

ANNUAL REVIEW
1 January 2018 – 31 December 2018

Jandra Quarry

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Appendix 1 – Transport Summary

Appendix 2 – Quarterly Noise Monitoring

SITE DETAILS

<u>Name of operation</u>	Jandra Quarry
<u>Name of operator</u>	Holcim (Australia) Pty Ltd
<u>Development consent / project approval #</u>	DA 213-10-99 (Modification 5)
<u>Name of holder of development consent / project approval</u>	Holcim (Australia) Pty Ltd
<u>Annual Review start date</u>	January 1, 2018
<u>Annual Review end date</u>	December 31, 2018
<p><u>I, Matt Neil certify that this audit report is a true and accurate record of the compliance status of Jandra Quarry for the period of January 1, 2017- December 31, 2017 and that I am authorised to make this statement on behalf of Holcim (Australia) Pty Ltd.</u></p>	
<p><i>Note.</i></p> <p>a) <i>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.</i></p> <p>b) <i>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).</i></p>	
<u>Name of authorised reporting officer</u>	Matt Neil
<u>Title of authorised reporting officer</u>	Quarry Manager
<u>Signature of authorised reporting officer</u>	
<u>Date</u>	27 March 2019

1 STATEMENT OF COMPLIANCE

See **Table 1** for statement of commitments for the 2018 reporting period for Jandra Quarry. **Table 3** details the non-compliances identified within the reporting period.

Table 1: Statement of Commitments

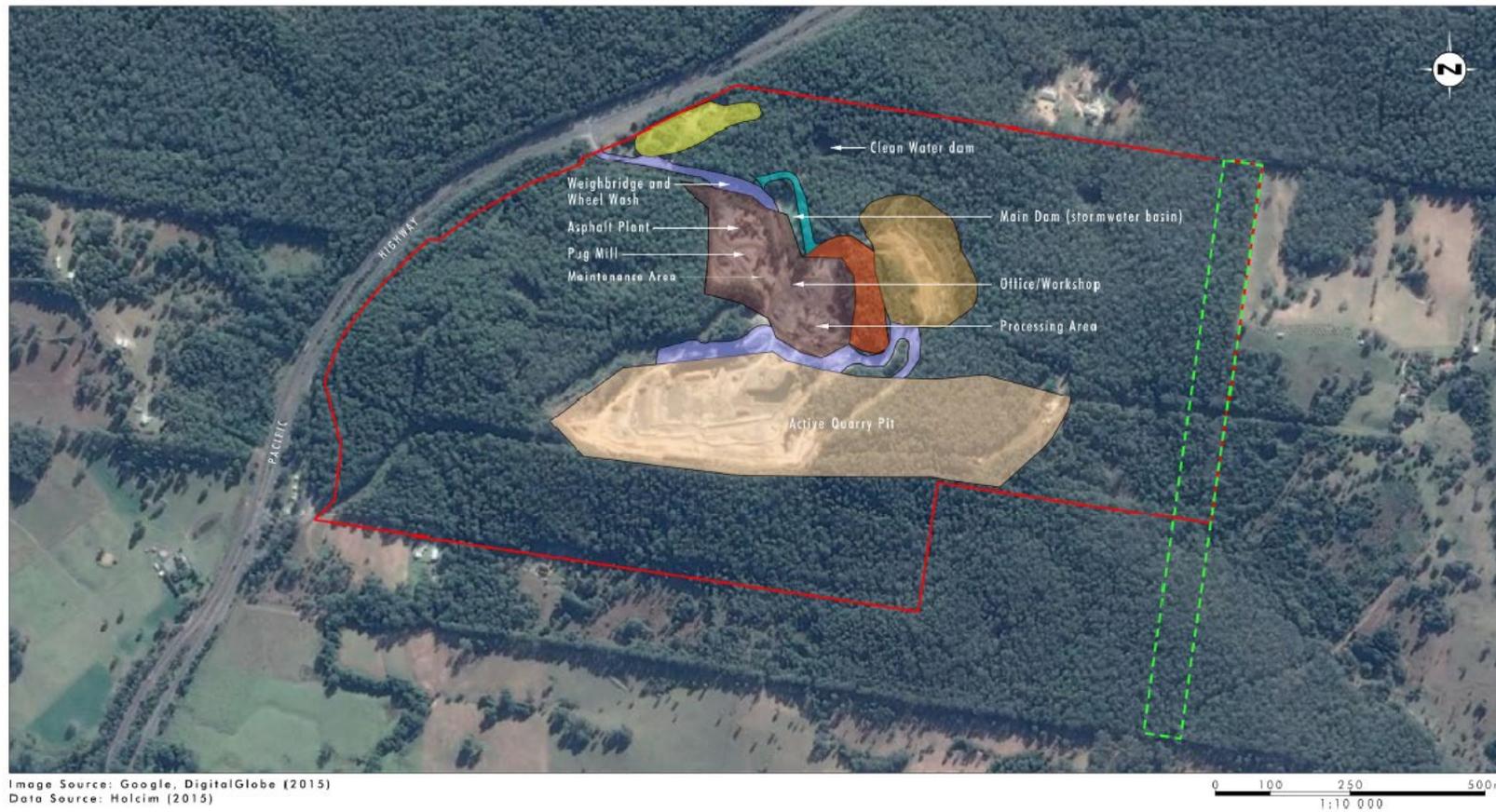
Were all conditions of the relevant approval(s) complied with?	
DA 213-10-99 (Mod 5)	NO - see table below for further details.
EPL No. 2796	YES

Table 2: DPE 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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 – Jandra Quarry

Relevant approval	Condition #	Condition description (summary)	Compliance status	Section addressed in Annual Review/Comment															
EPL 2796	Condition M2	Penalty Infringement Notice – 9 August 2018 Failure to conduct PM ₁₀ particulate monitoring - non-compliance with condition M2 of Environment Protection Licence 2796.	Low Risk Non - Compliant	Section 11															
EPL 2796	Condition M2.3	Penalty Infringement Notice – 9 August 2018 – Water Quality Reporting in Annual Return	Low Risk Non - Compliant	Section 11															
DA 213-10-99 (Mod 5)	Schedule 3 Condition 10	<p><i>The Applicant shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria listed in Tables 5, 6 and 7 at any residence on privately-owned land.</i></p> <p>Table 5: Long-term impact assessment criteria for particulate matter</p> <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Averaging Period</th> <th>^a Criterion</th> </tr> </thead> <tbody> <tr> <td>Total suspended particulate (TSP) matter</td> <td>Annual</td> <td>^a 90 µg/m³</td> </tr> <tr> <td>Particulate matter < 10 µm (PM₁₀)</td> <td>Annual</td> <td>^a 30 µg/m³</td> </tr> </tbody> </table> <p>Table 6: Short-term impact assessment criteria for particulate matter</p> <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Averaging Period</th> <th>^a Criterion</th> </tr> </thead> <tbody> <tr> <td>Particulate matter < 10 µm (PM₁₀)</td> <td>24 hour</td> <td>^a 50 µg/m³</td> </tr> </tbody> </table>	Pollutant	Averaging Period	^a Criterion	Total suspended particulate (TSP) matter	Annual	^a 90 µg/m ³	Particulate matter < 10 µm (PM ₁₀)	Annual	^a 30 µg/m ³	Pollutant	Averaging Period	^a Criterion	Particulate matter < 10 µm (PM ₁₀)	24 hour	^a 50 µg/m ³	Low Risk Non - Compliant	Non - compliance as no PM ₁₀ monitoring for two events (16 and 22 September 2018). Based on a critical failure of the PM ₁₀ unit.
Pollutant	Averaging Period	^a Criterion																	
Total suspended particulate (TSP) matter	Annual	^a 90 µg/m ³																	
Particulate matter < 10 µm (PM ₁₀)	Annual	^a 30 µg/m ³																	
Pollutant	Averaging Period	^a Criterion																	
Particulate matter < 10 µm (PM ₁₀)	24 hour	^a 50 µg/m ³																	
DA 213-10-99 (Mod 5)	Schedule 3 Condition 25	<i>Biodiversity and Rehabilitation Management Plan (f) include a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria;</i>	Low Risk Non - Compliant	Non - compliance for the implementation of monitoring.															



Legend		
Development Consent Boundary	Previously Approved Boundaries: Access Road and Haul Routes	MODS Approved Boundaries: Finished Stockpile Area
Biodiversity Offset Area (Indicative Boundary)	Approved Extraction Area	Heavy Vehicle Access Road
	Approved Overburden Emplacement Area	
	Approved Secondary Stockpile Area	
	Approved Stockpile and Site Facilities	

Figure 2: Jandra Quarry Operations (Including Offset Area) – Source: Umwelt August 2018

In accordance with Schedule 5, Condition 4 of the modified Development Consent the site is required to undertake an Annual Review of the site. This Annual Review has been prepared in accordance with Schedule 5 Condition 4 (Annual Performance Monitoring) of the Development Consent and in accordance with the *Annual Review Guideline: post approvals requirements for state significance mining developments* (October 2015). The Annual Review requirements and the section where they have been addressed in this document have been provided in **Table 4**.

Table 4: Annual Review Requirement

Condition	Section in Annual Review
<p>4. Annual Review</p> <p>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:</p> <p>(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;</p>	Section 4 and 6
<p>(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:</p> <ul style="list-style-type: none"> - the relevant statutory requirements, limits or performance measures/criteria;. - the monitoring results of previous years, and - the relevant predictions in the documents listed in condition 2 of Schedule 2; 	Section 6 and 7
<p>(c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;</p>	Section 1 and 11
<p>(d) identify any trends in the monitoring data over the life of the development;</p>	Section 6 and 7
<p>(e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and</p>	Section 6
<p>(f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the development</p>	Section 12

2.1 Name and Contact Details

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3 APPROVALS

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

Table 5: Approvals for Jandra Operations

Approval	Regulatory Authority
DA 213-10-99 (Modification No. 5)	NSW Department of Planning & Environment
EPL No. 2796	NSW Environmental Protection Authority

Holcim holds EPL 2796 which covers its activities at Jandra Quarry. **Table 6** outlines the EPL licensing limits.

Table 6: EPL Fee-Based Activity at Jandra Quarry

Scheduled Activity	Fee Based Activity	Scale
Crushing, grinding or separating	Crushing, grinding or separating	> 100,000 – 500,000 T processed
Extractive activities	Land-based extractive activity	>100,000 – 500,000 T extracted, processed or stored
Resource recovery	Recovery of general waste	Any waste recovered
Waste storage	Waste storage – other types of waste	Any other types of waste stored

Schedule 2 Condition 8 outlines the approved extraction limit is 490,000 tonnes of quarry products from the site in any calendar year.

4 OPERATIONS SUMMARY

4.1 Exploration

No exploration activities were completed during the Annual Review period.

4.2 Land Preparation

There was no land preparation (clearing) undertaken during the Annual Review period. Activities were completed within the existing quarry footprint.

4.3 Construction Activities

The only construction completed during the Annual Review period was the installation of a new bypass conveyor which was approximately 17 metres long and rubber lined.

4.4 Quarry Operations

Development activities undertaken at Jandra Quarry in 2018 included:

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

Extraction and processing operations in 2017 were undertaken between 6am and 10pm, Monday to Friday and between 6am and 6pm on Saturdays. Transportation operations in 2017 were undertaken between 6am and 10pm, Monday to Saturday. These timeframes are in accordance with the permissible hours outlined in Schedule 2, Condition 10 of the Development Consent DA 213-10-99 (Modification No. 5) dated 13 March 2015. .

Table 7 include a summary of the operations undertaken during the reporting period against the development consent conditions regarding product transported from Jandra Quarry. Production and sales volumes for the reporting period have been submitted to the Resources Regulator.

Table 7: Total Product Distributed (Jandra Quarry)

Material	Approved limit (Sch 2, Condition 8 & 9)	Previous reporting period (2017)	This reporting period (2018)
Product Extracted Total	490 000 T	335,705 T	252,165 T
Product Sales Total	475 000 T	299,945 T	257,016 T

4.5 Next Reporting Period

Operational activities proposed to be carried out at Jandra Quarry in 2019, include:

- Stripping of topsoil and overburden within the existing extraction limit boundary;
- Drill, blast, load and haul activities;
- Crushing, screening and stockpiling of product;
- Small area of clearance (0.5 ha) required for continued operations;
- Establishment of mobile conveyors in the stockpile area; and
- Progressive maintenance of rehabilitation in the completed bench at RL 50 on the northern face.

5 ACTIONS REQUIRED FROM 2017 ANNUAL REVIEW

The actions listed in **Table 8** were required as part of the findings of the 2017 Annual Review. These items have been closed out in accordance with the conditions of the Development Consent. Note, some of the section references have now changed based on the restructured 2018 Annual Review.

Table 8: Actions required from Annual Review - DPE

Section	Requirement	Comment
Section 1 Introduction	Please consolidate Figure 2, Figure 3 and Figure 4 to present the approved quarry location and offset areas in the one figure. Please also include a separate figure showing the environmental monitoring locations.	Figure 2 outlines the required information
Section 4 Operations Summary	Please report cumulative (for life of project) extraction to show compliance with Schedule 2 Condition 7 of the approval.	Holcim has only operated the quarry since March 2015 and does not have records of previous extraction. Since March 2015 when the Development Consent was modified Holcim have produced 1,093,283 tonnes, which is well within the Development Consent of 16.5 million tonnes overall extraction limit.
Section 6 Environmental Performance	Please include graphs or table to better show the long term trends for blasting, air quality and water monitoring results.	See tables where information is available Section 6.2, 6.3 and 7.
Section 6.5 Biodiversity	Please include a summary of the results of the BOA monitoring as described in Section 6.2 of the Jandra Quarry Biodiversity and Rehabilitation Management Plan (December 2015).	Section 6.5
Section 6.7 Waste Minimisation	Please include a table showing the volumes of recycled waste and general waste sent to landfill to demonstrate the effectiveness of waste minimisation and management measures, as required by Schedule 3 Condition 35 of the approval.	Section 6.7
Section 8 Rehabilitation and Landscape Management	Please include the results of the rehabilitation inspections, as per Section 6.1 of the Jandra Quarry Biodiversity and Rehabilitation Management Plan (December 2015).	Section 8
Section 9 Community	Please provide a brief discussion on trends in complaint data (table and/or graph preferred) compared to the previous five reporting periods, as required by Schedule 5 Condition 4(b) of the approval.	Section 9

Table 9: Actions required from the 2017 Annual Review – Holcim Proposed Actions

Commitment	Compliance Status
<p>Progressive Rehabilitation - The site will continue to progressively rehabilitate available areas.</p>	<p>This continued in 2018 with some benches being rehabilitated. Approximately 0.5 ha.</p>
<p>Desilting of the sites main process pond/sediment Basin - The site initiated an intensive campaign to dewater and desilt the main process pond/sediment basin. The benefits of this include greater free board management and increased water quality holdings.</p>	<p>Sediment basins continue to be inspected and maintained.</p>
<p>Biodiversity - Weed spraying will continue at the site during the next reporting period. Quarterly inspections of the nest boxes by Holcim staff will continue to occur during next reporting period. Ecological pre-clearance surveys will be required in the next reporting period for vegetation clearing required to extend the eastern end of the approved extraction boundary. A feral animal assessment will be undertaken in the next reporting period to determine if there is a need for managing feral animals in the rehabilitation area and Biodiversity Offset Area. A feral animal control program will be completed if required. To date, Holcim employees have not reported any sightings of feral animals within these areas.</p>	<p>Weed Spraying – This was completed during the Annual Review period every 8 weeks Ecological Pre-Clearance – Not required, no clearing. Feral Animal Assistance – Not completed. Completed by the Local Lands Service in 2017.</p>

6 ENVIRONMENTAL PERFORMANCE

6.1 Noise

6.1.1 EIS Predictions

The noise and blasting impact assessment in the Environmental Assessment (2014) considered the potential impacts of the proposed modification on nearby sensitive residential receivers.

Noise levels (without asphalt production) below the early morning shoulder project criteria, are predicted at all private residential receiver locations and for all stages of the quarry life, provided that operations are restricted during this time including:

- No works in the approved overburden emplacement area;
- No works above RL50; and
- No operation of the mobile processing plant.

Noise levels (without asphalt production) above the day / evening criteria are predicted at three private residential receivers and range from a marginal 2 dBA to 5 dBA above the criteria. Holcim is confident that these noise levels will not be perceived as a nuisance and has negotiated agreements with the potentially affected property owners.

Predicted noise levels from the Environmental Assessment (2014) from asphalt production were up to 7 dBA above the criteria at one private residential receiver R1 during all periods and all stages of the quarry development, as this receiver has a line of sight to the asphalt plant. Holcim has a negotiated agreement with the property holder of R1

Jandra Quarry is currently only in Stage 1 of its development plan as described in the Noise and Blasting Impact Assessment detailed within the Environmental Assessment (2014). **Table 10** details the noise modelling for this stage. When compared with the data in **Table 12** all results have been below that modelled within the Environmental Assessment (2014).

Table 10: Stage 1 Assessment without asphalt plant operating (exceedances in bold)

Receptor	Day / Evening (dBA Leq) 7 am to 10 pm		Early morning shoulder (dBA Leq) 6 am to 7 am		
	Project Criteria	Predicted level	Project criteria	Predicted level	
		Neutral		Neutral	Worst case
R1	41	41	40	41	46
R2	38	30	38	30	35
R3	51	<30	50	<30	30
R4	41	34	40	33	38
R5	41	40	40	38	43
R6	38	32	38	32	37
R7	38	<30	38	<30	<30
R8 (Holcim)	41	33	40	32	36
R9 (Holcim)	41	38	40	36	40
R10 (Holcim)	38	44	38	43	47

6.1.2 Approved Criteria

Criteria for each of the receivers R1 – R10, as outlined in the Conditions of Consent, for both quarry operation and combined quarry and asphalt production operations are provided in **Table 11**.

Table 11: Noise Criteria

Location	Quarry Operations		Quarry Operations and Asphalt Plant Production	
	6am – 10pm	6am – 10pm	10pm – 6am	10pm – 6am
	LAeq(15min)	LAeq(15min)	LAeq(15min)	LA1(1min)
<i>R1^{1,2}</i>	46	48	46	51
R2	36	40	35	48
<i>R3^{1,2}</i>	N/A	N/A	N/A	N/A
R4	36	40	39	51
R5	40	41	39	51
R6	36	40	35	48
R7	35	36	35	48
<i>R8^{1,2}</i>	N/A	N/A	N/A	N/A
<i>R9^{1,2}</i>	N/A	N/A	N/A	N/A
<i>R10^{1,2}</i>	N/A	N/A	N/A	N/A

Note 1: Noise criteria are not applicable to these receivers as per Section 4 of the NBMP.

Note 2: Either quarry owned or excluded from the assessment as per Section 4 of the NBMP.

6.1.3 Key Environmental Performance

Noise monitoring was undertaken by Muller Acoustic Consulting quarterly in 2017. The assessments identified that noise emissions generated by Jandra Quarry were in compliance with relevant statutory noise criteria specified in the Conditions of Consent on all occasions at all assessed locations. The compliance assessments for each residential receiver (R2, R4, R5, R6 and R7) are presented in **Table 12**.

Table 12: Noise Compliance Assessment (Muller Acoustic Consultants, 2018)

Assessment Period	Receiver No.	Quarrying Noise Criteria	Compliant				Quarrying and Asphalt Production Criteria	Compliant			
		L _{Aeq} (15min)	Q1	Q2	Q3	Q4	Day/evening L _{Aeq} (15min) Night LA ₁ (1min)	Q1	Q2	Q3	Q4
Day	R2	36	✓	✓	✓	✓	40	✓	✓	✓	✓
	R4	36	✓	✓	✓	✓	40	✓	✓	✓	✓
	R5	40	✓	✓	✓	✓	41	✓	✓	✓	✓
	R6	36	✓	✓	✓	✓	40	✓	✓	✓	✓
	R7	35	✓	✓	✓	✓	36	✓	✓	✓	✓
Evening	R2	36	✓	✓	✓	✓	40	✓	✓	✓	✓
	R4	36	✓	✓	✓	✓	40	✓	✓	✓	✓
	R5	40	✓	✓	✓	✓	41	✓	✓	✓	✓
	R6	36	✓	✓	✓	✓	40	✓	✓	✓	✓
	R7	35	✓	✓	✓	✓	36	✓	✓	✓	✓
Night	R2	35	✓	✓	✓	✓	48	✓	✓	✓	✓

Assessment Period	Receiver No.	Quarrying Noise Criteria	Compliant				Quarrying and Asphalt Production Criteria	Compliant			
		L _{Aeq} (15min)	Q1	Q2	Q3	Q4	Day/evening L _{Aeq} (15min) Night LA ₁ (1min)	Q1	Q2	Q3	Q4
	R4	39	✓	✓	✓	✓	51	✓	✓	✓	✓
	R5	39	✓	✓	✓	✓	51	✓	✓	✓	✓
	R6	35	✓	✓	✓	✓	48	✓	✓	✓	✓
	R7	35	✓	✓	✓	✓	48	✓	✓	✓	✓

Longterm Trends:

2018 was the second full year of quarterly noise monitoring undertaken at Jandra Quarry. During 2016 noise monitoring at Jandra Quarry was undertaken only in Quarter 4. This noise monitoring was undertaken post approval of the *Noise and Blast Management Plan* by DPE and the independent environmental audit. There were no noise complaints received during 2018.

Comparison to EIS Predictions:

2018 noise results at Jandra Quarry remained consistent with EIS predictions. The well-established vegetative buffer and distance between the operations and the sensitive receivers assists the Quarry in meeting these predictions.

6.1.4 Management Measures

Management measures relating to noise are outlined within the *Jandra Quarry Noise and Blast Management Plan*. These include:

- Defined operating hours as per Schedule 2 Condition 10 of the Development Consent;
- Work restrictions during the early morning shoulder period;
- Monitoring for noise and meteorological conditions;
- Broadband reversing beepers;
- Staff and contractors have been inducted; and
- Controlled blasting activities.

6.1.5 Proposed Improvements

None proposed relating to noise management.

6.2 Air Quality

6.2.1 Environmental Assessment Predictions

Jandra Quarry is currently in Stage 1 of its development plan as described in the Air Quality Impact Assessment detailed within the Environmental Assessment (2014). **Table 13 to 15** are the modelled dust contributions expected from Jandra Quarry. The air quality impact assessment concluded that with the implementation of existing and additional feasible management measures, all relevant air quality criteria could be met at all identified sensitive residential receivers for all stages of the quarry development.

Table 13: Summary of Contemporaneous Impact and Background – R1

Date	Highest Background ($\mu\text{g}/\text{m}^3$)	Predicted Increment ($\mu\text{g}/\text{m}^3$)	Total ($\mu\text{g}/\text{m}^3$)	Date	Background ($\mu\text{g}/\text{m}^3$)	Highest Increment ($\mu\text{g}/\text{m}^3$)	Total ($\mu\text{g}/\text{m}^3$)
Stage 1							
22-11-2012	45.8	0.6	46.4	03-06-2013	10.8	34.3	45.1
09-01-2013	42.7	0.0	42.7	22-06-2013	11.8	30.2	41.8
29-06-2013	41.3	0.3	41.6	30-07-2013	13.7	25.0	38.7
07-11-2012	40.7	0.0	40.7	08-07-2013	14.2	24.9	39.1
06-10-2012	40.6	0.3	40.9	07-06-2013	9.2	22.9	32.1
Stage 2							
22-11-2012	45.8	0.3	46.1	03-06-2013	10.8	28.3	39.1
09-01-2013	42.7	0.0	42.7	22-06-2013	11.8	20.7	32.3
29-06-2013	41.3	0.3	41.6	17-05-2013	10.2	19.0	29.2
07-11-2012	40.7	0.0	40.7	30-07-2013	13.7	18.9	32.6
06-10-2012	40.6	0.1	40.7	08-07-2013	14.2	16.3	30.5
Stage 2							
06-10-2012	40.6	0.2	40.8	03-06-2013	10.8	33.0	43.8
07-11-2012	40.7	0.0	40.7	22-06-2013	11.8	25.3	36.9
22-11-2012	45.8	0.9	46.7	25-06-2013	8.7	21.1	29.8
09-01-2013	42.7	0.0	42.7	08-07-2013	14.2	22.8	37.0
29-06-2013	41.3	0.3	41.6	30-07-2013	13.7	22.9	36.6
Criteria			50				50

Note: Top 5 shown for each Stage of operation

Table 14: Predicted Incremental & Cumulative Annual Average TSP Concentrations ($\mu\text{g}/\text{m}^3$)

Receptor ID	Increment			Cumulative		
	Stage 1	Stage 2	Stage 3	Stage 1	Stage 2	Stage 3
Privately Owned Receptors						
R1	2.5	2.6	2.8	48.5	48.6	48.8
R2	0.3	0.3	0.4	46.3	46.3	46.4
R3	0.8	0.7	0.6	46.8	46.7	46.6
R4	0.9	0.8	0.7	46.9	46.8	46.7
R5	0.6	0.5	0.5	46.6	46.5	46.5
R6	0.4	0.4	0.5	46.4	46.4	46.5
R7	0.1	0.1	0.2	46.1	46.1	46.2
R11	0.4	0.4	0.3	46.4	46.4	46.3
R12	0.3	0.3	0.3	46.3	46.3	46.3
R13	0.3	0.3	0.3	46.3	46.3	46.3
R14	0.3	0.3	0.3	46.3	46.3	46.3
R15	0.2	0.2	0.2	46.2	46.2	46.2
R16	0.3	0.2	0.2	46.3	46.2	46.2
R17	<0.1	<0.1	0.1	<46.1	<46.1	46.1
R18	<0.1	<0.1	<0.1	<46.1	<46.1	<46.1
R19	0.4	0.4	0.5	46.4	46.4	46.5
Quarry Owned Receptors						
R8	1.3	1.1	1.0	47.3	47.1	47.0
R9	1.7	1.7	1.7	47.7	47.7	47.7
R10	1.5	1.5	4.6	47.5	47.5	50.6
Criteria					90	

Table 15: Predicted Incremental Annual Average Dust Deposition Rate (g/m²/month)

Receptor ID	Stage 1	Stage 2	Stage 3
Privately Owned Receptors			
R1	<0.1	<0.1	<0.1
R2	<0.1	<0.1	<0.1
R3	<0.1	<0.1	<0.1
R4	<0.1	<0.1	<0.1
R5	<0.1	<0.1	<0.1
R6	<0.1	<0.1	<0.1
R7	<0.1	<0.1	<0.1
R11	<0.1	<0.1	<0.1
R12	<0.1	<0.1	<0.1
R13	<0.1	<0.1	<0.1
R14	<0.1	<0.1	<0.1
R15	<0.1	<0.1	<0.1
R16	<0.1	<0.1	<0.1
R17	<0.1	<0.1	<0.1
R18	<0.1	<0.1	<0.1
R19	<0.1	<0.1	<0.1
Quarry Owned Receptors			
R8	<0.1	<0.1	<0.1

6.2.2 Approved Criteria

Air Quality monitoring is required to be undertaken in accordance with the following development consent conditions:

Table 16: Long – term impact assessment criteria for particulate matter

Pollutant	Averaging Period	^d Criterion
Total suspended particulate (TSP) matter	Annual	^a 90 µg/m ³
Particulate matter < 10 µm (PM ₁₀)	Annual	^a 30 µg/m ³

Table 17: Short – term impact assessment criteria for particulate matter

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

Table 18: Long – term impact assessment criteria for deposited dust

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

6.2.3 Key Environmental Performance

6.2.3.1 Depositional Dust

Dust deposition monitoring has been undertaken at the Jandra Quarry throughout the 2018 reporting period with all results within the expected levels of criteria at each monitoring point. Results are shown in **Table 19**.

Table 19: Dust Monitoring (Dust Deposition) - 2018

Sampling Commencement	Date & Time Sampled	Insoluble Solids DDG1	Insoluble Solids DDG2	Insoluble Solids DDG3	Insoluble Solids DDG4	Insoluble Solids DDG5
19-12-2017	16-01-2018	1	2.2	1.2	1.1	1.4
16-01-2018	13-02-2018	1	1.5	0.8	0.5	2.4
13-02-2018	13-03-2018	0.6	0.5	0.4	0.1	1.5
13-03-2018	10-04-2018	0.4	0.8	0.3	0.3	10.8
10-04-2018	08-05-2018	0.4	0.7	0.5	0.4	2.9
08-05-2018	05-06-2018	0.3	0.1	0.1	0.3	1.3
05-06-2018	03-07-2018	0.4	0.2	0.4	0.3	2.4
03-07-2018	31-07-2018	0.3	0.2	0.2	0.3	NS
31-07-2018	28-08-2018	0.5	0.5	0.5	0.4	NS
28-08-2018	25-09-2018	0.5	0.4	0.3	0.4	NS
25-09-2018	22-10-2018	0.3	0.9	0.4	0.2	NS
22-10-2018	20-11-2018	0.8	0.7	0.9	0.9	NS
20-11-2018	19-12-2018	1.8	2.1	1.4	1.5	NS
	Average	0.6	0.8	0.5	0.5	2.9
	Min	0.3	0.1	0.1	0.1	1.3
	Max	1.8	2.2	1.4	1.5	10.8

The annual average of all gauges was below the development consent criteria for depositional dust gauges. This was also the case in the previous Annual Review period indicating effective dust management.

Depositional dust monitoring was not completed at DDG 5 from July 2018 onwards. Holcim stopped monitoring at this location as it is not an EPL monitoring location.

Table 20: Depositional Dust Monitoring Summary (2016-2018)

Dust Depositional Gauge	Monitoring Summary for Annual Review Period	Monitoring Results 2018 Period	Monitoring Results 2017 Period	Monitoring Results 2016 Period
		(g/m ² /month)		
DDG1	Insoluble Solids Reporting Period Average	0.6	0.6	0.4
	Max. Insoluble Solids	1.8	1.2	0.8
	Min. Insoluble Solids	0.3	0.2	<0.1
DDG2	Insoluble Solids Reporting Period Average	0.8	0.8	0.9
	Max. Insoluble Solids	2.2	1.5	2.9
	Min. Insoluble Solids	0.1	0.3	<0.1
DDG3	Insoluble Solids Reporting Period Average	0.5	0.7	0.5
	Max. Insoluble Solids	1.4	1.3	0.7
	Min. Insoluble Solids	0.1	0.2	<0.2
DDG4	Insoluble Solids Reporting Period Average	0.5	0.6	0.7
	Max. Insoluble Solids	1.5	1.3	1.8
	Min. Insoluble Solids	0.1	0.2	0.4
DDG5	Insoluble Solids Reporting Period Average	2.9	2.9	1.2
	Max. Insoluble Solids	10.8	9.8	1.9
	Min. Insoluble Solids	1.5	0.9	0.2

6.2.3.2 PM₁₀ Monitoring

PM₁₀ monitoring is required to be undertaken in accordance with the criteria provided in **Table 16** and **Table 17**.

Monitoring for PM₁₀ first commenced in May 2017 and continued in 2018. Results are provided in **Table 21**.

Table 21: PM₁₀ Monitoring – 2018

Sample	Particulate Matter (ug/m3)	Compliance Status
02-01-2018	7	With criteria
08-01-2018	22	With criteria
14-01-2018	8	With criteria
20-01-2018	8	With criteria
26-01-2018	9	With criteria
01-02-2018	11	With criteria
07-02-2018	7	With criteria
13-02-2018	14	With criteria
19-02-2018	17	With criteria
25-02-2018	12	With criteria
03-03-2018	12	With criteria
09-03-2018	5	With criteria
15-03-2018	13	With criteria
21-03-2018	18	With criteria
27-03-2018	14	With criteria
02-04-2018	14	With criteria
08-04-2018	10	With criteria
14-04-2018	14	With criteria
20-04-2018	6	With criteria
26-04-2018	8	With criteria
02-05-2018	3	With criteria
08-05-2018	16	With criteria
14-05-2018	15	With criteria
20-05-2018	28	With criteria
26-05-2018	14	With criteria
01-06-2018	15	With criteria
07-06-2018	7	With criteria
13-06-2018	6	With criteria
19-06-2018	2	With criteria
25-06-2018	2	With criteria
01-07-2018	2	With criteria
07-07-2018	2	With criteria
19-07-2018	2	With criteria
25-07-2018	2	With criteria
11-08-2018	10	With criteria
17-08-2018	10	With criteria
23-08-2018	9	With criteria
29-08-2018	15.60	With criteria
04-09-2018	5.90	With criteria
10-09-2018	12.90	With criteria
16-09-2018	No Sample	Failure of PM ₁₀ Unit

Sample	Particulate Matter (ug/m3)	Compliance Status
22-09-2018	No Sample	Failure of PM ₁₀ Unit
28-09-2018	7	With criteria
04-10-2018	7	With criteria
10-10-2018	15	With criteria
16-10-2018	30	With criteria
22-10-2018	23	With criteria
28-10-2018	30	With criteria
03-11-2018	34	With criteria
09-11-2018	18	With criteria
15-11-2018	33	With criteria
21-11-2018	15	With criteria
27-11-2018	35	With criteria
03-12-2018	42	With criteria
09-12-2018	27	With criteria
15-12-2018	22	With criteria
21-12-2018	27	With criteria
27-12-2018	23	With criteria

Dust levels for 2018 were within the short term and long term impact assessment criteria for particulate matter. This was also the case for 2017. It should be noted that there were two events (16 September 2018 and 22 September 2018) where there was a critical failure of the PM₁₀ unit. This has resulted in a non - compliance for Schedule 3 Condition 10. The EPA and DPE were notified of the issue and Holcim procured a new PM₁₀ unit as soon as possible. Holcim notified the EPA and DPE once the new unit was installed. **Table 22** compares PM₁₀ results between 2017 and 2018.

Table 22 PM₁₀ Monitoring Trends

Monitoring Summary for Annual Review Period	Monitoring Results 2018 Period (µg/m ³)	Monitoring Results May – December 2017 Period (µg/m ³)
PM ₁₀ Reporting Period Average	14.2	14.4
Max. PM ₁₀	42	40
Min. PM ₁₀	2	2

Longterm Trends:

Depositional dust monitoring commenced in 2016, once management plans were approved by the DPE. From 2016 – 2018 the annual depositional dust levels have been within the criteria.

As 2017 was the first year of PM₁₀ monitoring (monitoring commenced in May 2017), no longterm trends are available. Results for 2018 were very similar to the 2017 PM₁₀ results.

Comparison to EIS Predictions:

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

6.2.4 Management Measures

Dust minimisation and control measures implemented on site include:

- The use of a watercart that follows specified procedures to achieve the most optimal dust control measures;
- Sprays throughout the plant;
- Speed limits across the site;
- Dust covers in place across the screening building;
- Inspections;
- Defined operating hours;
- Monitoring for air quality and meteorological conditions; and
- Training of staff and contractors.

6.2.5 Proposed Improvements

No proposed improvements. The critical failure of the PM₁₀ unit was not expected in 2018.

6.3 Blasting

6.3.1 Environmental Assessment Predictions

The Noise and Blasting Impact Assessment (SLR, 2014) identified the MIC that allows the ANZEC Guidelines for human comfort to be met, at the closest private (non-Holcim owned) residences, during all stages of the quarry development.

The design of blasts will then be optimised to limit the possibility of EPA criteria exceedances, when blast locations are closer to residences and preferred blast designs can be used for blast locations with adequate distances to residences.

6.3.2 Approved Criteria

The site undertook blasts in 2018 in accordance with the criteria listed in **Table 23**.

Table 23: Blasting Criteria for Jandra Quarry

Location	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance
Any residence on privately owned land, or any public infrastructure	120	10	0%
	115	5	5% of the total number of blasts over a period of 12 months

6.3.3 Key Environmental Performance

Results of blasting undertaken in 2018 are shown in **Table 24**.

Table 24: 2018 Blast Monitoring Results for Jandra Quarry

Blast Number	Date	Result	
		Vibration(mm/s) (Criteria Limit 5 mm/s)	Overpressure (dBL) (Criteria Limit 115 dBL)
17-136	03-02-2018	0.36	108.9
17-147	18-03-2018	1.09	108.4
17-148	18-04-2018	1.09	108.4
17-149	20-05-2018	0.29	Nil trigger
18-150	04-06-2018	1.52	111.0
18-151	04-07-2018	0.31	100.7
18-152	24-08-2018	0.56	104.6
18-153	26-09-2018	1.27	105.6
18-154	30-09-2018	0.58	101.8
18-155	10-10-2018	0.96	74.7
18-156	14-11-2018	1.32	74.7

Blasting Notes:

1. 2 slightly staggered blasts captured by the blasting monitor. Designed by blasting contractors.
2. 3 slightly staggered blasts captured by the blasting monitor. Designed by blasting contractors.
3. 2 slightly staggered blasts captured by the blasting monitor. Designed by blasting contractors.

All blasts in 2017 were within the Development Consent criteria.

Sensitive receivers near the quarry are notified prior to blasting as per the *Jandra Quarry Noise and Blast Management Plan*. 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:

From 2015 – 2018 the blasting levels have been within the Development Consent criteria.

Table 25: Longterm Blasting Trends

Year	Number of Blasts	Max. Overpressure (dBL)	Average Overpressure (dBL)	Max Vibration (mm/s)	Average Vibration (mm/s)
2015	10	114.9	109.8	2.48	1.58
2016	9	116	107.8	1.3	0.84
2017	16	113.2	105.7	3.1	1.02
2018	11	111.0	99.8	1.52	0.85

Comparison to EIS Predictions:

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

6.3.4 Management Measures

Management measures relating to blasting are outlined within the *Jandra Quarry Noise and Blast Management Plan*, which includes a Drill and Blast Procedure. This procedure outlines the key steps of the blasting process including design, drilling, loading and firing.

6.3.5 Proposed Improvement

No improvements to blasting practices are required.

6.4 Traffic Management

6.4.1 Environmental Assessment Predictions

Section 3.5.6 of the Environmental Assessment (2014) stated that at peak demand, the maximum number of heavy vehicles leaving the site to deliver product to customers would reach approximately 12 (24 truck movements) per hour. This has been calculated based on a minimum loading time of approximately 5 minutes per truck. It is unlikely that, on a typical day, these peaks in demand will occur for more than a few hours at a time. A detailed assessment of traffic and transport is outlined within Section 6.2 of the Environmental Assessment (2014).

6.4.2 Approved Criteria

The site is required to operate traffic and manage transport through compliance with the requirements of the conditions listed below:

<p>Pacific Highway Intersection</p> <p>31. The Applicant shall maintain the intersection of the Pacific Highway and the Jandra Quarry Access Road, for the duration of product transport from the site, to the satisfaction of the RMS.</p> <p>32. The Applicant shall install and subsequently maintain street lighting at the intersection of the Pacific Highway and the Jandra Quarry Access Road, to the satisfaction of the RMS, prior to transporting quarry products from the site outside of the hours 7 am to 6 pm. Any works affecting the Pacific Highway must not take place without the prior approval of the RMS.</p> <p>Monitoring of Product Transport</p> <p>33. The Applicant shall keep accurate records of:</p> <ul style="list-style-type: none">(a) the amount of quarry products, including asphalt, transported from the site (calendar month and year);(b) the number of laden vehicle movements to and from the site (day, calendar month and year); and(c) publish these records on its website at the end of each calendar quarter.
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6.4.3 Key Environmental Performance

The site has maintained the intersection at the Pacific Highway and Quarry Access Road in accordance with the conditions in **Section 6.4.2**. No impacts to the intersection have been identified during the reporting period.

The site has not operated outside the hours of 7am and 6pm. Holcim are investigating a solar lighting option to install at the intersection in accordance with Schedule 3, Condition 32 of the consent. No operations outside the approved hours will occur until the solar lights are signed off by RMS and installed at the intersection.

All truck movements and quarry product volumes are published on the Holcim (Jandra Quarry) webpage in accordance with Schedule 3, Condition 33 of the consent. A summary of transport data for 2018 is appended to this Annual Review as **Appendix 1**.

In summary:

- There was 9383 truck movements; and
- There was 257,016 tonnes of material taken offsite as product.

Management Measures

Management measures relating to traffic include:

- Defined haulage times;
- Covered loads leaving site;
- Defined haulage limits; and
- Trained transport operators.

6.4.4 Proposed Improvements

There are no proposed improvements relating to transport.

6.5 Biodiversity

6.5.1 Environmental Assessment Predictions

The Environmental Assessment (2014) assessed the biodiversity impacts associated with clearing an additional 1.284 hectares of native vegetation. The Flora and Fauna Assessment accompanying the EIS stated: “*With the implementation of flora and fauna management measures included in the Flora and Fauna Management Plan and this Environmental Assessment (2014), (depending on the outcome of the targeted surveys for the Eastern Underground Orchid) the proposed modification would not result in any significant impacts on biodiversity on site and in surrounding bushland*”.

6.5.2 Approved Criteria

There are no specific criteria relating to biodiversity within the Development Consent. Schedule 3 Condition 25 outlines the requirement to complete a *Biodiversity and Rehabilitation Plan* with this document dated December 2015.

6.5.3 Key Environmental Performance

There were limited impacts to biodiversity in the reporting period as vegetation clearance was not required.

Four campaigns of weed spraying targeting Lantana (*Lantana* sp.) and Tobacco weed (*Solanum mauritianum*) were completed along the internal haul in the reporting period.

No biodiversity monitoring was completed.

6.5.4 Comparison to EIS Predictions

There were limited impacts to biodiversity within the Annual Review period. This is consistent with the EIS predictions.

6.5.5 Management Measures

Management measures relating to biodiversity are outlined within the *Jandra Quarry Biodiversity Management Plan*. These include:

- Weed and feral animal management;
- Pre clearance surveys and tree felling procedures;
- Salvaging of habitat resources;
- Nest box installation;
- Bushfire management; and
- Rehabilitation and biodiversity offset area monitoring.

6.5.6 Proposed Improvements

Weed spraying will continue at the site during the next reporting period.

Quarterly inspections of the nest boxes by Holcim staff will continue to occur during next reporting period.

Feral animal control will be required in 2019.

6.6 Heritage

6.6.1 Environmental Assessment Predictions

An extensive AHIMS search was conducted on 5 February 2014 for the purposes of an Aboriginal Heritage Due Diligence Assessment for the Environmental Assessment (2014). The search covered an area of approximately 10 square kilometres, which encompassed the disturbance area of the new heavy vehicle access road and expansion of the existing finished product stockpile area. Seven recorded sites are within the Jandra Quarry Development Consent boundary. All seven of these sites were determined to be of low or medium significance. No Aboriginal archaeological sites registered on AHIMS are located within the disturbance area of the new heavy vehicle access road and expansion of the existing finished product stockpile area. There are no predicted detrimental impacts to Aboriginal and cultural heritage.

6.6.2 Approved Criteria

There are no specific criteria relating to Aboriginal and Cultural Heritage within the Development Consent. Schedule 3 Condition 29 outlines the requirement to prepare an *Aboriginal Cultural Heritage Management Plan*.

6.6.3 Key Environmental Performance

There were no issues relating to Aboriginal and Cultural Heritage in 2018. There was no additional clearing during the Annual Review period.

6.6.4 Management Measures

Management measures relating to heritage are outlined within the *Jandra Quarry Aboriginal Cultural Heritage Management Plan*. These include:

- Consultation with Aboriginal stakeholders during the preparation of the *Jandra Quarry Aboriginal Cultural Heritage Management Plan*;
- Records of known sites of Aboriginal heritage significance;
- The Quarry Manager or delegate will undertake monthly inspections of the known Aboriginal and cultural heritage sites;
- Training of staff and contractors; and
- Procedure for impacts of unexpected finds.

6.6.5 Proposed Improvements

There are no proposed improvements relating to Aboriginal and cultural heritage.

6.7 Waste Minimisation

6.7.1 Management Measures

Wherever possible, Jandra Quarry implements initiatives to minimise the waste generated from our operations. General waste is minimised and all oil, cardboard, paper and steel is sorted on site and sent to recycling facilities in the region. This is significantly reducing the amount of waste going to landfill.

Tyres from machines are used for traffic management, garden edging and signage stabilisers. This reduces the use of raw materials as well as diverting rubber from landfill.

General waste and recycling is stored in separated into different streams and stored in a separate 3m³ bulky bin. These bins are collected fortnightly. Based on these bins being mostly full it is estimated that a maximum of 78m³ of general waste and 78m³ of recycling was generated during 2018.

6.7.2 Proposed Improvements

There are no proposed improvements to waste management during the Annual Review period.

6.8 Summary of Environmental Performance

A summary of the performance of environmental management measures and sampling results are detailed in **Table 26**.

Table 26: Summary of Performance

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.	Quarterly monitoring has met the Development Consent Criteria.	Meets criteria.	None required.
Air quality	EIS predictions are all below development consent criteria.	Dust deposition results are within criteria of EPL, EIS and Development Consent. PM ₁₀ monitoring has met criteria, however there were 2 missed monitoring events. Critical failure of PM ₁₀ unit.	Dust deposition has been consistent with EIS and previous Annual Review reporting. PM ₁₀ monitoring has been undertaken for the first full year.	Ensure there are no sampling collection errors for PM ₁₀ monitoring or depositional dust.
Blasting	EIS predictions are all below development consent criteria.	All blasts in 2018 were within the Development Consent criteria.	Blast results continue to remain within approved criteria and EIS predictions.	None required.
Water Management	EIS predictions are all below development consent criteria.	No discharge during 2018	Surface water generally meets criteria during the normal monitoring events. No discharge during 2018.	None required.
Biodiversity	2014 EA Mod – The proposed modification would not result in any significant impacts on biodiversity on site and in surrounding bushland.	No additional impacts - no clearing. No	No biodiversity or rehabilitation monitoring was completed in 2018.	Completion of monitoring in 2019 as per the Biodiversity Management Plan.
Heritage	No predictions	No impacts	Continued to be no impacts	None required.

7 WATER MANAGEMENT

7.1 EIS Predictions

The predictive modelling within the Environmental Assessment (July 2014) pertains to the water balance for Jandra Quarry (**Table 27**). During the reporting period, the water available on site was all that was required for operations providing Holcim with the confidence in the water balance figures. There are no other predictive figures for surface water management.

Table 27: Water Balance Modelling from Surface Water Management Plan

Summary Results	Current			Stage 1		
	Dry Year	Mean Year	Wet Year	Dry Year	Mean Year	Wet Year
Total Runoff (ML/yr)	35	98	165	34	97	164
Total Demands (ML/yr) ¹	25.60	24.88	24.11	36.60	35.64	34.63
Stormwater Supplied (ML/yr) ²	25.46	24.88	24.11	32.13	35.45	34.63
Total Storage Top Up (ML/yr)	0.13	0.00	0.00	4.46	0.19	0.00
% Demand Met	99%	100%	100%	88%	99%	100%
Spill Volume (ML/yr)	4	68	131	3	57	112

Summary Results	Stage 2			Stage 3		
	Dry Year	Mean Year	Wet Year	Dry Year	Mean Year	Wet Year
Total Runoff (ML/yr)	39	110	186	45	129	219
Total Demands (ML/yr)	36.42	35.47	34.46	34.60	33.74	32.82
Stormwater Supplied (ML/yr)	32.32	35.34	34.46	31.85	33.74	32.82
Total Storage Top Up (ML/yr)	4.09	0.13	0.00	2.75	0.00	0.00
% Demand Met	89%	100%	100%	92%	100%	100%
Spill Volume (ML/yr)	4	70	139	9	90	174

The Environmental Assessment (2014) stated with the implementation of surface water management measures included in the *Soil and Water Management Plan*, the EPL and this EA, the proposed modification would not result in any significant impacts on the downstream environments.

7.2 Approved Criteria

The site is required to monitor and record discharge events from the Main Dam offsite in accordance with the requirements listed in **Table 28** taken from the EPL.

Table 28: EPL Discharge Monitoring Requirements

POINT 1

Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
pH	pH				6.5-8.5
Total suspended solids	milligrams per litre				50

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1	Discharge quality monitoring	Discharge quality monitoring	Discharge from final sediment dam as shown in the CSR Readymix Site Photo - Jandra Quarry Water Monitoring Location Figure 1 provided to the EPA 13 May 2002

7.3 Water Use and Storage

Effective control of erosion and sediment movement at the site is currently achieved via the following measures:

- Sedimentation basins;
- Wash off water collection and primary treatment systems;
- Minimisation of disturbed areas;
- Diversion of clean water from undisturbed areas around working areas;
- Temporary erosion and sediment controls prior to commencement of topsoil and overburden removal;
- Sequential clearing and rehabilitation of the quarry as extraction of material proceeds; and
- Twice yearly maintenance of erosion and sediment control structures to ensure their efficiency.

7.4 Surface Water Results

There was no discharge at site during 2018. The approved *Soil and Water Management Plan* for Jandra (2015) outlines the requirements to complete monitoring of discharge events. The monthly water monitoring was discontinued in July 2018 and will only be completed if there is a discharge event.

A summary of the monthly water results are outlined in **Table 29**.

Table 29: Monthly surface water results

Sample	pH	Electrical Conductivity (us/cm)	Total Suspended Solids (mg/L)	Oil and Grease
16-01-2018	5.0	761	14	<5
13-02-2018	8.3	1,605	59	<5
13-03-2018	8.3	1,366	6	<5
10-04-2018	8.2	980	12	<5
08-05-2018	8.2	1,009	15	<5
05-06-2018	8.3	1,013	9	<5
03-07-2018	8.3	1,016	51	<5
Average	7.8	1,107	23.7	<5
Minimum	5.0	761	6	<5
Maximum	8.3	1,605	59	<5

The pH results from the monthly sampling was slightly alkaline ranging from 5.0 to 8.3. This was a larger range than past years, with the January pH being lower than previous results. The TSS results ranged from 6mg/L to 51mg/L, with this being a lower range compared to 2017. EC levels were between 761 us/cm and 1,605 us/cm in 2018. EC was not monitored in 2017.

Longterm Trends:

The results from 2015 to 2018 were reviewed for surface water. Results were similar over a long period with slightly alkaline pH and a large variability in TSS results. Although there was no discharge in 2018, there is a system in place at the site where samples are obtained prior to a discharge event, with the goal of containing water onsite if the water quality parameters are not within the EPL requirements.

Comparison to EIS Predictions:

The Environmental Assessment (2014) stated the increase in scale of the operations not result in any significant impacts on the downstream environments. With there being no discharge events during the Annual Review period and the site operating as per the *Soil and Water Management Plan*, Holcim consider this prediction has been met.

7.5 Groundwater Results

No groundwater monitoring was completed at Jandra during the Annual Review period.

7.5.1 Water Take

There is no groundwater extraction licences at Jandra Quarry, therefore there has been no water take.

8 REHABILITATION AND LANDSCAPE MANAGEMENT

8.1 Rehabilitation Performance during the Reporting Period

A summary of rehabilitation at Jandra Quarry is outlined in **Table 30**.

Table 30: Rehabilitation Performance

Guideline Requirement	Site Comment
Extent of the operations and rehabilitation at completion of the reporting period	<p>Rehabilitation of benches continued during the Annual Review period as per the <i>Biodiversity and Rehabilitation Management Plan</i>. There was approximately 0.5 ha of rehabilitation completed during the Annual Review period.</p> <p>Quarry benches are landscaped and vegetated using native tree and understorey species, to minimise the visual impact of the quarry.</p> <p>The rehabilitation process includes placing approximately 1 metre of overburden on benches, followed by 300mm of topsoil. Tubestocking is the preferred rehabilitation method on benches.</p>
Agreed post- rehabilitation land use	<p>The <i>Biodiversity and Rehabilitation Management Plan</i> outlines the proposed rehabilitation at the site.</p> <p>The proposed final land use is native woodland.</p>
Key rehabilitation performance indicators	<p>Key performance indicators are outlined within the <i>Biodiversity and Rehabilitation Management Plan</i>. Rehabilitation inspections are completed by Holcim.</p>
Renovation or removal of buildings	<p>None during reporting period.</p>
Any other Rehabilitation including: Exploration activities; Infrastructure; Dams; and The installation or maintenance of fences, bunds and any other works.	<p>No rehabilitation of exploration, infrastructure or dams undertaken during the Annual Review period.</p>
Any rehabilitation areas which have received formal sign off from the Resources Regulator	<p>None.</p>
Variations to activities undertaken to those proposed (including why there were variations and whether Resource Regulator was notified)	<p>Rehabilitation completed as per the <i>Biodiversity and Rehabilitation Management Plan</i>.</p>
Outcomes of trials, research projects and other initiatives	<p>No trials.</p>
Key issues that may affect successful rehabilitation	<p>There are several potential issues including availability of material, seed stock, climatic events and rehabilitation methodology.</p>

8.2 Summary of Current Rehabilitation and Disturbance

A summary of the rehabilitation and disturbance status is outlined in **Table 31**.

Table 31: Rehabilitation and Disturbance Status

Quarry Area Type	Previous Annual Review Period	Current Annual Review Period (ha)	2019 Annual Review Period (ha)
A. Total Quarry Footprint ¹	21	21	22.35
B. Total Active Disturbance ²	19.6	19.1	18.95
C. Land Being Prepared for Rehabilitation ³	0	0	0
D. Land Under Active Rehabilitation ⁴	1.4	1.9	3.40
E. Completed Rehabilitation ⁵	0	0	0

There was approximately 0.5 ha of rehabilitation in 2018.

There is proposed to be an additional 1.35 ha of disturbance in 2019.

There is proposed to be an additional 1.5 ha of rehabilitation in 2019 of existing disturbed land.

- 1 *Total disturbance and rehabilitation.*
- 2 *Total disturbance within the Development Consent 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 Resources Regulator.*

During 2018 there was no additional disturbance. Approximately 0.5 ha is proposed to be disturbed during 2019 for continued operations. During 2018 there was approximately 0.5 ha of additional rehabilitation over inactive quarry benches. There is an additional 0.5 ha of rehabilitation proposed for 2019.

8.3 Actions for the next Reporting Period

The DPE 2015 Annual Review Guidelines require the Annual Review to outline the rehabilitation actions proposed during the next reporting period. These actions are detailed in **Table 32**.

Table 32: Rehabilitation and Closure Actions for the Next 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	Rehabilitation to continue as per the <i>Biodiversity and Rehabilitation Management Plan</i> .
Outline proposed rehabilitation trials, research projects and other initiatives to be undertaken during next reporting period	No proposed rehabilitation trials.
Summary of rehabilitation activities proposed for next report period	There is planned to be the rehabilitation of the RL50 Northern Bench (0.5 ha).

The rehabilitation and disturbance areas at Jandra Quarry are outlined in **Figure 3**

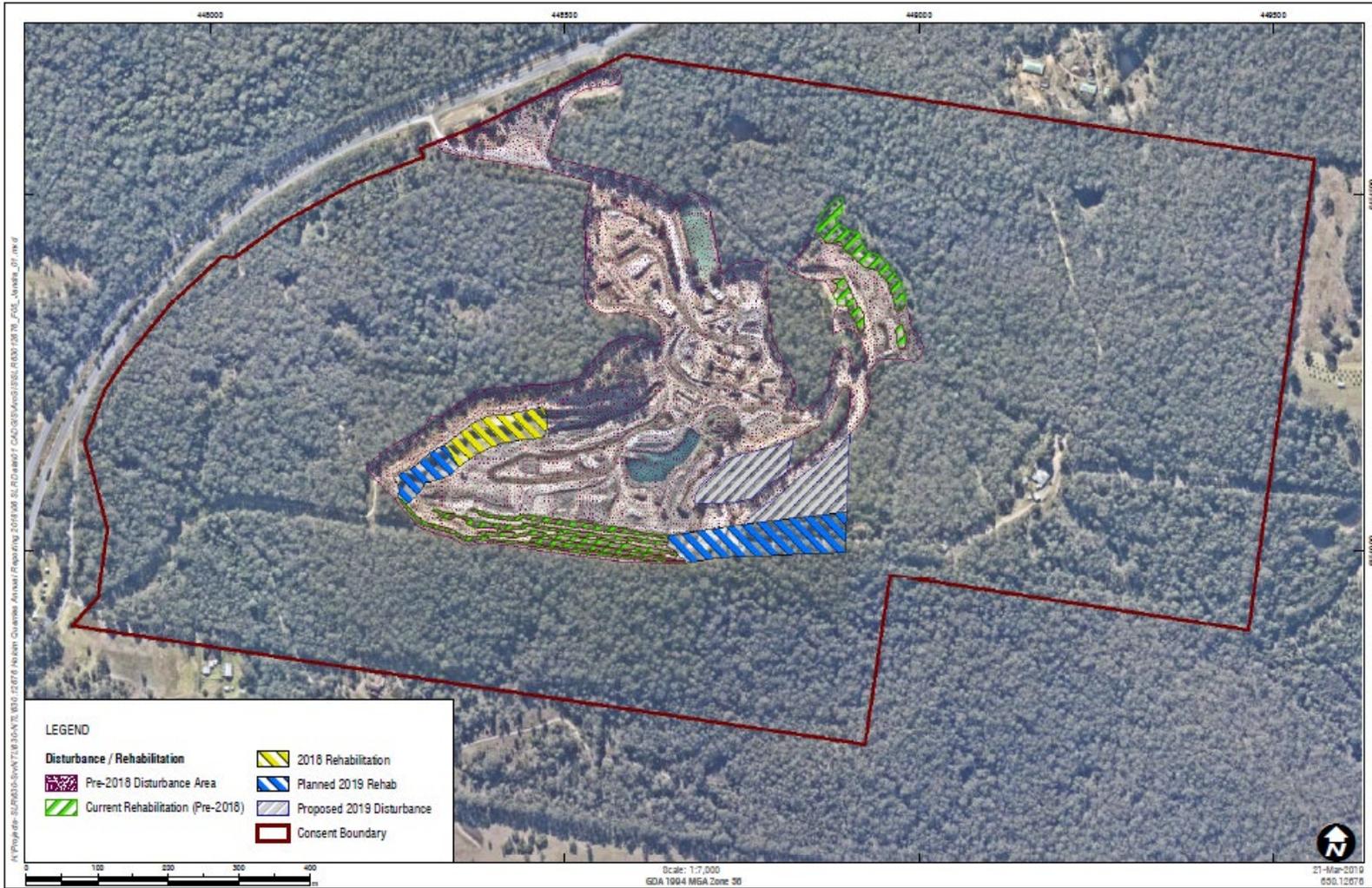


Figure 3: Jandra Quarry Rehabilitation and Disturbance (2018 and 2019)

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 7 and 10 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.

9.2 Community Contributions

During 2018 a contribution of money and material was provided to the Wingham Campdraft Association. Jandra also donated materials to the Manning Valley BMX Club.

9.3 Complaints

A review of the Holcim Safety, Health & Environment (SHE) reporting database (INX) did not identify any complaints from external stakeholders during the 2018 reporting period. This was also the case from 2017 – 2015.

A link to all publicly listed information including complaints registers and contacts for locals in the community is attached below showing compliance with this condition.

<http://www.holcim.com.au/about-us/community-link/jandra-quarry-possum-brush-taree-nsw.html>

10 INDEPENDENT AUDIT

The site undertook an Independent Environmental Audit (IEA) in 2016 in accordance with the timeframes of the Development Consent. All actions raised in IEA have been undertaken in accordance with the recommendations made by GHD Consultants. All actions were closed out in 2016..

The next Independent Environmental Audit for the site is due in May 2019.

11 INCIDENTS AND NON-COMPLIANCE

Table 33 summarises the incidents and non - compliances at Jandra in 2018.

Table 33: Summary of Incidents and Non Compliances

Date	Incident/Non Compliance	Action/Comment
9 August 2018	Penalty Infringement Notice – Water Quality Reporting in Annual Return	<p>Holcim was administered a Penalty Notice and Official Caution on 9 August 2018. The letter stated:</p> <p><i>On 30 June 2017, Holcim submitted an Annual Return (AR) for the reporting period 1 May 2016 to 30 April 2017 for Environment Protection Licence (EPL) 2796.</i></p> <p><i>On 24 May 2018 the EPA issued Holcim with a "show cause" letter for exceedance of the TSS limit on the EPL and (or providing false and/or misleading information in the AR (i.e. s66 POEO Act).</i></p> <p><i>On 18 June 2018, Holcim provided a response to the EPA's "show cause" letter. On 28 June 2018, Holcim provided a revised AR. The response to show cause letter in relation to the apparent TSS exceedance states that Holcim accidentally included water sampling values in the AR that are undertaken on a 'due diligence' basis in preparation for planned discharges but discharges did not occur. Holcim stated "This error occurred due to a misinterpretation of what was required to be reported in the tables.</i></p> <p><i>That is, the results that were written in the 2016/17 Annual Return included all the water quality samples undertaken rather than being limited to results from discharge events." This erroneous action suggests to the EPA a failure of Holcim's internal systems.</i></p> <p><i>Holcim was administered a Penalty Notice and Official Caution on 9 August 2018. The letter stated:</i></p> <p><i>The EPA has reasonable grounds to believe that Holcim committed an offence under section 64 of the POEO Act, by failing to monitor TSS and turbidity at the frequency required by Condition M2.3 of Environment Protection Licence 2796 on 21 April 2017 at the Holcim Jandra Quarry ("the alleged offence"). Further, the EPA believes that there is sufficient evidence to prove the alleged offence.</i></p> <p><i>Holcim needs to put in place procedures to prevent non-compliances of this nature occurring into the future.</i></p>

Date	Incident/Non Compliance	Action/Comment
9 August 2018	Penalty Infringement Notice Failure to conduct PM ₁₀ particulate monitoring - non-compliance with condition M2 of Environment Protection Licence 2796	<p>Holcim was administered a Penalty Notice and Official Caution on 9 August 2018. The letter stated:</p> <p><i>On 2 July 2018, Holcim (Australia) Pty Ltd submitted an Annual Return (AR) for the reporting period 1 May 2017 to 30 April 2018. Condition M2 requires monitoring of PM₁₀ at Point 11 (Receiver R1) every 6 days. The AR reported a non-compliance with condition M2.2 for failing to monitor PM₁₀ at Point 11 on 14 separate occasions between 1 May 2017 and 9 November 2017. The AR noted the reason for the non-compliance was "missed the 6-day deadline for paper changeout." This represents a failure to do the required monitoring for 23 % of the time, caused by poor internal systems.</i></p> <p><i>In the 2016-2017 AR period Holcim (Australia) Pty Ltd also failed to monitor PM₁₀ as per condition M2 over a 6.5-month period. On 24 May 2018 the EPA issued Holcim (Australia) Pty Ltd an Official Caution for this non-compliance.</i></p> <p>An Environmental monitoring Calendar by Holcim has been established with responsibilities and pre warning alerts active.</p>
16 September 2018 – and 22 September 2018	Non - compliance as no PM ₁₀ monitoring for two events.	Holcim liaised with the monitoring contractor to ensure sampling and analysis is completed in accordance with Development Consent requirements.
During reporting period	No biodiversity or rehabilitation monitoring.	The monitoring requirements within the Biodiversity and Rehabilitation Management Plan were not completed. To be completed in 2019.

12 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

Holcim staff will undertake the following works and improvement measures and projects in 2019 to ensure compliance with the consent and to ensure that effective environmental management controls are in place and operating in accordance with the requirements of the Consent.

Table 34: Proposed Improvement Measures - 2019

Improvement Measure	Activities
Independent Environmental Audit	There is a requirement to commission an Independent Environmental Audit, with this due in May 2019.
Progressive Rehabilitation	The site will continue to progressively rehabilitate available areas.
Desilting of the sites main process pond/sediment Basin	The site will continue to manage sediment control structures through inspections and desilting.
Biodiversity	Weed spraying will continue at the site during the next reporting period. Quarterly inspections of the nest boxes by Holcim staff will continue to occur during next reporting period. Ecological pre-clearance surveys will be required in the next reporting period for vegetation clearing required to extend the eastern end of the approved extraction boundary. A feral animal assessment will be undertaken in the next reporting period to determine if there is a need for managing feral animals in the rehabilitation area and Biodiversity Offset Area. A feral animal control program will be completed if required. To date, Holcim employees have not reported any sightings of feral animals within these areas.

13 REFERENCES

Department of Planning and Environment (2015) Jandra Quarry Development Consent (DA 213-10-99) – Notice of Modification

Holcim (2017) Jandra Quarry Annual Review 2016;

Holcim (2015) Environmental Management Plans

Holcim (2014) Jandra Quarry Environmental Assessment – Intensification in Production

Office of Environment and Heritage – Environment Protection Licence 2796

14 APPENDICES

APPENDIX 1

TRANSPORT SUMMARY



JANDRA QUARRY TRANSPORT 2018

2018	January		February		March		April		May		June		July		August		September		October		November		December	
	Truck Movements	Volume (T)	Truck Movements	Volume (T)	Truck Movements	Volume (T)	Truck Movements	Volume (T)	Truck Movements	Volume (T)	Truck Movements	Volume (T)	Truck Movements	Volume (T)	Truck Movements	Volume (T)	Truck Movements	Volume (T)	Truck Movements	Volume (T)	Truck Movements	Volume (T)	Truck Movements	Volume (T)
Day 1	0	0	9	185.92	62	1806.98	0	0	29	740.87	15	410.46	0	0	32	881.28	0	0	0	0	57	1613.22	0	0
Day 2	0	0	37	1000.99	44	1280.3	0	0	25	576.34	0	0	17	502.8	53	1463.7	0	0	30	776.02	51	1452.26	0	0
Day 3	0	0	0	0	0	0	63	1875.4	21	635.72	0	0	23	691.22	41	1229.14	22	688.38	29	706.66	0	0	42	1335.44
Day 4	0	0	0	0	0	0	56	1506.42	40	1180.32	18	524.84	13	402.04	0	0	8	143.6	30	822.66	0	0	77	2196.88
Day 5	0	0	23	724.5	19	536.5	58	1617.32	17	558.04	17	472.46	11	304.76	0	0	24	632.62	18	400.9	42	1234.16	100	2435.92
Day 6	0	0	32	934.88	17	365.8	60	1830.62	0	0	2	65.88	51	1411.11	40	1177.54	26	706.5	0	0	75	2170.52	54	1303.94
Day 7	0	0	29	824.92	12	270.86	12	394.62	38	1042.94	15	466.4	0	0	29	834.46	17	544.24	0	0	111	2049.16	55	1331.56
Day 8	19	505.3	33	952.2	27	682.38	0	0	31	902.94	22	660.14	0	0	32	995.74	0	0	19	394.98	81	1481.24	0	0
Day 9	37	1026.68	39	1206.34	59	1834.74	36	924.79	39	1038.9	0	0	55	1442.83	29	925.9	0	0	17	467.08	76	1332.72	0	0
Day 10	43	1093.44	0	0	0	0	65	1868.38	22	624.54	0	0	36	1077.94	35	1018.36	47	1313.39	37	1101.06	0	0	101	2530.14
Day 11	29	939.32	0	0	0	0	51	1465	16	442.03	0	0	36	965.47	0	0	50	1299.18	13	422	0	0	102	2700.28
Day 12	31	895.6	28	898.12	17	493.02	64	1816.64	0	0	14	348.96	43	772.9	0	0	59	1716.2	15	403.9	40	1009.88	70	2125.28
Day 13	2	76	61	1839.3	73	2061.42	38	1020.44	0	0	18	534.02	56	878.94	21	673.42	44	1017.81	0	0	21	589.16	41	1268.58
Day 14	0	0	62	1884.36	73	1976.54	0	0	25	680.64	40	1266.78	0	0	50	1026.06	52	864.36	0	0	79	1662.34	53	1688.92
Day 15	26	522.32	62	1692.14	60	1759.68	0	0	73	1941.44	40	1209.22	0	0	29	936.88	0	0	14	447.92	90	1957.9	0	0
Day 16	26	781.78	38	1058.94	35	961.82	43	1133.52	30	757.76	0	0	56	1441.52	33	941.84	0	0	0	299.88	89	1836.38	0	0
Day 17	56	1614.51	0	0	0	0	41	966.44	75	2158.58	0	0	45	1108.42	39	891.54	37	991.23	21	397.18	0	0	45	1394.25
Day 18	49	1407.66	0	0	0	0	35	1017.86	31	780.56	26	774.9	27	738.82	3	99.68	31	964.46	13	330.46	0	0	49	1522.44
Day 19	39	1136.94	45	1289.94	62	1834.48	29	844.92	0	0	12	340.68	20	431.82	0	0	58	965.38	38	646.56	40	1257.22	53	1690.7
Day 20	0	0	27	675.2	67	1894.44	26	762.18	0	0	11	316.46	22	546.76	12	333.2	81	1607.32	0	0	45	1161.5	35	1104.66
Day 21	0	0	23	548.54	17	544.6	0	0	17	513.84	12	360.5	0	0	46	1461.94	54	1541.74	0	0	43	1160.1	12	288
Day 22	12	403.68	35	1003.28	4	86.45	0	0	75	2215.02	19	583.07	0	0	39	1193.44	0	0	33	935.84	28	787.2	0	0
Day 23	36	1050.42	47	1352.36	0	0	21	594.06	61	1744.22	11	361.34	27	698.2	19	524.22	0	0	33	871.24	0	852.68	0	0
Day 24	23	747.44	0	0	0	0	12	310.92	65	1847.98	0	0	18	592.06	39	1255.5	39	1140.55	34	878.64	2	61.28	0	0
Day 25	20	658.94	0	0	0	0	0	0	27	842.08	32	934.68	13	392.84	0	0	51	1481.22	15	419.2	15	419.2	0	0
Day 26	0	0	12	390.82	21	490.36	14	439.2	0	0	53	1511.98	19	503.31	0	0	63	1431.61	38	1047.06	41	1029.12	0	0
Day 27	0	0	26	746.88	73	2089.48	23	776.8	0	0	56	1399.34	21	527.13	22	681.2	45	1314.73	12	379.06	85	2365.69	0	0
Day 28	0	0	34	873.38	90	2479.68	0	0	65	2002.12	50	1391.2	0	0	42	1030.14	44	1158.66	0	0	36	995.56	0	0
Day 29	25	761.72			53	1482.38	0	0	63	1971.22	48	1263.32	0	0	39	1170.1	0	0	58	1810.04	45	1410.2	0	0
Day 30	31	986.27			0	0	24	475.54	42	1230.17	0	0	18	464.38	11	277.84	0	0	39	1064.9	53	1573.1	0	0
Day 31	19	565.06			0	0			35	1085.82			32	769.24	22	553.9			66	1729.16			0	0
TOTAL	523	15173.08	702	20083.01	885	24931.91	771	21641.07	962	27514.09	531	15196.63	659	16664.51	757	21577.02	852	21523.18	622	16752.4	1230	31042.59	889	24916.99
TOTAL VOLUME	257016.48 (Q1 = 60188.00 Q2 = 64351.79 Q3 = 59764.71 Q4 = 72711.98)																							
TOTAL TRUCK MOVEMENTS	9383																							

APPENDIX 2
QUARTERLY NOISE MONITORING

Noise Monitoring Assessment Quarterly

Jandra Quarry, Possum Brush, NSW
March 2018.

Prepared for: VGT Pty Ltd
(on behalf of Holcim (Australia) Pty Ltd)
April 2018
MAC160381RP6



Document Information

Quarterly Noise Monitoring Assessment

Jandra Quarry, Possum Brush, NSW

March 2018

Prepared for: VGT Pty Limited (on behalf of Holcim Pty Ltd)

Prepared by: Muller Acoustic Consulting Pty Ltd

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Document ID	Status	Date	Prepared By	Signed	Reviewed By	Signed
MAC160381RP6	Final	9 April 2018	Robin Heaton	<i>Robin Heaton</i>	Oliver Muller	<i>Oliver Muller</i>

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APPENDIX A - GLOSSARY OF TERMS

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by VGT Pty Limited (VGT) on behalf of Holcim Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for the March 2018 quarter for Jandra Quarry ('the quarry'), Possum Brush, NSW.

The monitoring has been conducted in accordance with the Jandra Noise Management Plan and in general accordance with Conditions L4.2 to L4.8 of the EPL #2796 (EPL); at three representative monitoring locations. This assessment has been undertaken during Quarter 1, March 2018 and forms part of the annual noise monitoring program to address conditions of the EPL.

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

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Environment Protection Licence EPL #2796; and
- Standards Australia AS 1055.1:1997 - Acoustics - Description and measurement of environmental noise - General Procedures.

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, Section 1 of the Jandra Quarry Conditions of Consent, first approved on 30 March 2000 and modified on 13 March 2015, outlines the applicable noise criteria for residential receivers surrounding the quarry site. Schedule 3 presents noise criteria which are applicable for two different operational activities undertaken onsite.

The first set of criteria (presented in Table 2 of the consent) are applicable when the site undertakes quarrying operations during the hours of 6am to 10pm.

The second set of criteria (presented in Table 3 of the consent) are applicable to 24 hour operations when quarrying operations and asphalt production occur simultaneously.

Furthermore, Section 5 of the Jandra Noise and Blasting Management Plan (NBMP) outlines that noise criteria do not apply at R1, R3, R8 - R10. Section 5 of the NBMP states:

- *'Holcim has executed a negotiated agreement with the property owner of R1 which excludes this receptor from the approved noise criteria';*
- *'R3 is not included in the approved noise criteria as this receiver represented road noise and the EA concluded that road noise impacts as a consequence of the development were below guideline thresholds and didn't warrant further assessment'; and*
- *'Receivers R8, R9 & R10 are Holcim owned residences and the approved criteria only apply to privately owned land'.*

Table 1 presents the criteria for each of the receivers R1 – R10 as outlined in the Conditions of Consent for both quarry operation and combined quarry and asphalt production operations.

Table 1 Noise Criteria				
Location	Quarry Operations		Quarry Operations and Asphalt Plant Production	
	6am – 10pm	6am – 10pm	10pm – 6am	10pm – 6am
	dBA, LAeq(15min)	dBA, LAeq(15min)	dBA, LAeq(15min)	LA1(1min)
<i>R1^{1,2}</i>	46	48	46	51
R2	36	40	35	48
<i>R3^{1,2}</i>	N/A	N/A	N/A	N/A
R4	36	40	39	51
R5	40	41	39	51
R6	36	40	35	48
R7	35	36	35	48
<i>R8^{1,2}</i>	N/A	N/A	N/A	N/A
<i>R9^{1,2}</i>	N/A	N/A	N/A	N/A
<i>R10^{1,2}</i>	N/A	N/A	N/A	N/A

Note 1: Noise criteria are not applicable to these receivers as per Section 5 of the NBMP.

Note 2: Either quarry owned or excluded from the assessment as per Section 5 of the NBMP.

3 Methodology

3.1 Locality

The quarry is located in Possum Brush, NSW approximately 16km south of Taree, NSW. Receivers in the locality surrounding the quarry are primarily rural/residential. The Pacific Highway is situated to the west of the site, with highway traffic a dominant noise source at all assessed receivers. To the east, the quarry is bounded by rural properties with noise from Tuncurry Road dominating the acoustic environment. 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

Three monitoring locations have been selected as part of the NMA and in accordance with the NBMP. M1 is located adjacent to R1 to the north of the quarry and is used as a reference location for the northern catchment. It is noted that this assessment location has a negotiated agreement with Holcim, hence noise criteria are not mandatory. M2 is representative of receivers R2, R6 and R7, to the east of the quarry and M3 is situated to the west of the quarry and is representative of receivers R4 and R5.

3.3 Assessment Methodology

The attended noise surveys were conducted in general accordance with the procedures described in Australian Standard AS 1055-1997, "Acoustics - Description and Measurement of Environmental Noise" and the EPL. The measurements were carried out using Svantek Type 1, 971 noise analyser on Wednesday 28 March 2018 and Thursday 29 March 2018. 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 ± 0.5 dBA.

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 of the monitoring locations during the day monitoring period. Although the site was not undertaking asphaltting, evening measurements were undertaken for completeness. An additional round of noise measurements was completed during the night/morning shoulder period (ie 6am to 7am).

FIGURE 1

LOCALITY PLAN

REF: MAC160381



KEY	
	RECEIVER / MONITORING LOCATION
	PROJECT SITE



*Imagery Source : nearmap

4 Results

4.1 Assessment Results - Location M1

The monitored noise level contributions and observed meteorological conditions for each assessment period at location M1 for Wednesday 28 March 2018 and Thursday 29 March 2018 are presented in **Table 2**.

Table 2 Operator-Attended Noise Survey Results – Location M1						
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
28/3/2018	15:41 (Day)	56	43	40	Dir: NE Wind Speed: 1.2m/s Rain: Nil	Leaves Rustling 38 - 47
						Birds 40 - 56
						Highway traffic 44 - 52
						Aircraft 40 - 43
		Jandra Quarry L _{Aeq} (15min) Contribution				Quarry Inaudible
28/3/2018	19:05 (Evening)	59	50	43	Dir: NW Wind Speed: 0.1m/s Rain: Nil	Insects 45 - 59
						Highway traffic 45 - 50
						Birds 47 - 50
						Frog 42 - 45
		Jandra Quarry L _{Aeq} (15min) Contribution				Quarry Inaudible
29/3/2018	5:55 (Morning shoulder)	53	46	41	Dir: SW Wind Speed: 0.1m/s Rain: Nil	Highway traffic 44 - 53
						Insects 38 - 41
		Jandra Quarry L _{Aeq} (15min) Contribution				Quarry Inaudible

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 M2

The monitored noise level contributions and observed meteorological conditions for each assessment period at location M2 for Wednesday 28 March 2018 and Thursday 29 March 2018 are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location M2						
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
28/3/2018	16:55 (Day)	68	44	38	Dir: NE Wind Speed: 1.8m/s Rain: Nil	Resident Noise 39 - 68
						Birds 36 - 46
						Distant traffic 38 - 51
Jandra Quarry L _{Aeq} (15min) Contribution						Pool Pump 34 - 36
Jandra Quarry L _{Aeq} (15min) Contribution						Quarry Inaudible
28/3/2018	18:34 (Evening)	69	42	36	Dir: NE Wind Speed: 0.1m/s Rain: Nil	Insects 36 - 45
						Dog Barking 50 - 69
						Distant traffic 35 - 48
Jandra Quarry L _{Aeq} (15min) Contribution						Poll Pump 35 - 36
Jandra Quarry L _{Aeq} (15min) Contribution						Quarry Inaudible
29/3/2018	6:45 (Morning shoulder)	64	43	38	Dir: SW Wind Speed: 0.1m/s Rain: Nil	Distant traffic 33 - 46
						Birds 39 - 64
						Pool Pump 34 - 36
Jandra Quarry L _{Aeq} (15min) Contribution						Quarry Inaudible

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 M3

The monitored noise level contributions and observed meteorological conditions for each assessment period at location M3 for Wednesday 28 March 2018 and Thursday 29 March 2018 are presented in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location M3						
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
28/3/2018	16:03 (Day)	65	56	51	Dir: NE Wind Speed: 1.4m/s Rain: Nil	Aircraft 49 - 50
						Wind in trees 50 - 51
						Birds 41 - 44
						Traffic 50 - 65
Jandra Quarry L _{Aeq} (15min) Contribution						Quarry Inaudible
28/3/2018	19:33 (Evening)	74	56	48	Dir: NW Wind Speed: 0.1m/s Rain: Nil	Insects 48 - 52
						Resident Noise 60 - 74
						Traffic 55 - 59
						Jandra Quarry L _{Aeq} (15min) Contribution
29/3/2018	6:16 (Morning shoulder)	71	59	51	Dir: SW Wind Speed: 0.2m/s Rain: Nil	Traffic 53 - 71
						Birds 54 - 64
						Insects 45 - 50
						Jandra Quarry L _{Aeq} (15min) Contribution

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 residential receiver R2, R4, R5, R6 and R7 are presented in **Table 5** to **Table 7** for day, evening and morning shoulder/night assessment periods.

Table 5 Daytime Noise Compliance Assessment

Receiver No.	Quarry Noise	Quarrying Noise	Compliant	Quarrying & Asphalt	Compliant
	Contribution	Criteria		Production Criteria	
	dBA, LAeq(15min)	dBA, LAeq(15min)		dBA, LAeq(15min)	
R2	Nil	36	✓	40	✓
R4	Nil	36	✓	40	✓
R5	Nil	40	✓	41	✓
R6	Nil	36	✓	40	✓
R7	Nil	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.

Table 6 Evening Noise Compliance Assessment

Receiver No.	Quarry Noise	Quarrying Noise	Compliant	Quarrying & Asphalt	Compliant
	Contribution	Criteria		Production Criteria	
	dBA, LAeq(15min)	dBA, LAeq(15min)		dBA, LAeq(15min)	
R2	Nil	36	✓	40	✓
R4	Nil	36	✓	40	✓
R5	Nil	40	✓	41	✓
R6	Nil	36	✓	40	✓
R7	Nil	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.

Table 7 Morning Shoulder/Night Noise Compliance Assessment

Receiver No.	Quarry Noise	Quarrying & Asphalt	Compliant	Quarry Noise	Quarrying & Asphalt	Compliant
	Contribution	Production Criteria		Contribution	Production Criteria	
	dBA, LAeq(15min)	dBA, LAeq(15min)		dBA, LA1(1min)	dBA, LA1(1min)	
R2	Nil	35	✓	Nil	48	✓
R4	Nil	39	✓	Nil	51	✓
R5	Nil	39	✓	Nil	51	✓
R6	Nil	35	✓	Nil	48	✓
R7	Nil	35	✓	Nil	48	✓

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 M1

It is noted that M1 is a reference location only, and criteria is not applicable under the EPL for this receiver. Monitoring on Wednesday 28 March 2018 and Thursday 29 March 2018 identified that quarry noise was inaudible on all three occasions which demonstrates compliance with the EPL at R1 and receivers situated to the north of this location. It is noted that the quarry was not operational during the evening period although background measurements were undertaken for completeness. Extraneous sources audible during the three attended surveys included insects, birds, highway traffic and wind in trees.

6.2 Discussion of Results - Location M2

Monitoring results at M2 during the March 2018 quarter were inaudible during all three attended measurements, therefore satisfying the relevant daytime noise limits. The quarry was not operational during the evening period, although ambient measurements were undertaken to satisfy the EPL. Extraneous sources include resident noise, pool pump hum, insects, wind in trees, birds and distant traffic.

6.3 Discussion of Results - Location M3

Quarry noise was inaudible on all three occasions during the March 2018 survey period satisfying the morning, daytime and evening criteria. The quarry was not operational during the evening period although monitoring was completed as per the requirements of the EPL. Non-quarry noise sources included highway traffic, residential noise, insects and birds.

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7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) for VGT Pty Ltd on behalf of Holcim Pty Ltd at the Jandra Quarry, Possum Brush, NSW. The assessment was completed to assess the quarry's compliance with the relevant criteria outlined in their EPL (EPL#2796) for several residential receivers surrounding the quarry.

Attended noise monitoring was undertaken on Wednesday 28 March 2018 and Thursday 29 March 2018 at representative monitoring locations with quarry noise contributions compared against the relevant criteria. The assessment has identified that noise emissions generated by Jandra Quarry comply with relevant statutory noise criteria specified in the Conditions of Consent at all assessed locations.

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Appendix A - Glossary of Terms

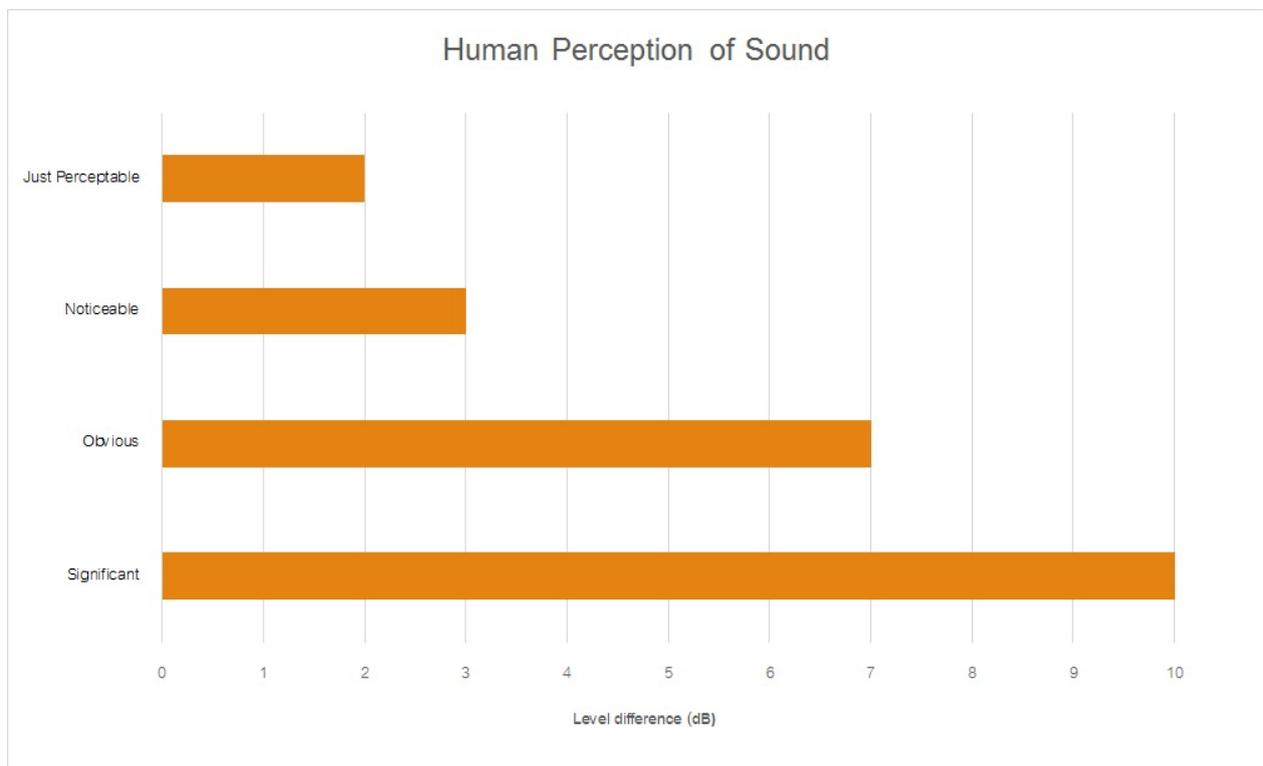
Table A1 provides a number of technical terms have been used in this report.

Table 1A 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 INP 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.
LAm _{ax}	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 : $= 10 \cdot \log_{10} (W/W_0)$ Where : W is the sound power in watts and W ₀ 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



Noise Monitoring Assessment Quarterly

Jandra Quarry, Possum Brush, NSW
June 2018.

Document Information

Quarterly Noise Monitoring Assessment

Jandra Quarry, Possum Brush, NSW

June 2018

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APPENDIX A - GLOSSARY OF TERMS

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by VGT Laboratories Pty Limited (VGT) on behalf of Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for the June 2018 quarter for Jandra Quarry ('the quarry'), Possum Brush, NSW.

The monitoring has been conducted in accordance with the Jandra Noise Management Plan and in general accordance with Conditions L4.2 to L4.8 of the EPL #2796 (EPL); at three representative monitoring locations. This assessment has been undertaken during Quarter 2, June 2018 and forms part of the annual noise monitoring program to address conditions of the EPL.

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

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Environment Protection Licence EPL #2796; and
- Standards Australia AS 1055.1:1997 - Acoustics - Description and measurement of environmental noise - General Procedures.

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, Section 1 of the Jandra Quarry Conditions of Consent, first approved on 30 March 2000 and modified on 13 March 2015, outlines the applicable noise criteria for residential receivers surrounding the quarry site. Schedule 3 presents noise criteria which are applicable for two different operational activities undertaken onsite.

The first set of criteria (presented in Table 2 of the consent) are applicable when the site undertakes quarrying operations during the hours of 6am to 10pm.

The second set of criteria (presented in Table 3 of the consent) are applicable to 24 hour operations when quarrying operations and asphalt production occur simultaneously.

Furthermore, Section 5 of the Jandra Noise and Blasting Management Plan (NBMP) outlines that noise criteria do not apply at R1, R3, R8 - R10. Section 5 of the NBMP states:

- *'Holcim has executed a negotiated agreement with the property owner of R1 which excludes this receptor from the approved noise criteria';*
- *'R3 is not included in the approved noise criteria as this receiver represented road noise and the EA concluded that road noise impacts as a consequence of the development were below guideline thresholds and didn't warrant further assessment'; and*
- *'Receivers R8, R9 & R10 are Holcim owned residences and the approved criteria only apply to privately owned land'.*

Table 1 presents the criteria for each of the receivers R1 – R10 as outlined in the Conditions of Consent for both quarry operation and combined quarry and asphalt production operations.

Table 1 Noise Criteria				
Location	Quarry Operations		Quarry Operations and Asphalt Plant Production	
	6am – 10pm	6am – 10pm	10pm – 6am	10pm – 6am
	dBA, LAeq(15-min)	dBA, LAeq(15-min)	dBA, LAeq(15-min)	LA1(1-min)
<i>R1^{1,2}</i>	46	48	46	51
R2	36	40	35	48
<i>R3^{1,2}</i>	N/A	N/A	N/A	N/A
R4	36	40	39	51
R5	40	41	39	51
R6	36	40	35	48
R7	35	36	35	48
<i>R8^{1,2}</i>	N/A	N/A	N/A	N/A
<i>R9^{1,2}</i>	N/A	N/A	N/A	N/A
<i>R10^{1,2}</i>	N/A	N/A	N/A	N/A

Note 1: Noise criteria are not applicable to these receivers as per Section 5 of the NBMP.

Note 2: Either quarry owned or excluded from the assessment as per Section 5 of the NBMP.

3 Methodology

3.1 Locality

The quarry is located in Possum Brush, NSW approximately 16km south of Taree, NSW. Receivers in the locality surrounding the quarry are primarily rural/residential. The Pacific Highway is situated to the west of the site, with highway traffic a dominant noise source at all assessed receivers. To the east, the quarry is bounded by rural properties with noise from Tuncurry Road dominating the acoustic environment. 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

Three monitoring locations have been selected as part of the NMA and in accordance with the NBMP. M1 is located adjacent to R1 to the north of the quarry and is used as a reference location for the northern catchment. It is noted that this assessment location has a negotiated agreement with Holcim, hence noise criteria are not mandatory. M2 is representative of receivers R2, R6 and R7, to the east of the quarry and M3 is situated to the west of the quarry and is representative of receivers R4 and R5.

3.3 Assessment Methodology

The attended noise surveys were conducted in general accordance with the procedures described in Australian Standard AS 1055-1997, "Acoustics - Description and Measurement of Environmental Noise" and the EPL. The measurements were carried out using Svantek Type 1, 971 noise analyser on Tuesday 26 June 2018 and Wednesday 27 June 2018. 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 ± 0.5 dBA.

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 of the monitoring locations during the day monitoring period. Although the site was not undertaking asphaltting, evening measurements were undertaken for completeness. An additional round of noise measurements was completed during the night/morning shoulder period (ie 6am to 7am).

FIGURE 1

LOCALITY PLAN

REF: MAC160381



KEY

-  RECEIVER / MONITORING LOCATION
-  PROJECT SITE



*Imagery Source : nearmap

4 Results

4.1 Assessment Results - Location M1

The monitored noise level contributions and observed meteorological conditions for each assessment period at location M1 for Tuesday 26 June 2018 and Wednesday 27 June 2018 are presented in **Table 2**.

Table 2 Operator-Attended Noise Survey Results – Location M1

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
26/06/2018	16:32 (Day)	61	43	38	Dir: SE	Birds 38 – 61
					Wind Speed: 0.1m/s	Highway traffic 38 – 56
					Rain: Nil	Aircraft 38 – 47
Jandra Quarry L _{Aeq} (15-min) Contribution						Quarry Inaudible
26/06/2018	18:31 (Evening)	62	51	44	Dir: SE	Insects 44 – 50
					Wind Speed: 0.1m/s	Highway traffic 36 – 62
					Rain: Nil	
Jandra Quarry L _{Aeq} (15-min) Contribution						Quarry Inaudible
27/06/2018	06:59 (Morning shoulder)	75	47	44	Dir: W	Highway traffic 48 – 52
					Wind Speed: 0.1m/s	Birds 44 – 75
					Rain: Nil	
Jandra Quarry L _{Aeq} (15-min) Contribution						Quarry Inaudible

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 M2

The monitored noise level contributions and observed meteorological conditions for each assessment period at location M2 for Tuesday 26 June 2018 and Wednesday 27 June 2018 are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location M2

Date	Time (hrs)	Descriptor (dBA re 20 μ Pa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
26/06/2018	17:05 (Day)	63	38	34	Dir: SE	Birds 36 – 63
					Wind Speed: 0.1m/s	Traffic 32 – 40
					Rain: Nil	Insects 30 – 34
Jandra Quarry LAeq(15-min) Contribution						Quarry Inaudible
26/06/2018	18:00 (Evening)	48	39	35	Dir: SE	Insects 30 – 35
					Wind Speed: 0.1m/s	Wildlife Noise 44 – 48
					Rain: Nil	Distant traffic 34 – 40
Jandra Quarry LAeq(15-min) Contribution						Quarry Inaudible
27/06/2018	06:30 (Morning shoulder)	69	46	39	Dir: W	Distant traffic 39 – 44
					Wind Speed: 0.5m/s	Birds 44 – 69
					Rain: Nil	
Jandra Quarry LAeq(15-min) Contribution						Quarry Inaudible

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 M3

The monitored noise level contributions and observed meteorological conditions for each assessment period at location M3 for Tuesday 26 June 2018 and Wednesday 27 June 2018 are presented in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location M3

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
26/06/2018	16:09	76	62	54	Dir: SE	Birds 54 – 60
	(Day)				Wind Speed: 0.2m/s	Traffic 54 – 76
					Rain: Nil	
Jandra Quarry LAeq(15-min) Contribution						Quarry Inaudible
26/06/2018	18:54	93	68	47	Dir: SE	Resident Noise 68 – 93
	(Evening)				Wind Speed: 0.1m/s	Traffic 45 – 70
					Rain: Nil	
Jandra Quarry LAeq(15-min) Contribution						Quarry Inaudible
27/06/2018	06:00	76	58	46	Dir: W	
	(Morning shoulder)				Wind Speed: 0.2m/s	Traffic 38 – 76
					Rain: Nil	
Jandra Quarry LAeq(15-min) Contribution						Quarry Inaudible

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 residential receiver R2, R4, R5, R6 and R7 are presented in **Table 5** to **Table 7** for day, evening and morning shoulder/night assessment periods.

Table 5 Daytime Noise Compliance Assessment

Receiver No.	Quarry Noise	Quarrying Noise	Compliant	Quarrying & Asphalt	Compliant
	Contribution	Criteria		Production Criteria	
	dBA, LAeq(15-min)	dBA, LAeq(15-min)		dBA, LAeq(15-min)	
R2	Nil	36	✓	40	✓
R4	Nil	36	✓	40	✓
R5	Nil	40	✓	41	✓
R6	Nil	36	✓	40	✓
R7	Nil	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.

Table 6 Evening Noise Compliance Assessment

Receiver No.	Quarry Noise	Quarrying Noise	Compliant	Quarrying & Asphalt	Compliant
	Contribution	Criteria		Production Criteria	
	dBA, LAeq(15-min)	dBA, LAeq(15-min)		dBA, LAeq(15-min)	
R2	Nil	36	✓	40	✓
R4	Nil	36	✓	40	✓
R5	Nil	40	✓	41	✓
R6	Nil	36	✓	40	✓
R7	Nil	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.

Table 7 Morning Shoulder/Night Noise Compliance Assessment

Receiver No.	Quarry Noise	Quarrying & Asphalt	Compliant	Quarry Noise	Quarrying & Asphalt	Compliant
	Contribution	Production Criteria		Contribution	Production Criteria	
	dBA, LAeq(15-min)	dBA, LAeq(15-min)		dBA, LA1(1-min)	dBA, LA1(1-min)	
R2	Nil	35	✓	Nil	48	✓
R4	Nil	39	✓	Nil	51	✓
R5	Nil	39	✓	Nil	51	✓
R6	Nil	35	✓	Nil	48	✓
R7	Nil	35	✓	Nil	48	✓

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 M1

It is noted that M1 is a reference location only, and criteria is not applicable under the EPL for this receiver. Monitoring during the June 2018 quarter identified that quarry noise was inaudible on all three occasions which demonstrates compliance with the EPL at R1 and receivers situated to the north of this location. It is noted that the quarry was not operational during the evening period however background measurements were undertaken for completeness. Extraneous sources audible during the three attended surveys included insects, birds, highway traffic and wind in trees.

6.2 Discussion of Results - Location M2

Monitoring results at M2 on Tuesday 26 June 2018 and Wednesday 27 June 2018 showed that Jandra quarry was inaudible during all three attended measurements, therefore satisfying the relevant daytime and morning noise limits. The quarry was not operational during the evening period, however ambient measurements were undertaken to satisfy the EPL. Extraneous sources include, insects, birds and distant traffic.

6.3 Discussion of Results - Location M3

Quarry noise was inaudible on all three occasions during monitoring conducted during the June 2018 quarter survey period conducted on Tuesday 26 June 2018 and Wednesday 27 June 2018, satisfying the morning shoulder, daytime and evening criteria. The quarry was not operational during the evening period however monitoring was completed as per the requirements of the EPL. Non-quarry noise sources included highway traffic, residential noise, insects and birds.

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7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) for VGT Laboratories Pty Ltd on behalf of Holcim (Australia) Pty Ltd at the Jandra Quarry, Possum Brush, NSW. The assessment was completed to assess the quarry's compliance with the relevant criteria outlined in their EPL (EPL#2796) for several residential receivers surrounding the quarry.

Attended noise monitoring was undertaken on Tuesday 26 June 2018 and Wednesday 27 June 2018 at representative monitoring locations with quarry noise contributions compared against the relevant criteria. The assessment has identified that noise emissions generated by Jandra Quarry comply with relevant noise criteria specified in the Conditions of Consent at all assessed locations.

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Appendix A - Glossary of Terms

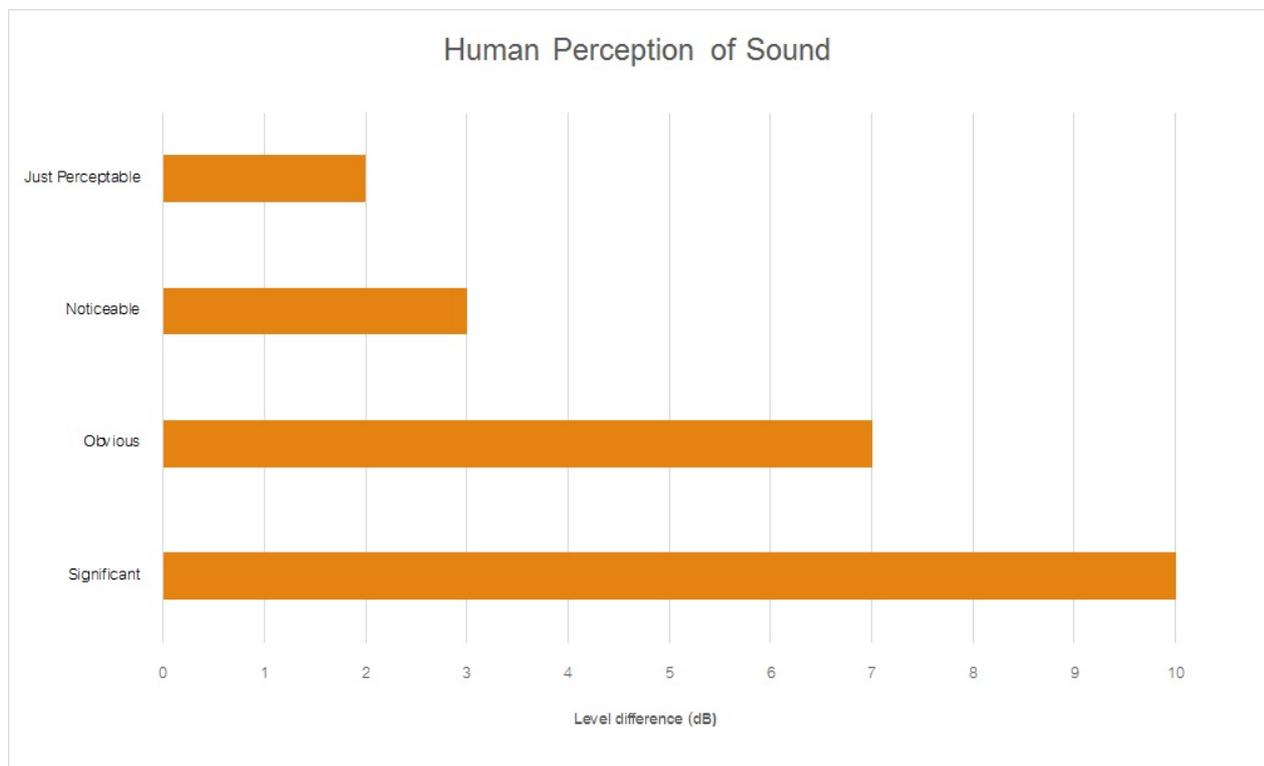
Table A1 provides a number of technical terms have been used in this report.

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.
LAm _{ax}	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 : $= 10 \cdot \log_{10} (W/W_0)$ Where : W is the sound power in watts and W ₀ 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

Jandra Quarry, Possum Brush, NSW
Quarter 3 Ending September 2018.

Document Information

Noise Monitoring Assessment

Jandra Quarry, Possum Brush, NSW

Quarter 3 Ending September 2018

Prepared for: Holcim (Australia) Pty Ltd

Prepared by: Muller Acoustic Consulting Pty Ltd

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MAC180611-04RP1	Final	17 September 2018	Robin Heaton	<i>Robin Heaton</i>	Rod Linnett	<i>Rod Linnett</i>

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APPENDIX A - GLOSSARY OF TERMS

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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 the quarterly period ending September 2018 for Jandra Quarry (the 'quarry'), Possum Brush, NSW.

The monitoring has been conducted in accordance with the Jandra Noise and Blast Management Plan and in general accordance with Conditions L4.2 to L4.8 of the EPL2796 (EPL); at three representative monitoring locations. This assessment has been undertaken during Quarter 3, September 2018 and forms part of the annual noise monitoring program to address conditions of the EPL.

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

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Environment Protection Licence (EPL), 2796;
- Jandra Quarry Conditions of Consent (CoC), 2015;
- Jandra Quarry Noise and Blast Management Plan (NBMP), 2015; and
- Australian Standard AS 1055.1:1997 - Acoustics - Description and measurement of environmental noise - General Procedures.

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, Section 1 of the Jandra Quarry Conditions of Consent, first approved on 30 March 2000 and modified on 13 March 2015, outlines the applicable noise criteria for residential receivers surrounding the quarry site. Schedule 3 presents noise criteria which are applicable for two different operational activities undertaken onsite, being when the site undertakes quarrying operations during the hours of 6am to 10pm and for 24 hour operations when quarrying operations and asphalt production occur simultaneously.

Furthermore, Section 5 of the Jandra Noise and Blast Management Plan (NBMP) outlines that noise criteria do not apply at R1, R3, R8, R9, R10. Section 5 of the NBMP states:

- *'Holcim has executed a negotiated agreement with the property owner of R1 which excludes this receptor from the approved noise criteria';*
- *'R3 is not included in the approved noise criteria as this receiver represented road noise and the EA concluded that road noise impacts as a consequence of the development were below guideline thresholds and didn't warrant further assessment'; and*
- *'Receivers R8, R9 & R10 are Holcim owned residences and the approved criteria only apply to privately owned land'.*

Table 1 presents the criteria for the receivers R1 – R10 where compliance is required for both quarry operation and combined quarry and asphalt production operations.

Table 1 Noise Criteria				
Location	Quarry Operations		Quarry Operations and Asphalt Plant Production	
	6am – 10pm	6am – 10pm	10pm – 6am	10pm – 6am
	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(15min)	dB LA1(1min)
R1 ¹	46	48	46	51
R2	36	40	35	48
R3 ¹	N/A	N/A	N/A	N/A
R4	36	40	39	51
R5	40	41	39	51
R6	36	40	35	48
R7	35	36	35	48
R8 ¹	N/A	N/A	N/A	N/A
R9 ¹	N/A	N/A	N/A	N/A
R10 ¹	N/A	N/A	N/A	N/A

Note 1: Noise criteria are not applicable to these receivers as per Section 5 of the NBMP.

3 Methodology

3.1 Locality

The quarry is located at Possum Brush, NSW approximately 16km south of Taree, NSW. Receivers in the locality surrounding the quarry are primarily rural/residential. The Pacific Highway is situated to the west of the site, with highway traffic a dominant noise source at all assessed receivers. To the east, the quarry is bounded by rural properties with noise from Tuncurry Road dominating the acoustic environment. 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

Three monitoring locations have been selected as part of the NMA and in accordance with the NBMP. Location M1 is located adjacent to R1 to the north of the quarry and is used as a reference location for the northern catchment. It is noted that this assessment location has a negotiated agreement with Holcim, hence noise criteria are not mandatory. Location M2 is representative of receivers R2, R6 and R7, to the east of the quarry. Location M3 is situated to the west of the quarry and is representative of receivers R4 and R5.

3.3 Assessment Methodology

Attended noise surveys were conducted in general accordance with the procedures described in Australian Standard AS 1055-1997, "Acoustics - Description and Measurement of Environmental Noise" and the EPL. The measurements were carried out using a Svantek Type 1, 971 noise analyser on Wednesday 5 September 2018 and Thursday 6 September 2018. 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 ± 0.5 dBA.

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 of the monitoring locations during the daytime period. Although the site was not undertaking asphaltting, evening measurements were undertaken for completeness. An additional round of noise measurements was completed during the morning shoulder period.

Extraneous noise sources were excluded from the analysis to determine the $L_{Aeq}(15min)$ noise contribution for comparison against the relevant criteria. Where the quarry was inaudible, the contribution is estimated to be at least 10dB below the ambient noise level.

FIGURE 1

LOCALITY PLAN

REF: MAC180611-04



KEY	
	RECEIVER / MONITORING LOCATION
	PROJECT SITE



*Imagery Source : nearmap

4 Results

4.1 Assessment Results - Location M1

The monitored noise level contributions and observed meteorological conditions for each assessment period at location M1 are presented in **Table 2**.

Table 2 Operator-Attended Noise Survey Results – Location M1						
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
05/09/2018	14:28	64	45	40	Dir: NE Wind Speed: 1.0m/s Rain: Nil	Birds 37-64
	(Day)					Highway traffic 40-54 Leaves Rustling 40-45 Quarry Inaudible
Jandra Quarry L _{Aeq} (15min) Contribution						<30
05/09/2018	18:29	64	48	42	Dir: NE Wind Speed: 0.1m/s Rain: Nil	Highway traffic 48-56
	(Evening)					Quarry Not Operational
Jandra Quarry L _{Aeq} (15min) Contribution						30
06/09/2018	05:55	67	49	43	Dir: E Wind Speed: 0.1m/s Rain: Nil	Highway traffic 40-47
	(Morning shoulder)					Birds 43-67 Reverse Beep 40-43
Jandra Quarry L _{Aeq} (15min) Contribution						30

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 M2

The monitored noise level contributions and observed meteorological conditions for each assessment period at location M2 for are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location M2						
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
05/09/2018	15:26 (Day)	58	43	37	Dir: NE	Birds 38-50
					Wind Speed: 1.1m/s	Traffic 37-44
					Rain: Nil	Quarry Inaudible
					Jandra Quarry L _{Aeq} (15min) Contribution	
05/09/2018	18:00 (Evening)	61	42	38	Dir: NE	Frogs 35-38
					Wind Speed: 0.2m/s	Birds 35-61
					Rain: Nil	Distant traffic 36-40
					Jandra Quarry L _{Aeq} (15min) Contribution	
06/09/2018	06:44 (Morning shoulder)	64	46	40	Dir: E	Distant traffic 39-48
					Wind Speed: 0.2m/s	Birds 45-64
					Rain: Nil	Quarry Inaudible
					Jandra Quarry L _{Aeq} (15min) Contribution	

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 M3

The monitored noise level contributions and observed meteorological conditions for each assessment period at location M3 are presented in **Table 4**.

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
05/09/2018	14:51 (Day)	82	63	49	Dir: NE Wind Speed: 1.6m/s Rain: Nil	Birds 51-63
						Traffic 50-82 Leaves Rustling 38-45 Quarry Inaudible
Jandra Quarry LAeq(15min) Contribution						<30
05/09/2018	18:48 (Evening)	79	62	44	Dir: NE Wind Speed: 0.1m/s Rain: Nil	Traffic 50-79
						Quarry Not Operational
Jandra Quarry LAeq(15min) Contribution						<30
06/09/2018	06:15 (Morning shoulder)	85	66	49	Dir: E Wind Speed: 0.2m/s Rain: Nil	Traffic 50-78
						Birds 45-85 Quarry Inaudible
Jandra Quarry LAeq(15min) Contribution						<30

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 residential receiver R2, R4, R5, R6 and R7 are presented in **Table 5** to **Table 7** for day, evening and morning shoulder/night assessment periods.

Table 5 Daytime Noise Compliance Assessment

Receiver No.	Quarry Noise	Quarrying Noise	Compliant	Quarrying & Asphalt	Compliant
	Contribution	Criteria		Production Criteria	
	dB LAeq(15min)	dB LAeq(15min)		dB LAeq(15min)	
R2	<30	36	✓	40	✓
R4	<30	36	✓	40	✓
R5	<30	40	✓	41	✓
R6	<30	36	✓	40	✓
R7	<30	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.

Table 6 Evening Noise Compliance Assessment

Receiver No.	Quarry Noise	Quarrying Noise	Compliant	Quarrying & Asphalt	Compliant
	Contribution	Criteria		Production Criteria	
	dB LAeq(15min)	dB LAeq(15min)		dB LAeq(15min)	
R2	<30	36	✓	40	✓
R4	<30	36	✓	40	✓
R5	<30	40	✓	41	✓
R6	<30	36	✓	40	✓
R7	<30	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.

Table 7 Morning Shoulder/Night Noise Compliance Assessment

Receiver No.	Quarry Noise	Quarrying & Asphalt	Compliant	Quarry Noise	Quarrying & Asphalt	Compliant
	Contribution	Production Criteria		Contribution	Production Criteria	
	dB LAeq(15min)	dB LAeq(15min)		dB LA1(1min)	dB LA1(1min)	
R2	<30	35	✓	<30	48	✓
R4	<30	39	✓	<30	51	✓
R5	<30	39	✓	<30	51	✓
R6	<30	35	✓	<30	48	✓
R7	<30	35	✓	<30	48	✓

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 M1

It is noted that M1 is a reference location only, and criteria is not applicable under the EPL for this receiver. Monitoring during the September 2018 quarter identified that quarry noise was briefly audible during the morning shoulder period and remained inaudible on all other occasions. The monitored noise levels demonstrate compliance with the EPL at R1 and receivers situated to the north of this location. The quarry was not operational during the evening period however monitoring was completed as per the requirements of the EPL. Extraneous sources audible during the three attended surveys included insects, birds, highway traffic and wind in trees.

6.2 Discussion of Results - Location M2

Quarry noise emissions were inaudible during all three measurements conducted on Wednesday 5 September 2018 and Thursday 6 September 2018, therefore satisfying the relevant daytime and morning shoulder noise limits. The quarry was not operational during the evening period however monitoring was completed as per the requirements of the EPL. Extraneous sources include, insects, birds and distant traffic.

6.3 Discussion of Results - Location M3

Quarry noise emissions were inaudible during all three measurements conducted on Wednesday 5 September 2018 and Thursday 6 September 2018, satisfying the morning shoulder, daytime and evening criteria. The quarry was not operational during the evening period however monitoring was completed as per the requirements of the EPL. Non-quarry noise sources included highway traffic, residential noise, insects and birds.

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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 Jandra Quarry, Possum Brush, NSW. The assessment was completed to assess compliance with the relevant noise criteria during Quarter 3, period ending September 2018.

Attended noise monitoring was completed on Wednesday 5 September 2018 and Thursday 6 September 2018 at representative monitoring locations with quarry noise contributions compared against the relevant criteria. The assessment has identified that noise emissions generated by Jandra Quarry comply with relevant noise criteria specified in the Conditions of Consent at all assessed locations.

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Appendix A - Glossary of Terms

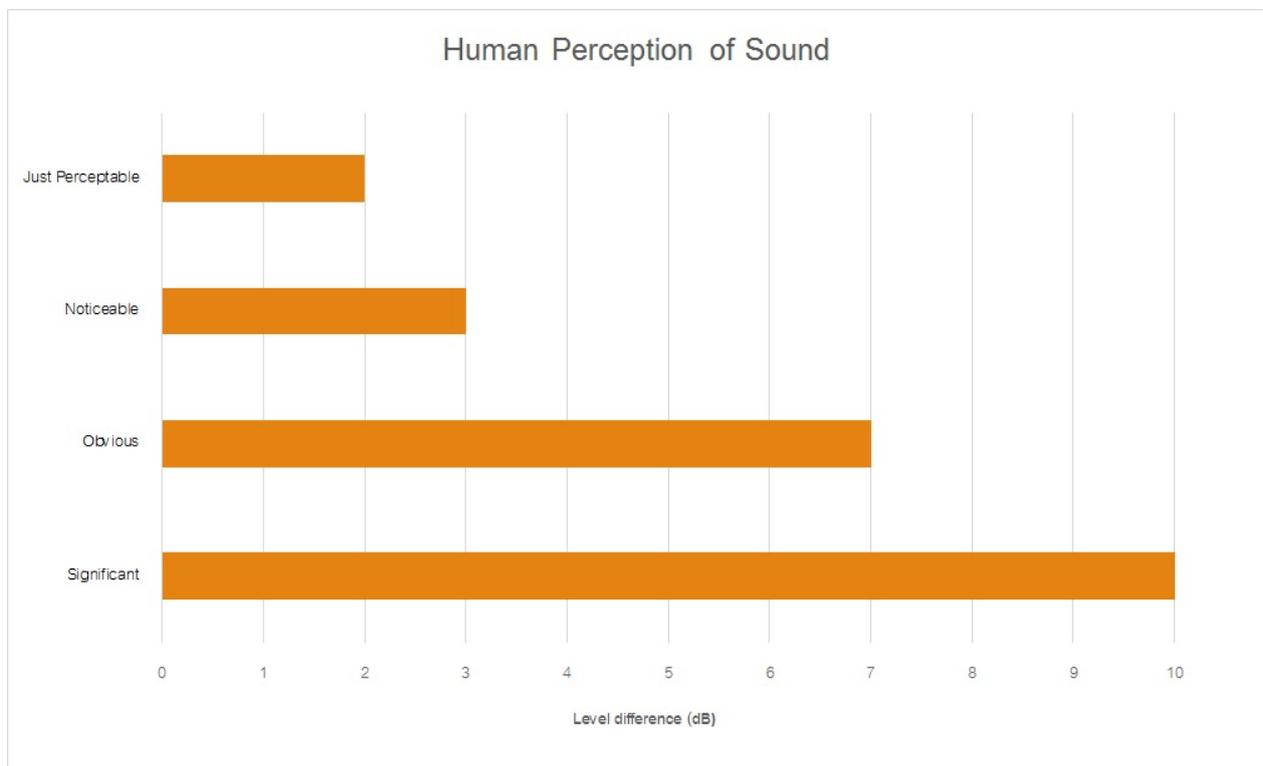
Table A1 provides a number of technical terms have been used in this report.

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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.
LAm _{ax}	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 : $= 10 \cdot \log_{10} (W/W_0)$ Where : W is the sound power in watts and W ₀ is the sound reference power at 10-12 watts.

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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

Jandra Quarry, Possum Brush, NSW
Quarter 4 Ending December 2018.

Document Information

Noise Monitoring Assessment

Jandra Quarry, Possum Brush, NSW

Quarter 4 Ending December 2018

Prepared for: Holcim (Australia) Pty Ltd

Prepared by: Muller Acoustic Consulting Pty Ltd

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1 Introduction

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The monitoring has been conducted in accordance with the Jandra Noise and Blast Management Plan and in general accordance with Conditions L4.2 to L4.8 of the EPL2796 (EPL); at three representative monitoring locations. This assessment has been undertaken during Quarter 4 ending December 2018 and forms part of the annual noise monitoring program to address conditions of the EPL.

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

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- Environment Protection Licence (EPL), 2796;
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2 Noise Criteria

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Furthermore, Section 5 of the Jandra Noise and Blast Management Plan (NBMP) outlines that noise criteria do not apply at R1, R3, R8, R9, R10. Section 5 of the NBMP states:

- *'Holcim has executed a negotiated agreement with the property owner of R1 which excludes this receptor from the approved noise criteria';*
- *'R3 is not included in the approved noise criteria as this receiver represented road noise and the EA concluded that road noise impacts as a consequence of the development were below guideline thresholds and didn't warrant further assessment'; and*
- *'Receivers R8, R9 & R10 are Holcim owned residences and the approved criteria only apply to privately owned land'.*

Table 1 presents the criteria for the receivers R1 – R10 where compliance is required for both quarry operation and combined quarry and asphalt production operations.

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R6	36	40	35	48
R7	35	36	35	48
R8 ¹	N/A	N/A	N/A	N/A
R9 ¹	N/A	N/A	N/A	N/A
R10 ¹	N/A	N/A	N/A	N/A

Note 1: Noise criteria are not applicable to these receivers as per Section 5 of the NBMP.

3 Methodology

3.1 Locality

The quarry is located at Possum Brush, NSW approximately 16km south of Taree, NSW. Receivers in the locality surrounding the quarry are primarily rural/residential. The Pacific Highway is situated to the west of the site, with highway traffic a dominant noise source at all assessed receivers. To the east, the quarry is bounded by rural properties with noise from Tuncurry Road dominating the acoustic environment. 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

Three monitoring locations have been selected as part of the NMA and in accordance with the NBMP. Location M1 is located adjacent to R1 to the north of the quarry and is used as a reference location for the northern catchment. It is noted that this assessment location has a negotiated agreement with Holcim, hence noise criteria are not mandatory. Location M2 is representative of receivers R2, R6 and R7, to the east of the quarry. Location M3 is situated to the west of the quarry and is representative of receivers R4 and R5.

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. The measurements were carried out using a Svantek Type 1, 971 noise analyser on Thursday 29 November 2018 and Friday 30 November 2018. 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 ± 0.5 dBA.

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 of the monitoring locations during the daytime period. An additional round of noise measurements was completed during the morning shoulder period.

Extraneous noise sources were excluded from the analysis to determine the LAeq(15min) noise contribution for comparison against the relevant criteria. Where the quarry was inaudible, the contribution is estimated to be at least 10dB below the ambient noise level.

FIGURE 1

LOCALITY PLAN

REF: MAC180611-04



KEY

-  RECEIVER / MONITORING LOCATION
-  PROJECT SITE



*Imagery Source : nearmap

4 Results

4.1 Assessment Results - Location M1

The monitored noise level contributions and observed meteorological conditions for each assessment period at location M1 are presented in **Table 2**.

Table 2 Operator-Attended Noise Survey Results – Location M1						
Date	Time (hrs)	Descriptor (dBA re 20 μ Pa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
30/11/2018	08:08 (Day)	62	48	43	WD: E WS: 0.2m/s Rain: Nil	Traffic 40-52
						Birds 45-62
						Primary Crusher 43-47
						Rock Breaker 48-53 (5-10secs)
Jandra Quarry L _{Aeq} (15min) Contribution						45
29/11/2018	18:40 (Evening)	61	46	43	WD: SW WS: 0.4m/s Rain: Nil	Leaves rustling 45-51
						Dogs barking 46-48
						Traffic 49-54
						Birds 40-61
						Primary Crusher 38-40
						Rock Breaker 45-50 (5-10secs)
Jandra Quarry L _{Aeq} (15min) Contribution						44
30/11/2018	06:00 (Morning shoulder)	65	49	44	WD: E WS: 0.1m/s Rain: Nil	Traffic 40-50
						Birds 42-65
						Quarry Inaudible
Jandra Quarry L _{Aeq} (15min) Contribution						<30

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 M2

The monitored noise level contributions and observed meteorological conditions for each assessment period at location M2 for are presented in **Table 3**.

Date	Time (hrs)	Descriptor (dBA re 20 μ Pa)			Meteorology	Description and SPL, dBA						
		L _{Amax}	L _{Aeq}	L _{A90}								
30/11/2018	07:10 (Day)	64	44	39	WD: E WS: 0.3m/s Rain: Nil	Traffic 40-48						
						Birds 40-64						
						Dog barking 50-54						
						Rock Breaker 34-40(5-10secs)						
						Primary Crusher 33-38						
Jandra Quarry L _{Aeq} (15min) Contribution						35						
29/11/2018	18:08 (Evening)	59	44	40	WD: SE WS: 2.5m/s Rain: Nil	Traffic 39-43						
						Car at dwelling 45-59						
						Tractor in field 44-49						
						Birds 40-46						
						Primary Crusher 30-38						
Jandra Quarry L _{Aeq} (15min) Contribution						35						
30/11/2018	06:50 (Morning shoulder)	63	47	41	WD: E WS: 0.1m/s Rain: Nil	Birds 40-63						
						Traffic 40-46						
						Primary Crusher 32-38						
						Jandra 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 M3

The monitored noise level contributions and observed meteorological conditions for each assessment period at location M3 are presented in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location M3						
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
30/11/2018	07:46	67	56	51	WD: E WS: 0.1m/s Rain: Nil	Traffic 48-67
	(Day)					Birds 50-61 Insects 40-50 Quarry inaudible
Jandra Quarry LAeq(15min) Contribution						<30
29/11/2018	19:01	64	54	48	WD: S WS: 0.4m/s Rain: Nil	Traffic 45-64
	(Evening)					Birds 42-57 Leaves rustling 40-45 Quarry inaudible
Jandra Quarry LAeq(15min) Contribution						<30
30/11/2018	06:20	76	60	51	WD: S WS: 0.1m/s Rain: Nil	Traffic 55-72
	(Morning shoulder)					Birds 48-57
Jandra Quarry LAeq(15min) Contribution						<30

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 residential receiver R2, R4, R5, R6 and R7 are presented in **Table 5** to **Table 7** for day, evening and morning shoulder/night assessment periods. The quarry was conducting crushing activities during the evening period on Thursday 29 November 2018 and the morning shoulder period on Friday 30 November 2018.

Table 5 Daytime Noise Compliance Assessment

Receiver No.	Quarry Noise	Quarrying Noise	Compliant	Quarrying & Asphalt	Compliant
	Contribution	Criteria		Production Criteria	
	dB LAeq(15min)	dB LAeq(15min)		dB LAeq(15min)	
R2	35	36	✓	40	✓
R4	<30	36	✓	40	✓
R5	<30	40	✓	41	✓
R6	35	36	✓	40	✓
R7	35	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.

Table 6 Evening Noise Compliance Assessment

Receiver No.	Quarry Noise	Quarrying Noise	Compliant	Quarrying & Asphalt	Compliant
	Contribution	Criteria		Production Criteria	
	dB LAeq(15min)	dB LAeq(15min)		dB LAeq(15min)	
R2	35	36	✓	40	✓
R4	<30	36	✓	40	✓
R5	<30	40	✓	41	✓
R6	35	36	✓	40	✓
R7	35	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.

Table 7 Morning Shoulder/Night Noise Compliance Assessment

Receiver No.	Quarry Noise	Quarrying & Asphalt	Compliant	Quarry Noise	Quarrying & Asphalt	Compliant
	Contribution	Production Criteria		Contribution	Production Criteria	
	dB LAeq(15min)	dB LAeq(15min)		dB LA1(1min)	dB LA1(1min)	
R2	35	35	✓	<30	48	✓
R4	<30	39	✓	<30	51	✓
R5	<30	39	✓	<30	51	✓
R6	35	35	✓	<30	48	✓
R7	35	35	✓	<30	48	✓

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 M1

It is noted that M1 is a reference location only, and criteria is not applicable under the EPL for this receiver. Monitoring during the December 2018 quarter identified that quarry noise was audible during the daytime and evening periods, however, was inaudible during the morning shoulder period.

The monitored noise levels demonstrate compliance with the EPL at R1 and receivers situated to the north of this location.

Extraneous sources audible during the three attended surveys included insects, birds, highway traffic and wind in trees.

6.2 Discussion of Results - Location M2

Quarry noise emissions were audible during all three measurements conducted on Thursday 29 November 2018 and Friday 30 November 2018, and satisfy the relevant daytime, evening and morning shoulder noise limits.

The quarry was conducting crushing activities during the evening period of Thursday 29 November 2018 and the morning shoulder of Friday 30 November 2018. The crusher was just audible during the measurements, being masked by constant road traffic noise.

Extraneous noise sources included dogs barking, birds and leaves rustling.

6.3 Discussion of Results - Location M3

Quarry noise emissions were inaudible during all three measurements conducted on Thursday 29 November 2018 and Friday 30 November 2018, satisfying the morning shoulder, daytime and evening criteria. The quarry was operational during all three monitoring periods but was largely masked by road traffic noise.

Non-quarry noise sources included highway traffic, insects and birds.

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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 Jandra Quarry, Possum Brush, NSW. The assessment was completed to assess compliance with the relevant noise criteria during Quarter 4, period ending December 2018.

Attended noise monitoring was completed on Thursday 29 November 2018 and Friday 30 November 2018 at representative monitoring locations with quarry noise contributions compared against the relevant criteria. The assessment has identified that noise emissions generated by Jandra Quarry comply with relevant noise criteria specified in the Conditions of Consent at all assessed locations.

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Appendix A - Glossary of Terms

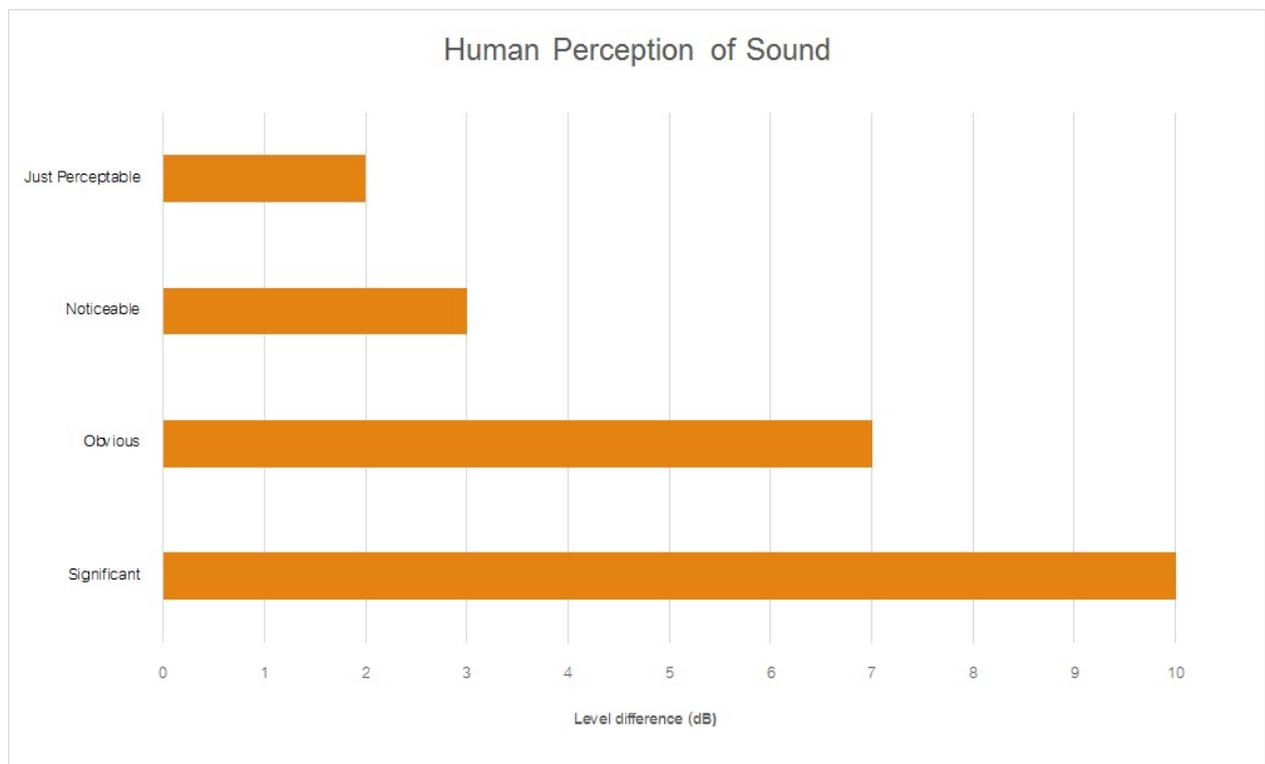
Table A1 provides a number of technical terms have been used in this report.

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.
LAm _{ax}	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 : $= 10 \cdot \log_{10} (W/W_0)$ Where : W is the sound power in watts and W ₀ 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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