

TEVEN QUARRY

2024 Annual Review



Site Details

Organisation	Holcim (Australia) Pty Ltd
Project	Teven Quarry
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Author	IEMA
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I, David Manning, certify that this audit report is a true and accurate record of the compliance status of the TEVEN 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	Matt Kelly
Title of authorised reporting officer	Quarry Manager
Signature of authorised reporting officer	
Document Date	04/01/2025



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1 Statement of Compliance

The Statement of Compliance for the Teven 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 6422 for 2024.

No compliance action was undertaken during the reporting period.

Table 1: Statement of Compliance

Were all conditions of the relevant approval(s) complied with?			
SSD 6422	No		
EPL 3293	No		

Table 2: Compliance Status Key

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



Table 3: 2024 Summary of Non-Compliances

Relevant Approval	Condition	Condition Description		Complianc e Status	Comments	Section Addressed in Annual Review		
SSD 6422	Schedule 3 Condition 4	Noise Impact Assessment The Applicant shall ensure does not exceed the criteria land. Table 2: Noise criteria dB(A) Receiver R3, R4, R13, R15, R16, R17, R18, R20 All other residences Noise generated by the de the relevant requirements conditions) of the NSW Inco meteorological conditions of requirements for evaluating However, the noise criteria agreement with the relevant Applicant has advised the agreement. In the event that the studio under the provisions of Sta Complying Development O April 2015, is constructed of that the noise generated by 55 dB(A) Leq (period) whe outbuilding, when it is in us	nt Criteria that the noise genera a in Table 2 at any res dB(A) (Laeq(15 min)) 38 37 in Appendix 4. velopment is to be me and exemptions (inclu lustrial Noise Policy. A under which these criti g compliance with these in Table 2 do not app in landowner to excee Department in writing outbuilding, certified a te Environmental Plan codes) 2008 by Techto on Lot 3 DP 703181, to the development doo in measured external to the table 2 do not app	ted by the developm sidence on privately- dB(A) (Lae(15 min)) 35 35 assured in accordance ding certain meteoro Appendix 5 sets out to eria apply and the se criteria. aly if the Applicant has d the noise criteria, a of the terms of this as Complying Develo nning Policy (Exemp on Building Services he Applicant shall en es not exceed a crite to the façade of the	owned owned ce with blogical the as an and the opment t and on 16 osure prion of	Non- compliance	During the annual return (AEMR) process on 14 March 2025, it was made evident to Holcim that on 7 May 2024 there was a moderate noise exceedance at Teven Quarry on the NM4 noise monitor which recorded an exceedance of the criteria by 6dBA (43 LAeq (15 min) dBA). It was reported to the DPHI and EPA on 14th March 2025 (after being made aware by the AEMR draft report and	Section 6.2
EPL 3293	L4.2 Noise generated at the premises that is measured at each noise monitoring point established under this licence must not exceed the noise levels specified in Column 4 of the table below for that point during the corresponding time periods specified in Column 1 when measured using the corresponding measurement parameters listed in Column 2.		nitoring sing the	Non- compliance	reported within 7 days of being known by Holcim).			



Relevant Approval	Condition	Condition Description			Complianc e Status	Comments	Section Addressed in Annual Review	
		POINT 2 Time period Measureme parameter Day Day-LAeq (1 Evening Evening-LAe (6pm-10pm f Note: Noise sensitive loca hospital, school, childcare homes. A noise sensitive building.	ant I 5 minute) () 4(15 minute) () 4onSun.) ations mean accentre, pla location inc	Measurement frequency Yearly ns buildings used aces of public wor cludes the land wi	Noise level dB(A) 37 35 as a residence, rship and nursing thin 30m of the			
SSD 6422 C	Schedule 3 Condition 11	Air Quality Impact Asset The Applicant shall ensur mitigation measures are e generated by the develop Table 4 at any residence Table 4: Air quality criteria Pollutant Particulate matter < 10 µm (PM ₁₀) Particulate matter < 10 µm (PM ₁₀) Total suspended particulates (TSP) ^c Deposited dust	ssment Cr e that all re employed s ment do no on privately Averaging Period Annual 24 hour Annual Annual	riteria easonable and fea so that particulate is ot cause exceedar y-owned land. c a,d b 2 g/m²/month	sible avoidance and matter emissions nees of the criteria in riterion 30 µg/m ³ 50 µg/m ³ 90 µg/m ³ a.d 4 g/m ² /month	Non- complianceHolcim was informed on 10 January 2025 that the site samples were damaged in transit by the laboratory courier (DDG1, DDG2 and DDG3 sampled on site on 12 December 2024). Holcim reported to DPHI and the EPA after being made aware by the engaged		Section 6.3.3
		 Notes tor Table 4: a. Cumulative impact (ie increase in consources). b. Incremental impact (ie incremental in exceedances of the criteria over the life c. Deposited dust is to be assessed as ins Sampling and Analysis of Ambient Air - d. Excludes extraordinary events such as agreed to by the Secretary. e. "Reasonable and feasible avoidance al conditions 12 and 13 to develop and in risks of exceedance of the criteria. 	centrations due to crease in concentr of the developmen oluble solids as de Determination of P bushfires, prescribe d mitigation measu plement a air qual	the development plus backgro rations due to the developme tt). Fined by Standards Australia, A Particulate Matter - Deposited M ed burning, dust storms, sea fo ures" includes, but is not limite lity management system that e	und concentrations due to all other nt on its own, with zero allowable S/NZS 3580.10.1:2003: Methods for latter - Gravimetric Method. g, fire incidents, or any other activity d to, the operational requirements in nsures operational responses to the		consultancy Ramboll on 13 January 2025 (within 7-day reporting period). On 14 February 2025 it was reported to Holcim that the PM10 monitor failed and	



Relevant Approval	Condition	Condition Description	Complianc e Status	Comments	Section Addressed in Annual Review
				required repairs (this included two missed reporting days on 4th February and 10th February). It was reported to the DPHI and EPA that the unit had failed and the DPHI followed up with a subsequent site visit (27 February 2024).	



2 Introduction

Holcim (Australia) Pty Ltd (Holcim) operates the Teven Quarry, a hard rock quarry located on Stokers Lane in the Ballina Shire Local Government Area in northern New South Wales (NSW) (refer to **Figure 1**). The site operates under Development Consent (SSD 6422 as modified) approved by the Department on 15 July 2015.

The site also operates in accordance with Environment Protection Licence (EPL) No. 3293 issued by the NSW Environmental Protection Authority (EPA).





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Figure 1: Site Location and Layout (GHD, 2019)



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

Table 4:	Annual	Review	Rec	uirements

Co	ndition	Section addressed in Annual Review
By dev	the end of March each year, the Applicant shall review the environmental per velopment to the satisfaction of the Secretary. This review must:	formance of the
a.	describe the development (including rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year;	Section 4 and 8
b.	 include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against the: relevant statutory requirements, limits, or performance measures/criteria; requirements of any plan or program required under this consent; the monitoring results of previous years; and the relevant predictions in the EIS. 	Section 6 and 7
C.	identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;	Section 1 and 13
d.	identify any trends in the monitoring data over the life of the development;	Section 6 and 7
e.	identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and	Section 6
f.	describe what measures will be implemented over the current calendar year to improve the environmental performance of the development.	Section 14

This Annual Review has also been prepared in accordance with the *Annual Review Guideline: Post-approval Requirements for State Significance Mining Developments* (October 2015). This report documents the environmental performance of the site from 1 January 2024 to 31 December 2024.



2.1 CONTACT DETAILS

The key contact details for the site are outlined below:

Quarry Manager

Matt Kelly Mob: 0429 790 895 Email: <u>matt.kelly@holcim.com</u>

Area Manager Aggregates – NSW North

Chris Hamilton Work: +61 2 6656 8620 Mob: +61 429 790 213 Email: <u>chris.s.hamilton@holcim.com</u>

Environment Manager – NSW

Dozie Egeonu Mob: +61 429 557 493 Email: <u>dozie.egeonu@holcim.com</u>



3 Approvals

The site operates under the approvals listed in Table 5.

Table 5: Approvals for Teven Quarry Operations

Approval	Regulatory Authority
SSD 6422	NSW DPHI
EPL No. 3293	NSW EPA

Holcim holds EPL 3293 which covers its activities at the Teven Quarry. **Table 6** outlines these licensing limits.

Table 6: EPL Fee-Based Activity at the Teven Quarry

Fee Based Activity	Scale (tonnes/T)
Extractive activities	>100,000 – 500,000 T annually extracted or processed



4 **Operations Summary**

4.1 **EXPLORATION**

There was no exploration undertaken within the reporting period.

4.2 LAND PREPARATION

There was no clearing undertaken during the reporting period.

4.3 CONSTRUCTION ACTIVITIES

There were no construction activities during the reporting period.

4.4 QUARRY OPERATIONS

Operational activities undertaken at Teven Quarry during the reporting period included:

- Stripping of topsoil and overburden within the existing approved extraction limit boundary.
- Drill, blast, load, and haul activities; and
- Crushing, screening, and stockpiling of product.

A list of the permissible operating hours under Schedule 3 Condition 1 is outlined below in **Table 7.** All activities took place within the approved operating hours in 2024.

Table 7: Operating Hours

Activity	Permissible Hours	
Extraction operations, processing operations, and	7 am to 6 pm Monday to Friday;	
everburden management	7 am to 4 pm Saturday; and	
overburden management	At no time on Sundays or public holidays.	
Planting	10 am to 3 pm Monday to Friday; and	
Diastilig	At no time on Sundays or public holidays.	
Loading and dispatch, stackhile management, and	7 am to 10 pm Monday to Friday;	
Loading and dispatch, stockpile management, and	7 am to 4 pm Saturdays; and	
	At no time on Sundays or public holidays.	



Table 8 presents the total product distributed from the Quarry during the reporting period, along with data from previous years and a forecast for 2025, compared against the annual Development Consent approval limit.

Year	Product Distributed Total (Tonnes)	Approval Limit (Tonnes)
2018	372,640	
2019	458,679	
2020	292,701	
2021	299,713	500.000
2022	295,018	500,000
2023	292,110	
2024	261,688	
2025 Forecast	284,582	

Table 8: Total Annual Product Distributed

Schedule 2, Condition 18 states that the applicant shall provide quarry production data to Division of Resources and Energy (DRE) and include a copy of this information in the annual review. **Table 9** details the 2023-2024 annual return extractives data provided to the DRE. Note that this data will not align with this annual review due to using the Annual Return reporting period.

Table 9: 2023-2024 Extractive Annual Return data

Product	Description	Quantity ¹ (tonnes)
Over 30 mm-70 mm (Railway Ballast)	Virgin materials - Crushed coarse aggregates	5,828
Over 5 mm-30 mm Concrete Aggregates	Virgin materials - Crushed coarse aggregates	112,552
Over 75 mm (Rock broken)	Virgin materials - Crushed coarse aggregates	1,523
Prepared Road Base & Sub-base & Drainage Filter	Virgin materials - Crushed coarse aggregates	56,201
Fill & Crusher Fines (under 5 mm)	Construction sand	48,013
Manufact Sand	Construction sand	36,447
	Total	260.564

Notes: ¹Quantity has been rounded, mm = millimetres.

4.5 NEXT REPORTING PERIOD

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

- Stripping of topsoil and overburden within the existing approved extraction limit boundary.
- Drill, blast, load, and haul activities; and
- Continuation of crushing, screening, and stockpiling of product.



5 Actions Required from the Previous Annual Review

5.1 ACTIONS FROM THE 2023 ANNUAL REVIEW – DPE ACTIONS

Holcim submitted the 2023 Annual Review to the Major Projects Portal on 25 March 2024. Holcim received feedback from the DPE on 31 July 2024 which is shown in **Table 10**.

DPE Feedback	Holcim Comment	Section addressed in Annual Review		
For future annual reviews, please include the dates, locations, causes, mitigation measures for adverse impacts, and preventive actions for each non-compliance listed in the "Summary of Non- Compliances."	Holcim have amended the Summary of Non-Compliances and included details regarding the mitigation measures and preventative actions of non-compliances in the relevant subsections of Section 6 Environmental Performance.	Table 3 Section 6		
Ensure all future annual reviews contain a summary of any compliance action taken on the project during the reporting period."	No compliance action was undertaken at Teven Quarry during this reporting period.	Section 1		

Table 10: 2023 Annual Review Feedback



5.2 ACTIONS FROM THE 2023 ANNUAL REVIEW – HOLCIM PROPOSED ACTIONS FOR 2024

 Table 11 provides an update on Holcim Proposed Actions for 2024.

Table 11:	Update	on Holcim	Proposed	Actions fo	r 2024
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Improvement	Activities	2024 Actions
Measure		
PM10	Maintain a HVAS monitoring program which meets Development Consent requirements.	Holcim continued to work with an independent consultant to maintain and ensure timely response to rectify any technical issues with the monitors.
Biodiversity	Weed spraying will continue at site during the next reporting period.	10 Ha of weed spraying was conducted during the reporting period.
Rehabilitation	Tubestock planting in the Brushbox forest directly to the east of the quarry is to continue in 2024.	Holcim will continue to assess opportunities for tubestock planting as they arise.
Water sampling	Complete water sampling for the parameters pH, Total Suspended Solids, and Oil and grease.	Surface water quality monitoring was undertaken in line with the <i>Water Management Plan</i> .
Groundwater Assessment	Condition 3, Schedule 19In the event that groundwater in excess of negligible quantities is intersected during extraction activities, the Applicant shall undertake a hydrogeological investigation, in consultation with NOW, to the satisfaction of the Secretary.The investigation must report on groundwater sources, levels, yield, and quality; identify any risks to groundwater users or groundwater dependent ecosystems and propose recommended management measures. The Applicant must implement reasonable and feasible management measures to the satisfaction of the Secretary.Holcim will continue to monitor the quarry void for groundwater quantities remain negligible.	Groundwater monitoring was undertaken in accordance with the <i>Water Management Plan</i> during the reporting period.



6 Environmental Performance

6.1 METEOROLOGICAL MONITORING

This report uses 2024 rainfall and temperature data from the Bureau of Meteorology's Ballina Airport station, approximately 5 kilometres (km) southeast of the site to provide a summary for the period. These meteorological results are presented in **Table 12**.

Month	Total Rainfall (mm)	Minimum Temperature (°C)	Maximum Temperature (°C)
January	290	17.4	34.2
February	190.2	17.6	33.4
March	143.6	16.8	31.4
April	334.4	12.8	28.4
Мау	269.8	10.5	24.8
June	13.2	5.0	26.1
July	133.4	3.5	25.4
August	256.4	5.6	35.0
September	209.0	6.7	29.4
October	97.6	9.9	31.7
November	166.0	14.6	31.5
December	150.6	15.3	34.9
Annual TOTAL	2254.2		•

Table 12: Meteorological Monitoring Results 2024 (Ballina Airport AWS, station 058198)

Annual rainfall experienced at Teven Quarry during the 2024 reporting period was 2254.2 millimetres (mm). This was an increase from the previous 2023 reporting period of 1246.6 mm.



6.2 NOISE

6.2.1 EIS Predictions

The 2014 EIS found that the Project was not predicted to exceed the project specific noise levels at any privately owned residences surrounding the Project Area, with the exception of Receiver 9. Receiver 9 has since been purchased by Holcim.

Road traffic noise levels were predicted to increase at some receivers whilst decreasing at others, with the criteria proposed in the EIS predicted to be met.

6.2.2 Approved Criteria

In accordance with Schedule 3, Condition 5(c) of SSD 6422, the Applicant shall: carry out noise monitoring (at least every 3 months) to determine whether the development is complying with the relevant conditions of this consent.'

Approved noise criteria from the Development Consent are outlined in Table 13.

Table 13: Noise Criteria for Teven Quarry (SSD 6422)

Receiver	Day dB(A) (L _{Aeq(15 min)})	Evening dB(A) (L _{Aeq(15 min)})
R3, R4, R13, R15, R16, R17, R18, R20	38	35
All other residences	37	35

6.2.3 Key Environmental Performance

Quarterly noise monitoring was undertaken 2024 in accordance with the requirements of Schedule 3, Condition 4. Monitoring was completed by Ramboll Australia Pty Ltd (Ramboll) on the following dates:

- Q1 monitoring 10 January 2024,
- Q2 monitoring 6 and 7 May 2024;
- Q3 monitoring 11 and 12 September 2024; and
- Q4 monitoring 9, 10, and 11 December 2024.

The Quarterly noise monitoring results are shown in **Table 14**. Copies of the quarterly noise monitoring reports for 2024 are attached as **Appendix A**.



Table 14: Noise Compliance Assessment for Teven Quarry	
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Assossment	Pocoivor	Monitoring	Quarrying Noise Criteria	Q1		Q2	2	Q3	i	Q4	
Period	No.	Location	LAeq _(15min)	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance	Quarry Noise Contribution (LAeq(15min))	Compliance	Quarry Noise Contribution	Compliance
	R2	NM3	37	<36 ³	\checkmark	<28	\checkmark	<22	\checkmark	<44 ⁸	×
	R3/R4	NM2	38	<42 ²	×	<35	\checkmark	<35	\checkmark	<30	\checkmark
Day	R7	NM1	37	<35 ¹	\checkmark	<39⁵	×	<16	\checkmark	<30	\checkmark
	R10	NM4	37	<28 ⁴	\checkmark	<43 ^{6,7}	×	<36 ⁶	\checkmark	<41 ⁹	×
	R14	NM5	37	<30	\checkmark	<29	\checkmark	<27	\checkmark	<28	\checkmark
	R2	NM3	35	Not operational	\checkmark	Not operational	\checkmark	Not operational	\checkmark	Not operational	\checkmark
	R3/R4	NM2	35	Not operational	\checkmark	Not operational	\checkmark	Not operational	\checkmark	Not operational	\checkmark
Evening	R7	NM1	35	Not operational	\checkmark	Not operational	\checkmark	Not operational	\checkmark	Not operational	\checkmark
	R10	NM4	35	Not operational	\checkmark	Not operational	\checkmark	Not operational	\checkmark	Not operational	\checkmark
	R14	NM5	35	Not operational	\checkmark	Not operational	\checkmark	Not operational	\checkmark	Not operational	\checkmark

Notes:

Values in bold indicate exceedances where quarry noise was audible.

Monday to Saturday; Day 7am to 6pm; Evening 6pm to 10pm; Night 10pm to 7am. On Sundays and Public Holidays, Day 8am to 6pm; Evening 6pm to 10pm; Night 10pm to 8am.

¹ Value estimated based on sound exposure level calculation in **Appendix 1 of 2024 Q1 Noise Monitoring Report**.

² LA90 value of 52 dBA was dominated by background noise so unable to estimate contribution for quarry at the assessment location.

³ Estimated based on observed background noise (insects) using LAeq.

⁴ Value estimated based on distance correction to receiver location in calculation in Appendix 1 of 2024 Q1 Noise Monitoring Report.

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

⁶ Value estimated based on SEL and distance correction to receiver location calculations in Appendix 1 of 2024 Q2 Noise Monitoring Report.

⁷ Moderate exceedance (NPfI 2017 – Table 4.1 and Table 4.2)

⁸ Measured LA90 value of 54.2 was dominated by insects so unable to estimate contribution for quarry at assessment location.

⁹ Measured LA90 value of 51.3 was dominated by insects and road traffic so unable to estimate contribution for quarry at assessment location.



During the 2024 monitoring period, the Quarry was generally inaudible at most locations, with other noise sources being birds, aircraft, insects, and vehicles.

During the annual return (AEMR) process on 14 March 2025, it was made evident to Holcim that on 7 May 2024 there was a moderate noise exceedance at Teven Quarry on the NM4 noise monitor which recorded an exceedance of the criteria by 6dBA (43 LAeq (15 min) dBA). It was reported to the DPHI and EPA on 14th March 2025 (after being made aware by the AEMR draft report, and reported within 7 days of being known by Holcim). The exceedance was not prompted by the environmental consultant (Ramboll) for Holcim to report the exceedance as following a review of the data by the consultant it was determined to be a moderate exceedance based on the guidance in the Noise Policy for Industry. The reasoning for this is that the consultant verified the exceedance of the noise criteria in the Quarter 3 noise monitoring. Given that there were no exceedances reported for Q3 2024 report it was deemed that the one-off moderate exceedance was marked as within criteria.

This exceedance has therefore only been assessed as a non-compliance with Schedule 3, Condition 4 Noise Impact Assessment Criteria of the Development Consent.

The noise exceedance at N4 during Q2 monitoring was the only exceedance above criteria during the reporting period during which quarry operations were audible.

Long-term Trends

The site has generally been compliant since 2017 when monitoring commenced. There have been, however, exceedances in previous years at receiver N4. These exceedances had been caused by changes in loading quantities, quarry plant operations and a significant decrease in size of quarry stockpiles functioning as a noise barrier between the site and receiver N4.

Comparison to EIS Predictions

All monitoring results, except for the one exceedance at NM4 during Q2 monitoring, were in accordance with EIS predictions.

6.2.4 Management Measures

Noise impacts are managed in accordance with the specific management strategies, procedures, controls, and monitoring programs within the Teven Quarry Noise Management Plan (NMP). The site will ensure that stockpiles are kept at a level to reduce noise from operations.

6.2.5 Proposed Improvements

Holcim will work together with Ramboll to improve due diligence when writing up monitoring datasheets and reports to ensure exceedances are communicated effectively and mitigation measures can be conducted as soon as possible.



6.3 AIR QUALITY

6.3.1 EIS Predictions

The 2014 EIS predicted that the change in air quality impacts due to the Project when compared to existing approved operations was predicted to be negligible, with the results for all scenarios predicted to be very similar.

The Project is predicted to comply with the relevant air quality criteria at all nearby sensitive receiver locations under worst case operating conditions, with the exception of 24-hour average PM_{10} concentrations at two nearby sensitive receiver locations - Receiver 9 and Receiver 6. This exceedance is due to the combined effect of Teven Quarry activities and maximum background levels. Receiver 9 has since been purchased by Holcim. If, on any day, the background levels were average rather than at maximum levels, then no property would be predicted to experience 24-hour average PM_{10} concentrations above the criteria.

6.3.2 Approved Criteria

Air quality monitoring criteria stipulated in Schedule 3, Condition 11 of SSD 6422 is presented in **Table** *15*.

Pollutant	Averaging Period	Criterion	
Particulate matter < 10 µm (PM ₁₀)	Annual	a,d 30 µg/m ³	
Particulate matter < 10 µm (PM ₁₀)	24 hour	^b 50 µg/m ³	
Total suspended particulates (TSP)	Annual	^{a,d} 90 µg/m ³	
^C Deposited dust	Annual	^b 2 g/m ² /month	^{a,d} 4 g/m ² /month

Table 15: Air Quality Monitoring Criteria (SSD 6422)

Notes tor Table 4:

- d. Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, or any other activity agreed to by the Secretary.
- e. "Reasonable and feasible avoidance and mitigation measures" includes, but is not limited to, the operational requirements in conditions 12 and 13 to develop and implement a air quality management system that ensures operational responses to the risks of exceedance of the criteria.

Cumulative impact (ie increase in concentrations due to the development plus background concentrations due to all other sources).

b. Incremental impact (ie incremental increase in concentrations due to the development on its own, with zero allowable exceedances of the criteria over the life of the development).

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



6.3.3 Key Environmental Performance

PM₁₀ Monitoring

Schedule 3, Condition 11 (PM₁₀)

In 2024, dust monitoring was undertaken using a High-Volume Air Sampler (HVAS) to monitor particulate matter (PM₁₀). PM₁₀ monitoring results for 2024 are provided in **Table 16**. A conversion factor outlined in the Air Quality Management Plan was used to calculate the actual monitoring result to derived TSP result.

Table 16: 2024 Dust Monitoring (PM10)

Comula Data	HVAS PM ₁₀ (μg/m3) TSP (μg/m3)		24 hour DM. Critorian	
Sample Date	Actual Result	Calculated Result	24-nour PM ₁₀ Criterion	
05/01/2024	14.9	42.57	Compliant	
11/01/2024	22.9	65.43	Compliant	
17/01/2024	26.8	76.57	Compliant	
23/01/2024	17.8	50.86	Compliant	
29/01/2024	3.3	9.43	Compliant	
04/02/2024	-	-	Non-compliant ⁴	
10/02/2024	-	-	Non-compliant ⁴	
16/02/2024	-	-	Non-compliant ⁴	
22/02/2024	-	-	Non-compliant ⁴	
28/02/2024	-	-	Non-compliant ⁴	
05/03/2024	-	-	Non-compliant ⁴	
11/03/2024	-	-	Non-compliant ⁴	
17/03/2024	-	-	Non-compliant ⁴	
23/03/2024	16.5	47.14	Compliant	
29/03/2024	-	-	Non-compliant ⁴	
04/04/2024	-	-	Non-compliant ⁴	
10/04/2024	-	-	Non-compliant ⁴	
16/04/2024	13.1	37.43	Compliant	
22/04/2024	11.8	33.71	Compliant	
28/04/2024	7.3	20.86	Compliant	
04/05/2024	14	40.0	Compliant	
10/05/2024	11.7	33.43	Compliant	
16/05/2024	11.4	32.57	Compliant	
22/05/2024	24.1	68.86	Compliant	
28/05/2024	8.1	23.14	Compliant	
04/06/2024	8.0	22.86	Non-Compliant ¹	
06/06/2024	6.1	17.43	Compliant	
10/06/2024	9.1	26.0	Compliant	
17/06/2024	9.4	26.86	Non-Compliant ²	
24/06/2024	6	17.14	Compliant	



Sample Data	HVAS PM10 (µg/m3)	TSP (µg/m3)	24 hour DM. Criterion
Sample Date	Actual Result	Calculated Result	24-nour PW10 Criterion
30/06/2024	9.8	28.0	Compliant
06/07/2024	-	-	Non-compliant ⁴
12/07/2024	-	-	Non-compliant ⁴
18/07/2024	10.2	29.14	Compliant
24/07/2024	10.1	28.86	Compliant
30/07/2024	8.1	23.14	Compliant
05/08/2024	2.9	8.29	Compliant
11/08/2024	-	-	Non-compliant ⁴
17/08/2024	7.1	20.29	Compliant
23/08/2024	4.5	12.86	Compliant
29/08/2024	4.2	12.0	Compliant
04/09/2024	6.1	17.43	Compliant
10/09/2024	25.9	74.0	Compliant
16/09/2024	16.6	47.43	Compliant
22/09/2024	3.4	9.71	Compliant
28/09/2024	12.9	36.86	Compliant
04/10/2024	4.4	12.57	Compliant
10/10/2024	7.3	20.86	Compliant
16/10/2024	6.5	18.57	Compliant
22/10/2024	20.5	58.57	Compliant
28/10/2024	5.7	16.29	Compliant
03/11/2024	5.4	15.43	Compliant
09/11/2024	18.1	51.71	Compliant
15/11/2024	8.7	24.86	Compliant
21/11/2024	7.1	20.29	Compliant
27/11/2024	9.2	26.29	Compliant
03/12/2024	-	-	Non-compliant ⁵
09/12/2024	26.2	74.86	Compliant
15/12/2024	64.1	183.14	Compliant
21/12/2024	4.0	11.43	Compliant
27/12/2024	7.2	20.57	Compliant
Minimum	2.9	8.29	
Maximum	64.1	183.14	1
Average	12.14	34.69	1

Notes: ¹HVAS unit ran on 4/6/24 to cover for not running on 3/6/24. Following this out of cycle sample date the unit was realigned to the original 1 in 6-day schedule

²HVAS sample on 17/06/2024 replaces samples for 16/06/2024 as unit did not run on the previous day. Following this out of cycle sample date the unit was realigned to the original 1 in 6-day schedule

³Exceedance is in Bold.

⁴Missed sample due to equipment failure.

⁵Sample invalidated due to unit error.



There were 46 sampling events for PM₁₀ and TSP in 2024; the majority were within the approved criteria.

On 14th February 2025 it was reported to Holcim that the PM10 monitor failed and required repairs (this included two missed reporting days on 4th February and 10th February). It was reported to the DPHI and EPA that the unit had failed and the DPHI followed up with a subsequent site visit (27 February 2024). The unit was repaired and returned to site (20th March 2024; however, experienced ongoing issues requiring a replacement rental unit that arrived 12th April 2025. Recurrent failures occurred throughout the year requiring replacement units to be onboarded at short notice resulting in missed samples in July (missed samples on 6th and 12th July), August (missed sample 11th August) and December (3rd December). Investigations are ongoing; however, believed to have been rectified with root cause potentially being attributed to an electrical supply issue.

On Sunday 15 December 2024 the HVAS unit recorded a PM 10 level of $64.1 \ \mu g/m^3$, which is above the 24-hour limit of 50 $\mu g/m^3$. Given that the quarry was not operating on the day of exceedance, incident notification was not warranted. During the time of the exceedance, adjacent farmland was conducting stripping works which is the likely cause of the PM10 exceedance.

The PM₁₀ 2024 average was 12.14 μ g/m3 This is significantly below the annual criteria of 30 μ g/m3 and compliant with the Development Consent. This 2024 average is slightly lower than the 2023 average of 13.9 μ g/m3. The PM₁₀ annual average for 2024 was significantly less than for 2019 and 2018, which were 32.4 μ g/m3 and 28.6 μ g/m3, respectively.

The annual average for derived TSP was 34.69 μ g/ m3 which is significantly below the annual criteria of 90 μ g/ m3 and meets conditions of the Development Consent.

While the annual averages for both PM₁₀ and TSP meet the conditions of the Development Consent, Teven Quarry has recorded a low-risk non-compliance in sampling frequency as a result of the missed sampling. Given the compliant results obtained for the vast majority of the reporting period which were significantly below criteria, this is considered low risk. During the 2025 monitoring period, Teven will continue to monitor in accordance with the Development Consent.



Depositional Dust Monitoring

Condition 11, Schedule 3 (Dust Deposition)

Depositional dust continued to be monitored at three depositional dust gauges at Teven Quarry throughout 2024. Results for this monitoring are provided in **Table 17.**

Table 17: 2024 Dust Monitoring (Depositional Dust)

Sample Period	Insoluble Solids DDG1 (g/m²/month)	Insoluble Solids DDG2 (g/m ² /month)	Insoluble Solids DDG3 (g/m²/month)
January	0.6	1.7	0.9
February	1.1	2.8	1.1
March	1.1	2.8*	0.9
April	0.5	1.8	0.6
Мау	0.4	2.9	0.4
June	0.1	0.1	0.2
July	0.2	1.2	3.7
August	1.7	0.9	1.7
September	2.6	1.4	3.2
October	0.5	3.8	0.1
November	6.6	2.4	0.9
December	-	-	-
Annual Average	1.3	2.0	1.2
Result	Within Criteria	Within Criteria	Within Criteria

Notes:

Contaminated results are marked with an asterisk (*).

¹ Exceedances are in bold

The complete monitoring program was undertaken during the reporting period. DDG1, DDG2, and DDG 3 were within the annual average criteria of 4 g/m²/month.

It was informed to Holcim on the 10th January 2025 that the site samples were damaged in transit by the laboratory courier (DDG1, DDG2 and DDG3 sampled on site on 12 December 2024). Holcim reported to DPHI and the EPA after being made aware by the engaged consultancy Ramboll on 13 January 2025 (within 7 day reporting period).

The yearly comparison of depositional dust monitoring data at Teven Quarry from 2018 to 2024 is presented below in **Table 18**.



Dust Depositional Gauge	Monitoring Summary for Reporting Period	2018	2019	2020	2021	2022	2023	2024
	Insoluble Solids Reporting Period Average	2.7	1.3	1.97	1.04	1.03	1.15	1.3
DDG1	Max. Insoluble Solids	5.0	3.9	5.2	4.8	1.0	3.6	6.6
	Min. Insoluble Solids	0.6	0.1	0.5	0.1	0.1	0.2	0.1
	Insoluble Solids Reporting Period Average	1.7	2.8	2.85	1.02	0.92	1.3	2.0
DDG2	Max. Insoluble Solids	2.1	5.5	2.9	3.7	1.4	3	3.8
	Min. Insoluble Solids	1.2	0.6	2.8	0.2	0.2	0.4	0.1
	Insoluble Solids Reporting Period Average	0.7	1.5	1.41	0.88	0.78	0.67	1.2
DDG3	Max. Insoluble Solids	1.6	3.8	0.1	2.5	1.6	2.8	3.7
	Min. Insoluble Solids	0.3	0.1	3.6	0.2	0.1	3	0.1



Long-term Trends

Trends analysis for depositional dust results in 2024 has found that depositional dust levels generally remained consistent compared to previous years.

The 2024 annual average for PM₁₀ remains below long-term criteria which is consistent with 2017, 2018, 2020 and 2021 results with the exception of the 2019 average which was above criteria. Deposition results from the reporting period also found no exceedance.

Comparison to EIS Predictions

Majority of the air quality monitoring data was within EIS predictions.

Key historical contributions to PM₁₀ exceedances are bushfires and nearby agricultural activity such as cutting of cane and slashing. Previous laboratory analysis indicates outside dust sources are the major contributor to dust levels at DDG1 and DDG2.

6.3.4 Management Measures

Teven Quarry is committed to implementing reasonable and feasible avoidance and mitigation measures and to continue to investigate ways to minimise any air quality impacts from the quarry. Air quality management measures implemented at Teven Quarry are detailed in the Air Quality Management Plan (AQMG) dated May 5 and approved by DPHI (then DPE) on May 25, 2022.

6.3.5 Proposed Improvements

Holcim is committed to improving air quality management at Teven Quarry and will investigate ways of minimising monitoring equipment failure in 2025. Teven Quarry will continue to implement the site's AQMP.



6.4 BLASTING

6.4.1 EIS Predictions

The 2014 EIS found that the Project could 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

Blasting was undertaken at Teven Quarry throughout the 2024 reporting period in accordance with the conditions of EPL No. 3293. The criteria for blasting at the site as per the EPL are detailed in **Table 19**.

Table 19: Diast Monitoring Criteria from EPL 329.	Table 19: Blas	st Monitoring	Criteria fror	n EPL 3293
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Blastir	ng
L5.1	Blasting operations at the premises may only take place between 10:00 to 15:00 Monday to Friday. (Where a blast failure has occurred or there are compelling safety reasons, the EPA may permit a blast to occur outside the above hours. The licensee must provide prior written notice of any such blast to the EPA by contacting 131 555).
L5.2	 The airblast overpressure level from blasting operations in or on the premises must not exceed: a) 115 dB (Lin Peak) for more than 5% of the total number of blasts during each reporting period; and b) 120 dB (Lin Peak) at any time. At any point within 1 metre of any affected residential property or other sensitive noise location.
L5.3	The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed: a) 5 mm/s for more than 5% of the total number of blasts carried out on the premises during each reporting period; and b) 10 mm/s at any time. At any point within 1 metre of any affected residential property or other sensitive noise location.
L5.4	All sensitive receivers are to begiven at least 24 hours' notice when blasting is to be undertaken.
L5.5	To determine compliance with condition(s) L4.2 and L4.3: a) Airblast overpressure level and ground vibration peak particle velocity must be measured at the most affected residence or noise sensitive location that is not owned by the licensee or subject to a private agreement between the owner of the residence or noise sensitive location and the licensee as to an alternative airblast overpressure level and/or ground vibration peak particle velocity for all blasts carried out in or on the premises; and b) Instrumentation used to measure the airblast overpressure level and ground vibration peak particle velocity must meet the requirements of the current Australian Standard.
L5.6	The licensee must report any exceedance of the licence blasting limits to the EPA within 24 hours of the exceedance becoming known to the licensee or to one of the licensee's employees or agents.

In accordance with Schedule 3, Condition 1 of the Development Consent, blasting is to be undertaken between 10am and 3pm Monday to Friday, with no blasting to occur on Sundays or public holidays.

Blast monitoring results for 2024 are displayed in Table 20.



Table 20: 2024 Blast Monitoring Results

Location	Description	Upper Limit Criteria	Date					
Location			29/01/2024	26/02/2024	26/02/2024	22/03/2024	02/04/2024	02/05/2024
Residence on Wellers	Over Pressure - dB (Lin Peak)	120	112.2	97.5	104.9	93.4	102.8	102.8
Rd	Ground Vibration - (mm/s)	10	0.81	1.26	0.95	2.89	1.16	0.79
Site Entrance,	Over Pressure - dB (Lin Peak)	120	106.1	107	108.4	104.2	88	110.9
Stokers Lane	Ground Vibration - (mm/s)	10	0.65	0.34	0.45	0.7	0.41	0.1
Location	Description		Date					
Location	Description	Upper Limit	Date					
Location	Description	Upper Limit Criteria	Date 25/06/2024	25/07/2024	25/07/2024	19/08/2024	18/09/2024	22/10/2024
Location Residence on Wellers	Description Over Pressure - dB (Lin Peak)	Upper Limit Criteria 120	Date 25/06/2024 99.5	25/07/2024 102.8	25/07/2024 95.9	19/08/2024 88.9	18/09/2024 105.5	22/10/2024 100
Location Residence on Wellers Rd	Description Over Pressure - dB (Lin Peak) Ground Vibration - (mm/s)	Upper Limit Criteria 120 10	Date 25/06/2024 99.5 1.58	25/07/2024 102.8 1.1	25/07/2024 95.9 0.4	19/08/2024 88.9 2.7	18/09/2024 105.5 1.96	22/10/2024 100 1.02
Location Residence on Wellers Rd Site Entrance,	Description Over Pressure - dB (Lin Peak) Ground Vibration - (mm/s) Over Pressure - dB (Lin Peak)	Upper Limit Criteria 120 10 120	Date 25/06/2024 99.5 1.58 DNT	25/07/2024 102.8 1.1 103.5	25/07/2024 95.9 0.4 DNT	19/08/2024 88.9 2.7 108.1	18/09/2024 105.5 1.96 105.5	22/10/2024 100 1.02 DNT

Note: DNT = Did Not Trigger



Long-term Trends

From 2015 – 2024 the blasting levels have generally been within the EPL criteria. Long-term blast results are provided in **Table 21.** These show long-term consistency for overpressure results. In 2024, the average overpressure and vibration levels were lower than those recorded in 2023.

Year	Number of blasts	No. of blasts below vibration or overpressure trigger level	Max. Overpressure (dBL)	Average Overpressure (dBL)	Max Vibration (mm/s)	Average Vibration (mm/s)
2015	14	10	113.1	109.3	0.66	0.44
2016	12	7	112.1	109.6	0.45	0.37
2017	15	8	114.0	106.9	0.5	0.33
2018	12	11	114.1	112.4	0.05	0.05
2019	11	11	NT	NT	NT	NT
2020	12	7	109.3	106.2	1.9	0.9
2021	10	0	117.50	108.28	4.99	2.07
2022	10	10	114.7	107.76	3.07	1.58
2023	10	9	116.5	107.82	2.08	1.30
2024	10	10	112.2	102.28	2.89	1.0

Table 21: Long-term Blasting Trends

Note: NT = Not Triggered.

6.4.3 Comparison to EIS Predictions

During the 2024 reporting period, Teven Quarry conducted 10 blasts, all of which complied with the established criteria.

6.4.4 Management Measures

Blast emission related impacts (vibration and air blast) are managed in accordance with the specific measures within the Teven Quarry Blast Management Plan (2021).

6.4.5 Proposed Improvements

Given the generally long-term performance within criteria, no further improvements to blast management are proposed for 2025.



6.5 TRAFFIC MANAGEMENT

6.5.1 EIS Predictions

The 2014 EIS assessment of traffic impacts associated with the Project found that impacts on the road network and principal intersections would be satisfactory and there was no requirement to upgrade the roads or intersections surrounding the site once minor improvements to Route 1 were undertaken.

A review of road safety conducted as part of the EIS recommended prioritising the use of Route 1 for product transport and recommended a number of minor improvements to Route 1 to improve the safety for nighttime haulage, including centre line marking, reflectors, and maintenance of existing guard rails at locations along Route 1. Holcim has implemented these recommendations.

6.5.2 Approved Criteria

According to Development Consent SSD 6422 the site is required to monitor transport in accordance with the following requirements:

<u>Schedule 2, Condition 9</u>: The Applicant will not dispatch more than 73 laden trucks from the site per day, averaged over the total number of dispatch days in any calendar month.

<u>Schedule 3, Condition 23:</u> The Applicant shall keep accurate records of all laden truck movements to and from the site (hourly, daily, weekly, monthly, and annually) and publish a summary of records on its website every 6 months.

6.5.3 Key Environmental Performance

Teven Quarry undertook monitoring of truck movements on a daily basis throughout 2024 to ensure compliance with movements and volume requirements discussed above. A copy of these monitoring results has been included in **Table 22**.

Month	Total Truck Movements	Active days	Average Truck Movement per active day
January	748	17	37
February	1248	21	49
March	1122	20	46
April	1033	20	44
Мау	1166	23	47
June	1045	19	41
July	810	23	35
August	802	22	34
September	959	21	45

Table 22: Average Truck Movements for 2024



Month	Total Truck Movements	Active days	Average Truck Movement per active day
October	1320	22	58
November	1341	21	61
December	945	15	60
Total	5815	557	20

Long Term Trends

Review of truck transport data for Teven Quarry since 2015 indicates average daily truck movements have not exceeded the maximum of 73 laden trucks from the site per day, averaged over the total number of dispatch days in any calendar month.

The annual average for laden truck movements per active day in 2024 was 20, which is less than previous reporting periods. Since the 2021 reporting period the annual average has been between 53-56 laden trucks. This is consistent with the EIS predictions.

6.5.4 Management Measures

Traffic and transport impacts are managed in accordance with the specific management strategies, procedures, controls, and monitoring programs within the Teven Quarry Transport Management Plan (TMP), which was approved by DPE on 20/05/2021. As per Condition 4(b) of Schedule 5, Holcim have reviewed the transport data against the TMP and have found it meets the approved requirements.

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

The 2014 EIS found the Project is unlikely to result in a significant change to the existing noise, dust and water runoff impacts of Teven Quarry, therefore it is considered that any indirect impacts to ecology that occur will be minor and will be consistent with the existing approved impacts. The results of the impact assessments under the Environmental Planning and Assessment Act (EP&A Act) and the Environment Protection and Biodiversity Conservation Act (EPBC Act) conclude that the indirect impacts of the Project are unlikely to have a significant impact on any threatened flora or fauna species, migratory fauna species, endangered population or threatened ecological communities listed under the Threatened Species Conservation Act (TSC Act) and/or the EPBC Act.

6.6.2 Approved Criteria

There are no specific criteria associated with biodiversity management for the site.

6.6.3 Key Environmental Performance

Teven Quarry conducted 10 hectares (Ha) of weed spraying in 2024. No additional clearing occurred in the reporting period. This has had a limited impact on biodiversity.

In December 2024, Holcim engaged Arbor Ecological to undertake the annual rehabilitation monitoring across site. See **Appendix B** for the full report. The findings of this report are:

- Weed control remains the priority to promote natural regeneration of plant communities.
- Rehabilitation zones are separated from the approved extraction area and remain unaffected by direct or indirect environmental impacts associated with extraction activities.
- Rainforest and Brushbox communities where rehabilitation works continue to be conducted are mostly in moderate condition and on-track to achieve rehabilitation provided rehabilitation works continue.
- Small (<6 centimetres (cm)) and medium (6 cm to 12 cm) sized hollow openings observed in mature Brushbox and Camphor Laurel. No substantial hollows observed in the rainforest community.
- Dense exotic grassland in relatively open areas adjoining forest vegetation offers good habitat for a range of birdlife, frogs and some mammals.
- Qualified and experienced bush regenerators continued to undertake weed control throughout the year using industry best practice methods for weed control and chemical handling.

No feral animal management occurred in the reporting period.

6.6.4 Management Measures

Teven Quarry implemented biodiversity management measures from its updated Biodiversity and Rehabilitation Management Plan (2021). The main procedures include:

- Weed management;
- Habitat reinstatement;


- Pre-clearance permit process; and
- Bushfire management.

6.6.5 Proposed Improvements

Weed spraying will continue at site during the next reporting period. There are no additional proposed improvements for the next reporting period.

6.7 Heritage (Aboriginal Archaeology and Historic)

6.7.1 EIS Predictions

Aboriginal Archaeology

No known Aboriginal cultural heritage sites occur within or in close proximity to the Teven Quarry Project Area. Given the terrain and history of extensive clearing, grazing, and quarrying, the area is considered to have low archaeological potential.

No known items or places of Aboriginal heritage significance are located in or within 50 metres of the Project Area. As such, the potential for impacts on items of Aboriginal cultural heritage is limited to indirect impacts such as from blasting or runoff.

Historic heritage

No known items of historic heritage significance occur within the Teven Quarry Project Area.

No historic heritage sites were found to be located within or in close proximity to the Project Area. The closest heritage item was located approximately three kilometres to the southeast in Alstonville, a sufficient distance to not experience or be impacted by indirect impacts associated with the Project.

6.7.2 Approved Criteria

There are no specific criteria associated with heritage relating to the quarry.

6.7.3 Key Environmental Performance

There were no issues relating to Aboriginal and historic heritage during the reporting period.

6.7.4 Management Measures

As stated in Schedule 3, Condition 26, If during the course of operations, Holcim becomes aware of any previously unknown Aboriginal archaeological material, all works likely to affect the material or site will cease immediately and Office of Environment and Heritage (OEH), relevant Aboriginal stakeholders and a suitably qualified archaeologist will be consulted to determine an appropriate course of action prior to the recommencement of work at the site.

6.7.5 Proposed Improvements

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



7 Water Management

7.1 EIS PREDICTIONS

7.1.1 Surface Water

The 2014 EIS stated the Project will not result in any changes to the quarry water management system or associated water management measures. The only potential changes that could result in surface water impacts as a result of the Project are associated with the change in water demands e.g. requirement to use more water for dust suppression or processing.

7.1.2 Groundwater

The results of the hydrogeological assessment conducted during preparation of the 2014 EIS indicate that the local and regional groundwater table is located below the current and proposed elevation of the Teven Quarry pit floor. The quarry has been extracted to its maximum depth of 4 metres above the Australian Height Datum (mAHD) without any evidence of groundwater inflows. For this reason, the assessment concludes that the Project will have a negligible impact on groundwater levels, groundwater quality, groundwater receptors, groundwater dependent ecosystems and groundwater users in the local area.

7.2 APPROVED CRITERIA

Holcim are required to monitor water quality from discharge events at the Teven Quarry licensed discharge points, in accordance with the requirements of EPL 3293 (refer to **Table 23** and **Table 24**).

Pollutant	Units of measurement	100 percentile concentration limits
Oil and Grease	Visible	Nil
рН	рН	6.5 - 8.5
Total Suspended Solid (TSS)	Milligrams per litre	50

Table 23: Water Monitoring Criteria (Teven Quarry EPL 3293) - LDP001

Table 24: Discharge Sampling Measurement Requirements (Teven Quarry EPL 3293)

Pollutant	Units of measurement	Frequency	Sampling method	
Oil and Grease	Visible		Visual inspection	
рН	рН	Special Frequency 1	No method specified	
Total Suspended Solid (TSS)	Milligrams per litre		Grab sample	

Note: Special Frequency 1 means sampling any discharge, whether controlled or otherwise, which has not occurred from rainfall exceeding 82.5mm over any consecutive 5-day period.



In addition to these surface water requirements, the site has been requested by the NSW DPHI to undertake an assessment of groundwater (should the requirement be triggered) based on the condition below:

Schedule 3 Condition 19

In the event that groundwater in excess of negligible quantities is intersected during extraction activities, the Applicant shall undertake a hydrogeological investigation, in consultation with NOW, to the satisfaction of the Secretary.

The investigation must report on groundwater sources, levels, yield, and quality; identify any risks to groundwater users or groundwater dependent ecosystems and propose recommended management measures. The Applicant must implement reasonable and feasible management measures to the satisfaction of the Secretary.

Teven Quarry is currently operating above the groundwater table. No groundwater seepage into the quarry void has been recorded. The quarry will continue to visually monitor the void for groundwater seepage and a detailed assessment will be undertaken in accordance with Schedule 19 Condition 3 of the Development Consent should groundwater in excess of negligible quantities be intercepted. During the reporting period this was not required.

7.3 WATER USEAGE AND STORAGE

Clean upstream catchment runoff is diverted away from the quarry and conveyed to the cane field drains which flow to Maguire's Creek and Emigrant Creek. Runoff from disturbed areas within the quarry operations are managed within the water management system, with this outlined in the Water Management Plan.

The Teven Quarry water management system has two dams/storages, the Main Dam, and the Pit Dam. Runoff within the quarry pit is managed in the primary siltation storage (Pit Dam), from which surplus water is pumped to the main silt retention storage (Main Dam) at the northern end of the quarry. The quarry water management system is designed to maximise sedimentation of pit runoff on site, prior to reuse on site or discharge via the licensed discharge point.

7.4 SURFACE WATER RESULTS

Table 25 summarises the water quality results during discharge events at LDP001. During the reporting period, LDP001 discharged 15 times in January, March, April, May, August, October, November and December. A copy of the full data is included in **Appendix C.**



Location/ Frequency	Lower Limit	Upper Limit	Unit	Description	2024 Minimum	2024 Maximum	2024 Average	2023 Average	2022 Average	2021 Average
LDP001	6.5	8.5	pН	pН	6.95	7.73	7.2	7.62	7.5	7.6
Wet Weather	N/A	50	mg/L	Suspended Solids	0	15	2.1	32	3.4	1.4
Special Frequency 1	N/A	10	mg/L	Total Oil & Grease	0	0	0	0.0	0.0	0

Table 25: Summary of Water Quality Data at Teven Quarry – 2024



There were no exceedances in pH and suspended solids criteria. Monitoring data at LDP001 in 2024 met the EPL criteria. This is consistent with EIS predictions.

No other discharges were recorded on site during the 2024 reporting period.

7.5 **GROUNDWATER RESULTS**

Groundwater monitoring was not undertaken during the 2024 reporting period, as there is no consent requirement. As per Schedule 3 Condition 19 of the Development Consent, if groundwater in excess of negligible quantities is intersected during extraction activities, Holcim will undertake a hydrogeological investigation, in consultation with Department of Industry Water, to the satisfaction of the Secretary.

There are no groundwater trends or comparisons to EIS predictions.

7.6 WATER TAKE

There was no water take during the reporting period.

7.6.1 Proposed Improvements

Holcim will continue to implement the Water Management Plan.



8 Rehabilitation

8.1 REHABILITATION PERFORMANCE DURING THE REPORTING PERIOD

The site is required to undertake biodiversity and rehabilitation in accordance with the conditions from SSD-6422.

27. The Applicant shall rehabilitate the site to the satisfaction of the Secretary. This rehabilitation must be generally consistent with the rehabilitation strategy in the EIS and the conceptual final landform in Appendix 2, and must comply with the objectives in Table 5.

Feature	Objective		
Site (as a whole)	 Safe, stable and non-polluting Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and designed to minimise the visual impacts of the development when viewed from surrounding land Restored with native, endemic vegetation 		
Surface Infrastructure	Decommissioned and removed, unless the Secretary agrees otherwise		
Quarry Benches	 Landscaped and vegetated using native tree and understorey species 		
Quarry Pit Floor	 Landscaped and revegetated using native tree and understorey species, above the final anticipated void water level 		

Table 5: Biodiversity and Rehabilitation objectives

Progressive Rehabilitation

28. The Applicant shall rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable and feasible measures must be taken to minimise the total area exposed for dust generation at any time. Interim stabilisation measures must be implemented where reasonable and feasible to control dust emissions in disturbed areas that are not active and which are not ready for final rehabilitation.

Note: It is accepted that parts of the site that are progressively rehabilitated may be subject to further disturbance in future.

See **Table 26** 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.*

Table 26: Rehabilitation Performance in 2024

Guideline Requirement	Response
Extent of the operations and rehabilitation at completion of the reporting period	No rehabilitation was completed in 2024 at the site as there was no opportunity for progressive rehabilitation due to ongoing operations.
Agreed post-rehabilitation land use	The final landform will be integrated with the surrounding landform through the sowing of target flora species representative of surrounding vegetation communities.



Guideline Requirement	Response
Key rehabilitation performance indicators	See Section 7.02 of the Biodiversity and Rehabilitation Management Plan.
Renovation or removal of buildings	There were no renovations or removal of buildings 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 Biodiversity and Rehabilitation Management Plan.
Outcomes of trials, research projects and other initiatives.	No trials proposed.
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.

8.2 SUMMARY OF CURRENT REHABILITATION AND PERFORMANCE

A summary of the rehabilitation and disturbance status of Teven Quarry is outlined in Table 27.

Table 27: Rehabilitation and Disturbance	Status per Reporting Period
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	2019	2020	2021	2022	2023	2024	2025
	Actual (ha)						Forecast
A. Total Quarry Footprint ¹	17.1	17.1	17.1	17.1	17.1	17.1	17.1
B. Total Active Disturbance ²	17.1	17.1	17.1	17.1	17.1	17.1	17.1
C. Land Being Prepared for Rehabilitation ³	0	0	0	0	0	0	0
D. Land Under Active Rehabilitation ⁴	0	0	0	0	0	0	0
E. Completed Rehabilitation ⁵	0	0	0	0	0	0	0

Notes: ¹Total 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.



At the end of 2024 there was approximately 17.1 Ha of active disturbance. This area remains consistent upon previous years given that the open pit is active and does not yet present an opportunity for progressive rehabilitation to occur. There was no active rehabilitation at Teven Quarry during the 2024 reporting period.

Holcim undertakes annual rehabilitation monitoring of the Quarry, as detailed in Section 6.6.

8.3 ACTIONS FOR NEXT REPORTING PERIOD

The DPE 2015 Annual Review Guidelines require the Annual Review to outline the rehabilitation actions proposed during the next reporting period. These actions are detailed in **Table 28**.

Table 28: Rehabilitation and Closure Actions for the 2025 Reporting Period

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.	Progressive rehabilitation will be performed once areas become available for rehabilitation. No areas are anticipated to become available during 2025.
Outline proposed rehabilitation trials, research projects and other initiatives to be undertaken during next reporting period.	No proposed rehabilitation trials.
Summary of rehabilitation activities proposed for next reporting period.	Holcim will assess opportunities to perform progressive rehabilitation.



9 Summary of Environmental Performance

A summary of the performance of environmental management measures and sampling results for the 2024 reporting period are detailed in **Table 29.**

Table 29: Environmenta	Performance at Teve	en Quarry in 2024
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Aspect	Approval Criteria / EIS Prediction	Performance during 2024 reporting period	Trend / key management implications	Implemented / proposed management actions
Meteorological	Development Consent	Within criteria. Continuous meteorological data collected from BOM station.	Meteorological data collected at the site. Inspections done on the site station for maintenance.	None required.
Noise	EIS predictions are all below Development Consent criteria.	Exceedance recorded at receiver R10(NM4) during Q2 monitoring. Remainder within criteria.	Noise monitoring results mostly met criteria.	None required.
Blasting	EIS predictions are all below Development Consent criteria.	Teven recorded a total of 10 blasts during the reporting period. All blasts were withing criteria.	2024 averages were mostly consistent with long-term trends.	None-required.
Air Quality	EIS predictions are all below Development Consent criteria.	Equipment malfunctions led to missed monitoring of PM ₁₀ in the 2024 reporting period. One PM ₁₀ exceedance was recorded in December 2024. Remainder within criteria. Depositional Dust monitoring identified one exceedance of 6.6 g/m ² /month recorded on 11 November 2024. Due to damaged samples (by laboratory courier) sampling was unable to be performed in December	In 2024, PM ₁₀ was consistent with long term data. Depositional dust monitoring continued in 2024.	Teven will continue to undertake management measures in line with the Air Quality Management Plan
Traffic Management	EIS predictions are all below Development Consent criteria.	Within criteria.	Consistently meets criteria.	None required.
Biodiversity	No proposed impacts. No Development Consent criteria.	As per criteria. No biodiversity issues identified. Holcim to continue to carry out weed and feral animal management as necessary.	No long-term negative trends.	None required. Teven will continue to implement the Biodiversity and



Aspect	Approval Criteria / EIS Prediction	Performance during 2024 reporting period	Trend / key management implications	Implemented / proposed management actions	
				Rehabilitation Management Plan.	
Heritage	No proposed impacts. No Development Consent criteria.	As per criteria. No Heritage impacts were identified during the reporting period.	No issues have been identified in recent years.	None required.	
Water Management	EIS predictions are all below Development consent criteria.	No discharges in 2024 triggered surface water monitoring.	Consistently meets criteria.	None required.	
Rehabilitation and Landscape Management	No proposed impacts. No Development Consent criteria.	As per criteria. Site is still operational, with progressive rehabilitation to occur once practicable. No issues identified.	No long-term negative trends.	None required.	



10 Waste Management

10.1 WASTE STREAMS

Waste streams produced at Teven Quarry are categorised as:

- Waste oil, filters, grease cartridges;
- Scrap metal;
- Tyres;
- Office paper and general rubbish;
- Silt (from aggregate washing); and
- Waste water from amenities and office.

10.2 Waste Management

All waste generated by Teven Quarry is managed by way of Council collection services, via licensed waste contractors or onsite treatment. No on-site disposal of general waste occurs. Teven Quarry is committed to reducing, reusing, and recycling wastes prior to disposal.

Key components of waste management are:

- All waste oil is collected and stored in containers within a covered and bunded area and is
 removed from the site by an appropriately licensed contractor as required;
- All oil filters are separately stored and returned to the manufacturer for reuse by appropriately licensed contractor;
- Scrap metal is deposited into a dedicated skip bin for periodic collection and recycling (approximately every three months) by an appropriately licenced contractor;
- Diesel fuel is stored within a self-bunded, above-ground tank and all refuelling are undertaken on a hardstand area which drains to an oil/water separator (refer waste oil disposal);
- Silt is captured in on-site silt control structures and is periodically removed and placed/stored in the product stockpile area or overburden materials for use;
- All waste tyres are removed by the supplier of replacement tyres;
- All paper/cardboard (1 x 3m³ bin) and general waste (2 x 3m³ bin) originating from the office and amenities buildings, as well as packaging from routine equipment is placed in the appropriate skips for collection by Council or a licensed contractor for disposal/ recycling at an appropriate waste management facility every month; and
- Wastewater from amenities is treated and disposed of via an on-site septic tank with absorption trenches/pump out.

Holcim will advise the Department once approval to operate the on-site wastewater amenities is received from Council.



11 Community

11.1 COMMUNITY ENGAGEMENT ACTIVITIES

Holcim has maintained community engagement measures during the reporting period by undertaking the following activities:

- Maintenance of a website containing publicly available documents as required by approvals;
- 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.

11.2 COMPLAINTS

A copy of the complaints register, as well as all publicly listed information including contacts for locals in the community is publicly available on the Teven Quarry webpage in accordance with the Development Consent requirements (<u>https://www.holcim.com.au/teven</u>).

There were two community complaints recorded during the 2024 reporting period, which have been summarised in **Table 30** below.

Date	Description	Outcome
26/04/2024	Neighbour called to complain about the volume of water being discharged from the Quarry.	Quarry manager explained to the neighbour that it is within the consent requirements of the site. The quarry manager also agreed to review the water discharge process to look for opportunities to reduce impacts e.g. discharge on low tide and/or dry conditions where possible.
15/08/2024	Neighbour called to complain about the volume of water being discharged from the Quarry onto their farmland.	Following investigations, it was found that the discharge channels that run along their paddocks were already at capacity and heavy rainfall had caused them to overflow into his paddocks which were already saturated due to a recent king tide and heavy rainfall.

Table 30: Community complaints received during 2024 reporting period

There were no complaints in 2017, three complaints in 2018, one complaint in 2019, three complaints in 2020, three complaints in 2021, one in 2022, and none in 2023.



12 Independent Audit

The next IEA is due in August 2025.



13 Incidents and Non-Compliances

See Table 31 for a summary of incidents and non-compliances within the 2024 reporting period.

Approval	Condition	Incident or Non-Compliance	Action
Approval SSD 6422	Condition Schedule 3, Condition 4	During the annual return (AEMR) process on 14 March 2025, it was made evident to	Action It was reported to the DPHI and EPA on 14th March 2025 (after being made aware by the AEMR draft report, and reported within 7 days of being known by Holcim). The exceedance was not prompted by the environmental consultant (Ramboll) for Holcim to report the exceedance as following a review of the data by the consultant it was determined to
EPL 3293	L4.2	Quarry on the NM4 noise monitor which recorded an exceedance of the criteria by 6dBA (43 LAeq (15 min) dBA).	be a moderate exceedance based on the guidance in the Noise Policy for Industry. The reasoning for this is that the consultant verified the exceedance of the noise criteria in the Quarter 3 noise monitoring. Given that there were no exceedances reported for Q3 2024 report it was deemed that the one-off moderate exceedance was marked as within criteria.
SSD 6422	Schedule 3 Condition 14	Holcim was informed on 10 January 2025 that the site samples were damaged in transit by the laboratory courier (DDG1, DDG2 and DDG3 sampled on site on 12 December 2024).	Holcim reported the damaged DD samples to the DPHI and the EPA after being made aware by the engaged consultancy

Table 31: Summary of I	ncidents and Non-Compliances
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Approval	Condition	Incident or Non-Compliance	Action
		On 14 February 2025 it was reported to Holcim that the PM ₁₀ monitor failed and required repairs (this included two missed reporting days on 4th February and 10th February)	Ramboll on 13 January 2025 (within 7-day reporting period).
		February).	The PM ₁₀ monitor failure was reported to the DPHI and EPA that the unit had failed and the DPHI followed up with a subsequent site visit (27 February 2024). The unit was repaired and returned to site (20th March 2024); however, experienced ongoing issues requiring a replacement rental unit that arrived 12th April 2025. Recurrent failures occurred throughout the year requiring replacement units to be onboarded at short notice resulting in missed samples in July (missed samples on 6th and 12th July), August (missed sample 11th August) and
			Investigations are ongoing; however, believed to have been
			potentially being attributed to an electrical supply issue.



14 Activities to be Completed in the Next Reporting Period

Holcim staff will undertake the following works and improvement measures and projects at Teven Quarry in 2025 to ensure compliance with the Development Consent and EPL 3293, and to ensure that effective environmental management controls are in place and operating in accordance with the requirements of the Development Consent. **Table 32** outlines proposed actions for 2025.

Improvement Measure	Activities
Biodiversity	Weed spraying will continue at site during the next reporting period
Air Quality	Maintain a HVAS monitoring program which meets Developmental Consent requirements
Water Sampling	Complete water sampling for at least the parameters pH, Total Suspended Solids, and Oil and grease
Groundwater Assessment	Holcim will continue to monitor the quarry void for groundwater seepage to ensure that groundwater quantities remain negligible

Table 32: Improvement Actions for 2025



Appendix A – 2024 Quarterly Noise Monitoring Reports

Intended for Holcim (Australia) Pty Ltd

Document type Report

Date May 2024

Teven Quarry Quarterly Noise Monitoring Assessment Quarter 1 2024



Teven Quarry Quarterly Noise Monitoring Assessment Quarter 1 2024

Project name	NSW Environmental Monitoring 2023-2024	
Project no.	318001799	Ramboll
Recipient	Matt Kelly	The Arc, 45a Watt St
Document type	Report	Newcastle, NSW 2300
Version	1	Australia
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 10 January for Teven Quarry during Quarter 1 2024 in Teven, NSW, as part of the noise monitoring program	

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Appendices

Appendix 1

Sound Exposure Level and Noise Emission Level Calculations

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 Teven Quarry ("the quarry") at Teven, NSW.

This NMA was done in accordance with the following documents:

- Noise Policy for Industry (NPfI) (NSW EPA, 2017).
- Teven Quarry Noise Management Plan (NMP) (Holcim Australia, 2021).
- Environment Protection Licence (EPL) number 3293 (NSW EPA, 2021).
- Development Consent Application Number SSD_6422 (Minister for Planning and Environment, 2015).
- 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 in accordance with the NMP 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 Teven, NSW, approximately 7 km west of Ballina. Sensitive receivers surrounding the quarry are primarily rural and residential properties in coastal bushland with elevated and undulating topography. Five monitoring locations have been selected as part of the NMA and in accordance with the EPL and Development Consent and are shown in **Table 1-1**.

Monitoring Locations	Nearest Receiver	Locality and Sensitive Receivers
NM1	R7	West of the quarry situated at a rural residential property at the end of Leadbeatters Lane
NM2	R3/R4	East of the quarry situated at a rural residential property on Teven Road
NM3	R2	South of the quarry situated at a rural residential property at the end of Wellers Road
NM4	R10	North of the quarry situated at a rural residential property adjacent the site off Stokers Lane
NM5	R14	Northeast of the quarry situated at a rural residential property of Teven Road

Table 1-1: Monitoring locations locality and sensitive receptors

The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**.



Legend

- Noise monitoring location
- Residential receiver location





2. Noise Criteria

Table 2-1 summaries the applicable onsite noise criteria outlined in the NMP and Development Consent for residential receivers (NM1, NM2, NM3, NM4, NM5) surrounding the quarry.

Table 2-1: Monitoring locations and noise criteria

		Day ¹	Evening ²	
Receivers	Monitoring Locations	LAeq (15min)	LAeq (15min)	
		dB	(A)	
R3, R4, R13, R15, R16, R17, R18, R20	NM2	38	35	
All other receivers	NM1, NM3, NM4, NM5	37	35	
1 7 am–6 pm Monday to Saturday and 8 am–6 pm Sunday and public holidays 2 6 pm–10 pm Monday to Sunday				

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 measurements were completed using a RION Sound Level Meter NL-52 on Wednesday 10 January 2024. The acoustic instrumentation used 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 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.

Attended noise monitoring was conducted for 15-minute periods at each location over one day. As per the NMP, two sets of measurements were completed during the day, and two sets of measurements were completed during the evening, at each monitoring location. It is noted that the quarry was not operational during the evening periods, however, monitoring was conducted as per requirements of the EPL.

Where the quarry 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:

- Wind speeds greater than 3m/s at 10m above ground level
- Temperature inversion conditions between 1.5°C and 3°C/100m and wind speed greater than 2m/s at 10m above ground level
- Temperature inversion conditions greater than 3°C/100m.

Appendix 5 of the Development Consent also specifies that except for wind speed at microphone height, the data to be used for determing meterological conditons shall be that recorded by a suitable meteorological station operating in the vicinity of the site.

4. Results and Discussion

4.1 Location NM1

Noise monitoring at location NM1 conducted on Wednesday 10 January 2024 resulted in audible quarry noise during the day. Holcim heavy machinery equipment were observed and measured during both day monitoring periods, however, are below the 15min LAeq criteria using sound level exposure calculations included in **Appendix 1**. The quarry was not operational during the evening. Ambient noise sources measured included insects, wind/rustling leaves, passing cars and a ride on mower. These results meet the established noise criteria and indicate that noise emissions from Teven Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location NM1are presented in **Table 4-1**.

		Descriptor (dBA)		Descriptor (dBA)		Descriptor (dBA)		Meteorology		Teven	
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	Onsite Met Station (10m height)	Onsite Met Station (10m height) Apparent Noise Source, Description and SPL (dBA)		LAeq(15min) Criteria (dBA)		
10-01-24	10:26am to 10:31am (Day)	64.5	58.2	52.1	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: D ¹	Insects (sporadic) 57-64 Ride on mower 58-64 Holcim machinery <47 (dozen times for several seconds) Quarry audible	<35 ³	37		
10-01-24	10:47am to 11:02am (Day)	62.1	54.8	47.8	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: D ¹	Insects (sporadic) 51-62 Holcim machinery <46 (15 times for several seconds) Quarry audible	<35 ³	37		
10-01-24	6:01pm to 6:16pm (Evening)	65.2	55.0	44.5	WD: 140° WS: 0.9 m/s Rain: Nil	WD: n/aInsects (sporadic) 44-62WS: 0 m/sPassing car 46Rain: nilWind/rustling leaves 45-47Stability Category: D1Quarry not operational		n/a²	35		
10-01-24	6:18pm to 6:33pm (Evening)	61.7	47.7	36.1	WD: 140° WS: 0.6 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: D ¹	Insects (sporadic) 43-61 Wind/rustling leaves 40-45 Quarry not operational	n/a²	35		

Table 4-1: Noise survey results and observations for Location NM1

¹ Temperature data used from BOM (Station ID 94596) to undertake modelling using TAPM to determine Stability Category.

² Quarry not operational.

³ Value estimated based on sound exposure level calculation in **Appendix 1**.

4.2 Location NM2

Noise monitoring at location NM2 was completed on Wednesday 10 January 2024. The quarry was inaudible during the day and was not operational during the evening period. The ambient noise environment was dominated by passing cars on Teven Road, birds, insects, a ride on mower and a whipper snipper. These results indicate that noise emissions from Teven Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location NM2 are presented in **Table 4-2**.

		Descriptor (dBA)		Meteorology			Teven		
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	Inheld at phone Onsite Met Station Apparent Noise Source, uphone (10m height) Description and SPL (dBA) t) t)		Quarry LAeq(15min) Contribution	LAeq(15min) Criteria (dBA)
10-01-24	12:01pm to 12:16pm (Day)	82.3	61.2	45.4	WD: n/a WS: 0 m/s Rain: Nil	WD: n/aRide on mower (sporadic) 55-67WS: 0 m/sPassing cars on Teven road <82		<35	38
10-01-24	12:29pm to 12:44pm (Day)	88.0	67.1	51.7	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: D ¹	Whipper snipper (occasional) 53-56 Passing cars (occasional) <89 Insects (sporadic) 61-62 Quarry inaudible	<423	38
10-01-24	8:00pm to 8:15pm (Evening)	77.4	55.6	44.8	WD: n/a WS: 0 m/s Rain: Nil	WD: S WS: 0.4 m/s Rain: nil Stability Category: E ¹ Insects (sporadic) 44-53 Passing cars (occasional) 57-75 Quarry not operational		n/a²	35
10-01-24	8:17pm to 8:32pm (Evening)	78.9	54.7	43.5	WD: n/a WS: 0 m/s Rain: Nil	WD: S WS: 0.2 m/s Rain: nil Stability Category: E ¹	Insects (sporadic) 41-47 Passing cars (occasional) <78 Quarry not operational	n/a²	35

Table 4-2: Noise survey results and observations for Location NM2

¹ Temperature data used from BOM (Station ID 94596) to undertake modelling using TAPM to determine Stability Category.

² Quarry not operational.

³ LA90 value of 52 dBA was dominated by background noise so unable to estimate contribution for quarry at the assessment location.

4.3 Location NM3

Noise monitoring at location NM3 was completed on Wednesday 10 January 2024. The quarry was inaudible during the day and was not operational during the evening period. The ambient noise environment consisted of insects, aircraft, and a passing car. These results indicate that noise emissions from Teven Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location NM3 are presented in **Table 4-3**.

		Descriptor (dBA)		Meteorology					
Date	Time	LAmax	PAeq	06V1	(handheld at microphone height)	Onsite Met Station (10m height)	Apparent Noise Source, Description and SPL (dBA)	Teven Quarry LAeq(15min) Contribution	LAeq(15min) Criteria (dBA)
10-01-24	11:21am to 11:36am (Day)	73.6	57.5	52.3	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: D ¹	Insects (sporadic) 46-65 Aircraft (few seconds) <74 Quarry inaudible	<36 ³	37
10-01-24	11:37am to 11:52am (Day)	77.4	57.4	51.2	WD: 0° WS: 0.6 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: D ¹	Insects (sporadic) 46-61 Car passing 69 Aircraft (10 seconds) <63 Quarry inaudible	<36 ³	37
10-01-24	8:38pm to 8:53pm (Evening)	59.5	54.2	51.1	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: E ¹	Insects 47-56 Quarry not operational	n/a²	35
10-01-24	8:56pm to 9:11pm (Evening)	64.3	53.4	50.2	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: E ¹	Insects 48-58 Aircraft (10 seconds) <64 Quarry not operational	n/a²	35

Table 4-3: Noise survey results and observations for Location NM3

¹ Temperature data used from BOM (Station ID 94596) to undertake modelling using TAPM to determine Stability Category.

² Quarry not operational.

3 Estimated based on observed background noise (insects) using LAeq.

4.4 Location NM4

Noise monitoring at location NM4 was completed on Wednesday 10 January 2024. The quarry was audible during both monitored day periods. One piece of Holcim heavy machinery equipment was observed and measured during each day monitoring period, however, noise emission from each is below the 15min L_{Aeq} criteria using sound level exposure calculations also included in **Appendix 1**. It should be noted that the monitoring was completed close to Stokers Lane at the entrance to the residence as to not disturb the resident, which places the attended noise monitoring location in direct line-of-sight of the quarry rather than near the sensitive receptor, i.e., the resident. Subsequently the results from the sound exposure level calculation results for both monitored day periods were adopted for distance correction to receiver using noise emission level calculations in **Appendix 1**. The quarry was not operating during the evening period. The ambient noise environment consisted of birds, insects, aircraft, and a passing car. The results and observations taken during the monitoring events at Location NM4 are presented in **Table 4-4** These results indicate that noise emissions from Teven Quarry did not contribute to noise nuisance.

		Descriptor (dBA)		Meteorology			Teven Quarry	LAeg	
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	at Onsite Met Station Apparent Noise Source, Description e (10m height) and SPL (dBA)		LAeq (15min) Contribution	(15min) Criteria (dBA)
10-01-24	1:23pm to 1:38pm (Day)	83.4	53.4	46.7	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: C ¹	Holcim HME 47-52 (several times for few seconds) Aircraft 54 (once for 10 seconds) Insects (sporadic) 47-54 Passing car 56 Quarry audible	<283	37
10-01-24	1:39pm to 1:54pm (Day)	77.3	50.9	39.4	WD: 0° WS: 0.4 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: C ¹	Holcim HME 45-51 (several times for few seconds) Insects (sporadic) 49-54 Quarry audible	<27 ³	37
10-01-24	7:22pm to 7:37pm (Evening)	62.2	40.5	37.5	WD: n/a WS: 0 m/s Rain: Nil	WD: S WS: 2.0 m/s Rain: nil Stability Category: D ¹	Insects (sporadic) 37-62 Birds 39-40 Quarry not operational	n/a²	35
10-01-24	7:38pm to 7:53pm (Evening)	60.8	42.5	39.7	WD: n/a WS: 0 m/s Rain: Nil	WD: S WS: 1.8 m/s Rain: nil Stability Category: D ¹	Insects (sporadic) 41-60 Birds 40-42 Quarry not operational	n/a²	35

Table 4-4: Noise survey results and observations for Location NM4

¹ Temperature data used from BOM (Station ID 94596) to undertake modelling using TAPM to determine Stability Category.

² Quarry not operational

³ Value estimated based on distance correction to receiver location in calculation in Appendix 1.

4.5 Location NM5

Noise monitoring at location NM5 was completed on Wednesday 10 January 2024. The quarry was inaudible during any monitored period during the day and evening. Noise sources measured included birds, insects, and passing cars. These results indicate that noise emissions from Teven Quarry did not contribute to noise nuisance during this time. The results and observations taken during the monitoring events at Location NM5 are presented in **Table 4-5**.

Table 4-5: Noise survey results and observations for Location NM5

		Dese	criptor (d	BA)					
Date	Time (hrs)	LAmax	LAeq	LA90	Meteorology (Handheld at microphone height)	Onsite Met Station (10m height)	nsite Met Station Apparent Noise Source, Om height) Description and SPL (dBA)		LAeq(15min) Criteria
10-01-24	12:47pm to 1:02pm (Day)	67.1	48.3	36.8	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: D/C ¹	Birds (occasional) 39-50 Passing cars (occasional) 57-65) Insects 45 Quarry inaudible	<27	37
10-01-24	1:04pm to 1:19pm (Day)	78.3	48.8	39.9	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: C ¹	Birds (occasional) 40 Passing cars (occasional) 62-78 Insects 41-46 Quarry inaudible	<30	37
10-01-24	6:46pm to 7:01pm (Evening)	70.9	46.0	37.8	WD: 60° WS: 1.1 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: D ¹	Passing cars (occasional) 49-72 Insects (sporadic) 37-46 Bird 44 Quarry not operational	n/a²	35
10-01-24	7:03pm to 7:18pm (Evening)	63.0	45.0	34.2	WD: 60° WS: 1.0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: D ¹	Passing cars (occasional) 49-63 Insects (sporadic) 37-48 Bird 47-54 Quarry not operational	n/a²	35

¹ Temperature data used from BOM (Station ID 94596) to undertake modelling using TAPM to determine Stability Category.

² Quarry not operational

5. Conclusion

This NMA completed by Ramboll at the Holcim Teven Quarry, Teven, NSW as a quarterly requirement of the NMP. Noise monitoring was completed on Wednesday 10 January 2024 at five locations selected as representative to the sensitive receptors at the surroundings to Teven Quarry.

Audible noise identified as emitted from the quarry was recorded during the day at location NM1 and NM4. The results presented in this NMA show compliance with the relevant noise criteria at the Holcim Teven Quarry, Teven, NSW.

6. References

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Standards Australia (2003) *AS 60942:2003 Electroacoustics - Sound calibrators.* Australian Standard.

Appendix 1 Sound Exposure Level and Noise Emission Level Calculations

NM1 day monitoring period (10:26AM - 10:31AM)

Noise source	Holcim machinery
Meas. Dist from source (m)	-
Meas. Time (s)	5
Meas. LAeq dB	47
Calc Sel dB	54
No. Events in 15min	12
Total LAeq (15min)	35

NM1 day monitoring period (10:47AM - 11:02AM)

Noise source	Holcim machinery
Meas. Dist from source (m)	-
Meas. Time (s)	5
Meas. LAeq dB	46
Calc Sel dB	53
No. Events in 15min	15
Total LAeq (15min)	35

NM4 day monitoring period (1:23PM - 1:38PM)

Noise source	Holcim HME
Meas. Dist from source (m)	-
Meas. Time (s)	3
Meas. LAeq dB	52
Calc Sel dB	57
No. Events in 15min	5
Total LAeq (15min)	34

NM4 day monitoring period (1:39PM - 1:54PM)

Noise source	Holcim HME
Meas. Dist from source (m)	-
Meas. Time (s)	3
Meas. LAeq dB	51
Calc Sel dB	56
No. Events in 15min	5
Total LAeq (15min)	33



NM4 day monitoring period (1:23PM - 1:38PM)

Site contribution corrected for distance from monitoring location to receiver

Noise source	Holcim crusher/ screening equipment
Estimated site contribution (LAeq) at monitoring location (dBA)	34.2
Approx. distance from monitoring location to site (m)	315
Approx. distance from site to receiver (m)	500
Distance corrected site contribution at receiver (LAeq dBA)	30.2
Estimated additional attenuation (vegetation)	2
Estimated site contribution at receiver (dBA)	28.2

NM4 day monitoring period (1:39PM - 1:54PM)

Site contribution corrected for distance from monitoring location to receiver

Noise source	Holcim crusher/ screening equipment
Estimated site contribution (LAeq) at monitoring location (dBA)	33.2
Approx. distance from monitoring location to site (m)	315
Approx. distance from site to receiver (m)	500
Distance corrected site contribution at receiver (LAeq dBA)	29.2
Estimated additional attenuation (vegetation)	2
Estimated site contribution at receiver (dBA)	27.2

Intended for Holcim (Australia) Pty Ltd

Document type
Report

Date July 2024

Teven Quarry Quarterly Noise Monitoring Assessment Quarter 2 2024


Teven Quarry Quarterly Noise Monitoring Assessment Quarter 2 2024

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Description	Data collected on 6 May 2024 and 7 May 2024 for Teven Quarry during Quarter 2 2024 in Teven, NSW, as part of the noise monitoring program	

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Appendices

Appendix 1

Sound Exposure Level and Noise Emission Level Calculations

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 Teven Quarry ("the quarry") at Teven, NSW.

This NMA was done in accordance with the following documents:

- Noise Policy for Industry (NPfI) (NSW EPA, 2017).
- Teven Quarry Noise Management Plan (NMP) (Holcim Australia, 2021).
- Environment Protection Licence (EPL) number 3293 (NSW EPA, 2021).
- Development Consent Application Number SSD_6422 (Minister for Planning and Environment, 2015).
- 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 in accordance with the NMP 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 Teven, NSW, approximately 7 km west of Ballina. Sensitive receivers surrounding the quarry are primarily rural and residential properties in coastal bushland with elevated and undulating topography. Five monitoring locations have been selected as part of the NMA and in accordance with the EPL and Development Consent and are shown in **Table 1-1**.

Monitoring Locations	Nearest Receiver	Locality and Sensitive Receivers
NM1	R7	West of the quarry situated at a rural residential property at the end of Leadbeatters Lane
NM2	R3/R4	East of the quarry situated at a rural residential property on Teven Road
NM3	R2	South of the quarry situated at a rural residential property at the end of Wellers Road
NM4	R10	North of the quarry situated at a rural residential property adjacent the site off Stokers Lane
NM5	R14	Northeast of the quarry situated at a rural residential property of Teven Road

Table	1-1:	Monitoring	locations	locality	and	sensitive	receptors
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The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**.



Legend

- Noise monitoring location
- Residential receiver location





2. Noise Criteria

Table 2-1 summaries the applicable onsite noise criteria outlined in the NMP and Development Consent for residential receivers (NM1, NM2, NM3, NM4, NM5) surrounding the quarry.

Table 2-1: Monitoring locations and noise criteria

		Day ¹	Evening ²						
Receivers	Monitoring Locations	LAeq (15min)	LAeq (15min)						
		dB(A)							
R3, R4, R13, R15, R16, R17, R18, R20	NM2	38	35						
All other receivers	NM1, NM3, NM4, NM5	37	35						
¹ 7 am–6 pm Monday to Saturday and 8 a ² 6 pm–10 pm Monday to Sunday	¹ 7 am–6 pm Monday to Saturday and 8 am–6 pm Sunday and public holidays ² 6 pm–10 pm Monday to Sunday								

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 measurements were completed using a RION Sound Level Meter NL-52 on Monday 6 May and Tuesday 7 May 2024. The acoustic instrumentation used 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 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.

Attended noise monitoring was conducted for 15-minute periods at each monitoring location over two days. As per the NMP, two sets of measurements were completed during the day, and two sets of measurements were completed during the evening, at each monitoring location. It is noted that the quarry was not operational during the evening periods, however, monitoring was conducted as per requirements of the EPL.

Where the quarry 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:

- Wind speeds greater than 3m/s at 10m above ground level.
- Temperature inversion conditions between 1.5°C and 3°C/100m and wind speed greater than 2m/s at 10m above ground level.
- Temperature inversion conditions greater than 3°C/100m.

Appendix 5 of the Development Consent also specifies that except for wind speed at microphone height, the data to be used for determing meterological conditons shall be that recorded by a suitable meteorological station operating in the vicinity of the site.

4. Results and Discussion

4.1 Location NM1

Noise monitoring at location NM1 conducted on Tuesday 7 May 2024 resulted in inaudible quarry noise during the day. The quarry was not operational during the evening. For one day period there was a negligible exceedance of the criteria (<2 dBA). Ambient noise sources measured included insects, wind/rustling leaves, and birds. These results meet the established noise criteria and indicate that noise emissions from Teven Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location NM1are presented in **Table 4-1**.

		Descriptor (dBA)		Meteorology			Teven		
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	Onsite Met Station (10m height)	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq(15min) Contribution	LAeq(15min) Criteria (dBA)
7-05-24	10:05am to 10:20am (Day)	62.8	51.8	46.4	WD: 310° WS: 0.5 m/s Rain: Nil	WD: W WS: 4 m/s Rain: nil Stability Category: E ¹	Background trees/wind/birds 40- 62 Quarry inaudible	<36	37
7-05-24	10:20am to 10:35am (Day)	66.5	56.2	49.0	WD: 310° WS: 0.5 m/s Rain: Nil	WD: W WS: 4 m/s Rain: nil Stability Category: E ¹	Background trees/wind/birds 43- 60 Car passing 59-64 Quarry inaudible	<39 ³	37
7-05-24	6:33pm to 6:48pm (Evening)	57.0	48.5	46.8	WD: n/a WS: 0 m/s Rain: Nil	WD: W WS: 1.8 m/s Rain: nil Stability Category: E ¹	Background trees/wind/birds 44- 50 Quarry not operational	n/a²	35
7-05-24	6:50pm to 7:05pm (Evening)	59.2	48.6	44.9	WD: 310° WS: 0.9 m/s Rain: Nil	WD: W WS: 2 m/s Rain: nil Stability Category: E ¹	Background wind/trees/birds 44- 48 Quarry not operational	n/a²	35

Table 4-1: Noise survey results and observations for Location NM1

¹ Modelled using TAPM to determine Stability Category.

² Quarry not operational.

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

4.2 Location NM2

Noise monitoring at location NM2 was completed on Tuesday 7 May 2024. Offsite quarry vehicles were audible during the day and the site was not operational during the evening period. Two Holcim trucks were observed and measured during one monitored day period, however as this was an offsite vehicle movement it doesn't constitute as a contributor to the quarry contribution. The ambient noise environment was dominated by wind, trees, motorway hum, and passing cars on Teven Road. These results indicate that noise emissions from Teven Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location NM2 are presented in **Table 4-2**.

		Descriptor (dBA)		Meteorology			Teven		
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	at Onsite Met Station Apparent Noise Source, e (10m height) Description and SPL (dBA)		Quarry LAeq(15min) Contribution	LAeq(15min) Criteria (dBA)
7-05-24	9:20am to 9:35am (Day)	86.4	65.8	44.6	WD: 310° WS: 1.4 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: E ¹	Background wind/trees/motorway 44-48 Cars passing on Teven Rd 55-75 Holcim trucks on Teven Rd 60- 85 (occurred twice for 7-10 seconds each) Quarry vehicles audible	<35	38
7-05-24	9:35am to 9:50am (Day)	84.1	61.9	41.1	WD: 310° WS: 1.4 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: E ¹	Background wind/trees/motorway 37-55 Cars passing on Teven Rd 58-81 Quarry inaudible	<31	38
7-05-24	7:54pm to 8:09pm (Evening)	83.8	58.0	37.7	WD: n/a WS: 0 m/s Rain: Nil	WD: W WS: 2 m/s Rain: nil Stability Category: E ¹	Background wind/trees/motorway 35-38 Cars passing on Teven Rd 83 Quarry not operational	n/a²	35
7-05-24	8:11pm to 8:26pm (Evening)	85.9	57.0	38.3	WD: n/a WS: 0 m/s Rain: Nil	WD: W WS: 2.2 m/s Rain: nil Stability Category: E ¹	Background wind/trees/motorway 35-38 Cars passing on Teven Rd 43-86 Quarry not operational	n/a²	35

Table 4-2: Noise survey results and observations for Location NM2

¹ Modelled using TAPM to determine Stability Category.

4.3 Location NM3

Noise monitoring at location NM3 was completed on Monday 6 May 2024 and Tuesday 7 May 2024. The quarry was inaudible during the day and was not operational during the evening period. The ambient noise environment consisted of insects, frogs, birds, trees, aircraft, and motorway hum. These results indicate that noise emissions from Teven Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location NM3 are presented in **Table 4-3**.

		Descriptor (dBA)		Meteorology					
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	Onsite Met Station (10m height)	Met Station Apparent Noise Source, height) Description and SPL (dBA)		LAeq(15min) Criteria (dBA)
7-05-24	7:57am to 8:12am (Day)	64.5	44.6	38.0	WD: 306° WS: 1.8 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: E ¹	Background trees/frogs 36-42 Birds 38-41 Aircraft 44-62 (occurred once) Quarry inaudible	<28	37
7-05-24	8:13am to 8:27am (Day)	48.9	38.5	36.6	WD: 306° WS: 1.8 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: E ¹	Background trees/frogs 34-40 Birds 48 Quarry inaudible	<27	37
6-05-24	6:00pm to 6:15pm (Evening)	48.7	42.5	40.4	WD: n/a WS: 0 m/s Rain: Nil	WD: NW WS: 3.1 m/s Rain: nil Stability Category: E ¹	Background insects/motorway hum 40-42 Quarry not operational	n/a²	35
6-05-24	6:15pm to 6:30pm (Evening)	54.5	44.1	42.9	WD: n/a WS: 0 m/s Rain: Nil	WD: NW WS: 3.1 m/s Rain: nil Stability Category: E ¹	Background insects/motorway hum 40-42 Aircraft 44-54 Birds 42-45 Quarry not operational	n/a²	35

Table 4-3: Noise survey results and observations for Location NM3

¹ Modelled using TAPM to determine Stability Category.

4.4 Location NM4

Noise monitoring at location NM4 was completed on Monday 6 May 2024 and Tuesday 7 May 2024. The quarry was audible during both monitored day periods. Continuous site background noise and reverse squawkers were measured for the first day period and sound exposure calculations (SEL) included in **Appendix 1** showed an exceedance of the criteria by 6 dBA. Reverse squeakers were measured during the second day period and SEL calculations included in **Appendix 1** showed an exceedance of the criteria by 3 dBA. It should be noted that the monitoring was completed close to Stokers Lane at the entrance to the residence as to not disturb the resident, which places the attended noise monitoring location in direct line-of-sight of the quarry rather than near the sensitive receptor, i.e., the resident. Subsequently the results from the SEL calculations the first day monitored period still showed an exceedance of the criteria by 6 dBA when factoring in the background noise also observed from the site. NEL calculations showed the second monitored day period did not exceed the criteria. Holcim vehicles entering and exiting the site were observed and measured four times for up to 12 seconds each time during the day. As these were offsite vehicle movements they don't constitute as a contributor to the quarry contribution. The quarry was not operating during the evening period. The ambient noise environment consisted of birds, insects, and aircraft. The results and observations taken during the monitoring events at Location NM4 are presented in **Table 4-4.** These results indicate that noise emissions from Teven Quarry did contribute to noise nuisance during the day.

		Descriptor (dBA)		Meteorology			Teven	I Aeg	
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	Onsite Met Station (10m height)	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq (15min) Contribution	(15min) Criteria (dBA)
7-05-24	8:43am to 8:58am (Day)	81.2	59.8	45.8	WD: 310° WS: 1.3 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: E ¹	Background site noise (unsure of noise source) 48-51 Holcim trucks entering/exiting quarry 55-80 (occurred twice for 10-12 secs each) Reverse squawkers 46-59 (occurred 11 times for 5-7 secs each) Cars passing on Stoker's Lane 48-73 Birds 45-50 Quarry audible	<43 ^{3,4}	37

Table 4-4: Noise survey results and observations for Location NM4

						Des	criptor (c	IBA)	Meteorology			Teven	I Aeg
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	Onsite Met Station (10m height)	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq (15min) Contribution	(15min) Criteria (dBA)				
7-05-24	9:00am to 9:15am (Day)	80.3	57.7	42.8	WD: 310° WS: 1.3 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: E ¹	Reverse squawkers 45-57 (occurred 6 times for 5-10 secs each) Hammering 44-46 (occurred once) Holcim trucks entering/exiting quarry 52-80 (occurred twice for 10-12 secs each) Birds 47-49 Quarry audible	<31 ^{3,}	37				
7-05-24	6:00pm to 6:15pm (Evening)	54.6	47.5	46.8	WD: n/a WS: 0 m/s Rain: Nil	WD: W WS: 1.3 m/s Rain: nil Stability Category: E ¹	Background insects/motorway hum 45-47 Quarry not operational	n/a²	35				
6-05-24	6:40pm to 6:55pm (Evening)	51.4	40.6	39.4	WD: n/a WS: 0 m/s Rain: Nil	WD: NW WS: 2.2 m/s Rain: nil Stability Category: E ¹	Background insects/motorway hum 39-40 Birds 51 Quarry not operational	n/a²	35				

¹ Modelled using TAPM to determine Stability Category.

² Quarry not operational

³ Value estimated based on SEL and distance correction to receiver location calculations in **Appendix 1**.

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

4.5 Location NM5

Noise monitoring at location NM5 was completed on Tuesday 7 May 2024. The quarry was inaudible during any monitored period during the day and evening. Noise sources measured included wind, trees, motorway hum, aircraft, birds, insects, and passing cars on Teven Road. These results indicate that noise emissions from Teven Quarry did not contribute to noise nuisance during this time. The results and observations taken during the monitoring events at Location NM5 are presented in **Table 4-5**.

Table 4-5: Noise survey results and observations for Location NM5

		Descriptor (dBA)							
Date	Time (hrs)	LAmax	LAeq	LA90	Meteorology (Handheld at microphone height)	Onsite Met Station (10m height)	Apparent Noise Source, Description and SPL (dBA)	Teven Quarry LAeq(15min) Contribution	LAeq(15min) Criteria
7-05-24	10:51am to 11:06am (Day)	62.9	45.6	38.7	WD: 310° WS: 0.4 m/s Rain: Nil	WD: W WS: 4 m/s Rain: nil Stability Category: E ¹	Background wind/trees/motorway hum 36-47 Cars passing 40-62 Quarry inaudible	<29	37
7-05-24	11:07am to 11:22am (Day)	65.0	47.1	38.6	WD: 310° WS: 0.4 m/s Rain: Nil	WD: W WS: 4 m/s Rain: nil Stability Category: E ¹	Background wind/trees/motorway hum 36-45 Cars passing 40-62 Aircraft 42-45 Quarry inaudible	<29	37
7-05-24	7:19pm to 7:34pm (Evening)	53.5	42.5	41.1	WD: n/a WS: 0 m/s Rain: Nil	WD: W WS: 2 m/s Rain: nil Stability Category: E ¹	Background wind/trees/motorway hum 39-41 Quarry not operational	n/a²	35
7-05-24	7:35pm to 7:50pm (Evening)	70.7	50.1	41.8	WD: n/a WS: 0 m/s Rain: Nil	WD: W WS: 1.8 m/s Rain: nil Stability Category: E ¹	Background wind/trees/motorway hum 39-41 Cars passing on Teven Road 70 Quarry not operational	n/a²	35

¹ Temperature data used from BOM (Station ID 94596) to undertake modelling using TAPM to determine Stability Category.

5. Recommendations and Conclusion

This NMA completed by Ramboll at the Holcim Teven Quarry, Teven, NSW as a quarterly requirement of the NMP. Noise monitoring was completed on Monday 6 May 2024 and Tuesday 7 May 2024 at five locations selected as representative to the sensitive receptors at the surroundings to Teven Quarry.

Audible noise identified as emitted from the quarry was recorded during the day at locations NM2 and NM4. The results presented in this NMA show compliance with the relevant noise criteria at the Holcim Teven Quarry, Teven, NSW, except for NM4 which exceeded the criteria by 6 dBA for one day period.

While the exceedance of the noise criteria is considered "moderate", and no exceedance of the noise criteria has been recorded since the third quarter of 2023, it is recommended that the following 'best management practice' (BMP) be considered to reduce noise emissions from quarry operations in the future.

- using the quieter plant that can do the job.
- restricting movement of trucks on ridgelines and exposed haul routes where their noise can propagate over a wide area, especially at night.
- scheduling the use of noisy equipment at the least-sensitive time of day.
- siting noisy equipment behind structures that act as barriers, or at the greatest distance from the noise-sensitive area; or orienting the equipment so that noise emissions are directed away from any sensitive areas, to achieve the maximum attenuation of noise.
- where there are several noisy pieces of equipment, scheduling operations so they are used separately rather than concurrently.
- keeping equipment well-maintained and operating it in a proper and efficient manner
- employing 'quiet' practices when operating equipment, for example, positioning idling trucks in appropriate areas.
- running staff-education programs and regular toolbox talks on the effects of noise and the use of quiet work practices.

When BMP is not effective to achieve the required noise reduction by itself, the 'best available technology economically achievable' (BATEA) approach can then be considered. Examples of uses of BATEA include:

- using equipment with efficient muffler design.
- using quieter engines, such as electric instead of internal combustion.
- fitting and maintaining noise reduction packages on plant and equipment.
- using efficient enclosures for noise sources.
- using high-pressure hydraulic systems to split rock, instead of hydraulic or pneumatic hammers.
- damping or lining metal trays or bins.

Ramboll will verify exceedances of the noise criteria in the next round of noise monitoring and discuss further with Holcim in case of significant exceedances of the noise criteria being recorded.

6. References

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Appendix 1 Sound Exposure Level and Noise Emission Level Calculations

NM4 day monitoring period (8:43AM - 8:58AM)

Noise source	Reverse squawkers
Meas. Dist from source (m)	-
Meas. Time (s)	7
Meas. LAeq dB	54
Calc Sel dB	62
No. Events in 15min	11
Total LAeq (15min)	43

NM4 day monitoring period (9:00AM - 9:15AM)

Noise source	Reverse squawkers
Meas. Dist from source (m)	-
Meas. Time (s)	10
Meas. LAeq dB	52
Calc Sel dB	62
No. Events in 15min	6
Total LAeq (15min)	40

NM4 day monitoring period (8:43AM - 8:58AM)

Site contribution corrected for distance from monitoring location to receiver

Noise source	Holcim background noise
Estimated site contribution (LAeq) at monitoring location (dBA)	51.0
Approx. distance from monitoring location to site (m)	310
Approx. distance from site to receiver (m)	500
Distance corrected site contribution at receiver (LAeq dBA)	46.8
Estimated additional attenuation (vegetation & ground absorption)	5
Estimated site contribution at receiver (dBA)	41.8

Noise source	Reverse Squawkers
Estimated site contribution (LAeq) at monitoring location (dBA)	43.3
Approx. distance from monitoring location to site (m)	310
Approx. distance from site to receiver (m)	500
Distance corrected site contribution at receiver (LAeq dBA)	39.2
Estimated additional attenuation (vegetation & ground absorption)	5
Estimated site contribution at receiver (dBA)	34.2

umulative NEL of Holcim reverse squawkers and background noise 42.5

NM4 day monitoring period (9:00AM - 9:15AM)

Site contribution corrected for distance from monitoring location to receiver

Noise source	Reverse Squawkers
Estimated site contribution (LAeq) at monitoring location (dBA)	40.2
Approx. distance from monitoring location to site (m)	310
Approx. distance from site to receiver (m)	500
Distance corrected site contribution at receiver (LAeq dBA)	36.1
Estimated additional attenuation (vegetation & ground absorption)	5
Estimated site contribution at receiver (dBA)	31.1

Intended for Holcim (Australia) Pty Ltd

Document type
Report

Date October 2024

Teven Quarry Quarterly Noise Monitoring Assessment Quarter 3 2024



Teven Quarry Quarterly Noise Monitoring Assessment Quarter 3 2024

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Prepared by	Jake Bourke, Matilda Englert	https://www.ramboll.com/
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Approved by	Gavan Butterfield	
Description	Data collected on 11 September 2024 and 12 September 2024 for Teven	
	Quarry during Quarter 3 2024 in Teven, NSW, as part of the noise monitoring program	

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Appendices

Appendix 1 Sound Exposure Level and Noise Emission Level Calculations

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 Teven Quarry ("the quarry") at Teven, NSW.

This NMA was done in accordance with the following documents:

- Noise Policy for Industry (NPfI) (NSW EPA, 2017).
- Teven Quarry Noise Management Plan (NMP) (Holcim Australia, 2021).
- Environment Protection Licence (EPL) number 3293 (NSW EPA, 2021).
- Development Consent Application Number SSD_6422 (Minister for Planning and Environment, 2015).
- 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 in accordance with the NMP 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 Teven, NSW, approximately 7 km west of Ballina. Sensitive receivers surrounding the quarry are primarily rural and residential properties in coastal bushland with elevated and undulating topography. Five monitoring locations have been selected as part of the NMA and in accordance with the EPL and Development Consent and are shown in **Table 1-1**.

Monitoring Locations	Nearest Receiver	Locality and Sensitive Receivers
NM1	R7	West of the quarry situated at a rural residential property at the end of Leadbeatters Lane
NM2	R3/R4	East of the quarry situated at a rural residential property on Teven Road
NM3	R2	South of the quarry situated at a rural residential property at the end of Wellers Road
NM4	R10	North of the quarry situated at a rural residential property adjacent the site off Stokers Lane
NM5	R14	Northeast of the quarry situated at a rural residential property of Teven Road

The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**.



Legend

- Noise monitoring location
- Residential receiver location





2. Noise Criteria

Table 2-1 summaries the applicable onsite noise criteria outlined in the NMP and Development Consent for residential receivers (NM1, NM2, NM3, NM4, NM5) surrounding the quarry.

Table 2-1: Monitoring locations and noise criteria

		Day ¹	Evening ²						
Receivers	Monitoring Locations	LAeq (15min)	LAeq (15min)						
		dB	(A)						
R3, R4, R13, R15, R16, R17, R18, R20	NM2	38	35						
All other receivers	NM1, NM3, NM4, NM5	37	35						
¹ 7 am–6 pm Monday to Saturday and 8 am–6 pm Sunday and public holidays ² 6 pm–10 pm Monday to Sunday									

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 measurements were completed using a RION Sound Level Meter NL-52 on Wednesday 11 September and Thursday 12 September 2024. The acoustic instrumentation used 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 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.

Attended noise monitoring was conducted for 15-minute periods at each monitoring location over two days. As per the NMP, two sets of measurements were completed during the day, and two sets of measurements were completed during the evening, at each monitoring location. It is noted that the quarry was not operational during the evening periods, however, monitoring was conducted as per requirements of the EPL.

Where the quarry 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	$-1.7 < \Delta T \le -1.5$
Neutral	D	$-1.5 < \Delta T \le -0.5$
Slightly stable	E	-0.5 < ∆T ≤ 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:

- Wind speeds greater than 3m/s at 10m above ground level.
- Temperature inversion conditions between 1.5°C and 3°C/100m and wind speed greater than 2m/s at 10m above ground level.
- Temperature inversion conditions greater than 3°C/100m.

Appendix 5 of the Development Consent also specifies that except for wind speed at microphone height, the data to be used for determing meterological conditons shall be that recorded by a suitable meteorological station operating in the vicinity of the site.

4. Results and Discussion

4.1 Location NM1

Noise monitoring at location NM1 conducted on Wednesday 11 September 2024 and Thursday 12 September 2024 resulted in inaudible quarry noise during the day. The quarry was not operational during the evening. Ambient noise sources measured included insects, motorway hum, barking dog, passing cars, aircraft, and birds. These results meet the established noise criteria and indicate that noise emissions from Teven Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location NM1are presented in **Table 4-1**.

Table 4-1: Noise survey results and observations for Location NM1

		Descriptor (dBA)			Meteorology			Teven	
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	Onsite Met Station (10m height)	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq(15min) Contribution	Criteria (dBA)
12-09-24	10:21am to 10:36am (Day)	81.3	50.7	25.2	WD: n/a WS: 0 m/s Rain: Nil	WD: 219.6° WS: 0.6 m/s Rain: n/a Stability Category: F ¹	Background motorway hum/insects 23-40 Birds 39-42 Dog barking 40 Car passing 46-81 Quarry inaudible	<15	37
12-09-24	10:37am to 10:52am (Day)	77.9	49	26.8	WD: n/a WS: 0 m/s Rain: Nil	WD: 219.6° WS: 0.6 m/s Rain: n/a Stability Category: F ¹	Background motorway hum/insects 24-32 Cars passing 30-78 Quarry inaudible	<16	37
11-09-24	6:00pm to 6:15pm (Evening)	68.6	55.7	54	WD: n/a WS: 0 m/s Rain: Nil	WD: 4.1° WS: 1.4 m/s Rain: nil Stability Category: E ¹	Background cicadas 49-56 Car passing 56-67 Quarry not operational	n/a²	35
11-09-24	6:15pm to 6:30pm (Evening)	71.2	47.2	35.5	WD: n/a WS: 0 m/s Rain: Nil	WD: 4.1° WS: 1.4 m/s Rain: nil Stability Category: E ¹	Background cicadas 32-56 Birds 46-50 Car passing 42-69 Aircraft 42-48 Quarry not operational	n/a²	35

¹ Modelled using TAPM to determine Stability Category.

4.2 Location NM2

Noise monitoring at location NM2 was completed on Wednesday 11 September 2024 and Thursday 12 September 2024. An offsite quarry vehicle was audible during the day and the site was not operational during the evening period. A single Holcim truck was observed and measured during one monitored day period, however as this was an offsite vehicle movement it doesn't constitute as a contributor to the quarry contribution. The ambient noise environment was dominated by birds, insects, aircraft, motorway hum, and passing cars on Teven Road. These results indicate that noise emissions from Teven Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location NM2 are presented in **Table 4-2**.

Table 4-2: Noise survey results and observations for Location NM2

		Descriptor (dBA)			Mataavalaav			Towar	
Date	Time	LAmax	LAmax LAeq LA90		(handheld at microphone height)	Onsite Met Station (10m height)	Apparent Noise Source, Description and SPL (dBA)	Quarry Quarry LAeq(15min) Contribution	LAeq(15min) Criteria (dBA)
12-09-24	11:41am to 11:56am (Day)	88	63.6	39.7	WD: n/a WS: 0 m/s Rain: Nil	WD: 191.8° WS: 0.8 m/s Rain: nil Stability Category: F ¹	Birds/motorway hum 31-50 Cars passing on Teven Rd 31-88 Aircraft 42-53 Holcim truck leaving site 42-83 Quarry inaudible	<35	38
12-09-24	11:56am to 12:11pm (Day)	85.2	62.9	37.1	WD: n/a WS: 0 m/s Rain: Nil	WD: 210.5° WS: 0.7 m/s Rain: nil Stability Category: F ¹	Birds/motorway hum 31-50 Cars passing on Teven Rd 31-85 Quarry inaudible	<31	38
11-09-24	7:59pm to 8:14pm (Evening)	83.8	57.8	31.6	WD: n/a WS: 0 m/s Rain: Nil	WD: 347.9° WS: 1.4 m/s Rain: nil Stability Category: E ¹	Insects/motorway hum 29-32 Cars passing on Teven Rd 29-83 Quarry not operational	n/a²	35
11-09-24	8:14pm to 8:29pm (Evening)	79.8	51.3	30.2	WD: n/a WS: 0 m/s Rain: Nil	WD: 347.9° WS: 1.4 m/s Rain: nil Stability Category: E ¹	Insects/motorway hum 29-32 Cars passing on Teven Rd 28-79 Quarry not operational	n/a²	35

¹ Modelled using TAPM to determine Stability Category.

4.3 Location NM3

Noise monitoring at location NM3 completed on Wednesday 11 September 2024 and Thursday 12 September 2024 resulted in inaudible quarry noise during the day. The quarry was not operational during the evening. The ambient noise environment consisted of wind/trees, insects, and birds. These results indicate that noise emissions from Teven Quarry did not contribute to noise nuisance. The results and observations taken during the monitoring events at Location NM3 are presented in **Table 4-3**.

Table 4-3: Noise survey results and observations for Location NM3

		De	scriptor (o	dBA)	Meteorology				LAcc(1Emin)
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	Onsite Met Station (10m height)	Apparent Noise Source, Description and SPL (dBA)	LAeq(15min) Contribution	Criteria (dBA)
12-09-24	12:17pm to 12:32pm (Day)	53.2	33.5	28.5	WD: 40° WS: 1.2 m/s Rain: Nil	WD: 210.5° WS: 0.7 m/s Rain: nil Stability Category: F ¹	Background wind/trees/birds 26-53 Quarry inaudible	<19	37
12-09-24	12:34pm to 12:49pm (Day)	48.7	34	32	WD: 40° WS: 1.2 m/s Rain: Nil	WD: 210.5° WS: 0.7 m/s Rain: nil Stability Category: F ¹	Background wind/trees/birds 29-48 Quarry inaudible	<22	37
11-09-24	8:34pm to 8:49pm (Evening)	54.4	34.5	33	WD: n/a WS: 0 m/s Rain: Nil	WD: 304.8° WS: 0.4 m/s Rain: nil Stability Category: E ¹	Background motorway/insects 31-54 Quarry not operational	n/a²	35
11-09-24	8:49pm to 9:04pm (Evening)	54	34.6	32.7	WD: n/a WS: 0 m/s Rain: Nil	WD: 304.8° WS: 0.4 m/s Rain: nil Stability Category: E ¹	Background motorway/insects 30-54 Quarry not operational	n/a²	35

¹ Modelled using TAPM to determine Stability Category.

4.4 Location NM4

Noise monitoring at location NM4 was completed on Wednesday 11 September 2024 and Thursday 12 September 2024. The quarry was audible during both monitored day periods. Holcim machinery and reverse squawkers were observed and measured during both day periods and sound exposure (SEL) calculations included in **Appendix 1** showed exceedances of the criteria by 6 and 8 dBA. It should be noted that the monitoring was completed close to Stokers Lane at the entrance to the residence as to not disturb the resident, which places the attended noise monitoring location in direct line-of-sight of the quarry rather than near the sensitive receptor, i.e., the resident. Subsequently the results from the SEL calculations were adopted for distance correction to receiver using noise emission level (NEL) calculations in **Appendix 1**. NEL calculations showed both monitored day periods did not exceed the criteria at NM4. Holcim vehicles entering and exiting the site were observed and measured during both day periods. As these were offsite vehicle movements they did not constitute as a contributor to the quarry contribution. The quarry was not operating during the evening period. The ambient noise environment consisted of birds, insects, aircraft, motorway hum and passing cars on Teven Road. The results and observations taken during the monitoring events at Location NM4 are presented in **Table 4-4.** These results indicate that noise emissions from Teven Quarry did contribute to noise nuisance during the day.

		Descriptor (dBA)			Meteorology			Teven	LAea
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	Onsite Met Station (10m height)	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq (15min) Contribution	(15min) Criteria (dBA)
12-09-24	1:07pm to 1:22pm (Day)	77.3	56.5	45.3	WD: 40° WS: 1.2 m/s Rain: Nil	WD: 217.8° WS: 0.6 m/s Rain: nil Stability Category: E ¹	Birds 44-62 Holcim trucks entering/exiting quarry 50-77 Holcim machinery 41-48 (occurred for approx. 5 minutes) Holcim reverse squawkers 42-48 (occurred 4 times for approx5-7 seconds each) Quarry audible	<34 ²	37
12-09-24	1:25pm to 1:40pm (Day)	71.7	53.6	46.1	WD: 40° WS: 1.2 m/s Rain: Nil	WD: 217.8° WS: 0.6 m/s Rain: nil Stability Category: E ¹	Birds 44-62 Holcim trucks entering/exiting quarry 50-71 Holcim machinery 42-48 (occurred for approximately 7 minutes) Holcim reverse squawkers 42-48 (occurred twice for approx. 5-7 seconds) Quarry audible	<36²	37

Table 4-4: Noise survey results and observations for Location NM4

		Descriptor (dBA)			Meteorology			Teven	l Aer
Date	Time	LAmax LAeq LA90		LA90	(handheld at microphone height) Onsite Met Station (10m height)		Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq (15min) Contribution	(15min) Criteria (dBA)
11-09-24	7:21pm to 7:36pm (Evening)	58.4	39.6	37.9	WD: n/a WS: 0 m/s Rain: Nil	WD: 346.8° WS: 1.3 m/s Rain: nil Stability Category: E ¹	Insects/motorway hum 36-39 Cars passing on Teven Rd 36-58 Quarry not operational	n/a³	35
11-09-24	7:37pm to 7:52pm (Evening)	52.3	38.9	37.7	WD: n/a WS: 0 m/s Rain: Nil	WD: 346.8° WS: 1.3 m/s Rain: nil Stability Category: E ¹	Insects/motorway hum 36-39 Cars passing on Teven Rd 35-41 Aircraft 35-52 Quarry not operational	n/a³	35

¹ Modelled using TAPM to determine Stability Category.

 2 Value estimated based on SEL and distance correction to receiver location calculations in **Appendix 1**.

4.5 Location NM5

Noise monitoring at location NM5 completed on Wednesday 11 September 2024 and Thursday 12 September 2024 resulted in inaudible quarry noise during the day. The quarry was not operational during the evening. The ambient noise environment consisted of birds, insects, aircraft, ans passing cars. These results indicate that noise emissions from Teven Quarry did not contribute to noise nuisance during this time. The results and observations taken during the monitoring events at Location NM5 are presented in **Table 4-5**.

Table 4-5: Noise survey results and observations for Location NM5

		Descriptor (dBA)			Meteorology			Teven	
Date	Time (hrs)	LAmax	LAeq	LA90	(Handheld at microphone height)	Onsite Met Station (10m height)	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq(15min) Contribution	LAeq(15min) Criteria
12-09-24	11:05am to 11:20am (Day)	72.3	54.1	36.9	WD: n/a WS: 0 m/s Rain: Nil	WD: 191.8° WS: 0.8 m/s Rain: nil Stability Category: F ¹	Background birds 31-43 Cars passing 33-72 Quarry inaudible	<27	37
12-09-24	11:20am to 11:35am (Day)	73.5	52	33.9	WD: n/a WS: 0 m/s Rain: Nil	WD: 191.8° WS: 0.8 m/s Rain: nil Stability Category: F ¹	Background birds 30-40 Cars passing 30-73 Aircraft 37-45 Quarry inaudible	<24	37
11-09-24	6:45pm to 7:00pm (Evening)	70.2	49.2	38.3	WD: n/a WS: 0 m/s Rain: Nil	WD: 4.1° WS: 1.4 m/s Rain: nil Stability Category: E ¹	Background insects 37-39 Cars passing 40-70 Quarry not operational	n/a²	35
11-09-24	7:01pm to 7:16pm (Evening)	73.3	51	38	WD: n/a WS: 0 m/s Rain: Nil	WD: 346° WS: 1.3 m/s Rain: nil Stability Category: E ¹	Background insects 37-39 Cars passing 40-73 Quarry not operational	n/a²	35

¹ Temperature data used from BOM (Station ID 94596) to undertake modelling using TAPM to determine Stability Category.

5. Conclusion

This NMA completed by Ramboll at the Holcim Teven Quarry, Teven, NSW as a quarterly requirement of the NMP. Noise monitoring was completed on Wednesday 11 September 2024 and Thursday 12 September 2024 at five locations selected as representative to the sensitive receptors at the surroundings to Teven Quarry.

Audible noise identified as emitted from the quarry was recorded during the day at locations NM2 and NM4. The results presented in this NMA show compliance with the relevant noise criteria at the Holcim Teven Quarry, Teven, NSW.

During the noise monitoring in the last quarter, one moderate exceedance was observed at NM4 for one day period. It was therefore recommended that exceedances be verified in the next round of noise monitoring and further discussion made in case of significant exceedances of the noise criteria. Since the monitoring results were compliant with the relevant noise criteria during the latest round of noise monitoring, no further discussion is required.

6. References

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Appendix 1 Sound Exposure Level and Noise Emission Level Calculations


NM4 day monitoring period (1:07PM to 1:22PM)

Noise source	Holcim machinery
Meas. Dist from source (m)	-
Meas. Time (s)	300
Meas. LAeq dB	48
Calc Sel dB	73
No. Events in 15min	1
Total LAeq (15min)	43
Noise source	Reverse squawkers

Noise source	Reverse squawkers
Meas. Dist from source (m)	-
Meas. Time (s)	7
Meas. LAeq dB	48
Calc Sel dB	56
No. Events in 15min	4
Total LAeq (15min)	33

NM4 day monitoring period (1:25PM to 1:40PM)

Noise source	Holcim machinery
Meas. Dist from source (m)	-
Meas. Time (s)	420
Meas. LAeq dB	48
Calc Sel dB	74
No. Events in 15min	1
Total LAeq (15min)	45

Noise source	Reverse squawkers
Meas. Dist from source (m)	-
Meas. Time (s)	7
Meas. LAeq dB	48
Calc Sel dB	56
No. Events in 15min	2
Total LAeq (15min)	30

NM4 day monitoring period (1:07PM to 1:22PM)

Site contribution corrected for distance from monitoring location to receiver

Noise source	Holcim machinery
Estimated site contribution (LAeq) at monitoring location (dBA)	43.0
Approx. distance from monitoring location to site (m)	310
Approx. distance from site to receiver (m)	500
Distance corrected site contribution at receiver (LAeq dBA)	38.8
Estimated additional attenuation (vegetation & ground absorption)	5
Estimated site contribution at receiver (dBA)	33.8

Noise source	Reverse Squawkers
Estimated site contribution (LAeq) at monitoring location (dBA)	33.0
Approx. distance from monitoring location to site (m)	310
Approx. distance from site to receiver (m)	500
Distance corrected site contribution at receiver (LAeq dBA)	28.8
Estimated additional attenuation (vegetation & ground absorption)	5
Estimated site contribution at receiver (dBA)	23.8

Cumulative NEL of Holcim reverse squawkers and background noise 34.3

NM4 day monitoring period (1:25PM to 1:40PM)

Site contribution corrected for distance from monitoring location to receiver

Noise source	Holcim machinery
Estimated site contribution (LAeq) at monitoring location (dBA)	45.0
Approx. distance from monitoring location to site (m)	310
Approx. distance from site to receiver (m)	500
Distance corrected site contribution at receiver (LAeq dBA)	40.8
Estimated additional attenuation (vegetation & ground absorption)	5
Estimated site contribution at receiver (dBA)	35.8

Noise source	Reverse Squawkers
Estimated site contribution (LAeq) at monitoring location (dBA)	30.0
Approx. distance from monitoring location to site (m)	310
Approx. distance from site to receiver (m)	500
Distance corrected site contribution at receiver (LAeq dBA)	25.8
Estimated additional attenuation (vegetation & ground absorption)	5
Estimated site contribution at receiver (dBA)	20.8
Cumulative NEL of Holcim reverse squawkers and background noise	36.0

Intended for Holcim (Australia) Pty Ltd

Document type
Report

Date January 2025

Teven Quarry Quarterly Noise Monitoring Assessment Quarter 4 2024



Teven 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).
С	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.
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
NPfI	Noise Policy for Industry 2017

	Description
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.
ТАРМ	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 Teven Quarry ("the quarry") at Teven, NSW.

This NMA was done in accordance with the following documents:

- Noise Policy for Industry (NPfI) (NSW EPA, 2017)
- Teven Quarry Noise Management Plan (NMP) (Holcim Australia, 2021)
- Environment Protection Licence (EPL) number 3293 (NSW EPA, 2021)
- Development Consent Application Number SSD_6422 (Minister for Planning and Environment, 2015)
- 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 in accordance with the NMP 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 Teven, NSW, approximately 7 km west of Ballina. Sensitive receivers surrounding the quarry are primarily rural and residential properties in coastal bushland with elevated and undulating topography. Five monitoring locations have been selected as part of the NMA and in accordance with the EPL and Development Consent and are shown in **Table 1-1**.

Monitoring Locations	Nearest Receiver	Locality and Sensitive Receivers
NM1	R7	West of the quarry situated at a rural residential property at the end of Leadbeatters Lane
NM2	R3/R4	East of the quarry situated at a rural residential property on Teven Road
NM3	R2	South of the quarry situated at a rural residential property at the end of Wellers Road
NM4	R10	North of the quarry situated at a rural residential property adjacent the site off Stokers Lane
NM5	R14	Northeast of the quarry situated at a rural residential property of Teven Road

Table 1-1: Monitoring locations locality and sensitive receptors

The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**.



Legend

- Noise monitoring location
- Residential receiver location





2. Noise Criteria

Table 2-1 summaries the applicable onsite noise criteria outlined in the NMP and Development Consent for residential receivers (NM1, NM2, NM3, NM4, NM5) surrounding the quarry.

Table 2-1: Monitoring locations and noise criteria

		Day ¹	Evening ²				
Receivers	Monitoring Locations	LAeq (15min)	LAeq (15min)				
		dB	(A)				
R3, R4, R13, R15, R16, R17, R18, R20	NM2	38	35				
All other receivers	NM1, NM3, NM4, NM5	37	35				
1 7 am–6 pm Monday to Saturday and 8 am–6 pm Sunday and public holidays 2 6 pm–10 pm Monday to Sunday							

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 measurements were completed using a RION Sound Level Meter NL-52 on Monday 9 December, Tuesday 10 December Wednesday 11 December 2024. The acoustic instrumentation used 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 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.

Attended noise monitoring was conducted for 15-minute periods at each monitoring location over three days. As per the NMP, two sets of measurements were completed during the day, and two sets of measurements were completed during the evening, at each monitoring location. It is noted that the quarry was not operational during the evening periods, however, monitoring was conducted as per requirements of the EPL. Where the quarry 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. An onsite meterological station with data recorded at 10m height 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	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	$1.5 < \Delta T \le 4.0$
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:

- Wind speeds greater than 3m/s at 10m above ground level
- Temperature inversion conditions between 1.5°C and 3°C/100m and wind speed greater than 2m/s at 10m above ground level
- Temperature inversion conditions greater than 3°C/100m.

Appendix 5 of the Development Consent also specifies that except for wind speed at microphone height, the data to be used for determing meterological conditons shall be that recorded by a suitable meteorological station operating in the vicinity of the site.

4. Results and Discussion

4.1 Location NM1

Noise monitoring at location NM1 was conducted on Monday 9 December 2024 and Wednesday 11 December 2024 with results presented in **Table 4-1**. The quarry was inaudible at NM1 during the day. The quarry was not operational during the evening. Ambient noise sources measured included wind, trees, insects, birds and passing vehicles and an aircraft. The results meet the established noise criteria and indicate that noise emissions from Teven Quarry did not contribute to noise nuisance at the time of the monitoring.

Table 4-1: Noise survey results and observations for Location NM1

		Des	escriptor (dBA)		Meteorology			Teven		
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	Onsite Met Station (at 10m)	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq(15min) Contribution	LAeq(15min) Criteria (dBA)	
11-12-24	4:37pm to 4:52pm (Day)	68.2	53.8	39.9	WD: 20° WS: 1 m/s Rain: Nil	WD: W WS: 3.1 m/s Rain: n/a Stability Category: E ¹	Background wind/trees/insects/birds 38-55 Aircraft 50-75 Quarry inaudible	<30	37	
11-12-24	4:52pm to 5:07pm (Day)	51.5	43.2	38.6	WD: 230° WS: 1 m/s Rain: Nil	WD: W WS: 3.1 m/s Rain: n/a Stability Category: E ¹	Background wind/trees/insects/birds 36-63 Quarry inaudible	<29	37	
09-12-24	8:54pm to 9:09pm (Evening)	54	51.1	47	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: E ¹	Insects 42-50 Car passing 69 Quarry not operational	n/a²	35	
09-12-24	9:10pm to 9:25pm (Evening)	62.3	55.7	45.6	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: E ¹	Insects 42-50 Truck passing 50-81 Quarry not operational	n/a²	35	

¹ Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

² Quarry not operational.

4.2 Location NM2

Noise monitoring at location NM2 was conducted on Monday 9 December 2024 and Wednesday 11 December 2024 with results presented in **Table 4-2**. The quarry was inaudible at NM2 during the day. The quarry was not operational during the evening. The ambient noise environment was dominated by wind, trees, birds, insects and passing cars on Teven Road. The results meet the established noise criteria and indicate that noise emissions from Teven Quarry did not contribute to noise nuisance at the time of the monitoring.

Table 4-2: Noise survey results and observations for Location NM2

	Descriptor (dBA)				Meteorology			Teven		
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	Onsite Met Station (at 10m)	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq(15min) Contribution	LAeq(15min) Criteria (dBA)	
11-12-24	5:22pm to 5:37pm (Day)	83.7	63.5	39.6	WD: 230° WS: 0.5 m/s Rain: Nil	WD: W WS: 3.1 m/s Rain: nil Stability Category: E ¹	Background wind/trees/birds 35-50 Passing cars 50-83 Quarry inaudible	<30	38	
11-12-24	5:39pm to 5:54pm (Day)	86.1	64	36	WD: 230° WS: 0.5 m/s Rain: Nil	WD: W WS: 3.1 m/s Rain: nil Stability Category: E ¹	Background wind/trees/birds 31-50 Passing cars 50-86 Quarry inaudible	<26	38	
9-12-24	7:25pm to 7:40pm (Evening)	84.7	58	35	WD: n/a WS: 0 m/s Rain: Nil	WD: W WS: 0.1 m/s Rain: nil Stability Category: E ¹	Background motorway hum/birds/insects 32-38 Cars passing 44-84 Quarry not operational	n/a²	35	
9-12-24	7:41pm to 7:56pm (Evening)	82.2	56.7	43.5	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: E ¹	Background motorway hum/birds/insects 41-46 Cars passing 50-82 Quarry not operational	n/a²	35	

¹ Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

² Quarry not operational.

4.3 Location NM3

Noise monitoring at location NM3 was conducted on Monday 9 December 2024 and Tuesday 10 December 2024 with results presented in **Table 4-3**. The quarry was inaudible at NM3 during the day. The quarry was not operational during the evening. The ambient noise environment consisted of background insects and passing aircraft. The results meet the established noise criteria and indicate that noise emissions from Teven Quarry did not contribute to noise nuisance at the time of the monitoring.

Table 4-3: Noise survey results and observations for Location NM3

		Descriptor (dBA)		iBA)	Meteorology			T	LAcc(1Emin)	
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	Onsite Met Station (at 10m)	Apparent Noise Source, Description and SPL (dBA)	LAeq(15min) Contribution	Criteria (dBA)	
10-12-24	10:27am to 10:42am (Day)	60.8	56.5	54.2	WD: n/a WS: 0 m/s Rain: Nil	WD: ESE WS: 1.3 m/s Rain: nil Stability Category: E ¹	Background insects 52-56 Quarry inaudible	<44²	37	
10-12-24	10:44am to 10:59am (Day)	64.8	56.3	51.3	WD: n/a WS: 0 m/s Rain: Nil	WD: ESE WS: 1.3 m/s Rain: nil Stability Category: E ¹	Background insects 47-64 Aircraft 50-57 Quarry inaudible	<41 ³	37	
9-12-24	8:05pm to 8:20pm (Evening)	56.4	48.6	44.9	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: E ¹	Background insects 43-56 Quarry not operational	n/a ⁴	35	
9-12-24	8:20pm to 8:35pm (Evening)	53.2	42.8	42	WD: n/a WS: 0 m/s Rain: Nil	WD: n/a WS: 0 m/s Rain: nil Stability Category: E ¹	Background insects 40-53 Quarry not operational	n/a ⁴	35	

¹ Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

² Measured LA90 value of 54.2 was dominated by insects so unable to estimate contribution for quarry at assessment location.

³ Measured LA90 value of 51.3 was dominated by insects and aircraft so unable to estimate contribution for quarry at assessment location.

⁴ Quarry not operational.

4.4 Location NM4

Noise monitoring at location NM4 was completed on Monday 9 December 2024 and Tuesday 10 December 2024 with results presented in **Table 4-4**. The quarry was inaudible at NM4 during the day. Holcim vehicles entering and exiting the site were observed and measured during both day periods. As these were offsite vehicle movements they did not constitute as a contributor to the quarry contribution. The quarry was not operational during the evening period. The ambient noise environment consisted of background motorway hum, birds, and insects. The results meet the established noise criteria and indicate that noise emissions from Teven Quarry did not contribute to noise nuisance at the time of the monitoring.

Table 4-4: Noise survey results and observations for Location NM4

		Des	criptor (d	BA)	Meteorology			Teven	I Aeg	
Date	Time	LAmax	LAeq	LA90	(handheld at microphone height)	Onsite Met Station (at 10m)	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq (15min) Contribution	(15min) Criteria (dBA)	
10-12-24	11:11am to 11:26am (Day)	70.8	57.4	51.0	WD: n/a WS: 0 m/s Rain: Nil	WD: ESE WS: 1.3 m/s Rain: nil Stability Category: E ¹	Trucks entering/exiting quarry 70 Background insects 50 Quarry inaudible	<41²	37	
10-12-24	2:46pm to 3:01pm (Day)	80.8	60.2	47.5	WD: n/a WS: 0 m/s Rain: Nil	WD: WNW WS: 1.3 m/s Rain: nil Stability Category: F ¹	Trucks entering/exiting quarry 42-80 Background insects 42-54 Quarry inaudible	<38 ³	37	
09-12-24	6:48pm to 7:03pm (Evening)	66.3	40.4	37.7	WD: n/a WS: 0 m/s Rain: Nil	WD: WNW WS: 0.2 m/s Rain: nil Stability Category: E ¹	Background motorway hum 35-39 Birds 38-66 Quarry not operational	n/a ⁴	35	
09-12-24	7:03pm to 7:18pm (Evening)	65.4	41	37.6	WD: n/a WS: 0 m/s Rain: Nil	WD: W WS: 0 m/s Rain: nil Stability Category: E ¹	Background motorway hum 34-37 Birds 36-65 Quarry not operational	n/a ⁴	35	

¹ Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

² Measured LA90 value of 51.0 was dominated by insects and road traffic so unable to estimate contribution for quarry at assessment location.

³ Measured LA90 value of 47.5 was dominated by insects and road traffic so unable to estimate contribution for quarry at assessment location.

⁴ Quarry not operational.

Location NM5

Noise monitoring at location NM5 was completed on Tuesday 10 December 2024 and Wednesday 11 December 2024 with results presented in **Table 4-5**. The quarry was inaudible at NM5 during the day. The quarry was not operational during the evening. The ambient noise environment consisted of birds, insects, frogs, aircraft, and passing cars. The results meet the established noise criteria and indicate that noise emissions from Teven Quarry did not contribute to noise nuisance at the time of the monitoring.

Table 4-5: Noise survey results and observations for Location NM5

	Descriptor (d				Meteorology			Teven		
Date	Time (hrs)	LAmax	LAeq	LA90	(Handheld at microphone height)	Onsite Met Station (at 10m)	Apparent Noise Source, Description and SPL (dBA)	Quarry LAeq(15min) Contribution	LAeq(15min) Criteria	
10-12-24	3:27pm to 3:42pm (Day)	78	53.9	38.3	WD: n/a WS: 0 m/s Rain: Nil	WD: WNW WS: 1.1 m/s Rain: nil Stability Category: F ¹	Background birds/insects/frogs 34-45 Car passing 34-78 Quarry inaudible	<28	37	
10-12-24	3:46pm to 4:01pm (Day)	76.5	51.7	29.2	WD: n/a WS: 0 m/s Rain: Nil	WD: NW WS: 0.9 m/s Rain: nil Stability Category: F ¹	Background birds/insects/frogs 23-55 Car passing 23-77 Quarry inaudible	<19	37	
11-12-24	6:00pm to 6:15pm (Evening)	71.8	53.3	39.1	WD: n/a WS: 0 m/s Rain: Nil	WD: W WS: 2.2 m/s Rain: nil Stability Category: E ¹	Background insects/birds 31-50 Car passing 40-71 Quarry not operational	n/a²	35	
11-12-24	6:15pm to 6:30pm (Evening)	73.7	54	37.2	WD: n/a WS: 0 m/s Rain: Nil	WD: W WS: 2.2 m/s Rain: nil Stability Category: E ¹	Background insects/birds 31-50 Car passing 40-73 Aircraft 35-48 Quarry not operational	n/a²	35	

 $^{\rm 1}$ Temperature data sourced from CSIRO CCAM and modelled using TAPM to determine Stability Category.

² Quarry not operational

5. Conclusion

This NMA completed by Ramboll at the Holcim Teven Quarry, Teven, NSW as a quarterly requirement of the NMP. Noise monitoring was completed on Monday 9 December, Tuesday 10 December and Wednesday 11 December 2024 at five locations selected as representative to the sensitive receptors at the surroundings to Teven Quarry.

No audible noise from quarry operations was observed at any of the five locations during the day and evening periods. The results presented in this NMA show compliance with the relevant noise criteria at the Holcim Teven Quarry, Teven, NSW.

6. References

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Appendix B – 2024 Rehabilitation and Revegetation Monitoring Report



Annual Report, 2024 Rehabilitation Monitoring Program, Teven Quarry, Teven NSW

Prepared for: Holcim Australia

Date: 4 January 2025

Prepared By: Michael Hallinan

Bachelor of Applied Science - Environmental Resource Management Diploma in Arboriculture (AQF level 5) Associate Diploma in Horticulture – Arboriculture Scientific License SL100965 – Ecological survey/ consultancy Biodiversity Assessment Method (BAM) Accredited Assessor: BAAS21025



1.Introduction

This annual report on the Teven Quarry 2024 Rehabilitation Monitoring Program aims to address annual report requirements outlined in the following reports:

- EMM, 2016, *Biodiversity and Rehabilitation Management Plan, Teven Quarry* (Prepared by EMM for Holcim (Australia) Pty Limited, 18 May 2016);
- Holcim Australia, 2020, *Teven Quarry Biodiversity & Rehabilitation Management* (August 2020 Update);
- Holcim Australia, 2021, *Teven Quarry Biodiversity & Rehabilitation Management* (November 2021 Update); and
- Holcim Australia, 2022, 2022 Teven Quarry Weed Management Plan.

In particular, rehabilitation and monitoring works have aimed to address requirements in relation to Holcim Australia's commitment to implement the following measures to minimise impacts of the quarry operations on ecological values of the site:

- Avoidance of impact on remnant subtropical rainforest community within Lot 1.
- Conservation, where possible, of hollow bearing trees.
- Implementation of a tree felling procedure to minimise potential impacts on fauna, in particular, koalas.
- Implementation of a rehabilitation strategy targeting regeneration of Eucalypt, Brushbox and Rainforest communities across the non-disturbance areas of the site. This strategy involves weed management protocols for Camphor Laurel, Lantana and other weed species, and targeted planting of a range of recommended native species, including rare and threatened plant species and species which may be of benefit to threatened fauna species.
- Annual inspections of rehabilitated areas undertaken over the life of the project to assist in guiding rehabilitation practice.
- Annual survey of monitoring plots and assessment against targets, with data presented in a report and submitted to BCD annually.

This annual report summarises 2024 flora and fauna rehabilitation and monitoring works and observations since the 2023 annual report (prepared by Arbor Ecological in January 2023).

1.1. Revised NSW Plant Community Types (PCTs)

Plant Community Types (PCTs) are broadly consistent with the *Trees Near Me NSW* database (NSW Department of Planning and Environment) as follows:

1.1.1. PCT: 3004 Far North Bangalow Palm Swamp Forest

Formation: Rainforests

Vegetation Class: Subtropical Rainforests

Description: Tall to very tall dense palm forest or rainforest, or rarely, extremely tall sclerophyll open forest with a dense sub-canopy, restricted to poorly-drained sites along a narrow strip of coastal lowlands north from Woodburn, North Coast.



Arbor Ecological Mob: 0424 064 002 e: arborecological@netspace.net.au www.arborecological.com.au The palm Archontophoenix cunninghamiana is almost always present and has the highest foliage cover, very frequently accompanied by Ficus coronata and Melaleuca quinquenervia, with Ficus obliqua occasionally present. Other tree species such as Araucaria cunninghamii or Syzygium francisii may be locally common and the vine Flagellaria indica is very frequent.

The mid-stratum and ground layer are commonly highly diverse, although it may have low species richness where the palm canopy cover is very high. This PCT occurs only at very warm, very wet locations receiving 1710-1830 mm mean annual rainfall, in poorly-drained and seasonally swampy gullies and depressions, usually on alluvium, at low elevations of up to 40 metres asl, within 15 km of the coast.

It occurs as part of a complex, small-scale mosaic involving a range of other lowland PCTs. For example, it may be replaced by PCT 3993 on adjacent estuarine deposits or by PCTs 3016 or 3148 on adjacent slopes.

1.1.2. PCT: 3147 Far North Brush Box-Bloodwood Wet Forest

Formation: Wet Sclerophyll Forests (Shrubby sub-formation) Vegetation Class: North Coast Wet Sclerophyll Forests Description: Mid-high to extremely tall, mid-dense to dense sclerophyll forest, which occurs mainly on metasediments, rarely on sandstone, in valleys and low coastal hills north from Broken Head.

The canopy very frequently contains Lophostemon confertus, often with high foliage cover and Corymbia intermedia, sometimes with high cover, and occasionally with Eucalyptus siderophloia and Eucalyptus pilularis. The mid-stratum consists of a mix of small trees, shrubs and vines, almost always including Smilax australis, very frequently Guioa semiglauca, Geitonoplesium cymosum, , commonly with Cupaniopsis anacardioides, Pittosporum undulatum and Synoum glandulosum.

The ground stratum very frequently includes Lomandra longifolia and Blechnum cartilagineum, the latter commonly with high cover. This PCT occurs mainly in very warm, very wet locations receiving 1710-1890 mm mean annual rainfall, at mostly low elevations of 10-170 metres asl.

It occurs at drier, upper slope or more frequently burnt locations, and forms a mosaic with rainforest communities. In the Broken Head area its distribution overlaps with that of the lowland rainforest PCT 3121, which occurs on more sheltered slopes and has a higher diversity and foliage cover of rainforest trees and shrubs.

In the same area, it grades into littoral rainforest PCT 3122 closer to the coast in areas exposed to maritime influence.



2.Monitoring

Vegetation community monitoring by Arbor Ecological commenced in March 2021 and continued in December 2021, 2022, 2023 and 2024. Additional monitoring was undertaken in August 2021 by EMM Consulting Pty Ltd (Holcim 2021).

2024 vegetation monitoring includes the following:

- **Appendix 1** 2024 Visual monitoring at photo points established in March 2021 in the Rainforest community and April 2021 in the Brushbox community.
- Appendix 2 2024 General flora and fauna observation plates.
- Appendix 3 2024 NSW Biodiversity Assessment Method (BAM) Field Survey Forms.
- Appendix 4 2024 Bush Regeneration Work Log.

The Subtropical Rainforest (STR1) monitoring plot established by EMM Consulting Pty Ltd (Holcim 2021) was adopted by Arbor Ecological as a long-term monitoring plot for the rainforest community as recommended by Holcim (2021), refer to **Appendix 3**. This is in place of the Subtropical Rainforest monitoring plot established by Arbor Ecological in 2021.

The Brushbox forest BBF2 monitoring plot established by Arbor Ecological remains the long-term Brushbox forest monitoring plot. The closed Camphor Laurel Smallleaved Privet Forest BBF1 monitoring plot randomly selected by EMM Consulting Pty Ltd has been discontinued. The monitoring plot has no safe access and is not representative of the Brushbox community due to the almost entirely non-native vegetation cover in all strata, and lack of Brushbox trees.

Monitoring photos and Annual plot-based monitoring continues annually in association with rehabilitation works to detect changes in vegetation condition, particularly in relation to weed cover and natural regeneration of locally endemic native species. Rehabilitation monitoring includes priority weeds listed in the 2022 Teven Quarry Weed Management Plan (Holcim Australia 2022).

As recommended by Holcim (2021), annual survey of monitoring plots was conducted using the NSW BAM Calculator (https://bamcalc.lmbc.nsw.gov.au). **Table 1 (BAM Monitoring Plot Key Indicators of Vegetation Condition)** includes the key indicators of vegetation condition Vegetation Integrity (VI), Composition Condition Score, Structure Condition Score, Function Condition Score, and High Threat Weed Cover. Assessments against benchmark targets for Plant Community Types will continue over the coming years following sustained rehabilitation works.

Detection of changes and trends is currently limited since 2021 was the first year of rehabilitation works and monitoring by Arbor Ecological. Noteworthy early trends in changes to vegetation conditions are as follows, refer to **Table 1**:

- STR1 Subtropical Rainforest (EMM & Arbor Ecological):
 - A slight increase in the number of native species recorded (Composition Condition Score)
 - No change in native species cover (Structure Condition Score)
 - An increase in the vegetation community Function Condition Score.



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- Continued reduction in High Threat Weed Cover from weed control works.
- Slight increase in overall Vegetation Integrity (VI) Score.
- BBF2 Brushbox Forest (Arbor Ecological):
 - Reductions in the number of native species recorded (Composition Condition Score), vegetation community Function Condition Score; and overall Vegetation Integrity (VI) Score resulting from soil erosion and reduced overstory vegetation from quarry roadworks near the southern extent of the monitoring plot.
 - An increase in native species cover (Structure Condition Score).
 - Continued reduction in High Threat Weed Cover from weed control works.
 - High survival rates of past infill and fauna habitat plantings.

Good growing conditions have prevailed since monitoring commenced with generally regular rainfall in the subtropical climate. Regular high rainfall during 2024 has continued to provide good growing conditions.

Annual monitoring also aims to detect the following attributes:

- Signs of native and feral fauna occurrences including mammals (e.g. koalas and foxes), birds, reptiles and amphibians.
- Koala scat searches around primary Koala food tree species in line with Phillips and Callaghan (2011)¹.
- Presence of nests, burrows and substantially hollow-bearing trees.
- Survival and condition of past and future infill and fauna habitat plantings.

Key findings outlined in **Table 2 (2024 Observations of Fauna Habitat Values)** are largely unchanged as follows:

- Small (<6cm) and medium (6cm to 12cm) sized hollow openings observed in mature Brushbox and Camphor Laurel. No substantial hollows observed in the rainforest community.
- No signs of Koala use or occupation despite targeted searches of mature, naturally occurring Tallowwood and planted Koala food trees species to southwest and adjoining the haul road and Brushbox forest to the northeast.
- Observations of commonly occurring bird, reptile (including a mature Lace Monitor) and frog species.
- No substantial nests observed.

¹ Phillips S and Callaghan J, 2011, *The Spot Assessment Technique: a tool for determining localised levels of habitat use by Koalas Phascolarctos cinereus*, Australian Zoologist 35, 774-780.



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Monitoring Plot/ Vegetation Type	Composition Condition Score			Structure Condition Score			Function Condition Score			High Threat Weed Cover			Vegetation Integrity (VI) Score							
	2021	2022	2023	2024	2021	2022	2023	2024	2021	2022	2023	2024	2021	2022	2023	2024	2021	2022	2023	2024
STR1 (EMM & Arbor Eco) Rainforest		13.2	22.5	24.6		19.1	20.3	20.3		61.9	63.6	67.4	35.2	27.7	9.4	6.4	19.6	25	31.7	32.3
BBF2 (Arbor Eco) Brushbox Forest	50.9	50.9	53.5	49.7	58.2	60.3	55.4	62.6	60.4	62.7	62.7	59.2	49	41.5	26.7	18.2	56.3	57.7	57.1	56.9

Table 1. 2024 BAM Monitoring Plot Key Indicators of Vegetation Condition



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Table 2. 2024 Observations of Fauna Habitat Values

Fauna Habitat Features	Observations/
Hollow-bearing trees including basal cavities, pipes/ spouts and dead stags	Small (<6cm) and medium (6cm to 12cm) sized hollow openings observed in mature Brushbox and Camphor Laurel. No substantial hollows observed in the rainforest community
Natural burrows or dens	Nil
Hollow fallen logs	Nil
Wetlands, streams, rivers, dams and other water bodies	The floodplain rainforest vegetation community is regularly inundated. Small ephemeral drainage lines cross the steep Brushbox vegetation community draining to the east. Constructed drainage lines exist for quarry operations draining to the east
Nests and roosts	Nil. No nests observed to date including large stick nests suitable for raptors/ birds of prey
Sap feed trees for Yellow-bellied Glider and Squirrel Glider	Nil
Distinctive scats (e.g. Spotted- tailed Quoll or Koala) and latrine sites	Nil. Wallaby scats typical of Swamp Wallaby detected. No Koala scats detected despite targeted searches of naturally occurring and planted Koala food trees
Signs of feeding on surfaces below potential feed trees and shrubs	Nil
Scratch marks on trees	Scratch marks on planted smooth-barked eucalypts typical of Lace Monitor and possum. A mature Lace Monitor was observed in the Brushbox community
Casuarina and Allocasuarina species for Glossy Black Cockatoo	Nil
Flying-fox camps	Nil



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Microchiropteran bat tree, decorticating bark or palm frond roosts	Nil. No roosts observed in somewhat dense canopy foliage within rainforest vegetation
Bush rock, caves, crevices, overhangs, culverts, tunnels or disused mine shafts	Bush rock of various sizes present, particularly within Brushbox and Camphor Laurel forest
Swift parrot and regent honeyeater feed or nest trees	Nil
Winter-flowering eucalypts and other tree/ shrub species	Nil
Mistletoe and epiphytes	Common epiphytes (e.g. Staghorn Fern) observed in rainforest and Brushbox forest
Koala food trees	Mature Tallowwood and planted Koala food trees species to southwest and adjoining the haul road and Brushbox forest to the northeast. No signs of Koala use or occupation
Fruit-bearing trees or shrubs	Common in both rainforest and Brushbox forest providing fauna food resources, particularly for frugivorous birdlife
Dense understory shrubs	Limited dense understory vegetation within the rainforest and Brushbox forest. More widespread in Camphor Laurel forest
Dense leaf litter	Dense leaf litter throughout, particularly within the rainforest and Camphor Laurel forest types
Dense grassland	Dense exotic grassland in relatively open areas adjoining forest vegetation offers good habitat for a range of birdlife, frogs and some mammals
Habitat connectivity	Corridors of connecting forest vegetation extend to the north, west and south through interspersed cleared farmland which is widespread to the east across the floodplain

Locations of priority work zones; vegetation monitoring plots; environmentally sensitive features detected; NSW mapped Biodiversity Values; and Koala scat search locations are shown on **Figure 1**.

Rehabilitation zones are separated from the approved extraction area and remain unaffected by direct or indirect environmental impacts associated with extraction activities.

Rainforest and Brushbox communities where rehabilitation works continue to be conducted are mostly in moderate condition and on-track to achieve rehabilitation provided rehabilitation works continue.





Figure 1. Locations of priority work zones; vegetation monitoring plots; environmentally sensitive features detected; NSW mapped Biodiversity Values; and Koala scat search locations.



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3. Rehabilitation Works, 2024

Eucalypt, Rainforest and Brushbox vegetation communities in non-disturbance/ extraction areas of the site have been identified as priority areas for rehabilitation. In agreement with quarry management, works have initially focused on rehabilitation of the Rainforest and Brushbox vegetation communities.

In line with sound principles of forest rehabilitation, rehabilitation works have not been prioritised in highly weed degraded areas such as the area of the randomly selected (EMM Consulting Pty Ltd) BBF1 monitoring plot. Safe access continues to be unavailable to this area.

Similarly, rehabilitation works have not commenced within the Eucalypt vegetation community near the southwest extent of the quarry since safe vehicle access is currently unavailable to this portion of the property.

Weed control remains the priority to promote natural regeneration of plant communities. As such, priority Rainforest and Brushbox plant communities in the best condition have been the focus of weed control works since 2021. Also, in line with sound principles of forest rehabilitation, understory weeds are controlled prior to control of any overstory weeds such as mature Camphor Laurel. Overstory weed species are controlled in a staged manner.

2024 rehabilitation works have expanded on previous works in these plant communities through continued primary weed control and follow up works working towards and beyond edges.

Revegetation infill planting works were undertaken in April 2023 following substantial rainfall. The planting program used locally sourced (i.e. Friends of the Koala Nursery, Lismore) rainforest planting tubestock. All planting species were endemic to the plant communities as reflected in the Plant Community Type species lists. Further infill planting works in priority work areas are planned for 2026.

It is considered that weed control to promote natural regeneration remains the most effective rehabilitation strategy with supplementary infill plantings. It is recommended that the rehabilitation strategy be reviewed annually in light of identified priorities and available resources. The current rehabilitation approach of priority works in priority areas is recommended to be continued and expanded to achieve objectives in a cost and resource effective manner.

3.1. Rainforest Community Works

The rainforest community occurs on a floodplain. Under the revised Plant Community Types in eastern NSW to the Biodiversity Offsets Scheme, the vegetation community most closely matches the Plant Community Type (PCT) 3004 – Far North Coast Bangalow Palm Swamp Forest. Vegetation varies on site in response to small variations in elevation and levels of regular inundation.

The site features large naturally occurring White Fig (*Ficus virens*), Port Jackson Fig (*Ficus rubiginosa*) and Giant Water Gum (*Syzygium francisii*). Numerous other locally



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The plant community is consistent with *Lowland Rainforest on Floodplain in the New South Wales North Coast bioregion*, an Endangered Ecological Community (EEC) listed as under the NSW *Biodiversity Conservation Act 2016* (BC Act). The plant community is also consistent with the Commonwealth listed Threatened Ecological Community (TEC) *Lowland Rainforest of Subtropical Australia* which is listed as Critically Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

From **Appendix 3**, species richness and structural complexity is limited by the relatively small size, high edge ratio and past disturbances. In particular, a previously cleared and open area extends through the central portion which effectively fragments the rainforest community dividing it into two. This has noticeably increased weed pressure at the perimeter edges and was the focus of April 2023 infill plantings aiming to expand the extent of the canopy and achieve canopy closure over time. Planting fatalities were substantial in this central open area due to high rainfall and inundation. Swamp Hibiscus, Broad-leaved Cumbungi, sedges and Broad-leaved Paperbark currently thrive in the inundated condition. Further infill planting works planned for 2026 will consist of inundation tolerant species.

Plantings occurred following heavy rainfall, plantings were watered-in, and tree guards were installed to protect them from browsing wallabies. A selection of 50 plantings was undertaken from the following locally endemic rainforest species:

Acacia melanoxylon Alphitonia excelsa Argyrodendron trifoliatum Beilschmiedia obtusifolia Castanospermum australe Commersonia bartramia Cryptocarya microneura Cryptocarya triplinervis **Diospyros fasciculosa** Dysoxylum mollissimum Elaeocarpus grandis Euroschinus falcata Ficus virens Ficus watkinsiana Flindersia schottiana Glochidion sumatranum Macaranga tanarius Melaleuca quinquenervia Melicope elleryana Planchonella australis



Arbor Ecological Mob: 0424 064 002 e: arborecological@netspace.net.au www.arborecological.com.au Polyscias elegans Syzygium leuhmannii Toechima dasyrrhache Waterhousea floribunda

High rainfall in the weeks and months following planting works lead to the death of between 15% and 20% of rainforest plantings due to prolonged inundation. Subsequent infill plantings are planned to replace planting losses with the most inundation tolerant species such as Broad-leaved Paperbark (*Melaleuca quinquenervia*), Weeping Lilly Pilly (*Syzygium floribunda*), Pink Euodia (*Melicope elleryana*) and *Hibiscus spp*.

Small-leaved Privet (*Ligustrum sinense*) and exotic grasses in open areas remain the most abundant exotic weed species in the rainforest community. Weed control works by Arbor Ecological commenced on the site on 10/03/21 and have largely focused on control of Small-leaved Privet to permit growth and development of native rainforest plants in the understory. Privet has been strategically retained around edges of rainforest community to exclude excessive drying sunlight and wind. A range of other exotic weeds thrive in areas with high soil moisture content, refer to **Appendix 3**.

Rehabilitation works continue to reduce understory weed cover and subsequently permit growth and development of native plants.

Qualified and experienced bush regenerators continued to undertake weed control throughout the year using industry best practice methods for weed control and chemical handling in line with DPI (2018)², BSRLG (2019)³, the North Coast Regional Strategic Weed Management Plan 2023-2027 (North Coast Local Land Services, 2022).

Weed control works include priority weeds listed in the 2022 Teven Quarry Weed Management Plan (Holcim Australia 2022).

3.2. Brushbox Community Works

Brushbox (*Lophostemon confertus*) makes up the sole native canopy species of several steep portions of the property to the south and east with a scrubby rainforest understory and midstory as part of the wet sclerophyll vegetation community. Characteristic midstory native species include commonly occurring rainforest species such as Sweet Pittosporum (*Pittosporum undulatum*), Red Kamala (*Mallotus philippensis*), and Tuckeroo (*Cupaniopsis anacardioides*). **Appendix 3** lists all native and exotic species recorded within the 400m² monitoring plot.

Under the revised Plant Community Types in eastern NSW to the Biodiversity Offsets Scheme, the vegetation community most closely matches the Plant Community Type (PCT) 3147 Far North Brush Box-Bloodwood Wet Forest.

³ Big Scrub Rainforest Landcare Group (BSRLG) 2019, *Subtropical Rainforest Restoration – A practical manual and data source for Landcare groups, land managers and rainforest regenerators, 3rd Ed.* Big Scrub Rainforest Landcare Group, Mullumbimby NSW.



² NSW Department of Primary Industries (DPI) 2018, Weed Control Handbook – A guide to weed control in non-crop, aquatic and bushland situations 7th Edition.

This PCT is partly associated with a threatened ecological community based on either distribution or floristic attributes. Despite occurrences of rainforest elements in the midstory and understory, the vegetation community is considered to not be associated with any NSW or Commonwealth listed Threatened Ecological Community (TEC). The PCT was identified as PCT 826 *Flooded Gum - Brush Box moist forest of the coastal ranges of the North Coast* by EMM (Holcim Australia 2021).

Weed control works by Arbor Ecological commenced within the Brushbox community on 10 March 2021 focusing on a vegetation corridor extending to the northeast. Works have focused on understory weed control, particularly the NSW Government listed High Threat Weeds Camphor Laurel, Lantana and Small-leaved Privet. This is similar to the rainforest community and as reflected in the monitoring. Weed control works to reduce weed cover includes priority weeds listed in the 2022 Teven Quarry Weed Management Plan (Holcim Australia 2022).

Quarry roadworks near the southern extent of the monitoring plot has caused soil erosion and reduced overstory vegetation which has compromised the integrity and value of the monitoring plot, refer to monitoring photos in **Appendix 1**. The monitoring plot will therefore be moved to the north in 2025 within the Brushbox community, away from potential quarry roadworks.

2024 works have continued to extend to the northeast and towards the edges of the Brushbox community. Control of midstory Camphor Laurel is continuing and a splatter gun continues to be used to control Lantana infestations. Control of overstory Camphor Laurel, particularly near the community edges, has commenced in a strategic and staged manner following primary works in the understory and midstory.

Brushbox community edge and understory plantings were the focus of April 2023 infill plantings which followed heavy rainfall. Plantings were watered-in, and tree guards were installed to protect them from browsing wallabies. 70 plantings were undertaken from the following locally endemic rainforest species:

Acacia melanoxylon Alphitonia excelsa Commersonia bartramia Cryptocarya microneura Cryptocarya triplinervis Diospyros fasciculosa Dysoxylum mollissimum Euroschinus falcata Ficus watkinsiana Flindersia schottiana Glochidion sumatranum Macaranga tanarius Melaleuca quinquenervia Melicope ellervana Polyscias elegans Syzygium leuhmannii



Arbor Ecological Mob: 0424 064 002 e: arborecological@netspace.net.au www.arborecological.com.au Cryptocarya glaucescens Dysoxylum fraseranum Toona ciliata

High rainfall occurred in the weeks and months following planting works. A planting survival rate of approximately 98% was recorded under good drainage conditions.

Previously cleared portions of the broader site, now dominated by Camphor Laurel, Small-leaved Privet and Lantana, are currently not high priority for weed control efforts. Weed control works in these areas occur in the areas of established and regenerating native plants, expanding out from areas in the best condition. This approach was adopted in the degraded Brushbox community to the southeast of the site, accessed via Wellers Road to the southeast. Minor works have continued in this low priority area in 2024.

A single over-mature NSW and Commonwealth listed Critically Endangered Scrub Turpentine (*Rhodamnia rubescens*) was detected in the Brushbox community at E547744.64 N6809457.78. The tree is in decline due to Myrtle Rust (*Austropuccinia psidii*) infection, refer to photos in **Appendix 2**. A recently dead Scrub Turpentine (*Rhodamnia rubescens*) of similar size was detected nearby. Searches will continue in 2025 for sapling Scrub Turpentines.

A single threatened (i.e. NSW Vulnerable listed) Arrow-head Vine (*Tinospora tinosporoides*) was detected in 2021 at the southern extent of the Brushbox overstory community. No further Arrow-head Vine has been detected since.

A suspected threatened (i.e. NSW Endangered listed) Green-leaved Rose Walnut (*Endiandra muelleri subsp. bracteata*) was detected in the degraded Brushbox community to the southeast of the site, accessed via Wellers Road. Identification confirmed it as the similar and non-threatened Green-leaved Rose Walnut (*Endiandra muelleri subsp. muelleri*). Works continue in this area expanding outward from isolated native trees.





Appendix C –2024 Surface Water Monitoring Results

Surface Water Monitoring Results

Notes: Exceedance of specified water quality criteria is not considered a breach of licence conditions in rain events exceeding 82.5 mm over any 5 consecutive days (special frequency 1). If this worksheet returns a fail result in such circumstances please provide a comment to allow this to be amended.

Expand to View - Surface Water Monitoring Monitoring Outcomes (2025)

Expand to View - Surface Water Monitoring Monitoring Outcomes (2024)

Location	Frequency	Source	Lower Limit	Upper Limit	Description	Unit	Sample Date	15 Jan 2024	16 Jan 2024	17 Jan 2024	5 Mar 2024	22 Mar 2024	5 Apr 2024	8 Apr 2024	9 Apr 2024	12 Apr 2024	8 May 2024	20 May 2024	12 Aug 2024	2 Oct 2024	22 Nov 2024	2 Dec 2024
LDP (Licensed discharge point)	Wet Weather Discharge (Special Frequency 1)	EPL	6.5	8.5	pН	pH Units	Outcome	7.36	7.37	7.38	7.19	7.2	7.08	7.07	7.09	7.19	7.27	6.95	7.12	6.96	7.73	7.16
							Result	Within Criteria	aVithin Criteri													
			-	50	Suspended Solids	mg/L	Outcome	1	15	2	1	0	0	1	2	3	3	0	1	1	1	1
							Result	Within Criteria	aVithin Criteri													
			-	-	Visible Oil & Grease	Visable or Not Visable	Outcome	Not Visible														
							Result	Within Criteria	aVithin Criteri													

Comments relating to Surface Water Monitoring							
Comment 1:							
Comment 2:							
Comment 3:							

Expand to View - Surface Water Monitoring Monitoring Outcomes (2023)