Strength. Performance. Passion

ANNUAL REVIEW
1 January 2019 – 31 December 2019

Cooma Road Quarry

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SITE DETAILS

Name of operation	Cooma Road Quarry
Name of operator	Holcim (Australia) Pty Ltd
Development consent / project approval #	SSD 5109
Name of holder of development consent / project approval	Holcim (Australia) Pty Ltd
Annual review start date	1 January 2019
Annual review end date	31 December 2019

I, **ADAM BERTRAM**, certify that this audit report is a true and accurate record of the compliance status of the **COOMA ROAD QUARRY** for the period of **1 JANUARY 2019 – 31 DECEMBER 2019** 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	Adam Bertram
Title of authorised reporting officer	Quarry Manager
Signature of authorised reporting officer	
Date	30th March 2020

1 STATEMENT OF COMPLIANCE

The statement of commitments for the 2019 reporting period for the Cooma Road Quarry is provided in **Table 1. Table 3** details the non-compliances at the Cooma Road Quarry identified within the 2019 reporting period, with the compliance status key provided in **Table 2**.

Table 1: Statement of Commitments

Were all conditions of the relevant approval(s) complied with?	
SSD 5109	NO- see **Table 3** for further details.
EPL 1453	NO- see **Table 3** for further details.

Table 2: DPIE Compliance Status Key

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

Table 3: Non-Compliances of SSD 5109 for 2019

<table>
<tr><th>Relevant approval</th><th>Condition</th><th>Condition Description</th><th>Compliance Status</th><th>Section Addressed in Annual Review/Comment</th></tr>
<tr>
<td>SSD 5109</td>
<td>Schedule 3 Condition 14</td>
<td>
Table 4: Long-term impact assessment criteria for particulate matter
<table>
<tr><th>Pollutant</th><th>Averaging Period</th><th>[d] Criterion</th></tr>
<tr><td>Total Suspended particulate (TSP) matter</td><td>Annual</td><td>[a]90 µm/m^3</td></tr>
<tr><td>Particulate matter < 10 µm(PM_{10})</td><td>Annual</td><td>[a] 30 µm/m^3</td></tr>
</table>
Table 5: Short-term impact assessment criteria for particulate matter
<table>
<tr><th>Pollutant</th><th>Averaging Period</th><th>[d] Criterion</th></tr>
<tr><td>Particulate matter < 10 µm(PM10)</td><td>24 hour</td><td>[a] 50 µm/m^3</td></tr>
</table>
Table 6: Long-term impact assessment criteria for Deposited Dust
<table>
<tr><th>Pollutant</th><th>Averaging Period</th><th>Maximum increase in deposited dust level</th><th>Maximum total deposited dust level</th></tr>
<tr><td>[C] Deposited dust</td><td>Annual</td><td>[b]2 g/m2/month</td><td>[a] 4 g/m^2/month</td></tr>
</table>
Notes to Tables 4-6:

[a] Total impact (ie incremental increase in concentrations due to the development plus bacground concentrations due to all other sources);
[b] Incremental impact (ie incremental increase in concentreatios due to the development on its own);
[c] Deposited dust is to be assessed as insoluable solids as

</td>
<td>Low</td>
<td>Non – compliance relating to criteria for depositional dust and PM_{10}.
See Section 6.3
See Section 11</td>
</tr>
</table>

Relevant approval	Condition	Condition Description	Compliance Status	Section Addressed in Annual Review/Comment
		defined by Standards Australia AS/NZS 3850:10.1.2003 – Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method • [d] Exludeds extraordinary events suchs as bishfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activites or any other activity agreed by the Secretary in consultation with EPA.		
SSD 5109	Schedule 3, Condition 20	*Groundwater Monitoring Program* that includes: • baseline data of groundwater levels surrounding the development; • groundwater assessment criteria based upon analysis of baseline data for groundwater, including trigger levels for investigating any potentially adverse groundwater impacts; and a program to monitor and/or validate the impacts of the development on groundwater resources.	Admin	Non – compliance relating to installation and monitoring See Section 7.5 Section 11
SSD 5109	Schedule 3, Condition 20	The Applicant must prepare a Rehabilitation Management Plan for the development to the satisfaction of the Secretary.	Admin	Failure to complete monitoring of rehabilitation (Section 8 of management plan - Ecological and Rehabilitation Monitoring). Section 6.6 and 8.
SSD 5109	Schedule 3, Condition 17	For the life of the development, the Applicant must ensure that there is a suitable meteorological monitoring station operating in the vicinity of the site that: • complies with the requirements in the Approved Methods for Sampling of Air Pollutants in New South Wales guideline; and • is capable of continuous measurement of stability class, in accordance with the NSW Industrial Noise Policy, or as otherwise approved by EPA.	Admin	Issues experienced with installed meteorological station; no data logged. Section 6.1

2 INTRODUCTION

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

The site also operates in accordance with the Environmental Protection Licence (EPL) No. 1453 issued by the NSW Environment Protection Authority (EPA). A regional locality figure and aerial view of the site are outlined in **Figure 1** and **Figure 2** below.

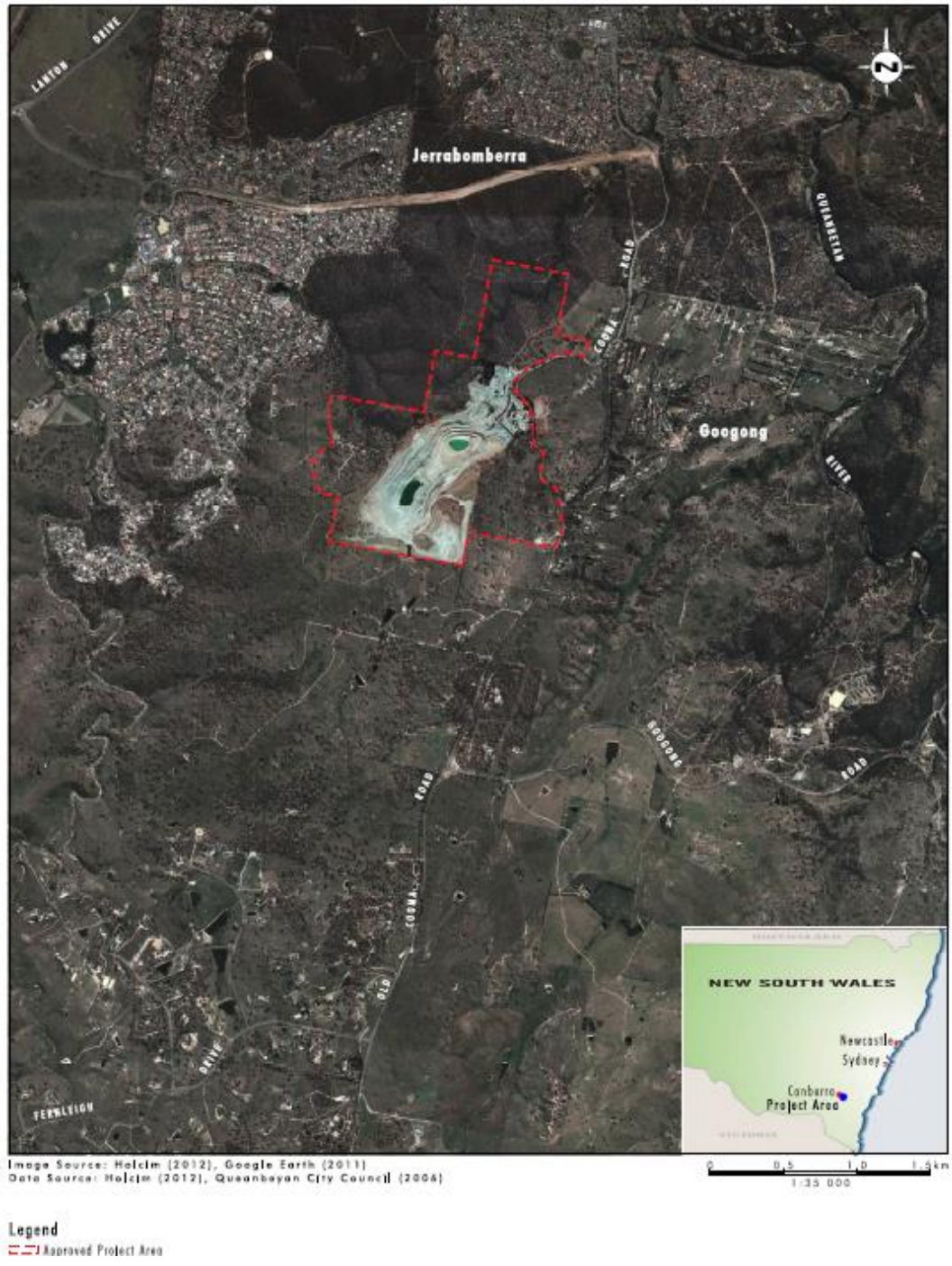

Figure 1: Locality Map (Umwelt 2014)

Figure 2: Aerial view of the Cooma Road Quarry, located on Old Cooma Road, Queanbeyan

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

Table 4: Annual Review Requirements

Condition	Section addressed in Annual Review
By the end of March each year, the Applicant shall review the environmental performance of the development to the satisfaction of the Secretary. This review must:	
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 6
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; - the monitoring results of previous years; and - the relevant predictions in the EIS.	Section 6, 7 and 9.3
c) identify any noncompliance over the last year, and describe what actions were (or are being) taken to ensure compliance;	Section 1
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 12

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 quarry from 1 January to 31 December 2019.

2.1 Name and Contact Details

The key contact details for the site are outlined below:

Quarry Manager
Adam Bertram
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Planning and Environment Coordinator NSW / ACT
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Email: shilpa.shashi@lafargeholcim.com

3 APPROVALS

The site operates under the following approvals listed in **Table 5**.

Table 5: Approvals for the Cooma Road Quarry Operations

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

Holcim holds **EPL 1453** which covers its activities at the Cooma Road Quarry. **Table 6** outlines these licensing limits. The EPL was varied by the EPA on 17 April 2018 enabling the site to receive **Virgin Excavated Natural Material (VENM)** to match Development Consent Modification approved in 2016.

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

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

4 OPERATIONS SUMMARY

4.1 Exploration

No exploration occurred at the Cooma Road Quarry in the 2019 reporting period.

4.2 Land Preparation

No land preparation activities occurred at the Cooma Road Quarry in the 2019 reporting period.

4.3 Construction Activities

No construction activities occurred at the Cooma Road Quarry in the 2019 reporting period.

4.4 Quarry Operations

Development activities undertaken at the Cooma Road Quarry in 2019 included:

- Stripping of topsoil and overburden within the existing extraction limit boundary;
- Drill, Blast, Load and Haul Activities;
- Crushing, screening and stockpiling of product;
- Overburden removal and replacement in the southwest overburden dump; and
- Maintenance of rehabilitation undertaken on the overburden dump in the south-western disturbance area.

All activities took place in accordance with the approved operating hours being 6am to 6pm, Monday to Saturday. These 6am-6pm timeframes applied to all operational activities where no crushing, screening or vehicle movements occurred after 6pm and before 6am.

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

Table 7: Cooma Road Operating Hours

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

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

Table 8: Total Product Distributed (Cooma Road Quarry)

Material	Approval Limit (Tonnes)	2018 Reporting Period (Tonnes)	2019 Reporting Period (Tonnes)
Product Distributed- Total	1,500,000	735,978	803,272

During the 2019 Annual Review period Cooma Road Quarry became an accredited smart waste organisation.

4.5 Next Reporting Period

Development activities proposed to be carried out at the Cooma Road Quarry in the 2020 reporting period include:

- Stripping of topsoil and overburden within the existing extraction limit boundary (In both the Granite and Dacite Pits);
- Drill, blast, load and haul activities;
- Crushing, screening and stockpiling of product;
- Overburden removal and placement in the south-west overburden dump; and

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

Feedback was provided to Holcim from DPIE in the 2017 Annual Review approval letter on 14 May 2018 with the following ongoing actions, **Table 2**. There was no feedback on the 2018 document.

Table 9: Status Update on DPIE Actions

Requirement	Compliance Status
The Department notes that no groundwater monitoring has been undertaken to validate the impacts of the project on groundwater resources, as required under the *Groundwater Management Plan* in accordance with Schedule 3, Condition 20 of the consent. Whilst it's acknowledged that the consent requires you to implement the approved *Groundwater Management Plan*, failure to undertake groundwater monitoring to assess potential impacts of the project is considered unacceptable. Consequently, the Department requests that within seven days from the date of this letter you follow up with the Department's assessment branch to finalise the approval of the *Groundwater Management Pla*n and subsequent implementation in the timely manner.	Groundwater monitoring has not been completed in 2019. To be completed in 2020. See **Section 7.5.**

Table 10 outlines an update on the proposed Holcim actions from the previous 2018 Annual Review.

Table 10: Status Update on Proposed Holcim Actions

Commitment	Compliance Status
Approval of the *Rehabilitation Management Plan* - The *Rehabilitation Management Plan* was submitted to DPIE, DoI Water and Council in 2014 but has not yet been approved. Holcim to follow up as required to get *Rehabilitation Management Plan* approved.	No response by DPIE
Depositional Dust Gauge Review - A review of the current location for DDG 4 will be undertaken during the next reporting period to determine if this gauge should be relocated to a more suitable position.	To be completed in 2020.
Progressive Rehabilitation - The site will continue to progressively rehabilitate available areas.	As soon as reasonable practicable after disturbance
Maintenance of Rehabilitation - Continued maintenance of rehabilitation in the completed overburden dump in the south-western disturbance area including weed control as well as nest box monitoring.	Ongoing
Groundwater Monitoring	Groundwater installation and monitoring to be completed
Biodiversity - Weed spraying will continue at site during the next Annual Review period. Implementation of the *Rehabilitation Management Plan*.	Annually

6 ENVIRONMENTAL PERFORMANCE

6.1 Meteorological Monitoring

A meteorological monitoring station has been installed to obtain data in accordance with the requirements of Schedule 3 of Condition 17of the Development Consent. However, during 2019 an issue with station and data was not logged, therefore data from the Bureau of Meteorology Canberra Airport Weather Station (Station 070351) has been used for this Annual Review. The issue was resolved on the 25 February 2020, however, based on the issue with the meteorological station issue this is a non – compliance with Schedule 3 Condition 17.

Monthly rainfall data has been provided in **Table 11.** The rainfall in 2019 was 359 mm compared to 449 mm in 2018.

Table 11: Rainfall Observed at Cooma Road Quarry (Canberra Airport Station 070351)

Monthly Rainfall (mm)												Total 2019
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
61.2	42.8	76.2	10.0	31.2	65.2	39.0	31.8	57.8	38.6	43.4	87.6	**358.6**

6.2 Noise

6.2.1 EIS Predictions

The 2012 EIS stated that '*Modelling results indicate that under worst case operational and meteorological conditions, with the implementation of the noise management measures outlined above, the Project is predicted to result in an exceedance of the PSNLs at one privately owned residence located to the south east of the Project area (N67) of up to 4dB during the day time period. If the secondary crushing plant were to be operated during the evening under worst case meteorological conditions, this same residence could be expected to experience exceedances of up to 3dB during the evening period. Holcim is however committed not to operate the secondary crushing plant under such conditions, namely gradient winds from the north east, thereby avoiding this potential impact.'*

6.2.2 Approved Criteria

The site has undertaken quarterly noise monitoring throughout 2019 in accordance with the Noise Management Plan. The Approved noise criteria from the Development Consent (Schedule 3 Condition 4) are provided in **Table 12.**

Table 12: Cooma Road Quarry Noise Criteria (SSD 5109)

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

Notes:

- To locate the receivers referred in Table 1 refer to Appendix 5 of the Development Consent
- After the first review on any EPL granted for this development under Section 78 of the POEO Act, nothing in this approval prevents the EPA from imposing stricter noise limits on the quarrying operations on site under the EPL.

Appendix 9 of the Development Consent sets out the metrological conditions under which these criteria apply and the requirements for evaluating compliance with this criteria.

However, these criteria do not apply If the Applicant has a written agreement with the relevant landowner/s to generate higher noise levels, and the Applicant has advised the Department in writing of these terms of this agreement.

6.2.3 Key Environmental Performance

Attended noise monitoring was undertaken quarterly at the Cooma Road Quarry by Muller Acoustic Consulting on the following dates:

- 6 and 7 February 2019;
- 14, 15 and 16 May 2019;
- 12, 13 and 14 August 2019; and
- 19, 20 and 21 November 2019.

The compliance assessments for each monitoring location (N3, N8, N38, N60 and N67) are presented in **Appendix 2** and summarised in **Table 13**.

It is noted that the Cooma Road Quarry was not operational during the evening period of quarter 4, therefore satisfying the evening noise limit of 35dBA. Dominant sources of noise at this receiver were non-quarrying sources such as distant traffic, wildlife noise and aircrafts which were identified throughout the monitoring events.

Table 13: Cooma Road Quarry Noise Results 2019

Assessment Period	Receiver No.	Quarrying Noise Criteria	Q1 March 2018		Q2 June 2018		Q3 August 2018		Q4 December 2018	
		$LAeq_{(15min)}$	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance
Morning Shoulder	N3	35	<35	✓	<35	✓	<32	✓	<30	✓
	N8	40	<35	✓	<35	✓	<37	✓	<34	✓
	N38	36	<35	✓	<35	✓	<36	✓	<35	✓
	N60	36	<35	✓	<35	✓	<34	✓	<35	✓
	N67	36	<35	✓	35	✓	<25	✓	<35	✓
Daytime	N3	35	<35	✓	<35	✓	<30	✓	<30	✓
	N8	44	<35	✓	<35	✓	<38	✓	<30	✓
	N38	38	<35	✓	<35	✓	<35	✓	<30	✓
	N60	38	<35	✓	<35	✓	<35	✓	<35	✓
	N67	41	<35	✓	35	✓	<30	✓	<35	✓
Evening	N3	35	<35	✓	<35	✓	<35	✓	Quarry not operating	✓
	N8	39	<35	✓	<35	✓	<39	✓	Quarry not operating	✓
	N38	35	<35	✓	<35	✓	<35	✓	Quarry not operating	✓
	N60	35	<35	✓	<35	✓	<35	✓	Quarry not operating	✓

Assessment Period	Receiver No.	Quarrying Noise Criteria	Q1 March 2018		Q2 June 2018		Q3 August 2018		Q4 December 2018	
		$LAeq_{(15min)}$	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance
	N67	35	<35	✓	<35	✓	<35	✓	Quarry not operating	✓

Note: Monday to Saturday: Morning shoulder 6am to 7am; Day 7am to 6pm; Evening 6pm to 10pm. On Sunday's and Public Holidays: Day 8am to 6pm; Evening 6pm to 10pm.

All monitoring results for quarterly noise assessments have been undertaken in accordance with the conditions of consent. All results met the criteria of the Development Consent and have been attached as **Appendix 2** to this report.

Longterm Trends:

During 2019 noise was within the Development Consent criteria. Based on the noise results from previous years, the site has continued to effectively manage noise.

6.2.4 Management Measures

Management measures relating to noise are outlined within the Cooma Road Quarry *Noise Management Plan*. These include:

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

6.2.5 Proposed Improvements

There are no proposed improvements to noise management.

6.3 Air Quality

6.3.1 EIS Predictions

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

6.3.2 Approved Criteria

Depositional dust monitoring conducted at Cooma Road Quarry is compared with the monitoring criteria stipulated in Schedule 3, Condition 14 of SSD 5109 and reproduced in **Table 14.**

Table 14: Depositional Dust Criteria

Table 6: Long-term impact assessment criteria for Deposited Dust (from Development Consent)

Pollutant	Averaging Period	Maximum increase in deposited dust level	Maximum total deposited dust level
[C] Deposited dust	Annual	[b] 2 g/m2/month	[a] 4 g/m^2/month

Notes to Tables 4-6:

- [a] Total impact (ie incremental increase in concentrations due to the development plus bacground concentrations due to all other sources);
- [b] Incremental impact (ie incremental increase in concentreatios due to the development on its own);
- [c] Deposited dust is to be assessed as insoluable solids as defined by Standards Australia AS/NZS 3850:10.1.2003 – Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method
- [d] Exludeds extraordinary events suchs as bishfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activites or any other activity agreed by the Secretary in consultation with EPA.

The site installed a **High Volume Sampling Unit (HVAS**) in late 2016 to monitor PM_{10} in accordance with the criteria stipulated in Schedule 3, Condition 14 of SSD 5109 and listed in **Table 15.** Air quality monitoring at the site has been undertaken throughout 2019.

Table 15: TSP and PM_{10} Dust Criteria

Table 4: Long-term impact assessment criteria for Particulate Matter (from Development Consent)

Pollutant	Averaging Period	[d] Criterion
Total Suspended particulate (TSP)	Annual	[a]90 µm/m^3
Particulate matter < 10 µm (PM_{10})	Annual	[a] 30 µm/m^3

Table 5: Short-term impact assessment criteria for Particulate Matter (from Development Consent)

Pollutant	Averaging Period	[d] Criterion
Particulate matter < 10 µm(PM10)	24 hour	[a] 50 µm/m^3

6.3.3 Key Environmental Performance

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

6.3.3.1 Depositional Dust Monitoring

Depositional dust monitoring was undertaken at five depositional dust gauges at Cooma Road Quarry in 2019. Results for this monitoring are provided in **Table 16.**

Table 16: 2019 Dust Monitoring (Depositional Dust)

Date	DDG1	DDG2	DDG3	DDG4	DDG5
07-01-2019	5.4	2.2	2.7	3.3	3.1
08-02-2019	5.6	4.1	4.5	5.9	4.1
08-03-2019	7.1	2.7	5	7.1	2.8
04-04-2019	3.3	2.3	1.7	2.9	0.9
07-05-2019	2.8	1.4	1	2.3	1.2
05-06-2019	4.8	2	0.6	2	1.1
05-07-2019	3.8	1	0.3	2.5	0.6
09-08-2019	3.8	2	1.2	1.7	1.5
17-09-2019	4.7	1.3	1.3	2.8	1
04-10-2019	3.3	2.3	1.6	6.2	1.8
07-11-2019	7.7	3.7	3.7	5.1	3.5
13-12-2019	6.6	1.4	1.2	1.9	2.6
Annual Average	**4.9**	2.2	2.1	3.6	2.0
Min	2.8	1	0.3	1.7	0.6
Max	7.7	4.1	5	7.1	4.1

For the 2019 reporting period, all Annual Average results at the 5 monitoring locations were compliant with the consent criteria, with the exception of DDG1 which was over the Development Consent criteria of 4g/m^2/month.

A review of the current location for DDG 4, and possibly DDG 1, will be undertaken during the next reporting period to determine if these gauges should be relocated to a more suitable position, as the dust levels have likely been affected by contamination eg. Bird droppings and insects.

A summary of depositional dust trends between 2017 and 2019 are outlined in **Table 17**.

Table 17: Depositional Dust Trends

Dust Depositional Gauge	Monitoring Summary for Annual Review Period	Monitoring Results 2019 Period (Contamination Removed)	Monitoring Results 2018 Period (Contamination Removed)	Monitoring Results 2017 Period (Contamination Removed)
		(g/m^2/month)		
DDG1	Insoluble Solids Reporting Period Average	**4.9**	3.8	3.1
	Max. Insoluble Solids	2.8	5.4	3.7
	Min. Insoluble Solids	7.7	1.9	2.1
DDG2	Insoluble Solids Reporting Period Average	2.2	1.7	1.8
	Max. Insoluble Solids	1	3.0	2.6
	Min. Insoluble Solids	4.1	0.7	0.9
DDG3	Insoluble Solids Reporting Period Average	2.1	1.5	0.8
	Max. Insoluble Solids	0.3	3.9	1.6
	Min. Insoluble Solids	5	0.5	0.4
DDG4	Insoluble Solids Reporting Period Average	3.6	**4.2**	2.1
	Max. Insoluble Solids	1.7	13.1	4.3
	Min. Insoluble Solids	7.1	0.3	0.8
DDG5	Insoluble Solids Reporting Period Average	2.0	2.2	2.0
	Max. Insoluble Solids	0.6	6.1	3.8
	Min. Insoluble Solids	4.1	0.5	0.7

6.3.3.2 PM_{10} Monitoring

PM_{10} monitoring continued at site in 2019. Monitoring of PM_{10} was undertaken at the quarry for the first full year in 2017 after the HVAS was installed in late 2016. Results for 2019 PM_{10} monitoring are provided in **Table 18**.

Table 18: 2019 Dust Monitoring (PM_{10})

Date	PM_{10} Result (ug/m^3)	Compliance Status
03-01-2019	9	Within criteria
10-01-2019	5.3	Within criteria
17-01-2019	32.6	Above 24 hour maximum (short term criterion)
24-01-2019	23	Within criteria
31-01-2019	37	Above 24 hour maximum (short term criterion)
07-02-2019	<1	Within criteria
14-02-2019	11.5	Within criteria
21-02-2019	14	Within criteria
28-02-2019	4.1	Within criteria
07-03-2019	1.8	Within criteria
14-03-2019	<1	Within criteria
21-03-2019	2.8	Within criteria
28-03-2019	8.1	Within criteria
04-04-2019	9.2	Within criteria
11-04-2019	10.1	Within criteria
18-04-2019	11.6	Within criteria
25-04-2019	11.9	Within criteria
02-05-2019	8.4	Within criteria
09-05-2019	9.7	Within criteria
16-05-2019	9.2	Within criteria
23-05-2019	8.7	Within criteria
30-05-2019	4.2	Within criteria
06-06-2019	4.9	Within criteria
13-06-2019	3.9	Within criteria
20-06-2019	7.2	Within criteria
27-06-2019	8.4	Within criteria
04-07-2019	6.1	Within criteria
11-07-2019	3.2	Within criteria
18-07-2019	8.4	Within criteria
25-07-2019	10.3	Within criteria
02-08-2019	10.7	Within criteria
09-082019	14.1	Within criteria
16-08-2019	2.7	Within criteria
23-08-2019	6.6	Within criteria
30-08-2019	12.3	Within criteria
11-09-2019	14.6	Within criteria
18-09-2019	3.8	Within criteria

Date	PM_{10} Result (ug/m^3)	Compliance Status
27-09-2019	5.8	Within criteria
08-10-2019	11.1	Within criteria
15-10-2019	7.5	Within criteria
22-10-2019	3	Within criteria
29-10-2019	4.1	Within criteria
07-11-2019	3	Within criteria
14-11-2019	12.2	Within criteria
21-11-2019	14.2	Within criteria
28-11-2019	15.7	Within criteria
05-12-2019	14.6	Within criteria
12-12-2019	17.4	Within criteria
19-12-2019	21.6	Within criteria
26-12-2019	18.6	Within criteria

The 2019 annual average for PM_{10} was 10.7 ug/m^3, compared to 13.1 ug/m^3 for 2019. A summary of average, minimum and maximum results from 2019 compared to 2017 and 2018 results are outlined in **Table 19**.

There was two occasion in January 2019 where the sample total was above the short-term impact assessment criteria for PM_{10}, which is 50 ug/m^3.

A summary of PM_{10} monitoring trends between 2017 and 2019 are outlined in **Table 19**.

Table 19: PM_{10} Monitoring Trends

Monitoring Summary for Annual Review Period	Monitoring Results 2019 Period ($\mu g/m^3$)	Monitoring Results 2018 Period ($\mu g/m^3$)	Monitoring Results 2017 Period ($\mu g/m^3$)
PM_{10} Reporting Period Average	10.7	13.1	10.97
Max. PM_{10}	37	80.3	35.9
Min. PM_{10}	1.8	1	1.2

6.3.3.3 Long term Trends:

Depositional Dust

Holcim has monitored depositional dust on a monthly basis at five locations within the Cooma Road Quarry project area since 2001. Dust deposition data from the site shows that annual average dust deposition levels have remained below the Development Consent criteria of 4 g/m^2/month, with the exception of DDG1, which had an annual average of 4.9 g/m^2/month. The annual average for DDG 1, 2 and 3 increased during 2019, with there being a small reduction in dust levels at DDG 4 and 5.

PM_{10}

PM_{10} results for 2019 are consistent with 2018 and 2017 with the annual average in all year below the consent criteria.

6.3.3.4 Comparison to EIS Predictions:

The results for annual average for depositional dust and PM_{10} were within the predicted limits of the EIS predictions, with the exception of DDG1.

There was two occasion where the site was above the PM_{10} short term criteria (17 January and

31 January 2019). This was above the EIS predictions.

6.3.4 Management Measures

Mitigation measures relating to air quality are outlined within the Cooma Road Quarry *Air Quality Management Plan*. The plan outlines the control measures implemented as part of the continued operations of the Cooma Road Quarry to minimise the potential air quality impacts on the local community, including:

- Inspections;
- Defined operating hours;
- Monitoring for air quality and meteorological conditions; and
- Training of staff and contractors.

6.3.5 Proposed Improvements

A review of the current location for DDG 4 will be undertaken during the next reporting period to determine if this gauge should be relocated to a more suitable position to reduce the potential contamination of results.

6.4 Blasting

6.4.1 EIS Predictions

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

6.4.2 Approved Criteria

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

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

6.4.3 Key Environmental Performance

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

Table 20: Blast Monitoring Results

Date	Heffernans House		Jerrabomberra		Compliance Status
	Overpressure (dBL)	Vibration (mm/s)	Overpressure (dBL)	Vibration (mm/s)	
22-01-2019	DNT	DNT	95.5	0.49	Compliant
05-02-2019	105.8	0.6	105.8	0.6	Compliant
19-02-2019	105	1.13	DNT	DNT	Compliant
26-02-2019	99.3	1.2	DNT	DNT	Compliant
12-03-2019	100.8	1.82	108.2	0.98	Compliant
19-03-2019	100.7	0.58	93.5	0.037	Compliant
02-04-2019	100.2	2.66	100.1	0.33	Compliant
02-04-2019	100.2	2.66	100.1	0.33	Compliant
30-04-2019	109.5	0.81	101.2	1.47	Compliant
17-05-2019	DNT	DNT	DNT	DNT	Compliant
24-05-2019	106.3	1.09	100.1	0.9	Compliant
06-06-2019	108.7	1.54	91.7	2.64	Compliant
27-06-2019	106	1.06	107.2	3.3	Compliant
25-07-2019	107.1	0.56	94.4	1.15	Compliant
06-08-2019	107.3	1.94	97.9	0.53	Compliant
16-08-2019	114	0.5	96.3	0.98	Compliant
30-08-2019	110	1.81	101.4	0.66	Compliant
27-09-2019	106.3	0.68	88.2	0.47	Compliant
29-10-2019	104.4	4	DNT	DNT	Compliant
05-11-2019	111	0.72	DNT	DNT	Compliant
08-11-2019	114.1	0.93	92.4	0.82	Compliant
18-11-2019	111.9	0.66	92.3	0.31	Compliant
22-11-2019	DNT	DNT	DNT	DNT	Compliant
26-11-2019	114.7	0.66	DNT	DNT	Compliant
03-12-2019	97.7	0.6	91.2	0.43	Compliant

DNT – Did not trigger

In summary:

- There were 25 blasts during 2019; and
- All blasts were within the overpressure and vibration criteria.

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

Longterm Trends:

Blasting levels were compared against the 2017 and 2018 results at the Cooma Road Quarry. In 2016 there was a non - compliance relating to a blast result at Heffernans House (result of 119.8 dB). There were no non – compliances in 2017, 2018 and 2019 regarding blasting. This illustrates the continued improvement in the blasting process.

Table 21: Longterm Blasting Trends

Year	Number of Blasts	Max. Overpressure (dBL)	Average Overpressure (dBL)	Max Vibration (mm/s)	Average Vibration (mm/s)
2016	9	119.8	102.6	1.98	0.88
2017	32	113.5	101.4	4.34	0.75
2018	16	113.5	102.8	3.55	0.98
2019	25	114.7	102.5	4.00	1.12

Comparison to EIS Predictions:

The results for blasting in 2019 were within the predicted limits of the EIS.

6.4.4 Management Measures

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

6.4.5 Proposed Improvements

Blast monitoring will continue in 2020 and all blasts will be reported in the Annual Review.

6.5 Traffic Management

6.5.1 EIS Predictions

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

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

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

6.5.2 Approved Criteria

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

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

6.5.3 Key Environmental Performance

Holcim recorded daily truck movements and volumes transported throughout 2019. The site maintained compliance with the conditions for truck movements throughout 2019. A copy of the truck movements recorded throughout 2019 are outlined in **Table 22.** A total of 947885.3 tonnes of product was transported on and offsite.

Table 22: Transport Tonnages 2019

Month	Transport Tonnages	Truck Movements
January	38,008.37	1362
February	59,828.95	2145
March	68,191.25	2396
April	82,515.91	2839
May	94,963.27	3383
June	99,538.16	3534
July	81,161.16	3027
August	57,598.15	2086
September	77,952.68	2918
October	108,354.98	3889
November	108,572.96	3722
December	71,199.46	2413
Total	947,885.30	33,714

6.5.4 Management Measures

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

6.5.5 Proposed Improvements

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

6.6 Biodiversity

6.6.1 EIS Predictions

Consideration of the proposal under Section 5A of the *Environment Planning and Assessment Act 1979* (EPBC Act) determined there was unlikely to be any significant impacts to species or communities listed in NSW.

The Project is also considered unlikely to result in a significant impact on EPBC Act listed species and communities, or on migratory species.

6.6.2 Approved Criteria

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

6.6.3 Key Environmental Performance

There was no additional clearing in the 2019 reporting period, therefore there have been no additional impacts to biodiversity.

Weed spraying was continued in 2019.

There was no additional tree planting in 2019, however trees that were planted during 2017 were maintained. Nest box monitoring was not completed in 2019.

6.6.4 Management Measures

The ongoing management of the ecological values of the Project area are required to be conducted in accordance with the Cooma Road Quarry *Rehabilitation Management Plan*. The plan outlines the control measures to be implemented as part of the continued operations at the Cooma Road Quarry. This includes minimising the potential impacts on biodiversity as a result of quarrying activities as well as risks associated with unsuccessful post-quarrying rehabilitation.

6.6.5 Proposed Improvements

During the 2020 reporting period Holcim will continue to manage weed species on the site.

Holcim will assess the need to carry out feral animal control and implement a program if required, however there have been no feral animal sightings to date.

Holcim will initiate a round of monitoring to assess the effectiveness of the 55 nest boxes that have previously been installed around the quarry. Holcim will continue to salvage fallen timber and boulders to promote increased habitat complexity in the rehabilitation areas.

6.7 Heritage (Aboriginal Archaeology and Historic Heritage)

6.7.1 EIS Predictions

6.7.1.1 Aboriginal Archaeology

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

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

6.7.1.2 Historic Heritage

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

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

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

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

6.7.2 Approved Criteria

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

6.7.3 Key Environmental Performance

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

Monitoring of Heritage infrastructure was undertaken in 2019 by Holcim with this involving taking before and after photos at the time of the blast. No significant observations were observed from base surveys conducted in 2014.

6.7.4 Management Measures

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

6.7.5 Proposed Improvements

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

6.8 Summary of Environmental Performance

A summary of the performance of environmental management measures and sampling results for 2019 are detailed in **Table 23**.

Table 23: Environmental Performance at Cooma Road Quarry in 2019

Aspect	Approval Criteria / EIS Prediction	Performance during the reporting period	Trend / key management implications	Implemented / proposed management actions
Noise	EIS predictions are all below development consent criteria.	Quarter 1- 4 monitoring has met the Development Consent Criteria.	Consistently meets criteria.	None Required.
Blasting	EIS predictions are all below development consent criteria.	Below criteria.	Below criteria in 2019 to 2017	None required.
Air Quality	EIS predictions are all below development consent criteria.	Dust deposition results are within criteria of EPL, EIS and Development Consent with the exception of DDG1. The site was above the PM_{10} short term impact assessment criteria for two monitoring events in January 2019.	Dust deposition was generally consistent with EIS and previous Annual Review with the exception of DDG1. PM_{10} data was generally consistent with the previous period.	A review of the current location for DDG1 will be undertaken during 2020 to determine if this gauge should be relocated to a more suitable position to reduce contamination of results. If determined to be required, liaise with the EPA and DPIE about moving DDG1 to a more suitable location.
Traffic Management	EIS predictions are all below development consent criteria.	Met the Development Consent Criteria	Consistently meets criteria.	None required.
Water Management	EIS predictions are all below development consent criteria.	No discharge. Groundwater has not been assessed during this reporting period.	Surface water generally meets criteria. There were no discharges during 2019. Groundwater has not been verified during this reporting period as no monitoring was undertaken.	See **Section 7.5** for details about proposed groundwater monitoring.

Aspect	Approval Criteria / EIS Prediction	Performance during the reporting period	Trend / key management implications	Implemented / proposed management actions
Biodiversity	It unlikely there will be any significant impacts to species or communities listed in NSW.	No additional impacts - no clearing.	Biodiversity monitoring has not been consistent with the *Rehabilitation Management Plan* as no nest box monitoring was undertaken.	Implement the *Rehabilitation Management Plan.*
Heritage	No predictions.	No impacts to Aboriginal Cultural Heritage or European Heritage.	Continued to be no impacts.	None Required.

7 WATER MANAGEMENT

Water management at the Cooma Road Quarry is undertaken in accordance with the *Water Management Plan*.

7.1 EIS Predictions

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

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

7.2 Approved Criteria

Holcim are required to monitor surface water quality during discharge events at the Cooma Road Quarry licensed discharge point (LDP), in accordance with the requirements of EPL 1453 (provided in **Table 24**)**.**

Table 24: Water Quality Criteria for the Cooma Road Quarry (EPL 1453)

POINT 1

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

7.3 Water Usage and Storage

Water storages utilised at the Cooma Road Quarry include:

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

During this reporting period water has been used for use in crushing and screening and watering of haul roads.

Water usage has continued to be recorded during this reporting period.

7.4 Surface Water Results

Holcim monitors surface water quality in Barracks Creek on a monthly basis.

All water monitoring results listed in **Table 25** are recorded from monitoring undertaken within the creek line, with there being no direct discharge to Barracks Creek in 2019.

Table 25: 2019 Water Monitoring Results (Barracks Creek)

Date	Total Suspended Solids (mg/L)	pH	Oil and Grease (mg/L)
07-01-2019	2	7.3	<1
08-02-2019	4	7.9	<1
08-03-2019	15	7.7	<1
04-04-2019	14	7.5	<1
07-05-2019	5	7.5	<1
05-06-2019	4	7.6	<1
05-07-2019	2	7.5	<1
09-08-2019	2	7.5	<1
17-09-2019	7	7.4	<1
04-10-2019	2	7.3	<1
07-11-2019	2	7.1	<1
13-12-2019	4	7.3	<1

There are discharge criteria within Condition L2.4 of the EPL relating to Barracks Creek, with these outlined in **Table 24**.

These criteria only apply to the site when discharging. Even though there was no discharge during 2019, the monthly samples were below the EPL criteria.

Long-term Trends:

A comparison of data between 2016 and 2019 indicated that results for pH, total oil and grease and suspended solids are generally within the EPL criteria. The only exceptions being one result in 2016 and one result in 2017 for pH. The pH results are generally neutral to slightly alkaline. Oil and grease and suspended solids both recording low readings between 2016 and 2019.

There was no discharge events in 2016- 2019, therefore the EPL criteria is not relevant.

Table 26: Longterm Water Monitoring Barracks Creek

Year	pH Average	Oil and Grease Average	TSS Average
2016	7.4	<1	2.5
2017	7.5	<1	2.6
2018	7.5	<1	4.75
2019	7.5	<1	5

During the 2020 report period Cooma Road Quarry are to install a v-notch weir at the point where the eastern catchment runoff enters the quarry pit and update the Water Management Plan accordingly.

Comparison to EIS Predictions:

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

7.5 Groundwater

Summary of Monitoring

There was no groundwater monitoring completed at the Cooma Road Quarry in 2019. Holcim notes in the letter from the DPIE on 14 May 2018 that groundwater monitoring is required by Holcim at Cooma Road Quarry.

The *Water Management Plan* (2014) outlines the groundwater condition at the site. The Plan states that following a groundwater assessment (Coffey Geotechnics 2012), it was concluded that the operation of Cooma Road Quarry is not considered to have a significant impact on the regional groundwater resources, as:

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

Cooma Road Quarry is committed to completing the following in regard to groundwater monitoring in 2020:

- Drilling of MB01 and MB02 bores;
- Casing and installation of piezometer;
- obtain quarterly land access to bores with neighbors for access to GW400534 and GW 416130 for monitoring;
- Add groundwater monitoring to contractors quarterly environmental monitoring program;
- Update the Water Management Plan accordingly; and
- Engage consultant over the 24 months to set trigger values based quarterly level monitoring.

7.6 Water Take

Table 27 outlines the water take at the Cooma Road Quarry in 2019. The water take was within the limits of the water access licence requirement.

Table 27: 2019 Water Take

Water Licence Number	Entitlement	Water Usage During 2019	Water Usage During 2018	Water Usage During 2017
40SL27690	98 ML	70ML	60ML	48ML

8 REHABILITATION AND LANDSCAPE MANAGEMENT

The site is required to undertake biodiversity and rehabilitation in accordance with the requirements in **Table 28**.

Table 28: Rehabilitation Requirements for Cooma Road Quarry (SSD 5109)

Rehabilitation Objectives

22. The Applicant must rehabilitate the site to the satisfaction of the Secretary. This rehabilitation must be generally consistent with the proposed rehabilitation strategy in the EIS and Appendix 7, and comply with the objectives in Table 7.

Rehabilitation Objectives

Feature	Objectives
Site (as a whole)	Safe, stable and non-polluting
Surface Infrastructure	To be decommissioned and removed (unless otherwise agreed with the Secretary)
Benched Quarry Walls	Landscaped and revegetated utilising native tree and understory species, ensuring that the tree canopy is restored and integrated with the surrounding canopy to minimise visual impacts
Quarry Pit Floors	Landscaped and revegetated utilising native flora species, above the anticipated final void water level
Other land affected by the development	Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of: - Native endemic species: ad - A landform consistent with Appendix 7 and the surrounding environment
Community	• Ensure public safety • Minimise the adverse socio-economic effects associated with the closure of the development

Note: Revegetation of existing and proposed industrial areas is not required

Progressive Rehabilitation

23. The Applicant must rehabilitation 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 to final rehabilitation.

Rehabilitation and biodiversity management strategies, procedures, controls and monitoring programs at the Cooma Road Quarry are undertaken in accordance with the *Rehabilitation Management Plan*. The *Rehabilitation Management Plan* is available on the Holcim Community Link website.

8.1 Rehabilitation Performance during the Reporting Period

There was no rehabilitation undertaken during 2019. Existing rehabilitation areas continue to be inspected and maintained. See **Table 29** for details of rehabilitation performance.

Table 29: Rehabilitation Performance in 2019

Guideline Requirement	Site Comment
Extent of the operations and rehabilitation at completion of the reporting period	No rehabilitation completed. Inspections were completed of the rehabilitation area.
Agreed post- rehabilitation land use	The final rehabilitation at the Cooma Road Quarry will consist of a woodland/grassland revegetation mix. No change in 2019.
Key rehabilitation performance indicators	See Section 4 of the *Rehabilitation Management Plan*
Renovation or removal of buildings	No buildings removed in 2019, and none proposed in 2020.
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 2019 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 as per the *Rehabilitation Management Plan.*
Outcomes of trials, research projects and other initiatives	Due to the lack of rain Holcim have only had a 30% success rate with the alpine tree planting from a previous period.
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. Dry conditions have impacted growth of rehabilitation.

8.2 Summary of Current Rehabilitation and Performance

A summary of the rehabilitation and disturbance status of Cooma Road Quarry is outlined in **Table 30** and **Figure 3**.

Table 30: Rehabilitation and Disturbance Status

Quarry Area Type	Previous 2018 Annual Review Period (ha)	Current 2019 Annual Review Period (ha)	2020 (next) AEMR Period (ha)
A. Total Quarry Footprint[1]	0	0	0
B. Total Active Disturbance[2]	71.5	71.5	71.5
C. Land Being Prepared for Rehabilitation[3]	0	0	0
D. Land Under Active Rehabilitation[4]	7.6	7.6	7.6
E. Completed Rehabilitation[5]	0	0	0

1 Total disturbance and rehabilitation.
2 Total disturbance within the Project Approval boundary
3 Rehabilitation that is being shaped in a phase of decommissioning, landform establishment and growth medium development.
4 rehabilitation under a phase of ecosystem and land use establishment or ecosystem and land use sustainability
5 This refers to rehabilitation that has been signed off from the DRG.

At the end of 2019 there was approximately 71.5 Ha of active disturbance and 7.6 Ha of active rehabilitation. There is no proposed additional disturbance or rehabilitation in 2020. Rehabilitation maintenance will continue.

8.3 Actions for the Next Reporting Period

The DPIE 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 31**.

Table 31: Rehabilitation and Closure Actions for the 2019 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	No rehabilitation proposed in 2020, unless significant rainfall occurs.
Outline proposed rehabilitation trials, research projects and other initiatives to be undertaken during next reporting period	There are some proposed alpine tree trials planned for 2020. However, this is dependent on climatic conditions.
Summary of rehabilitation activities proposed for next report period	Rehabilitation maintenance will continue in 2020.

Figure 3 Current Disturbance and Rehabilitation

9 COMMUNITY

9.1 Community Engagement Activities

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

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

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

A CCC meeting was held on 6th of May 2019.

Past community engagement activities have included open days, attendance at resident's association meetings and provision of materials for local projects. Whilst there were no community engagement days held in the reporting period, residents or groups are welcome to contact the Quarry to arrange tours.

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

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

9.2 Community Contributions

There were no specific community contributions in 2019.

9.3 Complaints

There were no community complaints in 2019.

All publicly listed information including incidents and contacts for locals in the community is available at http://www.holcim.com.au/cooma-road.html. Holcim continue to operate a Community contact line (02 6297 2211).

10 INDEPENDENT AUDIT

The most recent Independent Environmental Audit (IEA) was undertaken by Pitt & Sherry (Operations) Pty Ltd of behalf of Holcim in December 2017 as required in accordance with Schedule 5, Condition 10 of the Development Consent (SSD_5109) – MOD 1 for the quarry. This was the second IEA, with the previous IEA completed in 2014.

The 2017 IEA provided an assessment of the environmental performance of the project by way of compliance with the requirements and conditions of:

- Development Consent (SSD_5109);
- Statement of Commitments;
- EPL No. 1453; and
- Water Approval No. 40WA413082.

A copy of the IEA Action Plan, including an update on proposed actions is attached as **Appendix 1**.

The next IEA is required to be conducted in 2020.

11 INCIDENTS AND NON-COMPLIANCE

Incidents and non-compliances at Cooma Road Quarry in 2019 are summarised in **Table 32**.

Table 32: Incidents and Non-Compliance at the Cooma Road Quarry During 2019

Date	Incident/Non-Compliance	Action/Comment
Overall period	DDG1 above criteria	DDG1 which was just over the Development Consent criteria of 4g/m/^{2}/month. The location of DDG1 will be reviewed in 2020 as some results contained contamination for bird dropping/insects.
17 January 2019 31 January 2019	Above Short Term PM_{10} Criteria	The site was above the PM_{10} short term impact assessment criteria for two monitoring events in January 2019.
Throughout the period	No groundwater monitoring	No groundwater monitoring was completed in 2019, with this being a requirement of the *Water Management Plan* (see **Section 7**). This is to be completed in 2020.
Throughout the period	Implementation of the Rehabilitation Management Plan	Failure to complete nest box monitoring (Section 8 of management plan - Ecological and Rehabilitation Monitoring).

12 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

Proposed improvement actions for 2020 are noted in **Table 33**.

Table 33: Improvement Actions for 2020

Improvement Measure	Activities	Timeframe
Approval of the *Rehabilitation Management Plan*	The *Rehabilitation Management Plan* was submitted to DPIE, NOW and Council in 2014 but has not yet been approved. Holcim to follow up as required to get *Rehabilitation Management Plan* approved	Pending approval from DPIE
Progressive Rehabilitation	The site will continue to progressively rehabilitate available areas.	As soon as reasonably practicable after disturbance if sufficient rainfall occurs.
Maintenance of rehabilitation	Continued maintenance of rehabilitation in the completed overburden dump in the south-western disturbance area including weed control as well as nest box monitoring.	Ongoing
Depositional Dust Gauge Review	A review of the current location for DDG 1 and DDG 4 will be undertaken during the next reporting period to determine if this gauge should be relocated to a more suitable position.	Quarter 2 2020.
Groundwater monitoring	Completion of groundwater monitoring	Commencing 2020
Biodiversity	Weed spraying will continue at site during the next Annual Review period. Implementation of the *Rehabilitation Management Plan*.	Annually
Biodiversity	Holcim will initiate a round of monitoring to assess the effectiveness of the 55 nest boxes that have previously been installed around the quarry. Holcim will continue to salvage fallen timber and boulders to promote increased habitat complexity in the rehabilitation areas	2020 report period

13 APPENDICES

APPENDIX 1

COOMA ROAD QUARRY INDEPENDENT AUDIT ACTION PLAN

Holcim Audits and Inspections – Audit – Environmental – Action Plan

Condition	Comments and Recommendations	Holcim Actions
Schedule 5 Condition 10		In accordance with Schedule 5, Condition 10; Pitt & Sherry (Consultants) undertook the site visit component of an independent Audit of Cooma Road Quarry. The purpose of the independent audit was to assess the environmental performance of the Quarry and whether it is complying with the relevant requirements in the development consent and any relevant EPL and /or Water License (including any assessment, plan or program required under the approval). Final Audit report to be provided early next year.
Condition 7 of Schedule 3	Breach of Condition 7 of Schedule 3 - "The Applicant must prepare and implement a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must assesses the sound power levels of the equipment on site, compares it with the benchmark levels used in the EIS, and evaluates the effectiveness of any attenuation."	In relation to Condition 6 and Condition 7 of Schedule 3, Holcim will engage a suitably qualified person to conduct a sound power level testing program to review against sound power level (SWL) for equipment outlined in the Environmental Impact Statement (EIS).
Condition 20 of Schedule 3	Breach of Condition 20 of Schedule 3 - "Finalisation of Water Management Plan."	Holcim will engage a suitably qualified and experienced person/s to assist with the finalisation of the Water Management Plan through consultation with DPI Water.
Condition 24 of Schedule 3	Breach of Condition 24 of Schedule 3 - "Finalisation of Rehabilitation Management Plan."	Holcim will engage a suitably qualified and experienced person/s to assist with the finalisation of the Rehabilitation Management Plan through consultation with relevant stakeholders.
Condition 30 of Schedule 3	Breach of Condition 30 of Schedule 3 – "Prior to importing onto the site any recycled concrete or any other material that may be classified as a waste under the EPA Waste Classification Guidelines 2009 (or its latest version), the Applicant must obtain a 'resource recovery exemption' under the POEO Act and provide evidence of this exemption to the Department."	Holcim will engage a suitably qualified person to assist with the applying for a Resource Recovery Exemption for the concrete waste processed at Cooma Road Quarry.
Condition 31 of Schedule 3	Non-compliance for Condition 31 of Schedule 3 - One open waste oil drum for temporary storage was sighted outside the bund. The auditees mentioned that this area is served by an oil/grease separator with	Holcim has a comprehensive Environmental Management System (EMS) that addresses environmental risks associated with operational aspects related to quarrying. Chapter 6. 11 of the Holcim EMS provides guidelines

Condition	Comments and Recommendations	Holcim Actions
	hardstand sloping towards a capture drain. However, the area is not protected by any bunds and stormwater or surface water contamination is possible during storm events.	on the Storage of Liquid Fuels & Chemicals. Holcim's Quarry Manager will review Chapter 6.11 of the Holcim EMS and will hold a toolbox talk for Cooma Road Quarry employees. Environmental hazards will continue to be recorded using Holcim's internal reporting software – INX.
Condition 4 of Schedule 5	Breach of Condition 4 of Schedule 5 - "With 3 months of the submission of an: (a) incident report under condition 7 below; (b) Annual Review under condition 9 below; (c) audit report under condition 10 below; and (d) any modifications to this consent, The applicant must review, and if necessary revise, the strategies, plans and programs required under this consent, to the satisfaction of the Secretary."	Develop a Minutes template for recording meetings and/or reviews associated with strategies, plans and programs. Should a revision be required, the strategy, plan and/or program will be updated and submitted to DP&E as well as other relevant stakeholders.
Condition G1.1 of EPL	Breach of Condition G1.1 of EPL - "A copy of this licence must be kept at the premises to which the licence applies."	Holcim have a permit compliance folder on-site however this should be audited to check it contains all relevant approvals, licences and/or permits.
Water Licence	Breach of Water Licence Conditions in relation to requirements for a logbook.	Holcim will update the logbook with the required information. The Quarry Manager will continue to log details of water usage as well as additional information required as per logbook update.
Condition 5 of Water Licence	Breach of Condition 5 of Water Licence – "Once the approval holder becomes aware of a breach of any condition on this approval, the approval holder must notify the minister as soon as practicable. The minister must be notified by: a. email: information@water.nsw.gov.au, or by b. telephone: 1800 353 104. Any notification by telephone must also be confirmed in writing within seven (7) business days of the telephone call."	Holcim will report the non-compliances identified by this audit to DPI Water.

APPENDIX 2

COOMA ROAD QUARRY QUARTERLY NOISE MONITORING REPORTS 2019

Noise Monitoring Assessment

Cooma Road Quarry, Googong, NSW
Quarter 1 Ending March 2019.

Prepared for: Holcim (Australia) Pty Ltd
February 2019
MAC180611-03RP3

Muller Acoustic Consulting

Document Information

Noise Monitoring Assessment

Cooma Road Quarry, Googong, NSW

Quarter 1 Ending March 2019

Prepared for: Holcim (Australia) Pty Ltd

Prepared by: Muller Acoustic Consulting Pty Ltd
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Document ID	Status	Date	Prepared By	Signed	Reviewed By	Signed
MAC180611-03RP3	Final	26 February 2019	Nicholas Shipman		Oliver Muller	

CONTENTS

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for Cooma Road Quarry the 'quarry', Googong, NSW.

The monitoring has been conducted in accordance with the quarry Noise Management Plan and in general accordance with Development Consent (SSD-5109); at five representative monitoring locations. This assessment has been undertaken for the Quarterly period ending March 2019 and forms part of the annual noise monitoring program for the quarry.

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

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Cooma Road Quarry, Noise Management Plan (NMP), 2014;
- Development Consent SSD-5109; and
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise.

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

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2 Noise Criteria

Schedule 3, Condition 4 of the Cooma Road Quarry Development Consent, approved on 27 September 2013, outlines the applicable noise criteria for residential receivers N1 – N71 surrounding the quarry and are presented in **Table 1**.

Table 1 Noise Criteria

Receivers	Morning Shoulder 6am – 7am	Day 7am – 6pm	Evening 6pm – 10pm
	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$
N1, N7, N8, N56, N57, N59, N63, N64, N65	40	44	39
N67	36	41	35
All other Receivers between N9 and N71 inclusive	36	38	35
All other Receivers	35	35	35

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

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3 Methodology

3.1 Locality

The quarry is located in Googong, NSW approximately 13km south east of Canberra, ACT. The quarry is bounded primarily by rural and residential properties in all directions, with noise from passing road traffic on Old Cooma Road dominating the acoustic environment for receivers to the east of the quarry. The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**.

3.2 Noise Monitoring Locations

Five monitoring locations have been selected as part of the NMA and in accordance with the Development Consent.

Location N3 is to the west of the quarry situated on a rural property off Copperfield Road. This location represents residential and rural receivers to the west of the quarry.

Location N8 is to the north east of the quarry along Tempe Crescent and is representative of residential receivers in that area.

Location N38 is on Heights Road and is representative of the elevated residential receivers to the east of the quarry.

Location N60 is at 501 Old Cooma Road and represents the residence adjacent to the quarry access road.

Location N67 is situated on a rural property at 732 Old Cooma Road to the south of the quarry. This is representative of rural and residential receivers to the south, with direct line of site into the quarry pit.

3.3 Assessment Methodology

Attended noise surveys were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise" and the EPL. Measurements were carried out using Svantek Type 1, 971 noise analysers from Wednesday 6 February 2019 to Thursday 7 February 2019. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2004-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

Noise measurements were of 15 minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source. One measurement was conducted at each monitoring location during the day, evening and morning shoulder periods.

Extraneous noise sources were excluded from the analysis to calculate the $LA_{eq(15min)}$ quarry noise contribution for comparison against the relevant criteria.

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

FIGURE 1

LOCALITY PLAN

REF: MAC180611-03

0 350m

MAC
Muller Acoustic Consulting

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4 Results

4.1 Assessment Results - Location N3

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N3 for the NMA are presented in **Table 2**.

Table 2 Operator-Attended Noise Survey Results – Location N3

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
07/02/19	06:31 (Morning Shoulder)	69	46	35	WD: E WS: 1.5m/s Rain: Nil	Birds 35-62 Aircraft 38-40 Dog bark 36-38 Holcim quarry hum <35
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
06/02/19	12:04 (Day)	68	45	41	WD: E WS: 1.5m/s Rain: Nil	Traffic 38-41 Local residential noise 41-45 Aircraft 44-61 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
06/02/19	19:20 (Evening)	63	43	33	WD: S WS: 2.1m/s Rain: Nil	Birds 30-41 Wind 30-34 Aircraft 40-57 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35

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

4.2 Assessment Results - Location N8

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N8 for the NMA are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location N8

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
07/02/19	06:37 (Morning Shoulder)	71	56	49	WD: S WS: 0.5m/s Rain: Nil	Birds 40-53 Traffic 46-65 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
06/02/19	11:33 (Day)	70	51	42	WD: E WS: 2m/s Rain: Nil	Birds 44-51 Traffic 44-68 Wind in trees <44 Local residential noise 48-56 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
06/02/19	19:29 (Evening)	71	52	42	WD: NE WS: 0.5m/s Rain: Nil	Birds 39-46 Insects <40 Traffic 40-67 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35

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

4.3 Assessment Results - Location N38

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N38 for the NMA are presented in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location N38

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
07/02/19	06:19 (Morning Shoulder)	75	53	45	WD: S WS: 0.1m/s Rain: Nil	Aircraft <53 Birds 46-51 Traffic 46-56 Quarry inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
06/02/19	11:13 (Day)	68	52	44	WD: E WS: 0.5m/s Rain: Nil	Insects <44 Birds 44-51 Traffic 44-61 Quarry inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
06/02/19	19:11 (Evening)	70	50	45	WD: NE WS: 0.5m/s Rain: Nil	Traffic 42-64 Birds 41-46 Construction 43-46 Quarry inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35

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

4.4 Assessment Results - Location N60

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N60 for the NMA are presented in **Table 5**.

Table 5 Operator-Attended Noise Survey Results – Location N60

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
07/02/19	06:00 (Morning Shoulder)	70	59	43	WD: S WS: 0.1m/s Rain: Nil	Birds 39-44 Traffic 39-70 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
06/02/19	10:53 (Day)	77	59	44	WD: E WS: 1m/s Rain: Nil	Lawn mowing 42-50 Insects <42 Traffic 42-71 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
06/02/19	18:48 (Evening)	72	62	49	WD: NE WS: 2m/s Rain: Nil	Traffic 46-71 Wind in trees <46 Birds <46 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35

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

4.5 Assessment Results - Location N67

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N67 for the NMA are presented in **Table 6**.

Table 6 Operator-Attended Noise Survey Results – Location N67

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
07/02/19	06:00 (Morning Shoulder)	60	38	33	WD: E WS: 1.8m/s Rain: Nil	Birds 30-50 Aircraft 30-38 Traffic 36-40 Quarry Inaudible
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<35
06/02/19	10:29 (Day)	62	42	38	WD: E WS: 1m/s Rain: Nil	Birds 36-40 Traffic 3438 Aircraft 36-55 Quarry Inaudible
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<35
06/02/19	18:29 (Evening)	61	44	42	WD: NE WS: 0.5m/s Rain: Nil	Wind in trees 41-49 Birds 41-46 Traffic 38-44 Quarry Inaudible
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<35

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

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5 Noise Compliance Assessment

The compliance assessment for each monitoring location N3, N8, N38, N60 and N67 are presented in **Table 7** to **Table 9** for day, evening and morning shoulder assessment periods.

Table 7 Daytime Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
	dB, $L_{Aeq(15min)}$	dB, $L_{Aeq(15min)}$	
N3	<35	35	✓
N8	<35	44	✓
N38	<35	38	✓
N60	<35	38	✓
N67	<35	41	✓

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

Table 8 Evening Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
	dB, $L_{Aeq(15min)}$	dB, $L_{Aeq(15min)}$	
N3	<35	35	✓
N8	<35	39	✓
N38	<35	35	✓
N60	<35	35	✓
N67	<35	35	✓

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

Table 9 Morning Shoulder Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
	dB, $L_{Aeq(15min)}$	dB, $L_{Aeq(15min)}$	
N3	<35	35	✓
N8	<35	40	✓
N38	<35	36	✓
N60	<35	36	✓
N67	<35	36	✓

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

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6 Discussion

6.1 Discussion of Results - Location N3

Quarry noise was audible during the morning shoulder period on one out of three measurements. Estimated quarry contributions were <35dBA and therefore satisfied the morning shoulder and daytime criteria. It is noted that the quarry was not operational during the evening period however background measurements were undertaken for completeness and as per the EPL. Extraneous sources audible during the three attended surveys included birds, aircrafts, dog bark, traffic, wind and local residential noise.

6.2 Discussion of Results - Location N8

Noise levels were dominated by local traffic that was generally constant during all three attended measurements. Quarry emissions were inaudible during all three measurements. Estimated quarry contributions were <35dBA, therefore satisfying the relevant morning shoulder and daytime criteria. The quarry was not operational during the evening period therefore satisfying the evening noise limit of 39dB $LA_{eq(15min)}$. Extraneous sources noted during the measurements include birds, traffic, wind in trees, local residential noise and insects.

6.3 Discussion of Results - Location N38

Quarry noise was inaudible during all three measurements. Estimated quarry contributions were <35dBA, therefore satisfying the relevant morning shoulder and daytime criteria. The quarry was not operational during the evening period therefore satisfying the evening criteria. Non-quarrying noise sources included aircrafts, birds, traffic, insects and construction noise.

6.4 Discussion of Results - Location N60

Quarry noise emissions remained inaudible during all three measurements. Estimated quarry contributions were <35dBA for day, evening and morning shoulder measurements therefore satisfying the relevant morning shoulder and daytime criteria. It is noted that the quarry was not operational during the evening period, therefore satisfying the evening noise criteria. Extraneous sources noted during the measurements include birds, traffic, lawn mowing, insects and wind in trees.

6.5 Discussion of Results - Location N67

Quarry noise emissions were inaudible during the daytime and morning shoulder measurements at N67 during the March Quarter for 2019. Quarry emissions were estimated at <35dBA for all measurements at this location, therefore, satisfying relevant morning shoulder and daytime noise limits. It is noted that the quarry was not operational during the evening period, therefore satisfying the evening noise limit of 35dB $LA_{eq(15min)}$. Birds, aircraft noise, traffic and wind in trees were the dominant noise sources at this receiver during the survey.

7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) for Holcim (Australia) Pty Ltd at the Cooma Road Quarry, Googong, NSW. The assessment was completed to assess the quarry's compliance with the relevant noise criteria outlined in their Development Consent for residential receivers surrounding the quarry.

Attended noise monitoring was undertaken between Wednesday 6 February 2019 to Thursday 7 February 2019 at five representative monitoring locations. The assessment has identified that noise emissions generated by Cooma Road Quarry comply with relevant noise criteria specified in the Development Consent at all assessed residential receivers for the Quarterly period ending March 2019.

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Appendix A - Glossary of Terms

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

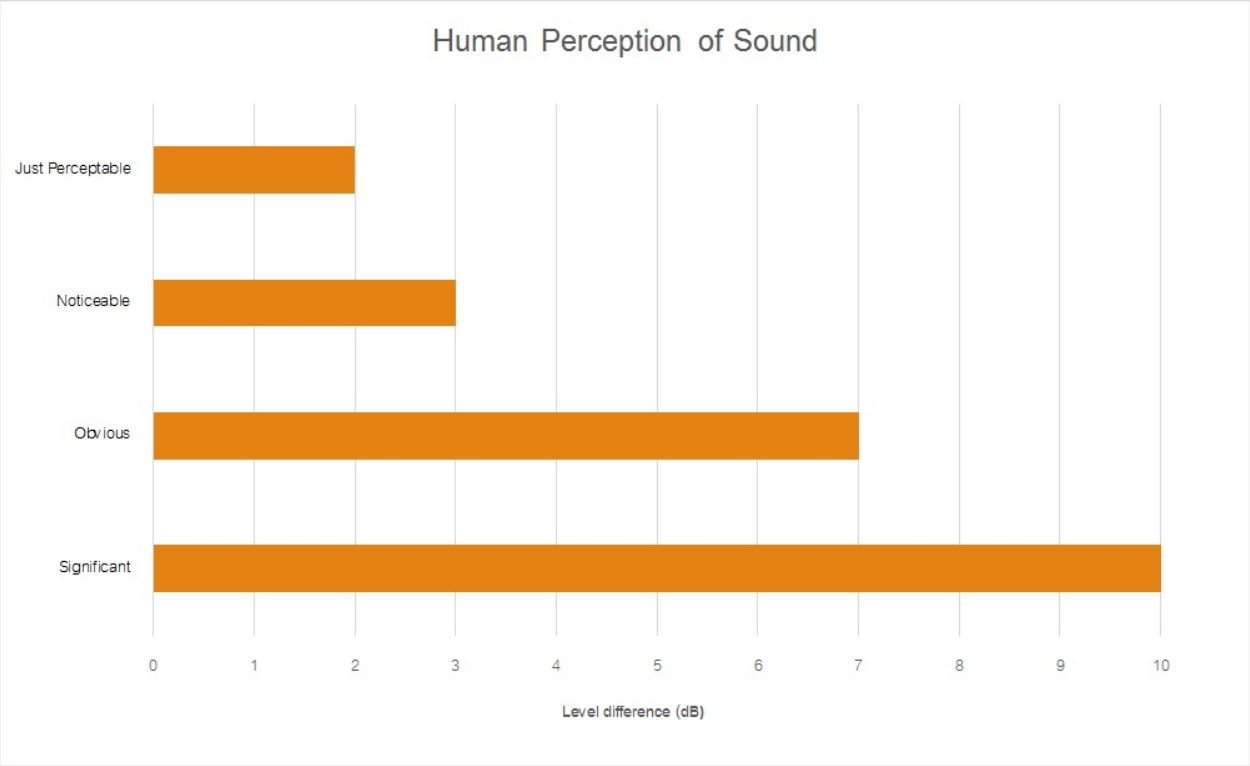
Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single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

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

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA

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

Figure A1 – Human Perception of Sound



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Muller Acoustic Consulting

Noise Monitoring Assessment

Cooma Road Quarry, Googong, NSW
Quarter 1 Ending June 2019.

Prepared for: Holcim (Australia) Pty Ltd
May 2019
MAC180611-03RP4

Muller Acoustic Consulting

Document Information

Noise Monitoring Assessment

Cooma Road Quarry, Googong, NSW

Quarter 2 Ending June 2019

Prepared for: Holcim (Australia) Pty Ltd

Prepared by: Muller Acoustic Consulting Pty Ltd
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Document ID	Status	Date	Prepared By	Signed	Reviewed By	Signed
MAC180611-03RP4	Final	28 May 2019	Robin Heaton		Rod Linnett	

CONTENTS

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1 Introduction

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The monitoring has been conducted in accordance with the quarry Noise Management Plan and in general accordance with Development Consent (SSD-5109); at five representative monitoring locations. This assessment has been undertaken for the Quarterly period ending June 2019 and forms part of the annual noise monitoring program for the quarry.

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

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

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2 Noise Criteria

Schedule 3, Condition 4 of the Cooma Road Quarry Development Consent, approved on 27 September 2013, outlines the applicable noise criteria for residential receivers N1 – N71 surrounding the quarry and are presented in **Table 1**.

Table 1 Noise Criteria

Receivers	Morning Shoulder 6am – 7am	Day 7am – 6pm	Evening 6pm – 10pm
	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$
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N67	36	41	35
All other Receivers between N9 and N71 inclusive	36	38	35
All other Receivers	35	35	35

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

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3 Methodology

3.1 Locality

The quarry is located in Googong, NSW approximately 13km south east of Canberra, ACT. The quarry is bounded primarily by rural and residential properties in all directions, with noise from passing road traffic on Old Cooma Road dominating the acoustic environment for receivers to the east of the quarry. The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**.

3.2 Noise Monitoring Locations

Five monitoring locations have been selected as part of the NMA and in accordance with the Development Consent.

Location N3 is to the west of the quarry situated on a rural property off Copperfield Place. This location represents residential and rural receivers to the west of the quarry.

Location N8 is to the north east of the quarry along Tempe Crescent and is representative of residential receivers in that area.

Location N38 is on Heights Road and is representative of the elevated residential receivers to the east of the quarry.

Location N60 is at 501 Old Cooma Road and represents the residence adjacent to the quarry access road.

Location N67 is situated on a rural property at 732 Old Cooma Road to the south of the quarry. This is representative of rural and residential receivers to the south, with direct line of site into the quarry pit.

3.3 Assessment Methodology

Attended noise surveys were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise" and the EPL. Measurements were carried out using Svantek Type 1, 971 noise analysers from Tuesday 14 May 2019 to Thursday 16 May 2019. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

Noise measurements were of 15 minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source. One measurement was conducted at each monitoring location during the day, evening and morning shoulder periods.

Extraneous noise sources were excluded from the analysis to calculate the $LA_{eq(15min)}$ quarry noise contribution for comparison against the relevant criteria.

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

FIGURE 1

LOCALITY PLAN

REF: MAC180611-03

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4 Results

4.1 Assessment Results - Location N3

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N3 for the NMA are presented in **Table 2**.

Table 2 Operator-Attended Noise Survey Results – Location N3

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
16/05/2019	06:00 (Morning Shoulder)	59	39	37	WD: E WS: 0.5m/s Rain: Nil	Birds 39-59 Urban Hum 36-40 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
14/05/2019	16:05 (Day)	64	47	39	WD: NE WS: 1.3m/s Rain: Nil	Urban Hum 39-45 Aircraft 40-64 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
14/05/2019	19:34 (Evening)	63	40	36	WD: E WS: 0.1m/s Rain: Nil	Urban Hum 35-41 Car Alarm 35-36 Aircraft 38-63 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35

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

4.2 Assessment Results - Location N8

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N8 for the NMA are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location N8

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
15/05/2019	06:39 (Morning Shoulder)	81	60	53	WD: W WS: 0.4m/s Rain: Nil	Birds 55-59 Traffic 50-81 Quarry Inaudible
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<35
14/05/2019	15:28 (Day)	85	58	44	WD: W WS: 0.2m/s Rain: Nil	Birds 50-55 Traffic 40-85 Road Works 45-55 Quarry Inaudible
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<35
14/05/2019	18:51 (Evening)	79	56	44	WD: W WS: 0.0m/s Rain: Nil	Traffic 50-79 Quarry Inaudible
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<35

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

4.3 Assessment Results - Location N38

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N38 for the NMA are presented in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location N38

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
15/05/2019	06:22 (Morning Shoulder)	74	53	48	WD: W WS: 1.0m/s Rain: Nil	Aircraft 45-52 Birds 50-74 Traffic 45-60 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
14/05/2019	15:11 (Day)	70	58	52	WD: W WS: 0.5m/s Rain: Nil	Roadworks 57-64 Traffic 40-63 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
14/05/2019	18:33 (Evening)	66	53	48	WD: W WS: 0.1m/s Rain: Nil	Traffic 49-66 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35

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

4.4 Assessment Results - Location N60

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N60 for the NMA are presented in **Table 5**.

Table 5 Operator-Attended Noise Survey Results – Location N60

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
16/05/2019	06:26 (Morning Shoulder)	89	69	48	WD: E WS: 0.5m/s Rain: Nil	Birds 50-54 Traffic 48-89 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
14/05/2019	14:50 (Day)	91	67	42	WD: E WS: 0.5m/s Rain: Nil	Traffic 48-91 Roadworks 40-50 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
14/05/2019	19:08 (Evening)	73	53	45	WD: E WS: 0.7m/s Rain: Nil	Traffic 50-73 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35

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

4.5 Assessment Results - Location N67

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N67 for the NMA are presented in **Table 6**.

Table 6 Operator-Attended Noise Survey Results – Location N67

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
15/05/2019	05:59 (Morning Shoulder)	61	43	40	WD: SW WS: 1.5m/s Rain: Nil	Urban Hum 36-41 Haul Truck Engine 40-46 (60secs) Birds 40-61
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						35
14/05/2019	14:20 (Day)	60	36	31	WD: W WS: 1.8m/s Rain: Nil	Birds 35-60 Dogs 30-35 Quarry Operations 30-41
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						35
14/05/2019	18:10 (Evening)	56	41	36	WD: W WS: 0.1m/s Rain: Nil	Urban Hum 37-40 Aircraft 40-56 Quarry Inaudible
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<35

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

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5 Noise Compliance Assessment

The compliance assessment for each monitoring location N3, N8, N38, N60 and N67 are presented in **Table 7** to **Table 9** for day, evening and morning shoulder assessment periods.

Table 7 Daytime Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
	dB, $L_{Aeq(15min)}$	dB, $L_{Aeq(15min)}$	
N3	<35	35	✓
N8	<35	44	✓
N38	<35	38	✓
N60	<35	38	✓
N67	35	41	✓

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

Table 8 Evening Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
	dB, $L_{Aeq(15min)}$	dB, $L_{Aeq(15min)}$	
N3	<35	35	✓
N8	<35	39	✓
N38	<35	35	✓
N60	<35	35	✓
N67	<35	35	✓

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

Table 9 Morning Shoulder Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
	dB, $L_{Aeq(15min)}$	dB, $L_{Aeq(15min)}$	
N3	<35	35	✓
N8	<35	40	✓
N38	<35	36	✓
N60	<35	36	✓
N67	35	36	✓

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

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6 Discussion

6.1 Discussion of Results - Location N3

Quarry noise was inaudible during all three measurements conducted at location N3 which satisfied the morning shoulder and daytime criteria. It is noted that the quarry was not operational during the evening period however background measurements were undertaken for completeness and per the EPL. Extraneous sources audible during the three attended surveys included birds, aircraft, and urban hum noise.

6.2 Discussion of Results - Location N8

Noise levels were dominated by local traffic that was generally constant during all three attended measurements and intermittent road work noise during the morning shoulder and daytime. Quarry emissions were inaudible during all three measurements. Estimated quarry contributions were below the relevant morning shoulder and daytime criteria. The quarry was not operational during the evening period therefore satisfying the evening noise limit of 39dB $LA_{eq(15min)}$. Extraneous sources noted during the measurements include birds, traffic, wind in trees, local residential noise and insects.

6.3 Discussion of Results - Location N38

Measurements conducted at the N38 monitoring location were dominated by traffic noise nd intermittent road work noise, in particular a rock hammer operating on Old Cooma Road. Quarry noise was inaudible during all three measurements. Estimated quarry contributions were below the relevant morning shoulder and daytime criteria. The quarry was not operational during the evening period therefore satisfying the evening criteria. Non-quarrying noise sources included aircrafts, birds, traffic, insects and construction noise.

6.4 Discussion of Results - Location N60

Quarry noise emissions remained inaudible during all three measurements. Estimated quarry contributions were below the relevant morning shoulder and daytime criteria. It is noted that the quarry was not operational during the evening period, therefore satisfying the evening noise criteria. Extraneous sources noted during the measurements include birds, traffic, and intermittent road works noise.

6.5 Discussion of Results - Location N67

Quarry noise emissions were audible during the daytime and morning shoulder measurements at N67. Audible quarry sources included truck movements, excavator operations and alarms at the fixed plant. Quarry emissions were estimated at 35dBA for both the daytime and morning shoulder measurements at this location, therefore, satisfying relevant daytime and morning shoulder noise limits. It is noted that the quarry was not operational during the evening period, therefore satisfying the evening noise limit of 35dB $LA_{eq(15min)}$. Birds, aircraft noise, traffic and dogs barking were other noise sources audible at this receiver during the survey.

7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) for Holcim (Australia) Pty Ltd at the Cooma Road Quarry, Googong, NSW. The assessment was completed to assess the quarry's compliance with the relevant noise criteria outlined in their Development Consent for residential receivers surrounding the quarry.

Attended noise monitoring was undertaken between Tuesday 14 May 2019 to Thursday 16 May 2019 at five representative monitoring locations. The assessment has identified that noise emissions generated by Cooma Road Quarry comply with relevant noise criteria specified in the Development Consent at all assessed residential receivers for the Quarterly period ending June 2019.

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Appendix A - Glossary of Terms

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

Table A1 Glossary of Terms

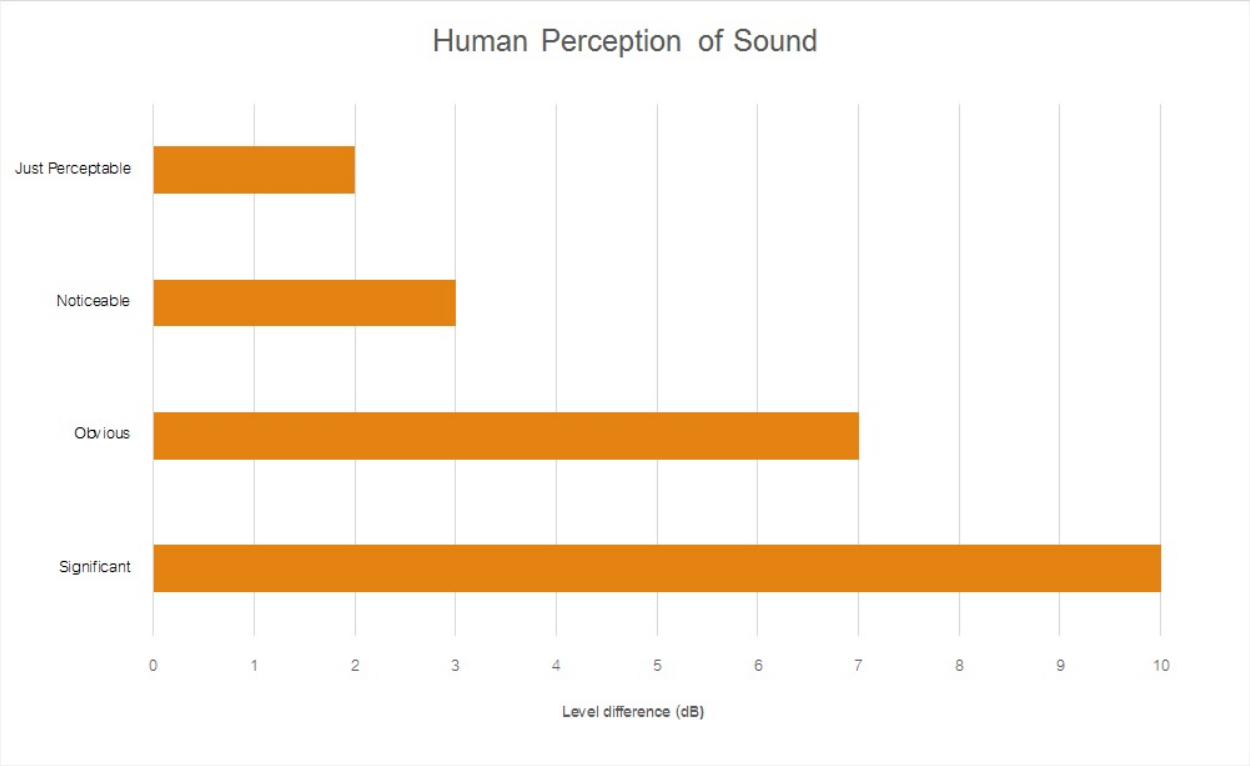
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for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

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

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA

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

Figure A1 – Human Perception of Sound



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Noise Monitoring Assessment

Cooma Road Quarry, Googong, NSW
Quarter 3 Ending September 2019.

Prepared for: Holcim (Australia) Pty Ltd
September 2019
MAC180611-03RP5

Muller Acoustic Consulting

Document Information

Noise Monitoring Assessment

Cooma Road Quarry, Googong, NSW

Quarter 3 Ending September 2019

Prepared for: Holcim (Australia) Pty Ltd

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Document ID	Status	Date	Prepared By	Signed	Reviewed By	Signed
MAC180611-03RP5	Final	2 September 2019	Robin Heaton		Rod Linnett	

CONTENTS

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for Cooma Road Quarry the 'quarry', Googong, NSW.

The monitoring has been conducted in accordance with the quarry Noise Management Plan and in general accordance with Development Consent (SSD-5109); at five representative monitoring locations. This assessment has been undertaken for the Quarterly period ending September 2019 and forms part of the annual noise monitoring program for the quarry.

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

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Cooma Road Quarry, Noise Management Plan (NMP), 2014;
- Development Consent SSD-5109; and
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise.

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

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2 Noise Criteria

Schedule 3, Condition 4 of the Cooma Road Quarry Development Consent, approved on 27 September 2013, outlines the applicable noise criteria for residential receivers N1 – N71 surrounding the quarry and are presented in **Table 1**.

Table 1 Noise Criteria

Receivers	Morning Shoulder 6am – 7am	Day 7am – 6pm	Evening 6pm – 10pm
	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$
N1, N7, N8, N56, N57, N59, N63, N64, N65	40	44	39
N67	36	41	35
All other Receivers between N9 and N71 inclusive	36	38	35
All other Receivers	35	35	35

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

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3 Methodology

3.1 Locality

The quarry is located in Googong, NSW approximately 13km south east of Canberra, ACT. The quarry is bounded primarily by rural and residential properties in all directions, with noise from passing road traffic on Old Cooma Road dominating the acoustic environment for receivers to the east of the quarry. The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**.

3.2 Noise Monitoring Locations

Five monitoring locations have been selected as part of the NMA and in accordance with the Development Consent.

Location N3 is to the west of the quarry situated on a rural property off Copperfield Place. This location represents residential and rural receivers to the west of the quarry.

Location N8 is to the north east of the quarry along Tempe Crescent and is representative of residential receivers in that area.

Location N38 is on Heights Road and is representative of the elevated residential receivers to the east of the quarry.

Location N60 is at 501 Old Cooma Road and represents the residence adjacent to the quarry access road.

Location N67 is situated on a rural property at 732 Old Cooma Road to the south of the quarry. This is representative of rural and residential receivers to the south, with direct line of site into the quarry pit.

3.3 Assessment Methodology

Attended noise surveys were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise" and the EPL. Measurements were carried out using Svantek Type 1, 971 noise analysers from Monday 12 August 2019 to Wednesday 14 August 2019. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

Noise measurements were of 15 minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source. One measurement was conducted at each monitoring location during the day, evening and morning shoulder periods.

Extraneous noise sources were excluded from the analysis to calculate the $LA_{eq(15min)}$ quarry noise contribution for comparison against the relevant criteria.

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

FIGURE 1

LOCALITY PLAN

REF: MAC180611-03

0 350m

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4 Results

4.1 Assessment Results - Location N3

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N3 for the NMA are presented in **Table 2**.

Table 2 Operator-Attended Noise Survey Results – Location N3

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
14/08/2019	06:29 (Morning Shoulder)	65	48	42	WD: SE WS: 0.1m/s Rain: Nil	Urban Hum 40-48 Birds 49-65 Aircraft 44-48 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<32
13/08/2019	08:45 (Day)	69	46	36	WD: SE WS: 0.3m/s Rain: Nil	Urban Hum 30-37 Aircraft 48-53 Birds 33-69 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<30
12/08/2019	19:29 (Evening)	60	42	34	WD: SSW WS: 0.1m/s Rain: Nil	Urban Hum 30-41 Aircraft 37-52 Birds 50-60
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35

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

4.2 Assessment Results - Location N8

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N8 for the NMA are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location N8

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
13/08/2019	06:43 (Morning Shoulder)	80	56	47	WD: SW WS: 0.6m/s Rain: Nil	Traffic 50-80 Birds 53-60 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<37
13/08/2019	08:17 (Day)	80	58	48	WD: SW WS: 0.4m/s Rain: Nil	Traffic 50-80 Birds 48-57 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<38
12/08/2019	19:02 (Evening)	72	57	43	WD: SSW WS: 0.1m/s Rain: Nil	Traffic 40-70 Dogs Barking 41-72
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<39

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

4.3 Assessment Results - Location N38

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N38 for the NMA are presented in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location N38

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
13/08/2019	06:25 (Morning Shoulder)	61	52	46	WD: SW WS: 0.1m/s Rain: Nil	Traffic 45-53 Birds 40-61 Aircraft 40-50 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<36
13/08/2019	08:00 (Day)	77	56	49	WD: W WS: 0.2m/s Rain: Nil	Traffic 50-77 Birds 40-51 Quarry Inaudible during lulls in traffic ~38-40
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
12/08/2019	18:45 (Evening)	74	53	45	WD: SW WS: 0.1m/s Rain: Nil	Traffic 40-74 Aircraft 35-40
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35

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

4.4 Assessment Results - Location N60

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N60 for the NMA are presented in **Table 5**.

Table 5 Operator-Attended Noise Survey Results – Location N60

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
14/08/2019	06:00 (Morning Shoulder)	68	58	44	WD: SE WS: 1.7m/s Rain: Nil	Traffic 49-68 Birds 40-49 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<34
13/08/2019	07:38 (Day)	73	62	57	WD: SW WS: 0.5m/s Rain: Nil	Traffic 30-55 Road Works 60-73 Quarry Inaudible
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
12/08/2019	18:25 (Evening)	69	62	53	WD: SSW WS: 1.3m/s Rain: Nil	Traffic 50-69
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35

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

4.5 Assessment Results - Location N67

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N67 for the NMA are presented in **Table 6**.

Table 6 Operator-Attended Noise Survey Results – Location N67

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
13/08/2019	06:00 (Morning Shoulder)	44	34	27	WD: SW WS: 0.6m/s Rain: Nil	Traffic 29-34 Birds 30-44 Aircraft Rumble 35-38 Quarry Inaudible
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<25
13/08/2019	07:10 (Day)	63	42	36	WD: SW WS: 1.0m/s Rain: Nil	Birds 30-63 Aircraft 45-49 Quarry Plant 40-43 (15 secs)
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<30
12/08/2019	18:01 (Evening)	67	39	28	WD: SW WS: 1.4m/s Rain: Nil	Aircraft 39-50 Car Click 62-67 Urban Hum 39-46
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<35

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

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5 Discussion

5.1 Discussion of Results - Location N3

Quarry noise was inaudible during all three measurements conducted at location N3 which satisfied the morning shoulder and daytime criteria.

It is noted that the quarry was not operational during the evening period however background measurements were undertaken for completeness and per the EPL. Extraneous sources audible during the three attended surveys included birds, aircraft, and urban hum noise.

5.2 Discussion of Results - Location N8

Noise levels were dominated by local traffic that was generally constant during all three attended measurements at the N8 monitoring location. Quarry emissions were inaudible during all three measurements. Estimated quarry contributions were below the relevant morning shoulder and daytime criteria.

The quarry was not operational during the evening period therefore satisfying the evening noise limit of 39dB $LA_{eq(15min)}$. Extraneous sources noted during the measurements include birds, traffic, and dogs barking.

5.3 Discussion of Results - Location N38

Measurements conducted at the N38 monitoring location were dominated by traffic noise and aircraft noise. Quarry noise was inaudible during all three measurements. Estimated quarry contributions were below the relevant morning shoulder and daytime criteria.

The quarry was not operational during the evening period therefore satisfying the evening criteria. Non-quarrying noise sources included aircrafts, birds and traffic.

5.4 Discussion of Results - Location N60

Quarry noise emissions remained inaudible during all three measurements. Estimated quarry contributions were below the relevant morning shoulder however due to the elevated ambient noise levels during the daytime, an accurate estimation of quarry contribution could not be made at the monitoring location. However, to determine the quarry contribution, consideration was given to the quarry contribution at Location N8 (<38dB) and N67 (<30dB) which are closer to the quarry and experience lower ambient noise levels from nearby road traffic. The contributions were used to calculate a quarry emitted sound power level which was then calculated to Location N60, resulting in a quarry contribution of less than 35dBA.

The quarry was not operational during the evening period, therefore satisfying the evening noise criteria. Extraneous sources noted during the measurements include birds, traffic, and road works noise.

5.5 Discussion of Results - Location N67

Quarry noise emissions were audible during the daytime measurement at N67. Audible quarry sources included truck movements. Quarry emissions were estimated at <30dBA for the daytime measurement at this location, therefore, satisfying relevant daytime noise limits. The quarry was inaudible during the morning shoulder period satisfying the applicable noise limit. It is noted that the quarry was not operational during the evening period, therefore satisfying the evening noise limit of 35dB $LA_{eq(15min)}$. Birds, aircraft noise, traffic and urban hum were other noise sources audible at this receiver during the survey.

6 Noise Compliance Assessment

The compliance assessment for each monitoring location N3, N8, N38, N60 and N67 are presented in **Table 7** to **Table 9** for day, evening and morning shoulder assessment periods.

Table 7 Daytime Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
	dB, $L_{Aeq(15min)}$	dB, $L_{Aeq(15min)}$	
N3	<30	35	✓
N8	<38	44	✓
N38	<35	38	✓
N60	<35	38	✓
N67	<30	41	✓

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

Table 8 Evening Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
	dB, $L_{Aeq(15min)}$	dB, $L_{Aeq(15min)}$	
N3	<35	35	✓
N8	<39	39	✓
N38	<35	35	✓
N60	<35	35	✓
N67	<35	35	✓

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

Table 9 Morning Shoulder Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
	dB, $L_{Aeq(15min)}$	dB, $L_{Aeq(15min)}$	
N3	<32	35	✓
N8	<37	40	✓
N38	<36	36	✓
N60	<34	36	✓
N67	<25	36	✓

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

The assessment has identified that noise emissions generated by Cooma Road Quarry comply with relevant noise criteria specified in the Development Consent at all assessed residential receivers for the Quarterly period ending September 2019 during the daytime and morning shoulder period.

As the quarry was not operating during the evening period, the site was deemed to comply with the applicable noise criteria for each monitoring location during the evening period.

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7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) for Holcim (Australia) Pty Ltd at the Cooma Road Quarry, Googong, NSW. The assessment was completed to assess the quarry's compliance with the relevant noise criteria outlined in their Development Consent for residential receivers surrounding the quarry.

Attended monitoring was undertaken from Monday 12 August 2019 to Wednesday 14 August 2019 at five representative monitoring locations. The assessment has identified that noise emissions generated by Cooma Road Quarry comply with relevant noise criteria specified in the Development Consent at all assessed residential receivers for the Quarterly period ending September 2019.

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Appendix A - Glossary of Terms

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

Table A1 Glossary of Terms

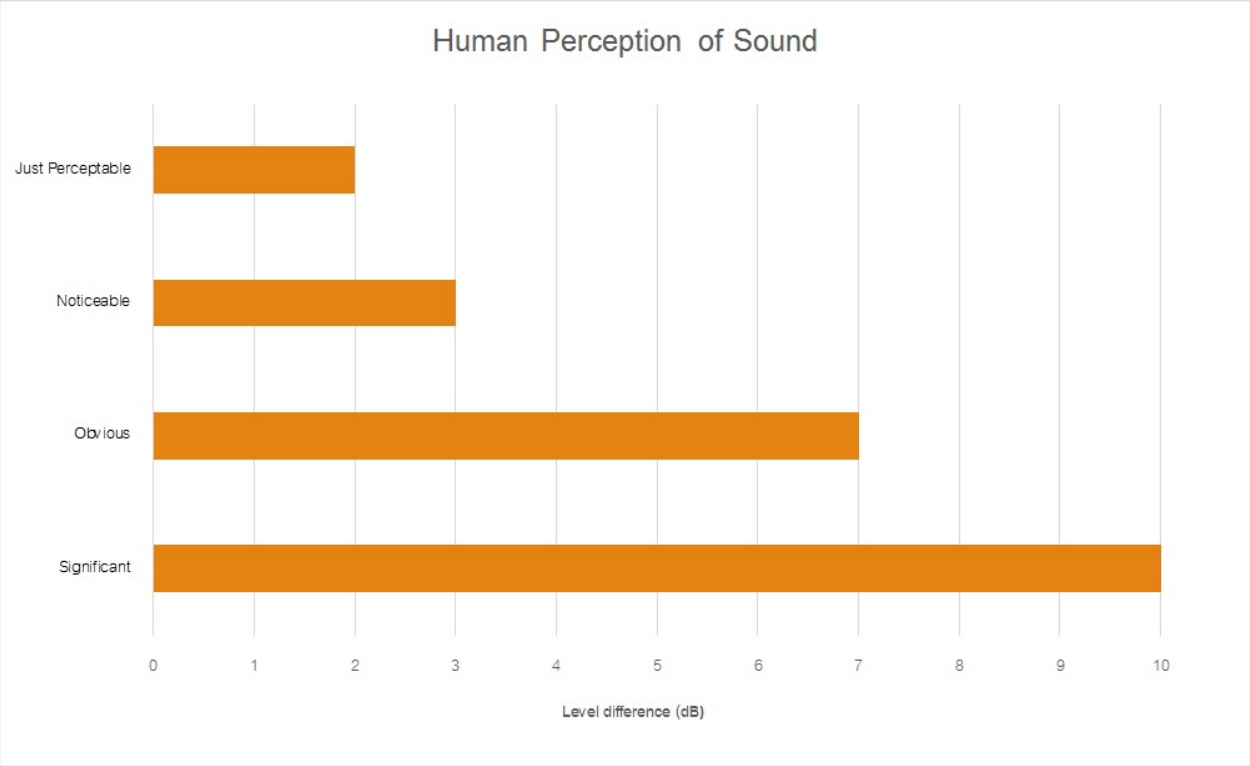
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for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

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

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA

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

Figure A1 – Human Perception of Sound



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Noise Monitoring Assessment

Cooma Road Quarry, Googong, NSW
Quarter 4 Ending December 2019.

Prepared for: Holcim (Australia) Pty Ltd
December 2019
MAC180611-03RP6

MAC
Muller Acoustic Consulting

Document Information

Noise Monitoring Assessment

Cooma Road Quarry, Googong, NSW

Quarter 4 Ending December 2019

Prepared for: Holcim (Australia) Pty Ltd

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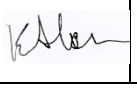
Document ID	Status	Date	Prepared By	Signed	Reviewed By	Signed
MAC180611-03RP6	Final	13 December 2019	Kristian Allen		Rod Linnett	

CONTENTS

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for Cooma Road Quarry the 'quarry', Googong, NSW.

The monitoring has been conducted in accordance with the quarry Noise Management Plan and in general accordance with Development Consent (SSD-5109); at five representative monitoring locations. This assessment has been undertaken for the Quarterly period ending December 2019 and forms part of the annual noise monitoring program for the quarry.

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

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Cooma Road Quarry, Noise Management Plan (NMP), 2014;
- Development Consent SSD-5109; and
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise.

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

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2 Noise Criteria

Schedule 3, Condition 4 of the Cooma Road Quarry Development Consent, approved on 27 September 2013, outlines the applicable noise criteria for residential receivers N1 – N71 surrounding the quarry and are presented in **Table 1**.

Table 1 Noise Criteria

Receivers	Morning Shoulder 6am – 7am	Day 7am – 6pm	Evening 6pm – 10pm
	dB $L_{Aeq(15min)}$	dB $L_{Aeq(15min)}$	dB $L_{Aeq(15min)}$
N1, N7, N8, N56, N57, N59, N63, N64, N65	40	44	39
N67	36	41	35
All other Receivers between N9 and N71 inclusive	36	38	35
All other Receivers	35	35	35

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

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3 Methodology

3.1 Locality

The quarry is located in Googong, NSW approximately 13km south east of Canberra, ACT. The quarry is bounded primarily by rural and residential properties in all directions, with noise from passing road traffic on Old Cooma Road dominating the acoustic environment for receivers to the east of the quarry. The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan shown in **Figure 1**.

3.2 Noise Monitoring Locations

Five monitoring locations have been selected as part of the NMA and in accordance with the Development Consent.

Location N3 is to the west of the quarry situated on a rural property off Copperfield Place. This location represents residential and rural receivers to the west of the quarry.

Location N8 is to the north east of the quarry along Tempe Crescent and is representative of residential receivers in that area.

Location N38 is on Heights Road and is representative of the elevated residential receivers to the east of the quarry.

Location N60 is at 501 Old Cooma Road and represents the residence adjacent to the quarry access road.

Location N67 is situated on a rural property at 732 Old Cooma Road to the south of the quarry. This is representative of rural and residential receivers to the south, with direct line of site into the quarry pit.

3.3 Assessment Methodology

Attended noise surveys were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise" and the EPL. Measurements were carried out using Svantek Type 1, 971 noise analysers from Tuesday 19 November 2019 to Thursday 21 November 2019. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

Noise measurements were of 15 minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source. One measurement was conducted at each monitoring location during the day, evening and morning shoulder periods.

Extraneous noise sources were excluded from the analysis to calculate the $LA_{eq(15min)}$ quarry noise contribution for comparison against the relevant criteria.

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

FIGURE 1

LOCALITY PLAN

REF: MAC180611-03

0 350m

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4 Results

4.1 Assessment Results - Location N3

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N3 for the NMA are presented in **Table 2**.

Table 2 Operator-Attended Noise Survey Results – Location N3

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
20/11/2019	06:37 (Morning Shoulder)	60	41	34	WD: W WS: 0.1m/s Rain: Nil	Birds 36-60 Distant Traffic 34-40 Site Not Audible
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<30
20/11/2019	11:05 (Day)	63	42	33	WD: N WS: 1.2m/s Rain: Nil	Birds 36-58 Dog Barking <33 Aircraft 38-52 Site Not Audible
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<30
19/11/2019	21:17 (Evening)	83	49	38	WD: S WS: 2.1m/s Rain: Nil	Wind in Trees 36-48 Dog Barking 65-83 Aircraft 39-44
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						Quarry Not Operating

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

4.2 Assessment Results - Location N8

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N8 for the NMA are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location N8

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
21/11/2019	06:17 (Morning Shoulder)	72	54	48	WD: NE WS: <0.5m/s Rain: Nil	Traffic 44-72 Birds 47-50 Dog Barking 52-61 Site Not Audible during lulls in traffic <45
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<34
20/11/2019	10:13 (Day)	73	51	42	WD: NE WS: <0.5m/s Rain: Nil	Traffic 40-73 Birds 40-49 Site Not Audible during lulls in traffic <40
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<30
19/11/2019	20:41 (Evening)	83	56	40	WD: SW WS: 0.5m/s Rain: Nil	Traffic 34-61 Dog Barking 55-83
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					Quarry Not Operating

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

4.3 Assessment Results - Location N38

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N38 for the NMA are presented in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location N38

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
21/11/2019	06:00 (Morning Shoulder)	61	53	45	WD: NE WS: 1.0m/s Rain: Nil	Traffic 42-61 Birds 45-54 Site Not Audible during lulls in traffic <45
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<35
20/11/2019	09:52 (Day)	80	53	38	WD: NE WS: <0.5m/s Rain: Nil	Traffic 37-80 Birds 38-61 Road Works 45-57 Aircraft 38-42 Site Not Audible during lulls in traffic <40
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<30
19/11/2019	20:22 (Evening)	56	39	35	WD: SW WS: 1.1m/s Rain: Nil	Traffic 33-46 Birds 36-40 Dog Barking <35 Aircraft 35-40
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						Quarry Not Operating

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

4.4 Assessment Results - Location N60

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N60 for the NMA are presented in **Table 5**.

Table 5 Operator-Attended Noise Survey Results – Location N60

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
21/11/2019	06:44 (Morning Shoulder)	83	64	53	WD: NE WS: <0.5m/s Rain: Nil	Traffic 44-62 Birds <50-56 Road Works 52-69 Trucks Leaving Site 60-83 Site Not Audible during lulls in traffic <45
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<35
20/11/2019	10:36 (Day)	81	62	48	WD: NE WS: <0.5m/s Rain: Nil	Traffic 44-67 Road Works 44-74 Dog Barks 47-50 Residential Noise 47-54 Trucks Leaving Site 55-81 Site Not Audible during lulls in traffic <45
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						<35
19/11/2019	20:02 (Evening)	67	52	41	WD: SW WS: 0.8m/s Rain: Nil	Traffic 36-67 Birds 40-48 Wind in Trees 40-44
Cooma Road Quarry $L_{Aeq(15min)}$ Contribution						Quarry Not Operating

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

4.5 Assessment Results - Location N67

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N67 for the NMA are presented in **Table 6**.

Table 6 Operator-Attended Noise Survey Results – Location N67

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
20/11/2019	06:00 (Morning Shoulder)	56	39	36	WD: W WS: 0.1m/s Rain: Nil	Site Vehicles 34-36 Birds 36-56 Distant Traffic 34-40
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
20/11/2019	09:21 (Day)	60	37	33	WD: NE WS: 0.9m/s Rain: Nil	Site Vehicle 33-39 Birds 33-60 Distant Traffic 33-36
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					<35
19/11/2019	19:36 (Evening)	57	36	26	WD: W WS: 1.0m/s Rain: Nil	Dog Barking <25 Birds 25-57 Insects 25-34 Wind in Trees 25-32 Distant Traffic <25 Aircraft 36-48
	Cooma Road Quarry $L_{Aeq(15min)}$ Contribution					Quarry Not Operating

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

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5 Discussion

5.1 Discussion of Results - Location N3

Quarry noise was inaudible during all three measurements conducted at location N3. Quarry noise contributions were estimated to satisfy the relevant morning shoulder and daytime criteria.

It is noted that the quarry was not operational during the evening period therefore satisfying the evening criteria of 35dB $LA_{eq(15min)}$. Extraneous sources audible during the survey included birds, dogs barking, wind in trees, distant traffic and aircraft noise.

5.2 Discussion of Results - Location N8

Noise levels were dominated by generally constant traffic on Old Cooma Road during all three measurements. Quarry emissions were inaudible during all three measurements. Quarry noise contributions were estimated to satisfy the relevant morning shoulder and daytime criteria.

The quarry was not operational during the evening period therefore satisfying the evening noise limit of 39dB $LA_{eq(15min)}$. Extraneous sources noted during the survey include birds, traffic, and dogs barking.

5.3 Discussion of Results - Location N38

Noise levels were dominated by traffic and road works noise. Quarry noise was inaudible during all three measurements. Quarry noise contributions were estimated to satisfy the relevant morning shoulder and daytime criteria.

The quarry was not operational during the evening period therefore satisfying the evening criteria of 35dB $LA_{eq(15min)}$. Extraneous sources audible during the survey included traffic, road works, dogs barking, aircraft, birds and traffic.

5.4 Discussion of Results - Location N60

Quarry noise was inaudible during all three measurements conducted at location N60. Quarry noise contributions were estimated to satisfy the relevant morning shoulder and daytime criteria.

It is noted that the quarry was not operational during the evening period therefore satisfying the evening criteria of 35dB $LA_{eq(15min)}$. Extraneous sources audible during the survey included birds, dogs barking, wind in trees, distant traffic and aircraft noise.

5.5 Discussion of Results - Location N67

Quarry noise emissions were audible during the morning shoulder and daytime measurement at N67. Audible quarry sources included truck movements, reverse alarms and rock tipping. Quarry emissions were estimated at <35dBA for morning shoulder and daytime measurements, therefore satisfying relevant noise limits.

It is noted that the quarry was not operational during the evening period, therefore satisfying the evening noise limit of 35dB $LA_{eq(15min)}$. Extraneous sources audible during the survey include birds, insects, dogs barking, aircraft noise, distant traffic and wind in trees.

The assessment has identified that noise emissions generated by Cooma Road Quarry comply with relevant noise criteria specified in the Development Consent at all assessed residential receivers for the Quarterly period ending December 2019 during the daytime and morning shoulder periods.

As the quarry was not operating during the evening period, the site was deemed to comply with the applicable noise criteria for each monitoring location during the evening period.

6 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) for Holcim (Australia) Pty Ltd at the Cooma Road Quarry, Googong, NSW. The assessment was completed to assess the quarry's compliance with the relevant noise criteria outlined in their Development Consent for residential receivers surrounding the quarry.

Attended monitoring was undertaken from Tuesday 19 November 2019 to Thursday 21 November 2019 at five representative monitoring locations. The assessment has identified that noise emissions generated by Cooma Road Quarry comply with relevant noise criteria specified in the Development Consent at all assessed residential receivers for the Quarterly period ending December 2019.

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Appendix A - Glossary of Terms

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Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
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dB(Z), dB(L)	Decibels Linear or decibels Z-weighted.
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LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAmax	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (LW)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by : = 10.log10 (W/Wo) Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts.

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Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
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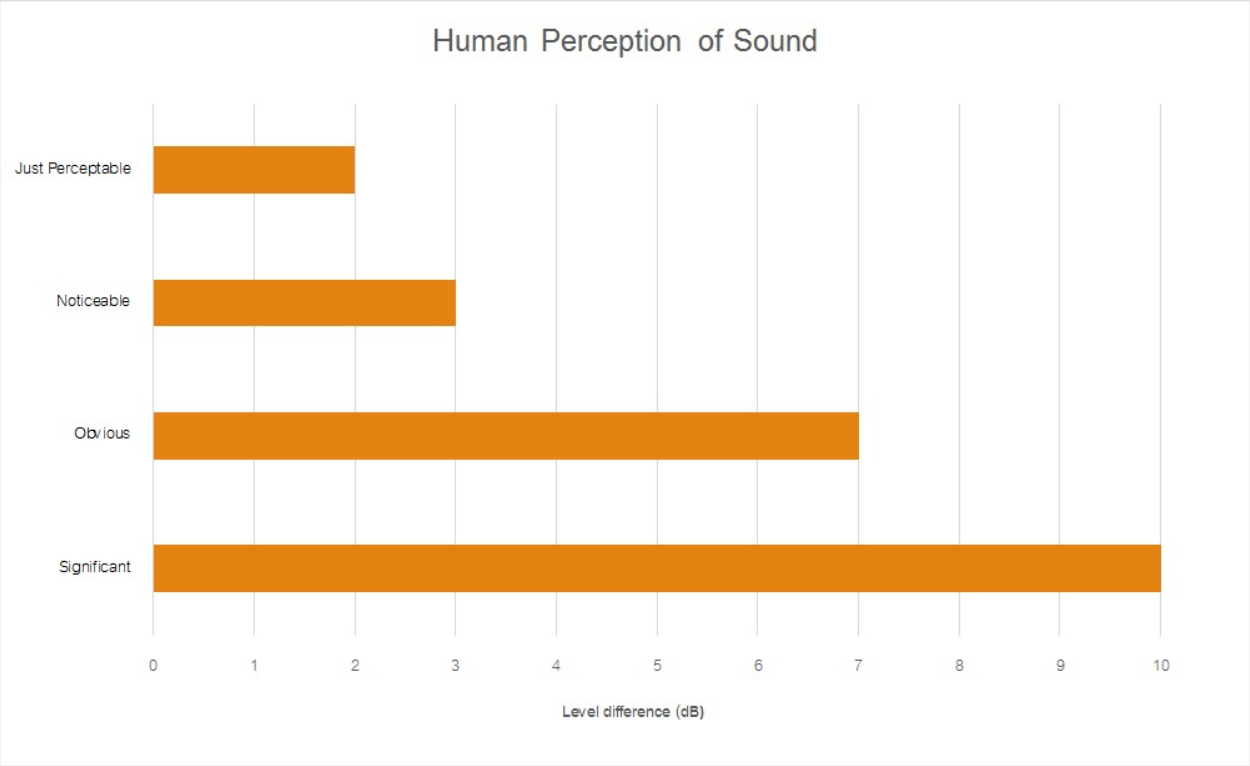
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



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