

## Cooma Road Quarry Annual Review: 2015

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<b>Date:</b>	April 21, 2016
<b>Title:</b>	Cooma Road Quarry Annual Review
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<b>Copies to internal:</b>	Adam Bertram, Peter Hewson & Ian Shenton

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## **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 & Environment) on September 27, 2013. The site also operates in accordance with the Environmental Protection Licence (EPL) No. 1453 issued by the Environmental Protection Authority.

In accordance with Schedule 5, Condition 4 of the modified Development Consent the site is required to undertake an Annual Review of the site in the following manner:

### ***Annual Review***

4. *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;*

*(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.*

*(c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;*

*(d) identify any trends in the monitoring data over the life of the development;*

*(e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and*

*(f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the development.*

This report documents the environmental performance of the site from January to December 2015.



Figure 1: View of the Cooma Road Quarry located on Old Cooma Road, Queanbeyan.

## DESCRIPTION OF DEVELOPMENT

***(a) describe the development (including any 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;***

Development activities undertaken at the Cooma Road Quarry in 2015 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 south-west overburden dump.
- Maintenance of rehabilitation undertaken on the overburden dump in the south-western disturbance area.

Operating hours in 2015 were undertaken between 6am to 6pm, Monday to Saturday. These 6am-6pm timeframes were applied for all operations onsite with no crushing, screening or vehicles movements after 6pm and before 10pm.

All activities took place within the approved operating hours in 2015.

Production volumes for the 2015 calendar year are detailed below.

<b>PRODUCT</b>	<b>DESCRIPTION</b>	<b>QUANTITY (t)</b>
Over 75mm	Overburden, Shot Rock & Scalps	<b>101 766.11</b>
Over 30mm to 75mm	Ballast & -40mm Aggregate	<b>1534.46</b>
5mm to 30mm	All size Aggregates	<b>212 429.06</b>
Manufactured Sand	Crusher Dust & Manufactured Sand	<b>70 180.3</b>
Prepared Road Base & Sub Base	20mm Base & Sub-Base	<b>201 467.75</b>
<b>TOTAL</b>		<b>587 377.68</b>

The site has not undertaken any development into the approved northern extension area and has operated within the existing footprint of the quarry throughout 2015. No new activities such as construction of the dam, workshop facilities or extraction in the extension area (approved under SSD-5109 Development Consent) have been undertaken. Conditions relating to these activities include:

- Schedule 2, Condition 18 (Construction of new buildings or structures requiring structural adequacy).
- Schedule 2, Condition 19 (Demolition of existing structures or buildings).

Development activities proposed to be carried out at Cooma Road Quarry in 2015, 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.
- Progressive maintenance of rehabilitation in the completed overburden dump in the south-western disturbance area. Involving: replacement of topsoil, re-vegetation activities with native species and weed control.

## **Community**

The site implemented a Community Consultative Committee in 2014 as part of the conditions of consent. All minutes from each of the meetings undertaken in 2014 have been uploaded on the Holcim webpage in the Cooma Road profile

**REVIEW OF MONITORING RESULTS**

**(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;**

**Noise**

The site is required to undertake the following activities in accordance with the requirements stipulated in the Development Consent and the Cooma Road Noise Management Plan.

**NOISE**

**Noise Criteria**

4. The Applicant shall ensure that the noise generated by the development does not exceed the criteria in Table 1 at any residence on privately-owned land

*Table 1: Noise criteria dB(A)*

Receiver	Day Shoulder 6 – 7 am	Day 7 am – 6 pm	Evening 6 – 10 pm
	<i>L<sub>Aeq</sub>(15 min)</i>	<i>L<sub>Aeq</sub>(15 min)</i>	<i>L<sub>Aeq</sub>(15 min)</i>
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

*Notes:*

- To locate the receivers referred to in Table 1 refer to Appendix 5.
- 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 sets out the metrological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

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

Figure 2: Noise criteria listed in the Cooma Road Development Consent (SSD-5109).

**Quarterly Noise Monitoring**

The site has not undertaken quarterly noise monitoring in accordance with the criteria listed in the Development Consent in 2015. Holcim has commissioned this activity to commence monitoring in Quarter 2, 2016 and ensure quarterly monitoring is undertaken in the future.

No complaints regarding noise levels were received in 2015.

It is noted that during this period Holcim has not undertaken any of the following activities:

- Construction and/ or demolition works.
- Operations outside of approved operating hours.
- Crushing & Screening or Ancillary Operations have not occurred after 6pm.
- 

**Blasting**

The site conducts blasting in accordance with the criteria listed in the Development Consent and the Cooma Road EPL No. 1453:

<b>Blasting Criteria</b>			
9.	The Applicant shall ensure that the blasting on the site does not cause exceedances of the criteria in Table 3.		
	<i>Table 3: Blasting Criteria</i>		
<b>Location</b>	<b>Airblast overpressure (dB(Lin Peak))</b>	<b>Ground vibration (mm/s)</b>	<b>Allowable exceedance</b>
Any residence on privately-owned land	120	10	0%
	115	5	5% of the total number of blasts over a period of 12 months
However, these criteria do not apply if the Applicant has a written agreement with the relevant owner or infrastructure provider/owner, and the Applicant has advised the Department in writing of the terms of this agreement.			

Figure 3; Blast criteria listed in the Cooma Road Development Consent (SSD-5109).

The site has undertaken blasting throughout 2015 with criteria for blasts assessed against the Cooma Road Blast Monitoring Plan and the criteria outlined in EPL No.1453.

The site fired 8 blasts in 2015 with no exceedances. Blast results were reported in the 2015 Annual Return to the EPA.

A copy of the 2015 blast data for Cooma Road is detailed in the table below:

<b>Location</b>	<b>Sample Date</b>	<b>Overpressure</b>	<b>Vibration</b>	<b>Comments</b>
Heffernans House	22/01/2015	113.1	1.24	Nil
Heffernans House	27/02/2015	89.6	0.68	Nil
Jerrabomberra	27/02/2015	91.4	0.51	Nil
Heffernans House	6/3/2015	112.3	0.43	Nil
Heffernans House	16/03/2015	111.2	0.34	Nil

Heffernans House	14/04/2015	105.1	1.3	Nil
Heffernans House	2/4/2015	114.3	0.35	Nil
Heffernans House	16/11/2015	110.7	0.99	Nil

**L3 Blasting**

L3.1 The airblast overpressure level from blasting operations in or on the premises must not exceed:

- (a) 115 dB (Lin Peak) for more than 5% of the total number of blasts during each reporting period; and
- (b) 120 dB (Lin Peak) at any time.

At any point within 1 metre of any affected residential boundary or other noise sensitive location such as a school or hospital.

L3.2 The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed:

- (a) 5 mm/s for more than 5% of the total number of blasts carried out on the premises during each reporting period; and
- (b) 10 mm/s at any time.

At any point within 1 metre of any affected residential boundary or other noise sensitive location such as a school or hospital.

Figure 4: Blast criteria listed in the Cooma Road EPL No. 1453.

**Air**

The site is required to operate in accordance with the criteria listed in the Development consent as shown in the table below:



<i>Table 5: Short Term Impact Assessment Criteria for Particulate Matter</i>			
<b>Pollutant</b>	<b>Averaging period</b>	<b><sup>d</sup> Criterion</b>	
Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	<sup>a</sup> 50 µg/m <sup>3</sup>	

<i>Table 6: Long-Term Impact Assessment Criteria for Deposited Dust</i>			
<b>Pollutant</b>	<b>Averaging period</b>	<b>Maximum increase in deposited dust level</b>	<b>Maximum total deposited dust level</b>
<sup>c</sup> Deposited dust	Annual	<sup>b</sup> 2 g/m <sup>2</sup> /month	<sup>a</sup> 4 g/m <sup>2</sup> /month

*Notes to Tables 4-6:*

- <sup>a</sup> Total impact (ie incremental increase in concentrations due to the development plus background concentrations due to all other sources);
- <sup>b</sup> Incremental impact (ie incremental increase in concentrations due to the development on its own);
- <sup>c</sup> Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.
- <sup>d</sup> Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed by the Director-General in consultation with EPA.

Figure 4: Air quality criteria listed in the Cooma Road Development Consent (SSD-5109).

The site has undertaken air monitoring throughout 2015 at 5 dust deposition locations. It is noted that a high volume of leaf matter, bugs and beetles were identified and attributed to exceedances at Dust Monitor 4 (located on council land west of the Cooma Road Quarry) during several monthly samples.

Analysis undertaken by ALS on these exceedances at Dust Monitor 4 found a high volume of combustible material with material identified including bugs, beetles and leaf matter that is not consistent with potential dust sources at the Cooma Road Quarry.

Due to the high volume of combustible materials found in samples at Dust Monitor 4 the results at this location have been discounted from the monitoring to determine a representative result of the average in 2015.

	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Ave
Dust 1	4.4	2.1	19.1	2	2.7	1.8	1.4	2.1	2.3	3.5	3.4	2.8	<b>3.97</b>
Dust 2	3	2	2.9	1.4	1.7	1	0.6	0.8	0.9	0.8	1.4	3.4	<b>1.66</b>
Dust 3	2	0.6	0.7	0.6	0.6	0.4	0.02	0.3	0.4	0.3	1.2	2.7	<b>0.82</b>
Dust 4	8.1	0.4	1.7	11.9	10.8	0.9	4	8.5	1.1	2.9	21	7.8	<b>2.69*</b>
Dust 5	2	1.1	0.7	0.7	0.8	2.1	0.9	0.3	0.4	0.6	1.2	1.1	<b>0.99</b>

It was identified as part of the Annual Review that the site has not operated a PM10 monitor throughout 2015. This requirement was not identified during the engagement of contractors to undertake monitoring on behalf of Holcim following the approval of the new Development Consent in September 2013.

No complaints regarding air quality were received in 2015.

To ensure compliance with Schedule 3, Condition 14 a PM10 monitor has been sourced from another Holcim site and will be installed by June 30, 2016.

## **Water**

Water quality objectives for Cooma Road are taken from the EPL. Water monitoring criteria detailed within the EPL are listed below:

POINT 1					
Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	milligrams per litre				10
pH	pH				6.5-8.5
Total suspended solids	milligrams per litre				50

Figure 5: Water quality criteria listed in the Cooma Road EPL No. 1453.

All water monitoring undertaken in 2015 complies with the criteria listed in the EPL and in the Cooma Road Water Management Plan. A copy of all water monitoring data for 2015 has been attached as below.

No discharges were recorded from the SIP dam into Barracks Creek in 2015. All water run-off from disturbed areas of the site was captured in the Dacite and Granite pits and re-used for dust suppression and production activities.

Location	Test	Limit		Units	Sample Date	Result
Barracks Creek	pH	6.5	8.5	pH	2/02/2015	7.6
	Total O&G	0	10	mg/L	2/02/2015	1
	Susp. Solids	0	50	mg/L	2/02/2015	2
Barracks Creek	pH	6.5	8.5	pH	3/03/2015	7.6
	Total O&G	0	10	mg/L	3/03/2015	1

	Susp. Solids	0	50	mg/L	3/03/2015	<b>4</b>
Barracks Creek	pH	6.5	8.5	pH	2/04/2015	<b>7.6</b>
	Total O&G	0	10	mg/L	2/04/2015	<b>0.01</b>
	Susp. Solids	0	50	mg/L	2/04/2015	<b>4</b>
Barracks Creek	pH	6.5	8.5	pH	1/05/2015	<b>7.1</b>
	Total O&G	0	10	mg/L	1/05/2015	<b>1</b>
	Susp. Solids	0	50	mg/L	1/05/2015	<b>5</b>
Barracks Creek	pH	6.5	8.5	pH	1/07/2015	<b>7.6</b>
	Total O&G	0	10	mg/L	1/07/2015	<b>&lt;1</b>
	Susp. Solids	0	50	mg/L	1/07/2015	<b>&lt;2</b>
Barracks Creek	pH	6.5	8.5	pH	1/09/2015	<b>7.2</b>
	Total O&G	0	10	mg/L	1/09/2015	<b>1</b>
	Susp. Solids	0	50	mg/L	1/09/2015	<b>1.9</b>
Barracks Creek	pH	6.5	8.5	pH	1/10/2015	<b>7.4</b>
	Total O&G	0	10	mg/L	1/10/2015	<b>1</b>
	Susp. Solids	0	50	mg/L	1/10/2015	<b>3</b>
Barracks Creek	pH	6.5	8.5	pH	2/11/2015	<b>7.3</b>
	Total O&G	0	10	mg/L	2/11/2015	<b>0.9</b>
	Susp. Solids	0	50	mg/L	2/11/2015	<b>4</b>
Barracks Creek	pH	6.5	8.5	pH	2/12/2015	<b>6.8</b>
	Total O&G	0	10	mg/L	2/12/2015	<b>&lt;1</b>
	Susp. Solids	0	50	mg/L	2/12/2015	<b>8</b>

### **Heritage**

The site has operated throughout 2015 in accordance with the requirements of the Cooma Road Heritage Management Plan. In accordance with the Management Plan the site has engaged consultants Craven, Elliston & Hayes to undertake surveys of the Moses Morley Kiln site on a 6 monthly basis.

These surveys have monitored the physical condition of the Kiln throughout 2015 to ensure that no blast vibrations have impacted on the site. Results of these surveys have identified:

- The Kiln site has not been impacted by vibration from blasting.
- The Kiln site has not been altered since previous surveys were conducted in 2013.

In addition to these surveys the site has undertaken regular inspections of the area to ensure that fencing remains intact. The fence around the Kiln site has not deteriorated or required repairs since installation in 2012.

A copy of the Kiln surveys have been attached as Appendix 1 of the Annual Review.

**Rehabilitation**

The conditions of consent related to rehabilitation at Cooma Road are listed in the table below:

<b>Rehabilitation Objectives</b>	
22.	The Applicant shall rehabilitate the site to the satisfaction of the Director-General. 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.
<i>Table 7: Rehabilitation Objectives</i>	
<b>Feature</b>	<b>Objective</b>
Site (as a whole)	Safe, stable and non-polluting
Surface Infrastructure	To be decommissioned and removed (unless otherwise agreed with the Director-General)
Benched Quarry Walls	Landscaped and revegetated utilising native tree and understorey 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: <ul style="list-style-type: none"> <li>- native endemic species; and</li> <li>- a landform consistent with Appendix 7 and the surrounding environment.</li> </ul>
Community	<ul style="list-style-type: none"> <li>• Ensure public safety</li> <li>• Minimise the adverse socio-economic effects associated with the closure of the development</li> </ul>

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

**Progressive Rehabilitation**

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

Figure 6: Rehabilitation criteria listed in the Cooma Road Development Consent (SSD-5109).

The site has not planted any seedlings in 2015 with works focusing on maintenance and development of rehabilitation works already undertaken within the south-west overburden dump.

The works undertaken in 2014 covered approximately 1.6 hectares of disturbed area with planting consisting of native species (White Box and Yellow Box Gum) in accordance with the Cooma Road Rehabilitation Management Plan.

Other works undertaken throughout 2015 for rehabilitation included:

- Weed and feral species control/ elimination in the rehabilitated area.
- Erosion control.
- Fertilisation of rehabilitated areas.
- Re-seeding in areas as required.

Works undertaken by the site in 2015 have been in accordance with the Rehabilitation Management Plan (Cooma Road Rehabilitation Strategy for the next 3 Years) and the requirements of Condition 23 listed above.

### **Incidents & Complaints**

No complaints were received for the site in 2015.

## **NON-COMPLIANCE ITEMS IN 2015**

***(c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;***

Non-compliant items in 2015, associated with the Development Consent include:

### **Schedule 2, Condition 1: Monitoring of Product Transport**

The Holcim Transport team are currently developing a report to capture all truck movements from the site over the 2015 period. This data was previously not available in the system to be published on the website and will be completed by May 1, 2016.

### **Schedule 3, Condition 4: Quarterly Noise Monitoring**

Noise monitoring previously undertaken at the site does not meet the criteria of Development Consent for 15 minute continuous attended monitoring. This issue will be rectified in May 2016 with Quarterly noise monitoring to be undertaken by a qualified consultant and continued on a quarterly basis.

### **Schedule 3, Condition 14: HVAS Monitoring**

Holcim have committed to the installation High Vol Air Sampler (HVAS) at the Cooma Road Quarry to satisfy this condition. This action will be completed following the transfer of an available HVAS monitoring station from another Holcim site by June 30, 2016.

### **Schedule 3, Condition 17: Meteorological Monitoring**

Holcim have committed to the installation of a weather station at the Cooma Road Quarry to satisfy this condition. This action will be completed by June 30, 2016.

**TRENDS IN MONITORING DATA IN 2015**

**(d) identify any trends in the monitoring data over the life of the development;**

**Blasting**

Monitoring data collected during blasts undertaken in 2015 has shown a consistent trend within the criteria listed in the Development Consent and the EPL, with results not deviating substantially (refer to blast monitoring results graph below) between monitoring dates.

Overpressure results show a consistent trend over the past 12 months with no trend established over the 2013-15 period. All results in 2015 complied with the criteria listed in the EPL.

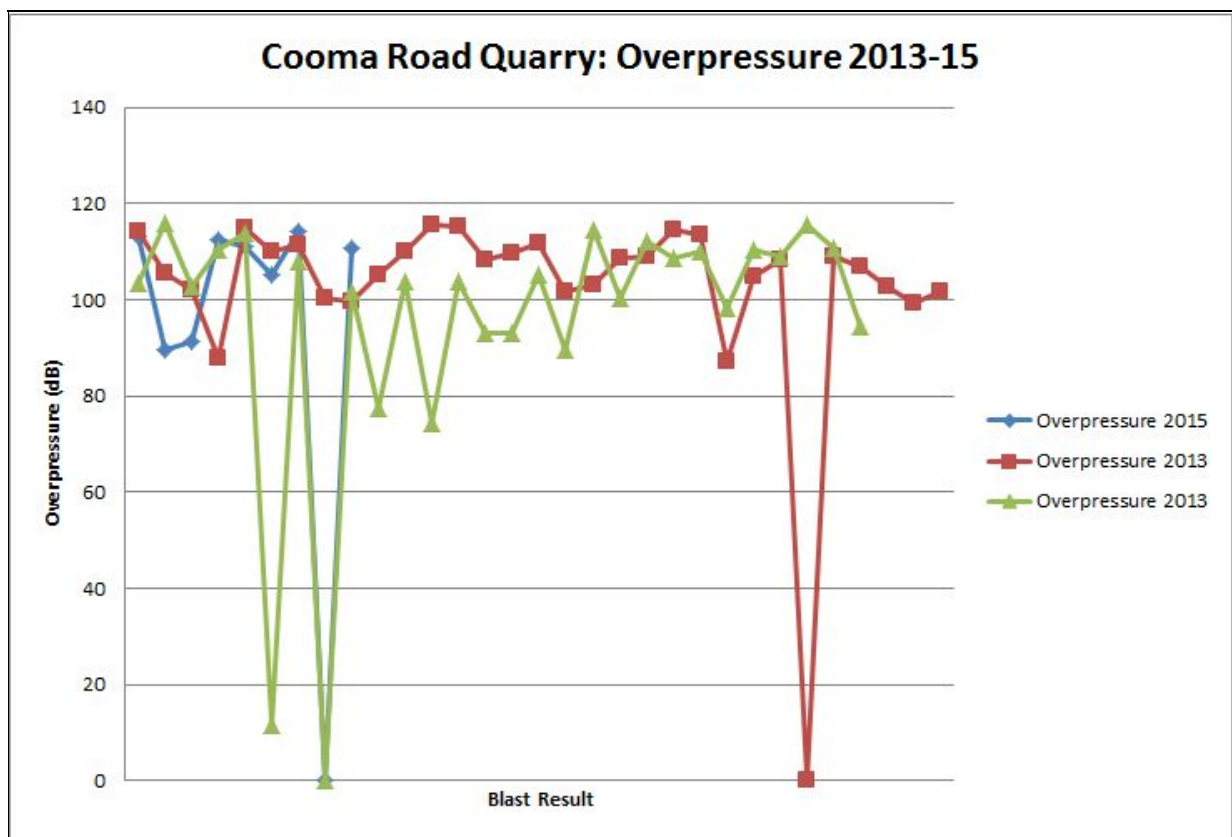


Figure 7: Cooma Road Blast Monitoring (Overpressure Results 2013-15).

This data is consistent with the predictions of the EIS as well as data collected in 2013. All data is consistent with the results that were predicted in 2012 with similar results expected in 2016.

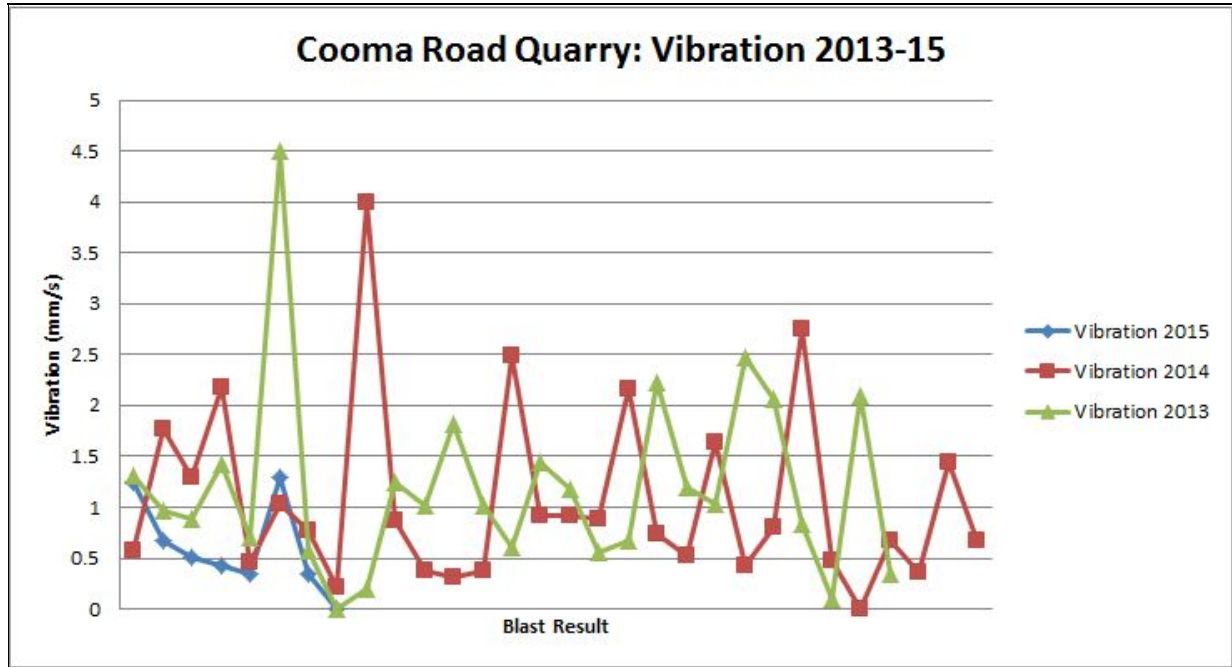


Figure 8: Cooma Road Blast Monitoring (Vibration Results 2013-15).

Vibration results in 2015 show no significant trends from results undertaken in the previous 12 months. The site has not registered a non-conformance against vibration criteria during the 2013-15 period.

**Air Quality**

Air monitoring data has shown a consistent trend in 2015, with results not deviating substantially (refer to air quality monitoring results graph below) between monitoring dates.



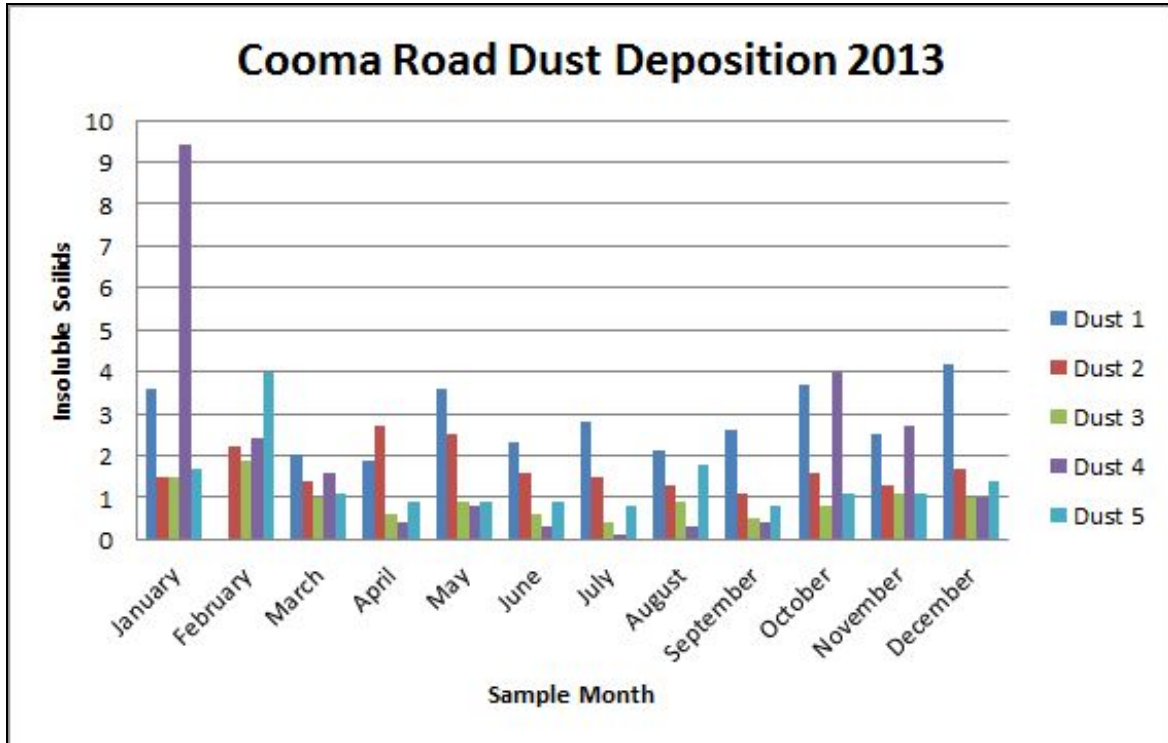


Figure 9: Cooma Road Dust Deposition Results 2013.

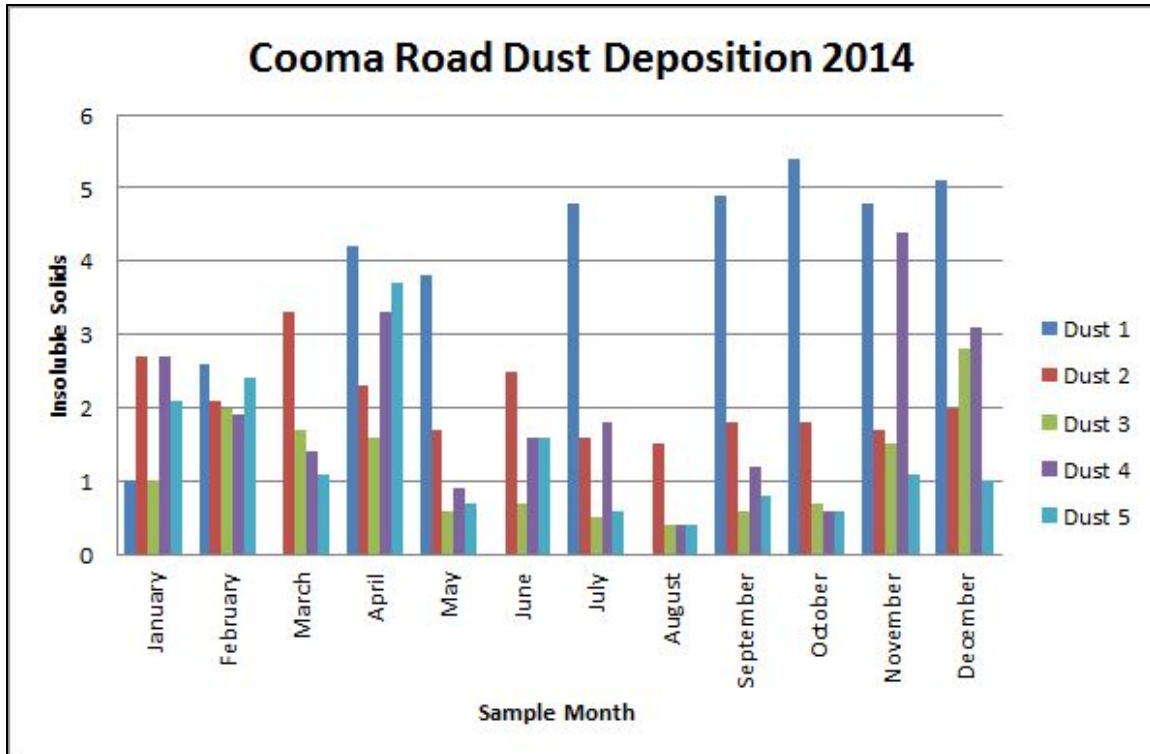


Figure 10: Cooma Road Dust Deposition Results 2014.

Holcim will ensure that all dust control measures specified in the Air Quality Management Plan are installed to ensure that the site is operating in accordance with the Development Consent. In accordance with the conditions of the Consent, the site will install a meteorological weather station and HVAS to measure Total Suspended Particulate and PM10 levels within the Quarry.

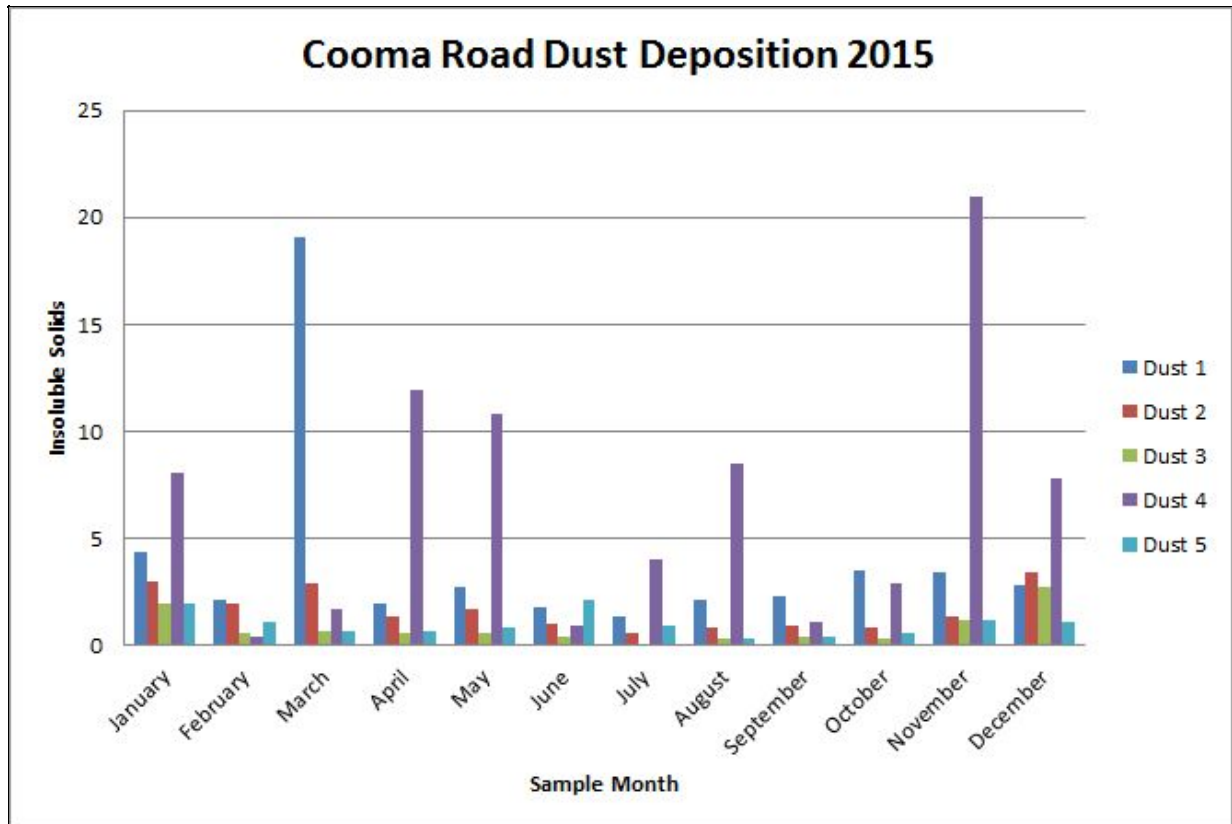


Figure 11: Cooma Road Dust Deposition Results 2015.

**Water Quality**

Water monitoring data has shown a consistent trend in 2015, with results not deviating substantially (refer to water monitoring results graph below) between monitoring dates over the past 12 months.

The range for pH has remained steady within the 6.5-8 pH range since monitoring was undertaken in accordance with the new Development Consent. The trend in data over this period has shown no change in the expected pH range in Barracks Creek. Measurements could not be undertaken from October-December 2015 due to Barracks Creek running dry during this period.

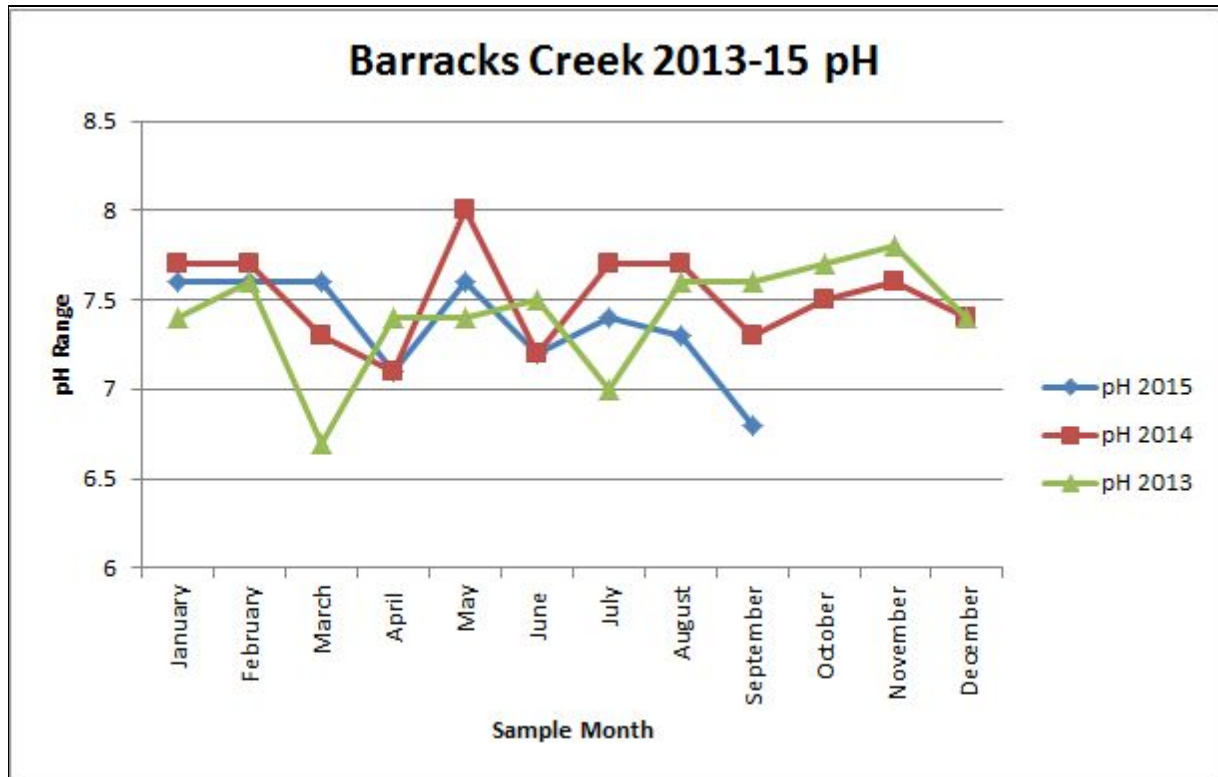


Figure 12: Cooma Road Water Monitoring (Barracks Creek pH 2013-15).

Data collected for Suspended Solids in Barracks Creek showed a consistent trend from 2013 to 2015. All results collected for this period (see graph below) found no exceedances in criteria with the creek found to be dry and unable to be monitored from October to December 2015.

No discharges occurred during 2015 with all water was contained onsite within the Quarry at the SIP dam, Granite pit and Dacite pits.

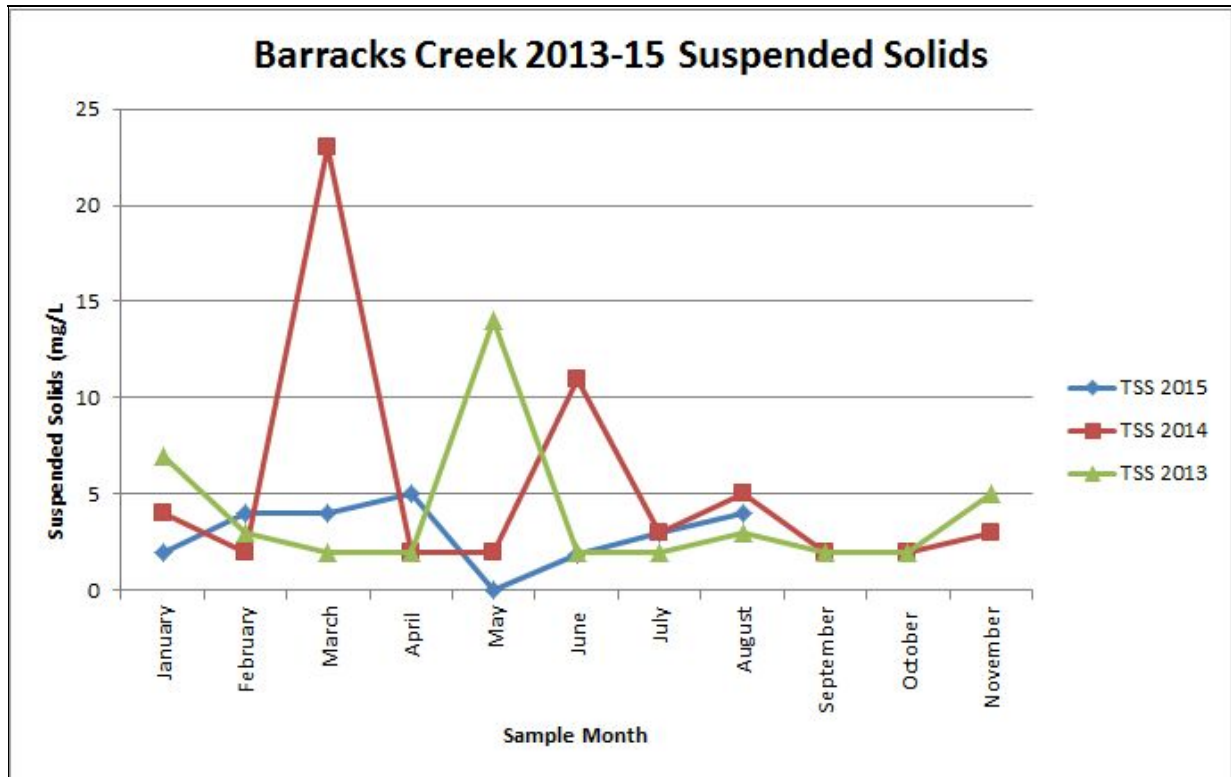


Figure 13: Cooma Road Water Monitoring (Barracks Creek Suspended Solids 2013-15).

Oil and Grease were also measured each month as part of the water monitoring criteria listed in the Development Consent. All results from monitoring undertaken in 2015 were found to be <1. This result is consistent with monitoring undertaken in 2013 & 2014 and is consistent with the predicted results in the EIS.

**Heritage**

Environmental monitoring data shows no change to the Kiln site in 2015, with results not deviating from previous surveys undertaken or any signs of deterioration. Holcim will continue to monitor this site at 6 monthly intervals to ensure that operations do not cause damage or further deterioration to the Moses Morley Kiln.

### **PREDICTED AND ACTUAL IMPACTS IN 2015**

*(e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and*

The correlation between actual environmental impacts (ie – monitoring results) and predicted impacts (as per the 2013 EIS) have shown that the site is operating in accordance with the expected impacts documented in the EIS.

Further assessment on the predicted and actual impacts will be undertaken in the 2016 Annual Review when the environmental monitoring network has been established.

Environmental monitoring results from 2015 are in line with results from previous years. There were no significant discrepancies with the data captured compared to the predicated results in the 2013 EIS.

### **ENVIRONMENTAL IMPROVEMENT MEASURES 2016**

*(f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the development.*

- Implementation of Quarterly Noise Monitoring.
- Completion of Independent Environmental Audit of the site, with submission of findings (including recommended measures and improvement actions) by September 30, 2016.
- Installation of a Meterological Station.
- Installation of a HVAS Unit.

**Appendix 1: Moses Morley Kiln Surveys 2015**



# Craven Elliston & Hayes (Dapto) Pty Ltd

ABN 81 056 544 604

Registered Surveyors

Monday, 20 April 2015

Our Ref: D302/25341

Holcim Australia  
Cooma Road Quarry

**QUEANBEYAN NSW 2620**

## Re: Monitoring of Heritage Infrastructure

### Location Ruins

Base Survey on 11/06/2014

Mark	Easting	Northing	Elevation
T1	974.919	996.063	101.312
T2	976.108	993.964	102.142
T3	983.133	986.175	102.205
T4	984.463	983.314	102.637
T5	983.356	979.866	103.251
T6	983.204	979.943	102.985
T7	980.625	978.824	103.216

Diagram of Survey Marks



Torrens and Strata Subdivisions  
 Volumetric Surveys  
 Residential Surveys  
 Mine surveyors

- Land Development
- Project Management
- Commercial Surveys
- Industrial Surveys

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9001

**Location Primary Crusher**  
**Base Survey on 11/06/2014**

Mark	Easting	Northing	Elevation
DH 1	1522.846	1500.443	597.977
DH 2	1514.142	1505.346	597.915
T11 - RSJ	1523.538	1500.650	598.919
T12 - RSJ	1512.807	1506.508	597.756
T13	1502.466	1509.642	597.416
T14	1497.901	1507.188	596.836

**Location Ruins**  
**Survey on 16/04/2015**  
**Observations**

T1	974.918	996.063	101.312
T2	976.108	993.964	102.14
T3	983.132	986.176	102.205
T4	984.463	983.314	102.64
T5	983.356	979.868	103.252
T6	983.197	979.938	102.985
T7	980.624	978.822	103.219

**Table of difference from Base Survey**

0.001	0	0
0	0	0.002
0.001	-0.001	0
0	0	-0.003
0	-0.002	-0.001
0.007	0.005	0
0.001	0.002	-0.003





## Craven Elliston & Hayes (Dapto) Pty Ltd

ABN 81 056 544 604

Registered Surveyors

Wednesday, 29 October 2014

Our Ref: D302/25341

Holcim Australia  
Cooma Road Quarry

QUEANBEYAN NSW 2620

### Re: Monitoring of Heritage Infrastructure

#### Location Ruins

Base Survey on 11/06/2014

Mark	Easting	Northing	Elevation
T1	974.919	996.063	101.312
T2	976.108	993.964	102.142
T3	983.133	986.175	102.205
T4	984.463	983.314	102.637
T5	983.356	979.866	103.251
T6	983.204	979.943	102.985
T7	980.625	978.824	103.216

Diagram of Survey Marks



- Torrens and Strata Subdivisions
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