022 - present
DG-17	300950	6167746	3.49	6.0	2.8–6.0	Alluvium	November 2018 - present
DG-21	301698	6168235	2.12	5.0	2.0–5.0	Alluvium	November 2018 - present
DG-31S	301366	6168150	3.05	5.5	2.5–5.5	Alluvium	May 2016 - present
GW026848	297884	6168941	Unk	Unk	Unk	Unk	NA

Bore ID	Easting MGA z55	Northing MGA z55	Ground level (mAHD)[2]	Total depth (mbgl)[1]	Screened interval (mbgl)[1]	Screened formation	Monitoring duration
BH-F (decommissioned)	-	-	2.23	5.2	2.1–5.2	Alluvium	July 2014 - March 2018
DG-59 (decommissioned)	301126	6167722	1.763	8.69	unknown	Alluvium	February 2017 - August 2019

Notes: 1. mbgl = metres below ground level; 2. mAHD = metre Australian Height Datum

3.2 Groundwater monitoring overview

The objectives of the groundwater monitoring plan are to:

- validate groundwater level modelling predictions
- monitor groundwater quality to inform the assessment of the quarry's surface water management system.

The WMP (EMM 2024) states that due to the minor groundwater inflow expected to enter the quarry pit, no formal monitoring of groundwater inflow is proposed.

A groundwater monitoring event was not completed in December 2024. However, groundwater monitoring is not required by any compliance consent or licence conditions. The six-monthly groundwater monitoring event in December 2024 that was missed due to a communication error The August 2025 monitoring event, although outside of the reporting period, will be incorporated into this report. Monitoring status is summarised in Table 3.2.

Table 3.2 Groundwater monitoring overview

Monitoring bores	Monitoring frequency	Monitored by	Reporting period comments
GW1 GW2 GW3 GW4	• Manual water level measurements and logger download to occur six monthly • Water quality sampled six monthly	EMM	• Six-monthly monitoring event in December 2024 was not completed due to a communication error • GW4 was part of the Boral monthly and quarterly monitoring program • Barometer and logger at GW2 was replaced by EMM
DG-17 DG-21 DG-31S	• Manual water level measurements and in-situ field parameters to occur monthly • Water quality sampled quarterly	Boral	• Monthly groundwater level measurements were conducted by Boral
GW026848	• Manual water level measurements to occur six monthly if permitted	-	• The bore was not accessed during the reporting period due to access permissions

3.3 Sampling methodology

Physicochemical parameters (pH, electrical conductivity (EC), temperature, oxygen (DO) and oxidation reduction potential (ORP)) were measured for the sampled water using a calibrated hand-held water quality meter. The Bumbo Latite monitoring bores (GW1-4) were purged with a decontaminated stainless steel double-check bailer until field parameters stablised within ±10% for EC and ±0.1 for pH. The sample was taken from within the screened interval of the monitoring bore.

Where field measurements of total dissolved solids (TDS) were not available, TDS has been calculated based upon the EC correlation, assuming a conversion factor (k) of 0.8 due to the higher CaCO3 concentration.

Groundwater quality data for DG-17, DG-21 and DG-31S was collected by Boral.

3.4 Chemical analysis

Water quality samples for GW1-4 were analysed for a general chemical suite. The suite allows groundwater systems to be differentiated by chemical signatures. The analytical suite has been updated as per the revised WMP (EMM 2024) with analytes that were consistently below the detection limits no longer monitored. The analytical suite is provided in Table 3.3.

Table 3.3 Water quality suite of analysis

Grouping	Parameter
Physicochemical parameters (field)	EC, pH, DO, Temperature, ORP, TDS
Major ions	Calcium, Magnesium, Sodium, Potassium, Chloride, Total hardness, Sulphate
Dissolved metals	Arsenic[1], Boron[1], Chromium[1], Copper[1], Iron, Nickel[1], Zinc[1]
Nutrients	Ammonia, Nitrate, Nitrite, Organic nitrogen[1], Total nitrogen, Reactive[1] and Total phosphorus

Note: 1. Not analysed in the shallow monitoring bores (DG-17, DG-31 and DG-21). These bores are monitored under a different program

The samples collected were analysed by Australian Laboratory Services Limited (ALS). All laboratories used for analysis are NATA accredited. All samples were collected in bottles provided by the laboratory, with appropriate preservation where required. Samples undergoing dissolved metal analysis were field filtered using 0.45 micron (µm) filters.

3.4.1 Quality assurance and quality control (QA/QC)

Field sampling procedures conformed to EMM's QA/QC protocols to prevent cross-contamination and preserve sample integrity. The following QA/QC procedures were applied:

- Samples were collected in clearly labelled bottles with appropriate preservation solutions.
- Samples were delivered to the laboratories within the specified holding times.
- Unstable parameters were analysed in the field (physiochemical parameters).

3.4.2 Laboratory QA/QC

The laboratories conduct their own internal QA/QC program to assess the repeatability of the analytical procedures and instrument accuracy. These programs include analysis of laboratory sample duplicates, spike samples, certified reference standards, surrogate standards/spikes and laboratory blanks. In addition, a duplicate sample is collected in the field for every ten samples collected to assess sampling and laboratory analysis accuracy. A duplicate sample at GW1 was taken during the August 2025 monitoring round.

3.5 Groundwater levels

Following completion of GW1, GW2, GW3 and GW4, pressure transducers (level loggers) were installed to record a groundwater level every six hours. During monitoring events, groundwater levels were also gauged using an electronic dip meter.

Level loggers were installed by Environmental Earth Sciences (EES) in monitoring bores DG-17, DG-21 and DG-31S. These level loggers were programmed to record water levels every hour. Groundwater level data for these alluvial bores was supplied to EMM by Boral.

3.5.1 Trigger Levels

Site specific trigger values (SSTVs) were developed in the WMP (EMM 2024) to capture any groundwater level changes that exceed those predicted in the *Groundwater Assessment Dunmore Hard Rock Quarry Modification 13* (EMM 2022). The SSTVs were developed based on predicted drawdown impacts and a statistical analysis of baseline data and presented in Table 3.4.

The SSTV is determined by the following calculation:

SSTV = mean groundwater level – (natural variability + predicted drawdown)

Where:

Natural variability = (standard deviation from mean x 2) x 120%

Baseline data is not yet available for GW026848 due to access permissions.

Table 3.4 Groundwater site-specific trigger values

Bore ID	Mean groundwater level (m AHD)	Standard deviation from mean (m)	Natural variability (m)	Predicted drawdown (m)[1]	SSTV (m AHD)
GW1	105.2[2]	3.5	8.4	22	74.8
GW2	128.3[2]	0.4	1.0	21	106.3
GW3	104.4[2]	0.4	1.0	14	89.4
GW4	53.8[3]	1.9	4.6	9	40.2
GW026848	-	-	-	5	More than 2 m drawdown observed

1. Predicted drawdown obtained from *Groundwater Assessment Dunmore Hard Rock Quarry Modification 13* (EMM 2022)
2. Calculated using baseline data from 2015 to 2018
3. Calculated using baseline data from 2022 to 2024

4 Groundwater levels

Hydrographs showing groundwater levels and rainfall from the start of monitoring until 30 June 2025 are presented in Figure 4.1 and Figure 4.2 for the alluvium and latite bores respectively. Individual hydrographs for the latite monitoring bores are included in Appendix A.

During the 2020/2021 monitoring period, GW1 and GW2 level loggers malfunctioned from December 2020 and June 2020, respectively. Level loggers were replaced in June 2021. The manual groundwater level measurements confirmed no significant changes to long-term groundwater levels at GW1 or GW2.

Since 2024, the level logger data recorded at GW2 have not matched manual dips. The logger data is erroneous and is experience significant logger drift and not representative of actual water levels. The malfunctioning logger along with a faulty barometric logger was replaced in the August 2025 monitoring event.

Since January 2024, the manual dips recorded at DG-17 do not align with level logger data. The logger data is generally consistent with CRD and rainfall distribution. This will require further investigation to determine the cause of the discrepancy.

4.1 Alluvium

Groundwater level trends in the alluvium (DG-31S and DG-21) are comparable to the previous monitoring period (Figure 4.1). These shallow alluvial monitoring bores shows a direct and immediate response to rainfall events with DG-21 and DG-31 showing the most pronounced responses. The highest groundwater level increase was observed at DG-31S (approximately 1.3 m). During the reporting period, the water levels fluctuated corresponding to the prevailing rainfall conditions and were within historical observations.

Manual dip data at DG-17 displays large variability across the period, a likely response of rainfall variability across the period (drier periods, followed by intense rain events).

4.2 Bumbo Latite

During the reporting period, there were no observable groundwater impacts in the fractured rock monitoring bores from quarrying activities.

Groundwater elevations in the latite monitoring bores at GW1, GW2 and GW3 ranged between 100 and 127 mAHD (Figure 4.2). Groundwater elevations at GW4, which is located down hydraulic gradient and screened at the base of the latite, ranged between 54 and 56 mAHD.

The groundwater levels in monitoring bores GW2, GW3 and GW4 show a more muted response to rainfall recharge compared to GW1. The groundwater level at GW1 has historically responded to recharge during periods of above average rainfall with correlation to the CDFM. GW1 is partially screened within the Kiama Sandstone member which responds well to recharge via rainfall and leakage from overlying sedimentary units. GW2, GW3 and GW4 are screened in the Bumbo Latite member has a more muted response to recharge due the steep valley slopes limiting recharge and the latite member which has limited connectivity to the regional system.

A summary of the groundwater levels during the monitoring period are as follows:

- GW1 recorded a water level decline between July 2024 and March 2025 (about 13 m) corresponding to a period of below average monthly rainfall. The groundwater level recorded a low of 100.2 mAHD in late March 2025 which was still within the SSTVs. Groundwater levels recovered (approximately 13 m) during the wetter conditions from April 2025 onwards.

- GW2 groundwater level declines observed in the logger data does not align with the manual measurement. Manual measurements show the groundwater level is stable and within the SSTVs. The logger was replaced in August 2025.

- GW3 groundwater levels are stable and within the SSTVs. A subdued trend corresponding to prevailing rainfall conditions was observed.
- GW4 groundwater levels are generally stable and recorded a slight upward trend towards the end of the reporting period, aligning with prevailing rainfall conditions. Groundwater levels are within the SSTVs. The periodic drawdown at GW4 is a result of purging prior to groundwater quality sampling by Boral and is not representative of natural groundwater conditions.

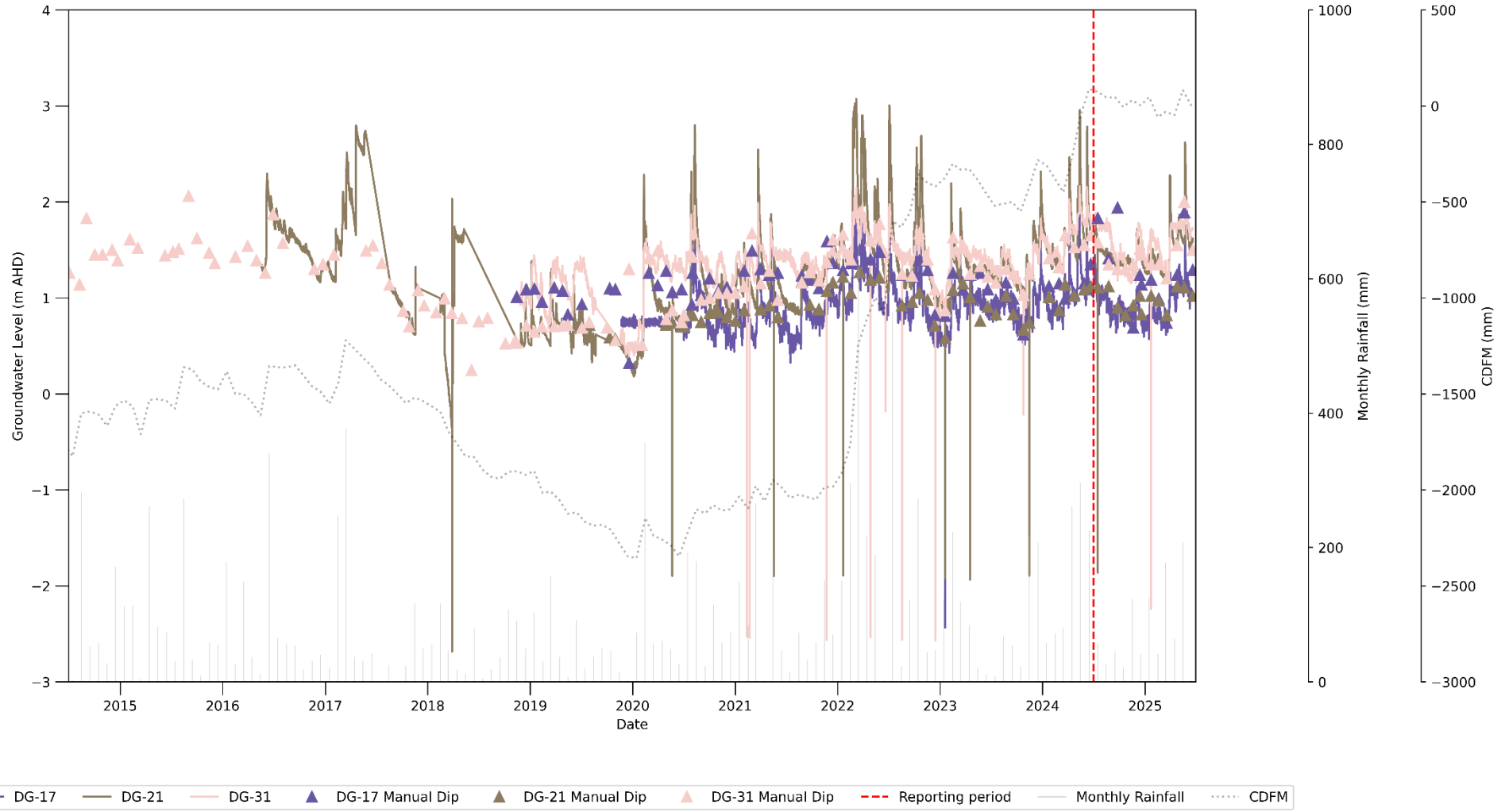


Figure 4.1 **Groundwater levels in the alluvium**

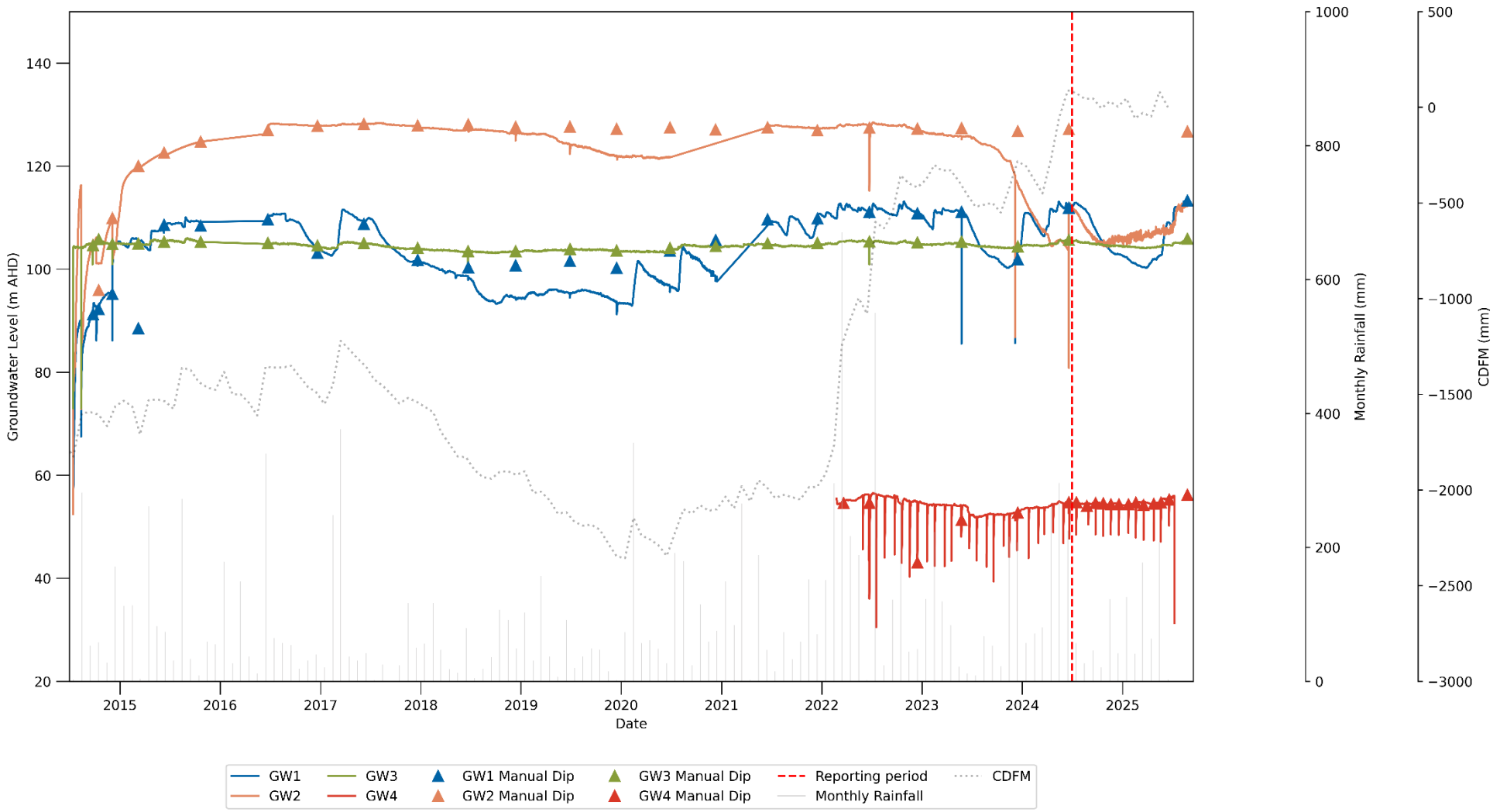


Figure 4.2 **Groundwater levels in the Bumbo Latite**

5 Groundwater quality

Water quality results for the reporting period are summarised below. The full water quality results for the monitoring sites are presented in Appendix B, with laboratory quality control reports provided in Appendix C. The water quality timeseries for metals for the monitoring bores (GW1 to GW4) are presented in Appendix D. Field parameters at DG-17, DG-21, DG-31, and GW4 were collected monthly by Boral between July 2024 to June 2025.

5.1 Field parameters

Groundwater Electrical conductivity (EC) and pH in the alluvium at DG-17, DG-21, DG-31 were overall comparable to previous monitoring year. Groundwater Electrical conductivity (EC) from the Bumbo latite bores, GW1 to GW4, was significantly lower compared to previous year, while pH was comparable. Time series of field EC and pH are presented in Figure 5.1 and Figure 5.2. The mean groundwater EC and pH for the monitoring period is summarised in Table 5.1.

Table 5.1 Mean measured field parameters for monitoring period

Bore	Mean electrical conductivity (µS/cm) 2023/24	Mean electrical conductivity (µS/cm) 2024/25	Mean pH (pH units) 2023/24	Mean pH (pH units) 2024/25
GW1	1,179	820	7.08	7.43
GW2	1,269	62	7.67	7.72
GW3	615	354	6.75	7.21
GW4	1,000	890	7.32	7.41
DG-17	2,076	1,546	7.03	7.48
DG-21	1,078	783	6.53	6.90
DG-31	625	720	6.89	7.06

Note: Concentrations at GW1, GW2 and GW3 are single values recorded on 25 August 2025

For the Bumbo Latite bores, during the reporting period EC measured a significant decrease compared to historical values. Further monitoring is required to confirm if this is a single temporary occurrence attributed to the significant rainfall (156 mm) that fell in the seven days prior to the monitoring event or a faulty water quality meter. The pH at the latite bores ranges between slightly acidic to slightly alkaline during the monitoring period and shows a slight increase compared to the previous reporting period.

EC in the alluvium shows a large range and high variability during the 2024/2025 monitoring period. The high salinity at these bores can be attributed to their proximity to the tidally influenced Rocklow creek. At DG-17 low EC (223 to 283 µS/cm) was recorded between August to November 2024. Similarly, low EC (112 to 119 µS/cm) at DG-21 was recorded between September and October 2024. These decreases in EC may be attributed discharges and seepages from onsite storage dams through the breccia from the significantly above average rainfall period between April to June 2024. The pH in the alluvium was slightly acidic during the monitoring period, in line with historical trends. There was a spike of higher pH (more alkaline) across all three alluvial bores in March 2025, however this is more likely a result water quality metre inaccuracy. The March 2025 pH values at DG-17 and DG-21 were the highest on historical records.

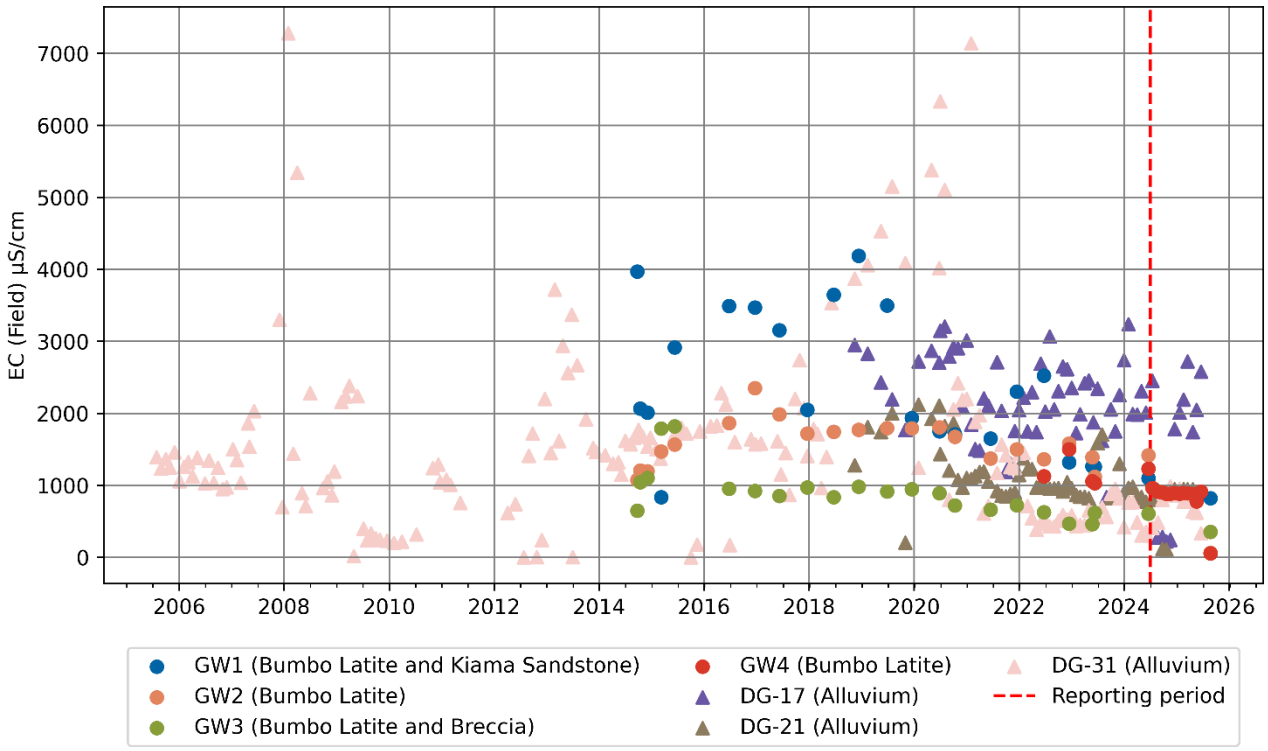


Figure 5.1 **EC timeseries for all monitoring bores**

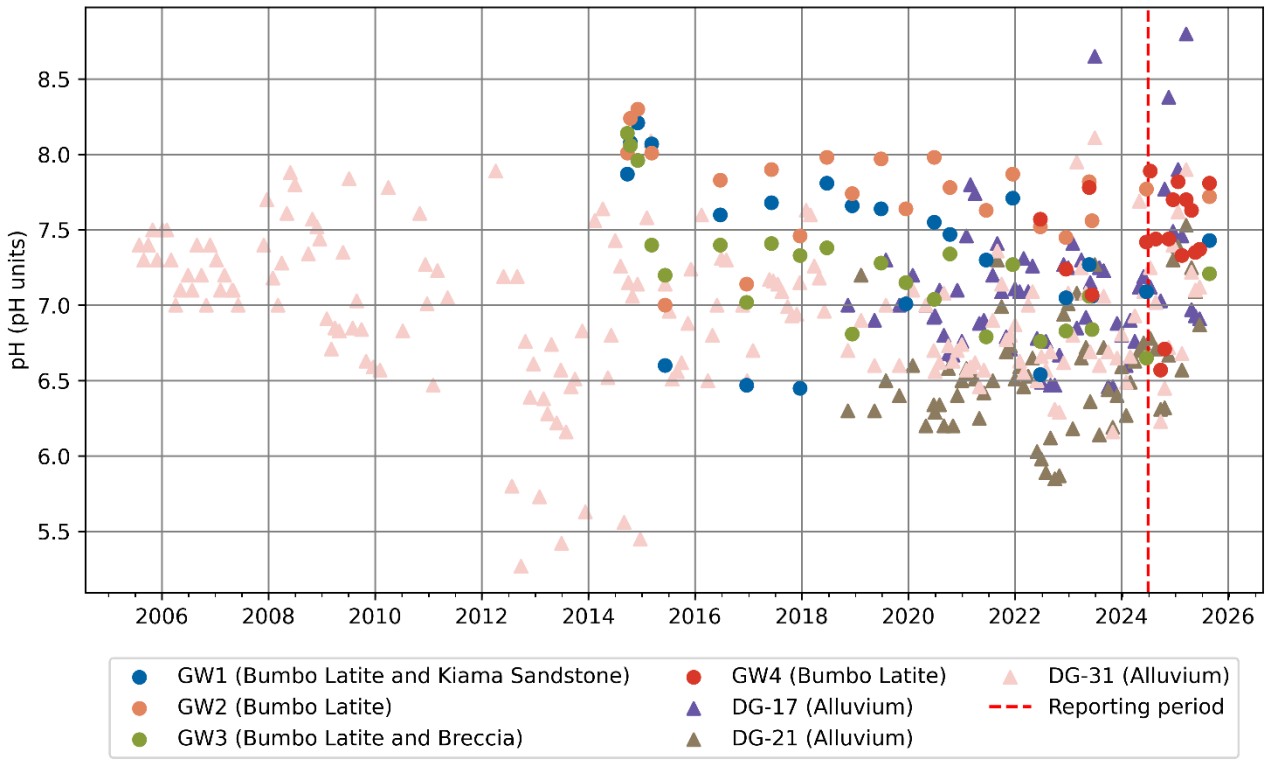


Figure 5.2 **pH timeseries for all monitoring bores**

5.2 Major ions

The major ion characteristics of groundwater samples for the monitoring sites for the reporting period are shown in a piper diagram in Figure 5.3. A piper diagram is a graphical representation of the relative concentrations of major ions (Ca^{2+}, Mg^{2+}, Na^{+}, K^{+}, Cl^{-}, HCO_3^{-}, CO_3^{2-} and SO_4^{2-}).

Groundwater chemistry from GW1 to GW4 (latite bores) shows some minor variation in water type:

- Based on the anion triangle, GW1 to GW3 bores are bicarbonate dominant, while GW4 is chloride dominant.
- Based on the cation triangle, GW1 and GW2 are sodium and potassium dominant, GW4 is sodium and potassium dominant but with a higher calcium and magnesium component, GW3 is calcium and magnesium dominant.

Major ion concentrations measured at GW1 and GW2 are comparable to previous monitoring year, while major ions concentrations measured at GW3 and GW4 show some shifts. Water at GW3 remains a magnesium-bicarbonate type but shows a shift towards chloride and sulfate type; GW4 shows a shift from a sodium-bicarbonate mixed type water towards a more sodium-chloride mixed water type. The shift towards a chloride type may be influenced by increased rainfall recharge in a coastal environment where sea spray is depositing salt in the environment.

Groundwater chemistry at DG-17, DG-21 and DG-31S (alluvial monitoring site) some minor variation in water type:

- Based on the anion triangle, DG-17 is bicarbonate dominant, DG-21 is spread between bicarbonate and chloride dominant, while DG-31 is sulfate dominant.
- Based on the cation triangle, DG-17 and DG-21 are sodium and potassium dominant, while DG-31 is calcium dominant. The sodium type at DG-17 and DG-17 may be attributed to the tidal infleunces at nearby Rocklow Creek.

Major ion concentrations measured at the alluvial monitoring sites show some changes compared to the previous year. DG-17 remains sodium bicabonate dominant. DG-21 shows a shift from a sodium bicarbonate type towards a more sodium chloride type. DG-31 show a shift from a calcium bicarbonate type towards a more calcium sulfate water type.

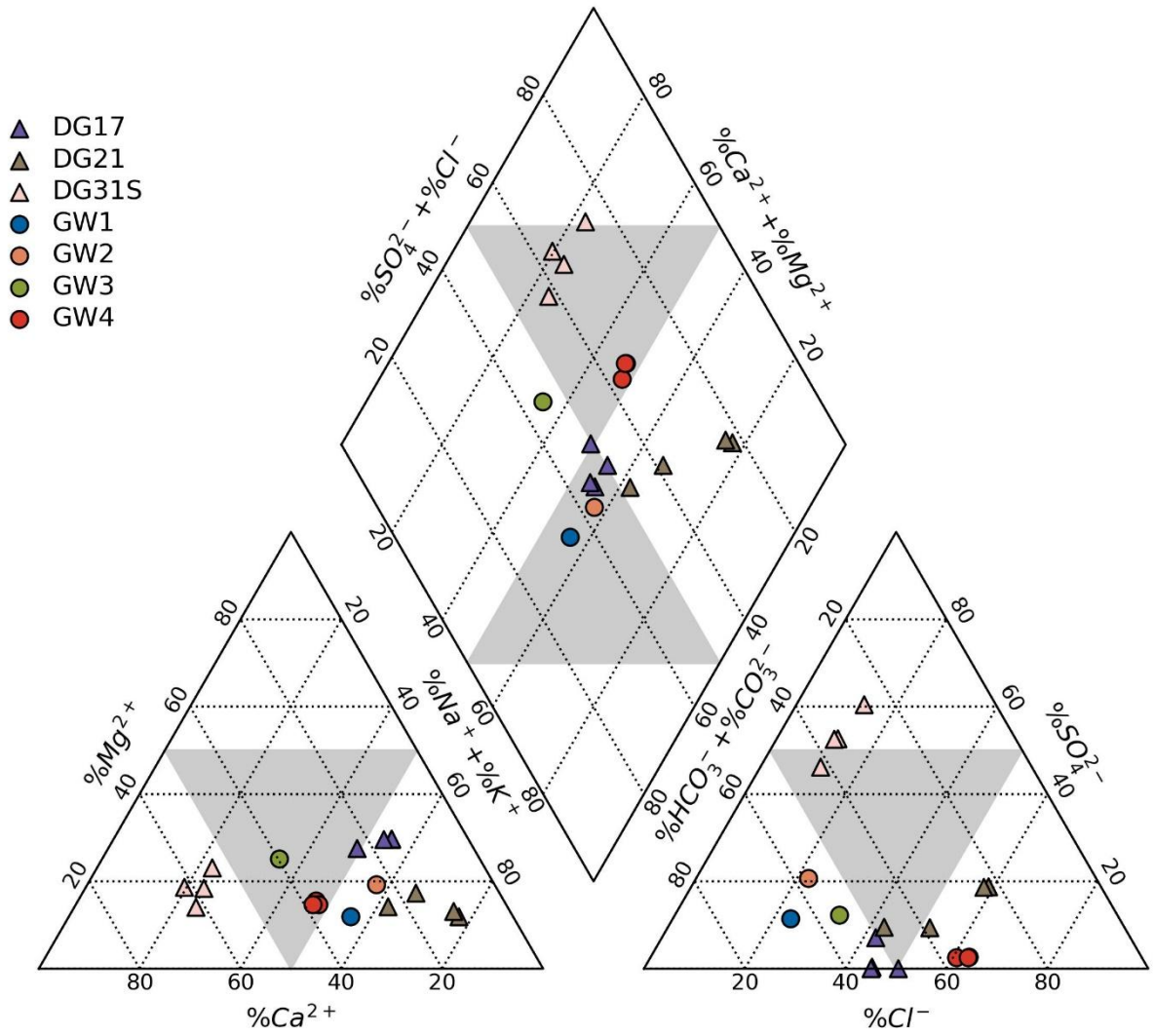


Figure 5.3 Piper plot for all monitoring bores (2024/2025 reporting period)

5.3 Dissolved metals

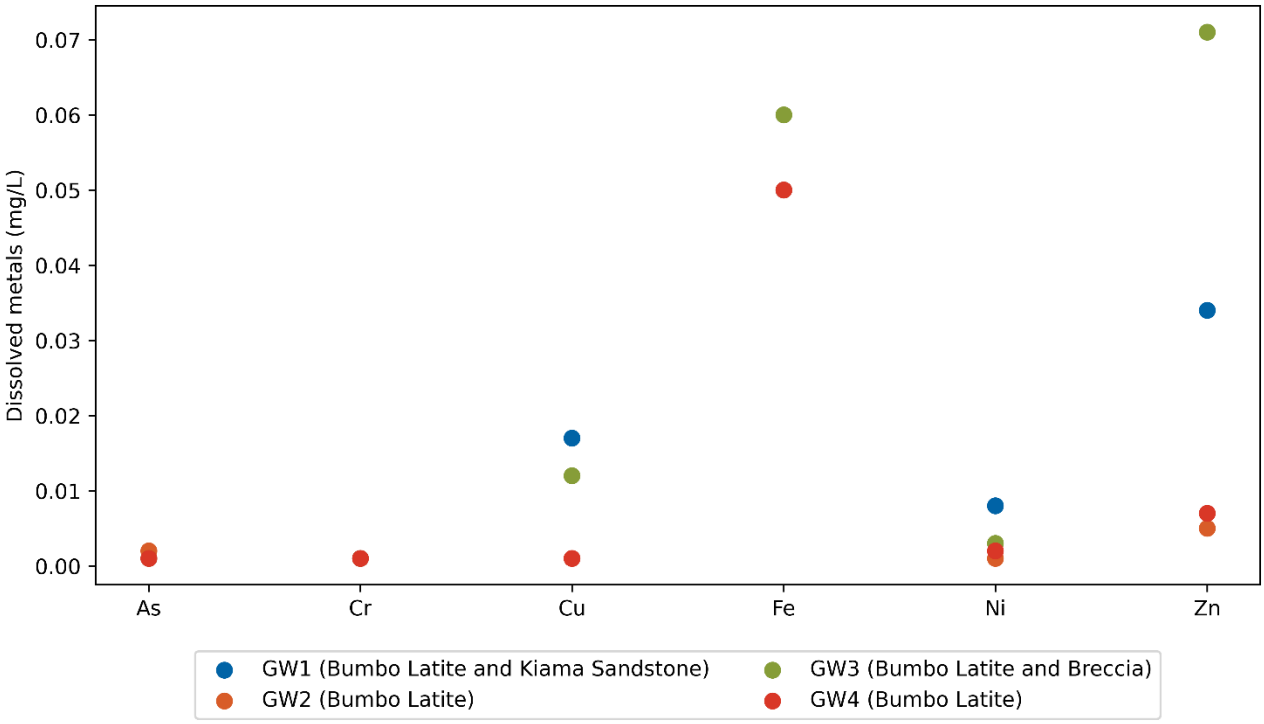
Concentrations of dissolved metals from the groundwater samples collected during the 2024/25 reporting period are presented in Figure 5.4. It is noted that only one monitoring event (August 2025) was conducted for this period.

The suite of dissolved metals analysed for the GW1 to GW4 monitoring sites are presented in Figure 5.4, with timeseries shown in Appendix D. The metals suite for the alluvial monitoring sites (DG-17, DG-21 and DG-31) was analysed for total iron and is not comparable.

The main findings for dissolved metals are as follows:

- Dissolved metals at GW1 to GW4 show concentrations within the same order of magnitude as the previous years.
- Arsenic concentrations are below the limit of reporting (LOR) (0.001 milligrams per litre (mg/L)) at GW1, GW3, and GW4. Arsenic concentrations are close to LOR at GW2 (0.002 mg/L) showing an ongoing decreasing trend.

- Chromium concentrations were below the LOR (0.001 mg/L) at all sites.
- Copper concentrations were below the LOR (0.001 mg/L) at GW1 and GW4, and stable with concentrations around 0.017 mg/L and 0.012 mg/L at GW1 and GW3, respectively.
- Iron concentrations are close to or below the LOR (0.05 mg/L) at all sites.
- Nickel concentrations were stable close to or below the LOR (0.001 mg/L) except at GW1 (0.008 mg/L).
- Zinc concentrations at GW1 and GW3 were elevated compared to the historical range (0.034 and 0.071 mg/L respectively). GW2 and GW4 was within historical observations, GW2 was below LOR (<0.005 mg/L).



Note: Concentrations below the Estimated Quantitation Limit (EQL) are presented as half the EQL

Figure 5.4 Dissolved metal concentrations for the 2024/2025 monitoring year

5.4 Nutrients

Time series of nitrate, total phosphorus and ammonia concentrations are presented in Figure 5.5, Figure 5.6, and Figure 5.7, respectively. Generally, nutrient concentrations were comparable to the previous monitoring year Observations for nutrients in the monitoring period are as follows:

- Nitrate measurements at GW3 are typically an order of magnitude higher than all the other bores (both the Bumbo Latite and alluvial bores). In the reporting period, single elevated measurements were observed at GW1 in August 2025 (0.66 mg/L) and at DG-31S in August 2024 (1.04 mg/L).
- Total phosphorus concentrations displayed a generally stable trend in the reporting period. The total phosphorous concentrations at DG-17 continues to be an order of magnitude higher when compared with DG-21 and DG-31. The elevated concentration at DG-17 may be attributed to water management processes at the nearby Middle dam.
- Ammonia concentrations at GW1 and GW2 are typically an order of magnitude higher than the other Bumbo Latite monitoring bores. However, during the reporting period, the concentration of ammonia was comparable across the four bores. With GW2 recording the highest concentration at 0.1 mg/L.
- The alluvial bores concentrations which generally measure close to or below the limit of reporting have measured a significant sustained increase compared to the previous period.

The elevated and variable nutrient concentrations are not unexpected as these bores are located on or adjacent to farmlands and the groundwater chemistry is likely to be influenced by localised land use practices.

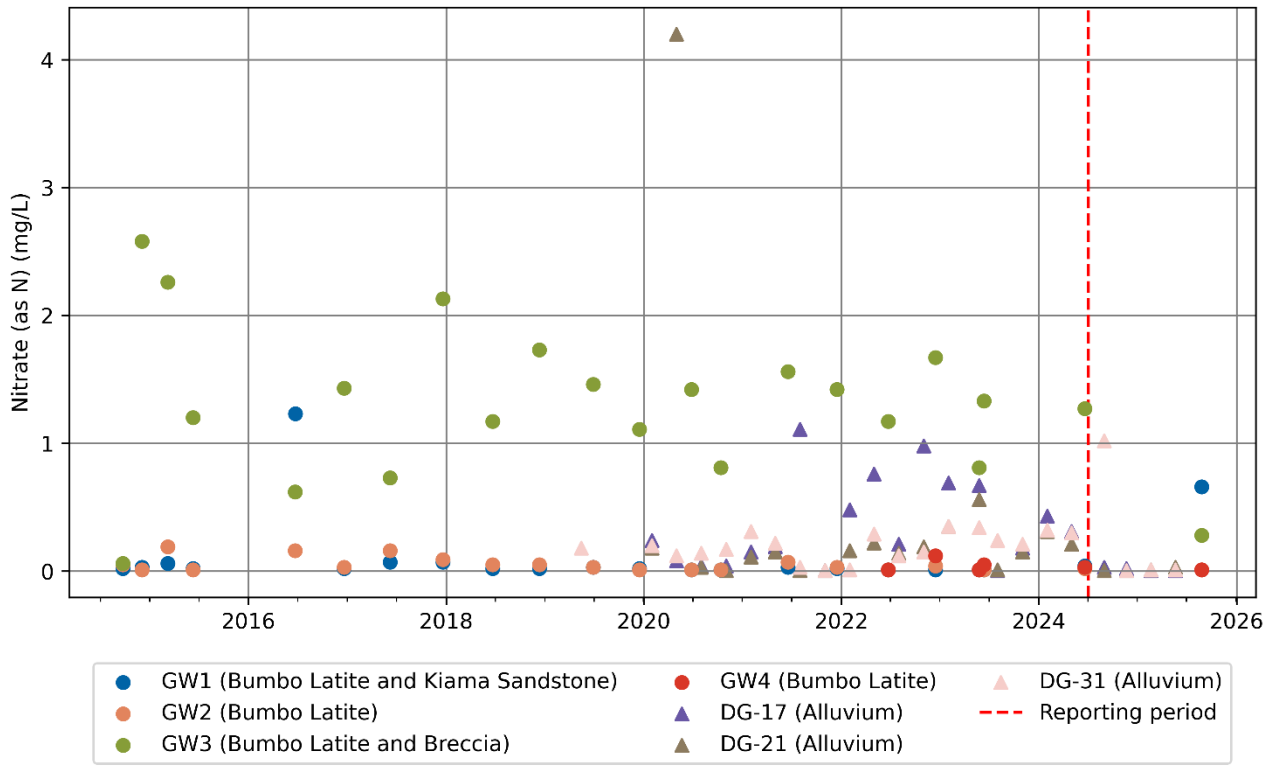
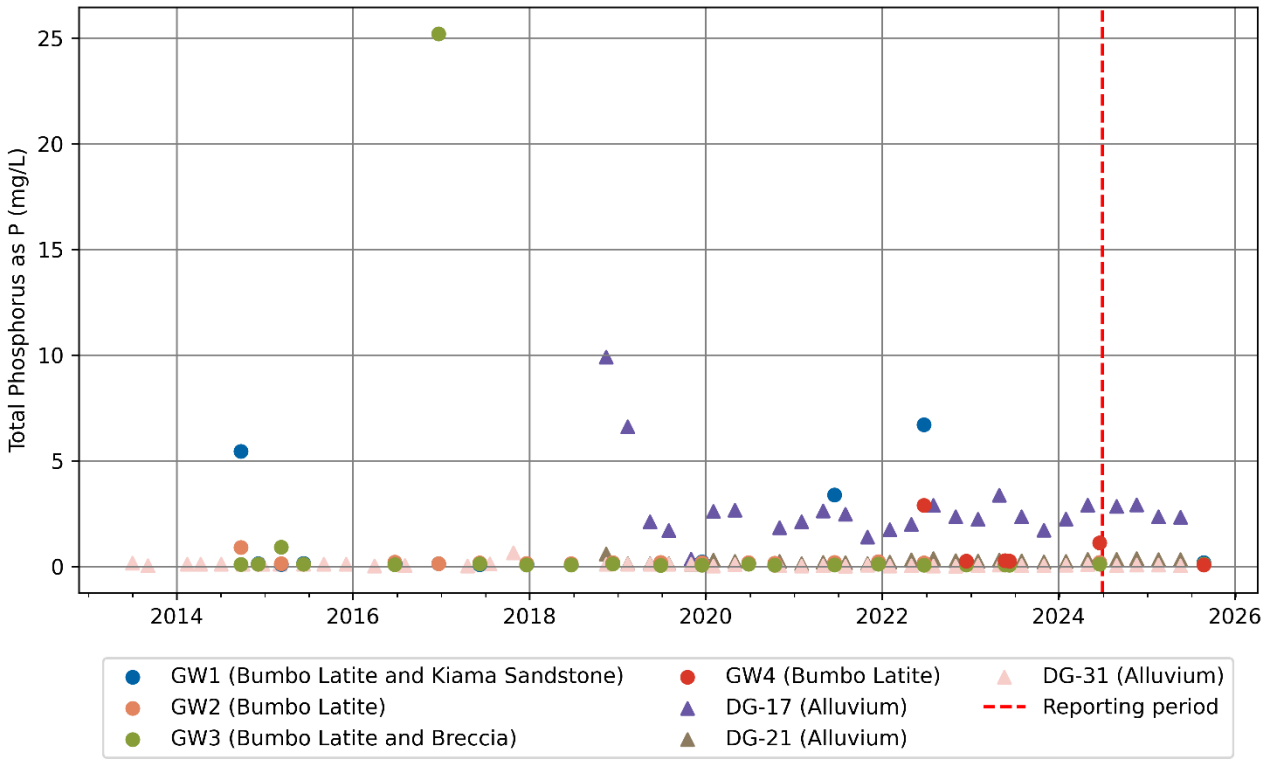


Figure 5.5 Nitrate concentration time series



Note: The figure presents total phosphorus for the alluvium bores and total phosphate as P for the Bumbo Latite bores

Figure 5.6 Total phosphorus concentration time series

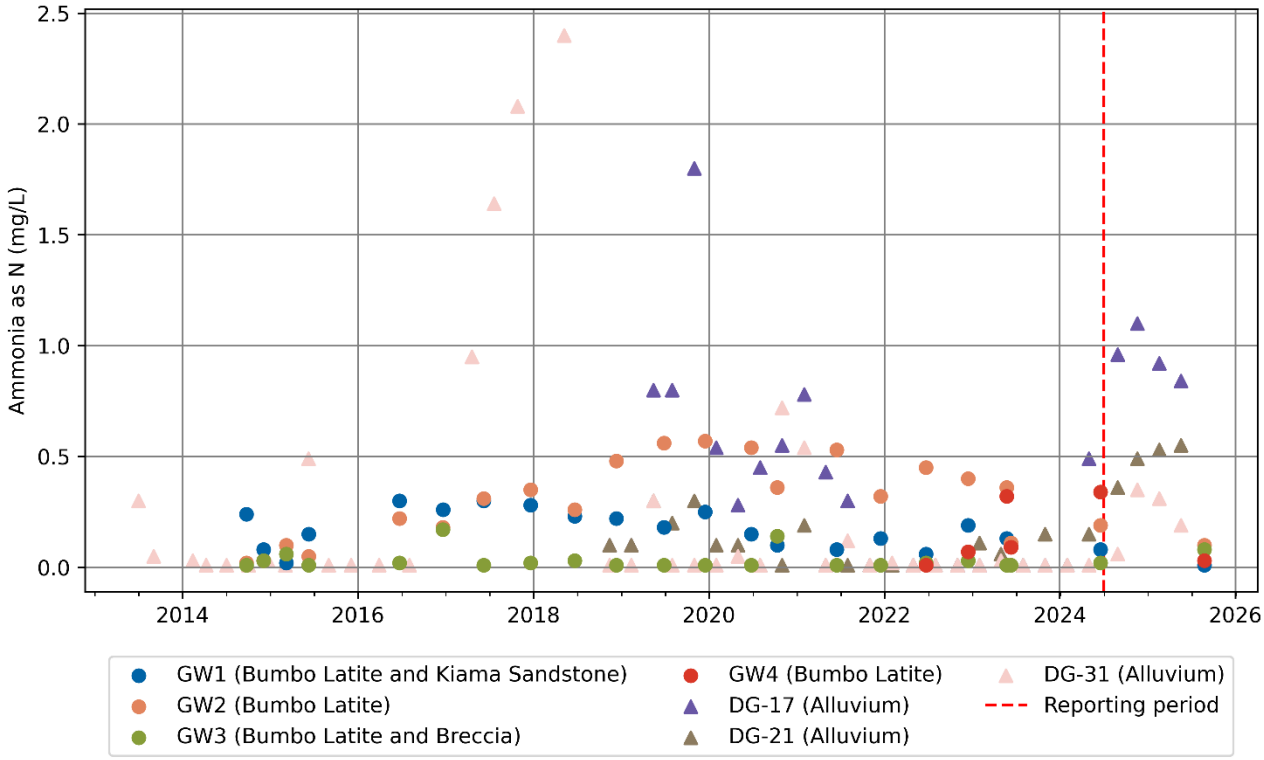


Figure 5.7 Ammonia concentration time series

6 Conclusions and recommendations

The main findings for the 2024/25 reporting period regarding groundwater levels are:

- No observable groundwater level impacts from quarrying activities associated with groundwater depressurisation were identified at the monitoring bores. The groundwater levels at GW1 to GW4 were within the SSTVs.
- Groundwater levels in the alluvium and Kiama Sandstone (GW1) show a response to rainfall recharge, while the Bumbo Latite shows a more muted rainfall recharge response.
- The level logger and baro logger at GW2 was faulty and was replaced during the August 2025 monitoring event.

The main findings for the 2024/25 reporting period regarding groundwater quality are:

- Groundwater quality at the monitoring sites was generally consistent with historical data, except for the significant decrease in EC at the Bumbo Latite bores (GW1 to GW4) that will require further monitoring and investigation.
- The variable nutrient concentrations are not unexpected as these bores are located on or adjacent to farmlands with livestock and the groundwater chemistry has possibly been altered by land use practices. Single spikes in nitrate concentrations were observed at GW1 and DG-31S. Sustained elevated concentrations of ammonia were observed across all the alluvial bores.

The results for the reporting period are consistent with historical observations. There were no changes to groundwater levels or water quality observed in the groundwater monitoring bores during the reporting period that could be associated with the RIC pit activities.

6.1 Recommendations

The Development Consent conditions, issued on 11 March 2019, note: *on the provision of two years of monitoring data that shows negligible impact on the regional groundwater network the Secretary may agree to suspend monitoring of regional groundwater levels and/or quality*. In the interest of being proactive in minimising potential impact whilst Boral is extracting in the RIC Pit, it is proposed that monitoring should continue in accordance with the WMP.

The groundwater logger at DG-17 logger does not align with the manual measurement. Further investigation is recommended and should the logger be faulty, we recommend it should be replaced.

Monitoring at private landholder bore GW026848 should be attempted again to obtain a baseline water level.

References

Arcadis 2016, *Dunmore Hard Rock Quarry Project Water Management plan*, NSW– November 2016. Prepared for Boral, dated 29 November 2016.

Clearly Bros (Bombo) 2019, *Scoping report for the Albion Park Quarry Extraction Area Stage 7 extension.* August 2019

Cohen 2006, *Shellharbour/Kiama regional hard rock resource review groundwater assessment study*, NSW Government – Department of Planning.

Department of Mine 1974, *Geology of the Wollongong, Kiama and Robertson 1:50,000 Sheets*.

EES 2017, *Annual report on groundwater level monitoring at the Swamp Road Quarry*, Dunmore NSW – May 2016 to May 2017. Prepared for Boral Dunmore Sand and Soils Pty Ltd, dated 16 June 2017.

EMM 2014, *Boral Dunmore Quarry Groundwater Monitoring-Monitoring well installation and groundwater assessment,* prepared for Boral, dated 21 November 2014

EMM 2016, *Groundwater Monitoring Program for Dunmore Hard Rock Quarry*, prepared for Boral Dunmore Quarry, dated 18 November 2016.

EMM 2022, *Groundwater Assessment Dunmore Hard Rock Quarry, Modification 13*, prepared for Boral Resources (NSW) Pty Limited, dated 1 November 2022.

EMM 2024, *Dunmore Hard Rock Quarry: Water Management Plan*, prepared for Boral Dunmore Quarry, dated 24 September 2024.

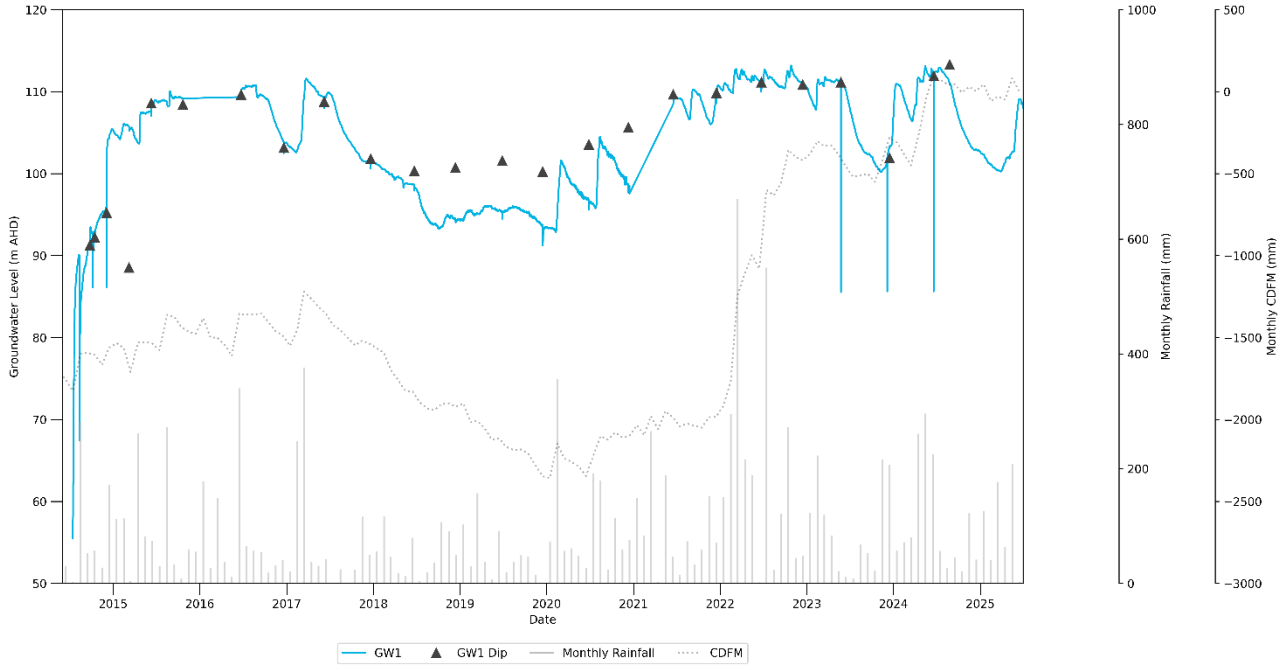
Evans and Peck 2006, *Statement of Environmental Effects, Section 4 Water Management*, Dunmore Hardrock Quarry extension.

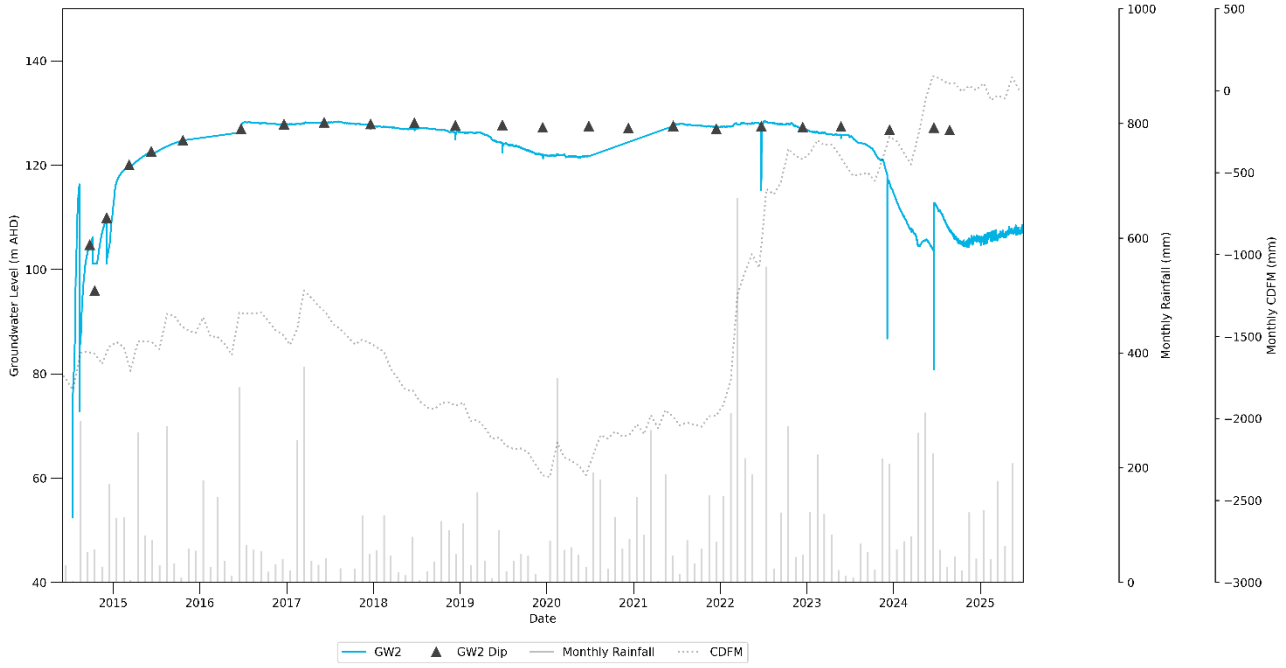
MMJ Wollongong (MMJ) 2013*, Environmental Assessment, Modification of Development Consent 10639 of 2005 Albion Park Quarry.*

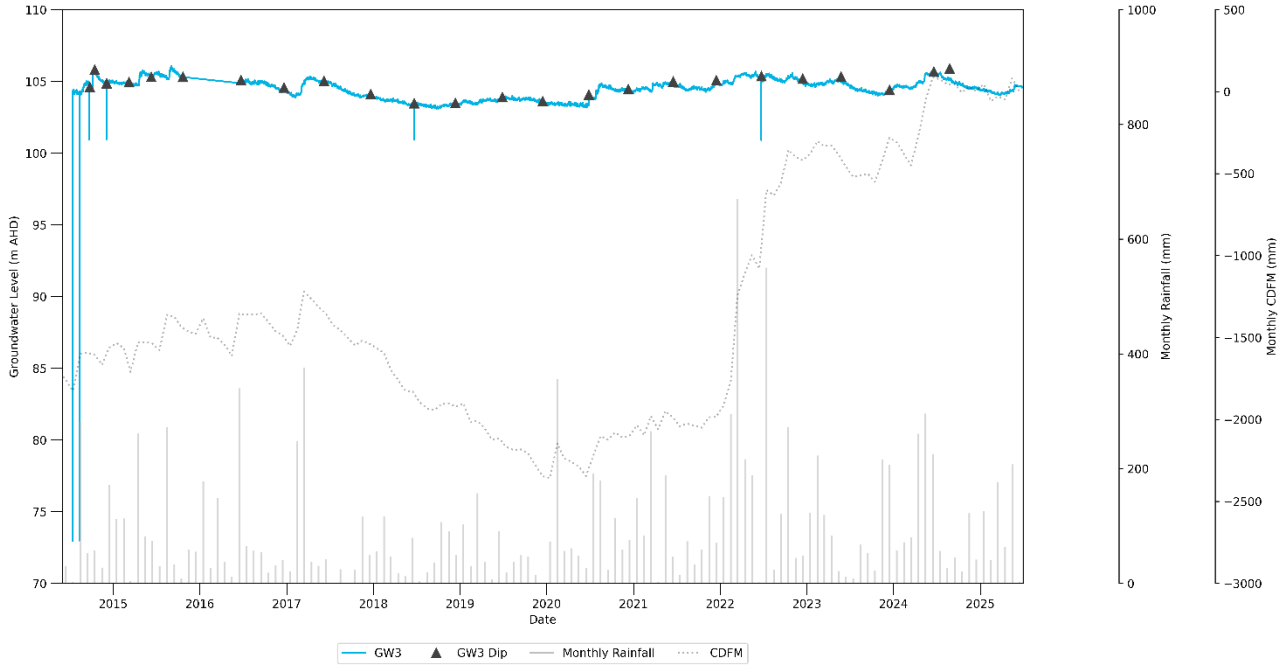
Walker G., Gilfedder M., Evans R., Dyson P., Stauffacher M. 2003*, Groundwater Flow Systems Framework – Essential Tools for Planning Salinity Management*, Murray Darling Basin Commission and CSIRO Land and Water.

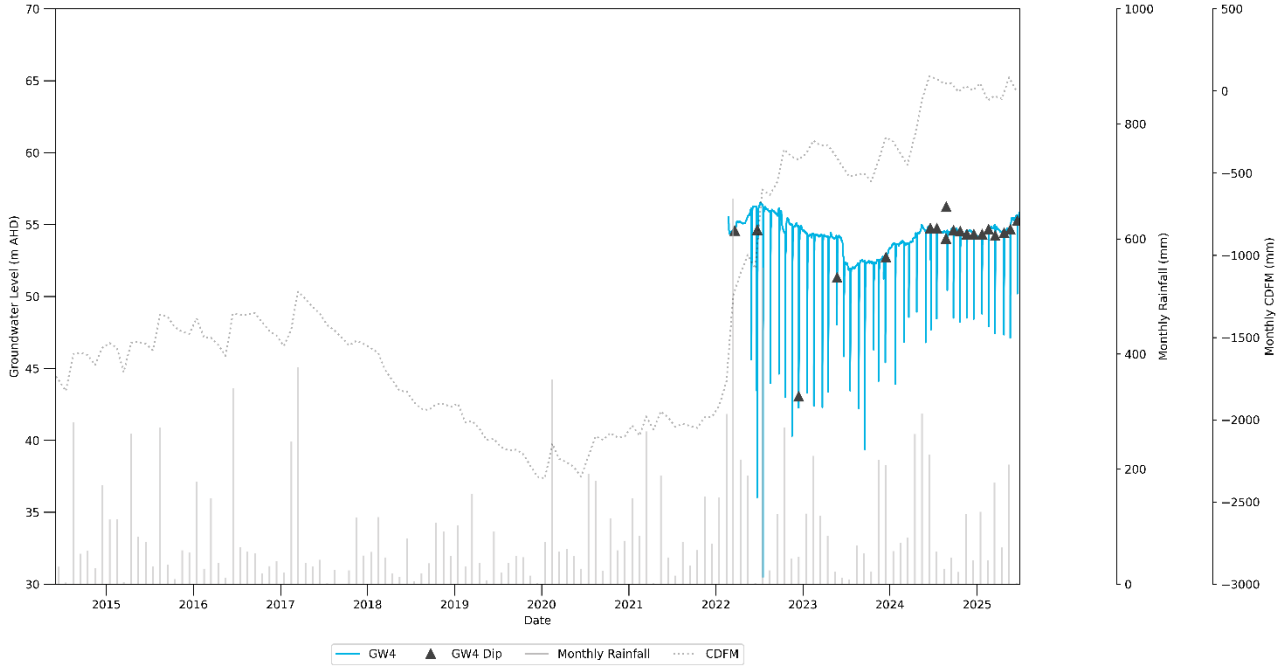
Appendix A
Groundwater hydrographs

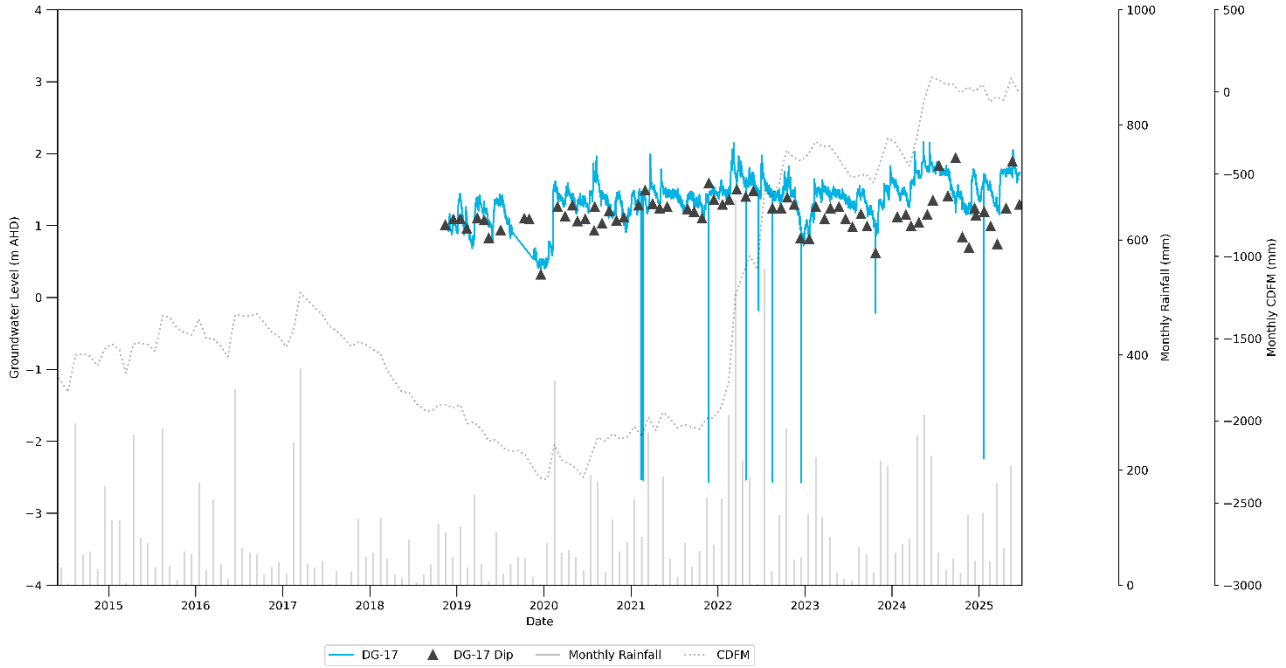
EMM
creating opportunities

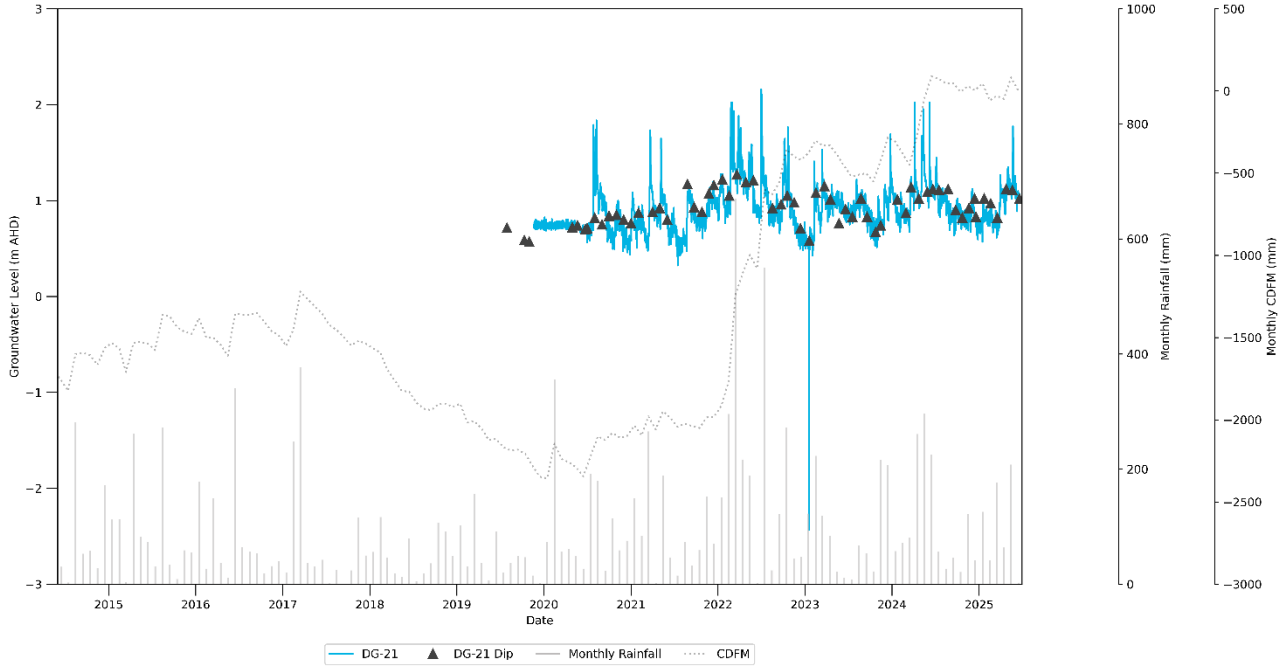

Groundwater Level (m AHD)
Monthly Rainfall (mm)
Monthly CDFM (mm)
Date
GW1
GW1 Dip
Monthly Rainfall
CDFM

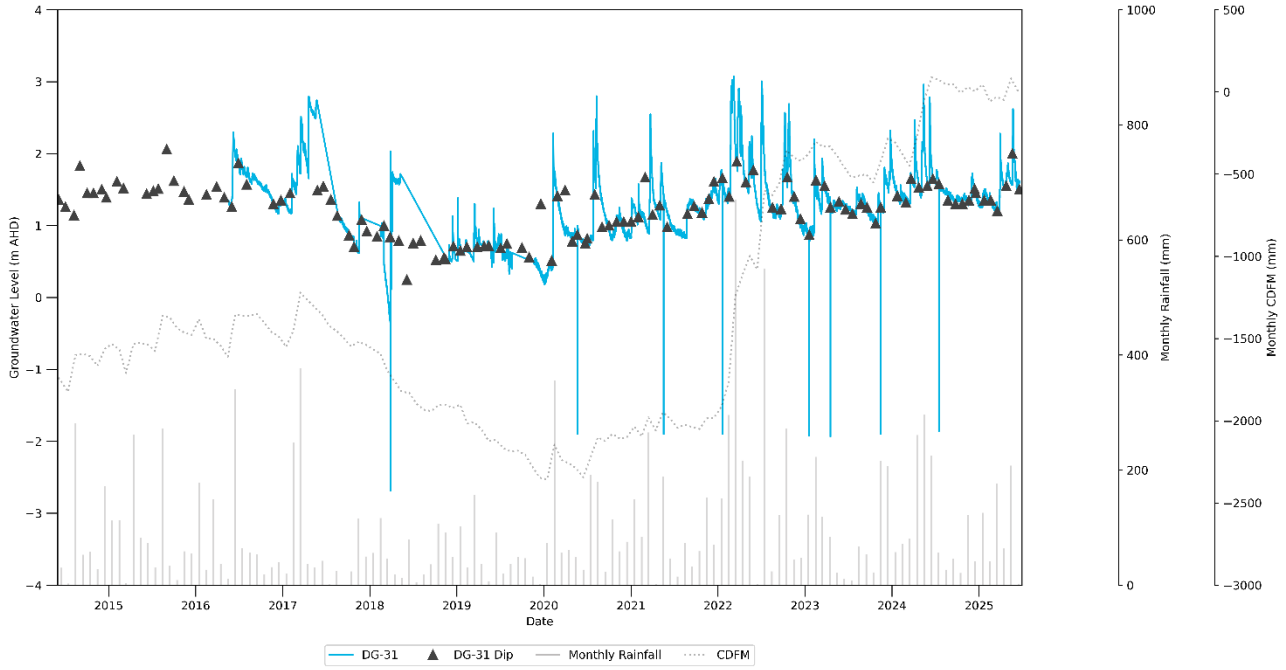

Groundwater Level (m AHD)
Monthly Rainfall (mm)
Monthly CDFM (mm)
Date
GW2
GW2 Dip
Monthly Rainfall
CDFM


Groundwater Level (m AHD)
Monthly Rainfall (mm)
Monthly CDFM (mm)
Date
GW3
GW3 Dip
Monthly Rainfall
CDFM


Groundwater Level (m AHD)
Monthly Rainfall (mm)
Monthly CDFM (mm)
Date
GW4
GW4 Dip
Monthly Rainfall
CDFM


Groundwater Level (m AHD)
Monthly Rainfall (mm)
Monthly CDFM (mm)
Date
DG-17
DG-17 Dip
Monthly Rainfall
CDFM


Groundwater Level (m AHD)
Monthly Rainfall (mm)
Monthly CDFM (mm)
Date
DG-21
DG-21 Dip
Monthly Rainfall
CDFM


Groundwater Level (m AHD)
Monthly Rainfall (mm)
Monthly CDFM (mm)
Date
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
DG-31
DG-31 Dip
Monthly Rainfall
CDFM

Appendix B
Water quality

EMM
creating opportunities

CERTIFICATE OF ANALYSIS

Work Order	: **ES2526312**	Page	: 1 of 4
Client	: **EMM CONSULTING PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Quan Bui	Contact	: Lianna Taing
Address	: The Forum Level 10 201 Pacific Highway St Leonards NSW NSW 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9493 9582	Telephone	: +61-2-8784 8555
Project	: Dunmore	Date Samples Received	: 26-Aug-2025 11:35
Order number	: E250630	Date Analysis Commenced	: 26-Aug-2025
C-O-C number	: ----	Issue Date	: 29-Aug-2025 14:47
Sampler	: Jordan de Boer		
Site	: ----		
Quote number	: EN/111		
No. of samples received	: 5		
No. of samples analysed	: 5		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- EG020: Zinc results for samples ES2526312-#001 and #005 have been confirmed by reanalysis.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW1	GW2	GW3	GW4	QC1
				Sampling date / time	25-Aug-2025 14:50	25-Aug-2025 16:30	25-Aug-2025 12:00	25-Aug-2025 09:00	25-Aug-2025 00:00
Compound	CAS Number	LOR	Unit		ES2526312-001	ES2526312-002	ES2526312-003	ES2526312-004	ES2526312-005
					Result	Result	Result	Result	Result
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		**198**	**219**	**106**	**246**	**198**
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**317**	**303**	**101**	**201**	**316**
Total Alkalinity as CaCO3	----	1	mg/L		**317**	**303**	**101**	**201**	**316**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**44**	**87**	**18**	**11**	**42**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**66**	**69**	**35**	**210**	**65**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**58**	**48**	**26**	**69**	**58**
Magnesium	7439-95-4	1	mg/L		**13**	**24**	**10**	**18**	**13**
Sodium	7440-23-5	1	mg/L		**115**	**134**	**26**	**103**	**115**
Potassium	7440-09-7	1	mg/L		**1**	**1**	<1	<1	**1**
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	**0.002**	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		**0.017**	<0.001	**0.012**	<0.001	**0.017**
Nickel	7440-02-0	0.001	mg/L		**0.008**	<0.001	**0.003**	**0.002**	**0.008**
Zinc	7440-66-6	0.005	mg/L		**0.034**	<0.005	**0.071**	**0.007**	**0.009**
Boron	7440-42-8	0.05	mg/L		<0.05	**0.52**	<0.05	**0.29**	<0.05
Iron	7439-89-6	0.05	mg/L		<0.05	<0.05	**0.06**	<0.05	<0.05
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		<0.01	**0.10**	**0.08**	**0.03**	<0.01
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW1	GW2	GW3	GW4	QC1
				Sampling date / time	25-Aug-2025 14:50	25-Aug-2025 16:30	25-Aug-2025 12:00	25-Aug-2025 09:00	25-Aug-2025 00:00
Compound	CAS Number	LOR	Unit		ES2526312-001	ES2526312-002	ES2526312-003	ES2526312-004	ES2526312-005
					Result	Result	Result	Result	Result
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.66**	**0.01**	**0.28**	<0.01	**0.68**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.66**	**0.01**	**0.28**	<0.01	**0.68**
EK060G:Organic Nitrogen as N (TKN-NH3) By Discrete Analyser									
Organic Nitrogen as N	----	0.1	mg/L		**0.4**	**0.2**	**0.3**	**0.3**	**0.3**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.4**	**0.3**	**0.4**	**0.3**	**0.3**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.1**	**0.3**	**0.7**	**0.3**	**1.0**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.17**	**0.10**	**0.10**	**0.06**	**0.18**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.15**	**0.08**	<0.01	<0.01	**0.16**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**9.11**	**9.81**	**3.38**	**10.2**	**9.02**
ø Total Cations	----	0.01	meq/L		**8.99**	**10.2**	**3.25**	**9.40**	**8.99**
ø Ionic Balance	----	0.01	%		**0.66**	**2.06**	**1.94**	**3.90**	**0.16**

Appendix C

Laboratory quality control reports

EMM
creating opportunities

QUALITY CONTROL REPORT

Work Order	: **ES2526312**	Page	: 1 of 7
Client	: **EMM CONSULTING PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Quan Bui	Contact	: Lianna Taing
Address	: The Forum Level 10 201 Pacific Highway St Leonards NSW NSW 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 9493 9582	Telephone	: +61-2-8784 8555
Project	: Dunmore	Date Samples Received	: 26-Aug-2025
Order number	: E250630	Date Analysis Commenced	: 26-Aug-2025
C-O-C number	: ----	Issue Date	: 29-Aug-2025
Sampler	: Jordan de Boer		
Site	: ----		
Quote number	: EN/111		
No. of samples received	: 5		
No. of samples analysed	: 5		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC
* = The final LOR has been raised due to dilution or other sample specific cause; adjusted LOR is shown in brackets. The duplicate ranges for Acceptable RPD% are applied to the final LOR where applicable.

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 6817926)									
ES2526312-001	GW1	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	317	316	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	317	316	0.0	0% - 20%
EN2514274-011	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	36	35	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	36	35	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 6815013)									
ES2526239-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1 (10)*	mg/L	<10	<10	0.0	No Limit
EW2504237-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4	4	0.0	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 6815015)									
ES2526303-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	42	42	0.0	0% - 20%
EW2504237-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	18	19	0.0	0% - 50%
ED093F: Dissolved Major Cations (QC Lot: 6816843)									
ES2526227-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	22	21	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	11	11	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	72	70	1.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	8	8	0.0	No Limit
ES2526277-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	4	4	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 6816843) - continued									
ES2526277-005	Anonymous	ED093F: Magnesium	7439-95-4	1	mg/L	3	3	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	17	17	0.0	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 6816842)									
ES2526227-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
ES2526277-005	Anonymous	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.37	0.37	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 6816845)									
ES2526312-005	QC1	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.017	0.017	0.0	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.008	0.008	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.009	0.009	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 6817692)									
ES2526295-006	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	20 µg/L	0.01	0.0	No Limit
ES2526312-005	QC1	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.01	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 6815012)									
ES2526239-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EW2504237-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 6817693)									
ES2526295-006	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	20 µg/L	0.02	0.0	No Limit
ES2526312-005	QC1	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.68	0.70	2.4	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 6817688)									
ES2526387-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	4.7	4.8	0.0	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 6817688) - continued									
ES2526295-006	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1000 µg/L	0.9	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 6817687)									
ES2526295-006	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	170 µg/L	0.17	0.0	0% - 50%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 6815016)									
ES2526312-001	GW1	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.15	0.15	0.0	0% - 50%
EW2504237-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 6817926)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	94.9	81.0	115
				----	50 mg/L	85.8	80.0	128
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 6815013)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	82.0	122
				<1	500 mg/L	101	82.0	122
ED045G: Chloride by Discrete Analyser (QCLot: 6815015)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	113	80.9	127
				<1	1000 mg/L	107	80.9	127
ED093F: Dissolved Major Cations (QCLot: 6816843)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	80.0	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	103	90.0	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	82.0	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	99.6	85.0	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 6816842)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.0	85.0	114
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.0	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.3	81.0	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	99.2	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	102	81.0	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	87.4	85.0	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	101	82.0	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 6816845)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.0	85.0	114
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.2	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.4	81.0	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.4	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	102	81.0	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	91.3	85.0	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	97.5	82.0	112
EK055G: Ammonia as N by Discrete Analyser (QCLot: 6817692)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EK055G: Ammonia as N by Discrete Analyser (QCLot: 6817692) - continued								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	107	90.0	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 6815012)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	96.8	82.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 6817693)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	103	91.0	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 6817688)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	5 mg/L	101	69.0	123
				<0.1	2.5 mg/L	98.1	70.0	123
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 6817687)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	2.21 mg/L	94.8	71.3	126
				<0.01	0.5 mg/L	81.4	71.3	126
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 6815016)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	103	85.0	117

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 6815013)							
ES2526239-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	121	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 6815015)							
ES2526303-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	119	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 6816842)							
ES2526227-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	98.2	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	92.7	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	104	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	102	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	102	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 6817692)							
ES2526295-006	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	115	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 6815012)							
ES2526239-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	104	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 6817693)							
ES2526295-006	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	113	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 6817688)							
ES2526295-007	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	93.2	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 6817687)							
ES2526295-007	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	85.4	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 6815016)							
ES2526312-001	GW1	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	105	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2526312**	Page	: 1 of 7
Client	: **EMM CONSULTING PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Quan Bui	Telephone	: +61-2-8784 8555
Project	: Dunmore	Date Samples Received	: 26-Aug-2025
Site	: ----	Issue Date	: 29-Aug-2025
Sampler	: Jordan de Boer	No. of samples received	: 5
Order number	: E250630	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, where applicable to the methodology, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	
Matrix Spikes (MS)						
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	21	4.76	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
GW1, GW2, GW3, GW4, QC1	**25-Aug-2025**	**----**	----	----	**28-Aug-2025**	22-Sep-2025	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
GW1, GW2, GW3, GW4, QC1	**25-Aug-2025**	**----**	----	----	**27-Aug-2025**	08-Sep-2025	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
GW1, GW2, GW3, GW4, QC1	**25-Aug-2025**	**----**	----	----	**26-Aug-2025**	22-Sep-2025	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
GW1, GW2, GW3, GW4, QC1	**25-Aug-2025**	**----**	----	----	**26-Aug-2025**	22-Sep-2025	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
GW1, GW2, GW3, GW4, QC1	**25-Aug-2025**	**----**	----	----	**28-Aug-2025**	22-Sep-2025	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
GW1, GW2, GW3, GW4, QC1	**25-Aug-2025**	**----**	----	----	**28-Aug-2025**	21-Feb-2026	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
GW1, GW2, GW3, GW4, QC1	**25-Aug-2025**	**----**	----	----	**27-Aug-2025**	22-Sep-2025	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
GW1, GW2, GW3, GW4, QC1	**25-Aug-2025**	**----**	----	----	**26-Aug-2025**	27-Aug-2025	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
GW1, GW2, GW3, GW4, QC1	**25-Aug-2025**	**----**	----	----	**27-Aug-2025**	22-Sep-2025	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
GW1, GW2, GW3, GW4, QC1	**25-Aug-2025**	**27-Aug-2025**	22-Sep-2025	✓	**28-Aug-2025**	22-Sep-2025	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
GW1, GW2, GW3, GW4, QC1	**25-Aug-2025**	**27-Aug-2025**	22-Sep-2025	✓	**28-Aug-2025**	22-Sep-2025	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
GW1, GW2, GW3, GW4, QC1	**25-Aug-2025**	**----**	----	----	**26-Aug-2025**	27-Aug-2025	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	21	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	19	**15.79**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	21	**4.76**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. Auto Titrator) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Organic Nitrogen as N (TKN - NH3) (discrete analyser)	EK060G	WATER	In house: Referenced to APHA 4500-Norg/4500-NH3. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)

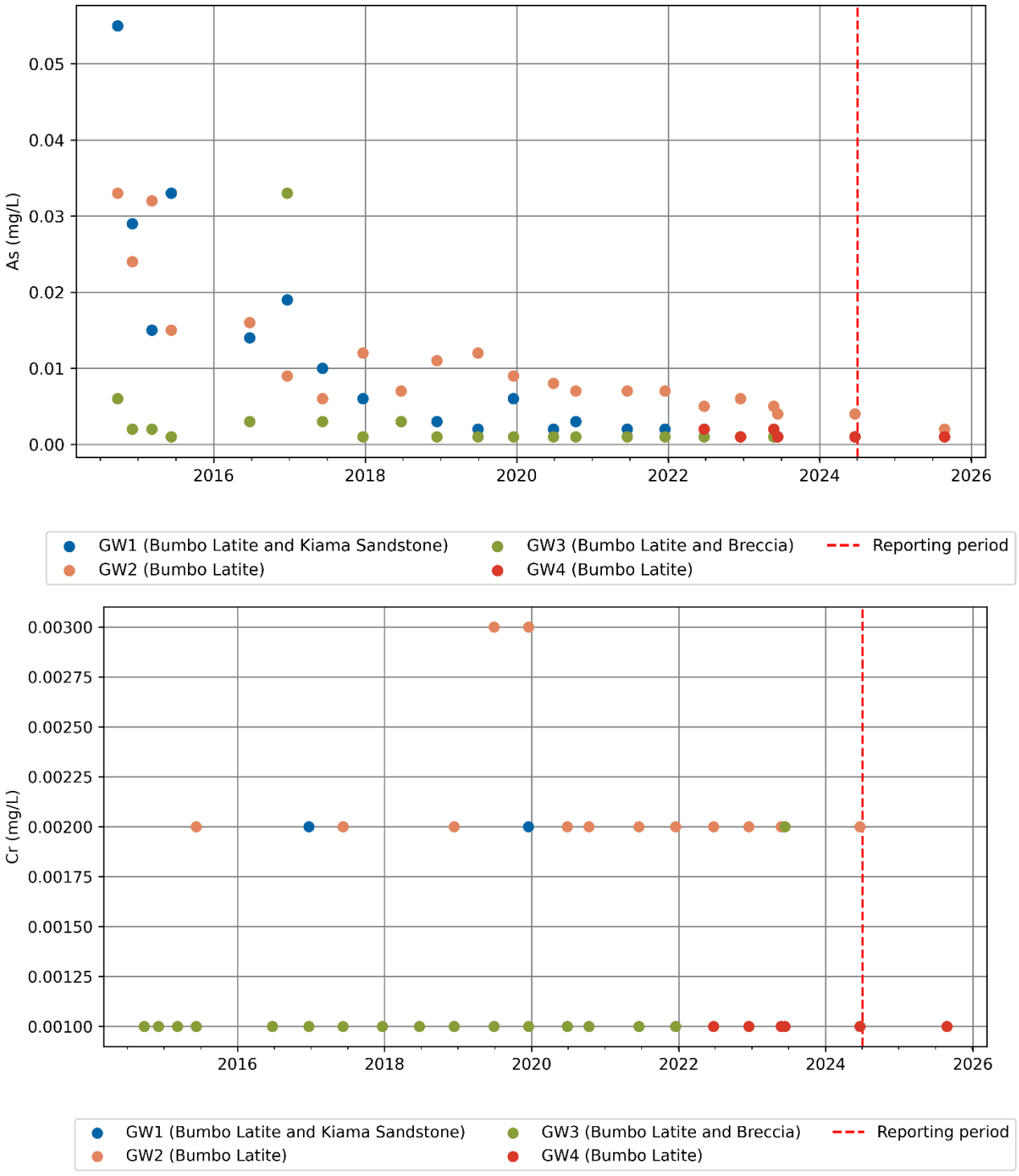
Analytical Methods	Method	Matrix	Method Descriptions
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030E. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)

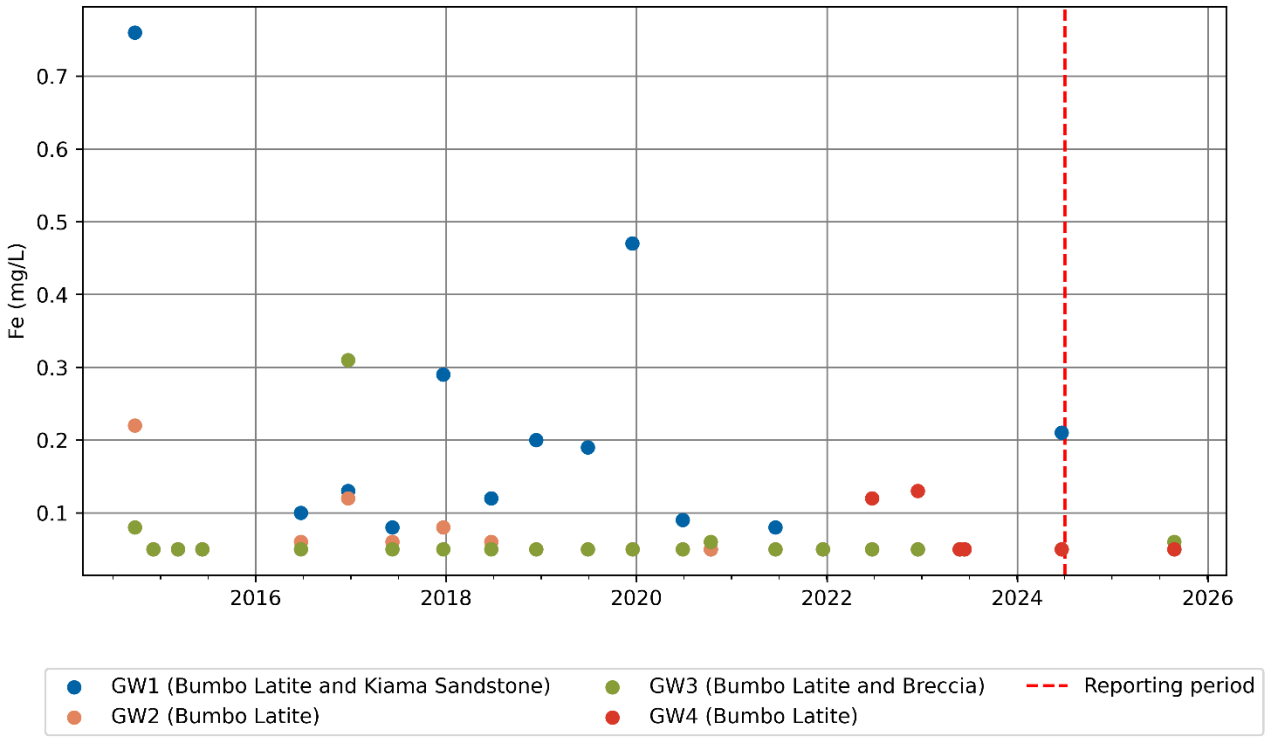
Appendix D

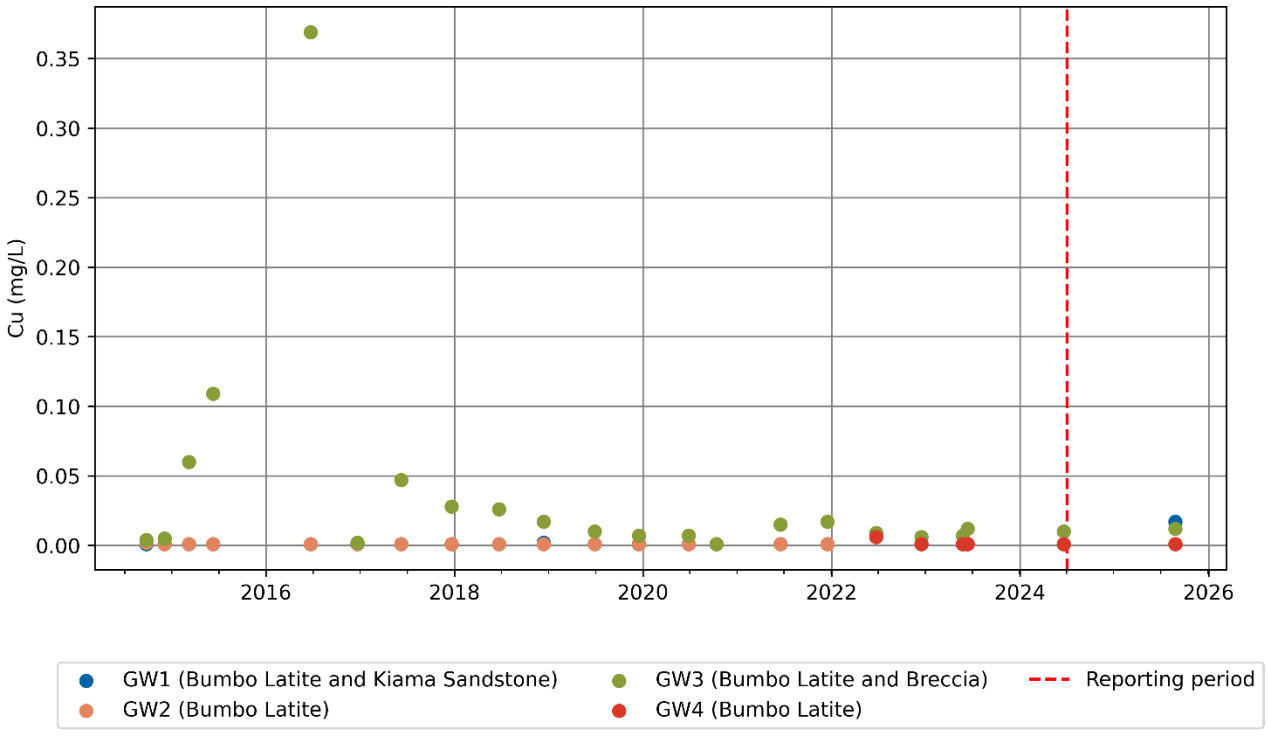
Metals time series charts – GW1 to GW4

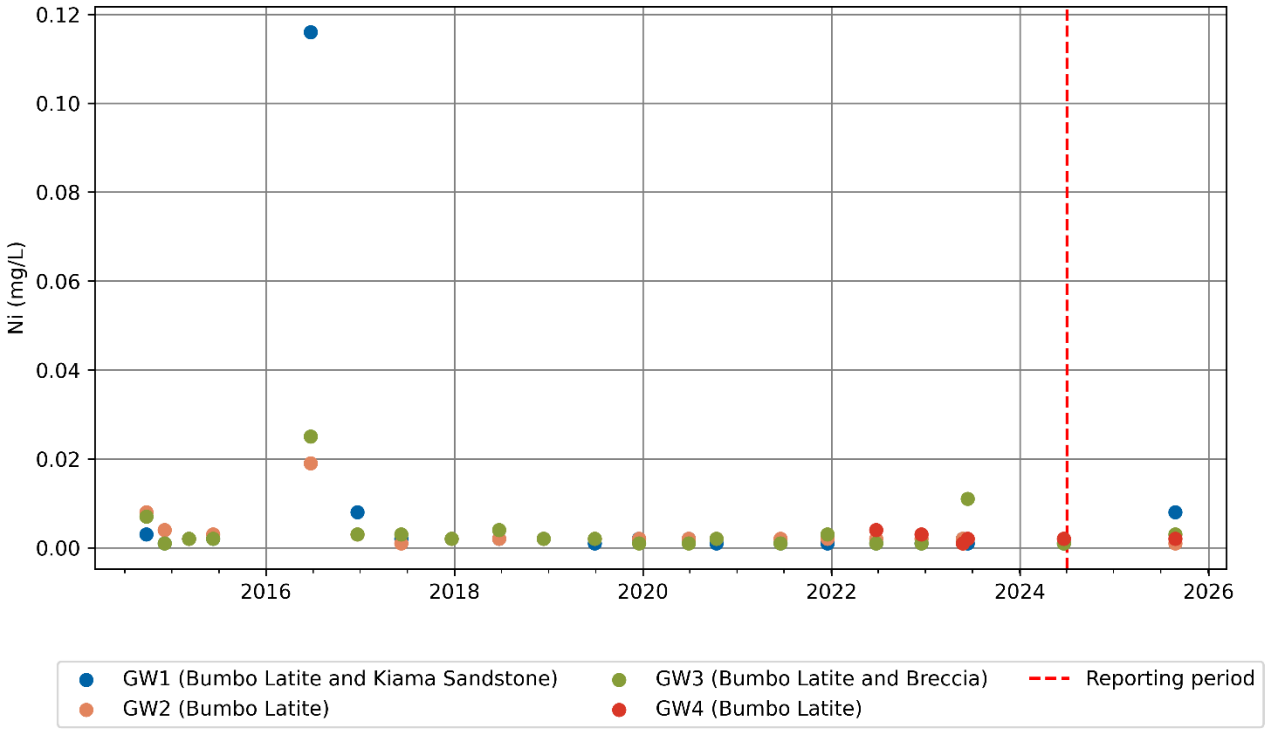
EMM
creating opportunities

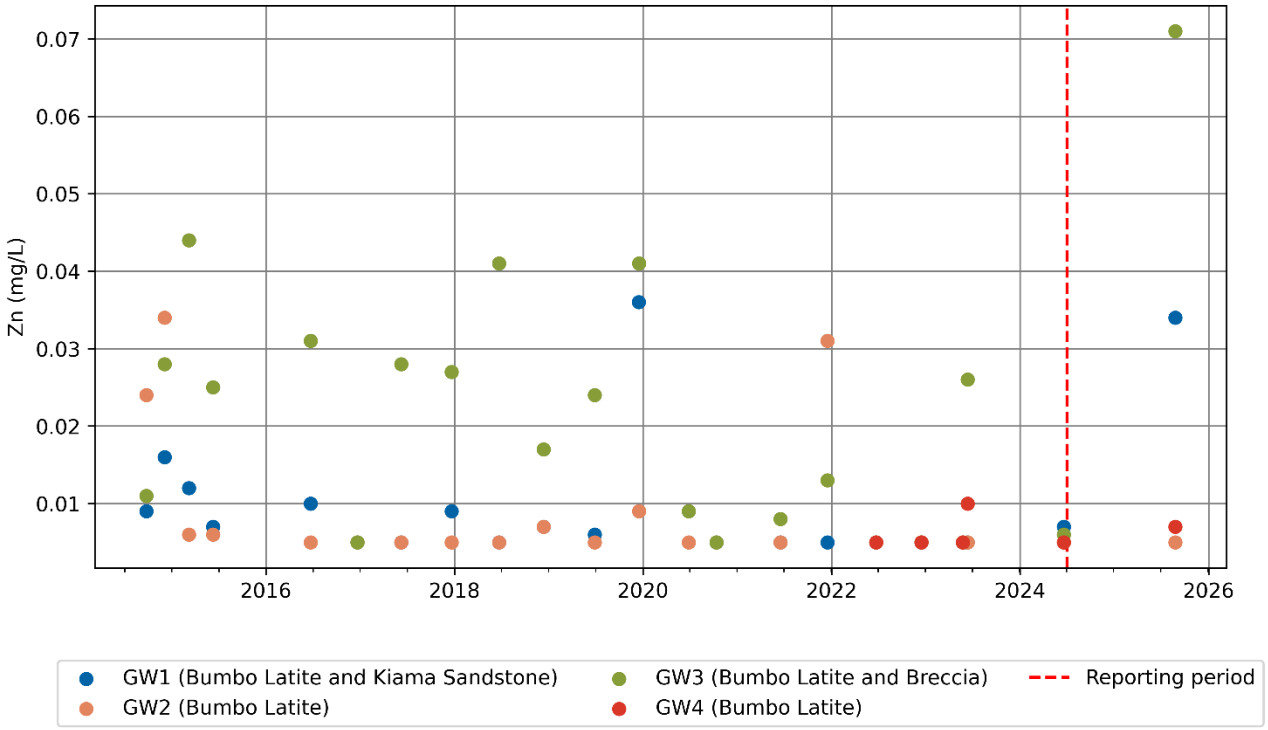

As (mg/L)
0.05
0.04
0.03
0.02
0.01
0.00
2016
2018
2020
2022
2024
2026
GW1 (Bumbo Latite and Kiama Sandstone)
GW2 (Bumbo Latite)
GW3 (Bumbo Latite and Breccia)
GW4 (Bumbo Latite)
Reporting period

Cr (mg/L)
0.00300
0.00275
0.00250
0.00225
0.00200
0.00175
0.00150
0.00125
0.00100
2016
2018
2020
2022
2024
2026
GW1 (Bumbo Latite and Kiama Sandstone)
GW2 (Bumbo Latite)
GW3 (Bumbo Latite and Breccia)
GW4 (Bumbo Latite)
Reporting period


Fe (mg/L)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
2016
2018
2020
2022
2024
2026
GW1 (Bumbo Latite and Kiama Sandstone)
GW2 (Bumbo Latite)
GW3 (Bumbo Latite and Breccia)
GW4 (Bumbo Latite)
Reporting period


Cu (mg/L)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
2016
2018
2020
2022
2024
2026
GW1 (Bumbo Latite and Kiama Sandstone)
GW2 (Bumbo Latite)
GW3 (Bumbo Latite and Breccia)
GW4 (Bumbo Latite)
Reporting period


0.12
0.10
0.08
0.06
0.04
0.02
0.00
Ni (mg/L)
2016
2018
2020
2022
2024
2026
GW1 (Bumbo Latite and Kiama Sandstone)
GW2 (Bumbo Latite)
GW3 (Bumbo Latite and Breccia)
GW4 (Bumbo Latite)
Reporting period


0.07
0.06
0.05
0.04
0.03
0.02
0.01
Zn (mg/L)
2016
2018
2020
2022
2024
2026
GW1 (Bumbo Latite and Kiama Sandstone)
GW2 (Bumbo Latite)
GW3 (Bumbo Latite and Breccia)
GW4 (Bumbo Latite)
Reporting period

Australia

SYDNEY
Level 10 201 Pacific Highway
St Leonards NSW 2065
T 02 9493 9500

NEWCASTLE
Level 3 175 Scott Street
Newcastle NSW 2300
T 02 4907 4800

BRISBANE
Level 1 87 Wickham Terrace
Spring Hill QLD 4000
T 07 3648 1200

CANBERRA
Suite 2.04 Level 2
15 London Circuit
Canberra City ACT 2601

ADELAIDE
Level 4 74 Pirie Street
Adelaide SA 5000
T 08 8232 2253

MELBOURNE
Suite 9.01 Level 9
454 Collins Street
Melbourne VIC 3000
T 03 9993 1900

PERTH
Suite 3.03
111 St Georges Terrace
Perth WA 6000
T 08 6430 4800

Canada

TORONTO
2345 Yonge Street Suite 300
Toronto ON M4P 2E5
T 647 467 1605

VANCOUVER
2015 Main Street
Vancouver BC V5T 3C2
T 604 999 8297

CALGARY
700 2nd Street SW Floor 19
Calgary AB T2P 2W2

linkedin.com/company/emm-consulting-pty-limited

emmconsulting.com.au

14. Appendix F Goodbush Report

Bushland Restoration Final Report

Boral: Rocklow Road, Dunmore

Good Bush Pty Ltd

CONTRACT PERIOD: September 2024 - September 2025

REPORT PREPARED BY: Marcus Burgess and Stefan Mursic

DATE COMPLETED: 16th September 2025

Boral Dunmore Quarry, Rocklow Road, Dunmore Final Report 2025

Table of Contents

Contents

Introduction

This final report is for bushland and riparian restoration works carried out by Good Bush Pty Ltd at Boral Metro Quarries, Rocklow Road, Dunmore from September 2024 to September 2025.

The works carried out at this site are based on the recommendations outlined in the 'Boral Dunmore Vegetation Assessment 29/04/2017'.

Objectives

The objective of these works was to undertake bushland restoration works in order to:

- Protect and enhance the remnants of the existing vegetation communities: Illawarra Dry Subtropical Rainforest, Illawarra Grassy Woodland and Melaleuca armillaris Tall Shrubland,
- reduce the area of Boral Dunmore Quarry natural areas impacted by WoNs and environmental invasive weeds,
- treat significant woody weeds throughout establishing 20-year-old revegetation areas to assist development and establishment,
- improve connectivity between local remnant bushland fragments through weed control activities and assisted regeneration,
- assist natural regeneration by removing significant weed species using bush regeneration techniques and methods, and
- monitor works, progress and completing using visual based documentation.

Vegetation Assessment Report Outcomes

The 'Boral Dunmore Vegetation Assessment 29/04/2017' identified three zones surrounding the hard rock quarry at Tabbitta Road and Rocklow Road, Dunmore as priority areas for restoration work. The three zones are as follows:

Zone 1 – Remnant Vegetation Conservation Area

Zone 2 – Offset Area

Zone 3 – Compensatory Habitat Area

Summary of Works (for all zones)

A total of 1,427 hours have been carried out within the three zones during the period from September 2024 to September 2025 resulting in a total cost of $65,196.50 (Ex GST) for this period

The following table is a summary of all hours carried out within the three work zones:

Site	Hours Worked	Cost
Zone 1 Remnant Vegetation Conservation Zone	No hours	
Zone 2 Offset Area	373 hours	$18,650.00
Zone 3 Compensatory Habitat Area	166.5 hours	$9,157.50
Gorse Control	250 hours	$13,750.00
Translocation Site Spray Preparation	235.5 hours	$23,639.00
Total	**1,427 hours**	**$65,196.50**

Works this year focused on maintaining previously worked areas and continuing primary weed control with the Zone 2 and Zone 3 work areas to protect and enhance natural vegetation within the bushland remnants as well as carrying out spray work for the translocation project and treatment of Gorse

The following summaries demonstrate the success of these works:

Zone 1 Remnant Vegetation Conservation Zone: No works were carried out within this zone due to inaccessibility of the site during wet periods and cattle accessing the site where fencing is inadequate.

Zone 2 Offset Area: Works within this zone focused on regeneration of the endangered ecological communities (EEC's) Illawarra Grassy Woodland, Illawarra Subtropical Rainforest and Melaleuca armillaris Tall Shrubland. Secondary weed control and maintenance works were carried out within this zone throughout all previously worked areas to treat re-growth from woody weeds and invasive vines. Additional primary weed control was carried out at the eastern extent of this zone covering approximately 2,150m². Additional populations of the threatened species White Wax Flower *(Cynanchum elegans)* were observed at the eastern extent of the work area and bush regeneration works were carried out within this area to protect and enhance the populations of this threatened species.

Zone 3 Compensatory Habitat Area: Works within this zone focused on regeneration of the endangered ecological communities (EEC's) Illawarra Subtropical Rainforest and Melaleuca armillaris Tall Shrubland. Secondary weed control and maintenance works were carried out within this zone throughout all previously worked areas to treat re-growth from woody weeds and invasive vines. Additional primary weed control was carried out within subtropical rainforest remnants around the populations of the threatened species Illawarra Socketwood *(Daphnandra johnsonii)* and Illawarra Zieria *(Zieria granulata)* with the Melaleuca armillaris Tall Shrubland remnants covering approximately 2,150m². The latter readily regenerated within areas where weed control works were carried out.

Translocation Spraying: This work involved spray treatment of several designated areas to prepare for the translocation of topsoils and leaf litter generated from the expansion of the quarry pit. A high volume spray unit was used to treat several very large areas in preparation for the translocation but a wet August has stalled the movement of trucks into this area and some of these areas have regenerated to weeds.

Gorse Program: Treatment of Gorse during this period was carried out over 2 days in October and December and again in July and September of 2025.
Gorse work was scheduled to be carried out in 2025 over the two months from July and August but August was a particularly wet season and access to the flat at the Mayfield property was not possible due to the wet conditions and potential for getting vehicles bogged and destroying cow pastures. The recent Gorse work has been very successful at treating Gorse in the Mayfeild, Bowhunters Club and Croome Vale areas and loads of Gorse was effectively treated which should provide a much better outcome for Gorse Inspections by IDWA in July 2026.

See below for descriptions of all of the above works

Zone 1 - Remnant Conservation Area

Site Description

This site consists of a large gully with a south easterly aspect with a drainage line that forms part of the Rocklow Creek catchment. The total site area of this zone is approximately 15 hectares. The gully is framed by basalt cliffs on the northern and western boundaries and large basalt boulders dominate the ground layer throughout much of this gully. The southeastern corner at the lower end of the gully has been cleared for pasture and grazing and a waterfall exists at the high end within the north western corner. Immediately west of the waterfall the Dunmore hard rock quarry dominates the landscape.

The basalt at this site erodes to a fine grained highly fertile soil that supports a diverse subtropical rainforest remnant that has remained largely intact despite the clearing of vegetation that was carried out here and within the surrounding areas in the mid 1800's.

The vegetation at this site consists of subtropical rainforest within the deep shaded and wet areas at the top of the gully and planted woodland at the lower end of the gully.

The subtropical rainforest within this zone consists of diverse rainforest remnants that have remained intact due to the rocky nature of the site, difficulty of removing timber species and low value of timber species present. A diverse range of canopy species exists within this gully including Sassafras *(Doryphora sassafras),* Myrtle Ebony *(Diospyros pentamera)* and all five of the local Fig *(Ficus sp.)* species. An abundance of vines exist within this remnant including Round Vine *(Legnephora moorei),* Kangaroo Grape *(Cissus antarctica)* and Milk Vine *(Marsdenia spp.)* and many species of ferns are present as epiphytes, lithophytes and within the ground layer.

Where gaps in the canopy occur, the gully has been invaded by woody weeds and a large percentage of the open areas on the slopes of the gully are dominated by Lantana.

The lower end of the gully has been revegetated within the last ten years using a range of local native tree species, some of which are not entirely relevant to this site. The revegetated areas are also subjected to grazing by cattle and woody weeds have colonised these areas.

Summary of Works

Works within this zone consisted of primary weed control targeting woody weeds throughout established approximately 20 year old 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.

The following hours worked and square metres covered were carried out within this site:

Date	Hrs	Weed Control	Primary (m²)
* No weed control activity undertaken within this zone due to wet weather restricting access and disruption due to cattle access within the work areas.			

Description of Works

- No works were carried out within this area during this period due to the lack of fencing surrounding the site. Work will recommence within this area once the fencing has been repaired.

- Treatment of Gorse was carried out during October and December 2024 and again in July and September 2025 during the flowering period to break the seed cycle of Gorse plants aiming for eradication of this species over the long term

Zone 2 - Offset Area Works

Site Description

This zone is located south of Rocklow Road and consists of a large bushland remnant with a creek line flowing through the middle. The total site area of this zone covers approximately 18.3 hectares. The majority of this zone is perched on the rocky hillside immediately adjacent to Rocklow Road and supports the 'Melaleuca armillaris tall shrubland' vegetation community. The creekline drops toward the eastern end of the site forming a gully which is well defined by the presence of the rainforest tree species and is identified as the 'Illawarra Subtropical Rainforest' vegetation community. The creek flows close to Rocklow Road at one point where dumping of rubbish and weed material has introduced several highly invasive weed species. Recent improvements to the fencing has been helpful in reducing the rubbish dumping within this area. On the southern side of the gully a tall intact canopy of Forest Red Gum *(Eucalyptus tereticornis)* exists that defines the 'Illawarra Grassy Woodland' vegetation community on site.

The Offset Area has been divided into three zones based on the three different vegetation communities found within this zone. Each of the three vegetation communities have had primary and secondary weed control works targeting woody weeds and invasive vines. The three zones with the Offset Area are as follows:

Zone 2a: Melaleuca armillaris Tall Shrubland

Zone 2b: Illawarra Subtropical Rainforest

Zone 2c: Illawarra Grassy Woodland

Summary of Works

This contract period bush regeneration works focused on secondary and primary weed control within the woodland and rainforest remnants and the rainforest ecotone at the eastern extent of this zone. Regeneration of native canopy species within these areas this year has been rapid and a connected sub-canopy exists within the RF remnant.

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 woodland remnants. Mass regeneration of Illawarra Zieria *(Zieria granulata)* has been observed within some areas and *Homalanthus stillingiifolius* has emerged within the site and is regenerating naturally and secondary populations of this regionally rare plant can be found throughout the site.

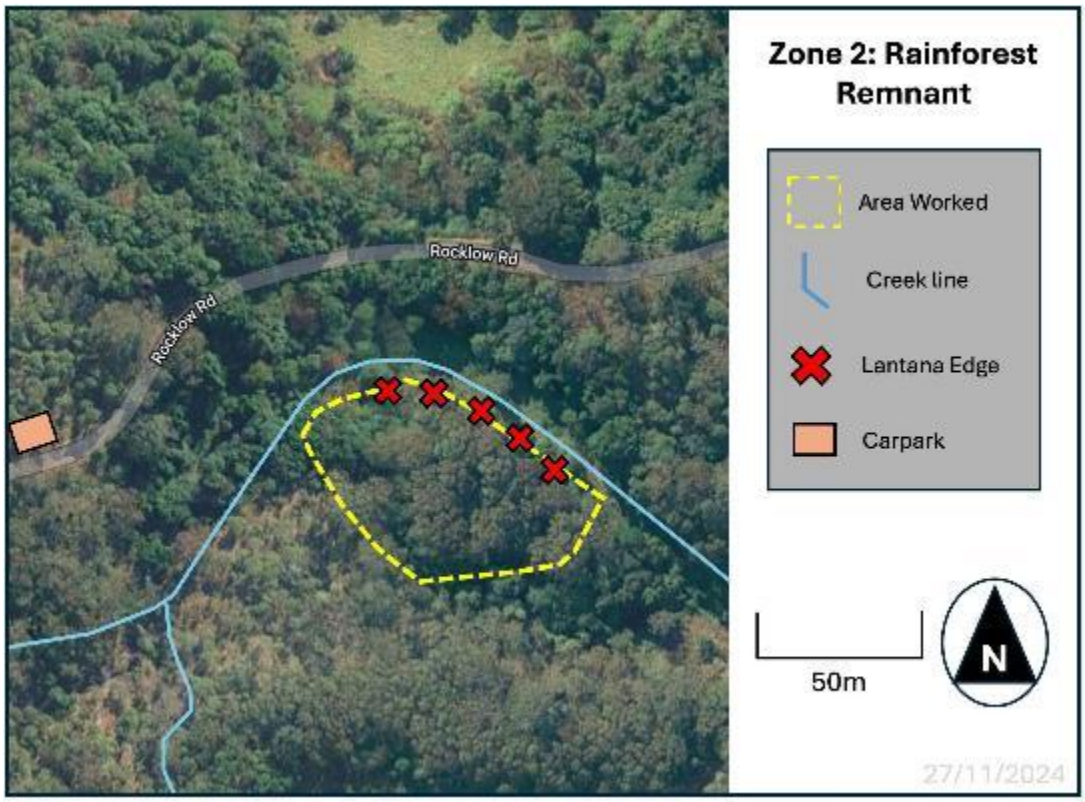
The following hours worked and square metres covered were carried out within the three zones at this site:

Date	Hrs	Weed Control	Primary (m²)
17/9/2024	56	Begin maintenance sweep through remnant rainforest strip from the most eastern worked point, sweeping west targeting woody weeds and ascending vines. Thorough hand removal of Cape Ivy and Moth Vine, which was bundled and rafted to prevent vegetative growth. Cut and paint woody weed regrowth including Wild tobacco, Lantana, African Olive and Cassia. Process woody weeds on site.	
27/11/2024	36	Begin maintenance sweep through remnant rainforest strip sweeping west targeting woody weeds and ascending vines. Thorough hand removal of Cape Ivy and Moth Vine, which was bundled and rafted to prevent vegetative growth. Cut and paint woody weed regrowth including Wild tobacco, Lantana, African Olive and Cassia. Process woody weeds on site. Pushed back woody weed edge to make way for emergent regenerating midstory.	1,000
23/12/2024	46	Secondary throughout lowlands grassy woodland east of the creek and pulpit rock. Targeted cut and paint (processing) removal of Lantana, Cotton Bush and African Olive regrowth. Primary/secondary weed control of Lantana and Wild Tobacco within the eco tone of rainforest and woodland east of the big fig and towards the known Cynanchum areas.	

		Obvious deer damage recorded within the ecotone with rutted white cedars, Lantana growth common to deer trafficked areas and scats identified.	
14/01/2025	56	Conducted maintenance and secondary weed removal in the subtropical rainforest remnant within Zone 2, targeting woody weed regrowth, climbing weeds and annuals. Hand removal of woody weed seedlings, climbers and annuals including Lantana, African Olive, Wild Tobacco, Moth Vine, Cape Ivy, Pitchforks and Paddy's Lucerne. Rafting all Cape Ivy material off-ground to prevent regrowth. Cut and paint treatment of larger woody weeds (as mentioned above). Scrape and paint treatment of ascending Madeira Vine stems.	
04/08/2025	57	Secondary weed control starting from the feeder creek heading west through to the Melaleuca armillaris Tall Shrubland then moving east from pulpit rock through Lowland Grassy Woodland. Cut and Paint of Lantana, Cotton Bush and African Olive regrowth using 50/50 Roundup Biactive and water. Minimal processing of lantana to prevent stem fragment regrowth.	
12/08/2025	59	Conducted a secondary weed control sweep throughout the rainforest ecotone, targeting Lantana, Wild Tobacco and Cape Ivy. Primary Weed Control in the woodland pushing the boundary further east clearing an area of approximately 500m2 Cut and paint treatment of large woody weeds including Wild Tobacco, African Olive and Lantana. Hand removal of Cape Ivy, rafting all material securely off-ground to prevent self-propagation.	500
18/08/2025	63	Commenced primary weed control pushing east linking up previously worked areas covering an approximate area of 521m2. Cut and paint treatment of large woody weeds including Wild Tobacco, African Olive and Lantana using 50/50 Roundup Biactive + Water and processing material on site.	521
TOTAL	**373 hours**		**2021 m²**

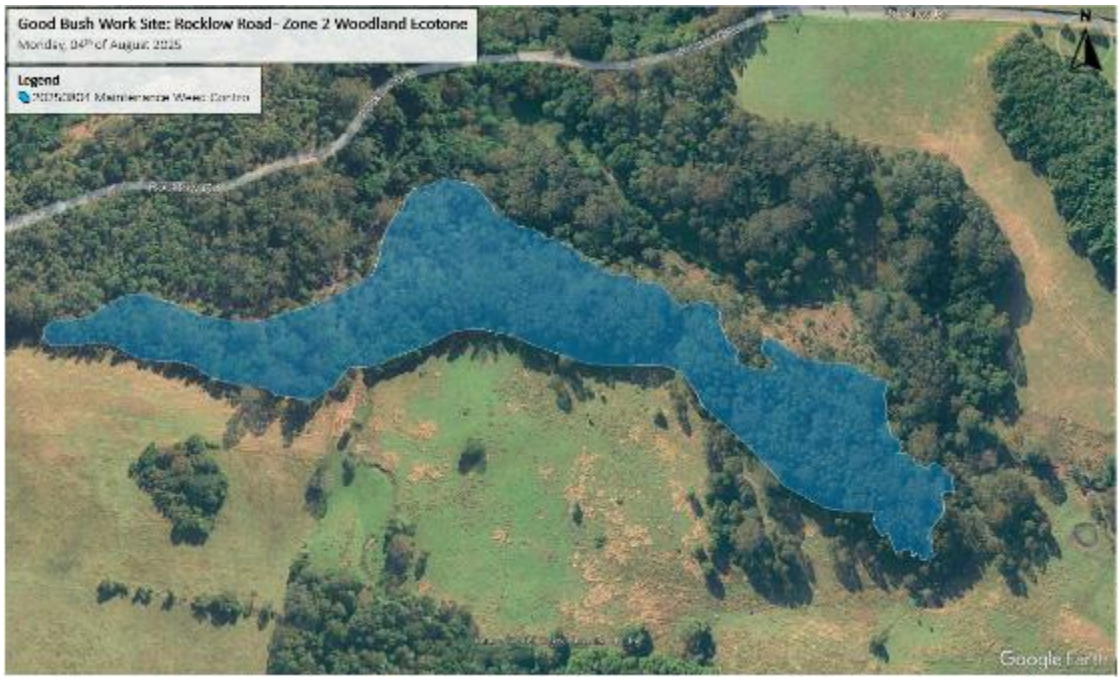
Work Areas Map

The following map identifies the approximate areas worked within the three zones:



Map: Work Area for 27th November 2024

Map: Work Area for 14th January 2025



Map: Work Area for 4th August 2025

Map: Work Area for 12th August 202

Map: Work Area for 18th August 2025

Progress Photographs

Madeira Vine ascending 5m into the Alphitonia, 23rd December 2024

Madeira Vine patch, approx 20x20m, 23rd December 2024

Lighter secondary weed control before moving into the more intense secondary / primary within the Rainforest/Woodland ecotone. 23rd December 2024

Photo: White-flowered Wax Plant (*Cynanchum elegans)* individual sighted within Zone 2 on 14th January 2025

Madeira Vine covering an Alphitonia excelsa (also covered in a Ficus sp.) on the outskirts of the rainforest canopy along Rocklow Creek. 14th January 2025

Before and After Primary Weed Removal (Photo bearing NW). 11th August 2025

Before and After Primary Weed Removal (Photo bearing N) 11th August 2025

Before and after primary weed control. 18th August 2025

Before and after primary weed control. 18th August 2025

Vegetation Condition Assessment

The vegetation condition assessments are based on a 20m² area surrounding the established photo points within each zone.

Zone 2a: Melaleuca armillaris Tall Shrubland

Photo Point	A1, A3		
Commencement Date	September 2023		
Monitoring Survey Date	15th September 2025		
Vegetation Condition		**Percentage Cover (PRIOR)**	**Percentage Cover (POST)**
Upper Stratum (emergent canopy)	The upper stratum surrounding this photo point is dominated by a tall canopy of *Melaleuca armillaris* *Eucalyptus tereticornis*	100% native cover	100% native cover
Mid Stratum (sub canopy)	The mid stratum surrounding this photo point is dominated by *Zieria granulata* *Dodonaea viscosa*	80% native cover 20% weed cover	95% native cover 5% weed cover
Shrub layer	The shrub layer surrounding this photo point is dominated by *Lantana camara** *Indigofera australis* *Leucopogon juniperinus* *Prostanrtthera nivea*	30% native cover 70% weed cover	80% native cover 20% weed cover
Ground Layer	The ground layer surrounding this photo point is dominated by native and weed grasses as well as a range of annual weeds and woody weed seedlings such as *Plectranthus graveolens*	80% native cover 20% weed cover	95% native cover 5% weed cover

* indicates exotic plant species

Zone 2b: Illawarra Subtropical Rainforest

Photo Point	B1		
Commencement Date	September 2023		
Monitoring Survey Date	15th September 2025		
Vegetation Condition		**Percentage Cover (PRIOR)**	**Percentage Cover (POST)**
Upper Stratum (emergent canopy)	The upper stratum surrounding this photo point is dominated by a tall canopy of rainforest species such as *Toona celata* *Polysias elegans* *Pittosporum undulatum* *Eucalyptus amplifolia*	100% native cover	100% native cover
Mid Stratum (sub canopy)	The mid stratum surrounding this photo point is dominated by rainforest species such as *Hibiscus heterophyllus* *Guioa semiglauca*	95% native cover 5% weed cover	100% native cover
Shrub layer	The shrub layer surrounding this photo point is dominated by small regenerating rainforest species and *Solanum mauritianum** *Solanum aviculare* *Lantana camara** *Homalanthus stillingiifolius*	20% native cover 80% weed cover	70% native cover 30% weed cover
Ground Layer	The ground layer surrounding this photo point is dominated by regenerating native rainforest trees and ferns as well as a range of annual weeds and invasive vines such as *Delairea odorata** *Arujua sericifera** *Stephania japonica*	40% native cover 60% weed cover	70% native cover 30% weed cover

* indicates exotic plant species

Zone 2c: Illawarra Grassy Woodland

Photo Point	A2		
Commencement Date	September 2023		
Monitoring Survey Date	15th September 2025		
Vegetation Condition		**Percentage Cover (PRIOR)**	**Percentage Cover (POST)**
Upper Stratum (emergent canopy)	The upper stratum surrounding this photo point is dominated by a tall canopy of *Melaleuca armillaris* *Eucalyptus tereticornis*	100% native cover	100% native
Mid Stratum (sub canopy)	The mid stratum surrounding this photo point is dominated by *Notolea venosa* *Dodonaea viscosa* *Acacia maidenii*	80% native cover 20% weed cover	100% native 0% weed
Shrub layer	The shrub layer surrounding this photo point is dominated by *Lantana camara** *Indigofera australis*	30% native cover 70% weed cover	80% native 20% weed
Ground Layer	The ground layer surrounding this photo point is dominated by native and weed grasses and annual weeds *Bidens pilosa**	40% native cover 60% weed cover	90% native 10% weed

Zone 2 Monitoring Photographs

B1 Monitoring point in excellent condition

A2 Monitoring point in excellent condition

A1, A3 Monitoring point in excellent condition

The Pulpit Rock feature with cascading waterfall showing significant rainfall over the previous week



Blunt Greenhood (*Pterostylis curta*) flowering near the Pulpit Rock


Old A3 Monitoring point has regenerated to 95%native in all stratums

Zone 3 - Compensatory Habitat Area

Site Description

This zone is located south of Rocklow Road and consists of a large bushland remnant on a hilltop with a small ephemeral creek line within a gully to the south of the hill. The total site area of this zone covers approximately 23.1 hectares. The majority of this zone is perched on the rocky hillside and supports the Melaleuca armillaris tall shrubland vegetation community. The gully drops at the southern end of the zone which is well defined by the presence of rainforest species and some very impressive land large Moreton Bay Fig (Ficus macrophylla) trees.

Extensive revegetation has been carried out within this zone within the southern gully and on the eastern and western edges of the zone. Hundreds of thousands of trees have been planted within this zone and are now reaching maturity. Many open areas that have been cleared of vegetation also exist within this zone with the majority of these clearings occurring on the rocky hill tops.

Works within this zone have focused on treating woody weeds within the establishing revegetation along the western boundary of the zone.

Vegetation community boundaries within the compensatory habitat zone are as follows:

Summary of Works

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

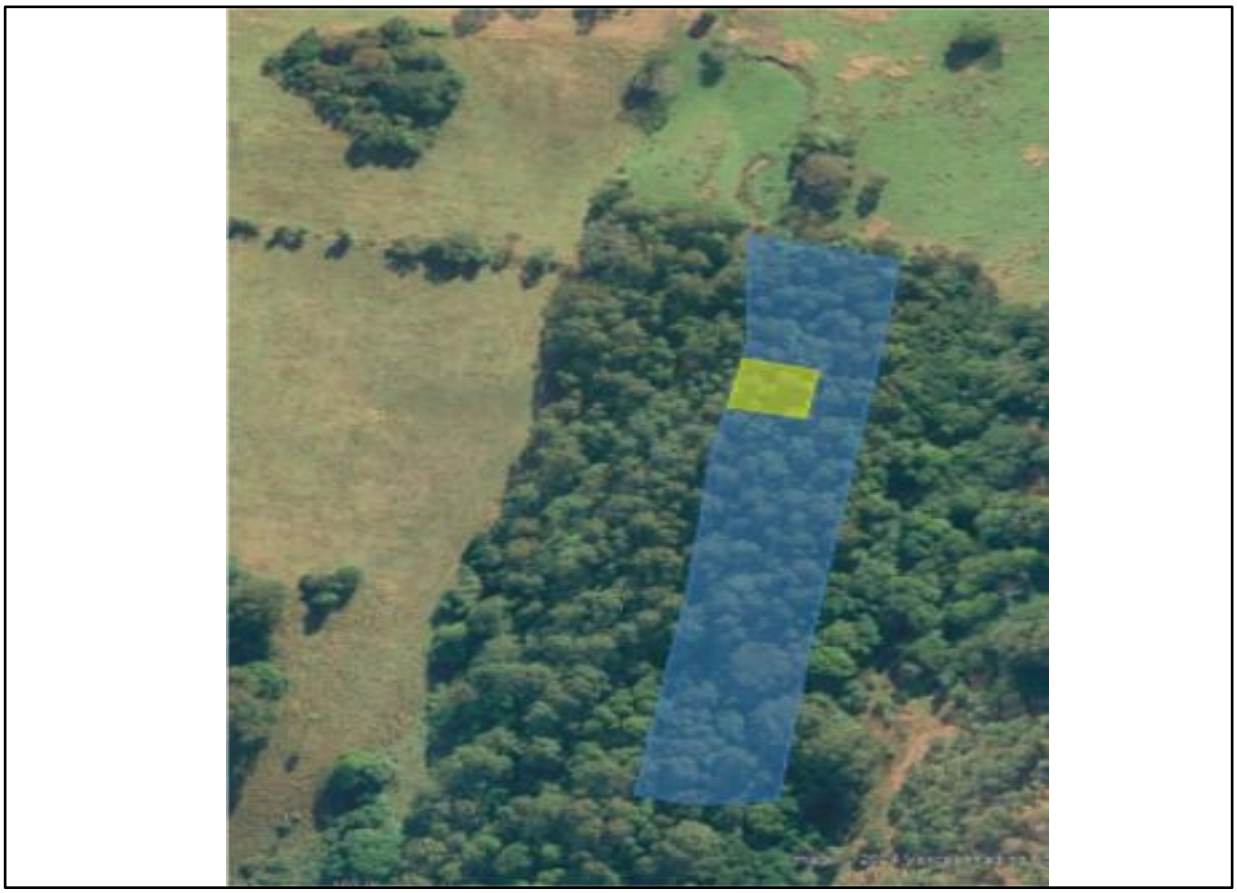
The following hours worked and square metres covered were carried out within this sit

Date	Hrs	Weed Control	Primary (m^2)
24/9/2024	63	Swept through the eastern side of the creek up to the rock wall heading south in zone 3, cutting down and removing ascending Moth Vine of establishing vegetation and targeting woody weeds such as Lantana, Tree Tobacco, Senna and Ink Weed. Continued thorough hand removal of Paddy's Lucerne, Moth Vine and Cape Ivy from the previous visit to Zone 3 heading south. Rafted vegetative weeds on site	
7/11/2024	35	At the start of day, the crew swept through between the creek and rockwall heading south towards the Daphnandra johnsonii cutting down any remaining Araujia sericifera and cutting and painting Cirsium vulgare Moved to the two figs site and started secondary weeding. Cut and painted woody weeds including Lantana, Wild Tobacco and African Olive to reveal regenerating rainforest. Regenerating species included Melia azedarach Elaeodendron australe, Geijera salicifolia Notelaea venosa Processed woody weeds on site.	
17/3/2025	27.5	Swept through the area with the highest concentration of moth vine and woody weeds, targeting ascending vines and woody weed regrowth Hand removal of ascending Moth Vine, White Passionfruit and Cape Ivy. Hand pulling and cut and paint treatment of Lantana, Wild Tobacco and Paddy's Lucerne. Rafting propagative material off-ground to prevent reshooting.	
16/05/2025	16	Hand removal of Moth Vine and Paddy's Lucerne Cut and paint treatment of Lantana and Wild Tobacco	
21/07/2025	60	A maintenance sweep was carried out targeting woody weeds and ascending vines, beginning at the entry gate and progressing toward the Daphnandra. Cape ivy and moth vine were hand-reeled and securely rafted, while lantana, sida, wild tobacco, and senna were treated using the cut and paint method.	

		Outside the entry gate, a Madeira vine infestation was addressed by hacking through maclura and lantana to access the base. Thick Madeira stems were scraped and painted, and surface tubers were bagged and disposed of offsite.	
TOTAL	**201.5**		

Work Areas Map

The following map identifies the approximate areas worked within this contract period:



Map: Site Area for 24th October 2024

Map: Site Area for 17th March 2025

Photo: *Cynanchum Elegans* - **White Flowered Wax Plant** (endangered) 17th March 2025

Madeira Vine infestation prior to works, 21st July 2025

Madeira Vine removal, 21st July 2025

Vegetation Condition Assessment

The vegetation condition assessments are based on a 20m² area surrounding the established photo points within each zone.

Photo Point	A2		
Commencement Date	September 2023		
Monitoring Survey Date	15th September 2025		
Vegetation Condition		**Percentage Cover (PRIOR)**	**Percentage Cover (POST)**
Upper Stratum (emergent canopy)	The upper stratum surrounding this photo point is dominated by a tall canopy of revegetation *Melaleuca armillaris* *Eucalyptus saligna* *Acacia maidenii*	100% native cover	100% native cover
Mid Stratum (sub canopy)	The mid stratum surrounding this photo point is dominated by *Hakea salicifolia* *Dodonaea viscosa* *Glochidion ferdinandi*	100% native cover 0% weed cover	100% native cover 0% weed cover
Shrub layer	The shrub layer surrounding this photo point is dominated by *Maclura cochinensis*	40% native cover 60% weed cover	100% native cover 0% weed cover
Ground Layer	The ground layer surrounding this photo point is dominated by native and weed grasses as well as a range of annual weeds and woody weed seedlings such as *Ehrharta erecta** *Bidens pilosa**	40% native cover 60% weed cover	40% native cover 60% weed cover

Photo Point	3B		
Commencement Date	September 2023		
Monitoring Survey Date	15th September 2025		
Vegetation Condition		**Percentage Cover (PRIOR)**	**Percentage Cover (POST)**
Upper Stratum (emergent canopy)	The upper stratum surrounding this photo point is dominated by a tall canopy of revegetation *Melaleuca armillaris* *Eucalyptus saligna* *Acacia maidenii*	100% native cover	100% native cover
Mid Stratum (sub canopy)	The mid stratum surrounding this photo point is dominated by *Hakea salicifolia* *Dodonaea viscosa* *Glochidion ferdinandi*	100% native 0% weed	100% native 0% weed
Shrub layer	The shrub layer surrounding this photo point was dominated by *Lantana camara** *Solanum mauritianum** *Ageratina adenophora**	30% native 70% weed	90% native cover 10% weed cover
Ground Layer	The ground layer surrounding this photo point is dominated by native and weed grasses as well as a range of annual weeds and woody weed seedlings such as *Sida rhombifolia** *Sigesbeckia orientalis* *Asplenium flabelafolium* *Aneilema biflorum*	30% native cover 70% weed cover	90% native cover 10% weed cover

Photo Point	3C		
Commencement Date	September 2023		
Monitoring Survey Date	15th September 2025		
Vegetation Condition		**Percentage Cover (PRIOR)**	**Percentage Cover (POST)**
Upper Stratum (emergent canopy)	The upper stratum surrounding this photo point is dominated by a tall canopy of *Melaleuca armillaris* *Acacia maidenii*	100% native cover	100% native cover
Mid Stratum (sub canopy)	The mid stratum surrounding this photo point is dominated by *Clerodendrum tomentosum* *Maclura cochinensis* *Ehretia accuminata* *Solanum mauritianum**	80% native cover 20% weed cover	90% native cover 10% weed cover
Shrub layer	The shrub layer surrounding this photo point is dominated by *Lantana camara** *Zieria granulata* *Croton verreauxii*	70% native cover 30% weed cover	90% native cover 10% weed cover
Ground Layer	The ground layer surrounding this photo point is dominated by native and weed grasses as well as a range of annual weeds and woody weed seedlings such as *Bidens pilosa** *Pellaea falcata* *Ehrharta erecta**	60% native cover 30% weed cover	80% native cover 20% weed cover

Photo Point	3D		
Commencement Date	September 2023		
Monitoring Survey Date	15th September 2025		
Vegetation Condition		**Percentage Cover (PRIOR)**	**Percentage Cover (POST)**
Upper Stratum (emergent canopy)	The upper stratum surrounding this photo point is dominated by a tall canopy of *Ficus macrophylla*	100% native cover	100% native cover
Mid Stratum (sub canopy	The mid stratum surrounding this photo point is dominated by *Elaeodendron australe* *Clerodendrum tomentosum* *Maclura cochinensis*	80% native cover 20% weed cover	100% native 0% weed cover
Shrub layer	The shrub layer surrounding this photo point is dominated by *Lantana camara** *Cestrum nocturnum** *Pittosporum multiflorum*	30% native cover 70% weed cover	40% native cover 60% weed cover
Ground Layer	The ground layer surrounding this photo point is dominated by native and weed grasses as well as a range of annual weeds and woody weed seedlings such as *Oplismenus imbecillis* *Bidens pilosa** *Solanum pseudocapsicuum** *Ehrata erecta**	40% native cover 60% weed cover	80% native cover 20% weed cover

A2 Monitoring point showing very few weeds present

Evidence of rutting/damage caused by deer and regeneration of RF species in old revegetation area

3B Monitoring point with only groundcover weeds and the ephemeral creek full due to recent rainfall

3c Monitoring point in good condition with flowering Zieria granulata

3D Monitoring Point showing regeneration of Stinging Trees and other native speceis

Photos: May Cynanchum elegans population.

Weed control (maintenance) works throughout Zone 3.

Old deer damage to a regenerating Hibiscus heterophyllus

Zieria granulata flowering within Zone 3 15/09/2025

Gorse Treatment

Gorse populations have been treated in previous years by Good Bush. Illawarra District Weeds Authority (IDWA) have previously treated these populations using spray controls. This treatment method, while effective in the initial treatment allowed plants to regrow from the base after a period of four or five months showing the spraying method to be a largely ineffective treatment method.

Gorse control works have been conducted in the October and December 2024 and again in July and September 2025 contract period. Very thorough Gorse works were carried out within this work period and it is anticipated that only minor seed growth will be observed in the coming years and an overall reduction of Gorse control works can be anticipated in future.

Summary of Works:

All Gorse plants treated during these works used the cut and paint method to ensure success of the weed treatments. Materials were not processed or removed from site as there was no seed present during the treatment period. All Gorse plants treated at this time were in full flower which is the optimum time for treatment to break the seed cycle and ensure no additional seeds were borne this year. Follow work will be required over consecutive years to treat the flush of seed stored in the soil and it is anticipated after a period of approximately five years the Gorse plants should be effectively eradicated from this site.

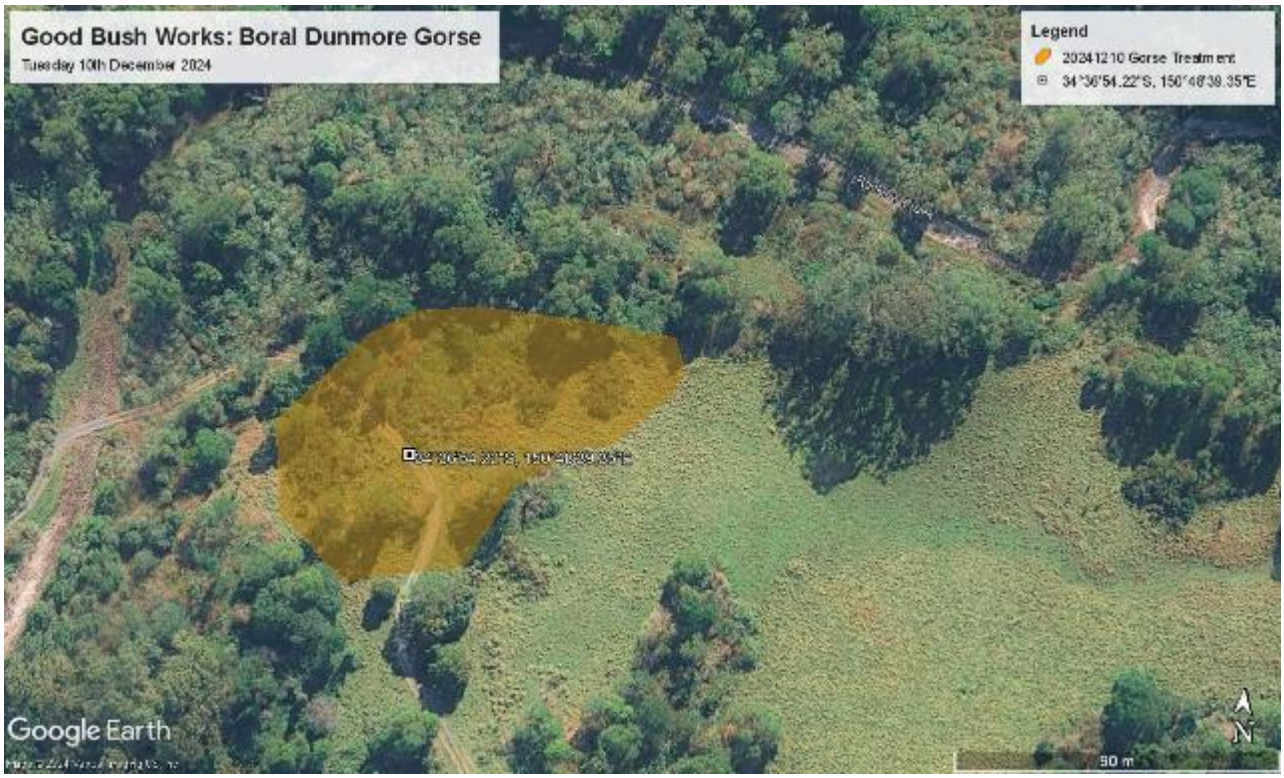
Date	Hrs	Weed Control	Primary (m^2)
10/10/2024	87	Access via the Mayfield Property Began Gorse (Ulex europaeus) removal from the same point that from the previous visit ended. Worked to the eastern side of the field finding numerous clumps of Gorse. Swept the northern end for Gorse taking out large clumps. Cut through other weedy vegetation (Lantana, Blackberry, Tree Tobacco) to access the bases of Gorse to be treated. Treatment of Gorse include Cut and Paint of large stems using saws and herbicide. Smaller stems were cut out using loppers and treated with herbicide.	3,400m^2
10/12/2024	66	Access via the Mayfield Property Continuation of manual removal and cut stump treatment of the invasive Gorse bushes using visual identification and reference material (i.e a map) provided by a recent survey. Cut and paint treatment of Gorse (Ulex europaeus). Areas highlighted by the map provided to Good Bush were unable to be addressed on this visit due to identification of established Gorse and regrowth in areas just to the east (as illustrated in the attached	5,000m^2

		map)	
29/07/2025	73	Access via the Mayfield Property Secondary / Follow-up weed control targeting Gorse in areas where it was present, ensuring that regrowth is managed and reinfestation does not occur. Cut and paint treatment of Gorse. Materials left to break down on site.	5,000m²
04/09/2025	84	Access Via the Bowhunters Club: Drive in the Bowhunters club gate and conduct toolbox talk Commence cut and paint treatment of Gorse within areas identified in the IDWA map Total Gorse treatment area for the Bowhunters Club site of approximately 26,000m² Croome Vale properties: Drive around to Croome Vale Road and commence Gorse treatment upstream of the bridge at the Glenbrook Property Large population of previously sprayed Gorse exists within this area resulting in short stunted plants with large bases All plants treated using the cut and paint method Continue downstream of the bridge and treat Gorse plants using the curt and paint method Continued downstream further than the pink tape marked plants and found many additional plants that were also treated A small population of Montpellier Broom (Genista monspessulana) consisting of approximately 10 stems also treated at the Glenbrook site. Total Gorse treatment area for the Glenbrook site of approximately 15,000m²	26,000m² 15,000m²
15/09/2025	93	Access Via the Bowhunters Club: Drive in the Bowhunters club gate and conduct toolbox talk Commence cut and paint treatment of Gorse within	30,000m²

		areas identified in the IDWA map after the recent IDWA Gorse inspections. Continue downstream inspecting previously treated Gores infestations and treating any missed plants and regrowth Total Gorse treatment area for the Bowhunters Club site of approximately 30,000m²	

Work area maps for Gorse treatment below:

Map: Area Map for 10th October 2024. Yellow areas on map represent treatment of high density Gorse. Blue represents the overall treatment area.



Map: Area Map for Gorse Treatment on 10th December 2024

Map: Area Map for Gorse Treatment on the 29th July 2025

Map: Gorse treatment map for 4/09/2025 (Bowhunters Club)

Map: Gorse treatment map for 4/09/2025 (Glenbrook)

Map: Gorse Treatment 15/09/2025 Bowhunters Club

Photographs:

Thorough follow-up control of secondary growth of Gorse. 29th July 2024

Thorough follow-up control of secondary growth of Gorse. 29th July 2025

Thorough follow-up control of secondary growth of Gorse. 29th July 2025

High density Gorse Treatment on 4th September 2025 Bowhunters Club area

Progress of High density Gorse Treatment on 4th September 2025 Bowhunters Club area

Gorse Treatment on 4th September 2025 Bowhunters Club area

Gorse Treatment on 4th September 2025 Glenbrook area

Gorse Treatment on 4th September 2025 Glenbrook area

Gorse Treatment on 4th September 2025 Glenbrook area

Gorse Treatment on 4th September 2025 Glenbrook area

Gorse Treatment on 4th September 2025 Glenbrook area

Missed Gorse treated on 15/09/2025

Translocation Site Spray Preparation

Site Description

The site is located at the end of Browns Road and Rocklow Road, Dunmore and consists of three identified areas totalling 16,150m².

The objective of this work was to spray pasture grasses and annual weeds prior to the translocation of vegetation and soil materials form a remnant of the 'Melaleuca armillaris Tall Shrubland' vegetation community in an attempt to salvage the seed bank and regeneration potential of the translocated material and to fabricate a new area with this parent material.

Map: Area Map of Translocation Sites

Summary of Works

Date	Hrs	Weed Control
23/12/2025	14	Spraying Translocation Sites
18/03/2025	14	Spraying Translocation Sites
1/04/2025	14	Spraying Translocation Sites
2/04/2025	14	Spraying Translocation Sites
3/05/2025	14	Spraying Translocation Sites
9/05/2025	14	Spraying Translocation Sites
10/05/2025	14	Spraying Translocation Sites
08/05/2025	69.5	**Zone 6:** Cut and paint treatment of various woody weeds within the 2m exterior

		boundary of the fenced compound. Spot spray herbicide application targeting regrowing weeds within the translocation area. It is worth noting that several cold weather annual weeds are just starting to germinate. Expect more in the coming months. 2m exterior boundary from the fenceline was sprayed targeting the encroaching Kikuyu and annual weeds **Zone 3:** Cut and paint treatment of various woody weeds within the 2m exterior boundary of the fenced compound. Spot spray herbicide application targeting regrowing weeds within the translocation area. It is worth noting that several cold weather annual weeds are just starting to germinate. Expect more in the coming months. 2m exterior boundary from the fenceline was sprayed targeting the encroaching Kikuyu and annual weeds There are two clumps of remnant rainforest canopy within the translocation area which need woody weeds removed within it (Lantana, Wild Tobacco, African Olive). Zone 2: Cut and paint treatment of various woody weeds within the 2m exterior boundary of the fenced compound. Spot spray herbicide application targeting regrowing weeds within the translocation area. It is worth noting that several cold weather annual weeds are just starting to germinate. Expect more in the coming months. 2m exterior boundary from the fenceline was sprayed targeting the encroaching Kikuyu and annual weeds There is one clump of remnant rainforest canopy within the translocation area which needs woody weeds removed. Zone 1: Cut and paint treatment of various woody weeds within the 2m exterior boundary of the fenced compound. Spot spray herbicide application targeting regrowing weeds within the translocation area., covering approximately one quarter of the area within the fenced compound. A 2m exterior boundary from the fenceline was sprayed on the outer edge targeting the encroaching Kikuyu and annual weeds, the full 2m was not completed but encroaching grass was prioritised.
16/05/2025	68	**Translocation Site 3:** Primary Weed Control beneath the canopy of Acacia maidenii and Exocarpos trees within the Translocation Zone 3, targeting woody weeds. Cut and paint treatment of woody weeds including Lantana and Wild Tobacco, processing materials to break down on site. Frilling treatment of one small African Olive tree. **Translocation Site 1:** Completed herbicide application of translocation site weed regrowth. Weeds present were paddock weeds which were expected to reoccur shortly after spray. There is a definite emergence of annual pasture legumes like clover and vetch which is to be expected in all of these areas, it would not impact the success of the translocation project. Fenceline perimeter spray was also completed.

TOTAL	235.5	


Good Bush Works: Boral Dunmore Translocation Sites
Legend
Zone 1
Zone 2
Zone 3
Zone 6
Google Earth

Photographs:

Marcus and Daniel conducting foliar herbicide application on Kikuyu and lawn grasses with the hi-vol in preparation for translocation. 23rd December 2025

Zone 5 Translocation spraying area in September 2025 has reverted to annual weeds and pasture grasses

Zone 3 Before and After Primary Weed Control under rainforest regrowth.

Completion of Zone 1 Translocation Spray

Appendix 1 Vegetation Monitoring Field Sheets

Good Bush Monitoring Survey Sheet		Site: Boral Zone 3 (west of creek)	
Date: 15/09/2025		Plot No: 3A Post Assessment	
Recorder: Marcus Burgess		Plot Size: 20 x 20m	
GPS Northing	616694	GPS Easting	0299814
GPS Accuracy	+-7m	GPS Elevation	69m
Vegetation Community: Established Revegetation with Rainforest understory			

NATIVE			WEED		
Botanical Name	Abundance	% Cover	Botanical Name	Abundance	% Cover
Acacia maidenii	U	<5%	*Ageratina riparia*	NP	
Acmena smithii	U	<5%	*Araujia sericifera*	U	<5%
Breynia oblongifolia	U	<5%	*Bidens pilosa*	U	<5%
Carex longibrachiata	U	<5%	*Cirsium vulgare*	NP	
Celastrus australis	U	<5%	*Delairea odorata*	U	<5%
Commelina cyanea	U	<5%	*Ehrharta erecta*	C	50%
Eucalyptus quadrangulata	U	<5%	*Lantana camara*	NP	
Eucalyptus saligna	U	<5%	*Modiola caroliniana*	NP	
Ficus coronata	U	<5%	*Olea europaea subsp. cuspidat*	NP	
Geitonoplesium cymosum	U	<5%	*Sida rhombifolia*	U	1-%
Glycine sp.	U	<5%	*Solanum mauritianum*	NP	
Guioa semiglauca	U	<5%			
Hakea salicifolia	U	<5%	**Natives Continued**		
Hibbertia scandens	NP		*Pandorea pandorana*	U	<5%
Hibiscus heterophyllus	U	<5%	*Pittosporum multiflorum*	U	<5%
Maclura cochinchinensis	U	<5%	*Oplismenus imbecillis*	U	10%
Melaleuca armillaris	U	<5%	*Sicyos australis*	NP	
Notelaea venosa	U	<5%	*Sigesbeckia orientalis*	NP	

Vegetation Condition:	Degraded revegetation, grass weeds dominating the ground layer sue to wet conditions
Fauna Evidence:	Bandicoot diggings near the Daphnandra population, loads of Kangaroos

Good Bush Monitoring Survey sheet		Site: Boral Zone 3 (east of creek)	
Date: 15/09/2025		Plot No: 3B Post Condition Assessment	
Recorder: Marcus Burgess		Plot Size: 20 x 20m	
GPS Northing	6166983	GPS Easting	299805
GPS Accuracy	+-7m	GPS Elevation	64m
Vegetation Community: Established Revegetation with Rainforest understory.			

NATIVE			WEED		
Botanical Name	Abundance	% Cover	Botanical Name	Abundance	% Cover
Acacia maidenii	I	40%	*Bidens pilosa*	NP	
Acmena smithii minor	U	5%	*Solanum mauritianum*	NP	
Breynia oblongifolia	U	<5%	*Ehrharta erecta*	C	25%
Carex longibrachiata	U	<5%	*Cirsium vulgare*	NP	
Cayratia clematidea	U	<5%	*Delairea odorata*	I	<5%
Geijera salicifolia	I	<5%	*Sida rhombifolia*	U	<5%
Dodonaea viscosa	I	<5%	*Ageratina riparia*	I	<5%
Elaeodendron australe	I	<5%	*Olea europaea subsp. cuspidat*	NP	
Eucalyptus saligna	I	<5%	*Araujia sericifera*	I	<5%
Ficus coronata	U	40%	*Olea europaea subsp. cuspidata*	NP	
Geitonoplesium cymosum	O	<5%			
Geranium homeanum	U	<5%	**Natives Continued**		
Glochidion ferdinandi	I	<5%	*Oplismenus imbecillis*	C	15%
Glycine sp.	NP		*Pandorea pandorana*	U	<5%
Guioa semiglauca	U	<5%	*Passiflora herbertiana*	NP	
Hakea salicifolia	U	<5%	*Pittosporum multiflorum*	O	<5%
Hibbertia scandens	I	<5%	*Pittosporum revolutum*	I	<5%
Hibiscus heterophyllus	U	5%	*Melaleuca armillaris*	I	<5%
Maclura cochinchinensis	U	5%	*Melaleuca decora*	I	<5%
Toona ciliata	I	5%	*Streblus brunonianus*	U	<5%

Anelima	O	60%	*Urtica incisa*	U	<5%
Notalea venosa	I	<5%	*Sigesbeckia orientalis*	O	<5%
Alphitonia excelsa	I	<5%	*Celastrus australis*	I	<5%

Vegetation Condition:	15 year old established revegetation, inappropriate species are now senescing regeneration of native species beginning to occur and dominate. Lots of deer damage noted throughout the site

Good Bush Monitoring Survey sheet		Site: Zone 3 Mel armillaris Shrubland	
Date: 15/09/2025		Plot No: 3C Post Assessment	
Recorder: Marcus Burgess		Plot Size: 20 x 20m	
GPS Northing	6166725	GPS Easting	0299937
GPS Accuracy	+-8m	GPS Elevation	87m
Vegetation Community: Ecotone Rainforest and Melaleuca armillaris Tall Shrubland			

NATIVE			WEED		
Botanical Name	Abundance	% Cover	Botanical Name	Abundance	% Cover
Acacia maidenii	I	5%	*Delairea odorata*	U	%10
Alphitonia excelsa	I	<5%	*Ehrharta erecta*	U	<5%
Aneilema biflorum	C	<5%	*Modiola caroliniana*	NP	
Asplenium flabellifolium	C	<5%	*Sida rhombifolia*	NP	
Breynia oblongifolia	O	<5%	*Solanum mauritianum*	NP	
Carex appressa	NP		*Senecio madagascariensis*	NP	
Cheilanthes tenuifolia	NP		*Oxalis sp.*	NP	
Clerodendrum tomentosum	U	<5%	*Stellaria media*	NP	
Commelina cyanea	NP		*Lantana camara*	NP	
Croton verreauxii	O	<5%	*Passiflora subpeltata*	NP	
Cryptocarya microneura	I	<5%			
Dichondra repens	C	<5%	**Natives continued**		
Ehretia acuminata	NP		*Pittosporum multiflorum*	C	<5%
Einadia hastata	NP		*Planchonella australis*	I	<5%
Eustrephus latifolius	I	<5%	*Plectranthus graveolens*	C	<5%
Geitonoplesium cymosum	C		*Poa labillardieri*	U	<5%
Guioa semiglauca	U	<5%	*Pseuderanthemum var.*	O	<5%
Gymnostachys anceps	U	<5%	*Sarcopetalum harveyanum*	U	<5%
Hibiscus heterophyllus	U	<5%	*Streblus brunonianus*	U	<5%
Maclura cochinchinensis	O	5%	*Trophis scandens*	O	5%

Melaleuca armillaris	U	<5%	*Xerochrysum bracteatum*	NP	
Phyllanthus gunnii	U	<5%	*Zieria granulata*	O	<5%
Notelaea venosa	I	5%	*Pandorea pandorana*	U	<5%
Oplismenus imbecillis	C	<5%	*Parsonsia straminea*	U	<5%
Oplismenus imbecillis	C	<5%	*Pellaea falcata*	O	<5%
Sigesbeckia orientalis	U	<5%	*Stephania japonica*	U	<5%
Diploglottis australia	I	<5%	*Nysanthies erecta*	U	<5%
Melicope micrococca	I	<5%	*Marsdenia rostrata*	I	<5%
Microlaena stipoides	U	<5%	*Clematis aristata*	I	<5%

Vegetation Condition:	Disturbed regenerating eco-tone (Rainforest to M. armillaris Woodland).
Fauna Evidence:	Kangaroos around the vicinity. Much deer damage noted
Significant Species:	*Zieria granulata* currently flowering

Good Bush Monitoring Survey sheet		Site: Zone 3 Subtropical RF Big Fig Area	
Date:15/09/2024		Plot No: 3D Post Assessment	
Recorder: Marcus Burgess		Plot Size: 20 x 20m	
GPS Northing	6166719	GPS Easting	0300124
GPS Accuracy	+- 10m	GPS Elevation	55m
Vegetation Community: Remnant Subtropical Rainforest			

NATIVE			WEED		
Botanical Name	Abundance	% Cover	Botanical Name	Abundance	% Cover
Alchornea ilicifolia	C	5%	*Lantana camara*	O	<5%
Ficus macrophylla	I	90	*Cestrum parqui*	I	<5%
Pittosporum multiflorum	O	<5%	*Solanum mauritianum*	I	<5%
Maclura cochinchinensis	O	<5%	*Delairea odorata*	U	<5%
Alectryon subcinereus	O	<5%	*Passiflora subpeltata*	I	<5%
Claoxylon australe	U	<5%	*Araujia sericifera*	I	<5%
Notelaea venosa	U	<5%	*Bidens pilosa*	U	<5%
Breynia oblongifolia	O	<5%	*Solanum psuedocapsicum*	C	25%
Diploglottis australis	C	<5%	*Ehrharta erecta*	C	20%
Brachychiton acerifolia	U	<5%	*Phytolacca octandra*	NP	
Streblus brunonianus	C	<5%	*Sida rhombifolia*	NP	
Clerodendrum tomentosum	C	<5%	*Olea europaea subsp. cuspidata*	I	<5%
Elaeodendron australe	O	<5%			
Melicytus dentatus	O	<5%	**Natives continued**		
Geitonoplesium cymosum	O	<5%	*Plectranthus parviflorus*	NP	-
Eustrephus latifloius	U	<5%	*Aphanopetalum resinosum*	C	<5%
Pandorea pandorana	O	<5%	*Sigesbeckia orientalis*	C	5%
Parsonsia straminea	I	<5%	*Sarcomelicope simplicifolia*	U	<5%
Nyssanthes erecta	C	50%	*Gynocthodes jasminoides*	U	<5%

Wilkiea huegeliana	I	<5%	*Cayratia clematidea*	O	<5%
Gymnostachys anceps	U	<5%	*Melia azedarach*	U	<5%
Oplismenus imbecillis	O	<5%	*Urtica incisa*	C	<5%
Pseuderanthemum var.	C	<5%	*Phyllanthus gunnii*	U	<5%
Pellaea falcata	I	<5%	*Actephila lindleyi*	U	<5%
Asplenium flabellifolium	U	<5%	*Dendrocnide excelsa*	O	<5%
Parietaria debilis	NP	-	*Croton verreauxii*	O	<5%
Legnephora moorei	U	<5%	*Trophis scandens*	U	<5%
Piper novae hollandiae	U	<5%	*Aneilema biflorum*	U	<5%
Stephania japonica	U	<5%	*Melicope micrococca*	U	<5%
Smilax australis	I	<5%	*Geranium homeanum*	I	<5%
Nyssanrhes erecta	C	15%	*Rubus rosifolius*	U	<5%

Vegetation Condition:	Good regeneration under the Fig. Stinging Trees that regenerated five years ago have now become 2 metre tall trees
Fauna Evidence:	Deer rutting and damage on Stinging Trees.
Significant Species:	*Actephila lindleyi*