

COOMA ROAD



2024 Annual Review



Site Details

Organisation	Holcim (Australia) Pty Ltd
Project	Cooma Road Quarry
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I, David Manning, certify that this audit report is a true and accurate record of the compliance status of the COOMA ROAD QUARRY for the period of 1 JANUARY 2024 – 31 DECEMBER 2024 and that I am authorised to make this statement on behalf of HOLCIM (AUSTRALIA) PTY LTD. Note.

- a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, \$1 million and for an individual, \$250,000.
- b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or \$22,000, or both).

Name of authorised reporting officer	David Manning
Title of authorised reporting officer	Quarry Manager
Signature of authorised reporting officer	P.n
Document Date	31/03/2025



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1 Statement of Compliance

The Statement of Compliance for the Cooma Road Quarry for the 2024 reporting period is provided in **Table 1**. The Compliance Status Key, outlined in **Table 2**, explains the risk levels and definitions used to classify non-compliances. **Table 3** lists the non-compliances associated with SSD 5109-MOD-2 for 2024.

Table 1: Statement of Compliance

Were all conditions of the relevant approval(s) complied with?			
SSD 5109	No, refer to Table 3 for further details		
EPL 1453	Yes.		

Risk level	Colour code	Description		
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence		
Medium	Non-compliant	 Non-compliance with: Potential for serious environmental consequences, but is unlikely to occur; or Potential for moderate environmental consequences, but is likely to occur 		
Low	Non-compliant	 Non-compliance with: Potential for moderate environmental consequences, but is unlikely to occur; or Potential for low environmental consequences, but is likely to occur 		
Administrative non-compliance	Non-complaint	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions).		

Table 2: Compliance Status Key



Table 3: Non-Compliances

Relevant Condition Condition Description		Condition Description	Compliance Status	Section Addressed in	Comment
SSD-5109-	Schedule 3,	Within 3 months of determination of	Non-	Annual Review Section 6.3	Missing PM10
MOD-2	Condition 16. Air Quality Management Plan	Modification 2, the Applicant must prepare an Air Quality Management Plan for the development to the satisfaction of the Secretary. This plan must: (a) be prepared by a suitably qualified and experienced person/s whose appointment has been endorsed by the Planning Secretary; (b) be prepared in consultation with the EPA; (c) describe the measures to be implemented to ensure: (i) compliance with the air quality criteria and operating conditions in this consent; (ii) best practice management is being employed; and (iii) air quality impacts of the	compliant		monitoring data for the period between 6 and 30 November 2024 due to the monitoring contractor losing the filter papers for this period. Holcim reported this immediately it was made aware by the engaged contractor.
		development are minimised during adverse meteorological conditions and extraordinary events; (d) describe the air quality management system; and (e) include an air quality monitoring program that: (i) is capable of evaluating the performance of the development against the air quality criteria; (ii) adequately supports the air quality management system; and (iii) includes a protocol for identifying any air quality-related exceedance, incident, or noncompliance and for notifying the Department and relevant stakeholders of these events.	Non- compliant	Section 6.3	Depositional Dust Monitoring (DDM) sample on 02 May 2024 was invalidated as per Section 7.2.2 of the <i>Air</i> <i>Quality Management</i> <i>Plan.</i> Reporting this was missed until this review process.



2 Introduction

Holcim (Australia) Pty Ltd (Holcim) operates the Cooma Road Quarry, a hard rock quarry located on Old Cooma Road in the Queanbeyan Local Government Area. The site operates under Development Consent (SSD 5109) approved by the New South Wales (NSW) Department of Planning, Housing & Infrastructure on 27 September 2013.

The site also operates in accordance with the Environmental Protection Licence (EPL) No. 1453 issued by the NSW Environment Protection Authority (EPA). Cooma Road Quarry has been operating since 1959 and is a significant supplier of granite and dacite hard rock aggregates. A regional locality figure is shown in **Figure 1** below.





Figure 1: Locality Map (SLR,2023)



In accordance with Schedule 5 Condition 9 of the modified Development Consent the site is required to prepare an Annual Review of the site in accordance with the conditions provided in **Table 4**.

Condition		Section addressed in Annual Review
By the end of March e Secretary, the Applica environmental perform Secretary. This review	each year, or other timing as may be agreed by the ant must submit a report to the Department reviewing the nance of the development to the satisfaction of the must:	
 a) describe the deve the previous caler carried out over th 	lopment (including rehabilitation) that was carried out in ndar year, and the development that is proposed to be ne current calendar year;	Section 8
 b) include a compret records of the dev includes a compare the relevant st measures/crite requirements the monitoring the relevant p Schedule 	nensive review of the monitoring results and complaints relopment over the previous calendar year, which rison of these results against: tatutory requirements, limits, or performance eria; of any plan or program required under this consent; g results of previous years; and redictions in the documents listed in condition 2(a) of	Section 6 and 7
c) identify any non-co were (or are being	ompliance over the last year, and describe what actions) taken to ensure compliance;	Section 1 and 13
d) identify any trends	s in the monitoring data over the life of the development;	Section 6
e) identify any discre the development, discrepancies; and	epancies between the predicted and actual impacts of and analyse the potential cause of any significant d	Section 6
f) describe what mean year to improve the	asures will be implemented over the current calendar the environmental performance of the development.	Section 14

This Annual Review has also been prepared in accordance with the Annual Review Guideline: Postapproval requirements for State significance mining developments (October 2015). This report documents the environmental performance of the quarry from 1 January to 31 December 2024.



2.1 Name and Contact Details

The key contact details for the site are outlined below:

Quarry Manager

David Manning Mobile: +61 429 791 390 Email: david.manning@holcim.com

Environment Manager – NSW Dozie Egeonu Mobile: +61 429 557 493 Email: <u>Dozie.Egeonu@holcim.com</u>



3 Approvals

The site operates under the following approvals listed in **Table 5**. The original Development Consent SSD 5109 was modified in 2016 (MOD 1) to approve the importation of VENM to the site. In 2019, the Development Consent was modified (MOD 2) to allow for the importation and application to land of excavated natural material (ENM) for the purposes of back filing and rehabilitation.

Approval	Regulatory Authority
Development Consent SSD 5109	Department of Planning, Housing, and Infrastructure
EPL No. 1453	Environment Protection Authority
Water Approval No. 40WA413082	NSW Department of Industry - Water

Table 5: Approvals for the Cooma Road Quarry Operations

Holcim holds EPL 1453 which covers its activities at the Cooma Road Quarry. **Table 6** outlines these licensing limits. The EPL was varied by the EPA on 17 April 2018 enabling the site to receive Virgin Excavated Natural Material (VENM) to match Development Consent Modification approved in 2016. The second Modification of Development Consent SSD 5109 was approved on the 30 April 2019 by Department of Planning, Housing and Infrastructure (DPHI).

Table 6: EPL Fee-Based Activity at the Cooma Road Quarry

Fee Based Activity	Scale (tonnes/T)					
Crushing, grinding, or separating	>500,000 – 2,000,000 processed					
Land-based extractive activity	> 500,000 – 2,000,000 extracted, processed, or stored					



4 Operations Summary

4.1 Exploration

Exploration drilling was carried out in the Southern Extension area of the Cooma Road Quarry in the 2024 reporting period.

4.2 Land Preparation

0.97 hectares (ha) of land was stripped in the Granite Pit and 0.64 ha of land was stripped in the Dacite Pit during the 2024 reporting period.

4.3 Construction Activities

No construction occurred at the Cooma Road Quarry in the 2024 reporting period.

Holcim received a Show Cause letter from DPHI on 5 September 2024 regarding the uncertified construction of infrastructure in 2023 within the relocated infrastructure area approved under SSD 5109. Holcim replied on 20 September 2024 stating: 'Holcim believes that formal action should not be taken on the grounds that the alleged non-compliance was unintentional and is being dealt with imminently'. DPHI followed up with a Warning letter dated 16 October 2024 stating that 'no formal action is warranted under the circumstances', however, they did liaise with Queanbeyan – Palerang Council regarding the circumstances. This resulted in Queanbeyan – Palerang Council issuing Holcim with a Penalty Infringement Notice on 13 December 2024.

4.4 Quarry Operations

Development activities undertaken at the Cooma Road Quarry in 2024 included:

- Drill, Blast, Load and Haul Activities;
- Crushing, screening, and stockpiling of product;
- Overburden removal and replacement in the southwest overburden dump;
- Maintenance of rehabilitation undertaken on the overburden dump in the south-western disturbance area; and
- Increasing the size of the Granite Pit; and
- Recycling of clean concrete on site for re-use as product.

All activities took place in accordance with the approved operating hours being 6am to 6pm, Monday to Saturday.

Operating hours relating to Cooma Road are outlined in Table 7.



	Operating Hours						
Activity	Monday - Friday Saturday		Sunday and Public Holidays				
Primary Crushing, Laden Truck Movements	6 am – 6 pm	6 am – 6 pm					
Construction Operations	7 am – 6 pm	8 am – 1 pm	None				
Unladen Truck Movements	6 am – 8 pm	6 am – 8 pm					
Other Operations	6 am – 10 pm	6 am – 10 pm					

Table 7: Cooma Road Operating Hours

Note: Maintenance activities may occur at any time provided they are inaudible at privately-owned residences.

 Table 8 includes a summary of the operations undertaken during the reporting period against the Development Consent conditions regarding product transported from the Cooma Road Quarry, with the site well below the consent criteria.

Table 8: Total Product Distributed (Tonnes)

Material	Approval Limit	2020	2021	2022	2023	2024	2025 Forecast
Product Distributed - Total	1,500,000	1,105,376	1,066,320	899,442	1,042,190	683,263	675,000

Schedule 2, Condition 7 of SSD 5109 states that Holcim must not carry out quarrying operations below 635 metres (m) Australian Height Datum (AHD). The deepest recorded point of operations in 2024 was 642 m AHD which is within the approved extraction depth.

Schedule 2, Condition 17 of SSD 5109 states that Holcim must provide production data to DPHI and include this data in the annual review. Note that Holcim submit this data on a financial year (July-June), therefore production data will not align completely with this report. **Table 9** details the extractive data for the 2023-2024 period.

Table 9: Extractive production data 2023-2024 reporting period

Product	Mining Type	Tonnes ¹
Fill & Crusher Fines (under 5mm)	Or not motion and	124,551
Manufactured Sand	Construction sand	10,002
Over 30mm-70mm (Railway Ballast)		7,323
Over 5mm-30mm Concrete Aggregates	Virgin materials - Crushed coarse	291,399
Over 75mm (Rock broken)	aggregates	3,142
Prepared Road Base & Sub-base & Drainage Filter		356,391
	Total	792,808

¹Production data has been rounded.



4.5 Next Reporting Period

Development activities proposed to be carried out at Cooma Road Quarry in 2025, include:

- Ongoing extraction of the resource within the approved quarry pit area;
- Allowance to receive quarry materials from other sites for crushing and screening (as required) and then sale. Total product (including from both material quarried from the site and from materials imported to the site) will be maintained within the total production limit; and
- Recycling of clean concrete on site for re-use as product.



5 Actions Required from Previous Annual Review

5.1 DPHI Actions from Previous Annual Review

Holcim submitted the 2023 Annual Review to the Major Projects Portal by 31st March 2024. Upon review of the Annual report DPHI stated:

"NSW Planning has reviewed the Annual Review and considers it to generally satisfy the reporting requirements of the approval and the NSW Planning Annual Review Guideline (October 2015)."

However, DPHI did request some further information to be included in future Annual Reviews, see **Table 10** below.

Table 10: DPHI Required Actions from 2023 Annual Review for Future Annual Reviews

Proposed Action	Section Addressed in Annual Review / Comment				
A description of operations in relation to requirements of S2 C7 regarding not carrying out quarrying operations	Section 4.4				
below 635 m AHO					
Complaint trends and comparison to previous years	Section 11.3				
Progress made in implementing the action plan from the	All audit actions have been closed out. See				
most recent independent audit	Section 12 for further details.				

5.2 Update on Proposed Actions from the Previous Annual Review

Table 11 outlines the actions proposed in the previous Annual Review (2023) for completion or commencement in 2023.

Improvement Measure	Activities	Update for this Annual Review
Progressive	The site will continue to progressively	Topsoil placed and spread with
Rehabilitation	rehabilitate if any areas are available.	self seeding.
Maintenance of rehabilitation	Continued maintenance of rehabilitation in the completed overburden dump in the south- western disturbance area including weed control as well as nest box monitoring.	Holcim engaged ecology to complete nest box monitoring. Weed control spraying was continued in the completed overburden dump rehabilitation.
Biodiversity	Weed spraying will continue at site during the next Annual Review period. Implementation of the Rehabilitation Management Plan.	7,331 metres squared (m2) of weed spraying on target weed species occurred in 2023. Holcim continued implementation of the Rehabilitation Management Plan.

Table 11: Holcim Proposed Actions from 2023 Annual Review for the 2024 Reporting Period



6 Environmental Performance

6.1 Meteorological Monitoring

This report uses 2024 rainfall data collected from the onsite Meteorological Station. The site uses meteorological results to inform daily operational activities, and to control potential impacts around noise and air quality. Results from this meteorological monitoring station for the report period are summarised in **Table 12**.

Monthly Rainfall (millimetres (m))									Total			
Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2024
96.33	70.17	40.88	90.58	0.25	0	0	21.79	26.38	22.31	108.96	35.58	513.23

Table 12: 2024 Rainfall Observations

During the 2024 reporting period, the onsite weather station recorded 513.23 mm of rain, which is lower than the 2023 period where 654.4 mm was recorded.

6.2 Noise

6.2.1 EIS Predictions

The 2012 Environmental Impact Statement (EIS) stated that:

'Modelling results indicate that under worst case operational and meteorological conditions, with the implementation of the noise management measures outlined above, the Project is predicted to result in an exceedance of the PSNLs at one privately owned residence located to the south-east of the Project area (N67) of up to 4dB during the daytime period. If the secondary crushing plant were to be operated during the evening under worst case meteorological conditions, this same residence could be expected to experience exceedances of up to 3dB during the evening period. Holcim is however committed not to operate the secondary crushing plant under such conditions, namely gradient winds from the north-east, thereby avoiding this potential impact.

6.2.2 Approved Criteria

The site has undertaken quarterly noise monitoring throughout 2023 in accordance with the Noise Management Plan. The Approved noise criteria from the Development Consent (Schedule 3 Condition 4) are provided in **Table 13**.



Receiver	Morning Shoulder 6 – 7 am	Day 7 am – 6 pm	Evening 6 – 10 pm	
	LAeq (15 min)	LAeq (15 min)	LAeq (15 min)	
N1, N7, N8, N56, N59, N63, N64, N65	40	44	39	
N67	36	41	35	
All other receivers between N9 and N71 inclusive	36	38	35	
All other receivers	35	35	35	
Notes:				

Table 13: Cooma Road Quarry Noise Criteria (SSD 5109)

• To locate the receivers referred in Table 1 refer to Appendix 5 of the Development Consent.

• After the first review on any EPL granted for this development under Section 78 of the POEO Act, nothing in this approval prevents the EPA from imposing stricter noise limits on the quarrying operations on site under the EPL.

Appendix 9 of the Development Consent sets out the metrological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria. However, these criteria do not apply if the Applicant has a written agreement with the relevant landowner/s to generate higher noise levels, and the Applicant has advised the Department in writing of these terms of this agreement.

6.2.3 Key Environmental Performance

Quarterly attended noise monitoring was undertaken at the Cooma Road Quarry on the following dates:

- 4 to 5 March 2024.
- 2 May, and 4 to 5 June 2024;
- 7 to 8 August 2024; and
- 2 to 3 October 2024.

The compliance assessments for each monitoring location (N3, N8, N38, N60 and N67) are presented in **Table 14**.

Cooma Road Quarry was not operational in the evening period of the duration of 2024 and therefore satisfied the minimum noise criterion of 35dBA. Non-quarry contributors to the noise survey results included traffic, aircraft, pedestrians, and birds.



Table 14: Cooma Road Quarry Noise Results 2024

Assessment	Receiver	Quarrying Noise Criteria	Q1		Q2		Q3		Q4	
Period	No.	LAeq _(15min)	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance
	N3	35	<33 ¹	Compliant	<17	Compliant	<31	Compliant	<19	Compliant
	N8	40	<24	Compliant	<34	Compliant	<41	Compliant	<47 ¹⁰	Compliant
Morning Shoulder	N38	36	<20	Compliant	<34	Compliant	<42 ⁹	Compliant	<32	Compliant
Shoulder	N60	36	<29	Compliant	<48 ⁶	Compliant	<32	Compliant	<35	Compliant
	N67	36	<30	Compliant	<43 ⁷	Compliant	<33	Compliant	<42 ¹⁴	Compliant
	N3	35	<40 ²	Compliant	<25	Compliant	<32	Compliant	<23	Compliant
	N8	44	<35	Compliant	<47 ³	Compliant	<46 ^{6,8}	Compliant	<46 ^{5,13}	Compliant
Daytime	N38	38	<37	Compliant	<40 ^{4,5}	Compliant	<42 ⁹	Compliant	<38	Compliant
	N60	38	<32	Compliant	<46	Compliant	<36	Compliant	<47 ¹¹	Compliant
	N67	41	<36	Compliant	<51 ⁷	Compliant	<41	Compliant	<51 ¹²	Compliant
	N3	35	Inaudible	Compliant	Inaudible	Compliant	Inaudible	Compliant	Inaudible	Compliant
	N8	39	Inaudible	Compliant	Inaudible	Compliant	Inaudible	Compliant	Inaudible	Compliant
Evening	N38	35	Inaudible	Compliant	Inaudible	Compliant	Inaudible	Compliant	Inaudible	Compliant
	N60	35	Inaudible	Compliant	Inaudible	Compliant	Inaudible	Compliant	Inaudible	Compliant
	N67	35	Inaudible	Compliant	Inaudible	Compliant	Inaudible	Compliant	Inaudible	Compliant

Notes: Monday to Saturday; Day 6am to 6pm; Evening 6pm to 10pm. Saturday, On Sundays and Public Holidays, Closed.

¹LA90 value of less than 50 (estimated) was dominated by background noise so unable to estimate contribution for quarry at assessment location.

² Estimated based on observed background noise using LAeq.

³ Measured LA90 value of 57 was dominated by road traffic noise so unable to estimate contribution for quarry at assessment location.

⁴ Measured LA90 value of 50 was dominated by road traffic noise so unable to estimate contribution for quarry at assessment location.

⁵ Negligible exceedance (NPfl 2017 – Table 4.1 and Table 4.2)

⁶ Measured LA90 value of 56 was dominated by road traffic noise so unable to estimate contribution for quarry at assessment location.

⁷ Measured LA90 value of less than 61 was dominated by road traffic noise so unable to estimate contribution for quarry at assessment location.

⁸Negligible exceedance (NPfl 2017 – Table 4.1 and Table 4.2)

⁹ Measured LA90 value of 52 was dominated by road traffic noise so unable to estimate contribution for quarry at assessment location.

¹⁰ Measured LA90 value of 56.5 was dominated by road traffic, birds, and aircraft so unable to estimate contribution for quarry at assessment location.

¹¹ Measured LA90 value of 57.0 was dominated by road traffic so unable to estimate contribution for quarry at assessment location.

¹² Measured LA90 value of 61.2 was dominated by road traffic so unable to estimate contribution for quarry at assessment location.

¹³ Measured LA90 value of 55.9 was dominated by road traffic so unable to estimate contribution for quarry at assessment location.

¹⁴ Measured LA90 value of 51.6 was dominated by road traffic so unable to estimate contribution for quarry at assessment location.



All monitoring during the quarterly noise assessments were undertaken in accordance with the conditions of consent. Extraneous noise sources measured during this time included traffic, aircraft, rustling trees, nearby residences, and wildlife. During the noise monitoring, Cooma Road Quarry was inaudible. As such, these results meet the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance and were not responsible for the exceedance. See **Appendix A** for the 2024 Noise Monitoring Reports.

Long-term Trends

Noise monitoring results were consistent with previous years and continued to meet th Development Consent criteria. The site continues to effectively manage noise.

6.2.4 Management Measures

Management measures relating to noise are outlined within the Cooma Road Quarry Noise Management Plan, these include:

- Defined operating hours;
- Work restrictions during the early morning shoulder period;
- Monitoring for noise and meteorological conditions;
- Broadband reversing beepers;
- Training of staff and contractors; and
- Controlled blasting activities.

6.2.5 Proposed Improvements

There are no proposed improvements to noise management.

6.3 Air Quality

6.3.1 EIS Predictions

A comprehensive Air Quality assessment was undertaken for the Project by Sinclair Knight Merz (SKM) for the 2012 EIS. The results of the predictive air quality modelling have identified that the Project will comply with the relevant air quality criteria at all nearby sensitive receiver locations under worst case operating conditions.

6.3.2 Approved Criteria

Depositional dust, Total Suspended Particulate (TSP), and particulate matter monitoring conducted at Cooma Road Quarry is compared with the monitoring criteria stipulated in Schedule 3, Condition 14 of SSD 5109 in **Table 15**. The site installed a High-Volume Sampling Unit (HVAS) in late 2016 to monitor PM₁₀ in accordance with the criteria stipulated in Schedule 3, Condition 14 of SSD 5109. HVAS air quality monitoring at the site has been undertaken throughout 2023.



Long-term impact assessment criteria for Deposited Dust						
Pollutant	Averaging Period	Maximum increase in deposited dust level	Maximum total deposited dust level			
° Deposited dust	Annual	^b 2 g/m ² /month	^a 4 g/m ² /month			
Long-term impact assessment criteria for Particulate Matter (from Development Consent)						
Pollutant		Averaging Period	^d Criterion			
TSP		Annual	₃90 μm/m³			
Particulate matter < 10 µm (PM10)		Annual	^a 30 µm/m ³			
Short-term impact assessment criteria for Particulate Matter (from Development Consent)						
Pollutant		Averaging Period	^d Criterion			
Particulate matter < 10	μm (PM ₁₀)	24 hour	^ь 50 μm/m³			

Table 15: Deposited Dust, TSP and PM₁₀ Criteria

Notes:

^a Total impact (i.e., incremental increase in concentrations due to the development plus background concentrations due to all other sources)

^b Incremental impact (i.e., incremental increase in concentration due to the development on its own)

° Deposited dust is to be assessed as insoluble solids as defined by Standards Australia AS/NZS 3850:10.1.2003 – Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method

^d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed by the Secretary in consultation with EPA.

The main potential source of air emission contributions at the quarry is in the form of airborne dust, which can arise from activities such as quarrying, vehicle movements and crushing. To minimise dust emissions associated with vehicle movements, Holcim continued to dampen haul roads and utilise the quarry's wheel wash facility.



6.3.3 Key Environmental Performance

Depositional Dust Monitoring

Depositional dust monitoring was undertaken at five depositional dust gauges at Cooma Road Quarry in 2024. Results for this monitoring are provided in **Table 16**.

Samula Data	Insoluble Solids (g/m²/month)					
Sample Date	DDG1	DDG2	DDG3	DDG4	DDG5	
04/01/2024	4.2	1.4	1.2	1	1.4	
05/02/2024	1.7	1.1	1.6	0.2	1.2	
05/03/2024	1.5	1.4	1.6	0.1	0.7	
02/04/2024	1.5	1.3	1.3	1.2	0.5	
02/05/2024	1.9	1.5	1.0	Invalidated	0.6	
03/06/2024	1.4	1.4	1.1	1.0	0.7	
04/07/2024	1.3	0.3	0.2	0.9	0.3	
05/08/2024	0.9	0.7	0.4	0.9	0.6	
03/09/2024	3.6	0.9	0.8	2.8	0.8	
04/10/2024	1.6	0.7	0.7	0.6	0.8	
04/11/2024	2.0	1.0	3.7	4.1	0.5	
05/12/2025	1.8	0.7	1.7	0.4	1.0	
Annual Average	2.0	1.1	1.0	1.0	0.8	

Table 16: 2024 Dust Monitoring (Depositional Dust)

During the 2024 reporting period, there were no exceedances, however, there was one invalidated reading at DDG 4 on 2 May 2024. Reporting this was missed until the preparation process of this Annual Review. The Department was notified of a reading of 4.1 g/m²/month at DDG4 during November 2024 monitoring, however, Holcim does not consider this as a noncompliance as the DDG4 depositional dust is still within the annual average in accordance with Schedule 3, Condition 14.

A summary of depositional dust trends between 2017 and 2024 are outlined in Table 17.



Table 17: Depositional Dust Trends

Dust Depositional Monitoring Summary for		Monitoring Results (Contamination Removed) (g/m²/month)							
Gauge Ar	Annual Review Period	2017	2018	2019	2020	2021	2022	2023	2024
DDG1	Insoluble Solids Reporting Period Average	3.1	3.8	4.9	3.6	2.6	2.2	1.75	2
	Max. Insoluble Solids	3.7	5.4	7.7	6.2	6.4	5.4	3.5	4.2
	Min. Insoluble Solids	2.1	1.9	2.8	0.5	2.5	0.3	0.1	0.9
	Insoluble Solids Reporting Period Average	1.8	1.7	2.2	1.9	2.1	1.1	1.0	1.11
DDG2	Max. Insoluble Solids	2.6	3.0	4.1	8.2	3.5	2.4	2.9	1.5
	Min. Insoluble Solids	0.9	0.7	1	0.9	1.2	0.2	0.1	0.3
DDG3	Insoluble Solids Reporting Period Average	0.8	1.5	2.1	1.9	1.3	1.1	1.0	1.02
	Max. Insoluble Solids	1.6	3.9	5	6.7	2.7	3.5	2.8	3.7
	Min. Insoluble Solids	0.4	0.5	0.3	0.6	0.5	0.4	0.1	0.2
DDG4	Insoluble Solids Reporting Period Average	2.1	4.2	3.6	2.1	3.7	4.5	1.8	1.01
	Max. Insoluble Solids	4.3	13.1	7.1	11.2	11.0	10	11	4.1
	Min. Insoluble Solids	0.8	0.3	1.7	0.2	0.4	0.4	0.1	0.2
	Insoluble Solids Reporting Period Average	2.0	2.2	2.0	1.5	2.0	0.9	0.5	0.76
DDG5	Max. Insoluble Solids	3.8	6.1	4.1	8.4	5.4	1.8	2.4	1.4
	Min. Insoluble Solids	0.1	0.3	0.5	0.2	0.6	0.5	0.7	0.3



PM₁₀ Monitoring

Results for 2024 PM₁₀ monitoring are provided in **Table 18**.

Table 18: 2024 Dust Monitoring (PM10)

Sample Date	ΡΜ ₁₀ (μg/m³)	TSP (calculated)	PM ₁₀ 24-hour Compliance Status
5/01/2024	4	10	Compliant
11/01/2024	6.5	17.1	Compliant
17/01/2024	5.5	13.7	Compliant
23/01/2024	7.7	19.2	Compliant
29/01/2024	13.5	33.8	Compliant
4/02/2024	16.5	41.2	Compliant
10/02/2024	5.8	14.6	Compliant
16/02/2024	11.1	27.7	Compliant
22/02/2024	7.1	17.7	Compliant
28/02/2024	11.2	28.1	Compliant
5/03/2024	10.1	25.2	Compliant
11/03/2024	8.2	20.6	Compliant
17/03/2024	2.2	5.4	Compliant
23/03/2024	4.9	12.1	Compliant
29/03/2024	9.8	24.6	Compliant
4/04/2024	2.3	5.7	Compliant
10/04/2024	2.3	5.8	Compliant
16/04/2024	6.8	16.9	Compliant
22/04/2024	6.4	16	Compliant
28/04/2024	4.9	12.3	Compliant
4/05/2024	0.9	2.3	Compliant
10/05/2024	1	2.5	Compliant
16/05/2024	4.4	10.9	Compliant
22/05/2024	2.3	5.8	Compliant
28/05/2024	6.2	1.5	Compliant
3/06/2024	1.5	3.7	Compliant
9/06/2024	3.7	9.4	Compliant
15/06/2024	1.8	4.6	Compliant
21/06/2024	2.5	6.1	Compliant



Sample Date	ΡΜ ₁₀ (μg/m³)	TSP (calculated)	PM ₁₀ 24-hour Compliance Status
27/06/2024	4.5	11.2	Compliant
3/07/2024	7.4	2.9	Compliant
9/07/2024	3.1	7.8	Compliant
15/07/2024	2.9	7.4	Compliant
21/07/2024	3.1	7.8	Compliant
27/07/2024	3.6	8.9	Compliant
2/08/2024	5	12.4	Compliant
8/08/2024	6.7	16.7	Compliant
14/08/2024	4.4	10.9	Compliant
20/08/2024	5.4	13.5	Compliant
26/08/2024	3.6	9.1	Compliant
1/09/2024	7.4	18.6	Compliant
7/09/2024	5.8	14.6	Compliant
13/09/2024	5.7	14.3	Compliant
19/09/2024	10.9	27.3	Compliant
25/09/2024	9.6	24	Compliant
1/10/2024	38.2	95.4	Compliant
7/10/2024	12.8	32	Compliant
13/10/2024	11.1	27.7	Compliant
19/10/2024	5.2	12.9	Compliant
25/10/2024	11.1	27.7	Compliant
31/10/2024	18.1	45.3	Compliant
6/11/2024	-	-	Non-compliant
12/11/2024	-	-	Non-compliant
18/11/2024	-	-	Non-compliant
24/11/2024	-	-	Non-compliant
30/11/2024	-	-	Non-compliant
6/12/2024	14.8	37	Compliant
12/12/2024	16.6	41.5	Compliant
18/12/2024	16.8	41.9	Compliant
24/12/2024	12.7	31.8	Compliant
30/12/2024	19.2	47.9	Compliant
Annual Average	7.8	19	Compliant



There were 61 sampling events recorded in the 2024 report period. There were no exceedances of the short term (24 hour) PM_{10} criterion of 50 µg/m³. There is a data gap from 6 to 30 November 2024 due to the monitoring contractor misplacing the filter papers containing the monitoring records for this period. Holcim reported this immediately as it was made aware by the engaged contractor.

Total Suspended Particulates (TSP) are also included in this report in **Table 18** as per the requirements of the Development Consent. These results have been calculated rather than directly measured through the monitoring program at Cooma Road, using a conversion factor as per the approved Cooma Road *Air Quality Management Plan*, which is consistent with the region. There are no long-term records to compare these results.

The 2024 annual average for PM_{10} was 7.8 μ g/m³, compared to 10.04 μ g/m³ for 2023. A summary of average, minimum and maximum results from 2024 compared to results from previous years are outlined in **Table 19**.

Monitoring Summary for Annual Review Period	2017 Results (µg/m3)	2018 Results (µg/m3)	2019 Results (µg/m3)	2020 Results (µg/m3)	2021 Results (µg/m³)	2022 Results (µg/m3)	2023 Results (µg/m3)	2024 Results (µg/m3)
PM ₁₀ Average	10.97	13.1	10.7	12.2	11.6	8.5	10.04	7.8
Max. PM ₁₀	35.9	80.3	37	35.1	37.3	29.8	23.8	38.2
Min. PM ₁₀	1.2	1	1.8	2.8	1.0	3.3	2.3	0.9

Table 19: PM₁₀ Monitoring Trends since 2017

Long Term Trends

Depositional Dust

Holcim has monitored depositional dust on a monthly basis at five locations within the Cooma Road Quarry project area since 2001. Dust deposition data from the site shows that annual average dust deposition levels have remained below the Development Consent criteria of 4 g/m²/month, and that average levels at all gauges in 2024 are similar to the 2023 average. Monitoring results for 2024 remain consistent with long-term dust trends at Cooma Road Quarry.

<u>PM₁₀</u>

PM₁₀ results for 2024 are mostly consistent with previous years. There were no exceedances recorded in 2024.

The maximum PM_{10} result was 38.2 μ g/m³ which is consistent with previous years. The PM_{10} annual average for 2024 was below the criteria and consistent with previous years.

Comparison to EIS Predictions

The results for the annual average for depositional dust and PM10 were generally within the predicted limits of the EIS predictions.



6.3.4 Management Measures

Mitigation measures relating to air quality are outlined within the Cooma Road Quarry *Air Quality Management Plan* (2019). The plan outlines the control measures implemented by Cooma Road Quarry to minimise the potential air quality impacts on the local community, including:

- Inspections;
- Defined operating hours;
- Application of water for dust suppression;
- Enclosure of plants and transfer points;
- Monitoring for air quality and meteorological conditions; and
- Training of staff and contractors.

6.3.5 Proposed Improvements

There are no further proposed improvements for Cooma Road Quarry in the next reporting period.

6.4 Blasting

6.4.1 EIS Predictions

The 2012 EIS found that air blast and ground vibration levels would comply with relevant vibration and air blast criteria at all sensitive residential receivers through ongoing management of blast design and size.

6.4.2 Approved Criteria

According to both EPL 1453 and SSD 5109, the overpressure level from blasting operations must not exceed 115 dB (L) for more than 5% of the total number of blasts, at any residences or nearby receiver, and must not exceed 120 dB (L) at any time.

Ground vibration must not exceed 5 mm/s for 5% of the total number of blasts over a period of 12 months and must not exceed 10 mm/s at the nearby receiver.

6.4.3 Key Environmental Performance

Table 20 outlines the blast monitoring results at the Cooma Road Quarry during the Annual Review period.

	Heffernans House		Jerrabomberra	Compliance	
Date	Overpressure (dBL)	Vibration (mm/s)	Overpressure (dBL)	Vibration (mm/s)	Status
17/0124	05.4	0.67			Compliant
17/0124	95.4	0.07	DNI		Compliant
5/02/24	94.9	0.97	DNT	DNT	Compliant
12/02/24	DNT	DNT	DNT	DNT	Compliant
20/02/24	DNT	DNT	DNT	DNT	Compliant
27/02/24	DNT	DNT	DNT	DNT	Compliant
4/03/24	DNT	DNT	DNT	DNT	Compliant

Table 20: 2024 Blast Monitoring Results



	Heffernans House		Jerrabomberra	Complianco	
Date	Overpressure	Vibration	Overpressure	Vibration	Status
	(dBL)	(mm/s)	(dBL)	(mm/s)	Olulus
21/03/24	109.1	0.841	97.6	0.51	Compliant
26/03/24	DNT	DNT	DNT	DNT	Compliant
5/04/24	DNT	DNT	DNT	DNT	Compliant
12/04/24	DNT	DNT	DNT	DNT	Compliant
29/04/24	DNT	DNT	DNT	DNT	Compliant
7/05/24	DNT	DNT	DNT	DNT	Compliant
16/05/24	DNT	DNT	DNT	DNT	Compliant
24/05/24	DNT	DNT	DNT	DNT	Compliant
6/06/4	DNT	DNT	DNT	DNT	Compliant
28/06/24	111.2	0.58	100.4	0.83	Compliant
15/07/24	DNT	DNT	DNT	DNT	Compliant
12/08/24	DNT	DNT	DNT	DNT	Compliant
2/09/24	102.3	1.09	96.4	0.37	Compliant
16/09/24	DNT	DNT	DNT	DNT	Compliant
20/09/24	107.9	0.54	76.5	0.58	Compliant
30/09/24	DNT	DNT	82.5	0.46	Compliant
14/10/4	100.2	0.5	DNT	DNT	Compliant
29/10/24	101.7	0.33	DNT	DNT	Compliant
25/11/24	112.5	0.56	82.5	0.44	Compliant
2/12/24	105.4	0.08	88.5	0.39	Compliant
5/12/24	107	0.32	DNT	DNT	Compliant
13/12/24	DNT	DNT	DNT	DNT	Compliant

Note: DNT = Did Not Trigger

In summary:

- There were 28 blasts during 2024; and
- All blasts were compliant with the overpressure and vibration criteria.

Holcim alerts the nearest sensitive receivers within 24 hours of a proposed blast. This process is managed by the weighbridge staff who send a text message to the tenants the day before a planned blast is undertaken.

Long-term Trends

Blasting levels from 2016 to 2023 measured at Heffernans House are presented in Table 21.

In 2016 there was a non-compliance relating to a blast result of 119.8 dBL. Zero non-compliances for blasting occurred in the subsequent years including this report period.



Heffernans House					
Year	Number of Blasts	Max. Overpressure (dBL)	Average Overpressure (dBL)	Max Vibration (mm/s)	Average Vibration (mm/s)
2016	9	119.8	102.6	1.98	0.88
2017	32	113.5	101.4	4.34	0.75
2018	16	113.5	102.8	3.55	0.98
2019	25	114.7	102.5	4.00	1.12
2020	29	114.7	104.8	3.0	1.1
2021	15	112.9	104.0	2.0	1.1
2022	19	112.1	102	2.38	1.1
2023	29	103.5	103.95	1.88	1.12
2024	28	112.5	104.3	1.09	0.6

Table 21: Long-term Blasting Trends

Comparison to EIS Predictions

The results for blasting in 2024 were within the predicted limits of the EIS.

6.4.4 Management Measures

Management measures relating to blasting are outlined within the Cooma Road *Quarry Blast Management Plan (BMP)*. The BMP provides a mechanism for assessing blast monitoring results against the relevant blast impact assessment criteria and outlines the control measures implemented as part of the continued operations of the quarry to minimise the potential for blast related impacts in the local community.

6.4.5 Proposed Improvement

No proposed improvements. Blast monitoring will continue in 2025 and all blasts will be reported in the Annual Review.

6.5 Traffic Management

6.5.1 EIS Predictions

The 2012 EIS predicted the increased traffic associated with the Project on the local road network to be satisfactory. On the wider network, the increase in traffic as a result of the Project was predicted to comprise a very small proportion of total traffic and be dispersed over a number of routes, resulting in relatively small increase in the overall traffic levels on these roads and intersections.

The Project was not predicted to have a negative impact on road safety.



The road upgrades were predicted to assist in managing/addressing future road safety issues associated with the overall future traffic growth on the road network, including the relatively small increase in traffic volumes due to the Project.

6.5.2 Approved Criteria

According to Schedule 2, Condition 13 of SSD 5109, for the life of the development, the Applicant must ensure that:

- No more than an average of 48 truck movements per hour occur collectively to and from the site on any day; and
- No more than 30 laden trucks per hour are dispatched from or received at the site collectively.

6.5.3 Key Environmental Performance

Holcim recorded daily truck movements and volumes transported throughout 2024. Holcim maintained compliance with the conditions for truck movements throughout 2024. A copy of the truck movements and transported quarry product recorded throughout 2024 are outlined in **Table 22**. A total of 801,228.13 t of product was transported on and offsite during 2024.

Month	Transport Tonnages	Truck Movements
January	51,286.35	1,841
February	88,254.28	3,317
March	73,516.66	2,508
April	62,003.41	2,186
Мау	91,323.12	3,102
June	50,105.82	1,774
July	61,209.06	2,297
August	64,429.30	2,277
September	67,915.92	2,427
October	69,801.90	2,725
November	81,375.97	2,921
December	40,006.34	1,565
Total	801,228.13	28,940

Table 22: Transport Tonnages 2024

6.5.4 Management Measures

Traffic and transport impacts are managed in accordance with the specific management measures and controls within the Cooma Road Quarry Transport Management Plan.



6.5.5 Proposed Improvements

Truck movements will continue to be monitored and recorded in the oncoming reporting period to ensure that they remain within the approved criteria.

6.6 **Biodiversity**

6.6.1 EIS Predictions

Consideration of the proposal under Section 5A of the *Environment Planning and Assessment Act 1979* (EPBC Act) determined there was unlikely to be any significant impacts to species or communities listed in NSW. The Project is also considered unlikely to result in a significant impact on EPBC Act listed species and communities, or on migratory species.

6.6.2 Approved Criteria

There are no specific criteria associated with biodiversity management for the site. The approved quarrying plan has been designed to include a number of biodiversity impact mitigation factors and rehabilitation design factors.

6.6.3 Key Environmental Performance

Weed spraying continued during the 2024 reporting period and total area sprayed in approximately (7,331 m2). Maintenance of trees planted in 2017 continued in this reporting period. Holcim continued to collect boulders and fallen timber to promote increased habitat complexity in the site rehabilitation areas.

55 nest boxes were installed in 2021 after bushfires, with the following nestboxes installed:

- 5 Large parrot nest boxes
- 16 Small parrot boxes
- 4 treecreeper nest boxes
- Microbat nest boxes
- Brushtail nest boxes
- 3 Ringtail nest boxes
- Squirrel glider nest boxes.

The 2024 winter survey demonstrates that since the 2023 winter survey, the nest boxes have shown a significant increase in usage, with 40 nest boxes showing signs of use compared to 32 in 2023 and 27 in 2022. This indicates a clear trend in increasing box usage over time. 4 nest boxes contained native fauna, with one containing a glider species. 25 nest boxes contained leaf nests with 5 containing fresh leaves, which indicates recent or current use by arboreal mammals, most likely gliders. Although current occupancy rates are low across the entire set of nest boxes, the use observed during the current survey represents a relatively strong occupancy result only three years after installation.

5 nest boxes require maintenance, 4 contained active beehives, and box #51 needs its lid re-sealed. The 2024 Biodiversity Monitoring Report can be found in **Appendix B**.

6.6.4 Management Measures

The ongoing management of the ecological values of the Project area are required to be conducted in accordance with the Cooma Road Quarry Rehabilitation Management Plan. The plan outlines the control



measures to be implemented as part of the continued operations at the Cooma Road Quarry. This includes minimising the potential impacts on biodiversity as a result of quarrying activities as well as risks associated with unsuccessful post-quarrying rehabilitation.

6.6.5 Proposed Improvements

During the 2025 reporting period Holcim will:

- Continue to manage weed species on the site.
- Continue to monitor next boxes.
- Assess the need for feral animal control and implement a program if required, however there have been no feral animal sightings to date.
- Salvage fallen timber and boulders to promote increased habitat complexity in the rehabilitation areas.

6.7 Heritage (Aboriginal Archaeology and Historic Heritage)

6.7.1 EIS Predictions

Aboriginal Archaeology

The 2012 EIS and associated due diligence assessment found that due to the highly disturbed nature of the Project Area, the potential for subsurface Aboriginal artefacts in modified areas would be extremely low. No previously recorded sites were identified within the proposed disturbance area.

One isolated artefact, a silcrete broken flake (identified as Cooma Quarry 2), was located on the spur crest adjacent to the proposed infrastructure area. Holcim has committed that the Project will not impact on this site.

Historic Heritage

The known, locally listed, Moses Morley Kiln is the only heritage item/site to be identified within the Project Area.

The Historic Heritage Assessment conducted as part of the 2012 EIS determined the Project would not physically impact on the kiln and it would be very unlikely to impact on the identified heritage significance of the site.

The EIS did identify the potential for indirect impacts as the result of vibration associated with blasting and construction. Holcim implemented additional management measures for construction and blasting operations.

No other potential heritage items/sites were identified within the Project Area.

6.7.2 Approved Criteria

There are no specific criteria associated with heritage relating to the project. The process for managing any unexpected heritage items is outlined in the Heritage Management Plan.



6.7.3 Key Environmental Performance

There were no issues relating to Aboriginal and historic heritage during the reporting period. Land clearing that occurred did not uncover any previous unidentified Aboriginal or Historic heritage artifacts.

Historic heritage monitoring was carried out by NGH Pty Ltd (NGH) on 12 December 2024. Findings of this report include:

- The three structures forming part of the Moses Morley Lime Kiln complex were still intact with no discernible changes since last photographed in 2012;
- The fence surrounding the complex is intact apart from a wombat burrow under the southern fence; no wombat burrowing was evident within the fenced area or into the structures themselves;
- Major threat identified to the structures is the presence of weeds that have started growing adjacent to the structures.

NGH recommended Holcim complete the following:

- Develop a weed management plan to provide direction on the management and removal of weeds and eucalypts to minimise impacts on onsite heritage structures.
- Conduct six-monthly weed inspections and annual site condition inspections.
- Ongoing photographic monitoring of historic sites.

See **Appendix C** for the 2024 Historic Heritage Monitoring Report.

6.7.4 Management Measures

Heritage impacts will continue to be monitored in accordance with the Heritage Management Plan.

6.7.5 **Proposed Improvements**

As there have been no Aboriginal heritage items located to date, no improvements to management measures are proposed.



7 Water Management

Water management at the Cooma Road Quarry is undertaken in accordance with the Water Management Plan. The 2014 Water Management Plan (Umwelt) (WMP) was updated and significantly altered in July 2019. The updated WMP was approved by DPHI 12 August 2019.

7.1 EIS Predictions

Section 5.3 of the EIS (2012) assessed impacts to local water systems. The Project is expected to have a negligible impact on annual flow volumes in Barracks Creek compared to the currently approved impacts. The Project will not impact on annual flow volumes within Jerrabomberra Creek. The Project is primarily located within the boundary of the existing water management system. The construction and operation of the Project will be consistent with the existing Water Management Plan and associated erosion and sediment controls. Therefore, it is considered that there will be negligible impact on water quality in downstream surface water systems. As such it is considered that the Project will result in no changes to the currently approved impacts.

Given both rock types (granite and dacite) quarried at the Cooma Road Quarry are relatively stable with respect to groundwater quality, there is no concern regarding the potential for the quarried material to affect groundwater quality.

7.2 Approved Criteria

Holcim are required to monitor surface water quality during discharge events at the Cooma Road Quarry licensed discharge point (LDP), in accordance with the requirements of EPL 1453 (provided in **Table 23**). These criteria only apply to water quality results when the site is discharging.

Pollutant	Units of Measure	100 percentile concentration limit
Oil and Grease	milligrams per litre	10
рН	рН	6.5-8.5
Total Suspended solids	milligrams per litre	50

	Table 23: Water Qualit	y Criteria for the Cooma	Road Quarry (E	EPL 1453) POINT 1
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Holcim are also required to conduct monthly water quality monitoring at Barracks Creek in accordance with the *Water Management Plan*. See **Table 24** below.



Table 24: Barracks Creek Water Quality Trigger Values

Parameter	Unit	Trigger Values
рН	pH units	6.5-8.5 ¹
EC	μS/cm	125-2200 ²
Oil and Grease	mg/L	10 ¹
TSS ³	mg/L	<50 ¹

Notes:

¹ Based on limits in EPL 1453

² Based on Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Australian and New Zealand Environment and Conservation Council, 2000) default trigger values for slightly to moderately disturbed lowland river systems.
³ TSS monitoring commenced June 2007.

7.3 Surface Water Results

There were two direct discharges to Barracks Creek in 2024 and the monitoring for these events are shown in **Table 25**. Holcim monitors surface water quality in Barracks Creek monthly and these results are shown in **Table 26**.

Table 25: 2024 Discharge Monitoring Results (LDP 1 - Barracks Creek)

Discharge Date	рН	Total Suspended Solids (mg/L)	Oil and Grease (mg/L)
Trigger	6.5-8.5	<50	10
17/01/2024	8.58	35	0
27/02/2024	8.18	3	0

Note - Exceedances are highlighted in BOLD

Table 26: 2024 Surface Water Monitoring Results (Barracks Creek)

Sample Date	Total Suspended Solids (mg/L)	рН	Oil and Grease (mg/L)	Electrical Conductivity (µS/cm)
Trigger	<50	6.5-8.5	10	125-2200
22/01/2024	5	7.8	10	555
05/02/2024	5	7.8	13	777
04/03/2024	5	8.1	10	1100
02/04/2024	5	7.8	10	783
01/05/2024	5	8.7	10	737
05/06/2024	5	8.1	14	651
03/07/2024	5	8.6	10	774
07/08/2024	53	7.5	12	852


Sample Date	Total Suspended Solids (mg/L)	рН	Oil and Grease (mg/L)	Electrical Conductivity (µS/cm)
Trigger	<50	6.5-8.5	10	125-2200
04/09/2024	5	8.4	10	739
17/10/2024	5	9.5	5	707
06/11/2024	6.2	8.6	14	731
04/12/2024	5	8.5	5	1190
Annual Average	9.1	8.3	10.25	800.5

Note - Exceedances are highlighted in BOLD.

The discharge pH exceedance (8.58) on 17 January 2024 was reported to the EPA on 6 February 2024 in accordance with SSD 5109 Schedule 5 Condition 7A (Non-Compliance Notification). This was followed by a site visit and investigation by the EPA as well as a follow-up letter dated 18 March 2024. The monitoring data from the discharge on 27 February 2024 was all within the criteria and therefore the Department didn't need to be notified.

The annual average for total suspended solids (TSS) in 2024 was 9.1 mg/L, which is higher than the annual average in 2023 which recorded 7.74 mg/L.

2024 monitoring showed a broad range of pH (7.5 to 9.5) with overall lower values compared to 2023, particularly in the first half of the year, suggesting a trend towards more neutral conditions.

pH had a slight increased in acidity when compared to the annual average from the 2023 reporting period and it is back within the criteria range in 2024 with an average of pH 8.3.

pH values exceeded the criteria level of 8.5 in May, July, October, and November, with October recording the highest reading of pH 9.5.

Oil and grease were higher than the EPL criteria in February, August, and November of 2024, with June and November recording 14mg/L, above the criteria limit of 10 mg/L. The annual average for oil and grease was 10.25 mg/L, which is lower than 2023, where 14.67 mg/L was recorded.

Long-term Trends

Table 27 shows a comparison of data between 2016 to 2024 and indicates that results for pH and oil and grease have increased compared to previous years and is outside of criteria levels TSS levels in 2024 have been lower than previous years and are within the EPL criteria.

In their 2023 Annual Review, Holcim proposed to engage a surface water specialist during the 2024 reporting period to conduct preliminary investigations of Barracks Creek, in response to the increasing trends outlined in **Table 27**. However, this engagement did not occur in 2024. Holcim remains uncertain about the causes of the elevated results and anticipates sampling at multiple locations in the future. The investigation into surface water quality trends at Barracks Creek is now proposed for 2025.



Year	pH Average	Oil and Grease Average (mg/L)	TSS Average (mg/L)
2016	7.4	<1	2.5
2017	7.5	<1	2.6
2018	7.5	<1	4.75
2019	7.5	<1	5.0
2020	7.7	5.58	53.08
2021	8.3	8.25	36.95
2022	8.4	7.5	30.25
2023	8.9	14.67	7.74
2024	8.3	10.25	9.1

Table 27: Long-term Water Monitoring Barracks Creek

Comparison to EIS Predictions

There was no evidence of any detrimental impact from the Quarry on surface water. This is consistent with the EIS predictions.

7.4 Groundwater

Schedule 3, Condition 20 of the Consolidated Consent states that Holcim must implement a groundwater monitoring program that includes:

- Baseline data of groundwater levels surrounding the development;
- Groundwater assessment criteria based upon analysis of baseline data for groundwater, including trigger levels for investigating any potentially adverse groundwater impacts; and
- A program to monitor and/or validate the impacts of the development on groundwater resources.

Groundwater monitoring is required in accordance with the WMP.

A groundwater assessment by Coffey Geotechnics (2012) concluded that the operation of Cooma Road Quarry is not considered to have a significant impact on the regional groundwater resources, as:

- The quarry site is in a tight rock formation where no meaningful groundwater extractions can be attained;
- Quarrying activities do not impact on a viable aquifer;
- The volume of groundwater affected by the Cooma Road Quarry is limited to the exposed water table in the granite pit;
- Interaction of the granite pit with regional groundwater is very limited; and
- The maximum extraction depth will not be increased.

Cooma Road Quarry is committed to the following to establish a regular groundwater monitoring system:

• Drilling of MB01 and MB02 bores;



- Casing and installation of piezometer;
- Obtain quarterly land access to bores with neighbours for access to GW400534 and GW 416130 for monitoring;
- Add groundwater monitoring to contractors quarterly environmental monitoring program;
- Update the Water Management Plan accordingly; and
- Engage consultant over the 24 months to set trigger values based quarterly level monitoring.

The Cooma Road Water Management Plan (WMP) was revised in 2019 to include a groundwater monitoring program that would require monitoring to occur at four groundwater bores. In 2020, a groundwater assessment occurred to establish criteria for the WMP, with trigger levels to be set after 24 months of monitoring.

A total of four bores were installed in early 2021. Quarterly groundwater monitoring commenced in June 2021.

Holcim has reviewed the interim trigger values and submitted revised trigger values to the Department for approval.

7.4.1 Groundwater Performance

Groundwater results for 2024 were compared to the trigger values in the Water Management Plan, outlined in **Table 28.**

Parameter	Unit	Trigger Values
рН	рН	6.5-8.5 ¹
Electrical Conductivity (EC)	µS/cm	125-2200 ¹
Total Dissolved Solids (TDS)	mg/L	600 ²

Table 28: Interim Groundwater Quality Trigger Values (Water Management Plan)

Notes

¹ Based on default triggers values for slightly to moderately disturbed lowland river systems for south east Australia in the ANZECC 2000 Guidelines

² Based on Groundwater Assessment Cooma Road Quarry (Coffey, 2012).

Groundwater monitoring continued at bores (GW400534 and GW416130) along with monitoring at the newly installed bores (MB01 and MB02). The monitoring results for 2024 are presented in **Table 29**.



Sampling Period	Monitoring Location	рН	Total Dissolved Solids (TDS)	Electrical Conductivity (EC)	Standing Water level (metres)	Observation (Colour / Odour)
Trigger		6.5 – 8.5	600 mg/L	125-2200 µS/cm	-	-
	MB01	8.2	587	1220	636.9	Clear, mild odour
Quarter 1	MB02	7.6	598	1467	718	Clear, no odour
(03/04/2024)	GW400534	7.4	319	718	669.8	Cloudy, no odour
	GW416130	6.7	537	1352	703.2	Clear, no odour
	MB01	7.7	861	846	636.6	Clear, no odour
Quarter 2 (01/05/2024)	MB02	7.9	743	2031	717.9	Cloudy, no odour
	GW400534	7.1	329	596	669.8	Cloudy, no odour
	GW416130	7.4	1469	2251	702.5	Cloudy, no odour
	MB01	7.9	796	877	636.7	Clear, mild odour
Quarter 3	MB02	7.4	737	1150	702.6	Cloudy, no odour
(04/09/2024)	GW400534	7.1	301	585	711.1	Cloudy, no odour
	GW416130	7.3	1230	1920	670	Cloudy, no odour
	MB01	7.4	602	1127	637.2	Clear, no odour
Quarter 4	MB02	7.5	163	250	708.6	Cloudy, mild odour
(06/11/2024)	GW400534	7.6	297	428	669.1	Clear, no odour
	GW416130	7.4	1130	1760	697.4	Clear no odour

Table 29: Groundwater Monitoring Results 2024

In 2024, all groundwater monitoring results for pH were within the trigger levels.

Eight monitoring events recorded TDS levels above the trigger level in 2024. These include:

- TDS level of 737 mg/L at MB02 during Q3 monitoring
- TDS level of 1230 mg/L at GW416130 during Q3 monitoring
- TDS level of 602 mg/L at MB01 during Q4 monitoring, and
- TDS level of 1130 mg/L at GW416130 during Q4 monitoring.
- TDS level of 861 mg/L at MB01 during Q2 monitoring
- TDS level of 743 mg/L at MB02 during Q2 monitoring
- TDS level of 1469 mg/L at GW400534 during Q2 monitoring, and
- TDS level of 796 mg/L at MB01 during Q3 monitoring.

TDS at GW400534 remained below the trigger level throughout the year. The highest TDS level occurred in Q2 recording 1,469 µS/cm at GW416130.

Electrical conductivity levels remained within the trigger values for all sampling events, except for a single instance in Q2 when GW416130 recorded a measurement of 2251 µS/cm.

Because these trigger values are based on the ANZECC Guideline values, these exceedances are not considered to be non-compliances for the groundwater at site.



Holcim engaged a consultancy to review the trigger values that were established after the groundwater assessment in 2020. The Water Management Plan was updated accordingly and has been submitted to the Department for approval.

Holcim will continue to perform groundwater monitoring in 2025.

7.5 Water Usage and Storage

Water storages utilised at the Cooma Road Quarry include:

- Extractive Area Sump;
- Granite Hole;
- Pump Dam;
- Sediment Interception Pond (SIP); and
- Discharge Pond.

During this reporting period water has been used for use in crushing and screening and watering of haul roads. Water usage has continued to be recorded during this reporting period.

7.6 Water Take

Table 30 outlines the water take at the Cooma Road Quarry in 2024. No water was taken during the period; therefore, the water take was within the limits of the water access licence (WAL) requirement.

Table 30: 2024 Water Take

WAL	Entitlement	2024	2023	2022	2021	2020	2019	2018
40SL27690	98 ML	No take	No take	16.49 ML	31ML	36ML	70ML	60ML



8 Rehabilitation and Landscape Management

The site is required to undertake progressive rehabilitation in accordance with Schedule 3, Condition 22 and 23 of SSD 5109 and their *Rehabilitation Management Plan*.

8.1 Rehabilitation Performance During the Reporting Period

During the 2024 reporting period, topsoil was placed on 12,000 m² of land of the south eastern side of the project area (previous overburden area) and allowed to self-seed. Rehabilitation is expected to continue into 2024 and consist of planting tubestock or hydromulching. Existing rehabilitation areas continue to be inspected and maintained. See **Table 31** for details of rehabilitation performance against the requirements outlined in Section 8 of the *Annual Review Guideline* under the *Post approval requirements for State Significant Mining developments 2015.*

Guideline Requirement	Response
Extent of the operations and rehabilitation at completion of the reporting period	Progressive rehabilitation undertaken. Topsoil was placed on 12,000 m ² on previous overburden area on the south eastern side of quarry. This area was allowed to self-seed. Inspections were completed of the rehabilitation areas.
Agreed post-rehabilitation land use	The final rehabilitation at the Cooma Road Quarry will consist of a woodland/grassland revegetation mix.
Key rehabilitation performance indicators	See Section 4 of the Rehabilitation Management Plan.
Renovation or removal of buildings	There was no construction activities or renovations performed in 2024
 Any other Rehabilitation taken including: Exploration activities; Infrastructure; Dams; and The installation or maintenance of fences, bunds, and any other works. 	No rehabilitation completed in 2024 relating to exploration, infrastructure, or dams.
Any rehabilitation areas which have received formal sign off from the Resources Regulator	No rehabilitation has received signoff.
Variations to activities undertaken to those proposed (including why there were variations and whether the Resources Regulator was notified)	Rehabilitation activities were undertaken as per the Rehabilitation Management Plan.
Outcomes of trials, research projects and other initiatives.	No trials proposed or required.
Key issues that may affect successful rehabilitation	There are several potential issues that can affect rehabilitation including availability of material, seed stock, climatic events, and rehabilitation methodology.

Table 31: Rehabilitation Performance in 2024

8.2 Summary of Current Rehabilitation and Performance

A summary of the rehabilitation and disturbance status of Cooma Road Quarry is outlined in **Table 32** and **Figure 2**.



Quarry Area Type	2019 (ha)	2020 (ha)	2021 (ha)	2022 (ha)	2023 (ha)	2024 (ha)	Proposed 2025 (ha)
A. Total Quarry Footprint ¹	0	0	0	102	102	102	102
B. Total Active Disturbance ²	71.5	71.5	71.5	71.5	88.9	90.5	90.5
C. Land Being Prepared for Rehabilitation ³	0	0	0.5	0	1.2	1.2	1.2
D. Land Under Active Rehabilitation ⁴	7.6	7.6	7.6	8.1	8.1	9.2	9.2
E. Completed Rehabilitation ⁵	0	0	0	0	0	0	0

Table 32: Rehabilitation and Disturbance Status

Notes:

¹ Total disturbance and rehabilitation.

² Total disturbance within the Project Approval boundary

³ Rehabilitation that is being shaped in a phase of decommissioning, landform establishment and growth medium development.

⁴ Rehabilitation under a phase of ecosystem and land use establishment or ecosystem and land use sustainability

⁵ This refers to rehabilitation that has been signed off from the DRG.



Sheet Size

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Rehabilitation and Disturbance 2024



At the end of 2024, there was approximately 90.51 Ha of active disturbance and 9.2 Ha of active rehabilitation. There is no further disturbance or rehabilitation preparation activities planned for 2024. Rehabilitation maintenance will be continued into 2025. Rehabilitation monitoring will continue in 2025.

8.3 Actions for the Next Reporting Period

The Annual Review Guidelines (DPE, 2015) require the Annual Review to outline the rehabilitation actions proposed during the next reporting period. These actions are detailed in **Table 33**.

Requirement	Site Comment
Describe the steps to be undertaken to progress agreement during next reporting period, where final rehabilitation outcomes have not yet been agreed between stakeholders.	Monitoring to continue through 2025.
Outline proposed rehabilitation trials, research projects and other initiatives to be undertaken during next reporting period.	No further trials are proposed.
	Topsoil (growth media) will be placed on the eastern side of the Quarry.
Summary of rehabilitation activities proposed for next report period.	The maintenance of existing and new rehabilitation will continue in 2025.
	Rehabilitation monitoring is to continue into 2025 in order to meet Condition 24 of Schedule 3 of the Development Consent.

Table 33: Rehabilitation and Closure Actions for the 2024 Reporting Period



9 Summary of Environmental Performance

A summary of environmental management measures and sampling results for 2024 are detailed in Table 34.

Aspect	Approval Criteria / EIS Prediction	Performance during the reporting period	Trend / key management implications	Implemented / proposed management actions
Noise	EIS predictions are all below development consent criteria.	Quarter monitoring has met the Development Consent Criteria.	Consistently meets criteria.	EIS predictions are all below development consent criteria.
Air Quality	EIS predictions are all below development consent criteria.	Dust deposition results within criteria of EPL, EIS and Development Consent. PM10 results has met the Development Consent Criteria. All depositional dust results were within the Development Consent criteria. One invalidated reading at DDG4 in May.	Dust deposition was consistent with EIS and previous Annual Reviews. PM10 data was generally consistent with the previous period.	Holcim will continue to refine the implementation of the air quality monitoring program and air quality management measures.
Blasting	EIS predictions are all below development consent criteria.	All blasts reported during 2023 were below criteria. No exceedances.	Below criteria from 2017 to 2023.	None required.
Traffic Management	EIS predictions are all below development consent criteria.	Met the Development Consent Criteria.	Consistently meets criteria.	None required.
Biodiversity	It is unlikely there will be any significant impacts to species or communities listed in NSW.	No additional impacts. Monitoring of nest boxes was completed in 2024	Biodiversity monitoring has been consistent with the Rehabilitation Management Plan.	Continue to implement the Rehabilitation Management Plan.
Heritage	No predictions.	No impacts to Aboriginal Cultural Heritage or European Heritage.	Continued to be no impacts.	None required.

Table 34: Environmental Performance at Cooma Road Quarry in 2024



Aspect	Approval Criteria / EIS Prediction	Performance during the reporting period	Trend / key management implications	Implemented / proposed management actions
Water Management	EIS predictions are all below development consent criteria.	There were two discharges into Barracks Creek during the reporting period. Surface water monitoring results were generally within trigger values outlined in the Water Management Plan, except for pH and Oil and Grease, which were slightly outside of the trigger levels. Groundwater monitoring results were generally aligned with Water Management Plan trigger levels, except for a few TDS levels exceedances during Q2, Q3, and Q4 monitoring and one EC exceedance during Q2 monitoring.	The first discharge on 17 January exceeded the pH criteria with a level of 8.58. This was reported to the Department. The second discharge was within EPL criteria. Surface water monitoring results generally met trigger levels. Groundwater quality was generally compliant with trigger values.	Continued implementation of Water Management Plan.



10 Waste Management

The waste streams at Cooma Road Quarry are categorised as:

- General waste
- Recyclables such as cardboard and paper
- Scrap steel
- Oils, greases, and filters.

There are three 2 m³ general waste bins and one 1.5 m3 recycling bin on site which are serviced weekly by contractors. Waste oil, grease, and associated filters are disposed of in a 44-gallon drum which is inspected monthly.

In 2019 Cooma Road Quarry became an accredited Smart Waste organisation. Cooma Road Quarry continues to demonstrate a commitment to improving the efficiency of their waste streams.

Cooma Road Quarry receives and processes waste concrete as per Schedule 2 Condition 14 of the Development Consent. This condition limits the intake of recycled concrete up to 10,000 t per calendar year. The site is compliant with this condition, receiving 7,774 t of recycled concrete in 2024.



11 Community

11.1 Community Engagement Activities

Holcim has maintained community engagement measures during the reporting period by undertaking the following activities in accordance with Schedule 5 Condition 6 of the Development Consent:

- Maintenance of a website (containing publicly available documents);
- A telephone number, email, and postal address (on the website) for community complaints and feedback;
- A copy of the Complaints Register is maintained on the company website; and
- All documents and items displayed on the website are regularly updated by Holcim staff.

Schedule 5 Condition 6 also requires the establishment and operation of a Community Consultative Committee (CCC) for Cooma Road Quarry. The Cooma Road Quarry CCC was established in May 2014.

CCC meetings were held in the reporting period in April 2024 and September 2024.

Past community engagement activities have included open days, attendance at resident's association meetings and provision of materials for local projects. An open day was held on 26 October 2024, attracting approximately 80 residents from Googong and Jerrabomberra. Holcim welcomes any residents or groups to contact the Quarry to arrange tours.

In addition to the CCC, Holcim prepared a Community Engagement Plan in 2016 to establish two-way communication with the community. Holcim understands that an integral part of ensuring the continuing success of the quarry operations is the fostering of positive community relations through effective two-way communications and through the promotion of a positive public image.

The Cooma Road Quarry has an extensive program for engagement with the local Ngambri Land Council including employment of Indigenous workers for maintenance and housekeeping activities, assistance in the start-up of a local native nursery and guidance on the establishment of a construction materials haulage company utilising Indigenous workers.

11.2 Community Contributors

In 2024, community contributions included sponsorship of the local Rotary Club and the Queanbeyan Rodeo.

11.3 Complaints

A complaint register is updated and published on the Holcim website quarterly. No complaints were received during the 2024 reporting period. This marks a reduction in complaints compared to 2023 and aligns more closely with long-term complaint trends, see **Table 35**.



Table 35: Long term complaint trends

Year	Number of complaints
2024	0
2023	5
2022	1
2021	0
2020	1
2019	0

All publicly listed information including this 2024 complaints register, incidents and contacts for locals in the community is available at <u>http://www.holcim.com.au/cooma-road.html</u>. Holcim continues to operate a community contact line.



12 Independent Audit

The most recent Independent Environmental Audit (IEA) was undertaken by EMM Consulting Pty Ltd on behalf of Holcim in February 2024 as required in accordance with Schedule 5, Condition 10 of the Development Consent (SSD_5109) – MOD 1 for the quarry. This was the fourth IEA, with the previous IEA completed in 2021.

Holcim have successfully completed all actions recommended by the most recent IEA.

The next IEA is due to be conducted in February 2027.



13 Incidents and Non-compliance

Incidents and non-compliances at Cooma Road Quarry in 2024 are summarised in Table 36.

Table 36: Incidents and Non-Compliance at the Cooma Road Quarry During 2024

Date	Incident/Non- Compliance	Action/Comment
		There was an invalidated depositional dust monitoring result
May 2024 Air Quality Monitoring	at DDG 4 on 2 May 2024 resulting in a low non-compliance	
101dy 2024		for Schedule 3, Condition 16. Reporting this was missed until
		the preparation of this Annual Review.
		Missing PM ₁₀ monitoring data for the period between 6 and
November	Air Quality	30 November 2024 due to the monitoring contractor losing
2024	Management Plan	the filter papers for this period. Holcim reported this
		immediately as it was made aware by the engaged contractor.



14 Activities to be Completed in the Next Reporting Period

Proposed improvement actions for 2024 are noted in Table 37.

Table 37: Improvement Actions for 2024

Improvement Measure	Activities	Timeframe
Surface Water	Investigation into increasing trends in surface water	To be completed in
Monitoring	monitoring.	2025.
Updating the Water	Review and updating of the current Water	To be completed in
Management Plan	Management Plan.	2025.
Protection of Heritage site	Weed management and fence mending as per recommendations from the 2024 Heritage monitoring report	To be completed in 2025.



APPENDIX A -2024 QUARTERLY NOISE MONITORING REPORTS

Intended for Holcim (Australia) Pty Ltd

Document type
Report

Date July 2024

Cooma Road Quarry Quarterly Noise Monitoring Assessment Quarter 2 2024



Cooma Road Quarry Quarterly Noise Monitoring Assessment Quarter 2 2024

Project name	NSW Environmental Monitoring 2023-2024	
Project no.	318001799	Ramboll
Recipient	David Manning	The Arc, 45a Watt St
Document type	Report	Newcastle, NSW 2300
Version	1	Australia
Date	12/07/2024	T +61 2 4962 5444
Prepared by	Jake Bourke, Matilda Englert	https://www.ramboll.com/
Checked by	Arnold Cho	
Approved by	Gavan Butterfield	
Description	Data collected on 2 May, and 4 and 5 June 2024 for the quarterly period ending June 2024 at Googong, NSW, as part of the noise monitoring program	

Ramboll Australia Pty Ltd. ACN 095 437 442 ABN 49 095 437 442

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Abbreviations and Definitions

Ambient Noise	The all-encompassing noise within a given environment. It is the composite of sounds from many sources, both near and far.
Background noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the LA90 descriptor (see below).
dB	Abbreviation for decibel, a measure of sound equivalent to 20 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure, and 10 times the logarithm of a given sound power to a reference power.
dB(A)	A measure of A-weighted sound levels. A Weighting is an adjustment made to the sound level measurement to approximate the response of the human ear.
Extraneous noise	Noise resulting from activities that are not typical of the area. Atypical activities may include construction, and traffic generated by holiday periods. Normal daily traffic is not extraneous noise.
LA1	The noise level, measured in dB(A), which is exceeded for 1 per cent of the measurement period.
LA1(1min)	The noise level, measured in dB(A), which is exceeded for 1 per cent of the time over a 1-minute measurement period, i.e., is exceeded for 0.6 seconds. This measure can approximate to the maximum noise level but may be less if there is more than 1 noise event during this 0.6 second period.
LA10	The noise level, measured in dB(A), which is exceeded for 10 per cent of the time.
LA90	The noise level, measured in dB(A), which is exceeded for 90 per cent of the time, referred to as the background noise level. This is considered to represent the background noise (see above).
LAeq	The level of noise equivalent to the energy average of noise levels occurring over a defined measurement period.
LAeq (period)	The average equivalent noise level, measured in dB(A), during a measurement period (e.g., 15-minute, day, evening, or night).
LAmax	The A-weighted sound pressure level that represents the maximum noise level measured over the time that a given sound is measured.
NMA	Noise Monitoring Assessment
NMP	Noise Management Plan
SPL	The Sound Pressure Level. Sound pressure is the fluctuation in air pressure, from the steady atmospheric pressure, created by sound. The sound pressure level is the sound pressure expressed on a decibel scale.

Source: Noise Guide for Local Government (NSW EPA, 2023)

1. Overview

1.1 Project Driver

Ramboll Australia Pty Ltd (Ramboll) has been commissioned by Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for Cooma Road Quarry ("the quarry") at Googong, NSW.

This NMA was done in accordance with the following documents:

- Noise Policy for Industry (NPfI) (NSW EPA, 2017).
- Cooma Road Quarry Noise Management Plan (NMP) (Holcim Australia, 2019).
- Development Consent Application Number SSD_5109 (Minister for Planning and Infrastructure, 2013).
- Environment Protection Licence (EPL) number 1453 (NSW EPA, 2020).
- Australian Standard AS 1055:2018 Acoustics—Description and measurement of environmental noise (Standards Australia, 2018).
- Australian Standard AS/NZS IEC 61672.1:2019 Electroacoustics Sound level meters, Part 1: Specifications (Standards Australia and Standards New Zealand, 2019)
- IEC 60942:2017 Electroacoustics Electroacoustics Sound calibrators (International Standard, 2017).

This NMA has been undertaken for the quarterly period April to June 2024, and forms part of the monitoring program to determine compliance with conditions of the Development Consent.

1.2 Site Location and Sensitive Receivers

The quarry is in Googong, approximately 6 kilometres south of Queanbeyan, NSW.

Sensitive receivers surrounding the quarry are primarily rural and residential properties in all directions. Old Cooma Road is located to the east of the quarry and passing road traffic is a dominate noise source for those receivers to the east of the quarry. Five monitoring locations have been selected as part of the NMA and in accordance with the

Development Consent and are shown in Table 1-1.

Monitoring Locations	Locality and Sensitive Receivers
N3	West of the quarry situated on a rural property off Copperfield Place. This location represents residential and rural receivers to the west of the quarry.
N8	Northeast of the quarry along Tempe Crescent and is representative of residential receivers in that area.
N38	On Heights Road and is representative of the elevated residential receivers to the east of the quarry.
N60	At 501 Old Cooma Road and represents the residence adjacent to the quarry access road.
N67	Situated on a rural property at 732 Old Cooma Road to the south of the quarry. This is representative of rural and residential receivers to the south, with direct line of site into the quarry pit

Table 1-1: Monitoring locations locality and sensitive receivers

The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**. The NMP states attended monitoring is to be undertaken within

30 metres of a private residence, where possible. During this NMA, monitoring at most locations (N3, N8, N60, and N67) was undertaken where safely accessible at each property boundary which was approximately 100 to 200 metres from each property dwelling.



Legend

- Noise monitoring location
- Property dwelling





2. Noise Criteria

Table 2-1 brings the applicable noise criteria outlined in the Development Consent for the residential receivers surrounding the quarry (N1–N71), and the five monitoring locations adopted from the NMP that are deemed representative and applicable for this NMA (N3, N8, N38, N60, and N67).

Table 2-1: Monitoring locations and noise criteria

		Morning Shoulder ²	Day ³	Evening⁴			
Receiver ¹	MonitoringLAeqLocations(15min)		LAeq (15min)	LAeq (15min)			
			dB(A)				
N1, N7, N8, N56, N57, N59, N63, N64, N65	N8	40	44	39			
N67	N67	36	41	35			
All other receivers between N9 and N71 inclusive	N60, N38	36	38	35			
All other receivers	N3	35	35	35			
¹ Refer to Appendix 5 of the Consolidated Development Consent – SSD 5109 (DOC19/541449) and/or the NMP for receiver locations on the map.							
² 6 am–7 am Monday to Saturday							
³ 7 am-6 pm Monday to Saturday							

⁴ 6 pm–10 pm Monday to Saturday

Note: No operations on Sundays and public holidays

3. Methodology

The monitoring program was developed in accordance with the procedures described in Australian Standard AS 1055:2018 and the Approval Documents referenced in Section 1.

The operator-attended measurements were carried out using a RION Sound Level Meter NL-52 on Thursday 2 May 2024, Tuesday 4 June 2024 and Wednesday 5 June 2024. The acoustic instrumentation implemented carries current NATA calibration and complies with AS/NZS IEC 61672-1:2019 Class 1. Calibration of all instrumentation was checked prior to and following the measurements using a Pulsar Acoustic Calibrator 105 which also carried a current NATA calibration and complies with IEC 60942:2017. Drift in calibration did not exceed ±0.3 dBA.

The attended noise monitoring was conducted for 15-minutes in duration during the day, evening, and night periods over three days at each monitoring location. Where possible, throughout each measurement the operator(s) quantified the contribution of each significant noise source.

Where the plant was not distinctly audible during the attended monitoring, the quarry contribution is estimated to be at least 10 dBA below the ambient noise level, as determined by the LA90.

3.1 Meteorological Conditions

Meterology has an important influence on noise monitoring assessment. Where an onsite meterological station with data recorded at 10m height has not been available, the nearest Bureau of Meteorology data has been adopted to inform this assessment and modelled using The Air Pollution Model (TAPM) to determine the atmospheric stability category as outline in **Table 3-1**.

Stability Classification	Pasquill Stability Category	Ambient temperature change with height (°C/100m)
Extremely unstable	A	ΔT ≤ -1.9
Moderately unstable	В	-1.9 < ΔT ≤ -1.7
Slightly unstable	С	-1.7 < ΔT ≤ -1.5
Neutral	D	-1.5 < ΔT ≤ -0.5
Slightly stable	E	-0.5 < ∆T ≤ 1.5
Moderately stable	F	1.5 < ΔT ≤ 4.0
Extremely stable	G	ΔT > 4.0

Table 3-1: Classification of Atmospheric Stability (NSW EPA, 2014)

As stated in the Development Consent, the noise criteria in Table 2-1 applies under all meteorological conditions except the following:

- During periods of rain or hail
- Average wind speed at microphone height exceeds 5 m/s
- Wind speeds greater than 3 m/s measured at 10 m above ground level
- Temperature inversion conditions greater than 3°C/100m.

Appendix 9 of the Development Consent also specifies that except for wind speed at microphone height, the data to be used for determing meterological conditons must be that recorded by the meterological station on or in the vicinity of the site.

4. Results and Discussion

4.1 Location N3

Noise monitoring at location N3 conducted on Thursday 2 May 2024, Tuesday 4 June 2024 and Wednesday 5 June 2024 resulted in inaudible quarry noise during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources include background road traffic, frogs, wind, birds, and aircraft. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N3 are presented in **Table 4-1**.

Date		Des	criptor (d	IBA)					
	Time (hrs)	LAmax	LAeq	LA90	Meteorology (Handheld at microphone height)	Onsite Met Station (2m height)	Apparent Noise Source, Description and SPL (dBA)	Cooma Road Quarry LAeq(15min) (dBA) Contribution	LAeq(15min) Criteria (dBA)
2-05-24	6:24am to 6:39am (Morning Shoulder)	54.7	34.5	27.2	WD: n/a WS: 0 m/s Rain: Nil	WD: N WS: 1.8 m/s Rain: nil Stability Category: E ¹	Background wind/motorway 24-32 Dog barking 34-54 Quarry inaudible	<17	35
5-06-24	8:36am to 8:51am (Day)	63.2	39.5	34.8	WD: n/a WS: 0 m/s Rain: Nil	WD: N WS: 0.9 m/s Rain: nil Stability Category: D ¹	Background motorway 32-63 Quarry inaudible	<25	35
4-06-24	6:00pm to 6:15pm (Evening)	61.1	43.3	40.0	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: Nil Stability Category: G ¹	Background motorway 38-42 Aircraft 55 Frogs 43 Quarry not operational	n/a²	35

¹ Modelled using TAPM to determine Stability Category.

² Quarry not operational.

4.2 Location N8

Noise monitoring at location N8 on Tuesday 4 June 2024 and Wednesday 5 June 2024 resulted in inaudible quarry noise during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources included road traffic and passing cars on Tempe Crescent. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N8 are presented in **Table 4-2**.

Table 4-2: Noise survey results and observations for Location N8

Date		Desc	riptor (dl	BA)					
	Time (hrs)	LAmax	Peq	06V1	Meteorology (handheld at microphone height)	Onsite Met Station (2m height)	Apparent Noise Source, Description and SPL (dBA)	Cooma Road Quarry LAeq(15min) (dBA) Contribution	LAeq(15min) Criteria (dBA)
5-06-24	6:00am to 6.15am (Morning Shoulder)	76.9	58.4	43.8	WD: n/a WS: 0 m/s Rain: Nil	WD: N WS: 0.4 m/s Rain: nil Stability Category: E ¹	Background motorway 34-76 Car passing on Tempe Crescent 60-62 Quarry inaudible	<34	40
5-06-24	7:29am to 7:44am (Day)	72.3	61.3	56.6	WD: n/a WS: 0 m/s Rain: Nil	WD: N WS: 0.7 m/s Rain: nil Stability Category: E ¹	Background motorway 47-72 Car passing on Tempe Crescent 71 Quarry inaudible	<47 ²	44
4-06-24	6:26pm to 6:41pm (Evening)	73.2	59.6	52.5	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: Nil Stability Category: G ¹	Background motorway 46-73 Quarry not operational	n/a³	39

¹ Modelled using TAPM to determine Stability Category.

² Measured LA90 value of 57 was dominated by road traffic noise so unable to estimate contribution for quarry at assessment location.

³ Quarry not operational.

4.3 Location N38

Noise monitoring at location N38 conducted on Tuesday 4 June 2024 and Wednesday 5 June 2024 resulted in inaudible quarry noise during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources included road traffic and passing cars on Heights Road. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N38 are presented in **Table 4-3**.

Table 4-3: Noise survey results and observations for Location N38

Date		De	scriptor (d	BA)					
	Time	LAmax	Laeq	LA90	Meteorology (handheld at microphone height)	Onsite Met Station (2m height)	Apparent Noise Source, Description and SPL (dBA)	Cooma Road Quarry LAeq(15min) (dBA) Contribution	Laeq(15min) Criteria (dBA)
5-06-24	6:15am to 6:30am (Morning Shoulder)	75.6	56.5	43.9	WD: n/a WS: 0 m/s Rain: Nil	WD: N WS: 0.4 m/s Rain: nil Stability Category: E ¹	Background motorway 38-75 Quarry inaudible	<34	36
5-06-24	7:48am to 8:03am (Day)	72.4	58.3	49.6	WD: n/a WS: 0 m/s Rain: Nil	WD: N WS: 1.1 m/s Rain: nil Stability Category: E ¹	Background motorway 43-72 Car passing on Tempe Crescent 61 Quarry inaudible	<40 ^{3,4}	38
4-06-24	6:45pm to 7:00pm (Evening)	72.2	55.1	47.2	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: Nil Stability Category: G ¹	Background motorway 42-72 Quarry not operational	n/a²	35

¹ Modelled using TAPM to determine Stability Category.

² Quarry not operational.

³ Measured LA90 value of 50 was dominated by road traffic noise so unable to estimate contribution for quarry at assessment location.

⁴ Negligible exceedance (NPfI 2017 – Table 4.1 and Table 4.2)

4.4 Location N60

Noise monitoring at location N60 conducted on Tuesday 4 June 2024 and Wednesday 5 June 2024 resulted in inaudible quarry noise during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources included road traffic, and frogs. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N60 are presented in **Table 4-4**.

Date	Time	Descriptor (dBA)							
		LAmax	LAeq	LA90	Meteorology (handheld at microphone height)	Onsite Met Station (2m height)	Apparent Noise Source, Description and SPL (dBA)	Cooma Road Quarry LAeq(15min) (dBA) Contribution	LAeq(15min) Criteria (dBA)
5-06-24	6:45am to 7:00am (Morning Shoulder)	75.1	66.2	57.5	WD: n/a WS: 0 m/s Rain: Nil	WD: N WS: 0.4 m/s Rain: nil Stability Category: E ¹	Background motorway 48-75 Quarry inaudible	<483	36
5-06-24	7:07am to 7:22am (Day)	79.3	67.4	55.8	WD: n/a WS: 0 m/s Rain: Nil	WD: N WS: 0.4 m/s Rain: nil Stability Category: E ¹	Background motorway 46-79 Quarry inaudible	<46 ³	38
4-06-24	7:25pm to 7:40pm (Evening)	73.7	61.3	46.1	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: Nil Stability Category: G ¹	Background motorway/frogs 34-73 Quarry not operational	n/a²	35

Table 4-4: Noise survey results and observations for Location N60

¹ Modelled using TAPM to determine Stability Category.

² Quarry not operational.

³ Measured LA90 value of 56 was dominated by road traffic noise so unable to estimate contribution for quarry at assessment location.

4.5 Location N67

Noise monitoring at location N67 conducted on Tuesday 4 June 2024 and Wednesday 5 June 2024 resulted in inaudible quarry noise during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources included road traffic. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N67 are presented in **Table 4-5**.

Date	Time	Descriptor (dBA)							
		LAmax	LAeq	LA90	Meteorology (handheld at microphone height)	Onsite Met Station (2m height)	Apparent Noise Source, Description and SPL (dBA)	Cooma Road Quarry LAeq(15min) (dBA) Contribution	LAeq(15min) Criteria (dBA)
5-06-24	6:30am to 6:45am (Morning Shoulder)	85.3	72.3	53.1	WD: n/a WS: 0 m/s Rain: Nil	WD: N WS: 0.4 m/s Rain: nil Stability Category: E ¹	Background motorway 39-85 Quarry inaudible	<43 ³	36
5-06-24	8:08am to 8:23am (Day)	85.0	74.3	60.7	WD: n/a WS: 0 m/s Rain: Nil	WD: N WS: 1.3 m/s Rain: nil Stability Category: D ¹	Background motorway 43-85 Quarry inaudible	<513	41
4-06-24	7:06pm to 7:21pm (Evening)	79.9	64.9	47.7	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: Nil Stability Category: G ¹	Background motorway 33-79 Quarry not operational	n/a²	35

Table 4-5: Noise survey results and observations for Location N67

¹ Modelled using TAPM to determine Stability Category.

² Quarry not operational.

³ Measured LA90 value of less than 61 was dominated by road traffic noise so unable to estimate contribution for quarry at assessment location.

5. Conclusion

This NMA was completed by Ramboll at the Holcim Cooma Road Quarry, Googong, NSW as a quarterly requirement of the NMP. Monitoring was carried out on Thursday 2 May 2024, Tuesday 4 June 2024 and Wednesday 5 June 2024 at five locations selected as representative to the sensitive receivers at the surroundings to Cooma Road Quarry.

No exceedances of the noise criteria were recorded, and quarry noise was inaudible at the selected monitoring locations during the monitoring campaign. The quarry was not operational during the evening periods.

The results presented in this NMA show compliance with the relevant noise criteria applicable to the operation of the Holcim Cooma Road Quarry, Googong, NSW.

6. References

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Intended for Holcim (Australia) Pty Ltd

Document type Report

Date May 2024

Cooma Road Quarry Quarterly Noise Monitoring Assessment Quarter 1 2024



Cooma Road Quarry Quarterly Noise Monitoring Assessment Quarter 1 2024

Project name	NSW Environmental Monitoring 2023-2024			
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Recipient	David Manning	The Arc, 45a Watt St		
Document type	Report	Newcastle, NSW 2300		
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Date	06/05/2024	T +61 2 4962 5444		
Prepared by	Jake Bourke, Matilda Englert	https://www.ramboll.com/		
Checked by	Arnold Cho	,		
Approved by	Belinda Sinclair			
Description	Data collected on 4 and 5 March 2024 for the quarterly period ending March 2024 at Googong, NSW, as part of the noise monitoring program			

Ramboll Australia Pty Ltd. ACN 095 437 442 ABN 49 095 437 442
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Abbreviations and Definitions

Ambient	The all-encompassing noise within a given environment. It is the composite of
Noise	sounds from many sources, both near and far.
Background	The underlying level of noise present in the ambient noise, excluding the noise
noise	source under investigation, when extraneous noise is removed. This is described
	using the LA90 descriptor (see below).
dB	Abbreviation for decibel, a measure of sound equivalent to 20 times the logarithm
	(to base 10) of the ratio of a given sound pressure to a reference pressure, and 10
	times the logarithm of a given sound power to a reference power.
dB(A)	A measure of A-weighted sound levels. A Weighting is an adjustment made to the
	sound level measurement to approximate the response of the human ear.
Extraneous	Noise resulting from activities that are not typical of the area. Atypical activities
noise	may include construction, and traffic generated by holiday periods. Normal daily
	traffic is not extraneous noise.
LA1	The noise level, measured in dB(A), which is exceeded for 1 per cent of the
	measurement period.
LA1(1min)	The noise level, measured in dB(A), which is exceeded for 1 per cent of the time
	over a 1-minute measurement period, i.e., is exceeded for 0.6 seconds. This
	measure can approximate to the maximum hoise level but may be less if there is
1.4.4.0	more than 1 hoise event during this 0.6 second period.
LAIU	The noise level, measured in dB(A), which is exceeded for 10 per cent of the time.
LA90	The noise level, measured in dB(A), which is exceeded for 90 per cent of the time,
	referred to as the background noise level.
	This is considered to represent the background noise (see above).
LAeq	The level of noise equivalent to the energy average of noise levels occurring over a
	defined measurement period.
LAeq	The average equivalent noise level, measured in dB(A), during a measurement
(period)	period (e.g., 15-minute, day, evening, or night).
LAmax	The A-weighted sound pressure level that represents the maximum noise level
	measured over the time that a given sound is measured.
NMA	Noise Monitoring Assessment
NMP	Noise Management Plan
SPL	The Sound Pressure Level. Sound pressure is the fluctuation in air pressure, from
	the steady atmospheric pressure, created by sound. The sound pressure level is the
	sound pressure expressed on a decibel scale.

Source: Noise Guide for Local Government (NSW EPA, 2023)

1. Overview

1.1 Project Driver

Ramboll Australia Pty Ltd (Ramboll) has been commissioned by Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for Cooma Road Quarry ("the quarry") at Googong, NSW.

This NMA was done in accordance with the following documents:

- Noise Policy for Industry (NPfI) (NSW EPA, 2017).
- Cooma Road Quarry Noise Management Plan (NMP) (Holcim Australia, 2019).
- Development Consent Application Number SSD_5109 (Minister for Planning and Infrastructure, 2013).
- Environment Protection Licence (EPL) number 1453 (NSW EPA, 2020).
- Australian Standard AS 1055:2018 Acoustics—Description and measurement of environmental noise (Standards Australia, 2018).
- IEC 60942 Ed. 3.0 b:2003 Electroacoustics Sound calibrators (Standards Australia, 2003).

This NMA has been undertaken for the quarterly period January to March 2024, and forms part of the monitoring program to determine compliance with conditions of the Development Consent.

1.2 Site Location and Sensitive Receivers

The quarry is in Googong, approximately 6 kilometres south of Queanbeyan, NSW.

Sensitive receivers surrounding the quarry are primarily rural and residential properties in all directions. Old Cooma Road is located to the east of the quarry and passing road traffic is a dominate noise source for those receivers to the east of the quarry. Five monitoring locations have been selected as part of the NMA and in accordance with the Development Consent and are shown in **Table 1-1**.

Monitoring Locations	Locality and Sensitive Receivers
N3	West of the quarry situated on a rural property off Copperfield Place. This location represents residential and rural receivers to the west of the quarry.
N8	Northeast of the quarry along Tempe Crescent and is representative of residential receivers in that area.
N38	On Heights Road and is representative of the elevated residential receivers to the east of the quarry.
N60	At 501 Old Cooma Road and represents the residence adjacent to the quarry access road.
N67	Situated on a rural property at 732 Old Cooma Road to the south of the quarry. This is representative of rural and residential receivers to the south, with direct line of site into the quarry pit

 Table 1-1: Monitoring locations locality and sensitive receivers

The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**. The NMP states attended monitoring will be undertaken within 30 metres of a private residence, where possible. During this NMA, monitoring at most locations (N3, N8, N60, and N67) was undertaken where safely accessible at each property boundary which was approximately 100 to 200 metres from each property dwelling.



Legend

- Noise monitoring location
- Property dwelling





2. Noise Criteria

Table 2-1 brings the applicable noise criteria outlined in the Development Consent for the residential receivers surrounding the quarry (N1–N71), and the five monitoring locations adopted from the NMP that are deemed representative and applicable for this NMA (N3, N8, N38, N60, and N67).

Table 2-1: Monitoring locations and noise criteria

		Morning Shoulder ²	Day ³	Evening⁴			
Receiver ¹	Monitoring Locations	LAeq (15min)	LAeq (15min)	LAeq (15min)			
			dB(A)				
N1, N7, N8, N56, N57, N59, N63, N64, N65	N8	40	44	39			
N67	N67	36	41	35			
All other receivers between N9 and N71 inclusive	N60, N38	36	38	35			
All other receivers	N3	35	35	35			
¹ Refer to Appendix 5 of the Consolidated Development Consent – SSD 5109 (DOC19/541449) and/or the NMP for receiver locations on the map.							
² 6 am–7 am Monday to Saturday							
³ 7 am-6 pm Monday to Saturday							

⁴ 6 pm–10 pm Monday to Saturday

Note: No operations on Sundays and public holidays

3. Methodology

The monitoring program was developed in accordance with the procedures described in Australian Standard AS 1055:2018 and the Approval Documents referenced in Section 1.

The operator-attended measurements were carried out using a RION Sound Level Meter NL-52 on Monday 4 March 2024 and Tuesday 5 March 2024. The acoustic instrumentation implemented carries current NATA calibration and complies with AS/NZS IEC 61672-1:2013/2002 Class 1. Calibration of all instrumentation was checked prior to and following the measurements using a Pulsar Acoustic Calibrator 105 which also carried a current NATA calibration and complies with IEC 60942:2003. Drift in calibration did not exceed ± 0.3 dBA.

The attended noise monitoring was conducted for 15-minutes in duration during the day, evening, and night periods over two days. Where possible, throughout each measurement the operator(s) quantified the contribution of each significant noise source.

Where the plant was not distinctly audible during the attended monitoring, the quarry contribution is estimated to be at least 10 dBA below the ambient noise level, as determined by the LA90.

3.1 Meteorological Conditions

Meterology has an important influence on noise monitoring assessment. Where an onsite meterological station with data recorded at 10m height has not been available, the nearest Bureau of Meteorology data has been adopted to inform this assessment and modelled using The Air Pollution Model (TAPM) to determine the atmospheric stability category as outline in **Table 3-1**.

Stability Classification	Pasquill Stability Category	Ambient temperature change with height (°C/100m)
Extremely unstable	A	ΔT ≤ -1.9
Moderately unstable	В	-1.9 < ΔT ≤ -1.7
Slightly unstable	С	-1.7 < ΔT ≤ -1.5
Neutral	D	-1.5 < ΔT ≤ -0.5
Slightly stable	E	-0.5 < ΔT ≤ 1.5
Moderately stable	F	1.5 < ΔT ≤ 4.0
Extremely stable	G	ΔT > 4.0

Table 3-1: Classification of Atmospheric Stability (NSW EPA, 2014)

As stated in the Development Consent, the noise criteria in Table 2-1 applies under all meteorological conditions except the following:

- During periods of rain or hail
- Average wind speed at microphone height exceeds 5 m/s
- Wind speeds greater than 3 m/s measured at 10 m above ground level
- Temperature inversion conditions greater than 3°C/100m.

Appendix 9 of the Development Consent also specifies that except for wind speed at microphone height, the data to be used for determing meterological conditons must be that recorded by the meterological station on or in the vicinity of the site.

4. Results and Discussion

4.1 Location N3

Noise monitoring at location N3 conducted on Monday 4 March 2024 resulted in inaudible quarry noise during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources include background road traffic, birds, wind, rustling trees, and aircraft. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N3 are presented in **Table 4-1**.

		Des	criptor (d	IBA)					
Date	Time (hrs)	LAmax	LAeq	LA90	Meteorology (Handheld at microphone height)	Onsite Met Station (10m height)	Apparent Noise Source, Description and SPL (dBA)	Cooma Road Quarry LAeq(15min) (dBA) Contribution	LAeq(15min) Criteria (dBA)
04-03-24	6:30am to 6:45am (Morning Shoulder)	71.3	50.4	46.2	WD: 224° WS: 1.1 m/s Rain: Nil	WD: N WS: 3.6 m/s Rain: nil Stability Category: E ¹	Background wind/trees/ motorway hum 43-56 Aircraft 51-57 Birds 67 Quarry inaudible	<333	35
04-03-24	7:00am to 7:15am (Day)	65.5	54.0	49.7	WD: 224° WS: 1.5 m/s Rain: Nil	WD: N WS: 2.7 m/s Rain: nil Stability Category: D ¹	Background wind/trees/ motorway hum 47-60 Aircraft 51-50 Quarry inaudible	< 40 ⁴	35
04-03-24	6:03pm to 6:18pm (Evening)	78.3	50.6	42.8	WD: 151° WS: 0.7 m/s Rain: Nil	WD: N WS: 3.6 m/s Rain: nil Stability Category: D ¹	Background wind/trees/ motorway hum 39-50 Birds 46-71 Aircraft 43-59 Quarry not operational	n/a²	35

¹ Temperature data used from BOM (Station ID 94925) to undertake modelling using TAPM to determine Stability Category.

² Quarry not operational.

³ LA90 value of less than 50 (estimated) was dominated by background noise so unable to estimate contribution for quarry at assessment location.

⁴ Estimated based on observed background noise using LAeq.

4.2 Location N8

Noise monitoring at location N8 on Monday 4 March 2024 and Tuesday 5 March 2024 resulted in inaudible quarry noise during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources included road traffic, passing cars on Tempe Crescent, birds, and nearby residences. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N8 are presented in **Table 4-2**.

		Desc	riptor (dl	BA)					
Date	Time (hrs)	LAmax	LAeq	LA90	Meteorology (handheld at microphone height)	Onsite Met Station (10m height)	Apparent Noise Source, Description and SPL (dBA)	Cooma Road Quarry LAeq(15min) (dBA) Contribution	LAeq(15min) Criteria (dBA)
05-03-24	6:00am to 6.15am (Morning Shoulder)	62.4	44.6	33.9	WD: n/a WS: 0 m/s Rain: Nil	WD: N WS: 0.4 m/s Rain: nil Stability Category: E ¹	Background road traffic 26-62 Cars on Tempe Cres. 60-62 Quarry inaudible	<24	40
04-03-24	7:27am to 7:42am (Day)	62.8	47.9	45.0	WD: 196° WS: 1.6 m/s Rain: Nil	WD: N WS: 3.1 m/s Rain: nil Stability Category: D ¹	Background road traffic 40-50 Birds 57-62 Quarry inaudible	<35	44
04-03-24	6:32pm to 6:46pm (Evening)	68.8	56.6	48.5	WD: 204° WS: 0.2 m/s Rain: Nil	WD: N WS: 3.1 m/s Rain: nil Stability Category: D ¹	Background motorway 39-56 Birds 45-62 Cars on Tempe Cres. 59-69 Nearby residences boxing 44-55 Quarry not operational	n/a ¹²	39

Table 4-2: Noise survey results and observations for Location N8

¹ Temperature data used from BOM (Station ID 94925) to undertake modelling using TAPM to determine Stability Category.

4.3 Location N38

Noise monitoring at location N38 conducted on Monday 4 March 2024 and Tuesday 5 March 2024 resulted in inaudible quarry noise during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources included road traffic, passing cars on Heights Road, and birds. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N38 are presented in **Table 4-3**.

Table 4-3: Noise survey results and observations for Location N38

		De	scriptor (d	BA)					
Date	Time	LAmax	LAeq	LA90	Meteorology (handheld at microphone height)	Onsite Met Station (10m height)	Apparent Noise Source, Description and SPL (dBA)	Cooma Road Quarry LAeq(15min) (dBA) Contribution	LAeq(15min) Criteria (dBA)
05-03-24	6:15am to 6:30am (Morning Shoulder)	60.6	40.3	30.1	WD: n/a WS: 0 m/s Rain: Nil	WD: N WS: 0.4 m/s Rain: nil Stability Category: E ¹	Background motorway 22-60 Birds Quarry inaudible	<20	36
04-03-24	7:46am to 8:01am (Day)	69.8	53.5	46.9	WD: 192° WS: 1.0 m/s Rain: Nil	WD: N WS: 3.1 m/s Rain: nil Stability Category: D ¹	Background motorway 34-68 Quarry inaudible	<37	38
04-03-24	6:52pm to 7:07pm (Evening)	73.0	53.7	42.9	WD: n/a WS: 0 m/s Rain: Nil	WD: N WS: 2.7 m/s Rain: nil Stability Category: D ¹	Background motorway/insects 38-73 Birds 44 Cars on Heights Rd. 59-70 Quarry not operational	n/a²	35

¹ Temperature data used from BOM (Station ID 94925) to undertake modelling using TAPM to determine Stability Category.

4.4 Location N60

Noise monitoring at location N60 conducted on Monday 4 March 2024 and Tuesday 5 March 2024 resulted in inaudible quarry noise during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources included road traffic, and insects. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N60 are presented in **Table 4-4**.

Table 4-4: Noise survey results an	d observations for Location N60
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		Des	criptor (dB	A)					
Date	Time	LAmax	LAeq	LA90	Meteorology (handheld at microphone height)	Onsite Met Station (10m height)	Apparent Noise Source, Description and SPL (dBA)	Cooma Road Quarry LAeq(15min) (dBA) Contribution	LAeq(15min) Criteria (dBA)
05-03-24	6:45am to 7:00am (Morning Shoulder)	79.7	54.1	39.1	WD: n/a WS: 0 m/s Rain: Nil	WD: N WS: 0.4 m/s Rain: nil Stability Category: E ¹	Background motorway 26-80 Quarry inaudible	<29	36
04-03-24	8:23am to 8:38am (Day)	64.1	50.3	41.8	WD: n/a WS: 0 m/s Rain: Nil	WD: N WS: 2.7 m/s Rain: nil Stability Category: D ¹	Background motorway 32-64 Quarry inaudible	<32	38
04-03-24	7:32pm to 7:43pm (Evening)	75.4	60.0	50.9	WD: n/a WS: 0 m/s Rain: Nil	WD: N WS: 2.2 m/s Rain: nil Stability Category: D ¹	Background motorway/insects 44-75 Quarry not operational	n/a²	35

¹ Temperature data used from BOM (Station ID 94925) to undertake modelling using TAPM to determine Stability Category.

4.5 Location N67

Noise monitoring at location N67 conducted on Monday 4 March 2024 and Tuesday 5 March 2024 resulted in inaudible quarry noise during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources included road traffic, wind, and insects. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N67 are presented in **Table 4-5**.

Table 4-5: Noise survey results and observations for Location N67

		Descriptor (dBA)							
Date	Time	LAmax	LAeq	LA90	Meteorology (handheld at microphone height)	Onsite Met Station (10m height)	Apparent Noise Source, Description and SPL (dBA)	Cooma Road Quarry LAeq(15min) (dBA) Contribution	LAeq(15min) Criteria (dBA)
05-03-24	6:30am to 6:45am (Morning Shoulder)	72.6	58.8	40.3	WD: n/a WS: 0 m/s Rain: Nil	WD: N WS: 0.4 m/s Rain: nil Stability Category: E ¹	Background motorway 27-73 Quarry inaudible	<30	36
04-03-24	8:05am to 8:20am (Day)	73.7	58.9	45.5	WD: 180° WS: 1.8 m/s Rain: Nil	WD: N WS: 3.1 m/s Rain: nil Stability Category: E ¹	Background motorway 37-73 Quarry inaudible	<36	41
04-03-24	7:13pm to 7:28pm (Evening)	84.1	65.1	46.7	WD: 150° WS: 0.6 m/s Rain: Nil	WD: N WS: 2.2 m/s Rain: nil Stability Category: E ¹	Background motorway/wind/insects 39-84 Quarry not operational	n/a²	35

¹ Temperature data used from BOM (Station ID 94925) to undertake modelling using TAPM to determine Stability Category.

5. Conclusion

This NMA was completed by Ramboll at the Holcim Cooma Road Quarry, Googong, NSW as a quarterly requirement of the NMP. Monitoring was carried out on Monday 4 March 2024 and Tuesday 5 March 2024 at five locations selected as representative to the sensitive receivers at the surroundings to Cooma Road Quarry. No exceedances of the noise criteria were recorded, and quarry noise was inaudible at the selected monitoring locations during the monitoring campaign. The quarry was not operational during the evening periods.

The results presented in this NMA show compliance with the relevant noise criteria applicable to the operation of the Holcim Cooma Road Quarry, Googong, NSW.

6. References

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Cooma Road Quarry Quarterly Noise Monitoring Assessment Quarter 4 2024

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5

Abbreviations and Definitions

Description				
ΔΤ	Vertical Temperature Difference, i.e. the measured difference in ambient temperature between two elevations on the same tower. It is defined as the upper-level temperature measurement minus the lower-level temperature measurement.			
0	Degree			
Ambient Noise	The all-encompassing noise within a given environment. It is the composite of sounds from many sources, both near and far.			
Background noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the LA90 descriptor (see below).			
C	Celcius			
CCAM	Conformal Cubic Atmospheric Model			
CSIRO	Commonwealth Scientific and Industrial Research Organisation			
dB	Abbreviation for decibel, a measure of sound equivalent to 20 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure, and 10 times the logarithm of a given sound power to a reference power.			
dB(A)	A measure of A-weighted sound levels. A Weighting is an adjustment made to the sound level measurement to approximate the response of the human ear.			
DPHI	Department of Planning, Housing, and Infrastructure			
EPA	Environment Protection Authority			
EPL	Environment Protection Licence			
Extraneous noise	Noise resulting from activities that are not typical of the area. Atypical activities may include construction, and traffic generated by holiday periods. Normal daily traffic is not extraneous noise.			
m	Metre			
LA1	The noise level, measured in dB(A), which is exceeded for 1 per cent of the measurement period.			
LA1(1min)	The noise level, measured in dB(A), which is exceeded for 1 per cent of the time over a 1-minute measurement period, i.e., is exceeded for 0.6 seconds. This measure can approximate to the maximum noise level but may be less if there is more than 1 noise event during this 0.6 second period.			
LA10	The noise level, measured in dB(A), which is exceeded for 10 per cent of the time.			
LA90	The noise level, measured in dB(A), which is exceeded for 90 per cent of the time, referred to as the background noise level. This is considered to represent the background noise (see above).			
LAeq	The level of noise equivalent to the energy average of noise levels occurring over a defined measurement period.			
LAeq (period)	The average equivalent noise level, measured in dB(A), during a measurement period (e.g., 15-minute, day, evening, or night).			
LAmax	The A-weighted sound pressure level that represents the maximum noise level measured over the time that a given sound is measured.			
NATA	National Association of Testing Authorities			
NMA	Noise Monitoring Assessment			

NMP Noise Management Plan

	Description
NPfI	Noise Policy for Industry 2017
NSW	New South Wales
S	Second
SPL	The Sound Pressure Level. Sound pressure is the fluctuation in air pressure, from the steady atmospheric pressure, created by sound. The sound pressure level is the sound pressure expressed on a decibel scale.
TAPM	The Air Pollution Model

Source: Noise Guide for Local Government (NSW EPA, 2023)

1. Overview

1.1 Project Driver

Ramboll Australia Pty Ltd (Ramboll) has been commissioned by Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for Cooma Road Quarry ("the quarry") at Googong, NSW.

This NMA was done in accordance with the following documents:

- Noise Policy for Industry (NPfI) (NSW EPA, 2017)
- Cooma Road Quarry Noise Management Plan (NMP) (Holcim Australia, 2019)
- Development Consent Application Number SSD_5109 (Minister for Planning and Infrastructure, 2013)
- Environment Protection Licence (EPL) number 1453 (NSW EPA, 2020)
- Australian Standard AS 1055:2018 Acoustics—Description and measurement of environmental noise (Standards Australia, 2018)
- Australian Standard AS/NZS IEC 61672.1:2019 Electroacoustics Sound level meters, Part 1: Specifications (Standards Australia and Standards New Zealand, 2019)
- IEC 60942:2017 Electroacoustics Electroacoustics Sound calibrators (International Standard, 2017).

This NMA has been undertaken for the quarterly period October to December 2024, and forms part of the monitoring program to determine compliance with conditions of the Development Consent.

1.2 Site Location and Sensitive Receivers

The quarry is in Googong, approximately 6 kilometres south of Queanbeyan, NSW. Sensitive receivers surrounding the quarry are primarily rural and residential properties in all directions. Old Cooma Road is located to the east of the quarry and passing road traffic is a dominate noise source for those receivers to the east of the quarry. Five monitoring locations have been selected for the NMA and in accordance with the Development Consent and are shown in **Table 1-1**.

Monitoring Locations	Locality and Sensitive Receivers
N3	West of the quarry situated on a rural property off Copperfield Place. This location represents residential and rural receivers to the west of the quarry.
N8	Northeast of the quarry along Tempe Crescent and is representative of residential receivers in that area.
N38	On Heights Road and is representative of the elevated residential receivers to the east of the quarry.
N60	At 501 Old Cooma Road and represents the residence adjacent to the quarry access road.
N67	Situated on a rural property at 732 Old Cooma Road to the south of the quarry. This is representative of rural and residential receivers to the south, with direct line of site into the quarry pit

Table 1-1: Monitoring locations locality and sensitive receivers

The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**. The NMP states attended monitoring is to be undertaken within 30 metres of a private residence, where possible. During this NMA, monitoring at most locations (N3, N8, N60, and N67) was undertaken where safely accessible at each property boundary which was approximately 100 to 200 metres from each property dwelling.



Legend

- Noise monitoring location
- Property dwelling





2. Noise Criteria

Table 2-1 brings the applicable noise criteria outlined in the Development Consent for the residential receivers surrounding the quarry (N1–N71), and the five monitoring locations adopted from the NMP that are deemed representative and applicable for this NMA (N3, N8, N38, N60, and N67).

Table 2-1: Monitoring locations and noise criteria

		Morning Shoulder ²	Day ³	Evening⁴
Receiver ¹	Monitoring Locations	LAeq (15min)	LAeq (15min)	LAeq (15min)
			dB(A)	
N1, N7, N8, N56, N57, N59, N63, N64, N65	N8	40	44	39
N67	N67	36	41	35
All other receivers between N9 and N71 inclusive	N60, N38	36	38	35
All other receivers	N3	35	35	35

 1 Refer to Appendix 5 of the Consolidated Development Consent – SSD 5109 (DOC19/541449) and/or the NMP for receiver locations on the map.

² 6 am–7 am

³ 7 am–6 pm Monday to Saturday

⁴ 6 pm–10 pm Monday to Saturday

Note: No operations on Sundays and public holidays

3. Methodology

The monitoring program was developed in accordance with the procedures described in Australian Standard AS 1055:2018 and the Approval Documents referenced in Section 1.

The operator-attended measurements were carried out using a RION Sound Level Meter NL-52 on Wednesday 2 October 2024 and Thursday 3 October 2024. The acoustic instrumentation implemented carries current National Association of Testing Authorities (NATA) calibration and complies with AS/NZS IEC 61672-1:2019 Class 1. Calibration of all instrumentation was checked prior to and following the measurements using a Pulsar Acoustic Calibrator 105 which also carried a current NATA calibration and complies with IEC 60942:2017. Drift in calibration did not exceed ± 0.3 dBA.

The attended noise monitoring was conducted for 15-minutes in duration during the day, evening, and night periods over three days at each monitoring location. Where possible, throughout each measurement the operator(s) quantified the contribution of each significant noise source. Where the plant was not distinctly audible during the attended monitoring, the quarry contribution is estimated to be at least 10 dBA below the ambient noise level, as determined by the LA90.

3.1 Meteorological Conditions

Meterology has an important influence on noise monitoring assessment. Where an onsite meterological station with data recorded at 10m height has not been available, the nearest Department of Planning, Housing and Infrastructure (DPHI) meterological station has been used to adopt wind direction, wind speed and rain data to inform this assessment. Temperature data has been adopted from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Conformal Cubic Atmospheric Model (CCAM) and modelled using The Air Pollution Model (TAPM) to determine the atmospheric category as outline in **Table 3-1**.

Stability Classification	Pasquill Stability Category	Ambient temperature change with height (°C/100m)
Extremely unstable	А	ΔT ≤ -1.9
Moderately unstable	В	-1.9 < ΔT ≤ -1.7
Slightly unstable	С	-1.7 < ΔT ≤ -1.5
Neutral	D	-1.5 < ΔT ≤ -0.5
Slightly stable	E	-0.5 < ΔT ≤ 1.5
Moderately stable	F	$1.5 < \Delta T \le 4.0$
Extremely stable	G	ΔT > 4.0

Table 3-1: Classification of Atmospheric Stability (NSW EPA, 2014)

As stated in the Development Consent, the noise criteria in Table 2-1 applies under all meteorological conditions except the following:

- During periods of rain or hail
- Average wind speed at microphone height exceeds 5 m/s
- Wind speeds greater than 3 m/s measured at 10 m above ground level
- Temperature inversion conditions greater than 3°C/100m.

Appendix 9 of the Development Consent also specifies that except for wind speed at microphone height, the data to be used for determing meterological conditons must be that recorded by the meterological station on or in the vicinity of the site.

4. Results and Discussion

4.1 Location N3

Noise monitoring at location N3 was conducted on Wednesday 2 October 2024 with results presented in **Table 4-1**. The quarry was inaudible at N3 during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources include background road traffic, birds, car, people, and aircraft. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance.

Table 4-1: Noise survey results and observations for Location N3

		Descriptor (dBA)		IBA)	Meteorology			Cooma Road	
Date	Time	LAmax	LAeq	LA90	(Handheld at DPHI Met Station (at microphone 10m) ¹ height)		Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq(15min) (dBA) Contribution	LAeq(15min) Criteria (dBA)
2-10-24	6:00am to 6:15am (Morning Shoulder)	64.4	41.8	28.8	WD: n/a WS: 0 m/s Rain: Nil	WD: 79° WS: 3 m/s Rain: nil Stability Category: E ²	Background motorway/birds 28- 30 Birds 43-68 Site inaudible	<19	35
2-10-24	8:45am to 9:00am (Day)	71.8	49	32.5	WD: n/a WS: 0 m/s Rain: Nil	WD: 98° WS: 3 m/s Rain: nil Stability Category: F ²	Background motorway traffic 32- 54 Passing car 40-63 Aircraft 45-63 Birds 52-72 Site inaudible	<23	35
2-10-24	6:00pm to 6:15pm (Evening)	63.5	42.8	36.3	WD: n/a WS: 0 m/s Rain: Nil	WD: 84° WS: 2.6 m/s Rain: nil Stability Category: E ²	Background road traffic 37-44 Aircraft 44-58 Person 38-39 Loud car 40-60 Birds 52-72 Site not operational	n/a³	35

¹ Data sourced from Goulburn DPHI Met Station.

² Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

4.2 Location N8

Noise monitoring at location N8 was conducted on Wednesday 2 October and Thursday 3 October 2024 with results presented in **Table 4-2**. The quarry was inaudible at N8 during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources included road traffic, aircraft, birds and passing cars on Tempe Crescent. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N8

Table 4-2: Noise survey results and observations for Location N8

		Descriptor (dBA)		Meteorology			Cooma Road Quarry	LAeg(15min)	
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	DPHI Met Station (at 10m) ¹	Apparent Noise Source, Description and SPL (dBA)	LAeq(15min) (dBA) Contribution	Criteria (dBA)
3-10-24	6:20am to 6.35am (Morning Shoulder)	72.6	59.6	56.5	WD: n/a WS: 0 m/s Rain: Nil	WD: 207° WS: 0.3 m/s Rain: nil Stability Category: E ²	Background motorway 44-66 Birds 50-55 Aircraft 45-60 Loud car 65-72 Site inaudible	<47³	40
2-10-24	7:12am to 7:27am (Day)	69.2	60	55.9	WD: n/a WS: 0 m/s Rain: Nil	WD: 85° WS: 2.8 m/s Rain: nil Stability Category: E ²	Background motorway 59-66 Cars passing on road 61-69 Site inaudible	<46 ^{4,5}	44
2-10-24	7:13pm to 7:28pm (Evening)	71.2	57.4	47.9	WD: n/a WS: 0 m/s Rain: Nil	WD: 84° WS: 2.4 m/s Rain: nil Stability Category: E ²	Background motorway 39-57 Motorbike 87-70 Site not operational	n/a ⁶	39

¹ Data sourced from Goulburn DPHI Met Station.

² Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

³ Measured LA90 value of 56.5 was dominated by road traffic, birds, and aircraft so unable to estimate contribution for quarry at assessment location.

⁴ Measured LA90 value of 55.9 was dominated by road traffic so unable to estimate contribution for quarry at assessment location.

⁵ Negligible exceedance (NPfI 2017 – Table 4.1 and Table 4.2)

4.3 Location N38

Noise monitoring at location N38 was conducted on Wednesday 2 October and Thursday 3 October 2024 with results presented in **Table 4-3**. The quarry was inaudible at N38 during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources include background road traffic, trucks, buses, and birds. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N38

Table 4-3: Noise survey results and observations for Location N38

		Descriptor (dBA)			Meteorology				
Date	Time	LAmax	Laeq	LA90	(handheld at microphone height)	DPHI Met Station (at 10m) ¹	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq(15min) (dBA) Contribution	LAeq(15min) Criteria (dBA)
3-10-24	6:37am to 6:52am (Morning Shoulder)	77.2	58.2	41.6	WD: n/a WS: 0 m/s Rain: Nil	WD: 207° WS: 0.3 m/s Rain: nil Stability Category: E ²	Background motorway 30-52 Trucks/buses 69-75 Loud bird 40-53 Site inaudible	<32	36
2-10-24	7:32am to 7:47am (Day)	72.3	57	48.1	WD: n/a WS: 0 m/s Rain: Nil	WD: 85° WS: 2.8 m/s Rain: nil Stability Category: E ²	Background motorway 43-69 Trucks/cars passing 50-67 Site inaudible	<38	38
2-10-24	7:32pm to 7:47pm (Evening)	75	53.4	44.9	WD: n/a WS: 0 m/s Rain: Nil	WD: 84° WS: 2.4 m/s Rain: nil Stability Category: E ²	Background motorway hum 37- 53 Trucks/buses 68-75 Birds 40-53 Site not operational	n/a³	35

¹ Data sourced from Goulburn DPHI Met Station.

² Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

4.4 Location N60

Noise monitoring at location N60 was conducted on Wednesday 2 October and Thursday 3 October 2024 with results presented in **Table 4-4**. The quarry was inaudible at N60 during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources included road traffic, birds, trucks, buses, motorbikes, and aircrafts. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N60

Table 4-4: Noise survey results and observations for Location N60

		Descriptor (dBA)		Meteorology			Cooma Road		
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	DPHI Met Station (at 10m) ¹	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq(15min) (dBA) Contribution	Criteria (dBA)
3-10-24	5:52am to 6:07am (Morning Shoulder)	83	64.8	44.9	WD: n/a WS: 0 m/s Rain: Nil	WD: 183° WS: 0.3 m/s Rain: nil Stability Category: E ²	Background motorway 45-60 Birds 50-58 Site inaudible	<35	36
2-10-24	7:51am to 8:06am (Day)	83.2	70.7	57.0	WD: n/a WS: 0 m/s Rain: Nil	WD: 92° WS: 3 m/s Rain: nil Stability Category: E ²	Background motorway 43-70 Trucks 77-83 Motorbike 60-72 Site inaudible	<473	38
2-10-24	6:50pm to 7:05pm (Evening)	75.7	61.8	45.7	WD: n/a WS: 0 m/s Rain: Nil	WD: 84° WS: 2.5 m/s Rain: nil Stability Category: E ²	Background motorway 37-61 Trucks/buses 70-75 Aircraft 63-68 Site not operational	n/a ⁴	35

¹ Data sourced from Goulburn DPHI Met Station.

² Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

³ Measured LA90 value of 57.0 was dominated by road traffic so unable to estimate contribution for quarry at assessment location.

4.5 Location N67

Noise monitoring results at location N67 was conducted on Wednesday 2 October and Thursday 3 October 2024 with results presented in **Table 4-5**. The quarry was inaudible at N67 during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources included road traffic and passing trucks. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance.

Table 4-5: Noise survey results and observations for Location N67

		Descriptor (dBA)		Meteorology			Cooma Road		
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	DPHI Met Station (at 10m) ¹	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq(15min) (dBA) Contribution	LAeq(15min) Criteria (dBA)
2-10-24	6:28am to 6:43am (Morning Shoulder)	87.3	7.2	51.6	WD: n/a WS: 0 m/s Rain: Nil	WD: 79° WS: 3 m/s Rain: nil Stability Category: E ²	Background motorway 47-81 Trucks 74-87 Site inaudible	<42 ³	36
2-10-24	8:10am to 8:25am (Day)	94	78.8	61.2	WD: n/a WS: 0 m/s Rain: Nil	WD: 98° WS: 3 m/s Rain: nil Stability Category: F ²	Background motorway 61-79 Trucks 79-94 Site inaudible	<514	41
2-10-24	6:29pm to 6:44pm (Evening)	90	73.5	53.6	WD: n/a WS: 0 m/s Rain: Nil	WD: 84° WS: 2.6 m/s Rain: nil Stability Category: E ²	Background motorway 38-73 Trucks 73-90 Site not operational	n/a ⁵	35

¹ Data sourced from Goulburn DPHI Met Station.

² Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

³ Measured LA90 value of 51.6 was dominated by road traffic so unable to estimate contribution for quarry at assessment location.

⁴ Measured LA90 value of 61.2 was dominated by road traffic so unable to estimate contribution for quarry at assessment location.

5. Conclusion

This NMA was completed by Ramboll at the Holcim Cooma Road Quarry, Googong, NSW as a quarterly requirement of the NMP. Monitoring was carried out on Wednesday 2 October and Thursday 3 October 2024 at five locations selected as representative to the sensitive receivers at the surroundings to Cooma Road Quarry.

No audible noise from quarry operations was observed at any of the five locations during the morning shoulder and day periods. The quarry was not operational during the evening periods. The results presented in this NMA show compliance with the relevant noise criteria applicable to the operation of the Holcim Cooma Road Quarry, Googong, NSW.

6. References

Holcim Australia (2019) Cooma Road Quarry, Noise Management Plan.

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Intended for Holcim (Australia) Pty Ltd

Document type **Report**

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Cooma Road Quarry Quarterly Noise Monitoring Assessment Quarter 3 2024



Cooma Road Quarry Quarterly Noise Monitoring Assessment Quarter 3 2024

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Abbreviations and Definitions

Ambient Noise	The all-encompassing noise within a given environment. It is the composite of sounds from many sources, both near and far.
Background noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the LA90 descriptor (see below).
dB	Abbreviation for decibel, a measure of sound equivalent to 20 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure, and 10 times the logarithm of a given sound power to a reference power.
dB(A)	A measure of A-weighted sound levels. A Weighting is an adjustment made to the sound level measurement to approximate the response of the human ear.
Extraneous noise	Noise resulting from activities that are not typical of the area. Atypical activities may include construction, and traffic generated by holiday periods. Normal daily traffic is not extraneous noise.
LA1	The noise level, measured in dB(A), which is exceeded for 1 per cent of the measurement period.
LA1(1min)	The noise level, measured in dB(A), which is exceeded for 1 per cent of the time over a 1-minute measurement period, i.e., is exceeded for 0.6 seconds. This measure can approximate to the maximum noise level but may be less if there is more than 1 noise event during this 0.6 second period.
LA10	The noise level, measured in $dB(A)$, which is exceeded for 10 per cent of the time.
LA90	The noise level, measured in dB(A), which is exceeded for 90 per cent of the time, referred to as the background noise level. This is considered to represent the background noise (see above).
LAeq	The level of noise equivalent to the energy average of noise levels occurring over a defined measurement period.
LAeq (period)	The average equivalent noise level, measured in dB(A), during a measurement period (e.g., 15-minute, day, evening, or night).
LAmax	The A-weighted sound pressure level that represents the maximum noise level measured over the time that a given sound is measured.
NMA	Noise Monitoring Assessment
NMP	Noise Management Plan
SPL	The Sound Pressure Level. Sound pressure is the fluctuation in air pressure, from the steady atmospheric pressure, created by sound. The sound pressure level is the sound pressure expressed on a decibel scale.

Source: Noise Guide for Local Government (NSW EPA, 2023)

1. Overview

1.1 Project Driver

Ramboll Australia Pty Ltd (Ramboll) has been commissioned by Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for Cooma Road Quarry ("the quarry") at Googong, NSW.

This NMA was done in accordance with the following documents:

- Noise Policy for Industry (NPfI) (NSW EPA, 2017).
- Cooma Road Quarry Noise Management Plan (NMP) (Holcim Australia, 2019).
- Development Consent Application Number SSD_5109 (Minister for Planning and Infrastructure, 2013).
- Environment Protection Licence (EPL) number 1453 (NSW EPA, 2020).
- Australian Standard AS 1055:2018 Acoustics—Description and measurement of environmental noise (Standards Australia, 2018).
- Australian Standard AS/NZS IEC 61672.1:2019 Electroacoustics Sound level meters, Part 1: Specifications (Standards Australia and Standards New Zealand, 2019)
- IEC 60942:2017 Electroacoustics Electroacoustics Sound calibrators (International Standard, 2017).

This NMA has been undertaken for the quarterly period July to September 2024, and forms part of the monitoring program to determine compliance with conditions of the Development Consent.

1.2 Site Location and Sensitive Receivers

The quarry is in Googong, approximately 6 kilometres south of Queanbeyan, NSW.

Sensitive receivers surrounding the quarry are primarily rural and residential properties in all directions. Old Cooma Road is located to the east of the quarry and passing road traffic is a dominate noise source for those receivers to the east of the quarry. Five monitoring locations have been selected as part of the NMA and in accordance with the

Development Consent and are shown in Table 1-1.

Table 1-1: Mor	nitoring locations	locality and	sensitive	receivers
----------------	--------------------	--------------	-----------	-----------

Monitoring Locations	Locality and Sensitive Receivers
N3	West of the quarry situated on a rural property off Copperfield Place. This location represents residential and rural receivers to the west of the quarry.
N8	Northeast of the quarry along Tempe Crescent and is representative of residential receivers in that area.
N38	On Heights Road and is representative of the elevated residential receivers to the east of the quarry.
N60	At 501 Old Cooma Road and represents the residence adjacent to the quarry access road.
N67	Situated on a rural property at 732 Old Cooma Road to the south of the quarry. This is representative of rural and residential receivers to the south, with direct line of site into the quarry pit

The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**. The NMP states attended monitoring is to be undertaken within 30 metres of a private residence, where possible. During this NMA, monitoring at most locations (N3, N8, N60, and N67) was undertaken where safely accessible at each property boundary which was approximately 100 to 200 metres from each property dwelling.



Legend

- Noise monitoring location
- Property dwelling





2. Noise Criteria

Table 2-1 brings the applicable noise criteria outlined in the Development Consent for the residential receivers surrounding the quarry (N1–N71), and the five monitoring locations adopted from the NMP that are deemed representative and applicable for this NMA (N3, N8, N38, N60, and N67).

Table 2-1: Monitoring locations and noise criteria

		Morning Shoulder ²		Evening ⁴
Receiver ¹	Monitoring Locations	LAeq (15min)	LAeq (15min)	LAeq (15min)
			dB(A)	
N1, N7, N8, N56, N57, N59, N63, N64, N65	N8	40	44	39
N67	N67	36	41	35
All other receivers between N9 and N71 inclusive	N60, N38	36	38	35
All other receivers	N3	35	35	35

¹ Refer to Appendix 5 of the Consolidated Development Consent – SSD 5109 (DOC19/541449) and/or the NMP for receiver locations on the map.

² 6 am–7 a

³ 7 am–6 pm Monday to Saturday

⁴ 6 pm–10 pm Monday to Saturday

Note: No operations on Sundays and public holidays
3. Methodology

The monitoring program was developed in accordance with the procedures described in Australian Standard AS 1055:2018 and the Approval Documents referenced in Section 1.

The operator-attended measurements were carried out using a RION Sound Level Meter NL-52 on Wednesday 7 August 2024 and Thursday 8 August 2024. The acoustic instrumentation implemented carries current NATA calibration and complies with AS/NZS IEC 61672-1:2019 Class 1. Calibration of all instrumentation was checked prior to and following the measurements using a Pulsar Acoustic Calibrator 105 which also carried a current NATA calibration and complies with IEC 60942:2017. Drift in calibration did not exceed ±0.3 dBA.

The attended noise monitoring was conducted for 15-minutes in duration during the day, evening, and night periods over three days at each monitoring location. Where possible, throughout each measurement the operator(s) quantified the contribution of each significant noise source.

Where the plant was not distinctly audible during the attended monitoring, the quarry contribution is estimated to be at least 10 dBA below the ambient noise level, as determined by the LA90.

3.1 Meteorological Conditions

Meterology has an important influence on noise monitoring assessment. Where an onsite meterological station with data recorded at 10m height has not been available, the nearest Bureau of Meteorology data has been adopted to inform this assessment and modelled using The Air Pollution Model (TAPM) to determine the atmospheric stability category as outline in **Table 3-1**.

Stability Classification	Pasquill Stability Category	Ambient temperature change with height (°C/100m)
Extremely unstable	A	ΔT ≤ -1.9
Moderately unstable	В	-1.9 < ΔT ≤ -1.7
Slightly unstable	С	-1.7 < ΔT ≤ -1.5
Neutral	D	-1.5 < ΔT ≤ -0.5
Slightly stable	E	$-0.5 < \Delta T \le 1.5$
Moderately stable	F	$1.5 < \Delta T \le 4.0$
Extremely stable	G	ΔT > 4.0

Table 3-1: Classification of Atmospheric Stability (NSW EPA, 2014)

As stated in the Development Consent, the noise criteria in Table 2-1 applies under all meteorological conditions except the following:

- During periods of rain or hail
- Average wind speed at microphone height exceeds 5 m/s
- Wind speeds greater than 3 m/s measured at 10 m above ground level
- Temperature inversion conditions greater than 3°C/100m.

Appendix 9 of the Development Consent also specifies that except for wind speed at microphone height, the data to be used for determing meterological conditons must be that recorded by the meterological station on or in the vicinity of the site.

4. Results and Discussion

4.1 Location N3

Noise monitoring at location N3 conducted on Wednesday 7 August 2024 resulted in inaudible quarry noise during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources include background road traffic, dogs, birds, car, and aircraft. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N3 are presented in **Table 4-1**.

Table 4-1: Noise survey results and observations for Location N3

		Descriptor (dBA)			Meteorology	DDIE Mat Station		Cooma Road	
Date	Time	LAmax	LAeq	LA90	(Handheld at microphone height)	(GOULBURN) 10m height	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq(15min) (dBA) Contribution	LAeq(15min) Criteria (dBA)
7-08-24	6:21am to 6:36am (Morning Shoulder)	65.4	45.8	41.4	WD: n/a WS: 0 m/s Rain: Nil	WD: 33° WS: 0.1 m/s Rain: nil Stability Category: F ¹	Background road traffic 39-41 Birds 42-65 Site inaudible	<31	35
7-08-24	8:39am to 8:54am (Day)	65.8	47.1	42.3	WD: n/a WS: 0 m/s Rain: Nil	WD: 35° WS: 0.2 m/s Rain: nil Stability Category: F ¹	Background road traffic 40-43 Birds 65 Site inaudible	<32	35
7-08-24	6:00pm to 6:15pm (Evening)	59	44.3	39.2	WD: n/a WS: 0 m/s Rain: Nil	WD: 270° WS: 0.4 m/s Rain: nil Stability Category: E ¹	Background road traffic 38-43 Aircraft 38-58 Dog barking 38-41 Person 38-39 Loud car 43 Site not operational	n/a²	35

¹ Modelled using TAPM to determine Stability Category.

² Quarry not operational.

4.2 Location N8

Noise monitoring at location N8 on Wednesday 7 August and Thursday 8 August 2024 resulted in inaudible quarry noise during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources included road traffic and passing cars on Tempe Crescent. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N8 are presented in **Table 4-2**.

Table 4-2: Noise survey results and observations for Location N8

		Descriptor (dBA)			Meteorology	DDIE Mat Chatian		Cooma Road	
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	(GOULBURN) 10m height	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq(15min) (dBA) Contribution	Criteria (dBA)
8-08-24	6:10am to 6.25am (Morning Shoulder)	72.1	59	51.2	WD: n/a WS: 0 m/s Rain: Nil	WD: 310° WS: 0.1 m/s Rain: nil Stability Category: G ¹	Background motorway 44-72 Site inaudible	<41	40
7-08-24	7:26am to 7:41am (Day)	81.7	62.9	55.8	WD: n/a WS: 0 m/s Rain: Nil	WD: 270° WS: 0.4 m/s Rain: nil Stability Category: F ¹	Background motorway 50-81 Cars passing on road 50-76 Site inaudible	<46 ^{2,3}	44
7-08-24	7:13pm to 7:28pm (Evening)	81.3	59.8	50.4	WD: n/a WS: 0 m/s Rain: Nil	WD: 48° WS: 0.4 m/s Rain: nil Stability Category: E ¹	Background motorway 41-81 Site not operational	n/a ⁴	39

¹ Modelled using TAPM to determine Stability Category.

² Measured LA90 value of 56 was dominated by road traffic noise so unable to estimate contribution for quarry at assessment location.

³ Negligible exceedance (NPfI 2017 – Table 4.1 and Table 4.2)

⁴ Quarry not operational.

4.3 Location N38

Noise monitoring at location N38 conducted on Wednesday 7 August 2024 resulted in inaudible quarry noise during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources included road traffic and passing cars on Heights Road. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N38 are presented in **Table 4-3**.

Table 4-3: Noise survey results and observations for Location N38

		De	scriptor (d	BA)	Meteorology			Cooma Road	
Date	Time	LAmax	Laeq	LA90	(handheld at microphone height)	(GOULBURN) 10m height	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq(15min) (dBA) Contribution	LAeq(15min) Criteria (dBA)
7-08-24	7:03am to 7:18am (Day)	77	59.3	52	WD: n/a WS: 0 m/s Rain: Nil	WD: 5° WS: 0.2 m/s Rain: nil Stability Category: F ¹	Background motorway 47-77 Cars passing on road 50-67 Site inaudible	<423	38
7-08-24	6:45am to 7:00am (Morning Shoulder)	78.5	59.4	51.7	WD: n/a WS: 0 m/s Rain: Nil	WD: 33° WS: 0.1 m/s Rain: nil Stability Category: F ¹	Background motorway 47-78 Cars passing on road 57-65 Dog barking 53-60 Site inaudible	<42 ²	36
7-08-24	6:39pm to 6:54pm (Evening)	67.5	55	49.9	WD: n/a WS: 0 m/s Rain: Nil	WD: 270° WS: 0.4 m/s Rain: nil Stability Category: E ¹	Background motorway hum 43- 67 Vehicle on road 51-64 Site not operational	n/a ⁴	35

¹ Modelled using TAPM to determine Stability Category.

² Measured LA90 value of 51.7 was dominated by road traffic noise so unable to estimate contribution for quarry at assessment location.

³ Measured LA90 value of 52 was dominated by road traffic noise so unable to estimate contribution for quarry at assessment location.

⁴ Quarry not operational.

4.4 Location N60

Noise monitoring at location N60 conducted on Wednesday 7 August and Thursday 8 August 2024 resulted in inaudible quarry noise during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources included road traffic, and a dog barking. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N60 are presented in **Table 4-4**.

Table 4-4: Noise survey results and observations for Location N60

		Descriptor (dBA)			Meteorology	DDIE Mat Station		Cooma Road	LAcc(15min)
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	(GOULBURN) 10m height	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq(15min) (dBA) Contribution	Criteria (dBA)
8-08-24	6:45am to 7:00am (Morning Shoulder)	70.7	54.5	41.8	WD: n/a WS: 0 m/s Rain: Nil	WD: 310° WS: 0.1 m/s Rain: nil Stability Category: G ¹	Background motorway 36-70 Site inaudible	<32	36
7-08-24	8:10am to 8:25am (Day)	66.7	55.4	45.7	WD: n/a WS: 0 m/s Rain: Nil	WD: 270° WS: 0.2 m/s Rain: nil Stability Category: F ¹	Background motorway 35-66 Site inaudible	<36	38
7-08-24	7:57pm to 8:12pm (Evening)	85.2	66.5	48.2	WD: n/a WS: 0 m/s Rain: Nil	WD: 155° WS: 0.2 m/s Rain: nil Stability Category: F ¹	Background motorway 36-85 Dog barking 41-44 Site not operational	n/a²	35

¹ Modelled using TAPM to determine Stability Category.

² Quarry not operational.

4.5 Location N67

Noise monitoring at location N67 conducted on Wednesday 7 August and Thursday 8 August 2024 resulted in inaudible quarry noise during morning shoulder and day periods. The quarry was not operational during the evening period. Measured ambient noise sources included road traffic, a car passing and a dog barking. These results satisfy the established noise criteria and indicate that noise emissions from Cooma Road Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location N67 are presented in **Table 4-5**.

Table 4-5: Noise survey results and observations for Location N67

		Descriptor (dBA)			Meteorology			Cooma Road	
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	DPIE Met Station (GOULBURN) 10m height	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq(15min) (dBA) Contribution	LAeq(15min) Criteria (dBA)
8-08-24	6:29am to 6:44am (Morning Shoulder)	71	57.5	42.8	WD: n/a WS: 0 m/s Rain: Nil	WD: 310° WS: 0.1 m/s Rain: nil Stability Category: G ¹	Background motorway 34-71 Site inaudible	<33	36
7-08-24	7:55am to 8:10am (Day)	73.2	61.3	51.2	WD: n/a WS: 0 m/s Rain: Nil	WD: 20° WS: 0.2 m/s Rain: nil Stability Category: F ¹	Background motorway 66-73 Site inaudible	<41	41
7-08-24	7:33pm to 7:48pm (Evening)	74.5	59.8	45	WD: n/a WS: 0 m/s Rain: Nil	WD: 48° WS: 0.4 m/s Rain: nil Stability Category: E ¹	Background motorway 49-45 Car passing 52-71 Dog barking 49-52 Site not operational	n/a²	35

¹ Modelled using TAPM to determine Stability Category.

² Quarry not operational.

5. Conclusion

This NMA was completed by Ramboll at the Holcim Cooma Road Quarry, Googong, NSW as a quarterly requirement of the NMP. Monitoring was carried out on Wednesday 7 August and Thursday 8 August 2024 at five locations selected as representative to the sensitive receivers at the surroundings to Cooma Road Quarry.

No exceedances of the noise criteria were recorded, and quarry noise was inaudible at the selected monitoring locations during the monitoring campaign. The quarry was not operational during the evening periods.

The results presented in this NMA show compliance with the relevant noise criteria applicable to the operation of the Holcim Cooma Road Quarry, Googong, NSW.

6. References

Holcim Australia (2019) Cooma Road Quarry, Noise Management Plan.

International Electrotechnical Commission IEC 60942:2017 Electroacoustics – Sound calibrators

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APPENDIX B – 2024 BIODIVERSITY MONITORING REPORT



₩SLR

Cooma Road Quarry

Ecological Monitoring Program 2024

Holcim (Australia) Pty Ltd

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Prepared by:

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SLR Project No.: 630.V30215

14 February 2025

Revision: 1.0

Making Sustainability Happen

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
0.2	12 February 2025	Bo Davidson	J Pepper	J Pepper
1.0	14 February 2025	Bo Davidson	J Pepper	J Pepper

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Holcim (Australia) Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

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1.0 Introduction

1.1 Background

SLR Consulting Australia Pty Ltd. (SLR) was commissioned by Holcim (Australia) Pty Ltd (Holcim) to undertake annual ecological monitoring at the Cooma Road Quarry (hereafter referred to as the 'Quarry Site'), a hard rock quarry located approximately six kilometres south of Queanbeyan, New South Wales (NSW) (see **Figure 1**). Operating since 1959, the Cooma Road Quarry's operations were recently approved to continue for a further 20 years and to increase annual production from one million tonnes per annum (Mtpa) to 1.5 Mtpa.

This report details the 2024 annual ecological monitoring report, continuing the annual monitoring has been conducted by SLR since 2020. The ecological monitoring works detailed in this report are divided into two phases, Winter and Spring. These two survey periods were chosen to allow different works to be carried out at appropriate times of year to allow for detection of flora and fauna and threatened species based on seasonal variations.

The primary objectives of the Winter surveys are:

- Ascertain condition and usage of nest boxes installed in April 2021.
- Determine presence of threatened birds at the Quarry Site, including the Regent Honeyeater (*Anthochaera phrygia*), Swift Parrot (*Lathamus discolor*), Gang-gang Cockatoo (*Callocephalon fimbriatum*) and other nomadic or migratory birds that can occur during winter.

The primary objectives of the Spring surveys are:

- Determine the condition of retained bushland (native vegetation monitoring).
- Determine the status and extent of existing threatened plant populations (via plot surveys and mapping).
- Determine usage of the Quarry Site by threatened species, particularly, birds and herpetofauna (reptiles and amphibians).
- Determine status and condition of existing rehabilitation areas.

1.2 Aims of the Study

The purpose of the ecological monitoring programme is to monitor progress and demonstrate the achievement of rehabilitation objectives within the Quarry Site in accordance with the *Cooma Road Quarry Continued Operations Project Environmental Impact Statement EIS* (Umwelt Environmental Consultants, 2012), the *Cooma Road Quarry Rehabilitation Management Plan* (Umwelt Environmental Consultants, 2014) and the *Cooma Road Quarry Continued Operations Project Development Consent* (Department of Primary Industries, 2013).



FIGURE 1

2.0 Methods

The works detailed in this report comprise both Winter and Spring survey periods. The methodologies used during these two monitoring events are detailed below.

2.1 Winter Survey

The Winter 2024 survey was completed between 18th July 2024, with the key survey tasks being:

- Diurnal bird surveys.
- Inspection of nesting boxes.

The above monitoring techniques are described in more detail in the following sections.

2.1.1 Retained Vegetation Monitoring

The monitoring plots were selected within areas of remnant vegetation across the Quarry Site, distributed to ensure appropriate representation of the Quarry Site's geography and key vegetation communities.

Four plots were established during the initial Winter 2020 monitoring event. These plots are detailed below in **Table 1** and locations shown in **Figure 2**.

Monitoring Plot	Coordinates (Latitude, Longitude)	Mapped Vegetation Class#	
Cooma Road Control 1 (CR1)	-35.399956, 149.224462	Southern Tableland Grassy Woodlands	
Cooma Road Control 2 (CR2)	-35.3941358, 149.22088	Upper Riverina Dry Sclerophyll Forests	
Cooma Road Control 3 (CR3)	-35.390988, 149.225064	Upper Riverina Dry Sclerophyll Forests	
Cooma Road Control 4 (CR4)	-35.388903, 149.22438	Upper Riverina Dry Sclerophyll Forests	
# Source of vegetation mapping data: State Vegetation Type Map (NSW Government, 2023)			

 Table 1:
 Holcim Cooma Road Quarry Monitoring Control Plots

2.1.2 Previous Diurnal Bird Surveys

Several threatened bird species or their habitat have been previously identified on the Quarry Site during past assessments, including but not limited to:

- Brown Treecreeper (eastern subspecies) (Climacteris picumnus victoriae).
- Diamond Firetail (Stagonopleura guttata).
- Hooded Robin (south-eastern form) (Melanodryas cucullata cucullata).
- Varied Sittella (Daphoenositta chrysoptera).

Additionally, the Quarry Site contains suitable habitat for a selection of migratory or nomadic threatened birds that have been recorded in the locality and utilise grassy woodlands during winter, specifically the Gang-gang Cockatoo, Glossy Black Cockatoo (*Calyptorhynchus lathami*), Regent Honeyeater and Swift Parrot.



Bird surveys involved the completion of a 20-minute bird census at the four control vegetation monitoring plots. This was completed by two ecologists and involved the identification of birds through call and/or visually (using binoculars or digital SLR camera). The location of these survey points is shown below in **Figure 2**.



FIGURE 2

2.1.3 Nest-box Monitoring

A total of 55 nesting boxes were installed by Wildthing Environmental Consultants in April 2021, 34 within retained vegetation in the north-western area and 20 within retained vegetation in the southern lease area. The location of all installed nesting boxes is shown **Figure 3**.

The 2024 annual inspection of these boxes was conducted on 18th July 2024. These inspections comprised physical inspection of the interior of each box with a camera fixed to an extendable pole to minimise fauna distress. A photograph was collected from each box and the box number, type, presence of fauna, nesting material, eggs, young or other was documented on field sheets as well as whether any boxes needed pest removal (e.g. beehives, etc.) or repair.

2.1.4 Weather

Weather during the Winter survey was cool and partly overcast. **Table 7** below provides local weather data for the Winter survey dates from the Australian Bureau of Meteorology (BOM). This data is sourced from the Canberra Airport weather station, located approximately 8 km from the Quarry Site.

Table 2: Spring Survey Weather Conditions

Date	Minimum temperature (^o C)	Maximum temperature (°C)	Rainfall (mm)
18/07/2024	-0.4	10.8	0.2

Source Australian Bureau of Meteorology, Canberra Airport station (Australian Bureau of Meteorology 2025)



2.2 Spring Survey

The Spring 2024 surveys were completed on the 3rd and 4th of December 2024. The key tasks for the Spring surveys are:

- Collect vegetation, habitat and soils data from the existing monitoring plots that were established in retained vegetation during 2020.
- Survey three vegetation monitoring plots within the three rehabilitation areas across the Quarry Site.
- Survey four vegetation monitoring plots within retained vegetation areas.
- Bird census at two monitoring plots (CR1 and CR3), located within retained vegetation.
- Survey the five 2 m x 2 m Hoary Sunray (*Leucochrysum albicans* var. *tricolor*) monitoring plots and identify and map existing and new populations.
- Diurnal herpetological (reptile and amphibian) surveys.
- Identify and map suitable grassland boulder habitat for the Grassland Earless Dragon (*Tympanocryptis pinguicolla*).
- Identify important habitat features for locally occurring native vertebrate fauna (hollow-bearing trees, log piles, boulder fields etc.).

The above monitoring techniques are described in more detail in the following sections.

2.2.1 Retained Vegetation Monitoring

2.2.1.1 Monitoring Plots

Monitoring of the retained vegetation was completed during the Spring survey period at each of the four permanent monitoring plots described above in **Section 2.1.1**, following survey methods as per the NSW Biodiversity Assessment Method (BAM; DCCEEW 2020).

The location of these plots is shown in **Figure 2**. A description of the retained vegetation monitoring plots is provided below in **Table 3**.

Vegetation Monitoring Plot	Description
CR1	CR1 is located to the east of the quarry pit within remnant Box Gum Woodland dominated by <i>Eucalyptus melliodora</i> (Yellow Box). The plot is on generally flat terrain within a slight NW aspect.
CR2	CR2 is located to the north of the quarry pit in the west of the quarry area. This plot was dominated by <i>Eucalyptus melliodora</i> and the shrub <i>Kunzea ericoides</i> (Burgan). The plot has a northerly aspect, falling towards an ephemeral creekline.
CR3	CR3 is in East Jerrabomberra Nature Reserve to the north of the quarry within open woodlands dominated by <i>Eucalyptus rossii</i> (Inland Scribbly Gum) and <i>Eucalyptus macrorhyncha</i> (Red Stringybark). This plot has a westerly aspect, falling towards Barracks Creek.
CR4	CR4 is located to the north of CR3 within East Jerrabomberra Nature Reserve and contains forest dominated by <i>Eucalyptus macrorhyncha</i> , with a shrubby understorey dominated by <i>Ozothamnus thyrsoideus</i> (Sticky Everlasting). This plot has an easterly aspect, falling towards Barracks Creek.

Table 3: Description of Vegetation Monitoring Plots

2.2.1.2 BAM Plots

Retained vegetation monitoring plots were surveyed following the methodology detailed in Section 4.3.4 of the Biodiversity Assessment Method (BAM, DCCEEW 2020). This involved a 20 x 20 m floristic plot to assess species diversity and ground cover, a 20 x 50 m structural attribute plot to collect tree stem size, large woody debris (LWD) and hollow-bearing tree data and five 1 m x 1 m plots to assess ground cover percentage (bare ground, cryptogram, leaf litter and rock), see **Figure 4**.

Figure 4: BAM Plot Layout

0 metres				
KEY:	Vegetation su Vegetation su Plot mid-line (rvey plot - 20m rvey plot - 20m (Starts at 0m, re	x 50m x 20m ecord coordinates a	nd midline bearing here)

This method provides a repeatable assessment tool to compare vegetation and structural changes over time and to provide comparison for the revegetation areas.

2.2.2 Ecosystem Function Analysis

The EFA system allows collection of indictor datasets which can be matched against appropriate rehabilitation objectives. EFA is designed to demonstrate whether completion criteria have been met while also planning for remedial action, should monitoring demonstrate that the completion criteria are unlikely to be met.

EFA comprises four parts: (i) Landscape Function Analysis (LFA), (ii) Vegetation and Structure Composition, (iii) Habitat Complexity, and (iv) Erosion and Rill assessment (Tongway and Hindley 2004). EFA was developed by the CSIRO in 1994 for monitoring rangelands and mining sites.

This methodology has been discontinued at the Quarry Site from 2023 onwards. Adequate data can be obtained from the BAM plot data to address the relevant requirements of the Rehabilitation Closure Criteria (see **Section 2.2.7**).

2.2.3 General Notes

In addition to the plot-based surveys, the following features were recorded opportunistically during traversing the Quarry Site:

• Floristic composition (including cover and abundance of species) and structure.



- General health of vegetation.
- Evidence of natural regeneration.
- Occurrence and abundance of weed species.
- Presence of threatened or other significant species.
- Signs of disturbance, either by stock, feral animals, vehicles, or humans.
- evidence of site management (e.g., fencing and weed control actions).

2.2.4 Threatened Plant Survey and Mapping

Populations of the threatened plant *Leucochrysum albicans* var. *tricolor*, which is listed as endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were previously mapped by Umwelt in 2012.

The extent of these known populations as well as new or additional populations not recorded in previous years were mapped using a handheld GPS unit. The five permanent 2 m x 2 m reference plots established within major populations were surveyed with accurate counts of individuals within the plot area recorded and a reference photo taken. These data are used to monitor population health over time. The locations of mapped populations and monitoring plots are shown on **Figure 2**.

2.2.5 Diurnal Bird Surveys

Bird surveys involved the completion of a single 20-minute bird census at two of the retained vegetation monitoring plots (CR1 and CR3). This was completed by two ecologists and involved the identification of birds through call and/or visually (using binoculars or digital SLR camera). The location of these survey points is shown above in **Figure 2**.

2.2.6 Diurnal Herpetological (Reptile and Amphibian) Surveys

Surveys for the threatened reptile species, the Grassland Earless Dragon (*Tympanocryptis pinguicolla*), Pink-tailed Worm Lizard (*Aprasia parapulchella*), Rosenberg's Monitor (*Varanus rosenbergi*) and Striped Legless-lizard (*Delma impar*) and were completed during the 2024 Spring surveys.

Four 30-minute random meander surveys were undertaken in areas of suitable reptile and amphibian habitat (boulder fields, around waterbodies, drainage lines, leaf litter piles etc.), identified in previous years' surveys. These surveys involved lifting rocks, logs and searching through leaf litter for resident reptiles and amphibians. All items were placed back in their original locations following searches. These surveys were completed over both survey dates (two transects per day).

Transect locations are shown on Figure 2.

2.2.7 Rehabilitation Closure Criteria

Holcim's rehabilitation responsibilities are outlined in the Conditions of Consent for Cooma Road Quarry Continued Operations Project as follows: **Condition 22** "*The Applicant must rehabilitate the site to the satisfaction of the Secretary. This rehabilitation must be generally consistent with the proposed rehabilitation strategy in the EIS and Appendix 7 and comply* *with the objectives in Table 7*". Relevant ecological closure and rehabilitation criteria are listed in **Table 5.23** in **Section 5.15.3** of the EIS and are detailed in **Table 4** below.

Table 4:	Preliminary	y Rehabilitation	and	Closure	Criteria
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Aspect		Preliminary rehabilitation and closure criteria
Landform	•	Rehabilitated slopes on overburden dumps are stable.
	•	No significant erosion is present that would constitute a safety hazard or compromise the capability of supporting the end land use.
	•	Contour banks are stable and there is no evidence of overtopping or significant scouring as a result of runoff.
	•	Surface layer is free of any hazardous materials.
Soil	•	Topsoil or a suitable alternative has been spread uniformly over the rehabilitation surface.
	•	Soil pH to be in the range of analogue sites.
	•	Monitoring demonstrates soil profile development in rehabilitated areas (e.g. development of organic layer, litter layer).
Native Vegetation	•	Revegetation areas contain flora species assemblage characteristic of the desired native vegetation communities.
	•	Second generation tree seedlings are present or likely to be, based on monitoring in comparable older rehabilitation sites (i.e. evidence of fruiting of native species observed).
	•	More than 75 per cent of trees are healthy and growing as indicated by long term monitoring.
	•	There is no significant weed infestation such that weeds do not comprise a significant proportion of species in any stratum.

Monitoring of rehabilitation is to be annual and throughout the life of the quarry, as detailed in **Section 8.2** of the *Cooma Road Quarry Rehabilitation Management Plan* (Holcim 2019) to assess:

- Soil conditions and erosion (i.e., stability).
- Drainage and sediment control structures.
- Runoff water quality.
- Germination rates.
- Plant health.
- Weed infestation.

As part of the Spring 2020 survey, SLR established permanent monitoring plots within the three areas identified as active rehabilitation sites during the winter survey, as follows:

- Set up of three permanent monitoring plots (one for each mapped rehabilitation area).
- BAM plot and vegetation surveys completed at each monitoring station (including plots within retained vegetation).
- LFA transects completed at each monitoring station.
- Walked meander to identify areas of erosion, which were marked on GPS and photographed.

BAM plot surveys and meander surveys for incidents of erosion were undertaken as part of the Spring 2024 surveys.



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Other environmental variables that may require sampling in future seasons would comprise:

- Surface water sampling from discharge points and test for typical analytes at certified laboratory.
- Soil sampling and chemical analysis (for pH, N, P, and other soil nutrient essential for plant growth).

These works were not undertaken during the 2024 surveys.

The locations of the three rehabilitation areas and plots are shown in **Figure 2**. Location and orientation of these plots was randomised. However, alterations were made to avoid locating plots to close to the outer boundaries of the rehabilitation areas.

The locations and mapped vegetation classes are detailed below in **Table 5** below. **Table 6** provides a brief description of each plot.

Table 5:	Holcim Cooma	Road Quarry	Rehabilitation	Monitoring Plots

Monitoring Plot	Coordinates	Mapped Vegetation Class
Rehabilitation 1 (R1)	-35.402650, 149.220325	Southern Tableland Grassy Woodlands
Rehabilitation 2 (R2)	-35.398929, 149.223259	Southern Tableland Grassy Woodlands
Rehabilitation 3 (R3)	-35.391297, 149.225968	Upper Riverina Dry Sclerophyll Forests

Table 6: Description of Rehabilitation Monitoring Plots

Vegetation Monitoring Plot	Description
R1	R1 is located in the south of quarry area within rehabilitation area 1. This plot is characterised by a mix of native and exotic grasses and forbs with some planted native <i>Allocasuarina verticillata</i> (Drooping She-oak). This plot is located in a gently sloping portion of rehabilitation area 1 with a south-westerly aspect
R2	R2 is located in the southeast of the quarry area, within rehabilitation area 2. The plot is characterised by an open shrubland of planted <i>Eucalyptus blakelyi</i> (Blakley's Red Gum) and a mixed native and exotic ground stratum. This plot has an overall westerly aspect, located across contour berms within the rehabilitation area
R3	R3 is located in the far north of the quarry area within rehabilitation area 3 and contained the best condition native vegetation of the rehabilitation areas. This plot is dominated by the wattles <i>Acacia rubida</i> (Red-stemmed Wattle) and <i>Acacia vestita</i> (Weeping Boree). This plot has a gentle to moderate northerly aspect, falling towards Barracks Creek

2.2.8 Weather

Weather during the Spring surveys was fine and sunny over both survey days. **Table 7** below provides local weather data for the Spring survey dates from the BOM. This data is sourced from the Canberra Airport weather station, located approximately 8 km from the Quarry Site.

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Table 7:	Spring Survey Weather Conditions
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Date	Minimum temperature (^o C)	Maximum temperature (^o C)	Rainfall (mm)
03/12/2024	16.5	25.3	0.0
04/12/2024	16.6	30.5	7.0

Source Australian Bureau of Meteorology, Canberra Airport station (Australian Bureau of Meteorology 2025)

2.3 SLR Permits and Licences

The SLR ecology team operates under a Scientific Licence (licence number SL100176), issued under the NSW *Biodiversity Conservation Act 2016* (BC Act), which authorises field staff to trap, capture, harm, hold and release plants and animals protected under the BC Act and *National Parks and Wildlife Act 1974* (NPW Act), as well as Animal Research Authority (issued by the Secretary of the NSW Animal Care and Ethics Committee of DCCEEW), which allows trapping of animals in NSW for the purposes of animal research.

2.4 Staff Roles and Qualifications

The roles and qualifications of all staff responsible for preparation of this report are listed in **Table 8**.

Staff Name & Title Qualifications and Training		Role
Jeremy Pepper Principal Ecologist	Bachelor of Science (Hons Class 1), University of NSW 1996 Cert II Bushland Regeneration, TAFE NSW Cert III Horticulture (Arboriculture), TAFE NSW BAM accredited assessor (#BAAS17104)	Project director
Bo Davidson Associate Ecologist	Bachelor of Science, Macquarie University (2010) Postgraduate Diploma of Environmental Science, Macquarie University (2013) Master of Environment, Macquarie University (2014) BAM accredited assessor (#BAAS19079)	Project manager Report author Team lead Spring field survey
Joshua Drane Project Ecologist	Bachelor of Environmental Science, Australian Catholic University (2018)	Winter field survey
Elise Newberry Project Consultant	Bachelor of Environmental Biotechnology, University of Technology Sydney	Winter and Spring field survey

 Table 8:
 Staff Roles and Qualifications

2.5 Survey Limitations

Survey efficacy is influenced by a range of factors. For this type of survey, such limitations are generally due to a single, short duration survey that does not account for seasonal variation. Given the short period of time spent on site, the detection of certain species may be affected by:

- Seasonal migration (particularly migratory birds).
- Seasonal flowering periods (some species are cryptic and are unlikely to be detected outside of the known flowering period).
- Seasonal availability of food, such as blossoms and fruits for some fauna.

- Weather conditions during the survey period (some species may go through cycles of activity related to specific weather conditions; for example, some reptiles and frogs can be inactive during cold weather).
- Species lifecycle (cycles of activity related to breeding).

2.6 Conservation Significance

Reference to threatened species in this report will be taken to mean entities listed under:

- BC Act, for threatened species, populations and ecological communities within NSW; and/or:
- Commonwealth EPBC Act, for matters of national environmental significance listed under the Act. In the context of the current monitoring program, EPBC Act matters relevant to the Quarry Site are listed threatened species, listed migratory species and listed ecological communities.

3.0 Results

3.1 Winter Surveys

3.1.1 Bird Monitoring

A total of 23 bird species were recorded during the Winter 2024 monitoring event (**Appendix A**), 22 in the four monitoring plot locations and one recorded incidentally. One threatened species was recorded, the Scarlet Robin (*Petroica boodang*), listed as vulnerable under the BC Act.

The number of species recorded was lower than the 35 and 31 species recorded during the Winter 2023 and 2022 monitoring events, respectively.

3.1.2 Nest Box Monitoring

A total of 55 nest boxes were inspected during the Winter 2024 monitoring event (See **Appendix B** for complete nest box inventory and thumbnail photos). Key results are summarised as follows:

- Overall box usage was considerably higher than that observed in 2023, with 40 boxes showing signs of use (i.e. resident fauna, nesting material or eggs) compared to 32 in 2023, 27 in 2022 and nine in 2021. This indicates a clear trend in increasing box usage over time.
- Four nest boxes were occupied by native fauna, comprising three boxes with Common Brushtail Possums (*Trichosurus vulpecula*) and one with Sugar Glider (*Petaurus breviceps*) or Squirrel Glider (*Petaurus norfolcensis*) – species of gliders could not be confirmed from the photos collected. The Squirrel Glider is listed as vulnerable under the BC Act and is known to occur in the area.
- 25 nest boxes contained leaf nests with five containing fresh leaves, which indicates recent or current use by arboreal mammals, most likely gliders.
- One box contained an egg with no nesting material inside and one box contained egg fragments. Both located in the northwestern area. Likely bird occupants would be parrots or owls.
- 15 nest boxes were empty (13 in the north and two in the south). Six of these empty boxes had visible chew marks around the entry hole, showing evidence that the box may have been used previously.
- One box (number 51) requires the lid to be re-sealed.
- Four nest boxes contained active European Honeybee (*Apis mellifera*) hives, which require control. This is a decrease from eight in 2024.

3.2 Spring Survey

3.2.1 Retained Vegetation Monitoring

3.2.1.1 Vegetation Communities

The 2020 surveys identified two distinct Plant Community Types (PCTs) within the Quarry Site, as classified under the NSW BioNet Vegetation Classification database. **Table 9** below provides the classifications of these PCTs, corresponding Threatened Ecological Communities (TECs) (where relevant) and identifies the vegetation monitoring plots that correspond with these PCTs.

With changes to the NSW PCT system in 2022, the PCTs on the Quarry Site have been reclassified in line with the newly revised State Vegetation Type Map (SVTM), accessible through the NSW Government Sharing and Enabling Environmental Data (SEED) database (NSW Government 2023). The new PCTs are broadly similar to the older PCTs used in previous reports. However, the new PCTs do differ slightly in the benchmark data from the old PCTs. These changes have been reflected in **Table 9** below.

PCT ID	PCT Name	Vegetation Class	Associated Threatened Ecological Community	Status BC Act/ EPBC Act	Plot Name
3376	Southern Tableland Grassy Box Woodland	Southern Tableland Grassy Woodlands	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	Critically Endangered/ Critically Endangered	CR1
3534	Central West Stony Hills Stringybark- Box Forest	Upper Riverina Dry Sclerophyll Forests	-	-	CR2, CR3, CR4

Table 9 [.]	Plant Community Types within Cooma Road Quar	rv
Table J.	Thank Community Types within Cooma Road Quar	ıy.

Appendix C provides PCT profiles for these two PCTs. **Appendix D** provides regional-scale vegetation mapping for the Quarry Site and immediate surrounds.

Note: The regional scale mapping shown in **Appendix D** identifies the vegetation identified as PCT 3376 in **Table 9** above as predominantly PCT 3375 (Monaro-Queanbeyan Rolling Hills Grassy Forest). However, plot data from CR1 indicates that the vegetation within the Quarry Site more closely resembles PCT 3376.

3.2.1.2 Control Plot Descriptions

Four control plots were established in areas of retained native vegetation. **Table 10** below provides a brief description of the vegetation conditions for each plot encountered during the Spring 2024 survey, as well as a plot base photo.

Table 10: Control Plot Descriptions

Control plot	Plot photo
CR1	2023
CR1 is located within an open woodland dominated by <i>Eucalyptus melliodora</i> (Yellow Box) with smaller numbers of <i>E. blakelyi</i> (Blakley's Red Gum) and <i>E. macrorhyncha</i> (Red Stringybark). The understorey is open (lacking shrubs) and dominated by a primarily native forb and grass complex including <i>Austrostipa scabra</i> (Rough Speargrass), <i>Chrysocephalum apiculatum</i> (Yellow Buttons) and <i>Rytidosperma carphoides</i> (Short Wallaby Grass). Exotic species are mostly sparse, except for widespread populations of <i>Petrorhagia dubia</i> (Hairy Pink) and <i>Trifolium arvense</i> (Hare's Foot Clover)	<image/>
 CR2 CR2 comprises an open to shrubby woodland dominated by <i>Eucalyptus goniocalyx</i> (Long-leaved Box) with <i>Kunzea ericoides</i> (Burgan) forming dense stands in part of the plot. The understorey is sparse, and the plot contains large areas of exposed soil and rock. Common understorey species include <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> (Poison Rock Fern), <i>Goodenia hederacea</i> (Ivy Goodenia) and <i>Lomandra filiformis</i> (Wattle Mat-rush). No exotic species were recorded within this plot in 2024 	2023





3.2.1.3 BAM Plot Data

The BAM survey method collects a variety of floristic and structural data to generate a final Vegetation Integrity Score (VIS) for a given vegetation zone (in the current context VIS is calculated for each BAM plot within a single PCT). All PCTs listed in the NSW BioNet Vegetation Classification database provide 'benchmark' scores for these attributes, to which comparison with the relevant plot data can be made. Due to the widespread use of this method in NSW, BAM was chosen to provide a consistent, scientifically rigorous and replicable method for assessing rehabilitation performance.

Table 11 below provides a comparison between the data collected from the control plots (during the current survey and during the 2023 survey) and selected attributes from the benchmark data for both PCT 3376 and PCT 3534.

РСТ	Benchmark Data		Plot	Attribute Score	
				2023	2024
3376	Number of tree species	4	CR1	2	2
	Number of shrub species	7		3	2

Table 11: Comparison of Control Plot Data to PCT Benchmarks

РСТ	Benchmark Data			Attribut	te Score
				2023	2024
	Number of grass and grass-like species	9		5	5
	Number of forb species	16		14	12
	Number of fern species	1		0	1
	Number of other species	2		1	2
	Tree cover	26		25	33
	Shrub Cover	5		0.7	0.6
	Grass and grass-like cover	35		5.5	12.5
	Forb cover	9		4.1	2
	Fern cover	0		0	0.1
	Other cover	0		0.5	0.2
3534	Number of tree species	5	CR2	1	1
			CR3	3	3
			CR4	2	1
	Number of shrub species	9	CR2	5	5
			CR3	7	7
			CR4	8	10
	Number of grass and grass-like species	8	CR2	6	9
			CR3	3	4
			CR4	4	4
	Number of forb species	13	CR2	6	3
			CR3	9	7
			CR4	14	8
	Number of fern species	1	CR2	1	1
			CR3	1	2
			CR4	2	2
	Number of other species	2	CR2	3	1
			CR3	0	0
			CR4	2	3
	Tree cover	46	CR2	20	35
			CR3	50	47
			CR4	25.5	40
	Shrub Cover	17	CR2	26	25.7
			CR3	5.3	6.8
			CR4	13.9	16.3
	Grass and grass-like cover	26	CR2	2.7	6.8
			CR3	4.5	5.7
			CR4	2.1	4.2



РСТ	Benchmark Data		Plot	Attribut	e Score
				2023	2024
	Forb cover	9	CR2	2.4	0.7
			CR3	2.7	3.3
			CR4	2.6	2.7
	Fern cover	0	CR2	1	0.5
			CR3	0.1	0.2
			CR4	0.2	0.2
	Other cover	0	CR2	0.7	0.1
			CR3	0	0
			CR4	0.2	0.3

At or above PCT benchmark

As shown in **Table 11** above, several benchmark attributes were achieved in all plots for their respective PCTs. Overall attributes are comparable to previous years, with 19/47 total attributes equal or above benchmark compared to 18/47 in 2023. Based on this analysis, the four control plots are considered adequate reference data for monitoring the recovery of native vegetation within the three rehabilitation areas.

Section 3.2.3 below provides a comparison of data between the control and rehabilitation plots.

3.2.2 Threatened Plant Surveys and Mapping

The threatened plant *Leucochrysum albicans* var. *tricolor* (Hoary Sunray) is listed as endangered under the EPBC Act. The populations of *L. albicans* var. *tricolor* mapped within the Quarry Site during the Spring 2022 and 2023 survey are shown in **Figure 6**. All populations previously identified by Umwelt in 2012 were identified as still present. However, there had been significant changes in extent of most populations. In most cases, these populations were observed to have decreased their area of occupation.

Photo 1 provides an example of an individual Hoary Sunray in flower on the Quarry Site.



Photo 1: Leucochrysum albicans var. tricolor within the Quarry Site

As shown in **Figure 2** above, a total of five 2 m x 2 m population monitoring plots were surveyed during the Spring 2024 survey and population counts conducted. The results of these plot counts are shown below in **Table 12** and graphically in **Figure 5**, as well as comparative data from these plots in 2020-20234 The threatened species profile for this species is provided in **Appendix E** and reference photos from all plots are provided in **Appendix F**.

Plot Number	Number of Individuals 2020	Number of Individuals 2021	Number of Individuals 2022	Number of Individuals 2023	Number of Individuals 2024
HSP1	98	50	42	22	18
HSP2	43	54	82	12	11
HSP3	53	37	33	5	1
HSP4	76	63	89	12	5
HSP5	10	23	5	0	0

Table 12: L. albicans var	tricolor Plot (Counts over time
---------------------------	-----------------	------------------


Figure 5 Graphed L. albicans var. tricolor Plot Counts over time

As shown in the above table and graph, population counts show a declining trend in all plots from the 2022 data, with counts in 2024 being the lowest since the beginning of monitoring.

Figure 6 below shows the 2024 extent of all mapped *L. albicans* var. *tricolor* populations within the Quarry Site overlying the 2023 mapping for comparison.



FIGURE 6

3.2.3 **Diurnal Bird Surveys**

A total of 25 bird species were recorded during the Spring 2024 monitoring event across the Quarry Site (Appendix A). This is a significant decrease from 31 in 2023 but a significant increase to 18 in 2022. No threatened bird species were detected during the 2024 Spring monitoring period.

3.2.1 **Diurnal Herpetological (Reptile and Amphibian) Surveys**

As described in Section 2.2.5. a total of four dedicated 30-minute active herpetological surveys were conducted. These were conducted in areas of suitable amphibian and reptile habitat (see Photo 2). The location of these survey transects are shown in Figure 2.

Photo 2: Grassy Boulder Reptile Habitat within the Quarry Site

None of the target threatened reptile species (see Section 2.2.6) were detected during these surveys. Several common native reptile species were detected:

- Coppertail Skink (Ctenotus taeniolatus).
- Eastern Blue-tongued Skink (Tiliqua scincoides scincoides). •
- Jacky Dragon (Amphibolurus muricatus). .
- Robust Skink (Ctenotus sp.).
- Sunskink (Lampropholis sp.).

These results represent a decline from seven in 2023 but greater than two recorded in 2022. One common amphibian species was encountered during the 2024 Spring surveys, the Spotted Marsh Frog (*Limnodynastes tasmaniensis*).

Figure 7 below shows the location of suitable threatened reptile habitat on the Quarry Site. **Figure 2** shows the locations of the four herpetological survey transects.



FIGURE 7

3.2.3 Rehabilitation Monitoring

As described in **Section 2.2.1**, three rehabilitation monitoring plots were established in the three quarry rehabilitation areas. **Table 13** below provides a brief description of the floristic conditions of each plot during the Spring 2024 survey, as well as plot photos from 2023 (for comparison).

Table 13: Rehabilitation Plot Descriptions

Rehabilitation plot	Plot photo
R1	
R1 is characterised by mainly exotic species including <i>Trifolium arvense</i> (Hare's-foot Clover) and <i>Medicago lupulina</i> (Black Medic). The priority weed <i>Hypericum perforatum</i> (St John's Wort) is also present at low densities.	Tarsentrum - Volkazi (kali / zwiedzie zastali zwiedzie Tarsentrum - Volkazi (kali / zwiedzie Eurome, 1992/2006) Zwanno Uli Zeantrum - 2022 (Woldon 1/ Minoritantine (kali / z Berneten Janes - 2022 (Woldon 1/ z Berneten Janes - 2022 (W
Native species are present, mainly restricted to rows on the outer benches of the refilled areas. These include <i>Allocasuarina verticillata</i> (Drooping She-oak) and <i>Eucalyptus blakelyi</i> (Blakely's Red Gum). Native forbs and grasses are present in the ground stratum, including <i>Austrostipa scabra</i> (Speargrass) and <i>Vittadinia muelleri</i> (Fuzzweed)	2024





The following sections provide the results of BAM flora plot survey, a discussion of rehabilitation performance compared to the target PCTs and control plot data.

3.2.3.1 BAM Plot Data

Table 14 below provides a comparison of the VIS between the rehabilitation plots and their corresponding control plots (control plots which correspond to the PCT being replicated within the relevant rehabilitation area). This table also provides the following measures of comparison between rehabilitation and control areas as well as with target PCTs:

- The number and percentage of species shared between the rehabilitation plot and their corresponding control plot(s) (as a proportion and percentage of the total number of native species in the rehabilitation plot).
- The number and percentage of species shared between the three rehabilitation plots and their corresponding PCT species list (from the NSW BioNet Vegetation Classification database) as a proportion and percentage of total native species in the rehabilitation plot.

Table 14: VIS Comparison, Rehabilitation and Control Monitoring Plot Data

PCT	Reha b plot	Rehab VIS Contr ol plo				Contr ol plot		C	Control V	IS		No. N	lative Spj	o. (rehabi plots (%)	litation/ c)	ontrol	No. Ni	ative spp	. (PCT lis	t/ rehab p	llot (%))	
		2020	2021	2022	2023	2024		2020	2021	2022	2023	2024	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024
3376	R1	8.7	27.6	15.8	33	23.3	CR1	55.6	63.5	57.8	55.9	58	4/12 (33%)	2/11 (18%)	4/8 (50%)	6/13 (46%)	3/6 (50%)	11/12 (92%)	10/11 (91%)	6/8 (75%)	11/13 (85%)	6/6 (100%)
	R2	22	21.1	14	24.1	42							3/12 (25%)	3/10 (30%)	5/10 (50 %)	8/16 (50%)	9/15 (60%)	11/12 (92%)	9/10 (90%)	8/10 (80%)	12/15 (80%)	14/15 (93%)
3534	R3	36.6	46.6	43	38.4	48.4	CR2, CR3, CR4*	56.5	65.8	64.3	57.9	55.7	13/20 (65%)	17/26 (65%)	23/32 (72 %)	13/23 (57%)	12/22 (55%)	14/20 (70%)	16/26 (62%)	24/32 (75%)	16/23 (70%)	19/22 (86%)

*Average of three control plots

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As shown in **Table 14**, current VIS for most rehabilitation plots remains significantly lower than their corresponding control plot(s), with R2 having improved significantly from 2023 but R1 having declined significantly. R3 is in the most established rehabilitation area and continues to have the highest VIS of the rehabilitation plots and is approaching the control plot VIS in 2024. Native species common to rehabilitation and control plots as a percentage of total native species in the rehabilitation plots has improved in R1 and R2 from 2023, and R3 has declined slightly.

Correlation with species listed in the PCT descriptions is very high. In previous years these scores were low, likely due to the limited species list provided for the older PCTs used in 2020 and 2021. These scores have been updated with the new PCT's much more extensive species lists for all three years in **Table 14**. The methodology has also been changed in this report to the number and percentage of species listed in the PCT species list found in the plot, as a percentage of the total number of native species in the plot. Previous years (2020 to 2022) compared this to the number of species in the PCT species list. However, with the much larger species list in the new PCT descriptions, this percentage would have been too low to be an effective indicator.

A comparison of total native species richness and exotic vegetation cover between control and rehabilitation plots is displayed in **Figure 8** and **Figure 9**, respectively. These two attributes were selected to be displayed graphically to assist with assessing against the native species diversity and weed cover rehabilitation criteria (see **Table 15**). The two dashed line (**Figure 8**) represent the lower (red) and upper (black) benchmark values for the respective PCTs (from the NSW BioNet VIS database).







As shown in **Figure 8**, native species diversity scores within rehabilitation plots R1 and R2 are not comparable to their respective control plot (CR1). Diversity declined in both in 2024 but is still comparable to previous years. As in 2023, species diversity within R3 is equal to or greater than in CR2 and CR3, indicating that R3 is approaching comparable condition to surrounding remnant bushland. However, total native species diversity within control and rehabilitation plots is still well below respective PCT benchmarks, with CR4 continuing to be the most diverse. Native species diversity decreased or stayed the same in all control plots, compared to 2023.

Total exotic vegetation cover scores within most rehabilitation plots continue to be substantially greater than their respective control plots, as shown in **Figure 9**. However, all rehabilitation plots show a declining trend decline from the start of monitoring in 2020. Weed cover in all control plots has declined from 2023 scores, with the exception of CR1. R3 is the only rehabilitation plots with a comparable exotic cover score to the respective control plots, this has been consistent across all monitoring years. Exotic cover was almost 0% in 2024.





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In conclusion, data comparison between 2023 and 2024 suggests rehabilitation is proceeding well in R2 and R3, with an overall increasing species diversity and decreasing exotic weed cover since the start of monitoring. R1 continues to struggle with the 2024 data consistent with an overall declining trend in native species diversity since 2020.

Although the VIS and benchmark condition scores provide useful comparison tools, to address all relevant objectives detailed in the *Cooma Road Quarry Rehabilitation Management Plan* (as described in **Section 2.2.7**) additional monitoring attributes were recorded. **Table 15** below assesses the performance of the rehabilitation areas against the "Native Vegetation" objectives stipulated in the management plan.

Rehabilitation plot	Objective	Assessment 2023				
R1	Revegetation areas contain flora species assemblage characteristic of the desired native vegetation communities	Achieved. R1 has a species correlation of 100% with the target PCT and 50% with the relevant control plot (CR1)				
	Second generation tree seedlings are present or likely to be, based on monitoring in comparable older rehabilitation sites (i.e. evidence of fruiting of native species observed)	Not achieved. Second generation tree seedlings were not observed within the R1 rehabilitation area. Grazing by exotic goats is impacting this area				
	More than 75 per cent of trees are healthy and growing as indicated by Long Term Monitoring	Not achieved Plantings appeared to have varied success rates, with several rows within the R1 area containing numerous unsuccessful seedlings				
	There is no significant weed infestation such that weeds do not comprise a significant proportion of species in any stratum	Achieved. Weed populations remain present in R1, but exotic cover is at its lowest since the beginning of monitoring (8.2%)				
R2	Revegetation areas contain flora species assemblage characteristic of the desired native vegetation communities	Achieved. R2 has a species correlation of 93% with the target PCT and 60% with the relevant control plot (CR1)				
	Second generation tree seedlings are present or likely to be, based on monitoring in comparable older rehabilitation sites (i.e. evidence of fruiting of native species observed)	Partially achieved. Planted eucalypt seedlings appear to have largely successfully established. Future second generation tree recruitment considered likely in the R2 area in future years				
	More than 75 per cent of trees are healthy and growing as indicated by Long Term Monitoring	Achieved. Planted eucalypts appear overall healthy, with few losses apparent. Several dead acacias were observed; however, due to these species' generally shorter lifespan this is not considered indicative of poor ecosystem health				
	There is no significant weed infestation such that weeds do not comprise a significant proportion of species in any stratum	Achieved. Weed populations remain present in R2, but exotic cover is low, with a slight increase from 2023 (12%)				

Table 15: Native Vegetation Rehabilitation Criteria Assessment

Rehabilitation plot	Objective	Assessment 2023
R3	Revegetation areas contain flora species assemblage characteristic of the desired native vegetation communities	Achieved. R3 has a species correlation of 86% with the target PCT and 70% with the relevant control plots (CR2, CR3, CR4)
	Second generation tree seedlings are present or likely to be, based on monitoring in comparable older rehabilitation sites (i.e. evidence of fruiting of native species observed).	Achieved. Flowering/fruiting eucalypts were observed to be present in R3. Second generation seedlings are likely to be present
	More than 75 per cent of trees are healthy and growing as indicated by Long Term Monitoring	Achieved. Planted eucalypts appear overall healthy with few losses apparent. Numerous dead acacias were observed; however, due to these species' generally shorter lifespan this is not considered indicative of poor ecosystem health
	There is no significant weed infestation such that weeds do not comprise a significant proportion of species in any stratum	Achieved Weed cover was 0.2% in R3, the lowest value recorded since the beginning of monitoring

Only R3 meets all vegetation rehabilitation objectives. R2 meets or partially meets most objectives, with weed management the most urgent management issue. R1 has declined in all metrics from 2023 except for exotic coverage score, and has considerable management issues, notably numerous failed plantings as well as impacts from browsing by Feral Goats. Recommendations to address the outstanding matters in these rehabilitation areas are discussed in **Section 4.0** below.

BAM plot flora data is provided in **Appendix G**, and the BAM field sheets in **Appendix H**.

4.0 Conclusion and Recommendations

Based on the results from the Winter and Spring 2024 monitoring events, the following conclusions and recommendations can be made.

4.1 Winter Surveys

4.1.1 Conclusions

The following conclusions for all items of work from the Winter survey period are detailed below:

- 23 species of birds were recorded during the winter survey period, including one threatened species, the Scarlet Robin (*Petroica boodang*). This is a decline from on 35 in 2023.
- Nesting box use shows a significant increase when compared to 2023 data. Results indicate the boxes are being used by a variety of native fauna, including potential threatened species (Squirrel Glider (*Petaurus norfolcensis*)). However, definitive identification was not possible from inspection photos.
- A small number of weed species were recorded whilst conducting the Winter 2023 surveys including the priority weed Prickly Pear (*Opuntia stricta*). This species was in very low abundance, with only one mature specimen identified north of the quarry office.
- Rehabilitation of previously disturbed and recontoured land has been completed within three areas of the Quarry Site. There is also a requirement for monitoring of rehabilitated areas under the conditions of consent, including soil condition, erosion, and floristic composition, condition and structure, to identify risks to the success of the rehabilitation works and to collect data than can be used to demonstrate the rehabilitation is tracking towards meeting completion criteria (see **Section 2.2.7**).

4.1.2 Recommendations

The following recommendations for all items of work from the Winter survey period are detailed below:

- Reptile habitat management retention of existing piles of fallen timber, which provide habitat for threatened species, particularly reptiles (e.g., Striped Legless Lizard) and birds (e.g., Scarlet Robin).
- Weed management within the retained vegetation areas should be a priority, especially whilst weed abundance is minimal.
- Soil management suitable soil ameliorants and local native species mix to be developed to improve the current condition of the rehabilitation in R1.

4.2 Spring Surveys

4.2.1 Conclusions

The following conclusions for all items of work from the Spring survey period are detailed below:



- All three rehabilitation plots showed improvement in one or more measured metrics (VIS, native species diversity, exotic species cover) compared to 2023. R2 and R3 continue to show a clear improvement since 2020; however, R1 shows a less clear trend of improvement.
- All Hoary Sunray populations mapped by Umwelt in 2012 were found to still be present. Populations are showing a consistent decline since the start of monitoring in 2020 in all five monitoring plots.
- 25 species of birds were recorded, a notable decline from 31 in 2023. No threatened bird species were recorded.
- No threatened reptile species were recorded, although a significant diversity of common species was recorded with five documented.
- R3 is the best performing of the three rehabilitation areas, with native species diversity cover almost comparable to its respective control plots (CR2, CR3 and CR4). R2 is progressing well, although less advanced than R3. R1 continues to underperform compared to R2 and R3, with the VIS and native species diversity score declining notably from 2023.

4.2.2 Recommendations

The following actions are recommended for the Quarry Site, based on Spring survey results:

- Rehab management (R1):
 - ongoing active management of feral goats. Browsing by feral goats has resulted in low establishment rates of planted trees and shrubs and is supressing natural recruitment. Exclusion fencing or culling should be enacted.
 - supplementary planting. As above, many of the initial plantings have failed and native vegetation colonisation is not sufficiently progressing in much of the area. However, this will be ineffective without feral goat management.
- Soils in rehab areas Analysis of soil chemistry to be considered in future monitoring events to assess if the soils of the rehabilitation plots are impacting the potential for successful outcomes (i.e., limiting for plant growth).
- Threatened plant management Additional monitoring of Hoary Sunray populations to determine if observed decline in populations since 2020 is real or a result of survey timing (all surveys since 2020 were undertaken in late November or early December).
- Reptile management Areas identified as suitable habitat for threatened reptiles to be considered for any future quarry expansion or other clearance works. Dedicated pre-clearance surveys and management plans are recommended for any works disturbing these areas.

5.0 References

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Appendix A Fauna Survey Data

Cooma Road Quarry

Ecological Monitoring Program 2024

Holcim (Australia) Pty Ltd

SLR Project No.: 630.V30215

14 February 2025



Common name	Scientific name	BC Act	CR1	CR2	CR3	CR4	Incidental
Australian Magpie	Gymnorhina tibicen		Х	Х	Х	x	
Australian Raven	Corvus coronoides					Х	
Bell Miner				Х		Х	
Brown Thornbill	Acanthiza pusilla			Х	Х	Х	
Crimson Rosella	Platycercus elegans			Х		Х	
Eastern Rosella	Platycercus eximius		х				
Eastern Yellow Robin	Eopsaltria australis		х		Х		
Fan-tailed Cuckoo	Cacomantis flabelliformis				х		
Golden Whistler	Pachycephala pectoralis					X	
Grey Fantail					Х	Х	
Grey Shrike-thrush	Colluricincla harmonica		Х	Х			
Laughing Kookaburra	Dacelo novaeguineae					Х	
Magpie Lark	Grallina cyanoleuca		х		Х		
Noisy Miner	Manorina melanocephala		x		х		
Rufous Whistler	Pachycephala rufiventris			Х			
Scarlet Robin	Petroica boodang	V					Х
Spotted Pardalote	Pardalotus punctatus			Х	Х	х	
Striated Pardelote	Acanthiza lineata		х	Х			
Superb Fairywren	Malurus cyaneus			Х		х	
White-browed Scrubwren	Sericornis frontalis			х			
White-naped Honeyeater	Melithreptus lunatus				х	X	
White-throated Treecreeper	Cormobates leucophaea			Х	Х	X	
Yellow-faced Honeyeater	Lichenostomus chrysops			Х	Х	Х	

Table A1: Bird Census Results – Winter 2024

Table A2: Fauna Survey Results – Spring 2024

Class	Common name	Scientific name	Exotic	CRC1	CRC3	HT1	HT2	HT3	HT4	Incidental
Amphibia	Spotted Marsh Frog	Limnodynastes tasmaniensis				х			х	
Aves	Australian Magpie	Gymnorhina tibicen		х						
	Australian Raven	Corvus coronoides								Х
	Black-faced Cuckooshrike	Coracina novaehollandiae								Х
	Common Starling	Sturnus vulgaris	*	х	Х					
	Crimson Rosella	Platycercus elegans		х						
	Eastern Yellow Robin	Eopsaltria australis			Х					
	Galah	Eolophus roseicapilla								Х
	Grey Butcherbird	Cracticus torquatus								Х
	Grey Fantail	Rhipidura albiscapa			Х					
	Laughing Kookaburra	Dacelo novaeguineae								Х
	Magpie Lark	Grallina cyanoleuca			Х					
	Noisy Miner	Manorina melanocephala		Х						
	Pied Currawong	Strepera graculina								Х
	Silvereye	Zosterops lateralis								Х
	Spotted Pardalote	Pardalotus punctatus			Х					
	Superb Fairywren	Malurus cyaneus		х	Х					
	Thornbill	Acanthiza sp.		х						
	Wedge-tailed Eagle	Aquila audax								Х
	White-browed Scrubwren	Sericornis frontalis			Х					
	White-throated Gerygone	Gerygone olivacea								Х

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Class	Common name	Scientific name	Exotic	CRC1	CRC3	HT1	HT2	HT3	HT4	Incidental
	White-throated Treecreeper	Cormobates leucophaea			х					
	White-winged Triller	Lalage tricolor								Х
	Willie Wagtail	Rhipidura leucophrys			Х					
	Yellow-faced Honeyeater	Lichenostomus chrysops			Х					
Mammalia	Common Wallaroo	Macropus robustus								Х
	Eastern Grey Kangaroo	Macropus giganteus								Х
	European Rabbit	Oryctolagus cuniculus	*							Х
Reptilia	Coppertail Skink	Ctenotus taeniolatus						Х		
	Eastern Blue-tongued Skink	Tiliqua scincoides scincoides						х		
	Jacky Dragon	Amphibolurus muricatus				Х				
	Robust Skink	Ctenotus sp.					Х		Х	
	Sunskink	Lampropholis sp.				Х	Х	Х	Х	



Appendix B Nest Box Inventory

Cooma Road Quarry

Ecological Monitoring Program 2024

Holcim (Australia) Pty Ltd

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14 February 2025



Table B1: Nest Box Inventory

Box ID Box Type		Nativ	e Fauna O	ccupancy	7 (Y/N)	Pests (Y/N)	Repair (Y/N)	Comment (species present, signs of use, repair etc.)		
		Fauna	Nest	Eggs	Young					
1	Ringtail possum	Ν	Y	N	N	N	N	Leaf litter. Chew marks		
2	Sugar Glider	Ν	Y	Ν	Ν	Ν	Ν	Leaf nest. Chew marks. Old bees nest		
3	Brushtail Possum	Ν	N	N	N	Y	Ν	Bees nest (Active)		
4	Parrot	Ν	Ν	Ν	Ν	Ν	N	Chew marks. Spider web		
5	Squirrel Glider	Ν	Ν	Ν	Ν	Y	N	Bees nest (not active – recent)		
6	Tree creeper	Ν	Ν	Ν	Ν	N	N	Chew marks. Empty		
7	Microbat	Ν	Ν	Ν	Ν	N	N	Empty		
8	Brushtail Possum	Ν	N	N	N	N	N	Chew marks. Empty		
9	Small parrot	Ν	Y	Ν	Ν	N	N	Leaf litter (fresh). Chew marks		
10	Small parrot	Ν	Ν	Ν	Ν	N	N	Chew marks. Cobwebs.		
11	Large parrot	Y	Y	N	N	N	N	Brushtail possum		
12	Microbat	Ν	N	N	N	N	N	Spider web		
13	Brushtail Possum	Y	N	N	N	N	N	Brushtail possum. Chew marks		
14	Ringtail Possum	Ν	N	N	N	N	N	Leaf litter (small amount). Chew marks		
15	Parrot	Ν	Y	N	N	N	N	Leaf nest. Chew marks		
16	Squirrel Glider	Ν	Y	N	N	N	N	Leaf litter. Chew marks. Old Bees nest		
17	Ringtail Possum	Ν	N	N	N	Y	Ν	Bees nest (Active).		
18	Microbat	N	Ν	N	N	N	N	Empty		

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Box ID	Вох Туре	Native Fauna Occupancy (Y/N)		Pests (Y/N)	Repair (Y/N)	Comment (species present, signs of use, repair etc.)		
		Fauna	Nest	Eggs	Young			
19	Ringtail Possum	N	Y	N	N	N	N	Leaf litter
20	Parrot	Ν	Ν	Ν	Ν	Ν	Ν	Egg fragments. Chew marks
21	Tree Creeper	Ν	Y	N	N	Ν	N	Old leaf nest. Chew marks
22	Brushtail Possum	Ν	N	N	N	N	N	Empty
23	Brushtail Possum	Ν	N	N	N	Y	N	Bees nest (active). Old chew marks
24	Microbat	Ν	N	N	N	N	N	Spider
25	Brushtail Possum	Ν	N	N	N	N	N	Chew marks. Leaf litter (small amount)
26	Microbat	Ν	Ν	Ν	Ν	Ν	Ν	Spider
27	Squirrel Glider	Ν	Ν	Ν	Ν	Y	Ν	Old Bees nest. Chew marks
28	Parrot	Ν	Ν	Y	Ν	Ν	Ν	Egg
29	Parrot	Ν	Ν	Ν	Ν	Ν	Ν	Chew marks. Empty
30	Parrot	Ν	Ν	Ν	Ν	Ν	Ν	Leaf litter. Chew marks
31	Squirrel Glider	Y	Y	Ν	Ν	Ν	Ν	3x Gliders. Leaf nest. Chew marks
32	Microbat	Ν	Ν	Ν	Ν	Ν	Ν	Empty
33	Parrot	Ν	Ν	Ν	Ν	Ν	Ν	Chew marks. Leaf litter
34	Microbat	Ν	Ν	Ν	Ν	Ν	Ν	Spider web
35	Small parrot	Ν	Y	Ν	Ν	Ν	Ν	Leaf litter, feather
36	Small parrot	Ν	Y	Ν	Ν	Ν	Ν	Leaf nest. Chew marks
37	Large parrot	Ν	Y	Ν	Ν	Ν	Ν	Leaf litter. Chew marks
38	Squirrel Glider	Ν	Ν	Ν	Ν	Y	Ν	Bees nest (Active). Chew marks
39	Squirrel Glider	Ν	N	Ν	Ν	Ν	Ν	Old Bees nest

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Box ID	Вох Туре	Native Fauna Occupancy (Y/N)			Pests (Y/N)	Repair (Y/N)	Comment (species present, signs of use, repair etc.)	
		Fauna	Nest	Eggs	Young			
40	Small parrot	Ν	Y	N	N	N	N	Leaf litter. Chew marks
41	Small parrot	Ν	Y	N	N	N	N	Leaf nest. Chew marks
42	Tree creeper	Ν	Y	N	Ν	Ν	Ν	Leaf nest. Chew marks
43	Brushtail possum	Ν	N	N	N	N	N	Leaf litter (small amount). Chew marks
44	Small parrot	Ν	Ν	Ν	Ν	Ν	Ν	Empty. Chew marks
45	Brushtail possum	Y	Y	N	N	N	N	Brushtail Possum. Leaf litter. Chew marks
46	Small parrot	Ν	Y	N	N	N	N	Leaf nest. Chew marks
47	Squirrel Glider	Ν	Y	N	Ν	Ν	N	Leaf litter. Chew marks
48	Tree creeper	Ν	Y	N	Ν	Ν	N	Leaf litter. Chew marks
49	Squirrel Glider	Ν	Y	N	Ν	Ν	Ν	Leaf litter. Chew marks
50	Small parrot	Ν	Y	N	Ν	Ν	Ν	Leaf litter – bald spot. chew marks
51	Small parrot	Ν	Y	N	Ν	Ν	Y	Lid detached from box and resting on top. Leaf litter. Chew marks
52	Small parrot	Ν	Y	Ν	Ν	Ν	Ν	Leaf litter. Chew marks
53	Large parrot	Ν	Ν	Ν	Ν	Ν	Ν	Leaf litter (small amount). Chew marks
54	Squirrel Glider	Ν	Y	N	Ν	Ν	N	Leaf litter. Chew marks
55	Microbat	N	Ν	N	N	N	N	Spider web



NB1	NB2	NB3
NB4	NB5	NB6
	A CARLES	
NB7	NB8	NB9
NB10	NB11	NB12
NB13	NB14	NB15

NB16	NB17	NB18
NB19	NB20	NB21
NB22	NB23	NB24
NB25	NB26	NB27
NB28	NB29	NB30

NB31 Image: NB34	NB32 NB35	NB33 NB36
NB37	NB38	MB39
NB40	NB41	NB42

NB46	NB47	NB48
NB49	NB50	NB51
NB52	NB53	NB54
NB55		



Appendix C PCT Profiles and Benchmarks

Cooma Road Quarry

Ecological Monitoring Program 2024

Holcim (Australia) Pty Ltd

SLR Project No.: 630.V30215

14 February 2025



BioNet Vegetation Classification - Community Profile Report

Plant Community Type ID (PCT ID): 3376

PCT Name: Southern Tableland Grassy Box Woodland

Classification Confidence Level: 3-Medium

Total Number of Replicates: 187

Number of Primary Replicates: 110

Number of Secondary Replicates: 77

Vegetation Description: A tall sclerophyll woodland with a dry shrub layer that is patchy to absent and a mid-dense, grassy groundcover, widespread in the low hills of the drier parts of the Southern Tablelands between Bredbo and Rylstone. The canopy almost always includes box eucalypts (Eucalyptus melliodora or Eucalyptus bridgesiana), occasionally associated with Eucalyptus blakelyi which may be locally prominent in lower parts of the landscape. The shrub layer is sparse to absent with occasional, scattered Melichrus urceolatus, Lissanthe strigosa or various Acacia species. The mid-dense ground layer typically includes grasses, forbs, graminoids and some twiners, very frequently including Hydrocotyle laxiflora, Austrostipa scabra, Lomandra filiformis, Microlaena stipoides and Elymus scaber. The PCT primarily occurs in the Bredbo, Canberra, Goulburn and Boorowa areas, with more scattered occurrences extending north to Bathurst, Orange and Rylstone. It occurs on granite, volcanic and sedimentary substrates in cold, dry environments with a mean annual rainfall typically below 760 mm. While widespread, this PCT primarily occurs in small, often disturbed patches with a long history of grazing. It is not closely related floristically to nearby PCTs, however it grades into PCT 3373 which has a more diverse shrub layer and some subtle differences in canopy species. Eucalyptus macrorhyncha, Eucalyptus dives, Bossiaea buxifolia, Dillwynia sericea and Brachyloma daphnoides are only occasional in PCT 3373 however collectively represent a suite of species that are rare in this PCT. In the Boorowa area, PCT 3376 grades into PCT 3400 which are both grassy woodlands featuring Eucalyptus melliodora and Eucalyptus blakelyi. This represents the transition from the colder environment of the tablelands (PCT 3376) to the woodlands of the lower elevation, warmer climate of the South-west Slopes (PCT 3400).

Vegetation Formation: Grassy Woodlands;

Vegetation Class: Southern Tableland Grassy Woodlands;

IBRA Bioregion(s): NSW South Western Slopes; South East Corner; South Eastern Highlands; Sydney Basin;

IBRA Sub-region(s): Capertee Valley; Inland Slopes; South East Coastal Ranges; Bathurst; Bondo; Bungonia; Crookwell; Hill End; Monaro; Murrumbateman; Oberon; Orange; Wollemi;

LGA: BATHURST REGIONAL; BLAYNEY; CABONNE; GOULBURN MULWAREE; HILLTOPS; LITHGOW CITY; MID-WESTERN REGIONAL; QUEANBEYAN-PALERANG REGIONAL; SNOWY MONARO REGIONAL; SNOWY

VALLEYS; UPPER LACHLAN SHIRE; YASS VALLEY;

Elevation (m) (Min, Median, Max): 311.9 684.1 1028.1

Annual Rainfall (mm) (Min, Median, Max): 574 687 918

Annual Mean Temperature (deg C) (Min, Median, Max): 10.55 12.44 14.06

Median Native Species Richness per plot: 34

TEC Assessed: Has associated TEC

TEC List: Listed BC Act,CE: White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions (Part); Listed EPBC Act,CE: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Part);

TEC Comments: (Comment TEC1) Relates to the NSW White Box - Yellow Box - Blakely's Red Gum Grassy Woodland TEC. (Comment TEC2) May relate to the Commonwealth White Box-Yellow Box-Blakely's Red Gum Grassy Woodland TEC where it meets condition criteria as per section 4 of the Listing Advice.

PCT Percent Cleared: 92.96

PCT Definition Status: Approved

Species By Growth Form Group

Growth Form Group	Species	Median cover score	Frequency
Unassigned (UA)	Wurmbea dioica	1	30
Unassigned (UA)	Isolepis hookeriana	1	3
Fern (EG)	Cheilanthes sieberi subsp. sieberi	1	39
Fern (EG)	Cheilanthes austrotenuifolia	1	10
Fern (EG)	Ophioglossum lusitanicum	2	2
Fern (EG)	Asplenium flabellifolium	1	1
Forb (FG)	Hydrocotyle laxiflora	2	82
Forb (FG)	Oxalis perennans	1	63
Forb (FG)	Chrysocephalum apiculatum	2	61
Forb (FG)	Gonocarpus tetragynus	1	59
Forb (FG)	Acaena ovina	1	58

Forb (FG)	Rumex brownii	1	57
Forb (FG)	Solenogyne dominii	1	54
Forb (FG)	Tricoryne elatior	1	53
Forb (FG)	Cymbonotus lawsonianus	1	50
Forb (FG)	Hypericum gramineum	1	49
Forb (FG)	Crassula sieberiana	1	45
Forb (FG)	Geranium solanderi	1	42
Forb (FG)	Einadia nutans	2	40
Forb (FG)	Asperula conferta	2	39
Forb (FG)	Plantago varia	1	36
Forb (FG)	Triptilodiscus pygmaeus	2	34
Forb (FG)	Goodenia hederacea	2	32
Forb (FG)	Wahlenbergia communis	1	30
Forb (FG)	Vittadinia muelleri	1	29
Forb (FG)	Euchiton involucratus	1	28
Forb (FG)	Dichondra repens	1	26
Forb (FG)	Bulbine bulbosa	1	25
Forb (FG)	Daucus glochidiatus	1	23
Forb (FG)	Leptorhynchos squamatus	2	22
Forb (FG)	Vittadinia cuneata	1	21
Forb (FG)	Plantago gaudichaudii	2	20
Forb (FG)	Senecio quadridentatus	1	20
Forb (FG)	Wahlenbergia stricta	2	20
Forb (FG)	Eryngium ovinum	1	19
Forb (FG)	Acaena echinata	1	17
Forb (FG)	Arthropodium minus	1	17
Forb (FG)	Wahlenbergia gracilis	2	17
Forb (FG)	Euchiton sphaericus	1	16
Forb (FG)	Arthropodium fimbriatum	2	15
Forb (FG)	Bossiaea prostrata	1	15
Forb (FG)	Chrysocephalum semipapposum	1	14
Forb (FG)	Cotula australis	2	14
Forb (FG)	Goodenia pinnatifida	2	14
Forb (FG)	Microtis unifolia	1	13
Forb (FG)	Oxalis radicosa	2	13
Forb (FG)	Calocephalus citreus	1	12
Forb (FG)	Galium gaudichaudii	1	12
Forb (FG)	Scleranthus biflorus	1	12
Forb (FG)	Hackelia suaveolens	1	11
Forb (FG)	Dianella longifolia	1	10
Forb (FG)	Dianella revoluta	2	10
Forb (FG)	Drosera peltata	1	10
Forb (FG)	Euphorbia drummondii	1	10

Forb (FG)	Haloragis heterophylla	2	10
Forb (FG)	Leucochrysum albicans	1	10
Forb (FG)	Stackhousia monogyna	1	10
Forb (FG)	Xerochrysum viscosum	1	10
Forb (FG)	Veronica calycina	1	9
Forb (FG)	Veronica plebeia	1	9
Forb (FG)	Ajuga australis	1	7
Forb (FG)	Euchiton japonicus	1	7
Forb (FG)	Opercularia aspera	1	7
Forb (FG)	Opercularia diphylla	1	7
Forb (FG)	Oxalis exilis	2	7
Forb (FG)	Wahlenbergia luteola	1	7
Forb (FG)	Laxmannia gracilis	2	6
Forb (FG)	Lythrum hyssopifolia	1	6
Forb (FG)	Microseris lanceolata	1	6
Forb (FG)	Oreomyrrhis eriopoda	1	6
Forb (FG)	Sebaea ovata	1	6
Forb (FG)	Aphanes australiana	1	5
Forb (FG)	Burchardia umbellata	1	5
Forb (FG)	Dysphania pumilio	2	5
Forb (FG)	Epilobium billardierianum	1	5
Forb (FG)	Euphorbia dallachyana	2	5
Forb (FG)	Geranium retrorsum	1	5
Forb (FG)	Scleranthus diander	1	5
Forb (FG)	Thelymitra circumsepta	2	5
Forb (FG)	Wahlenbergia graniticola	1	5
Forb (FG)	Brachyscome rigidula	1	4
Forb (FG)	Calotis lappulacea	2	4
Forb (FG)	Cynoglossum australe	2	4
Forb (FG)	Plantago hispida	2	4
Forb (FG)	Ranunculus lappaceus	1	4
Forb (FG)	Solenogyne gunnii	1	4
Forb (FG)	Stuartina muelleri	1	4
Forb (FG)	Swainsona sericea	1	4
Forb (FG)	Vittadinia gracilis	1	4
Forb (FG)	Acaena novae-zelandiae	1	3
Forb (FG)	Alternanthera nana	2	3
Forb (FG)	Erodium crinitum	1	3
Forb (FG)	Hypoxis hygrometrica	1	3
Forb (FG)	Isoetopsis graminifolia	1	3
Forb (FG)	Oxytes brachypoda	1	3
Forb (FG)	Thysanotus tuberosus	1	3
Forb (FG)	Ammobium craspedioides	2	2

Forb (FG)	Arthropodium milleflorum	1	2
Forb (FG)	Calotis anthemoides	1	2
Forb (FG)	Calotis scabiosifolia	3	2
Forb (FG)	Coronidium scorpioides	1	2
Forb (FG)	Craspedia variabilis	1	2
Forb (FG)	Einadia hastata	1	2
Forb (FG)	Hovea linearis	1	2
Forb (FG)	Lagenophora gracilis	1	2
Forb (FG)	Microtis parviflora	1	2
Forb (FG)	Opercularia hispida	1	2
Forb (FG)	Plantago debilis	2	2
Forb (FG)	Podolepis jaceoides	1	2
Forb (FG)	Pterostylis mutica	1	2
Forb (FG)	Pterostylis nana	1	2
Forb (FG)	Stellaria pungens	2	2
Forb (FG)	Thelymitra pauciflora	1	2
Forb (FG)	Viola betonicifolia	1	2
Forb (FG)	Wahlenbergia multicaulis	2	2
Forb (FG)	Zornia dyctiocarpa var. dyctiocarpa	1	2
Forb (FG)	Alternanthera sp. A	1	1
Forb (FG)	Arthropodium strictum	1	1
Forb (FG)	Brachyscome angustifolia	1	1
Forb (FG)	Brachyscome ciliaris	1	1
Forb (FG)	Brachyscome multifida	1	1
Forb (FG)	Brachyscome ptychocarpa	2	1
Forb (FG)	Caesia parviflora	1	1
Forb (FG)	Caladenia tentaculata	2	1
Forb (FG)	Centipeda cunninghamii	2	1
Forb (FG)	Cymbonotus preissianus	2	1
Forb (FG)	Desmodium rhytidophyllum	1	1
Forb (FG)	Diuris sulphurea	1	1
Forb (FG)	Einadia trigonos	3	1
Forb (FG)	Galium ciliare	1	1
Forb (FG)	Galium leiocarpum	1	1
Forb (FG)	Gnaphalium indutum	1	1
Forb (FG)	Goodenia elongata	3	1
Forb (FG)	Hydrocotyle algida	1	1
Forb (FG)	Hydrocotyle foveolata	1	1
Forb (FG)	Isotoma axillaris	1	1
Forb (FG)	Lepidium pseudohyssopifolium	1	1
Forb (FG)	Mentha diemenica	1	1
Forb (FG)	Myriophyllum crispatum	2	1
Forb (FG)	Polygala japonica	1	1

Forb (FG)	Poranthera microphylla	1	1
Forb (FG)	Portulaca oleracea	2	1
Forb (FG)	Ranunculus pumilio	1	1
Forb (FG)	Rumex dumosus	1	1
Forb (FG)	Rutidosis leptorrhynchoides	2	1
Forb (FG)	Scutellaria humilis	1	1
Forb (FG)	Senecio diaschides	1	1
Forb (FG)	Senecio prenanthoides	1	1
Forb (FG)	Senecio tenuiflorus	1	1
Forb (FG)	Solanum pungetium	1	1
Forb (FG)	Spiranthes australis	1	1
Forb (FG)	Swainsona monticola	1	1
Forb (FG)	Urtica incisa	1	1
Forb (FG)	Velleia paradoxa	2	1
Forb (FG)	Vittadinia triloba	1	1
Forb (FG)	Wahlenbergia gracilenta	1	1
Forb (FG)	Xerochrysum bracteatum	2	1
Grass & grasslike (GG)	Austrostipa scabra	2	79
Grass & grasslike (GG)	Lomandra filiformis	2	79
Grass & grasslike (GG)	Microlaena stipoides	2	77
Grass & grasslike (GG)	Elymus scaber	2	70
Grass & grasslike (GG)	Themeda triandra	2	63
Grass & grasslike (GG)	Bothriochloa macra	2	55
Grass & grasslike (GG)	Panicum effusum	1	54
Grass & grasslike (GG)	Poa sieberiana	2	53
Grass & grasslike (GG)	Rytidosperma racemosum	2	46
Grass & grasslike (GG)	Carex inversa	1	43
Grass & grasslike (GG)	Aristida ramosa	2	41
Grass & grasslike (GG)	Lomandra multiflora subsp. multiflora	1	30
Grass & grasslike (GG)	Rytidosperma carphoides	2	26
Grass & grasslike (GG)	Schoenus apogon	1	26
Grass & grasslike (GG)	Juncus filicaulis	1	24
Grass & grasslike (GG)	Austrostipa bigeniculata	1	23
Grass & grasslike (GG)	Austrostipa densiflora	2	21
Grass & grasslike (GG)	Rytidosperma auriculatum	3	20
Grass & grasslike (GG)	Rytidosperma pilosum	2	13
Grass & grasslike (GG)	Dichelachne micrantha	1	12
Grass & grasslike (GG)	Luzula densiflora	1	12
Grass & grasslike (GG)	Rytidosperma laeve	2	11
Grass & grasslike (GG)	Chloris truncata	1	10
Grass & grasslike (GG)	Poa labillardierei var. labillardierei	2	10
Grass & grasslike (GG)	Rytidosperma erianthum	2	10
Grass & grasslike (GG)	Rytidosperma pallidum	2	10
Grass & grasslike (GG)	Carex breviculmis	1	9
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Grass & grasslike (GG)	Rytidosperma caespitosum	2	8
Grass & grasslike (GG)	Enneapogon nigricans	1	7
Grass & grasslike (GG)	Eragrostis benthamii	2	7
Grass & grasslike (GG)	Juncus subsecundus	1	7
Grass & grasslike (GG)	Aristida jerichoensis	2	5
Grass & grasslike (GG)	Lepidosperma laterale	1	5
Grass & grasslike (GG)	Poa meionectes	2	5
Grass & grasslike (GG)	Rytidosperma monticola	2	5
Grass & grasslike (GG)	Carex appressa	1	4
Grass & grasslike (GG)	Cymbopogon refractus	1	4
Grass & grasslike (GG)	Cynodon dactylon	2	4
Grass & grasslike (GG)	Lomandra bracteata	1	4
Grass & grasslike (GG)	Lomandra longifolia	2	4
Grass & grasslike (GG)	Rytidosperma setaceum	1	4
Grass & grasslike (GG)	Sorghum leiocladum	1	4
Grass & grasslike (GG)	Austrostipa rudis	2	3
Grass & grasslike (GG)	Dichelachne sieberiana	2	3
Grass & grasslike (GG)	Eragrostis brownii	2	3
Grass & grasslike (GG)	Eragrostis leptostachya	2	3
Grass & grasslike (GG)	Rytidosperma penicillatum	1	3
Grass & grasslike (GG)	Rytidosperma tenuius	2	3
Grass & grasslike (GG)	Sporobolus creber	1	3
Grass & grasslike (GG)	Aristida vagans	2	2
Grass & grasslike (GG)	Austrostipa mollis	3	2
Grass & grasslike (GG)	Bothriochloa decipiens var. decipiens	2	2
Grass & grasslike (GG)	Dichanthium sericeum	2	2
Grass & grasslike (GG)	Dichelachne crinita	1	2
Grass & grasslike (GG)	Dichelachne rara	1	2
Grass & grasslike (GG)	Digitaria brownii	1	2
Grass & grasslike (GG)	Echinopogon ovatus	2	2
Grass & grasslike (GG)	Eragrostis parviflora	2	2
Grass & grasslike (GG)	Juncus homalocaulis	1	2
Grass & grasslike (GG)	Lachnagrostis filiformis	2	2
Grass & grasslike (GG)	Luzula flaccida	2	2
Grass & grasslike (GG)	Rytidosperma bipartitum	2	2
Grass & grasslike (GG)	Rytidosperma fulvum	2	2
Grass & grasslike (GG)	Aristida behriana	1	1
Grass & grasslike (GG)	Austrostipa gibbosa	1	1
Grass & grasslike (GG)	Austrostipa setacea	2	1
Grass & grasslike (GG)	Carex tereticaulis	1	1
Grass & grasslike (GG)	Cyperus gracilis	2	1
Grass & grasslike (GG)	Deyeuxia quadriseta	1	1

Grass & grasslike (GG)	Dichanthium tenue	3	1
Grass & grasslike (GG)	Dichelachne hirtella	1	1
Grass & grasslike (GG)	Dichelachne inaequiglumis	1	1
Grass & grasslike (GG)	Dichelachne parva	1	1
Grass & grasslike (GG)	Eragrostis elongata	1	1
Grass & grasslike (GG)	Eragrostis trachycarpa	1	1
Grass & grasslike (GG)	Isolepis cernua	1	1
Grass & grasslike (GG)	Juncus gregiflorus	2	1
Grass & grasslike (GG)	Juncus usitatus	1	1
Grass & grasslike (GG)	Luzula meridionalis	1	1
Grass & grasslike (GG)	Luzula ovata	1	1
Grass & grasslike (GG)	Sporobolus elongatus	1	1
Grass & grasslike (GG)	Tricostularia pauciflora	1	1
Grass & grasslike (GG)	Typha domingensis	2	1
Other (OG)	Desmodium varians	1	63
Other (OG)	Glycine tabacina	1	37
Other (OG)	Convolvulus erubescens	1	35
Other (OG)	Glycine clandestina	1	19
Other (OG)	Convolvulus angustissimus	1	10
Other (OG)	Clematis microphylla	1	5
Other (OG)	Kennedia prostrata	1	5
Other (OG)	Amyema pendula	1	4
Other (OG)	Amyema miquelii	1	3
Other (OG)	Thysanotus patersonii	1	3
Other (OG)	Hardenbergia violacea	2	2
Other (OG)	Glycine microphylla	1	1
Other (OG)	Xanthorrhoea concava	1	1
Shrub (SG)	Melichrus urceolatus	1	34
Shrub (SG)	Lissanthe strigosa	1	33
Shrub (SG)	Pimelea curviflora	1	28
Shrub (SG)	Hibbertia obtusifolia	1	26
Shrub (SG)	Bossiaea buxifolia	1	13
Shrub (SG)	Cassinia sifton	1	11
Shrub (SG)	Astroloma humifusum	1	10
Shrub (SG)	Cryptandra amara	1	10
Shrub (SG)	Dillwynia sericea	2	10
Shrub (SG)	Acacia implexa	1	9
Shrub (SG)	Acrotriche serrulata	1	6
Shrub (SG)	Cassinia longifolia	1	6
Shrub (SG)	Pultenaea microphylla	1	6
Shrub (SG)	Acacia genistifolia	1	5
Shrub (SG)	Cassinia quinquefaria	1	5
Shrub (SG)	Acacia mearnsii	1	4

Shrub (SG)	Daviesia genistifolia	1	4
Shrub (SG)	Daviesia ulicifolia	2	4
Shrub (SG)	Dodonaea viscosa	3	4
Shrub (SG)	Exocarpos cupressiformis	1	4
Shrub (SG)	Kunzea ericoides	2	4
Shrub (SG)	Acacia deanei	1	3
Shrub (SG)	Acacia rubida	1	3
Shrub (SG)	Brachyloma daphnoides	1	3
Shrub (SG)	Bursaria spinosa	1	3
Shrub (SG)	Cassinia aculeata	1	3
Shrub (SG)	Pultenaea procumbens	1	3
Shrub (SG)	Rubus parvifolius	1	3
Shrub (SG)	Acacia falciformis	2	2
Shrub (SG)	Cassinia laevis	1	2
Shrub (SG)	Daviesia leptophylla	1	2
Shrub (SG)	Hibbertia riparia	1	2
Shrub (SG)	Indigofera australis	1	2
Shrub (SG)	Leucopogon fletcheri	1	2
Shrub (SG)	Styphelia triflora	2	2
Shrub (SG)	Acacia cardiophylla	1	1
Shrub (SG)	Acacia dawsonii	3	1
Shrub (SG)	Acacia paradoxa	2	1
Shrub (SG)	Acacia ulicifolia	1	1
Shrub (SG)	Acacia vestita	2	1
Shrub (SG)	Calytrix tetragona	1	1
Shrub (SG)	Cheiranthera linearis	1	1
Shrub (SG)	Daviesia acicularis	1	1
Shrub (SG)	Daviesia latifolia	1	1
Shrub (SG)	Daviesia mimosoides	1	1
Shrub (SG)	Dillwynia phylicoides	1	1
Shrub (SG)	Hibbertia cistoidea	2	1
Shrub (SG)	Hibbertia monogyna	1	1
Shrub (SG)	Indigofera adesmiifolia	1	1
Shrub (SG)	Leucopogon neoanglicus	1	1
Shrub (SG)	Monotoca scoparia	1	1
Shrub (SG)	Pultenaea ferruginea	2	1
Shrub (SG)	Pultenaea subspicata	1	1
Shrub (SG)	Pultenaea villosa	1	1
Shrub (SG)	Rhytidosporum procumbens	1	1
Shrub (SG)	Solanum linearifolium	1	1
Tree (TG)	Eucalyptus melliodora	3	70
Tree (TG)	Eucalyptus blakelyi	2	41
Tree (TG)	Eucalyptus bridgesiana	2	32

Tree (TG)	Eucalyptus rossii	3	13
Tree (TG)	Acacia dealbata	1	12
Tree (TG)	Eucalyptus macrorhyncha	2	11
Tree (TG)	Eucalyptus mannifera	4	11
Tree (TG)	Eucalyptus rubida	3	5
Tree (TG)	Allocasuarina verticillata	2	4
Tree (TG)	Eucalyptus dives	2	4
Tree (TG)	Eucalyptus polyanthemos	2	4
Tree (TG)	Brachychiton populneus	1	3
Tree (TG)	Eucalyptus nortonii	1	3
Tree (TG)	Eucalyptus pauciflora	3	3
Tree (TG)	Eucalyptus tereticornis	3	3
Tree (TG)	Acacia decurrens	1	2
Tree (TG)	Acacia parramattensis	2	2
Tree (TG)	Allocasuarina littoralis	1	2
Tree (TG)	Eucalyptus amplifolia	4	2
Tree (TG)	Callitris endlicheri	1	1
Tree (TG)	Eucalyptus albens	3	1
Tree (TG)	Eucalyptus camaldulensis	1	1
Tree (TG)	Eucalyptus cinerea	1	1
Tree (TG)	Eucalyptus dalrympleana	2	1
Tree (TG)	Eucalyptus sieberi	1	1
Tree (TG)	Eucalyptus viminalis	1	1

BioNet Vegetation Classification - Community Profile Report

Plant Community Type ID (PCT ID): 3534

PCT Name: Central West Stony Hills Stringybark-Box Forest

Classification Confidence Level: 2-High

Total Number of Replicates: 232 Number of Primary Replicates: 190

Number of Frinary Replicates: 190 Number of Secondary Replicates: 42

Vegetation Description: A mid-high to tall sclerophyll dry shrub-grass open forest to woodland found on stony hills and ranges of north-west and northern parts of the South Eastern Highlands and adjacent higher parts of the NSW South Western Slopes bioregion. This PCT is distributed from Murrumbateman north to Dunedoo, west to Conimbla and Nangar national parks, and east to Capertee and Abercrombie River National Park. It occurs at elevations of 350-1050 metres asl, in locations receiving 600-950 mm mean annual precipitation and with 3-26 mean annual frost days, on a wide variety of sedimentary, acid volcanic and granitic rocks. A mid-dense tree canopy almost always includes Eucalyptus macrorhyncha, very frequently with Eucalyptus goniocalyx and commonly Eucalyptus polyanthemos, occasionally with Eucalyptus rossii. A sparse to mid-dense shrub layer very frequently includes Hibbertia obtusifolia, commonly Brachyloma daphnoides and occasionally Styphelia triflora, Melichrus urceolatus, Cassinia sifton or Dillwynia phylicoides. The ground layer is also sparse and often grassy, however also includes graminoids and tough forbs. Species present very frequently include scattered Poa sieberiana, Lomandra filiformis and Goodenia hederacea, commonly with Rytidosperma pallidum, Lomandra multiflora subsp. multiflora, Gonocarpus tetragynus, Dianella revoluta and Cheilanthes sieberi subsp. sieberi, with occasional Dichelachne micrantha, Stypandra glauca or Phyllanthus hirtellus. This community is floristically related to PCT 3747, which replaces it in similar dry rocky range habitats with cooler temperatures to the east. Where they overlap, this PCT tends to be found in more exposed, dry and rocky situations such as west-facing stony slopes.

Vegetation Formation: Dry Sclerophyll Forests (Shrub/grass sub-formation);

Vegetation Class: Upper Riverina Dry Sclerophyll Forests;

IBRA Bioregion(s): Brigalow Belt South; NSW South Western Slopes; South Eastern Highlands;

IBRA Sub-region(s): Talbragar Valley; Inland Slopes; Bathurst; Capertee Uplands; Crookwell; Hill End; Monaro; Murrumbateman; Oberon; Orange;

LGA: BATHURST REGIONAL; BLAYNEY; CABONNE; COWRA; HILLTOPS; LITHGOW CITY; MID-WESTERN REGIONAL; OBERON; QUEANBEYAN-PALERANG REGIONAL; UPPER LACHLAN SHIRE; WARRUMBUNGLE; WEDDIN; YASS VALLEY; DUBBO REGIONAL; Elevation (m) (Min, Median, Max): 364.8 747.9 1038.0 Annual Rainfall (mm) (Min, Median, Max): 610 763 941 Annual Mean Temperature (deg C) (Min, Median, Max): 10.88 12.71 15.05 Median Native Species Richness per plot: 27 TEC Assessed: No associated TEC TEC List: TEC Comments: PCT Percent Cleared: 65.35

PCT Definition Status: Approved

Species By Growth Form Group

Growth Form Group	Species	Median cover score	Frequency
Tree (TG)	Eucalyptus nortonii	3	2
Tree (TG)	Acacia decurrens	1	1
Tree (TG)	Acacia melanoxylon	1	1
Tree (TG)	Acacia pycnantha	2	1
Tree (TG)	Allocasuarina littoralis	1	1
Tree (TG)	Allocasuarina verticillata	1	1
Tree (TG)	Angophora floribunda	3	1
Tree (TG)	Eucalyptus crebra	2	1
Tree (TG)	Eucalyptus dalrympleana	1	1
Tree (TG)	Eucalyptus dwyeri	2	1
Tree (TG)	Eucalyptus fibrosa	1	1
Tree (TG)	Eucalyptus praecox	3	1
Unassigned (UA)	Wurmbea dioica	1	3
Forb (FG)	Triptilodiscus pygmaeus	1	2
Forb (FG)	Viola betonicifolia	2	2

Forb (FG)	Vittadinia cuneata	2	2
Forb (FG)	Vittadinia muelleri	2	2
Forb (FG)	Wahlenbergia communis	2	2
Forb (FG)	Acaena echinata	1	1
Forb (FG)	Acianthus collinus	1	1
Forb (FG)	Actinotus helianthi	1	1
Forb (FG)	Ammobium craspedioides	2	1
Forb (FG)	Aphanes australiana	1	1
Forb (FG)	Asperula scoparia	2	1
Forb (FG)	Burchardia umbellata	1	1
Forb (FG)	Calochilus robertsonii	1	1
Forb (FG)	Calotis lappulacea	1	1
Forb (FG)	Dampiera lanceolata var. lanceolata	2	1
Forb (FG)	Dichondra sp. Inglewood	1	1
Forb (FG)	Diuris platichila	1	1
Forb (FG)	Einadia polygonoides	1	1
Forb (FG)	Euphorbia drummondii	1	1
Forb (FG)	Galium leiocarpum	1	1
Forb (FG)	Galium leptogonium	1	1
Forb (FG)	Geranium neglectum	1	1
Forb (FG)	Glossodia major	1	1
Forb (FG)	Gonocarpus micranthus	1	1
Forb (FG)	Gonocarpus montanus	1	1
Forb (FG)	Gonocarpus teucrioides	2	1
Forb (FG)	Haloragis heterophylla	1	1
Forb (FG)	Helichrysum rutidolepis	1	1
Forb (FG)	Hypericum japonicum	1	1
Forb (FG)	Isotoma axillaris	1	1
Forb (FG)	Microtis parviflora	2	1
Forb (FG)	Opercularia varia	1	1
Forb (FG)	Oxalis chnoodes	1	1
Forb (FG)	Plantago debilis	1	1
Forb (FG)	Plantago hispida	1	1
Forb (FG)	Podolepis hieracioides	1	1
Forb (FG)	Pterostylis reflexa	1	1
Forb (FG)	Pterostylis rufa	1	1
Forb (FG)	Schenkia spicata	1	1
Forb (FG)	Scleranthus biflorus	2	1
Forb (FG)	Senecio bathurstianus	1	1
Forb (FG)	Senecio minimus	1	1
Forb (FG)	Stackhousia viminea	1	1
Forb (FG)	Stuartina muelleri	1	1
Forb (FG)	Swainsona galegifolia	1	1

Forb (FG)	Thelionema caespitosum	2	1
Forb (FG)	Urtica incisa	1	1
Forb (FG)	Veronica derwentiana	2	1
Forb (FG)	Wahlenbergia gracilenta	2	1
Forb (FG)	Wahlenbergia victoriensis	1	1
Grass & grasslike (GG)	Lomandra filiformis	2	88
Grass & grasslike (GG)	Poa sieberiana	2	84
Grass & grasslike (GG)	Rytidosperma pallidum	2	65
Grass & grasslike (GG)	Lomandra multiflora subsp. multiflora	1	60
Grass & grasslike (GG)	Dichelachne micrantha	2	50
Grass & grasslike (GG)	Lepidosperma laterale	1	37
Grass & grasslike (GG)	Microlaena stipoides	2	31
Grass & grasslike (GG)	Aristida ramosa	2	23
Grass & grasslike (GG)	Echinopogon caespitosus	2	15
Grass & grasslike (GG)	Rytidosperma racemosum	2	15
Grass & grasslike (GG)	Echinopogon ovatus	2	13
Grass & grasslike (GG)	Dichelachne sieberiana	2	11
Grass & grasslike (GG)	Austrostipa scabra	2	10
Grass & grasslike (GG)	Dichelachne rara	2	9
Grass & grasslike (GG)	Aristida vagans	2	7
Grass & grasslike (GG)	Elymus scaber	2	7
Grass & grasslike (GG)	Rytidosperma monticola	2	7
Grass & grasslike (GG)	Luzula flaccida	1	6
Grass & grasslike (GG)	Carex inversa	1	5
Grass & grasslike (GG)	Dichelachne crinita	2	5
Grass & grasslike (GG)	Dichelachne inaequiglumis	2	5
Grass & grasslike (GG)	Juncus subsecundus	1	5
Grass & grasslike (GG)	Rytidosperma caespitosum	1	5
Grass & grasslike (GG)	Rytidosperma erianthum	1	5
Grass & grasslike (GG)	Themeda triandra	2	5
Grass & grasslike (GG)	Lomandra longifolia	2	4
Grass & grasslike (GG)	Rytidosperma laeve	2	4
Grass & grasslike (GG)	Schoenus apogon	1	4
Grass & grasslike (GG)	Lomandra confertifolia	2	3
Grass & grasslike (GG)	Poa labillardierei var. labillardierei	2	3
Grass & grasslike (GG)	Rytidosperma fulvum	2	3
Grass & grasslike (GG)	Rytidosperma longifolium	2	3
Grass & grasslike (GG)	Rytidosperma pilosum	1	3
Grass & grasslike (GG)	Aristida calycina	1	2
Grass & grasslike (GG)	Austrostipa mollis	1	2
Grass & grasslike (GG)	Austrostipa setacea	1	2
Grass & grasslike (GG)	Carex appressa	1	2
Grass & grasslike (GG)	Cymbopogon refractus	2	2

Grass & grasslike (GG)	Cyperus sanguinolentus	2	2
Grass & grasslike (GG)	Echinopogon cheelii	2	2
Shrub (SG)	Ozothamnus diosmifolius	2	4
Shrub (SG)	Pimelea curviflora	1	4
Shrub (SG)	Pultenaea spinosa	1	4
Shrub (SG)	Acacia falciformis	1	3
Shrub (SG)	Acacia venulosa	2	3
Shrub (SG)	Bossiaea buxifolia	2	3
Shrub (SG)	Bursaria spinosa	1	3
Shrub (SG)	Cassinia quinquefaria	1	3
Shrub (SG)	Cryptandra amara	1	3
Shrub (SG)	Hakea decurrens	2	3
Shrub (SG)	Hibbertia pedunculata	2	3
Shrub (SG)	Kunzea ericoides	1	3
Shrub (SG)	Olearia elliptica subsp. elliptica	2	3
Shrub (SG)	Pimelea linifolia	1	3
Shrub (SG)	Platylobium formosum	1	3
Shrub (SG)	Rhytidosporum procumbens	2	3
Shrub (SG)	Acacia leucolobia	2	2
Shrub (SG)	Acacia mearnsii	3	2
Shrub (SG)	Acacia ulicifolia	1	2
Shrub (SG)	Acacia verniciflua	2	2
Shrub (SG)	Acrotriche serrulata	1	2
Shrub (SG)	Allocasuarina diminuta	3	2
Shrub (SG)	Grevillea triternata	1	2
Shrub (SG)	Hibbertia calycina	1	2
Shrub (SG)	Hibbertia serpyllifolia	1	2
Shrub (SG)	Indigofera coronillifolia	2	2
Shrub (SG)	Kunzea parvifolia	2	2
Shrub (SG)	Leptospermum brevipes	4	2
Shrub (SG)	Leptospermum myrtifolium	3	2
Shrub (SG)	Leucopogon ericoides	1	2
Shrub (SG)	Leucopogon fletcheri	1	2
Shrub (SG)	Leucopogon fraseri	2	2
Shrub (SG)	Olearia viscidula	2	2
Shrub (SG)	Persoonia curvifolia	2	2
Shrub (SG)	Persoonia linearis	1	2
Shrub (SG)	Pomaderris angustifolia	1	2
Shrub (SG)	Pomaderris betulina	1	2
Shrub (SG)	Pomaderris phylicifolia	2	2
Shrub (SG)	Pultenaea foliolosa	1	2
Shrub (SG)	Pultenaea subspicata	1	2
Shrub (SG)	Styphelia laeta	2	2

Shrub (SG)	Veronica perfoliata	2	2
Shrub (SG)	Acacia ausfeldii	1	1
Shrub (SG)	Acacia cognata	1	1
Shrub (SG)	Acacia gladiiformis	2	1
Shrub (SG)	Acacia hakeoides	2	1
Shrub (SG)	Acacia lineata	1	1
Shrub (SG)	Acacia rubida	1	1
Shrub (SG)	Allocasuarina distyla	1	1
Shrub (SG)	Cassinia compacta	1	1
Shrub (SG)	Crowea exalata	2	1
Shrub (SG)	Daviesia acicularis	1	1
Shrub (SG)	Daviesia genistifolia	3	1
Shrub (SG)	Dodonaea triangularis	1	1
Shrub (SG)	Gompholobium uncinatum	3	1
Shrub (SG)	Grevillea arenaria	2	1
Shrub (SG)	Hibbertia crinita	3	1
Shrub (SG)	Hibbertia fasciculata	1	1
Shrub (SG)	Hovea lanceolata	1	1
Shrub (SG)	Hovea longifolia	2	1
Shrub (SG)	Hovea rosmarinifolia	1	1
Shrub (SG)	Indigofera adesmiifolia	1	1
Shrub (SG)	Leptospermum continentale	2	1
Shrub (SG)	Leptospermum divaricatum	3	1
Shrub (SG)	Leucopogon juniperinus	2	1
Shrub (SG)	Melicytus dentatus	3	1
Shrub (SG)	Mirbelia oxylobioides	1	1
Shrub (SG)	Myoporum montanum	1	1
Shrub (SG)	Persoonia mollis	1	1
Shrub (SG)	Persoonia sericea	2	1
Shrub (SG)	Philotheca salsolifolia	2	1
Shrub (SG)	Pimelea glauca	1	1
Shrub (SG)	Platysace lanceolata	2	1
Shrub (SG)	Podolobium ilicifolium	1	1
Shrub (SG)	Pomaderris eriocephala	1	1
Shrub (SG)	Prostanthera hirtula	2	1
Shrub (SG)	Prostanthera howelliae	1	1
Shrub (SG)	Solanum cinereum	2	1
Tree (TG)	Eucalyptus macrorhyncha	3	96
Tree (TG)	Eucalyptus goniocalyx	3	70
Tree (TG)	Eucalyptus polyanthemos	3	55
Tree (TG)	Eucalyptus rossii	3	40
Tree (TG)	Callitris endlicheri	2	27
Tree (TG)	Acacia dealbata	1	10

Tree (TG)	Eucalyptus dealbata	2	9
Tree (TG)	Eucalyptus sideroxylon	2	9
Tree (TG)	Eucalyptus blakelyi	1	7
Tree (TG)	Eucalyptus melliodora	1	7
Tree (TG)	Eucalyptus mannifera	3	6
Tree (TG)	Eucalyptus dives	3	4
Tree (TG)	Brachychiton populneus	1	3
Tree (TG)	Eucalyptus albens	2	3
Tree (TG)	Acacia linearifolia	2	2
Tree (TG)	Acacia parramattensis	1	2
Tree (TG)	Callitris glaucophylla	3	2
Tree (TG)	Eucalyptus bridgesiana	2	2
Grass & grasslike (GG)	Juncus usitatus	1	2
Grass & grasslike (GG)	Lepidosperma gunnii	1	2
Grass & grasslike (GG)	Luzula densiflora	1	2
Grass & grasslike (GG)	Panicum effusum	1	2
Grass & grasslike (GG)	Poa meionectes	3	2
Grass & grasslike (GG)	Rytidosperma penicillatum	2	2
Grass & grasslike (GG)	Rytidosperma tenuius	2	2
Grass & grasslike (GG)	Aristida jerichoensis	1	1
Grass & grasslike (GG)	Austrostipa bigeniculata	2	1
Grass & grasslike (GG)	Austrostipa densiflora	3	1
Grass & grasslike (GG)	Austrostipa nitida	2	1
Grass & grasslike (GG)	Austrostipa pubescens	1	1
Grass & grasslike (GG)	Deyeuxia quadriseta	1	1
Grass & grasslike (GG)	Eragrostis parviflora	1	1
Grass & grasslike (GG)	Gahnia aspera	2	1
Grass & grasslike (GG)	Isolepis habra	1	1
Grass & grasslike (GG)	Juncus remotiflorus	2	1
Grass & grasslike (GG)	Lachnagrostis filiformis	1	1
Grass & grasslike (GG)	Lepidosperma latens	2	1
Grass & grasslike (GG)	Lomandra glauca	2	1
Grass & grasslike (GG)	Panicum simile	1	1
Grass & grasslike (GG)	Rytidosperma bipartitum	1	1
Grass & grasslike (GG)	Rytidosperma richardsonii	1	1
Grass & grasslike (GG)	Rytidosperma setaceum	1	1
Other (OG)	Hardenbergia violacea	1	37
Other (OG)	Glycine clandestina	2	15
Other (OG)	Billardiera scandens	1	9
Other (OG)	Cassytha pubescens	1	9
Other (OG)	Desmodium varians	1	5
Other (OG)	Macrozamia secunda	1	4
Other (OG)	Xanthorrhoea australis	1	4

Other (OG)	Amyema miquelii	1	3
Other (OG)	Thysanotus patersonii	1	3
Other (OG)	Cassytha glabella	2	2
Other (OG)	Convolvulus erubescens	1	2
Other (OG)	Xanthorrhoea glauca	2	2
Other (OG)	Amyema miraculosum subsp. boormanii	1	1
Other (OG)	Amyema pendula	1	1
Other (OG)	Clematis glycinoides	1	1
Other (OG)	Glycine tabacina	1	1
Other (OG)	Macrozamia concinna	2	1
Shrub (SG)	Hibbertia obtusifolia	2	81
Shrub (SG)	Brachyloma daphnoides	2	63
Shrub (SG)	Phyllanthus hirtellus	2	46
Shrub (SG)	Styphelia triflora	1	44
Shrub (SG)	Cassinia sifton	2	40
Shrub (SG)	Melichrus urceolatus	2	35
Shrub (SG)	Dillwynia phylicoides	2	32
Shrub (SG)	Lissanthe strigosa	2	29
Shrub (SG)	Monotoca scoparia	1	27
Shrub (SG)	Persoonia rigida	1	24
Shrub (SG)	Dodonaea viscosa	1	21
Shrub (SG)	Platysace ericoides	2	20
Shrub (SG)	Cassinia longifolia	2	19
Shrub (SG)	Pultenaea procumbens	1	19
Shrub (SG)	Calytrix tetragona	2	17
Shrub (SG)	Daviesia leptophylla	2	16
Shrub (SG)	Acacia buxifolia	1	15
Shrub (SG)	Hibbertia riparia	2	15
Shrub (SG)	Cassinia laevis	1	14
Shrub (SG)	Acacia implexa	1	13
Shrub (SG)	Grevillea ramosissima subsp. ramosissima	1	12
Shrub (SG)	Indigofera australis	1	12
Shrub (SG)	Dillwynia sericea	1	9
Shrub (SG)	Gompholobium huegelii	1	9
Shrub (SG)	Pultenaea setulosa	2	9
Shrub (SG)	Acacia gunnii	1	8
Shrub (SG)	Acacia uncinata	2	8
Shrub (SG)	Cheiranthera linearis	1	8
Shrub (SG)	Leucopogon virgatus	1	8
Shrub (SG)	Acacia decora	1	7
Shrub (SG)	Melichrus procumbens	1	7
Shrub (SG)	Acacia genistifolia	1	6
Shrub (SG)	Acacia vestita	1	6

Shrub (SG)	Astroloma humifusum	1	6
Shrub (SG)	Leucopogon attenuatus	2	6
Shrub (SG)	Leucopogon microphyllus	2	6
Shrub (SG)	Acacia lanigera	1	5
Shrub (SG)	Acacia penninervis	1	5
Shrub (SG)	Cassinia aculeata	1	5
Shrub (SG)	Dillwynia sieberi	2	5
Shrub (SG)	Melichrus erubescens	1	5
Shrub (SG)	Olearia microphylla	1	5
Shrub (SG)	Pultenaea microphylla	1	5
Shrub (SG)	Pultenaea subternata	2	5
Shrub (SG)	Acacia paradoxa	1	4
Shrub (SG)	Daviesia latifolia	1	4
Shrub (SG)	Dillwynia retorta	1	4
Shrub (SG)	Exocarpos cupressiformis	1	4
Shrub (SG)	Grevillea floribunda subsp. floribunda	2	4
Shrub (SG)	Grevillea polybractea	1	4
Shrub (SG)	Leptospermum multicaule	2	4
Unassigned (UA)	Genoplesium clivicola	1	1
Fern (EG)	Cheilanthes sieberi subsp. sieberi	2	54
Fern (EG)	Cheilanthes austrotenuifolia	3	3
Fern (EG)	Adiantum aethiopicum	2	2
Fern (EG)	Asplenium flabellifolium	1	2
Fern (EG)	Cheilanthes distans	1	2
Fern (EG)	Grammitis billardierei	1	1
Fern (EG)	Ophioglossum lusitanicum	1	1
Fern (EG)	Pellaea falcata	1	1
Fern (EG)	Pteridium esculentum	2	1
Forb (FG)	Goodenia hederacea	2	88
Forb (FG)	Gonocarpus tetragynus	2	70
Forb (FG)	Stypandra glauca	2	50
Forb (FG)	Dianella revoluta	2	49
Forb (FG)	Wahlenbergia stricta	2	42
Forb (FG)	Hovea linearis	1	34
Forb (FG)	Hydrocotyle laxiflora	2	33
Forb (FG)	Hypericum gramineum	1	33
Forb (FG)	Poranthera microphylla	2	31
Forb (FG)	Pomax umbellata	1	23
Forb (FG)	Senecio quadridentatus	2	23
Forb (FG)	Galium gaudichaudii	1	22
Forb (FG)	Senecio prenanthoides	1	19
Forb (FG)	Chrysocephalum apiculatum	2	15
Forb (FG)	Stellaria pungens	2	14

Forb (FG)	Wahlenbergia gracilis	1	13
Forb (FG)	Oxalis perennans	1	12
Forb (FG)	Daucus glochidiatus	1	10
Forb (FG)	Patersonia sericea	2	10
Forb (FG)	Euchiton japonicus	1	9
Forb (FG)	Euchiton sphaericus	2	9
Forb (FG)	Geranium solanderi	2	9
Forb (FG)	Hydrocotyle sibthorpioides	2	9
Forb (FG)	Laxmannia gracilis	1	8
Forb (FG)	Veronica plebeia	2	8
Forb (FG)	Opercularia diphylla	2	7
Forb (FG)	Scutellaria humilis	2	7
Forb (FG)	Brachyscome spathulata	1	6
Forb (FG)	Dianella longifolia	1	6
Forb (FG)	Drosera peltata	1	6
Forb (FG)	Gonocarpus elatus	2	6
Forb (FG)	Goodenia bellidifolia	2	6
Forb (FG)	Veronica calycina	1	6
Forb (FG)	Microseris lanceolata	1	5
Forb (FG)	Microtis unifolia	1	5
Forb (FG)	Opercularia aspera	2	5
Forb (FG)	Opercularia hispida	2	5
Forb (FG)	Arthropodium minus	2	4
Forb (FG)	Chrysocephalum semipapposum	2	4
Forb (FG)	Crassula sieberiana	1	4
Forb (FG)	Cymbonotus lawsonianus	2	4
Forb (FG)	Dichondra repens	2	4
Forb (FG)	Drosera auriculata	1	4
Forb (FG)	Senecio tenuiflorus	1	4
Forb (FG)	Thysanotus tuberosus	1	4
Forb (FG)	Tricoryne elatior	1	4
Forb (FG)	Wahlenbergia luteola	1	4
Forb (FG)	Brachyscome multifida	2	3
Forb (FG)	Caladenia carnea	1	3
Forb (FG)	Cynoglossum australe	1	3
Forb (FG)	Diuris sulphurea	1	3
Forb (FG)	Oxalis exilis	2	3
Forb (FG)	Plantago varia	2	3
Forb (FG)	Pterostylis revoluta	1	3
Forb (FG)	Ranunculus lappaceus	1	3
Forb (FG)	Stylidium graminifolium	1	3
Forb (FG)	Xerochrysum bracteatum	1	3
Forb (FG)	Xerochrysum viscosum	1	3

Forb (FG)	Acaena novae-zelandiae	2	2
Forb (FG)	Acaena ovina	1	2
Forb (FG)	Ajuga australis	1	2
Forb (FG)	Asperula conferta	1	2
Forb (FG)	Bossiaea prostrata	1	2
Forb (FG)	Bulbine bulbosa	1	2
Forb (FG)	Caladenia cucullata	1	2
Forb (FG)	Calotis cuneifolia	1	2
Forb (FG)	Coronidium scorpioides	1	2
Forb (FG)	Cyrtostylis reniformis	1	2
Forb (FG)	Dampiera purpurea	1	2
Forb (FG)	Einadia nutans	1	2
Forb (FG)	Eriochilus cucullatus	2	2
Forb (FG)	Euchiton involucratus	2	2
Forb (FG)	Genoplesium rufum	1	2
Forb (FG)	Hydrocotyle tripartita	1	2
Forb (FG)	Lobelia gibbosa	2	2
Forb (FG)	Plantago gaudichaudii	2	2
Forb (FG)	Pterostylis aciculiformis	1	2
Forb (FG)	Pterostylis ampliata	1	2
Forb (FG)	Pterostylis parviflora	1	2
Forb (FG)	Pterostylis rubescens	2	2
Forb (FG)	Ranunculus sessiliflorus	1	2
Forb (FG)	Rumex brownii	1	2
Forb (FG)	Senecio bipinnatisectus	1	2
Forb (FG)	Senecio diaschides	1	2
Forb (FG)	Senecio hispidulus	1	2
Forb (FG)	Stackhousia monogyna	1	2
Forb (FG)	Thelymitra pauciflora	1	2



Appendix D Regional Vegetation Mapping for Site (Excerpt)

Cooma Road Quarry

Ecological Monitoring Program 2024

Holcim (Australia) Pty Ltd

SLR Project No.: 630.V30215





尜SLR

APPENDIX 4

Map (ŠVTM)



Appendix E Threatened Species Profile – Hoary Sunray

Cooma Road Quarry

Ecological Monitoring Program 2024

Holcim (Australia) Pty Ltd

SLR Project No.: 630.V30215



Hoary Sunray - profile

Scientific name: Leucochrysum Indicative albicans var tricolor

Conservation status in NSW: Not listed

Commonwealth status:

Endangeredra

Profile last updated: 17 Aug 2018

Description

A perennial everlasting daisy. Stems are 10-15 cm tall, with narrow leaves 2-10 cm long, covered in white cottony hairs. Yellowish flowerheads are 2-5 cm in diameter, surrounded by numerous papery, white, overlapping ovate-oblong bracts, with the outer layers tinged red. pink, purple or brown. Fruits are brown, ovoid, 2-3 mm long, with 14-20 pappus bristles. Leucochrysum albicans var. tricolor is distinguished from the other varieties within L. albicans by its white involucral bracts

distribution



The areas shown in pink and/purple are the subregions where the species or community is known or predicted to occur. They may not occur thoughout the sub-region but may be restricted to certain areas. (click here to see geographic restrictions). The information presented in this map is only indicative and may contain errors and omissions.

and narrow, linear-oblanceolate leaves. In rare instances, populations typical of var. tricolor apparently intergrade with the yellow-flowered L. albicans var. albicans.

Distribution

Endemic to south-eastern Australia, where it is currently known from three geographically separate areas in Tasmania, Victoria and south-eastern NSW and ACT. In NSW it currently occurs on the Southern Tablelands adjacent areas in an area roughly bounded by Albury, Bega and Goulburn, with a few scattered locatlities know from beyond this region.

Habitat and ecology

- Occurs in a wide variety of grassland, woodland and forest habitats, generally on relatively heavy soils.
- Can occur in modified habitats such as semi-urban areas and roadsides.
- Highly dependent on the presence of bare ground for germination.
- In some areas, disturbance is required for successful establishment.

Images



Hoary Sunray - Leucochrysum albicans var. tricolor Image 1 of 5. View slideshow.



Appendix F Leucochrysum albicans var. tricolor **Plot Photos**

Cooma Road Quarry

Ecological Monitoring Program 2024

Holcim (Australia) Pty Ltd

SLR Project No.: 630.V30215



Photo F1 Hoary Sunray Plot 1



Photo F2: Hoary Sunray Plot 2



Photo F3: Hoary Sunray Plot 3



Photo F4: Hoary Sunray Plot 4



Photo F5: Hoary Sunray Plot 5





Appendix G BAM Plot Survey Flora Data

Cooma Road Quarry

Ecological Monitoring Program 2024

Holcim (Australia) Pty Ltd

SLR Project No.: 630.V30215



Table G1: Plot Survey Flora Data

Scientific name	Common name	Native/ Exotic	Control plots									Rehabilitation Plots						
			CI	२१	CR2		CR3		CR4		R1		R2		R3			
			Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu		
Acacia brownii	Heath Wattle	Native					0.1	3										
Acacia longifolia	Sydney Golden Wattle	Native											1	3				
Acacia longissima	Long-leaved Wattle	Native																
Acacia mearnsii	Black Wattle	Native							2	1					3	6		
Acacia pycnantha	Golden Wattle	Native													10	10		
Acacia rubida	Red-stem Wattle	Native													60	40		
<i>Acacia</i> sp.	A Wattle	Native											0.1	3				
Acacia terminalis	Sunshine Wattle	Native																
Acacia vestita	Weeping Boree	Native													1	3		
Acaena novae- zelandiae	Bidgee Widgee	Native	0.5	50														
Adiantum aethiopicum	Maidenhair Fern	Native					0.1	3										
Aira cupaniana	Silvery Hairgrass	Exotic	0.1	20														
Ajuga australis	Austral Bugle	Native																
<i>Ajuga</i> sp.	Ajuga	Exotic							0.1	20								
Allocasuarina verticillata	Drooping Sheoak	Native													2	2		
Alternanthera pungens	Khaki Weed	Exotic																
Amyema pendula	Drooping Mistletoe	Native			0.1	2												
Aristida sp.	A Wiregrass	Native																

Scientific name	Common name	Native/ Exotic	Control plots									Rehabilitation Plots						
			CI	२१	CR2		CI	२३	C	R4	F	81	R	2	R	3		
			Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu		
Asplenium flabellifolium	Necklace Fern	Native							0.1	6								
Austrostipa bigeniculata	-	Native													5	30		
Austrostipa densiflora	-	Native																
Austrostipa scabra	Speargrass	Native	1	20	1	20					2	50	2	50				
Avena sativa	Wild Oats	Exotic	0.1	20							0.1	10	0.1	20				
Bossiaea buxifolia	Matted Bossiaea	Native							0.5	1								
Bothriochloa sp.	A Beard Grass	Native									40	1000	30	1000				
Bromus rubens	Red Brome	Exotic									0.1	10	0.1	20				
Brunoniella sp.	Blue Trumpet	Native							0.1	20								
Bulbine bulbosa	Bulbine Lily	Native																
Bursaria spinosa	Blackthorn	Native							0.1	1								
Carthamus lanatus	Saffron Thistle	Exotic									2	100	1	50				
Cenchrus clandestinus	Kikuyu Grass	Exotic									3	100						
Centaurea melitensis	Maltese Star- thistle	Exotic											0.1	3				
Centaurium sp.	Centaury	Exotic							0.1	20								
Cerastium glomeratum	Sticky Mouse- ear Chickweed	Exotic																
Cheilanthes sieberi subsp. sieberi	Poison Rock Fern	Native	0.1	6	0.5	20	0.1	10	0.1	10					0.1	6		
Chrysocephalum apiculatum	Common Everlasting	Native																
Cirsium vulgare	Spear Thistle	Exotic																

Scientific name	Common name	Native/ Exotic		Control plots								Rehabilitation Plots						
			C	R1	C	R2	C	R3	C	R4	R	1	R	2	R	3		
			Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu		
Convolvulus angustissimus	-	Exotic																
Conyza sp.	Fleabane	Exotic																
Crassula sieberiana subsp. tetramera	-	Native																
Cymbonotus Iawsonius	Bears Paw	Native																
Cyperus sanguinolentus	-	Native																
Cyperus sp.	-	Native			0.1	6			0.1	20								
Daucus sp.	Native Carrot	Native	0.1	3														
Daviesia squarrosa	Bitter Pea	Native																
Deyeuxia parviseta	-	Native																
Dianella longifolia	Blueberry Lily	Native					1	20										
Dichelachne crinita	Longhair Plumegrass	Native			1	20	5	40										
Dichelachne micrantha	Shorthair Plumegrass	Native																
Dichondra repens	Kidney Weed	Native	0.1	300														
<i>Diuris</i> sp.	Donkey Orchid	Native																
Dodonaea viscosa	Broadleaf Hopbush	Native							0.1	3			2	4				
Echinopogon ovatus	Forest Hedgehog Grass	Native																
Echium plantagineum	Petterson's Curse	Exotic									0.1	6						
Einadia hastata	Saloop	Native													2	20		
Einadia nutans	Climbing Saltbush	Native	0.5	20			0.1	6							1	20		

Holcim (Australia) Pty Ltd
Cooma Road Quarry

Scientific name	Common name	Native/ Exotic	Control plots								Rehabilitation Plots						
			С	R1	CR2		CR3		CR4		R1		R2		R3		
			Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	
Einadia trigonos	Fishweed	Native															
Entolasia marginata	Bordered Panic	Native	0.5	20	0.5	10	0.1	6									
Eragrostis brownii	Browns Lovegrass	Native															
Erodium sp.	Storksbill	Exotic															
Eschsholzia californica	California Poppy	Exotic											1	20			
Eucalyptus blakelyi	Blakley's Red Gum	Native									0.1	1	3	6			
Eucalyptus goniocalyx	Long-leaved Box	Native															
Eucalyptus macrorhyncha	Red Stringybark	Native	3	1			15	6	40	12							
Eucalyptus melliodora	Yellow Box	Native	30	16	35	38	2	2					3	2			
Eucalyptus punctata	Grey Gum	Native													3	3	
Eucalyptus rossii	Inland Scribbly Gum	Native					30	19									
Euchiton sphaericus	Star Cudweed	Native															
Euphorbia serpens	Matted Sandmat	Exotic	0.1	10							0.5	50					
Galium gaudichaudii	Rough Bedstraw	Native							0.1	10							
Gamochaeta pensylvanica	Pennsylvania Cudweed	Exotic															
Geranium solanderi	Native Geranium	Native	0.1	6									0.1	6			
Glycine clandestina	Twining Glycine	Native	0.1	10					0.1	10			0.1	6	0.1	6	
Glycine tabacina	Variable Glycine	Native							0.1	10							

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Scientific name	Common name	Native/ Exotic	Control plots									Rehabilitation Plots						
			C	R1	C	R2	C	R3	С	R4	F	R1	R2		R3			
			Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu		
Gonocarpus teucrioides	Forest Raspwort	Native	0.1	20			0.1	10										
Gonocarpus tetragynus	Common Raspwort	Native																
Goodenia hederacea	Ivy Goodenia	Native	0.1	6	0.5	20	0.5	30	0.1	20								
Grona varians	Slender Tick- trefoil	Native	0.1	10									0.1	6				
Hardenbergia violacea	False Sarsaparilla	Native							0.1	1								
Hibbertia obtusifolia	Hoary Guinea Flower	Native	0.1	6	0.1	6	0.5	6	1	10								
Hydrocotyle laxiflora	Stinking Pennywort	Native																
Hypericum gramineum	Small St John's Wort	Native																
Hypericum perforatum	St John's Wort	Exotic	2	50							0.5	20	1	50				
Hypochaeris radicata	Flatweed	Exotic	1	50			0.1	1					1	50				
Indigofera australis	Australian Indigo	Native																
Kunzea ericoides	Burgan	Native			20	15												
Lepidosperma laterale	Variable Swordsedge	Native			0.1	6	0.5	10	0.1	6					0.5	10		
Leucochrysum albicans subsp. tricolor	Hoary Sunray	Native																
Leucopogon fletcheri subsp. brevisepalus	-	Native			0.1	3	1	3	1	6								
Lobelia purpurascens	Whiteroot	Native			0.1	3												
Lolium perenne	Perennial Ryegrass	Exotic																

Holcim (Australia) Pty Ltd
Cooma Road Quarry

Scientific name	Common name	Native/ Exotic	Control plots									Rehabilitation Plots						
			C	R1	CR2		CR3		C	R4	F	R1	F	2	R	3		
			Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu		
Lomandra filiformis	Wattle Mat- rush	Native	1	20	1	30			2	50								
Lomandra multiflora	Many-headed Mat-rush	Native																
Lysimachia arvensis	Scarlet Pimpernel	Exotic																
Marrubium vulgare	White Horehound	Exotic	0.1	3							0.1	3						
Medicago lupilina	Black Medic	Exotic									0.5	20	0.5	20				
Melichrus urceolatus	Urn Heath	Native							0.1	3					0.1	3		
Microleana stipoides	Weeping Meadow Grass	Native	5	200	1	20							1	20	1	20		
Modiola caroliniana	Red Flower Mallow	Exotic									0.5	20	0.5	20				
Onopordum acanthium	Scotch Thistle	Exotic																
Opercularia varia	Variable Stinkweed	Native																
Oxalis perennans	Yellow Woodsorrel	Native							0.1	6	0.1	6	0.1	6	0.1	10		
Ozothamnus thyrsoideus	Sticky Everlasting	Native	0.5	3	5	15	2	10	10	20					0.1	3		
Paronycha brasiliana	Brazilian Whitlow	Exotic	0.1	6														
Petrorhagia dubia	Hairy Pink	Exotic	0.1	10							0.1	50	0.1	20				
Pimelea curviflora subsp. Sericea	Curved Rice- flower	Native																
Pimelea linifolia	Slender Rice- flower	Native					0.1	3										
Plantago lanceolata	Lambs Tongues	Exotic	0.5	20							0.1	20	2	50				
Plantago sp.	-	Native	0.1	3														

Holcim (Australia) Pty Lto
Cooma Road Quarry

Scientific name	Common name	Native/ Exotic				Contro	ol plots					i	Rehabilita	ation Plot	8	
			CI	र1	C	R2	C	R3	C	R4	R	1	R	2	R	3
			Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu
Poranthera microphylla	Small Poranthera	Native														
Pultenaea microphylla	Spreading Bush-pea	Native			0.5	6	3	50							1	10
Pultenaea procumbens	Heathy Bush- pea	Native					0.1	1	0.5	6						
Rosa rubiginosa	Wild Rose	Exotic	0.1	1									1	2		
Rubus fruticosus agg	Blackberry	Exotic													0.1	1
Rumex brownii	Browns Dock	Native	0.1	6											0.1	6
Rytidosperma Iongifolium	Long-leaved Wallaby Grass	Native														
Rytidosperma pallidum	Red-anther Wallaby Grass	Native			0.1	6										
Rytidosperma tenuius	Purplish Wallaby Grass	Native														
Rytidosperma sp.	A Wallaby Grass	Native	5	200	2	100	0.1	6	2	100	3	100			0.5	20
Salvia verbenaca	Wild Sage	Exotic														
Senecio diaschides	-	Native														
Senecio hispidulus var. hispidulus	Hill Fireweed	Native														
Senecio quadridentatus	Cotton Fireweed	Native														
Sisymbrium officinale	Hedge Mustard	Exotic									0.5	10	0.5	10		
Solanum cinereum	Narrawa Burr	Native													0.1	6
Solanum nigrum	Blackberry Nightshade	Exotic													0.1	6
Sonchus oleraceus	Milk Thistle	Exotic											0.1	3		
Stellaria pungens	Prickly Starwort	Native							2	50						

Scientific name	Common name	Native/ Exotic				Contro	ol plots					I	Rehabilitation Plots					
			CI	R1	C	R2	C	R3	С	R4	R	1	R	2	R	3		
			Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu	Cov	Abu		
Stypandra glauca	Nodding Blue Lily	Native					1	6							2	6		
Styphelia adscendens	Golden Heath	Native							1	2								
Tolpis barbata	European Umbrella Milkwort	Exotic																
Trifolium angustifolium	Narrow Clover	Exotic																
Trifolium arvense	Hares-foot Clover	Exotic	0.1	20					0.1	20	0.1	20						
Trifolium sp.	Clover	Exotic																
Verbascum thapsus	Great Mullein	Exotic							0.1	3			3	200				
Veronica perfoliata	Diggers Speedwell	Native					0.5	10										
Vittadenia cuneata	Fuzzweed	Native	0.1	6					0.1	20	0.1	10	0.1	20				
Vittadinia muelleri	-	Native	0.1	6									0.5	20	0.1	6		
Wahlenbergia gloriosa	Royal Bluebell	Native	0.1	6	0.1	3	0.1	3	0.1	6			0.1	6				
Wahlenbergia gracilis	Australian Bluebell	Native																
Xerochrysum bracteatum	Golden Everlasting	Native																



Appendix H BAM Plot Data Sheets

Cooma Road Quarry

Ecological Monitoring Program 2024

Holcim (Australia) Pty Ltd

SLR Project No.: 630.V30215



RSLR

Sia		L.	umbers	- o on this pa	ge cone	elate with th	le numbers	s and exp	nanator	notes on	page 3				
oite sheet #	1 of	C	Date	4122	4 SI	ame	Coon	na K	2d		Plo	t Identifie	er (HC	i
Recorders		Bo. (),El	ise N)		IBRA region				Veg	zone ID			
Datum		Co-ordin system	ate	Projected or deographic	N	AGA Zone		¹ X coo	rdinate	s		¹ Y coord	linates		
Location des	criptio	n		Descriptive	notes to	locale site		id referer							
Plot dimensi	ons	For comp For functi	osition &	structure (400 n2): 20 m x 5)m2): 20 0 m) m x 20 m	Ori fro	entation m 0m line	of midl e	ine	Magn	etic	Phot	o #	
atum: AGD66 SW or 54 (We	WGS estern N	84. GDA9 NSW) X/Y	4, GDA20 Coordina	20 or Other (te: Long/Lat (specify) for Proj	MGA Zon ected coord	e (for Proje linate syst	ected cool lem), Eas	rdinate ting/No	system or thing (for	ly): 56 geograp	Coastal N phic coord	ISW), linate	55 (Cen system)	tral
Ćom.	aosition	and strue	clare sum	values may b	e comp	leted after	entering da	sta into av	vailable	tools it is	not requ	uired whit	e in the	field	
composition	(400 n	n ² plot)		Structure	e (400 m	n ² plot)			Func	tion (1000	m ² plot	:)			
			Sum values				Sum valu (may sun >100%)	ies (%) n to	³ Tree class	e stem size (DBH)		If data a more ap i.e. to ge benchm counted	propria enerate arks, s	e used a ite local local tems m	as dat ust t
of native	Trees	(TG)	2	Sum of	Trees	(TG)	33	,	80 + 0	cm		×unt			
Species (richness) in each	Shrut	os (SG)	2	foliage cover of	Shrubs (SG) Grasses (GG)		0.	6	50-79	cm		Pount (best practice)/to 8 large tree benchmark ≥50 cm, count			
growth form group (not	Grass	ses (GG)	5	species by growth			12.	5	30-49	cm		¥ount († 8 large ≥ 30 cm	pest pr tree be count	actice // nchmar	ick Kist
individual plants within each	Forbs	(FG)	12	form group	Forbs	(FG)	2		20-29) cm		¥# alge ≥ 20 cm	oest pr iree be coun	actice // nchmar	ick K St
growth form)	Ferns	(EG)	l		Ferns	(EG)	Ø.]	10-19	cm		HIFHT	Ht	actice	NOK
	Other	(OG)	-		Other	(OG)	~	1	5-9 ci	m		\$ HT	H ist pr	actice)/	ick
			2				0.	2	⁴ Tree <5cm	regenerat	tion	5			
				Total high cover	h threat	weed	3	Ļ	⁵ Leng	th of falle	n logs	HHTP	ace	6	
									⁶ Hollo trees	ow-bearing)	Tick	X	-	
Vegetation in function cont.	(five 1m	²) plots)	⁷ Litter c	over (%)		Bare gro	und cover	(%)	Crypt	ogam cov	er (%)	Ro	ock cov	er (%)	
Subplot sco	res		80 1	D757	280	5 7	559	5 5	0	0	O	05	15	ês.	0
				1.											

These attributes require consideration of sile observations and may be completed after field work.

.

Vegetation class	⁸ Large tree benchmark size	20/ 30/ 5	0/ 80 DB	н	Confidence	H/ M/ L
Plant community type (PCT)			EEC	Tick	Confidence	H/ M/ L

Priverography and site features that may help in determining PCT and management zone (optional) or for BioNet systematic flora survey purposes

Morphological type		Landforr	m	Landform pattern	Microrelief
Lithology		Soil surf texture	ace	Soil colour	Soil depth
Slope		Aspect		Site drainage	Distance to nearest water type
Disturbance	Severity code	Age code	Brief	site description or other notes	
Clearing (inc. logging)	0		Kan	renter Sout	
Cultivation (inc. pasture)	Ø		nune	pres sur	





RSLR

2 floristics plot:	Survey Name	Plot identifier	Recorders						
041224	Cooma ad	CHCI	Bo	P, EL	ise_N				
Species name Full species name, or mandatory. Data from	a unique means of identifying separ here will be used to assign growth f	ate taxa within a survey is orm richness and cover.	N, HTW or non- HTW	² Foliage cover	Abund- ance	Vouche			
Eurolyp	tu narozzi	rcha	N	3	1				
Eucolly	tus melliodoro	r	S	30	16				
Tritoligh	overse		6	0.1	20				
1	C. I. 1			8	2				

66 Microleana stipoides Hypenium perfordin - univers 14 20 200 N 5 50 HTE 2 Hypochean Protections Plantago conceolota -5 50 -E 0.5 20 SG Ozothanns thyssisibes N 3 0.5 FG Aceana norea-dealandis Ν 50 0.5 66 Rytidorpenno sp. EG Chelienthes seeben N 5 200 N D. 6 6 Petropagio dubis £ 0.1 0) FG Dichondra repens N 0.1 300 06 15 ranians 0.1 Cyora N 10 Mometria sp. Mometria vulgare -۲ F 3 0.1 - Aira upanioites 66 Entologia trita 0. N 0) 0.1 E 20 AC

60	chouse genue		0.5	20	
FG	Conversos terrision	N	0.1	20	
FG	22 Coodenia hébérneuse	N	0.1	6	
FG	20 vittebanio cureata	N	0.1	6	
~	Euchopsis serpens	E	B I	0	
56	= + Uperting obtasitation	N	QI	6	
FG	« Vittobenis mullen	N	0.1	6	
FG	27 Ecnobio, rutons	N	0.5	20	
66	28 Austroction siama	N	1	20	
-	Paronycho brasilienis	F	0.1	L	
FG	Vahlensergra doriora	N	0 i	6	
FG	Plantago Sp. 0	N	0.1	9	
FG	2 Danus Sp.	N	m i	2	
FG	Rimer prouni	N	01		
FG	34 (seram solonder"	A I	0	6	
-	35 Avena Stria			0	
		D	0.1	20	

Print more copies of this page to allow for higher species counts at a plot. All vascular plant species in a plot need to be recorded

GF Code designs with form definitions in BAM 2020 Appendix F (TG Tree ISG shrub, GG grass, FG forb, EG, fern, OG athor IN Dance NTW, bight Foliade cover 01 0 0 3 12 3 5 10 15 20 25 100%. Note 0 1% cover represents no area of approximation for the 2 0.1 11

63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 1.0 x 1.0 m, blood x 5 m, 25% = 10 x 10 m. Note the top 3 dominant native species within each OF group



		Nu	imbers 1-	on this pa	gecon		ino munibora	13	1			ntifior	CH	17
Site sheet #	1 of	Da	te (+ 12 2	4 SN	urvey ame	(coma	Ka			101 106			
Recorders		W	BD				IBRA region			1	eg zor	ne ID		
Datum	Co-	ordinat	te	Projected or geographic		MGA Zone		¹ X coo	ordinates		1Y (coordina	tes	
Location des	cription			Descriptive	notes la	o locate site	e without gri	d referen	nce					
Plot dimension	ons Eor Eor	compo function	sition & s n (1000m	tructure (400 2) 20 m x 50	m2): 20) m	0 m x 20 m	Orie from	entation n 0m lin	of midline e	Ma	gnetic'		10to #	entral
atum: AGD66 SW or 54 (We	WGS84 estern NSV	GDA94 V) X/Y (GDA202 coordinate	20 or Other (s e: Long/Lat (specify) for Proj	MGA Zon ected coor	dinate system	em), Eas	ting/Northing	(for geog	raphic	coordinal	e systen	n)
Com	nosition an	d struct	ure sum y	ralues may b	e comp	pleted after	entering da	ta into av	vailable tools	It is not n	aquirec	l while in	the field	
Composition	(400 m ² p	olot)		Structure	e (400 n	n ² plot)			Function (1000 m² p	lot)	ate ere te	houso	1 96
			Sum values				Sum value (may sum >100%)	es (%) to	class (DBF	i)	i.e. ber	to gener nchmarks	oriate local ate local , stems r	al dat
Total count of native	Trees (T	G)	١	Sum of	Sum of Trees		35	5	80 + cm		X	unt		
plant species (richness)	Shrubs (S	SG)	5	foliage cover of	Shrub	os (SG)	25	-5.7 ^{50-79 cm}			€0 8 k ≥50	unt (best arge tree) cm cou	practice) benchma nt	/tick ark siz
growth form group (not	Grasses	(GG)	9	native species Grasses (GG) by		6.5	6.8 ^{30-49 cr}			Xia B 30		Lount (best practice)/tick Klarge (ree benchmark s ≥ 30 cm count		
individual plants within each	Forbs (Fo	G)	3	form group	Forbs	(FG)	0.	7	20-29 cm		×	unt (best arge tree 0 cm i cot	practice benchma int	/lick ark siz
growth form)	Ferns (E	G)	1		Ferns	(EG)	0.4	5	10-19 cm		itt	HHHH		bok
	Other (O	G)	4		Other	(OG)	A	7	5-9 cm		tit	HHH	HE HAT HA	1111
			l				0.		<pre>*Tree rege <5cm</pre>	neration	V			
		1		Total high cover	threat	weed	0		⁵ Length of	fallen logs	HA	HH	10	>
	~								⁶ Hollow-be trees	aring	Tiq			
Vegetation in function cont.	ntegrîty - (five 1m²) pl	ots)	7Litter co	over (%)		Bare gro	und cover (%)	Cryptogam	cover (%))	Rock c	over (%)	
Subplot scor	res		80 95	5 90 80	85	KO	05	10	00	00	0	50	10 1	0
Average of 5	subplots	5		86			6			\bigcirc			6	

These attributes require consideration of site observations and may be completed after field work

•

Vegetation class	⁸ Large tree benchmark siz	e	20/ 30/ 5	0/ 80 DB	н	Confidence	H/ M/ L
Plant community type (PCT)				EEC	Tučk	Confidence	H/ M/ L

En prography and site leatures that may help in determining PCT and management zone (optional) or for BioNet systematic flora survey purposes

Morphological		Landforr	n	Landform pattern	Microrelief
Lithology		Soil surfater	ace	Soil colour	Soil depth
Slope		Aspect		Site drainage	Distance to nearest water type
Disturbance	Severity	Age code	Brief site de	scription or other notes	
Clearing (inc. logging)	0		Kanna	- cont	



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17

floristics plot:	Survey Name	Plot identifier	Recorders
04 12 24	Cooma Rd	Cfic2	Bo. D. Elise. N

GF code	Species name Full species name, or a unique means of identifying separate taxa within a survey is mandatory. Data from here will be used to assign growth form richness and cover.	N, HTW or non- HTW	² Foliage cover	Abund- ance	Voucher
TG	Euclustus a stration mellid on	N	35	38	
SG	Europe of allonger	N	20	15	
56	De lla marial	N	5	15	
EG	4 Chelies the cieber	N	0.5	20	
FC.	Envolenio hederaies	N	0.5	20	
66	Rutilopena Sp.	N	2	100	
SG	Il abertia ablistatio	r	<i>O.</i> 1	6	
002	« Angeno Dendula	N	0.1	2	
66	I anardra Cilitans	N	1	30	
(20)	10 Lepitossema loterale	N	1.0	6	
SG	Leuropogon Eletchen	N	0.1	3	
SG	2 Puttenese mirophyla	N	0.5	6	
66	1) Ocheloune coints	R	l	20	
GG	14 Copens ss.	N	0.1	6	
FG	Labelis servers	N	0.(3	
GG	Mindeand stipailes	N	1	20	
GG	Entoplio struta	N	0.5	10	
GG	18 Rytroopenno pallido	N	0.1	6	
F(-	1º Waldenbergis botton fonos	N,	0,1	3	
66	20 Austrostipo siabro	N	I	20	
	21				
	22				
	23				
	24				
	25				
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	35				

a more copies or this page to allow for higher species counts at a plot. All vascular plant species in a plot need to be recorded



7

5 m, 25 % C 10 X 10 m Table the top 5 dominant native species within each GE group. Abundance. Count 1, 2, 3 , when \$10, estimate when 10, 20, 30 - 100, 200, 300 - 1000, 2000, 3000 - (as integer values).

² Foliage cover 0.1.0.2.0.3 1.2.3.4.5.10.15.20.25. 100%, Note: 0.1% cover represents an area of approximately 63×63 cm or a circle about 71 cm across. 0.5% cover represents an area of approximately 1.4×1.4 m, and $1\% \approx 2.0 \times 2.0$ m, $5\% \approx 4 \times 5$ m, $25\% = 10 \times 10$ m. Note the top 3 dominant native species within each GE group.

GF Code use growth form definitions in BAM 2020 Appendix F (TG Tree, SG shrub, GG grass, FG forb, EG, tom, OG other, N, oative, HTW, high threat weed


		Number	s 1- 8 on this page	correlate with	the numb	ers and explanatory notes	on page 3		CHC3
Site sheet # 1 of Date		3 12 24	Survey Name	600	na Rd	Plot Identifier		CRAZ	
Recorders		EN	BD		IBRA region		Veg	zone ID	/
Datum Co-ordinate system		Projected or geographic	MGA Zon	ie	¹ X coordinates	1	Y coordinate	s	
Location desc	ription		Descriptive not	es to locate s	ite without	grid reference			
Plot dimensions		composition unction (100): 20 m x 20 r	20 m x 20 m from 0m line		Magnetic		oto #	

Datum: AGD66, WGS84, GDA94, GDA2020 or Other (specify), MGA Zone (for Projected coordinate, system only): 56 (Coastal NSW), 55 (Central NSW) or 54 (Western NSW), X/Y coordinate: Long/Lat (for Projected coordinate, system), Easting/Northing (for geographic coordinate, system)

Vegetation integrity

Compositio	n (400 m ² plot)		Struct	ure (400	m ² plot)		Func	tion (100	0 m ² pl	ot)			
		Sum value	S		in piery	Sum values (%) (may sum to >100%)	³ Treclass	e stem siz (DBH)	e	lf o mo i.e be co	data are to be ore appropriat e. to generate l enchmarks, ste	used as e local data local ems must be	
Total count of native	Trees (TG)	3	Sum o	f Tree	s (TG)	47	80 +	cm			Count		
plant species (richness) in each	Shrubs (SG)	7	cover of	Shru	bs (SG)	6.9	50-79) cm		C(8 ≥5	Count (best practice)/tick 8 large tregenchmark st ≥50 cm. count		
growth form group (not	Grasses (GG	» 4	specie by growth	s Gras	ses (GG)	5.7	30-49	cm		FM/nt (best practice)/ ange tree benchmar a 30 cm count		ctice)/tick li chmark size	
individual plants within each	Forbs (FG)	VE	7 form group	Forb	s (FG)	3.3	20-29) cm		4	t HH11	otice stok II onmark size	
growth form)	Ferns (EG)	2		Ferns	s (EG)	0.2	10-19	10-19 cm		HT NI/			
	Other (OG)	0		Othe	r (OG)		5-9 c	m		18-1	HTT it	ctice //tick	
		0				0	⁴ Tree <5cm	regenera	tion	L	/		
			Total h cover	igh threat	weed	Ø	⁵ Leng	th of falle	n logs	HI	HATHY	18	
		-					⁶ Hollo trees	ow-bearin	g		X	•	
Vegetation in function cont.	(five 1m ²) plots)	⁷ Litter	cover (%)		Bare gro	und cover (%)	Crypt	ogam cov	/er (%)		Rock cover	r (%)	
Subplot scor	es	95 -	75657	080	0 15	20 15 5	5	15	0		45	10512	
Average of 5	subplots		77		11			1.6		6.8		8	
hese artribules	s require consi	deration o	í site observa	ilions and	i may be co	mpleted after field	work.						
Vegetation c	lass			⁸ La	arge tree b	enchmark size	20/ 30/	50/ 80 DE	вн	C	Confidence	H/ M/ L	
Plant commu	inity type (PC	T)						EEC	Tick	C	Confidence	H/ M/ L	
Momboles:	ind sile feature	s that may	help in dete	mining P	CT and ma	inagement zone (o	ptional) e	ir for BioN	let syst	omat	ic flora survey	purposes	
type	1		Landforr	n		Landform			Mi	crore	elief		
Lithology			Soil surfa	ace		Soil colour			Sc	il de	pth		
Slope			Aspect			Site drainage	1		Di	stand	e to t water type		
Disturbance Clearing (inc.	levereday	Severity code	Age code	Brief	site descrip	otion or other notes	3						
Cultivation (in	ingging)	0		Step	p, rode	Chi							
Stil erreiten	a pasiule)	0				1 1							

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 Soli erosion
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 Firewood / CWD removal
 C

 Grazing (id native/stock)
 C

 Fire damage
 O

 Storm damage
 I

 Weediness
 I

 Other
 I

Kagaroo Scat

Upper stratum height Emergent height Lower stratum ht Middle stratum ht Bt Md Тр Md Bt Тр Md Тр Md BIL 1p Bt

Seventy O=no sydence 1 light 2 moderate a strong Age Pracent (- syrar NE and recent (Etdyes) a) ald (Etdyes)

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o m2 floristics plot:	Survey Name	Plot identifier	Recorders
te 03 12 24	Froma Rd	CHC3	R. A FLID N

GF Code	Species name Full species name, or a unique means of identifying separate taxa within a survey is mandatory. Data from here will be used to assign growth form richness and cover.	N, HTW or non- HTW	² Foliage cover	Abund- ance	Voucher
TG	Eurolystus marronguha	N	15	L	
TG	Eudystus rossi l	N	30	19	
FG	Stypendo glano.	N	1	6	
SG	Vultener minostylla.	N	3	50	

Pipelahne 2 minortha 66 5 40 N SG 0.5 N FG redennea 200danis, O. N 30 5 56 д, tions N morom, ~ hederactae 3000ena 56 encopogon Elethen jubs Elethen N epissemo beterole Veronio pertolisto Rytibospemo sp-0.5 N 0 FG 0.5 N 10 66 56 V 0. Obsthammy thypsioides Hypothean robiting N 2 10 Hypochean D. E Wahlenbergia FG gloriora N 0. altiques **EG** Chelienthe, 0. 50 N EG Ð, Adiantino 2 N SG 10 Puttener FG 20 Dionella 2) Puttener sp (photo)? 2) Vionella (ongitalio procumbers N 0.1 RI 2:2

				~ 0	
FG	21 Einadio mitan	N	0.1	6	
FG	26 morapos tennoides	N	0.1	(0)	
56	Pimelia (intolia (abouta)	N	0.1	3	
EG	24 Entologia struta	N	0.1	6	
TG	2 Eurolyptus melliodena	N	2	2	
	26				
	27				
	28				
	29				
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	Declarge erected of the opporte allow for high				L

of this page to allow for higher species counts at a plot. All vascular plant species in a plot need to be received

GF Code See grown form dolimitions in BAM 2020 Appendix F (TG Tree, SG shrub, GG grass, FG lorb, Loc Jern, OG ether, N. Dawe, HTW, high threat weed

2 Foliage cover 0.1.0.2.0.3. 1.2.3.4.5.10.15.20.25. 100%, Note 0.15 gave topicsonic at approximately 63 x 63 cm or a circle about 71 cm across 0.5% cover represents in ancircle approximately 1.1 x 1.4 m and 1.5 2.0 x 2.0 m 5% - 4 x 5 m. 25% = 10 x 10 m. Note the top 3 dominant patro species within each OF group

Abundance: Count 1, 2, 3 ..., when \$10, estimate when \$10, 20, 30, 100, 200, 300, 2000, 3000 ... (as integer values).





Site sheet #	1 of	Date	4 12 24	Survey Name	Coona	na Rd		ot Identifier	CH
Recorders		EN	BO		IBRA region		Ve	eg zone ID	
Datum	Co-or syste	dinate m	Projected or geographic	MGA Zone		¹ X coordinates		¹ Y coordin	nates
ocation descr	iption		Descriptive note	es to locate site	e without gr	id reference			
Plot dimensions For composition & structure (400m2): 20 m x 20 For function (1000m2): 20 m x 50 m					Orio from	entation of midline m 0m line	Mag	Inetic	Photo #

Vegetation integrity

Total count of native plant species (richness) in each growth form group (not individual plants within each growth form)		Sum				O	2-		and the second second second		the second s	and the second state of th
Total count of native plant species (richness) in each growth form group (not individual plants within each growth form)						Sum values (%) (may sum to >100%)	class (stem siz DBH)	e	lf c mo i.e be co	data are to be ore appropriate to generate la nchmarks, ste unted	used as e local data ocal ems must be
plant species (richness) in each growth form group (not individual plants within each growth form)	Trees (TG)	ł	Sum of	Trees	s (TG)	40	80 + cm		X	unt		
growth form group (not individual plants within each growth form)	Shrubs (SG)	10	toliage cover of native	Shrub	os (SG)	16.3	50-79	50-79 cm 30-49 cm		Count (best practice)/tick		
individual plants within each growth form)	Grasses (GG)	4	species by growth	Grass	ses (GG)	4.2	30-49			Ħ	rge tree bend	tice;/ticklf chmark_size
growth form)	Forbs (FG)	8	form group	Forbs (FG)		2.7	20-29	cm		Ħt	argetree benc	tice //tick. If chmark size
	Ferns (EG)	2		Ferns	(EG)	0.2	10-19	cm		M	unt (best prac	tice)/tick
	Other (OG)			Other	(OG)		5-9 cm			100	unt (best prac	tice tick
3		3				0.3	⁴ Tree r <5cm	egenera	tion	Lig	/	
			Total hig cover	h threat	weed	Ø,	⁵ Lengt	h of falle	n logs	HATH	HT HITHH	48
							⁶ Hollov trees	v-bearing	9	V	K	
Vegetation int	five 1m ²) plots)	⁷ Litter co	over (%)		Bare grou	Ind cover (%)	Crypto	gam cov	er (%)		Rock cover	(%)
Subplot score	s	8595908		85	60	055	\$1	3111		0	1055	ig 5
verage of 5 s	subplots	8	88		2		1		6	7		10 5
ese attributes	require consid	eration of s	ile observati	ons and	may be cor	npleted after field v	vork.				(
egetation cla	ass			⁸ La	rge tree be	enchmark size	20/ 30/ 5	0/ 80 DE	вн	C	onfidence	H/ M/ L
Plant commu	nity type (PCT)						EEC	Fick	C	onfidence	H/ M/ L
Acrobological	nd site features	that may h	elp in detern	ining P	CT and mar	nagement zone (op	tional) or	for BioN	et syste	emati	c flora survey	ourposes
ype			Landform element			Landform pattern			Mi	crore	lief	
Ithology			Soil surfact texture	e		Soil colour			So	oil dep	oth	
Slope			Aspect			Site drainage			Dis	stanc	e to	
Disturbance		Severity code	Age code	Brief	site descript	tion or other notes			ne	arest	water type	
Cleaning (inc. I	logging)			<i>m</i> .		alla H	Cec					
Soil eresion	au ai			110	FING MA	Shall Print	-)					



X-SI

m2 floristics plot:	Survey Name	Plot identifier	Recorders
te 04 12 24	Compa Rd	CHC4	Bp. D. Flise N

GF code	Species name Full species name, or a unique means of identifying separate taxa within a survey is mandatory. Data from here will be used to assign growth form richness and cover.	N, HTW or non- HTW	² Foliage cover	Abund- ance	Voucher
TG	Eucolytus moroninha	N	40	12	
F6	Stellatio oungery	N	2	50	
66	1 omandra FillEom	N	2	50	
SG	11. Ebertia abtusitatio	N	1	P [2	

Clyine dankesting Osothammes thysicites Clyine takoins 0C N Ð. U SG N D 20 0.1 OG N 10 Lepibosperma loterale 0. 66 N GG Rytitopenna Sp. V 2 100 Toldin avenue E 0.1 20 Ø 76 56 Sp. 0.1 jugo 20 N check) Melihas formate 0.1 N spours 3 entainin enthin 6 20 0.1 * SG Styphelts N abscenders 2 FG moniella 0.1 S 20 So. 66 56 spens sp. N 0.1 20 empenn! N emopogon (sober as Gtas) proumbas pinosa cureata SG SG FG uleksea N 0.5 Bursonia Vittabenia N 0.1 N 0,1 20 SG EG sones Э N mozo Elobellitolin colonin N O FG 20,1 lun gausinous N 0 FG ananons 0. N thoops eroann -£ 0 FG Denis N Servieroe 0. 20 FG gloriosa N д EG 56 56 N reben 0.1 0 N coina 2 bux italis nois vidareal N 0.5 Handenbergig N D.1 Print reore sopies of this page to allow for higher species counts at a plot. All vascular plant species in a plot need to be received

GF Code loss growth form definitions in BAM 2020 Appendix F (TG Tree, SG shrub, GG grass, FG forb, CG, ferril OG ather - N. alam & HTW, high threat weed

² Foliage cover: 0.1.0.2.5.3 1.2.3.4.5.10.15.20.25. 100% Note: 0.15. reversents an activit appresentation oppresentation oppresentation oppresentation. 63 cm or a circle about 71 cm across -0.6% covor represents an area of approximately 1.4 x 1.4 m and 1.5 × 1.0 x 1.0 m. Such 4.5 5 m, 25% = 10 x 10 m. Note the top 3 dominant nativo species within each GL quoup

Abundance Count 1, 2, 3 , when \$10, estimate when \$10, 20, 30 , 100, 200, 300, 3000, 3000, (as integer values)





RSLR

		. N	lumbers 1	- 8 on this pa	ige corre	late with	the num	bers and ex	planator	y notes o	on page	e 3	- Constant Provi	1	0
Site sheet #	1 of	D	ate	4 12 2	4 Su Na	rvey me	(ac	mal	RS		F	Plot Ide	entifier	СЦ	RI
Recorders		EA	IBD)			IBRA region				•	/eg zo	ne ID		
Datum		Co-ordina system	ate	Projected or geographic	M	GA Zone	•	¹ X co	ordinate	S		1Y	coordinat	es	
Location des	criptio	n		Descriptive	notes to	locate sit	e withou	it grid refere	ence						
Plot dimensi	ons	For comp For functi	osition & s on (1000n	structure (400 n2): 20 m x 5()m2): 20 0 m	m x 20 m		Orientation from 0m lin	n of midl ne	ine	Ma	ignetic	Ph	oto #	
atum AGD66 SW or 54 (We	WGS estern M	84. GDA9 NSW) X/Y	4, GDA20 Coordina	20 or Other (s te: Long/Lat (specify). for Proje	MGA Zor Incled coor	ne (for P rdinate	rojected co system), Ea	ordinate sting/Nor	system thing (fo	only) or geog	56 (Co: iraphic	astal NSW coordinate), 55 (Ce e. system	entral 1)
Com	oosilipr	and struk	dure sum	values may t	e compl	Vegetat	ion inte	grity a data ínto á	wailable	tools. It	is not r	aquire	1 while in I	ne field	
Composition	(400 n	n ² plot)		Structure	e (400 m	² plot)			Funct	tion (100	00 m ² p	olot)			
			Sum values				Sum v (may = >100%	values (%) sum to %)	³ Tree class	stem si (DBH)	ze	lf o mo i.e be co	data are to pre approp to genera nchmarks unted	be used riate local ate local stems n	l as al data nust b
Total count of native	Trees	(TG)	1	Sum of	Trees	(TG)	Ć).1	80 + c	m		3	K		
plant species (richness) in each	Shrubs (SG)		Ø	foliage cover of native	Shrubs	s (SG)		0	50-79	cm			unt (best) rge tree t om cour	practice) penchma ht	/tick rk size
growth form group (not	Grass	ses (GG)	3	species by growth	Grasse	Grasses (GG)		45	30-49	cm		Count (best practice)/tick. Yrge tree benchmark siz			tick. rk size
individual plants within each	Forbs	s (FG)	2	form group	Forbs (FG)		Ć	7.1	20-29 cm 10-19 cm			Count (best practice)/ ≥ 20 cm count Count (best practice)/		tick. rk size	
growth form)	Ferns	s (EG)	0		Ferns	Ferns (EG)		д						practice)/	tick
	Othe	r (OG)	0		Other	(OG)	O		5-9 cm ⁴ Tree <5cm	n regenera	ation	Kount (best practice)/tic		itick	
				Total high cover	h threat v	veed	5	.5	⁵ Lengt	th of falle	en logs	X	ly space	Total	n
									⁶ Hollow trees	w-bearin	g	X	K		
Vegetation in function cont	ntegrit	y - n²) plots)	⁷ Litter c	over (%)		Bare gro	ound cov	er (%)	Crypto	gam co	ver (%))	Rock co	ver (%)	
Subplot sco	res		50 80	56075	575	60	5	385	0	00	\mathcal{O}	0	BS	5 5	513
Average of 5	5 subp	lots		69			3			C	D			9	
hese attribute	es requ	ire conside	eration of	sile observali	ons and	may be co	ompleted	after field	vork.			1		1	
Vegetation of	lass				⁸ Lar	ge tree b	enchma	ark size	20/ 30/ 5	60/ 80 DI	ЗH	C	onfidence	H/ I	M/ L
Plant comm	unity t	ype (PCT))							EEC	Tick	C	onfidence	H/	M/ L

Physiography and site features that may help in determining PCT and management zone (optional) or for BioNet systematic flora survey purposes

Morphological type		Landforr	m	Landform pattern	Microrelief
Lithology		Soil surf texture	face	Soil colour	Soil depth
Slope	Aspect			Site drainage	Distance to nearest water type
Disturbance	Severity code	Age code	Brief site des	cription or other notes	
Clearing (inc. logging)		Plant qu	erds and broken wood	den gabos apont	
Cultivation (inc. pasture)	Cultivation (inc. pasture)			of unconsol 1	the line
the state of the second st		DIL OLACA	OF SHEESSALL IN	POLY CI	



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loristics plot:	Survey Name	Plot identifier	Recorders
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Code	Species name Full species name, or a unique means of identifying separate taxa within a survey is mandatory. Data from here will be used to assign growth form richness and cover.	N, HTW or non- HTW	² Foliage cover	Abund- ance	Voucher
66	Bathiochloo se.	N	40	1000	
	Corthanus Conjotus	HTE	2	100	
	mediago lupilino	Б	2.5	20	
- A (Hyperilin perfortim	HTE	2.5	20	

66 Rytizospenno Lotasale sp. - Petrohogia dabio - Aveno sotivo - Sysightun officinale - Medolis carolian - Echim plantagenium - Mombrilin vielgare FG Oxalis peranam - Tritolin avense - Echim plantagenium CC E E 100 90 0.1 0.1 10 0,5 D 10 E 0.5 20 0.1 6 WATE -0.1 3 F N D. P 0.1 20 - Euphorlaio serpers - Conchins Janbertons 66 Austrostipo seabra F6 Vettoderio cureato - Bromus Filsers E 50 0.5 HITE 3 100 2 N 50 N 0. ((0) F 0.1 10 - Eurolyptus Stakley - 20 Piontogo Concealato 0.1 N 5 0. 20

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² Foliage cover: 0.1, 0.2, 0.3, \pm , 1, 2, 3, 4, 5, 10, 15, 20, 25, \pm 100%. Note 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m. Note the top 3 dominant native species within each OF group.

Abundance: Count 1, 2, 3 ..., when ≤10, estimate when >10, 20, 30 ... 100, 200, 300 ..., 1000, 2000, 3000 ... (as integer values).



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TG	Filolytus blaklent	N	3	6	
TG	Euclustus melliona	N	3	2	
~	Cathomas Innotes	HTE	1	50	
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-	21 Scrubes Derakens	E.	0.1	3	
FG	22 Geranin Solenden	R	0.1	6	
-	23 Ross rubignoss	HTE	l	2	
SG	24 Acoria bonditalia	N	1	3	
FG	25 Oxalis permons	N	0.1	6	
OG	26 Colyvic Clandestinn	N	0.1	6	
06	27 Cordian varian	N	0.1	в	
-	28 Contourin melitensis	E	0.1	3	
-	29 flypoches radiatica	F	1	50	
2	30 Bronnis rubens	E	0.1	20	
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GF Code: see growth form definitions in BAM 2020 Appendix F (TG Tree, SG shrub, GG grass, FG forb, EG, forn, OG other: N. native, HTW: high threat weed

² Foliage cover: 0.1, 0.2, 0.3, \dots , 1, 2, 3, 4, 5, 10, 15, 20, 25, \dots , 100%; Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m. Note the top 3 dominant native species within each GF group.

Abundance: Count 1, 2, 3 ..., when ≤10, estimate when >10, 20, 30 ... 100, 200, 300 ..., 1000, 2000, 3000 ... (as integer values).

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These attributes require consideration of site observations and may be completed after field work.

Vegetation class	⁸ Large tree benchmark size	20/ 30/ 50/ 80 DBH		н	Confidence	H/ M/ L
Plant community type (PCT)			EEC	Tick	Confidence	H/ M/ L

Physiography and site features that may help in determining PCT and management zone (optional) or for BioNet systematic flora survey purposes

Morphological type		Landfor	m	Landform pattern	Microrelief
Lithology		Soil surf	face	Soil colour	Soil depth
Slope	Aspect			Site drainage	Distance to nearest water type
Disturbance code		Age code	Brief site de	escription or other notes	near ear trater type
Clearing (inc. logging)	0		Venera	5 Scot	
Cultivation (inc. pasture)	0		nargeor		

Soil erotion Firewood / CWD removal Grazing (id native/stock) Fire damage Storm damage Weediness Other

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Wombat Scat Plant guards present Some rubbish present

P 2 Emergent height Upper stratum height Middle stratum ht Lower stratum ht Tp Bt Md Md Tp BI Тр Md Bt Тр Md 111 111 111 111 13.1 111 m. -613 111 m Seventy 0=no evidence, 1=light, 2=moderate, 3 50200 Age Revecent (3yrs), NEtabot recent (3-10yrs), O=old (>10yrs),



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T6	Eurolysta unitato	N	3	3	••
56	Acorio 11 meatrin	N	3	6	
TG	Acous pyrnantho	N	10	10	
SG	Acoria Prubida	N	60	40	
	A - / /				

56 Acoria unum 56 Acorio vestito TG Allocomonin vesticillato 66 Mincelano stipordes N 2 2 N N 20 2 N 20 FG Styponka glama FG Einobio Rutan 2 N N 20 FG Rymex brownig N 0-56 Putlenes minspylls GG Autrostipo Sigmulato - Repus Entresis ago N 10 N 30 HTE 0. - AB 6 Schann nignim 0 05 GG Legisspermo 0.5 laterale N (0) Oralis' penanas FG 0.1 N 10 2 Ozathomus Elysioides 56 ٥. N 3 EG Chelienthes fie GG 20 Rytidespermo gp. Sieben N 0. N 0.5 20 ~1 A -

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FG	22 Salann cinerium	N	ð. í	6	
06	2 Glynne clandestins	N	0.1	6	
56	Same pertading (strats) 2 "elulus	N	0.1	3	
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GF Code see growth form definitions in BAM 2020 Appendix F (TG Tree, SG shrub, GG grass, EG forb, EG form, OG other, N, native, HTW, high threat weed

² Foliage cover: 0.1, 0.2, 0.3, 1.2, 3, 4, 5, 10, 15, 20, 25, 100%. Note: 0.1% covor represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m. Note the top 3 dominant native species within each GE group.

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Making Sustainability Happen



APPENDIX C – 2024 HISTORIC HERITAGE MONITORING REPORT

18 December 2024

Dozie Egeonu Environment Manager NSW/ACT Holcim (Australia) Suite 201, Level 2, 7-9 Irvine Place Bella Vista NSW 2153



Dozie.Egeonu@holcim.com cc: David.Manning@holcim.com Kurt.Bridges@holcim.com

Dear Dozie,

Re: 240866 - Cooma Road Quarry Historic Heritage Monitoring Report

As part of the requirements under operational management plans for the Holcim operated quarry on Cooma Road, I attended the site to conduct a photographic recording of the Moses Morley Lime Kiln. The following is a summary of the results and assessment of the findings. This simple report can be used to provide evidence for meeting the requirements under the Heritage Management Plan.

If you have any questions, please contact me on (02) 6280 5053. I would be pleased to discuss any aspect of this project with you further.

Yours sincerely,

Matthew Barles

Matthew Barber Technical Director- Heritage

Heritage Inspection of Morley Moses Kiln

Introduction and Background Context

The Cooma Road Quarry was provided with development consent by the NSW Department of Planning and Infrastructure (DPI) to continue operations in 2013 (SSD – 5109), with subsequent modifications to the consent conditions in 2016 and 2019. In 2012, and Environmental Impact Statement (EIS) was completed for the project (Umwelt 2012). This included separate reports details assessments of Aboriginal and non-Aboriginal (Historic) heritage (Umwelt 2012a, 2012b).

Umwelt's report (2012b) identified and confirmed that the Moses Morley kiln site was listed on the Queanbeyan Local Environmental Plan (LEP) 2011. The site had been subject to previous identification and recording in 1993 and Umwelt used the basis of that information in their report and assessment. The history and significance of the kiln was provided in the Umwelt report and in summary includes:

- Moses Morley likely built the kiln around 1876 and operated it between the years 1876 to 1895.
- It was likely used to supply lime to the local Queanbeyan area during an era of demand and expansion in the town.
- The kiln is a common 'D' type of kiln but with associated outbuildings, the purpose of which is not known.
- The kiln is well preserved and demonstrates a high level of technical achievement in a rural setting.
- It is considered to have high local significance and contains archaeological and research value (Umwelt 2012b:5.1).

As part of the conditions of consent (CoC), Condition 21 requires that a Heritage Management plan be prepared to, amongst other things;

- Describe the measures implemented for
 - Monitoring, maintaining and protecting the Moses Morley Kiln site;

The Heritage Management Plan was drafted in 2014 and approved by NSW Department of Planning Industry and Environment (DPIE) in 2019 (Holcim 2019). The plan outlines how the Moses Morley Kiln site (kiln site) will be managed and provides a statement of commitments to mange and protect the site. Some of the key management actions and commitments in relation to the Moses Morley kiln are summarised below for context.

Commitment	Statement of action	Relevance to current visit
8.	An exclusion zone of 20m will be established around the kiln site and associate buildings during construction of the eastern dam.	N/A dam wall has been constructed.
9.	The existing fence around the kiln will be maintained and an opportunity to extend the fence outside the exclusion zone will be investigated.	Unknown
10.	Vegetation within the fenced area will be managed to limit adverse impacts on the kiln site.	Relevant See below for comments
11.	Holcim will inspect the physical condition of the kiln site on a 6-monthly basis and compare conditions with photographs contained in the EIS. The results will be	Unknown See below for comments

Commitment	Statement of action	Relevance to current visit
	reported in the site's annual review.	
12.	Prior to any blasting or construction activities, photographs/archival recording of the kiln site will be undertaken in accordance with the Heritage Branch guidelines <i>Photographic Recording of Heritage Items</i> <i>Using Film or Digital Capture (2006)</i>	Unknown
13.	Holcim will make good/repair and damage to the kiln site which occurs due to Cooma Road quarry operations. Repairs will be undertaken in a suitable manner using appropriate fabric but appropriately skilled heritage professional.	NA See below for comments

Site Visit Results

On 12 December 2024, Matthew Barber, Technical Director- Heritage of NGH Pty LTD visited the kiln site to take photographs of the kiln site. In addition, some general notes were made about the current preservation status of the site. The methodology for the inspection included:

- 1. Review of existing documentation of the kiln including requirements under the HMP.
- 2. Comparison of previous photographs from 1993 and 2012 to the current position and condition of the kiln and associate buildings.
- 3. Photographs of the same elevations and directions of previous photos were taken for comparative purposes.
- 4. Additional photographs were also taken to provide a more comprehensive array of conditional photos at different direction and elevation to provide a more comprehensive record for future site visits. It was noted that the 1993 and 2012 photos did not have a photo scale so one was used for the current visit as a more accurate indicator of condition changes.

Below is a sequence of comparative photos form the 1993, 2012 and 2024 visits showing the same angles. Comments about the status and condition of each structure is also provided.

Overall site complex





The overall view of the site complex comprising the three structures is noted to be relatively intact and similar to the original (1993) and most recent (2012) photos available. The fence is intact, apart from a wombat burrow underneath a portion at the southern end of the site.

Stone Kiln







Plate 5. 2024 photo of kiln structure view west

The stone kiln appears to be in a similar state of condition to the previous photos taken in 1993 and 2012. Possibly the most fragile element- the large log across the top is sound and has not decayed or collapsed, although in time this is likely to occur. The photos reveal largely similar structure for the two front walls, as well as the wall above the opening. There has been some weathered eroding of the clay and mud mortar between some of the stones but this has not led to any collapse that was observable.

There is a bush rose growing from the stone rubble on the north side of the structure (Plate 5) and one also is present on the southern side of the wall, along with a Eucalypt sapling (Plate 3). These should be poisoned and if possible, removed by hand to prevent spreading and root damage to the structure.

Main building structure







Plate 10. 2012 photo of main stone structure view north east (Umwelt 2012b plate 3.9)



Plate 11. 2024 photo of main stone structure view north east

What is termed the main structure in the Umwelt reports is the middle structure. It is the larger of the other stone buildings adjacent to the kiln.

Photo comparisons show that this is essentially the same a when first photographed and again in 2012. The structure has two gaps (one may be a possible entrance) in the walls but these appear to be the same with

no further degradation. The corner wall photo (Plate 8) shows similar height and structure with no discernible change. The photos form above also show no change in the height or profile of the structure.

However, the structure is threatened by blackberry growing over the south western portion of the structure, extending onto the southern wall. There are also weeds growing within the structure and a Eucalypt sapling is noted near the north eastern corner (Plate 11). All of these threaten the stability and integrity of the structure and must be removed.

Second structure







Plate 17. 1993 photo of second stone structure view east (Umwelt 2012b plate 3.13) (or more correctly east north east)



Plate 18. 2012 photo of second stone structure view east (Umwelt 2012b plate 3.14) (or more correctly east north east)



The second structure, as termed by Umwelt is the smaller, most southerly structure of the complex. The condition of this structure also appears to be the same as the 1993 and 2012 photos. There are no discernible changes in the height or condition of the walls.

This structure is however affected by blackberry and other grassy weeds that are beginning to overgrow the structure (Plate 19). These must be carefully removed to prevent degradation of the structure.

Additional photos

The photos provided in the Umwelt report (2012b) are limited to generally replicating those form the 1993 recording. In order to more effectively manage and identify any changes to the structures, some additional photos have been provided in this report below to assist in future comparative and condition checks. Photos have also been provided as a digital file to Holcim for their records and to assist in management of the place.





Conclusions and Recommendations

The inspection carried out in December 2024 showed that the three structures forming part of the Moses Morley Lime Kiln complex were still intact and there had been no discernible changes since the last photographs were taken in 2012. The stone work appeared to be relatively stable and none of the wall had collapsed further and no displaced stones were noticed. However, some of the mud and clay mortar that binds some of the stone work, notably in the walls above the kiln, were beginning to erode after being exposed to the elements. In time this will likely lead to some of the wall collapsing, although it is difficult to say how long this may take.

The fence surrounding the complex is intact apart form a wombat burrow under the southern fence but no wombat burrowing was evident within the fenced area or into the structures themselves.

The major threat identified to the structures is the presence of weeds, most notably blackberry and small Eucalypt saplings that have started growing adjacent to the structures. These must be removed as a priority before they grow to a stage where eradication is too difficult.

The location of the complex on private property and its generally hidden location has kept the site form visitation and there is no evidence of visitation, or graffiti.

Overall the complex appears sound and intact.

The following recommendations are provided for action to manage the identified risks.

- 1. A weed management plan or strategy should be developed as a priority to provide direction on how the manage and remove the weeds and Eucalypts.
- 2. The management plan should outline the most effective way for weed removal. This may include initial poisoning or cutting and removal by hand, with subsequent poisoning of stumps and roots.
- 3. Weed removal must avoid digging adjacent to the structures unless absolutely necessary.
- 4. The fence on the southern end of the complex should be ended to prevent further wombat entry, as much as possible.
- 5. Site inspections should be undertaken every six months after the weeds have been removed to ensure none grow back. After a period of two years, if weeds are confirmed to be eradicated, inspections for weeds can occur annually.
- 6. The site condition inspections should be maintained at least annually, but with detailed inspections and photographic records taken at least every five years, or in the event that there is a collapse or notable damage or change to the structures.
- 7. Ongoing monitoring of the structures should continue. Further digital photographs have been provided to Holcim to enable the next visit a broader range of comparative angles and elevations.

References

Umwelt 2012a Cooma Road Quarry Continued Operations Project: Environmental Impact Statement. Report to Holcim Australia.

Umwelt 2012b Cooma Road Quarry Continued Operations Project: Historic Heritage Assessment. Report to Holcim Australia.

Holcim Australia 2019 Cooma Road Quarry Heritage Management Plan.