Strength. Performance. Passion.

Teven Quarry
Annual Review 2017

Holcim (Australia) Pty Ltd

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

SITE DETAILS

Name of operation	Teven Quarry
Name of operator	Holcim (Australia) Pty Ltd
Development consent / project approval #	SSD 6422
Name of holder of development consent / project approval	Holcim (Australia) Pty Ltd
Annual review start date	1 January 2017
Annual review end date	31 December 2017

I, **SCOTT CALLANDER**, certify that this audit report is a true and accurate record of the compliance status of the **TEVEN QUARRY** for the period of **JANUARY 2017- DECEMBER 2017** and that I am authorised to make this statement on behalf of **HOLCIM (AUSTRALIA) PTY LTD**.

Note.

a) *The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.*

b) *The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or $22,000, or both).*

Name of authorised reporting officer	Scott Callander
Title of authorised reporting officer	Quarry Supervisor
Signature of authorised reporting officer	
Date	29 March 2018

Revision	2	**Purpose**	DPE Review Comments
Author	Victoria Musgrove	**Date**	8 November 2018

Amendments

Section 6.5 and Appendix 2 updated to reflect revised truck movements following review.

Table 15 of the AEMR 2017 updated to include specific times for each blast undertaken in 2017.

A new Section 9 included addressing waste minimisation and management at Teven Quarry, and subsequent sections renumbered accordingly.

Sections 1, 7.4 and 12 updated to reflect revised pH monitoring dates and identify where monitoring periods were greater than 1 week.

1 STATEMENT OF COMPLIANCE

The statement of commitments for the 2017 reporting period for Teven Quarry is provided in **Table 1.** **Table 3** details the non-compliances of SSD 6422 identified within the 2017 reporting period.

Table 1: Statement of Commitments

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

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

Table 3: Non-Compliances of SSD 6422 for 2017

<table>
<tr><th>Relevant approval</th><th>Condition</th><th>Condition Description</th><th>Status</th><th>Relevant Section of the Annual Review</th></tr>
<tr><td>SSD 6422</td><td>Condition 11, Schedule 3</td><td>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 in Table 4 at any residence on privately-owned land.

Table 4: Air quality criteria
<table><tr><th>Pollutant</th><th>Averaging Period</th><th colspan="2">Criterion</th></tr><tr><td>Particulate matter < 10 µm (PM_{10})</td><td>Annual</td><td colspan="2">[a,d] 30 µg/m³</td></tr><tr><td>Particulate matter < 10 µm (PM_{10})</td><td>24 hour</td><td colspan="2">[b] 50 µg/m³</td></tr><tr><td>Total suspended particulates (TSP)</td><td>Annual</td><td colspan="2">[a,d] 90 µg/m³</td></tr><tr><td>[c] Deposited dust</td><td>Annual</td><td>[b] 2 g/m²/month</td><td>[a,d] 4 g/m²/month</td></tr></table>
This condition relates to installation and operation of the PM_{10} monitor.
Note: the PM_{10} monitor has been operational since September 2017.</td><td>Low Risk
Non - Compliant</td><td>Section 6.3 (Air Quality)</td></tr>
<tr><td>SSD 6422</td><td>Condition 14, Schedule 3</td><td>The Applicant shall prepare and implement an Air Quality Management Plan for the development to the satisfaction of the Secretary. This plan must:

(d) include an air quality monitoring program that:
• is capable of evaluating the performance of the development;
• includes a protocol for determining any exceedances of the relevant conditions of consent;
• effectively supports the air quality management system; and
• evaluates and reports on the adequacy of the air quality management system.

This condition relates to the implementation of the air quality monitoring component - - component of the Air Quality Management Plan.
Note: the PM_{10} monitor has been operational since September 2017.</td><td>Low Risk
Non - Compliant</td><td>Section 6.3 (Air Quality)</td></tr>
</table>

<table>
<tr><th>Relevant approval</th><th>Condition</th><th>Condition Description</th><th>Status</th><th>Relevant Section of the Annual Review</th></tr>
<tr><td>SSD 6422</td><td>Condition 10, Schedule 3</td><td>The Applicant shall prepare and implement a Blast Management Plan for the development to the satisfaction of the Secretary. This plan must:
(d) include community notification procedures for the blasting schedule; and</td><td>Admin
Non - Compliant</td><td>Section 6.2 (Blasting)</td></tr>
<tr><td>EPL</td><td>Condition M2.2</td><td>Condition M2.2 of the EPL – Water and/or Land Monitoring Requirements

M2.2 Water and/ or Land Monitoring Requirements

POINT 1
<table><tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr><tr><td>Oil and Grease</td><td>milligrams per litre</td><td>Yearly during discharge</td><td>Grab sample</td></tr><tr><td>pH</td><td>-</td><td>Weekly</td><td>No method specified</td></tr><tr><td>Total suspended solids</td><td>milligrams per litre</td><td>Yearly during discharge</td><td>Grab sample</td></tr></table>
Weekly monitoring for pH is required at EPL Point 1.

Monitoring was completed weekly except weeks 1, 11, 22, 31 42 and 52.</td><td>Low Risk
Non - Compliant</td><td>Section 7.4 (Surface Water)</td></tr>
</table>

2 INTRODUCTION

Holcim (Australia) Pty Ltd (Holcim) operates Teven Quarry, a hard rock quarry located on Stokers Lane in the Ballina Shire Local Government Area (refer to Figures 1 and 2). The site operates under Development Consent (SSD 6422 as modified) approved by the New South Wales (NSW) Department of Planning and Environment (DPE) on July 15, 2015.

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

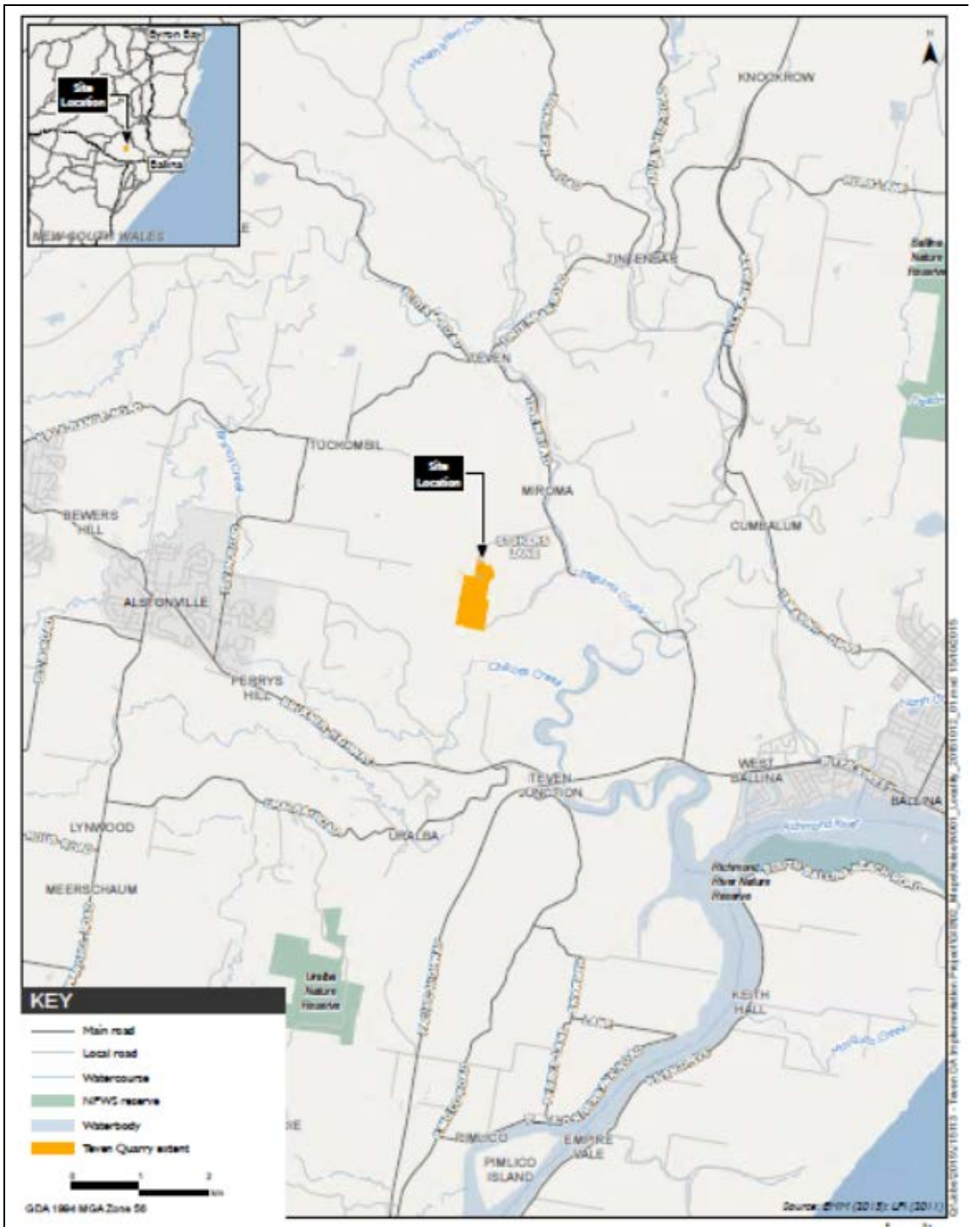

Figure 1: Regional Locality

Figure 2: Aerial view of the Teven Quarry, located on Stokers Lane, Teven

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

Table 4: Annual Review Requirements

Condition	Section addressed in Annual Review
By the end of March each year, the Applicant shall review the environmental performance of the development to the satisfaction of the Secretary. This review must:	
a) describe the development (including rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year;	Section 4 and 6
b) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against the: - relevant statutory requirements, limits or performance measures/criteria; - the monitoring results of previous years; and - the relevant predictions in the EIS.	Section 6 and 7
c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;	Section 1 and 11
d) identify any trends in the monitoring data over the life of the development	Section 6 and 7
e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and	Section 6
f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the development.	Section 13

This Annual Review has also been prepared in accordance with the *Annual Review Guideline: post approvals requirements for state significance mining developments* (October 2015). This report documents the environmental performance of the site from January to December 2017.

2.1 Contact Details

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3 APPROVALS

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

Table 5: Approvals for Teven Quarry Operations

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

4 OPERATIONS SUMMARY

4.1 Exploration

There was no exploration undertaken within the Annual Review period.

4.2 Land Preparation

There was no clearing undertaken during the Annual Review period.

4.3 Construction Activities

There was no construction undertaken during the Annual Review period.

4.4 Quarry Operations

Operational activities undertaken at Teven Quarry in 2017 included:

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

Quarry operations were undertaken between the hours of 7am to 6pm, Monday to Friday and 7am-4pm on Saturdays, during the reporting period. These timeframes were applied to all operations on-site with no load out or dispatch after 6pm.

All activities took place within the approved operating hours in 2017.

Table 6 includes a summary of the operations undertaken during the reporting period against the development consent conditions regarding product transported from Teven Quarry.

Table 6: Total Product Distributed (Holcim Teven Quarry)

Material	Approval Limit (Tonnes)	2016 Reporting Period (Tonnes)	2017 Reporting Period (Tonnes)
Product Distributed- Total	500,000	363,079	283,251

4.5 Next Reporting Period

Development activities proposed to be carried out at Teven Quarry in 2018, include:

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

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

Actions required by the previous Annual Review are listed in **Table 7.**

Table 7: Status Update on Proposed Holcim Actions

Commitment	Compliance Status
Progressive Rehabilitation - The site will continue to progressively rehabilitate available areas.	No rehabilitation was completed in 2017, due to all benches currently being active. Rehabilitation of existing terminal benches was completed during earlier reporting periods.
Undertake a Water Assessment in accordance with *Condition 3, Schedule 19.* *Condition 3, Schedule 19:* 'In the event that groundwater in excess of negligible quantities is intersected during extraction activities, the Applicant shall undertake a hydrogeological investigation, in consultation with NOW, to the satisfaction of the Secretary. The investigation must report on groundwater sources, levels, yield and quality; identify any risks to groundwater users or groundwater dependent ecosystems and propose recommended management measures. The Applicant must implement reasonable and feasible management measures to the satisfaction of the Secretary'.	No groundwater seepage into the quarry void was recorded during the 2017 reporting period. The quarry will continue to monitor the void for groundwater seepage and a detailed assessment will be undertaken in accordance with Condition 3, Schedule 19 should groundwater in excess of negligible quantities be intercepted.

6 ENVIRONMENTAL PERFORMANCE

6.1 Meteorological Monitoring

A meteorological monitoring station was installed at Teven Quarry in late 2016 to obtain data in accordance with the requirements of Schedule 3, Condition 15 of the Development Consent. Monthly rainfall data for 2017 has been provided in **Table 8.**

Table 8: Rainfall Received at Teven Quarry 2017

Monthly Rainfall (mm)												Total 2017
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
16	63	290	144	81	262	5	5	0	90	183	44	**1,183**

No meteorological trends are currently available due to the limited time that the station has been operational.

6.2 Noise

6.2.1 EIS Predictions

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

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

6.2.2 Approved Criteria

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

Approved noise criteria from the Development Consent are outlined in **Table 9**.

Table 9: Noise Criteria for Teven Quarry (SSD 6422)

Table 2: Noise criteria dB(A)

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

Note: Receiver locations are shown on the figure in Appendix 4.

6.2.3 Key Environmental Performance

Quarterly noise monitoring was undertaken 2017 in accordance with the requirements of the Schedule 3, Condition 4.

Noise results at all locations were within the approved performance criteria for the site as shown in **Table 10**. Copies of the quarterly noise monitoring reports for 2017 are attached as **Appendix 1**.

Table 10: Noise Compliance Assessment for Teven Quarry (Muller Acoustic Consultants, 2017)

Assessment Period	Receiver No.	Monitoring Location ID	Quarry Noise Contribution	Quarrying Noise Criteria	Compliance Status			
			$LAeq_{(15min)}$		Q1	Q2	Q3	Q4
Day	R2	N1	34	37	✓	✓	✓	✓
	R3/R4	N2	Nil	38	✓	✓	✓	✓
	R7	N3	36	37	✓	✓	✓	✓
	R10	N4	36	37	✓	✓	✓	✓
	R14	N5	Nil	37	✓	✓	✓	✓
Evening	R2	N1	Nil	35	✓	✓	✓	✓
	R3/R4	N2	Nil	35	✓	✓	✓	✓
	R7	N3	Nil	35	✓	✓	✓	✓
	R10	N4	Nil	35	✓	✓	✓	✓
	R14	N5	Nil	35	✓	✓	✓	✓

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

Longterm Trends:

2017 is the first year of full noise monitoring (four quarters of monitoring). There are no trends yet available relating to noise compliance.

Comparison to EIS Predictions:

The results for noise in 2017 were within the predicted limits of the EIS predictions.

6.2.4 Management Measures

Noise impacts are managed in accordance with the specific management strategies, procedures, controls and monitoring programs within the Teven Quarry *Noise Management Plan.*

6.2.5 Proposed Improvements

There are no proposed improvements relating to noise.

6.3 Air Quality

6.3.1 EIS Predictions

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

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

6.3.2 Approved Criteria

Air Quality monitoring conducted at Teven Quarry is compared with the monitoring criteria stipulated in Schedule 3, Condition 11 of SSD 6422 and reproduced in **Table 11**.

Table 11: Air Quality Monitoring Criteria (SSD 6422)

Table 4: Air quality criteria

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

Notes tor Table 4:

a. *Cumulative impact (ie increase in concentrations due to the development plus background concentrations due to all other sources).*
b. *Incremental impact (ie incremental increase in concentrations due to the development on its own, with zero allowable exceedances of the criteria over the life of the development).*
c. *Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.*
d. *Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, or any other activity agreed to by the Secretary.*
e. *"Reasonable and feasible avoidance and mitigation measures" includes, but is not limited to, the operational requirements in conditions 12 and 13 to develop and implement a air quality management system that ensures operational responses to the risks of exceedance of the criteria.*

6.3.3 Key Environmental Performance

Condition 11, Schedule 3 (PM_{10})

A Low Volume Air Sampler was installed at Teven Quarry in September 2017 to monitor for particulate matter. PM_{10} monitoring results have been obtained from September to December 2017. These results are provided in **Table 12.**

Table 12: 2017 Dust Monitoring (PM_{10})

Date Sampled	Sampling Period (hours)	PM_{10} ($\mu g/m^3$)	Compliance with Criteria (50 $\mu g/m^3$ in 24hr)
09/09/17	24	44	Within criteria
15/09/17	24	<35	Within criteria
21/09/17	24	50	At criteria level.
27/09/17	24	47	Within criteria
03/10/17	24	35	Within criteria
09/10/17	24	41	Within criteria
15/10/17	24	40	Within criteria
21/10/17	24	<14	Within criteria
27/10/17	24	42	Within criteria
02/11/17	24	39	Within criteria
08/11/17	24	24	Within criteria
14/11/17	24	<14	Within criteria
20/11/17	24	<14	Within criteria
26/11/17	24	32	Within criteria
02/12/17	24	<23	Within criteria
08/12/17	24	27	Within criteria
14/12/17	24	<23	Within criteria
20/12/17	24	<23	Within criteria
26/12/17	24	50	At criteria level.
Annual Average (30µg/m^3/year)		**24.8**	**Within criteria**

Condition 11, Schedule 3 (Dust Deposition)

Depositional dust continued to be monitored at three depositional dust gauges at Teven Quarry throughout 2017. Results for this monitoring are provided in **Table 13**.

Table 13: 2017 Dust Monitoring (Depositional Dust)

Start Date	End Date	DDG1	DDG2	DDG3
		(g/m^2/month)		
23-Mar-17	20-Apr-17	0.7	4	2.1
20-Apr-17	18-May-17	2.2	0.9	0.5
18-May-17	15-Jun-17	7.2	1.7	1.5
15-Jun-17	13-Jul-17	3.7	3.6	0.4
13-Jul-17	10-Aug-17	0.4	1.6	0.7
10-Aug-17	07-Sep-17	0.6	6.1	1.5
07-Sep-17	05-Oct-17	1.4	*18	1.1
05-Oct-17	02-Nov-17	*14.5	3.3	0.1
02-Nov-17	30-Nov-17	*12.3	*193.9	1.3
30-Nov-17	29-Dec-17	7.6	*61.7	0.7
Annual Average (4g/m^2/year) – with all sites		**5.06**	**29.48**	**0.99**
Annual Average – contaminated samples removed ***contaminated samples (bird dropping, insects, vegetation)**		**2.9**	**3.0**	**0.99**
Result (for Year to Date)		**Within Criteria**	**Within Criteria**	**Within Criteria**

In October the canefields adjacent to DDG1 were harvested and replanted. This resulted in significant vegetation in the sample. Similarly, the canefield adjacent to DDG2 was slashed and burnt during the November monitoring period resulting in significant ash in the sample. Additional slashing in the canefield as well as earthworks associated with a canefield track took place in December also impacting the results at DDG2. As such these three sample results have been excluded from the annual average. Other samples that were contaminated by insects or bird droppings were also excluded from the annual average.

Longterm Trends:

During preparation of the 2016 Annual Review for Teven Quarry it was discovered that Holcim were receiving incorrect dust deposition results from EAL Laboratories. The results received by Holcim were found to be results for the Boral Teven Quarry.

Immediately upon identifying this non-compliance, Holcim commissioned VGT consultants in February 2017 to undertake monthly monitoring in accordance with the Air Quality Management Plan to ensure full compliance with this condition. As such, any trends analysis of depositional dust is not currently possible due to the lack of data available from 2016. Holcim will provide comparison data in the 2018 Annual Review when there is sufficient data available.

As 2017 was the first year of PM_{10} monitoring there are no trends available.

Comparison to EIS Predictions:

The results for both depositional dust and PM_{10} were within the predicted limits of the EIS predictions.

6.3.4 Management Measures

Teven Quarry is committed to implementing reasonable and feasible avoidance and mitigation measures and to continue to investigate ways to minimise any air quality impacts from the quarry.

Air quality management measures implemented at Teven Quarry are detailed in the *Air Quality Management Plan*.

6.3.5 Proposed Improvements

Holcim will improve the depositional dust and PM_{10} sampling process in 2018 to ensure that sampling is conducted correctly and on the required timetable to ensure operation as per the Development Consent requirements.

6.4 Blasting

6.4.1 EIS Predictions

The 2014 EIS found that the Project can comply with relevant vibration and air blast criteria at all sensitive residential receivers through ongoing management of blast design and size.

6.4.2 Approved Criteria

Blasting was undertaken at Teven Quarry throughout 2017 in accordance with the conditions of Development Consent and EPL No. 3293. The criteria for blasting at the site are detailed in **Table 14.**

Table 14: Blast Monitoring Criteria from EL 3293 for Teven Quarry

L4	**Blasting**
L4.1	Blasting operations at the premises may only take place between 09:00 to 15:00 Monday to Friday. (Where compelling safety reasons exist, the Authority may permit a blast to occur outside the abovementioned hours. Prior written (or facsimile) notification of any such blast must be made to the Authority).
L4.2	The airblast overpressure level from blasting operations in or on the premises must not exceed: a) 115 dB (Lin Peak) for more than 5% of the total number of blasts during each reporting period; and b) 120 dB (Lin Peak) at any time. At any point within 1 metre of any affected residential property or other sensitive noise location.
L4.3	The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed: a) 5 mm/s for more than 5% of the total number of blasts carried out on the premises during each

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

6.4.3 Key Environmental Performance

Results of blasting undertaken in 2017 are shown in **Table 15**.

Table 15: Blast Monitoring Results from Teven Quarry – Monitoring Location: Wellers Road

Date and Time	Blast No	Overpressure (dBL)	Vibration (mm/s)	Compliance with Approved Criteria
		(Criteria Limit 115 dBL)	(Criteria Limit 5 mm/s)	
01-Feb-17 14:05	233	Not Triggered	Not Triggered	Within Criteria
24-Mar-17 12:53	234	113.0	0.35	Within Criteria
05-Apr-17 12:42	235	102.9	0.53	Within Criteria
30-May-17 13:15	236	Not Triggered	Not Triggered	Within Criteria
27-Jun-17 14:03	237	Not Triggered	Not Triggered	Within Criteria
04-Jul-17 12:10	238	Not Triggered	Not Triggered	Within Criteria
28-Jul-17 12:52	239	100.6	0.35	Within Criteria
16-Aug-17 11:00	240	Not Triggered	Not Triggered	Within Criteria
29-Aug-17 11:32	242	Not Triggered	Not Triggered	Within Criteria
18-Sep-17 11:03	243	108.8	0.36	Within Criteria
29-Sep-17 10:40	244	112.0	0.19	Within Criteria
12-Oct-17 12:29	245	Not Triggered	Not Triggered	Within Criteria
17-Nov-17 13:28	246	97.1	0.50	Within Criteria
01-Dec-17 12:35	247	Not Triggered	Not Triggered	Within Criteria
20-Dec-17 13:20	248	114.0	0.09	Within Criteria

The results for blasting at the site fell within the expected criteria of the EPL, EIS and Development Consent during the whole reporting period.

Longterm Trends:

From 2015 – 2017 the blasting levels have been within the Development Consent and EPL criteria.

Comparison to EIS Predictions:

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

6.4.4 Management Measures

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

6.4.5 Proposed Improvements

The *Blast Management Plan* will be updated in 2018 to include the relevant Blasting Protocol.

6.5 Traffic Management

6.5.1 EIS Predictions

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

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

6.5.2 Approved Criteria

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

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

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

6.5.3 Key Environmental Performance

Teven Quarry undertook monitoring of truck movements on a daily basis throughout 2017 to ensure compliance with movements and volume requirements discussed above. A copy of these monitoring results has been included in the table below.

Table 16: Average Truck Movements for 2017

Average Daily Truck Movements												Annual Average 2017
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
31	32	63	41	50	42	53	60	47	45	72	69	51

Longterm Trends:

Review of truck transport data for Teven Quarry since 2015 indicates average daily truck movements have not exceeded 73 laden trucks from the site. This is consistent with the EIS predictions.

6.5.4 Management Measures

Traffic and transport impacts are managed in accordance with the specific management strategies, procedures, controls and monitoring programs within the Teven Quarry *Transport Management Plan.*

6.5.5 Proposed Improvements

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

6.6 Biodiversity

6.6.1 EIS Predictions

The 2014 EIS found the Project is unlikely to result in a significant change to the existing noise, dust and water runoff impacts of Teven Quarry, therefore it is considered that any indirect impacts to ecology that occur will be minor and will be consistent with the existing approved impacts. It is unlikely that any minor indirect impacts that do occur would result in a significant impact on the ecological values of the Project Area.

6.6.2 Approved Criteria

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

6.6.3 Key Environmental Performance

As there was no additional clearance in 2017, there were no additional impacts to biodiversity. Weed spraying was completed along the internal haul in the Annual Review reporting period.

6.6.4 Management Measures

The ongoing management of the ecological values of the Project area are conducted in accordance with the Teven Quarry *Environmental Management Plan* (EMP) and the *Biodiversity and Rehabilitation Management Plan*.

These plans describe the biodiversity management strategies, procedures, controls and monitoring programs implemented at Teven Quarry.

6.6.5 Proposed Improvements

Weed spraying will continue at site during the next Annual Review period.

6.7 Heritage (Aboriginal Archaeology and Historic Heritage)

6.7.1 EIS Predictions

6.7.1.1 Aboriginal Archaeology

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

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

6.7.1.2 Historic Heritage

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

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

6.7.2 Approved Criteria

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

6.7.3 Key Environmental Performance

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

6.7.4 Management Measures

If during the course of operations, Holcim becomes aware of any previously unknown Aboriginal archaeological material, all works likely to affect the material or site will cease immediately and OEH, relevant Aboriginal stakeholders and a suitably qualified archaeologist will be consulted to determine an appropriate course of action prior to the recommencement of work at the site.

6.7.5 Proposed Improvements

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

6.8 Summary of Environmental Performance

A summary of the performance of environmental management measures and sampling results for 2017 are detailed in **Table 17**.

Table 17: Environmental Performance at Teven Quarry in 2017

Aspect	Approval Criteria / EIS Prediction	Performance during 2017 reporting period	Trend / key management implications	Implemented / proposed management actions
Noise	EIS predictions are all below development consent criteria.	Within criteria.	Consistently meets criteria.	None required.
Air Quality	EIS predictions are all below development consent criteria.	Sampling has not been undertaken in accordance with development consent criteria for PM_{10}. Depositional dust within levels for the monitoring that was undertaken in 2017, however sampling only commenced in April 2017.	Trend data has not yet been determined.	Improve data collection regarding the PM_{10} monitor and depositional dust.
Traffic Management	EIS predictions are all below development consent criteria.	Met the Development Consent Criteria.	Consistently meets criteria.	None required.
Water Management	EIS predictions are all below development consent criteria.	pH monitored at the monitoring/discharge point throughout the 2017 reporting period. Groundwater has not been assessed during this reporting period.	Surface water consistently meets criteria. Groundwater has not been verified during this reporting period.	Groundwater assessment will be undertaken during the 2018 reporting period should above negligible quantities be intercepted in the quarry void.
Biodiversity	No proposed impacts. No development consent criteria.	No issues identified. Minor weed management completed.	No long-term negative trends.	None required.
Heritage	No proposed impacts. No development consent criteria.	No issues identified.	No issues identified.	None required.

7 WATER MANAGEMENT

7.1 EIS Predictions

7.1.1 Surface Water

The 2014 EIS stated the Project will not result in any changes to the quarry water management system or associated water management measures. The only potential changes in surface water impacts as a result of the Project are associated with the change in water demands.

7.1.2 Groundwater

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

7.2 Approved Criteria

Holcim monitor water quality associated with water discharges at the Teven Quarry licensed discharge point in accordance with the requirements of EPL 3293 (provided in **Table 18** and **Table 19**).

Table 18: Water Monitoring Criteria (Teven Quarry EPL)

POINT 1

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

Table 19: Discharge Sampling Measurement Requirements (Teven Quarry EPL)

POINT 1

Pollutant	Units of measure	Frequency	Sampling Method
Oil and Grease	milligrams per litre	Yearly during discharge	Grab sample
pH	-	Weekly	No method specified
Total suspended solids	milligrams per litre	Yearly during discharge	Grab sample

In addition to these requirements, the site has been requested by the NSW DPE to undertake an assessment based on the condition below:

Condition 3, Schedule 19

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

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

Teven Quarry is currently operating above the groundwater table. No groundwater seepage into the quarry void has been recorded. The quarry will continue to monitor the void for groundwater seepage and a detailed assessment will be undertaken in accordance with Condition 3, Schedule 19 should groundwater in excess of negligible quantities be intercepted.

7.3 Water Usage and Storage

Clean upstream catchment runoff is diverted away from the quarry and conveyed to the canefield drains which flow to Maguire's Creek and Emigrant Creek. Runoff from disturbed areas within the quarry operations are managed within the water management system.

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

7.4 Surface Water Results

Water quality results for weekly surface water monitoring are provided in **Table 20.**

Table 20: Weekly pH Monitoring Results at Teven Quarry - 2017

Date of Sample	Result (Criteria 6.5-8.5)	Compliance
09/01/17*	7.2	Within criteria
12/01/17	7.8	Within criteria
19/01/17	7.8	Within criteria
27/01/17	7.4	Within criteria
02/02/17	7.3	Within criteria
09/02/17	7.6	Within criteria
13/02/17	7.8	Within criteria
20/02/17	7.7	Within criteria
01/03/17	7.8	Within criteria
06/03/17*	7.6	Within criteria
20/03/17*	7.4	Within criteria
27/03/17	7.6	Within criteria
03/04/17	7.7	Within criteria
10/04/17	7.6	Within criteria

Date of Sample	Result (Criteria 6.5-8.5)	Compliance
18/04/17	7.6	Within criteria
24/04/17	7.5	Within criteria
01/05/17	7.7	Within criteria
08/05/17	7.3	Within criteria
16/05/17	7.4	Within criteria
22/05/17*	7.2	Within criteria
06/06/17*	7.8	Within criteria
13/06/17	7.7	Within criteria
20/06/17	7.5	Within criteria
27/06/17	7.5	Within criteria
03/07/17	7.6	Within criteria
10/07/17	7.7	Within criteria
17/07/17	7.7	Within criteria
24/07/17*	7.6	Within criteria
07/08/17*	7.7	Within criteria
14/08/17	7.6	Within criteria
21/8/17	7.4	Within criteria
28/8/17	7.4	Within criteria
04/09/17	7.6	Within criteria
11/09/17	7.7	Within criteria
18/09/17	7.6	Within criteria
25/09/17	7.7	Within criteria
03/10/17	7.8	Within criteria
09/10/17*	7.6	Within criteria
23/10/17*	7.6	Within criteria
30/10/17	7.7	Within criteria
06/11/17	7.6	Within criteria
13/11/17	7.7	Within criteria
20/11/17	7.7	Within criteria
27/11/17	7.8	Within criteria
04/12/17	6.9	Within criteria
11/12/17	7.0	Within criteria
18/12/17	7.7	Within criteria
21/12/17*	7.7	Within criteria

*Notes: *Sampling prior to or after a period greater than one week.*

Longterm Trends:

Results from 2015 through to 2017 show that water samples taken at Teven Quarry have remained within the relevant EPL criteria.

Comparison to EIS Predictions:

The 2017 surface water results remain consistent with the predictions made in the 2014 EIS.

Compliance:

Monitoring of pH at Teven Quarry has been undertaken to ensure four samples per month. Periods where pH samples were not taken weekly, as prescribed by the Quarry Water Management Plan, are identified in **Table 20**.

7.5 Groundwater Results

Groundwater monitoring was not undertaken during the 2017 reporting period. As per Condition 3, Schedule 19 of the Development Consent, in the event that groundwater in excess of negligible quantities is intersected during extraction activities, Holcim will undertake a hydrogeological investigation, in consultation with DPI Water, to the satisfaction of the Secretary.

There are no groundwater trends or comparison to EIS predictions.

7.6 Water Take

There has been no groundwater take during the Annual Review period.

8 REHABILITATION AND LANDSCAPE MANAGEMENT

8.1 Rehabilitation Performance during the Reporting Period

The site is required to undertake biodiversity and rehabilitation in accordance with the requirements in **Table 21.**

Table 21: Biodiversity and Rehabilitation Requirements for Teven Quarry (SSD 6422)

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

Table 5: Biodiversity and Rehabilitation objectives

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

Progressive Rehabilitation

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

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

No rehabilitation was completed in 2017 at the site.

Table 22: Rehabilitation Performance in 2017

Guideline Requirement	Site Comment
Extent of the operations and rehabilitation at completion of the reporting period	There was no rehabilitation completed during the Annual Review period. Operations were completed within the existing quarry footprint.
Agreed post- rehabilitation land use	According to the Biodiversity and Rehabilitation Management Plan, vegetation communities consist of: ● Mixed Eucalyptus Forest; ● Brushbox Forest; and ● Subtropical Rainforest.
Key rehabilitation performance indicators	Key rehabilitation indicators are outlined within Section 7 of the Biodiversity and Rehabilitation Management Plan.
Renovation or removal of buildings	No building removal during the Annual Review period.
Any other Rehabilitation Taken including: ● Exploration activities; ● Infrastructure;	There was no rehabilitation completed during the Annual Review period.

Guideline Requirement	Site Comment
• Dams; and • The installation or maintenance of fences, bunds and any other works.	
Any rehabilitation areas which have received formal sign off from DRG	No rehabilitation has received signoff during the Annual Review period.
Variations to activities undertaken to those proposed (including why there were variations and whether DRG was notified)	No rehabilitation completed during the Annual Review period.
Outcomes of trials, research projects and other initiatives	No trials conducted during the Annual Review period.
Key issues that may affect successful rehabilitation	There are several potential issues that can affect rehabilitation including availability of material, seed stock, climatic events and rehabilitation methodology.

8.2 Summary of Current Rehabilitation and Performance

A summary of the rehabilitation and disturbance status is outlined in **Table 23.** Current rehabilitation and disturbance are shown **on Figure 3.**

Table 23: Rehabilitation and Disturbance Status

Quarry Area Type	This Reporting Period (Actual)	Next Reporting Period (Forecast)
	Current AEMR Period (ha)	Next AEMR Period (ha)
A. Total Quarry Footprint[1]	17.1	17.8
B. Total Active Disturbance[2]	17.1	17.8
C. Land Being Prepared for Rehabilitation[3]	0	0
D. Land Under Active Rehabilitation[4]	0	0
E. Completed Rehabilitation[5]	0	0

1 Total disturbance and rehabilitation.
2 Total disturbance within the Project Approval boundary
3 Rehabilitation that is being shaped in a phase of decommissioning, landform establishment and growth medium development.
4 rehabilitation under a phase of ecosystem and land use establishment or ecosystem and land use sustainability

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

At the end of 2017 there was approximately 17.1 Ha of active disturbance. There is proposed to be 0.7 Ha of additional disturbance in 2018 at Teven Quarry. There is no active rehabilitation at Teven Quarry, and none proposed in 2018.

Sheet Size : A4

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Teven Quarry
Disturbance and Rehabilitation 2017

FIGURE 3

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 24**.

Table 24: 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.	A program for progressive rehabilitation will be established.
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.	All benches will be active next reporting period and hence there will be no area in need of rehabilitation.

9 WASTE MANAGEMENT

9.1 Waste Streams

Waste streams produced at Teven Quarry are categorised as:

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

9.2 Waste Management

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

Key components of waste management are:

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

10 COMMUNITY

10.1 Community Engagement Activities

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

- Maintenance of a website (containing publicly available documents;
- 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.

10.2 Community Contributions

Holcim has maintained community contributions by sponsoring the following sporting clubs from the local region:

- Red Devils Dolphin Rugby League Club;
- Ballina Seagulls Rugby League Club;
- Lennox Head Football Club (LHFC) and
- Bangalow Soccer Club.

10.3 Complaints

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

A copy of the register, as well as all publicly listed information including contacts for locals in the community is available on the Teven Quarry webpage in accordance with the Development Consent requirements (http://www.holcim.com.au/about-us/community-link/teven-quarry-teven-ballina-nsw.html).

11 INDEPENDENT AUDIT

The site undertook an Independent Environmental Audit (IEA) in 2016 in accordance with the timeframes of the Development Consent. All recommendations raised in IEA have been actioned in accordance with the report prepared by GHD Consultants. According to the previous Annual Review, all actions have been closed out.

12 INCIDENTS AND NON-COMPLIANCE

Table 25 summarises the incidents and non - compliances at Teven in 2017.

Table 25: Summary of Incidents and Non Compliances

<table>
<tr><th>Date</th><th>Incident/Non Compliance</th><th>Action</th></tr>
<tr><td>Throughout the Period</td><td>Condition 11, Schedule 3 - SSD 6422

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 in Table 4 at any residence on privately-owned land.
Table 4: Air quality criteria
<table>
<tr><th>Pollutant</th><th>Averaging Period</th><th colspan="2">Criterion</th></tr>
<tr><td>Particulate matter < 10 µm (PM_{10})</td><td>Annual</td><td colspan="2">[a,d] 30 µg/m^3</td></tr>
<tr><td>Particulate matter < 10 µm (PM_{10})</td><td>24 hour</td><td colspan="2">[b] 50 µg/m^3</td></tr>
<tr><td>Total suspended particulates (TSP)</td><td>Annual</td><td colspan="2">[a,d] 90 µg/m^3</td></tr>
<tr><td>[c] Deposited dust</td><td>Annual</td><td>[b] 2 g/m^2/month</td><td>[a,d] 4 g/m^2/month</td></tr>
</table>

<u>This condition relates to installation and operation of the PM_{10} monitor.</u>
<u>Note: the PM_{10} monitor has been operational since September 2017.</u></td><td>Improve the PM_{10} and depositional dust sampling process in 2018 to operate as per the Development Consent requirements.</td></tr>
<tr><td>Throughout the Period</td><td>Condition 14, Schedule 3 - SSD 6422

The Applicant shall prepare and implement an Air Quality Management Plan for the development to the satisfaction of the Secretary. This plan must:

(d) include an air quality monitoring program that:
• is capable of evaluating the performance of the development;
• includes a protocol for determining any exceedances of the relevant conditions of consent;
• effectively supports the air quality management system; and</td><td>Improve the PM_{10} and depositional dust sampling process in 2018 to operate as per the Development Consent requirements.</td></tr>
</table>

<table>
<tr><th>Date</th><th>Incident/Non Compliance</th><th>Action</th></tr>
<tr><td></td><td>• evaluates and reports on the adequacy of the air quality management system.

This condition relates to the implementation of the air quality monitoring component - - component of the Air Quality Management Plan.
Note: the PM_{10} monitor has been operational since September 2017.</td><td></td></tr>
<tr><td>Throughout the Period</td><td>Condition 10, Schedule 3

The Applicant shall prepare and implement a Blast Management Plan for the development to the satisfaction of the Secretary. This plan must:
(d) include community notification procedures for the blasting schedule;</td><td>The Blast Management Plan will be updated in 2018 to include the relevant Blasting Protocol.</td></tr>
<tr><td>Weeks 1, 11, 22, 31, 42 and 52</td><td>Condition M2.2 of the EPL – Water and/or Land Monitoring Requirements
M2.2 Water and/ or Land Monitoring Requirements

POINT 1
<table><tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr><tr><td>Oil and Grease</td><td>milligrams per litre</td><td>Yearly during discharge</td><td>Grab sample</td></tr><tr><td>pH</td><td>-</td><td>Weekly</td><td>No method specified</td></tr><tr><td>Total suspended solids</td><td>milligrams per litre</td><td>Yearly during discharge</td><td>Grab sample</td></tr></table>Weekly monitoring for pH is required at EPL Point 1.

Monitoring was completed weekly except weeks: 1, 11, 22, 31, 42 and 52.</td><td>Complete pH monitoring as per the weekly frequency.</td></tr>
</table>

13 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

Holcim staff will undertake the following works and improvement measures and projects in 2018 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 26: Improvement Actions for 2018

Improvement Measure	Activities
Progressive Rehabilitation	The site will continue to progressively rehabilitate available areas
PM_{10} and depositional dust monitoring	Improve the PM_{10} and depositional dust sampling process in 2018 to operate as per the Development Consent requirements.
Biodiversity	Weed spraying will continue at site during the next Annual Review period.
Water sampling	Complete all weekly pH sampling during the Annual Review period.
Groundwater Assessment	Condition 3, Schedule 19 *In the event that groundwater in excess of negligible quantities is intersected during extraction activities, the Applicant shall undertake a hydrogeological investigation, in consultation with NOW, to the satisfaction of the Secretary.* *The investigation must report on groundwater sources, levels, yield and quality; identify any risks to groundwater users or groundwater dependent ecosystems and propose recommended management measures. The Applicant must implement reasonable and feasible management measures to the satisfaction of the Secretary.* Holcim will continue to monitor the quarry void for groundwater seepage to ensure that groundwater quantities remain negligible.

APPENDIX 1
QUARTERLY NOISE RESULTS

Quarterly Noise Monitoring Assessment

Teven Quarry, March 2017.

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

April 2017

MAC
Muller Acoustic Consulting

Document Information

Quarterly Noise Monitoring Assessment

Teven Quarry, Teven, NSW

March 2017

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

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Document ID	Status	Date	Written By	Signed
MAC170439RP1	Final	20 April 2017	Oliver Muller	

CONTENTS

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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 Teven Quarry ('the quarry'), Teven, NSW.

The monitoring has been conducted in accordance with the Teven Noise Management Plan and in general accordance with relevant conditions outlined in the Development Consent (ref: SSD 6422); at five representative monitoring locations. This assessment has been undertaken during Quarter 1 March 2017 and forms part of the noise monitoring program for the quarry.

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

- NSW Environment Protection Authority (EPA), Industrial Noise Policy (INP), 2000;
- NSW Department of Planning and Environment, Development Consent (SSD 6422), 2015; 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 of the Teven Quarry Development Consent (2015), outlines the applicable noise criteria for residential receivers surrounding the quarry site.

Table 1 reproduces relevant criteria for each of the receivers as outlined in Table 2 of the quarries Development Consent.

Table 1 Noise Criteria

Location	Quarry Operations	
	Period: Day	Period: Evening
	6am – 10pm	6pm – 10pm
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$
R3, R4, R13, R15, R16, R17, R18, R20	38	35
All other receivers	37	35

Note 1: Receiver locations are shown in Figure 1.

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3 Methodology

3.1 Locality

The quarry is located in Teven, NSW approximately 7km west of Ballina, NSW. Receivers in the locality surrounding the quarry are primarily rural. The surroundings of the quarry include bushland to the west and farming pastures to the east. The monitoring locations with respect to the quarry are presented in the locality plan shown in **Figure 1**.

3.2 Noise Monitoring Locations

Table 2 presents the noise monitoring location IDs and relevant coordinates with respect to the nearest corresponding receiver.

Table 2 Monitoring Locations

Location	Nearest Receiver	Easting	Northing
N1	R7	546698	6809937
N2	R3/R4	548771	6810481
N3	R2	547803	6809032
N4	R10	547725	6810228
N5	R3/4	548142	6810308

It is noted that some noise monitoring locations where unable to be reached due to severe weather and agriculture conditions, however the noise monitoring locations completed during this quarter are representative of those locations that were inaccessible.

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" in the INP. The measurements were carried out using Svantek Type 1, 971 noise analyser on Wednesday 29 March 2017. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2004-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

As per the Noise Management Plan, two day and two evening measurements were conducted at each monitoring location. Measurements were of 15 minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source. Extraneous noise sources were excluded from the analysis as to calculate the $L_{Aeq(15min)}$ quarry noise contribution for comparison against the relevant noise criteria. It is noted that the quarry was not operational during the evening period therefore quarry noise contributions are not applicable.

In the event of quarry attributed noise being above the applicable criteria, prevailing meteorological conditions for the monitoring period were sourced from Ballina airport's meteorological station and analysed in accordance with Appendix E4 of the INP to determine the stability category present at the time of each measured sample.

The meteorological analysis has been completed to determine applicability of results in accordance with Condition 1 of Appendix 5 of the Development Consent. Results obtained during non-prevailing meteorological conditions (ie F Class Stability in conjunction with a 2m/s drainage wind or a G Class Stability) are considered not applicable against the criteria.

FIGURE 1

LOCALITY PLAN

REF: MAC170439

0 250m

KEY

N1 NOISE MONITORING LOCATION

SITE LOCATION

MAC Muller Acoustic Consulting

*Imagery Source : nearmaps

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4 Results

4.1 Assessment Results - Location N1

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N1 for Wednesday 29 March 2017 are presented in **Table** .

Table 3 Operator-Attended Noise Survey Results – Location N1

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
29/03/2017	9:26	76	54	51	Dir: NE Wind Speed: 3-4 m/s Rain: Nil	Birds and insects 36 - 46 Aircraft 50 - 76 Quarry Hum 33 - 37 Wind Local residential noise
		Teven Quarry $L_{Aeq(15min)}$ Contribution				35
29/03/2017	9:43	72	47	43	Dir: NE Wind Speed: 3-4 m/s Rain: Nil	Wind 36 - 42 Birds and insects 33 - 49 Quarry Hum 34 - 38 Traffic 72
		Teven Quarry $L_{Aeq(15min)}$ Contribution				36
29/03/2017	18:00	69	50	49	Dir: N Wind Speed: 3-4 m/s Rain: Nil	Wind <45 Insects <45 Local residential noise 45 - 69 Cars 45
		Teven Quarry $L_{Aeq(15min)}$ Contribution				N/A
29/03/2017	18:15	82	54	50	Dir: N Wind Speed: 3-4 m/s Rain: Nil	Wind <46 Insects and birds 46 - 57 Aircraft <47 Cars 46 - 68
		Teven Quarry $L_{Aeq(15min)}$ Contribution				N/A

Note: N/A identifies quarry as not being audible during attended measurements.

4.2 Assessment Results - Location N2

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N2 for Wednesday 29 March 2017 are presented in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location N2

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
29/03/2017	10:15	90	65	62	Dir: N Wind Speed: 2-3 m/s Rain: Nil	Traffic 42 - 44 Insects <42 Birds 42 - 48 Trucks 45 - 90
		Teven Quarry $L_{Aeq(15min)}$ Contribution				N/A
29/03/2017	10:30	89	65	61	Dir: N Wind Speed: 2-3 m/s Rain: Nil	Traffic 42 - 44 Insects <45 Birds 38 - 47 Trucks 45 - 89
		Teven Quarry $L_{Aeq(15min)}$ Contribution				N/A
29/03/2017	18:47	63	54	52	Dir: N Wind Speed: 2-3 m/s Rain: Nil	Birds and insects 55 - 59 Traffic 58 - 60 Local residential noise 56 - 63
		Teven Quarry $L_{Aeq(15min)}$ Contribution				N/A
29/03/2017	19:02	60	51	49	Dir: N Wind Speed: 2-3 m/s Rain: Nil	Birds and Insects 40 - 53 Traffic 53 - 56
		Teven Quarry $L_{Aeq(15min)}$ Contribution				N/A

Note: N/A identifies quarry as not being audible during attended measurements.

4.3 Assessment Results - Location N3

The monitored noise level contributions and observed meteorological conditions for each day and evening night survey period at location N3 for Wednesday 29 March 2017 are presented in **Table 5**.

Table 5 Operator-Attended Noise Survey Results – Location N3

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
29/03/2017	10:57	68	44	42	Dir: NE Wind Speed: 2-3 m/s Rain: Nil	Quarry hum 32 - 35 Wind 34 - 38 Insects <34
		Teven Quarry $L_{Aeq(15min)}$ Contribution				34
29/03/2017	11:12	68	41	40	Dir: NE Wind Speed: 2-3 m/s Rain: Nil	Aircraft 39 - 43 Quarry hum 33 - 34 Wind 34 - 38 Insects <34
		Teven Quarry $L_{Aeq(15min)}$ Contribution				34
29/03/2017	19:21	66	47	45	Dir: N Wind Speed: 3-4 m/s Rain: Nil	Insects and birds <43 Wind <43 Traffic 43 - 46 Aircraft 44 - 66
		Teven Quarry $L_{Aeq(15min)}$ Contribution				N/A
29/03/2017	19:36	51	44	43	Dir: N Wind Speed: 3-4 m/s Rain: Nil	Insects 42 - 46 Wind <42 Traffic 43 - 51
		Teven Quarry $L_{Aeq(15min)}$ Contribution				N/A

Note: N/A identifies quarry as not being audible during attended measurements.

4.4 Assessment Results - Location N4

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N4 for Wednesday 29 March 2017 are presented in **Table 6**.

Table 6 Operator-Attended Noise Survey Results – Location N4

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
29/03/2017	11:40	81	61	59	Dir: N Wind Speed: 3-4 m/s Rain: Nil	Birds 34 - 46 Insects <36 Local residential noise <36 Trucks 34 – 81 Quarry hum 36
Teven Quarry $L_{Aeq(15min)}$ Contribution						36
29/03/2017	11:55	78	56	55	Dir: N Wind Speed: 3-4 m/s Rain: Nil	Birds 34 – 46 Insects <36 Local residential noise <36 Trucks 34 –78 Quarry hum 36
Teven Quarry $L_{Aeq(15min)}$ Contribution						36
29/03/2017	19:55	53	45	44	Dir: N Wind Speed: 3-5 m/s Rain: Nil	Insects 42 - 48 Distant traffic <44
Teven Quarry $L_{Aeq(15min)}$ Contribution						N/A
29/03/2017	20:10	58	44	43	Dir: N Wind Speed: 3-5 m/s Rain: Nil	Insects 42 - 44 Distant traffic <44 Wind 44 - 55
Teven Quarry $L_{Aeq(15min)}$ Contribution						N/A

Note: N/A identifies quarry as not being audible during attended measurements.

4.5 Assessment Results - Location N5

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N5 for Wednesday 29 March 2017 are presented in **Table 7**.

Table 7 Operator-Attended Noise Survey Results – Location N5

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
29/03/2017	12:16	78	58	56	Dir: NE Wind Speed: 2-3 m/s Rain: Nil	Wind <38 Birds 38 - 52 Traffic<38 Trucks 48 - 78 Aircraft 48 - 65
			Teven Quarry $L_{Aeq(15min)}$ Contribution			N/A
29/03/2017	12:31	76	58	56	Dir: NE Wind Speed: 2-3 m/s Rain: Nil	Wind <38 Birds 38 - 52 Traffic <38 Trucks 48 - 76
			Teven Quarry $L_{Aeq(15min)}$ Contribution			N/A
29/03/2017	20:25	66	45	44	Dir: N Wind Speed: 3-5 m/s Rain: Nil	Insects <40 Traffic 44 - 66
			Teven Quarry $L_{Aeq(15min)}$ Contribution			N/A
29/03/2017	20:40	50	44	43	Dir: N Wind Speed: 3-5 m/s Rain: Nil	Insects <40 Traffic 40 - 50 Livestock <40
			Teven Quarry $L_{Aeq(15min)}$ Contribution			N/A

Note: N/A identifies quarry as not being audible during attended measurements.

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5 Noise Compliance Assessment

The compliance assessment for each residential receiver R2, R3, R7, R10 and R14 are presented in **Table 8** and **Table 9** for day and evening assessment periods.

Table 8 Daytime Noise Compliance Assessment

Receiver No.	Monitoring Location ID	Quarry Noise Contribution $L_{Aeq(15min)}$	Quarrying Noise Criteria $L_{Aeq(15min)}$	Compliant
R2	N1	34	37	✓
R3	N2	Nil	38	✓
R7	N3	36	37	✓
R10	N4	36	37	✓
R14	N5	Nil	37	✓

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

Table 9 Evening Noise Compliance Assessment

Receiver No.	Monitoring Location ID	Quarry Noise Contribution $L_{Aeq(15min)}$	Quarrying Noise Criteria $L_{Aeq(15min)}$	Compliant
R2	N1	Nil	37	✓
R3	N2	Nil	38	✓
R7	N3	Nil	37	✓
R10	N4	Nil	37	✓
R14	N5	Nil	37	✓

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

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6 Conclusion

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

Attended noise monitoring was undertaken on 29 March 2017 at several representative monitoring locations, quarry noise contributions were compared against the relevant criteria. The assessment has identified that noise emissions generated by Teven Quarry comply with relevant statutory noise criteria specified in the conditions of consent at all assessed residential receivers.

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Appendix A - Glossary of Terms

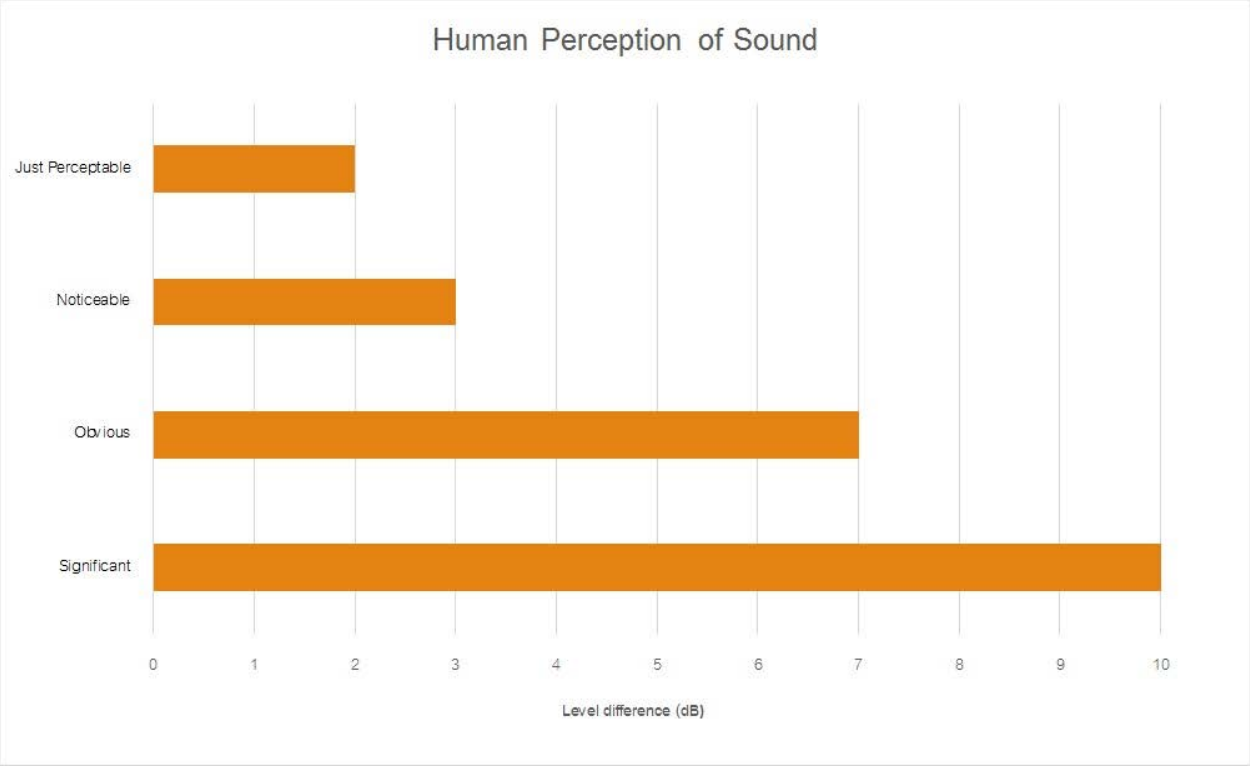
Table A1 provides a number of technical terms have been used in this report.

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.
LAmax	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (LW)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by : = 10.log10 (W/Wo) Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts.

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

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA	
Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



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Quarterly Noise Monitoring Assessment

Teven Quarry, June 2017

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

July 2017

Document Information

Quarterly Noise Monitoring Assessment

Teven Quarry, Teven, NSW

June 2017

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	Written By	Signed
MAC170439RP2	Final	6 July 2017	Oliver Muller	

CONTENTS

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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 Teven Quarry ('the quarry'), Teven, NSW.

The monitoring has been conducted in accordance with the Teven Noise Management Plan and in general accordance with relevant conditions outlined in the Development Consent (ref: SSD 6422); at five representative monitoring locations. This assessment has been undertaken during Quarter 2, June 2017, and forms part of the noise monitoring program for the quarry.

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

- NSW Environment Protection Authority (EPA), Industrial Noise Policy (INP), 2000;
- NSW Department of Planning and Environment, Development Consent (SSD 6422), 2015; 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 of the Teven Quarry Development Consent (2015), outlines the applicable noise criteria for residential receivers surrounding the quarry site.

Table 1 reproduces relevant criteria for each of the receivers as outlined in Table 2 of the quarry's Development Consent.

Table 1 Noise Criteria

Location	Quarry Operations	
	Period: Day	Period: Evening
	7am – 6pm	6pm – 10pm
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$
R3, R4, R13, R15, R16, R17, R18, R20	38	35
All other receivers	37	35

Note 1: Receiver locations are shown in Figure 1.

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3 Methodology

3.1 Locality

The quarry is located in Teven, NSW approximately 7km west of Ballina, NSW. Receivers in the locality surrounding the quarry are primarily rural. The surroundings of the quarry include bushland and farming pastures. The monitoring locations with respect to the quarry are presented in the locality plan shown in **Figure 1.**

3.2 Noise Monitoring Locations

Table 2 presents details of monitoring locations, representative to receiver locations.

Table 2 Monitoring Locations

Location	Nearest Receiver	Easting	Northing
N1	R7	547017	6810098
N2	R3/R4	548877	6810290
N3	R2	548642	6810801
N4	R10	547729	6810226
N5	R15	547793	6808998

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 in the INP. The measurements were carried out using Svantek Type 1, 971 noise analyser on Monday 19 June 2017. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2004-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

As per the Noise Management Plan, two day and two evening measurements were conducted at each monitoring location. Measurements were of 15 minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source. Extraneous noise sources were excluded from the analysis as to calculate the $L_{Aeq(15min)}$ quarry noise contribution for comparison against the relevant noise criteria. It is noted that the quarry was not operational during the evening period therefore quarry noise contributions are not applicable.

FIGURE 1

LOCALITY PLAN

REF: MAC170439

0 150m

KEY

N1 RECEIVER LOCATION

SITE LOCATION

MAC
Muller Acoustic Consulting

*Imagery Source : nearmaps

4 Results

4.1 Assessment Results - Location N1

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N1 for Monday 19 June 2017 are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location N1

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
19/06/17	09:41	69	56	50	Dir: S Wind Speed: 3 m/s Rain: Nil	Birds 43-56 Wind in trees 38-46 Local traffic 45-69
Teven Quarry $L_{Aeq(15min)}$ Contribution						NA
19/06/17	09:56	65	53	48	Dir: S Wind Speed: 3 m/s Rain: Nil	Wind in trees 44-47 Birds 46-61 Local residential noise 41-49 Local & distant traffic 31-64
Teven Quarry $L_{Aeq(15min)}$ Contribution						NA
19/06/17	18:01	66	53	48	Dir: S Wind Speed: 4 m/s Rain: Nil	Wind in trees 48-56 Insects <30 Local & distant traffic 50-65
Teven Quarry $L_{Aeq(15min)}$ Contribution						NA
19/06/17	18:16	65	54	47	Dir: S Wind Speed: 4 m/s Rain: Nil	Aircraft 49-61 Wind in trees 36-55 Insects <30
Teven Quarry $L_{Aeq(15min)}$ Contribution						NA

Note: NA identifies quarry as not being audible during attended measurements.

4.2 Assessment Results - Location N2

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N2 for Monday 19 June 2017 are presented in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location N2

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
19/06/17	12:27	87	66	49	Dir: S Wind Speed: 3 m/s Rain: Nil	Local traffic 46-83 Birds 48-57 Wind in trees 41-56
Teven Quarry $L_{Aeq(15min)}$ Contribution						NA
19/06/17	12:42	86	63	46	Dir: S Wind Speed: 3 m/s Rain: Nil	Local traffic 52-80 Wind in trees 41-58 Local residential noise 47-65
Teven Quarry $L_{Aeq(15min)}$ Contribution						NA
19/06/17	18:45	84	54	44	Dir: S Wind Speed: 4 m/s Rain: Nil	Wind in trees 46-54 Insects <30 Birds 46-55 Local traffic 44-82 Aircraft 44-64
Teven Quarry $L_{Aeq(15min)}$ Contribution						NA
19/06/17	19:00	83	58	45	Dir: S Wind Speed: 4 m/s Rain: Nil	Wind in trees 38-46 Insects <30 Local & distant traffic 50-82
Teven Quarry $L_{Aeq(15min)}$ Contribution						NA

Note: NA identifies quarry as not being audible during attended measurements.

4.3 Assessment Results - Location N3

The monitored noise level contributions and observed meteorological conditions for each day and evening night survey period at location N3 for Monday 19 June 2017 are presented in **Table 5**.

Table 5 Operator-Attended Noise Survey Results – Location N3

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
19/06/17	10:39	66	48	44	Dir: S Wind Speed: 2 m/s Rain: Nil	Wind in trees 41-52 Distant traffic 31-34 Insects <30 Birds 48-62 Aircraft 51-61
		Teven Quarry $L_{Aeq(15min)}$ Contribution				NA
19/06/17	11:15	72	50	46	Dir: S Wind Speed: 2 m/s Rain: Nil	Distant traffic <35 Birds 46-65 Aircraft 43-65 Wind in trees 41-58
		Teven Quarry $L_{Aeq(15min)}$ Contribution				NA
19/06/17	19:29	70	53	45	Dir: SW Wind Speed: 4 m/s Rain: Nil	Wind in trees 39-61 Insects <35 Distant traffic <35
		Teven Quarry $L_{Aeq(15min)}$ Contribution				NA
19/06/17	19:44	80	55	48	Dir: SW Wind Speed: 4 m/s Rain: Nil	Wind in trees 39-46 Insects <30 Distant traffic <35 Birds 49-55 Aircraft 52-76
		Teven Quarry $L_{Aeq(15min)}$ Contribution				NA

Note: NA identifies quarry as not being audible during attended measurements.

4.4 Assessment Results - Location N4

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N4 for Monday 19 June 2017 are presented in **Table 6**.

Table 6 Operator-Attended Noise Survey Results – Location N4

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
19/06/17	11:51	80	61	49	Dir: S Wind Speed: 3 m/s Rain: Nil	Wind in trees 38-46 Birds 42-52 Quarry hum 32-36 Local traffic 48-80 Aircraft 46-78
			Teven Quarry $L_{Aeq(15min)}$ Contribution			34
19/06/17	12:06	81	60	49	Dir: S Wind Speed: 3 m/s Rain: Nil	Wind in trees 48-58 Birds 45-56 Quarry hum 32-34 Local traffic 32-81
			Teven Quarry $L_{Aeq(15min)}$ Contribution			33
19/06/17	20:07	75	46	40	Dir: SW Wind Speed: 2 m/s Rain: Nil	Wind in trees 41-56 Insects <30 Distant traffic 32-34
			Teven Quarry $L_{Aeq(15min)}$ Contribution			NA
19/06/17	20:22	69	49	42	Dir: SW Wind Speed: 2 m/s Rain: Nil	Wind in trees 41-59 Insects <30 Distant traffic <35
			Teven Quarry $L_{Aeq(15min)}$ Contribution			NA

Note: NA identifies quarry as not being audible during attended measurements.

4.5 Assessment Results - Location N5

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N5 for Monday 19 June 2017 are presented in **Table 7**.

Table 7 Operator-Attended Noise Survey Results – Location N5

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
19/06/17	12:59	83	62	48	Dir: S Wind Speed: 8 m/s Rain: Nil	Birds 56-61 Wind in trees 38-52 Birds 41-46 Local & distant traffic 46-81
Teven Quarry $L_{Aeq(15min)}$ Contribution						NA
19/06/17	13:14	88	67	56	Dir: S Wind Speed: 8 m/s Rain: Nil	Birds 46-52 Wind in trees 46-61 Local & distant traffic 46-84
Teven Quarry $L_{Aeq(15min)}$ Contribution						NA
19/06/17	20:39	71	52	44	Dir: S Wind Speed: 4 m/s Rain: Nil	Insects <30 Wind in trees 39-68 Running water (Creek) 36-40
Teven Quarry $L_{Aeq(15min)}$ Contribution						NA
19/06/17	20:55	81	57	41	Dir: S Wind Speed: 4 m/s Rain: Nil	Insects 18-21 Wind in trees 39-58 Running water (Creek) 36-40 Local traffic 42-80
Teven Quarry $L_{Aeq(15min)}$ Contribution						NA

Note: NA identifies quarry as not being audible during attended measurements.

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5 Noise Compliance Assessment

The compliance assessment for each residential receiver R2, R3, R7, R10 and R15 are presented in **Table 8** and **Table 9** for day and evening assessment periods.

Table 8 Daytime Noise Compliance Assessment

Receiver No.	Monitoring Locations	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
		$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	
R2	N3	Nil	37	✓
R3/R4	N2	Nil	38	✓
R7	N1	Nil	37	✓
R10	N4	34	37	✓
R15	N5	Nil	38	✓

Table 9 Evening Noise Compliance Assessment

Receiver No.	Monitoring Locations	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
		$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	
R2	N3	Nil	35	✓
R3/R4	N2	Nil	35	✓
R7	N1	Nil	35	✓
R10	N4	Nil	35	✓
R15	N5	Nil	35	✓

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6 Discussion

6.1 Discussion of Results - Location N1

Monitoring on 19 June 2017 identified that Teven Quarry noise was inaudible on all four occasions, and therefore satisfied the daytime noise limits of 37dBA. It is noted that Holcim Teven was not operational during the evening period although background measurements were undertaken for completeness and as per the EPL. Extraneous sources audible during the four attended surveys included birds, wind in trees, insects, aircraft, local residential noise, local and residential traffic.

6.2 Discussion of Results - Location N2

Monitoring results for N2 during the June 2017 quarter were dominated by local traffic that was mostly constant during all four attended measurements. Quarry emissions were inaudible on all four occasions, therefore satisfying the relevant daytime noise limit of 38dBA. The quarry was not operational during the evening period therefore satisfying the evening noise limit of 35dBA. Extraneous sources measured include local traffic, birds, wind in trees, local residential noise, insects, birds (ducks), aircraft and distant traffic.

6.3 Discussion of Results - Location N3

Quarry noise was inaudible on all four occasions during the June 2017 survey period satisfying the daytime criteria of 37dBA. Teven quarry was not operational during the evening period therefore satisfying the evening criteria of 35dBA. Non-mining noise sources included birds, distant highway traffic, insects, aircraft and wind in trees.

6.4 Discussion of Results - Location N4

Quarry noise emissions were audible during both daytime attended noise surveys at N4 for the June 2017 quarter. The relevant daytime noise limits of 37dBA were satisfied as Holcim emissions ranged from 33dBA to 34dBA at this monitoring location. It is noted that Teven Quarry was not operational during the evening period, therefore satisfying the evening noise limit of 35dBA. Local traffic was the dominant source at this receiver with other non-quarrying sources including wind in trees, birds, aircraft, insects and distant traffic all audible throughout the four attended measurements.

6.5 Discussion of Results - Location N5

Holcim Quarry hum was inaudible on all four occasions throughout the June 2017 monitoring quarter at N5. Therefore, quarry emissions satisfied the relevant daytime noise limit of 38dBA It is noted that the quarry was not operational during the evening period and therefore satisfied the evening noise limits 35dBA. Local traffic was the dominant source at this receiver with other non-quarrying sources including wind in trees, birds (ducks), distant traffic, insects, and water flow noise from the nearby creek all audible during the June 2017 quarter.

7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment for VGT Pty Ltd on behalf of Holcim Pty Ltd at the Teven Quarry, Teven, NSW. The assessment was completed to assess the quarry's compliance with the relevant criteria outlined in their Conditions of Consent for relevant surrounding residential receivers. It is again reaffirmed that the quarry was not operational during the evening period on 19 June 2017 although measurements were completed as per the EPL which is considered a comprehensive assessment approach.

Attended noise monitoring was undertaken on 19 June 2017 at available representative monitoring locations, quarry noise contributions were compared against the relevant criteria. The assessment has identified that noise emissions generated by Teven Quarry comply with relevant statutory noise criteria specified in the Conditions of Consent at all assessed residential receivers.

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Appendix A - Glossary of Terms

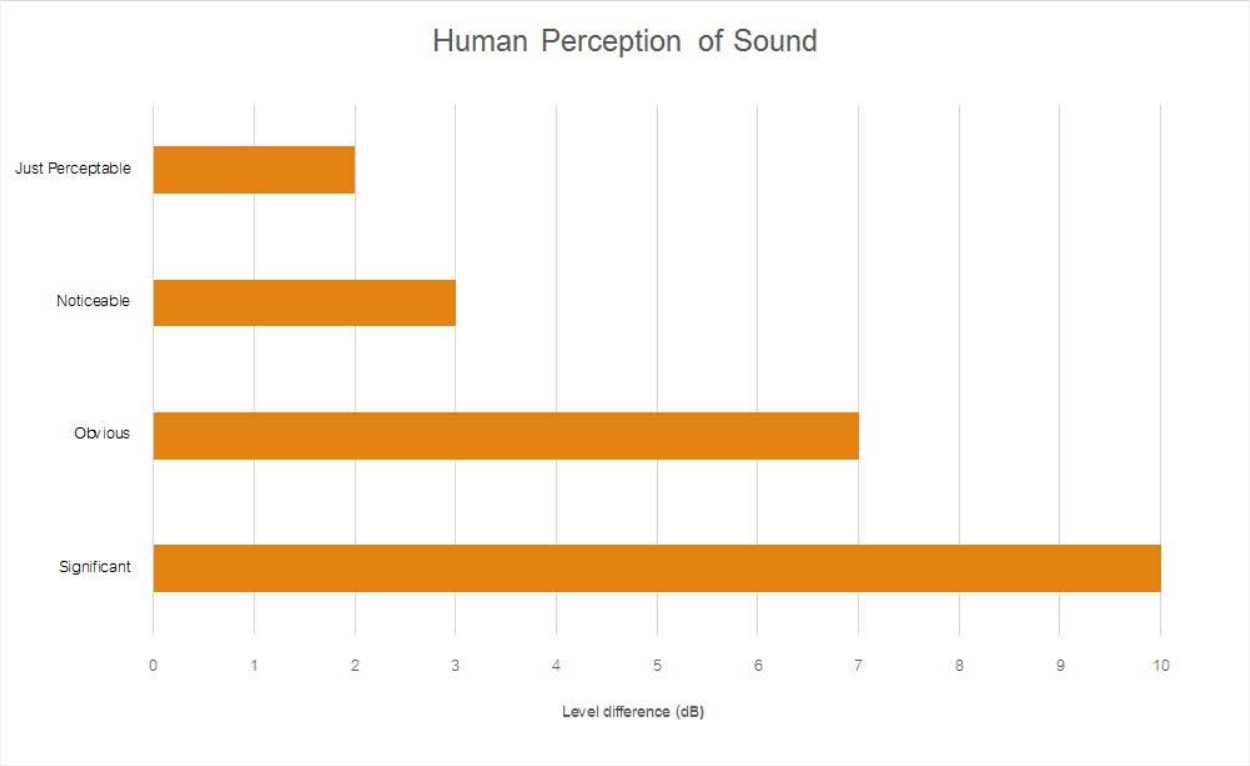
Table A1 provides a number of technical terms have been used in this report.

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.
LAmax	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (LW)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by : = 10.log10 (W/Wo) Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts.

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

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA	
Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



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Quarterly Noise Monitoring Assessment

Teven Quarry, September 2017

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

October 2017

MAC
Muller Acoustic Consulting

Document Information

Quarterly Noise Monitoring Assessment

Teven Quarry, Teven, NSW

September 2017

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

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MAC170439RP3	Final	16 October 2017	Oliver Muller	

CONTENTS

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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 Teven Quarry ('the quarry'), Teven, NSW.

The monitoring has been conducted in accordance with the Teven Noise Management Plan and in general accordance with relevant conditions outlined in the Development Consent (ref: SSD 6422); at five representative monitoring locations. This assessment has been undertaken during Quarter 3, September 2017, and forms part of the noise monitoring program for the quarry.

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

- NSW Environment Protection Authority (EPA), Industrial Noise Policy (INP), 2000;
- NSW Department of Planning and Environment, Development Consent (SSD 6422), 2015; 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 of the Teven Quarry Development Consent (2015), outlines the applicable noise criteria for residential receivers surrounding the quarry site.

Table 1 reproduces relevant criteria for each of the receivers as outlined in Table 2 of the quarry's Development Consent.

Table 1 Noise Criteria

Location[1]	Quarry Operations	
	Period: Day	Period: Evening
	7am – 6pm	6pm – 10pm
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$
R3, R4, R13, R15, R16, R17, R18, R20	38	35
All other receivers	37	35

Note 1: Receiver locations are shown in Figure 1.

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3 Methodology

3.1 Locality

The quarry is located in Teven, NSW approximately 7km west of Ballina, NSW. Receivers in the locality surrounding the quarry are primarily rural. The surroundings of the quarry include bushland and farming pastures. The monitoring locations with respect to the quarry are presented in the locality plan shown in **Figure 1.**

3.2 Noise Monitoring Locations

Table 2 presents details of monitoring locations, representative to receiver locations.

Table 2 Monitoring Locations

Location	Nearest Receiver	Easting	Northing
N1	R7	547017	6810098
N2	R3/R4	548877	6810290
N3	R2	548642	6810801
N4	R10	547729	6810226
N5	R15	547793	6808998

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 in the INP. The measurements were carried out using Svantek Type 1, 971 noise analyser on Wednesday 20 September 2017 and Thursday 21 September 2017. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2004-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

As per the Noise Management Plan, two day and two evening measurements were conducted at each monitoring location. Measurements were of 15 minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source. Extraneous noise sources were excluded from the analysis as to calculate the $L_{Aeq(15min)}$ quarry noise contribution for comparison against the relevant noise criteria. It is noted that the quarry was not operational during the evening period therefore quarry noise contributions are not applicable.

FIGURE 1

LOCALITY PLAN

REF: MAC170439

0 150m

KEY

N1 RECEIVER LOCATION

SITE LOCATION

MAC
Muller Acoustic Consulting

*Imagery Source : nearmaps

4 Results

4.1 Assessment Results - Location N1

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N1 for Wednesday 20 September 2017 and Thursday 21 September 2017 are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location N1

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
20/09/17	18:16 (Evening)	54	36	31	Dir: S Wind Speed: 0.1 m/s Rain: Nil	Insects 30-41 Wind in trees <39 Distant traffic <39
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
20/09/17	18:31 (Evening)	55	38	32	Dir: S Wind Speed: 0.1 m/s Rain: Nil	Insects 28-36 Distant traffic <28 Aircraft 34-52
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
21/09/17	07:36 (Day)	82	54	37	Dir: NE Wind Speed: 0.5 m/s Rain: Nil	Wind in trees 36-42 Birds 38-42 Distant traffic <36 Aircraft 38-46 Dog bark <38 Local traffic 40-81
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
21/09/17	07:51 (Day)	77	51	33	Dir: NE Wind Speed: 0.5 m/s Rain: Nil	Birds 33-56 Wind in trees 34-38 Local residential noise 44-62 Local traffic 38-61 Aircraft 38-46
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible

4.2 Assessment Results - Location N2

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N2 for Wednesday 20 September 2017 and Thursday 21 September 2017 are presented in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location N2

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
20/09/17	18:56 (Evening)	86	62	34	Dir: S Wind Speed: 0.1 m/s Rain: Nil	Local traffic 36-82 Insects <36 Birds 36-40
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
20/09/17	19:11 (Evening)	73	50	38	Dir: S Wind Speed: 0.1 m/s Rain: Nil	Insects <34 Local residential noise 38-63 Aircraft 36-62 Distant traffic 32-36 Local traffic 39-64
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
21/09/17	08:18 (Day)	88	67	41	Dir: E Wind Speed: 1.0 m/s Rain: Nil	Birds 40-54 Local traffic 40-84 Wind in trees <40
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
21/09/17	08:33 (Day)	89	67	40	Dir: E Wind Speed: 1.0 m/s Rain: Nil	Birds 37-47 Local traffic 38-81 Wind in trees <37
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible

4.3 Assessment Results - Location N3

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N3 for Wednesday 20 September 2017 and Thursday 21 September 2017 are presented in **Table 5**.

Table 5 Operator-Attended Noise Survey Results – Location N3

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
20/09/17	19:28 (Evening)	53	36	33	Dir: S Wind Speed: 0.1 m/s Rain: Nil	Insects 28-34 Distant traffic <34 Aircraft 38-52 Birds 37-53
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
20/09/17	19:44 (Evening)	44	36	33	Dir: S Wind Speed: 0.1 m/s Rain: Nil	Insects <32 Distant traffic 32-38 Local traffic 38-42
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
21/09/17	08:55 (Day)	62	40	36	Dir: NE Wind Speed: 0.5 m/s Rain: Nil	Quarry hum <34 Birds 42-60 Insects <34 Wind in grass 35-42 Aircraft 45-52
Teven Quarry $L_{Aeq(15min)}$ Contribution						<34
21/09/17	09:10 (Day)	62	43	35	Dir: NE Wind Speed: 1.0 m/s Rain: Nil	Birds 39-61 Quarry hum <34 Insects <34 Aircraft 36-59 Wind in grass 33-42
Teven Quarry $L_{Aeq(15min)}$ Contribution						<34

4.4 Assessment Results - Location N4

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N4 for Wednesday 20 September 2017 and Thursday 21 September 2017 are presented in **Table 6**.

Table 6 Operator-Attended Noise Survey Results – Location N4

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
20/09/17	20:03 (Evening)	60	36	34	Dir: S Wind Speed: 0.1 m/s Rain: Nil	Insects <28 Distant traffic 28-36
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
20/09/17	20:18 (Evening)	56	36	34	Dir: S Wind Speed: 0.1 m/s Rain: Nil	Insects <28 Distant traffic 32-34 Local traffic 32-46
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
21/09/17	09:32 (Day)	89	67	40	Dir: NE Wind Speed: 1.2 m/s Rain: Nil	Quarry hum <36 Local traffic 39-88 Insects <36 Birds 36-54 Wind in grass<40 Aircraft 55-64
Teven Quarry $L_{Aeq(15min)}$ Contribution						<36
21/09/17	09:47 (Day)	91	66	40	Dir: NE Wind Speed: 1.5 m/s Rain: Nil	Local traffic 39-91 Quarry hum <34 Birds 39-54 Insects <39 Wind in trees 36-42
Teven Quarry $L_{Aeq(15min)}$ Contribution						<34

4.5 Assessment Results - Location N5

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N5 for Wednesday 20 September 2017 and Thursday 21 September 2017 are presented in **Table 7**.

Table 7 Operator-Attended Noise Survey Results – Location N5

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
20/09/17	20:35 (Evening)	63	38	35	Dir: S Wind Speed: 0.3 m/s Rain: Nil	Distant traffic 35-40 Insects <34
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
20/09/17	20:51 (Evening)	76	49	35	Dir: S Wind Speed: 0.5 m/s Rain: Nil	Insects <32 Distant traffic 32-40 Local traffic 38-75 Ducks 36-40
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
21/09/17	10:06 (Day)	86	59	36	Dir: N Wind Speed: 1.0 m/s Rain: Nil	Insects <34 Aircrafts 42-56 Local traffic 47-86 Birds 48-52 Wind in trees <46
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
21/09/17	10:21 (Day)	88	63	36	Dir: N Wind Speed: 0.5 m/s Rain: Nil	Local traffic 48-88 Insects <33 Birds 48-72 Wind in trees 39-48
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible

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5 Noise Compliance Assessment

The compliance assessment for each residential receiver R2, R3/R4, R7, R10 and R15 are presented in **Table 8** and **Table 9** for day and evening assessment periods.

Table 8 Daytime Noise Compliance Assessment

Receiver No.	Monitoring Locations	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
		$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	
R2	N3	<34	37	✓
R3/R4	N2	Nil	38	✓
R7	N1	Nil	37	✓
R10	N4	<36	37	✓
R15	N5	Nil	38	✓

Table 9 Evening Noise Compliance Assessment

Receiver No.	Monitoring Locations	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
		$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	
R2	N3	Nil	35	✓
R3/R4	N2	Nil	35	✓
R7	N1	Nil	35	✓
R10	N4	Nil	35	✓
R15	N5	Nil	35	✓

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6 Discussion

6.1 Discussion of Results - Location N1

Monitoring on 20 September 2017 and 21 September 2017 identified that Teven Quarry noise was inaudible on all four occasions, and therefore satisfied the daytime noise limits of 37dBA. It is noted that Holcim Teven was not operational during the evening period however background measurements were undertaken for completeness and as per the EPL. Extraneous sources audible during the four attended surveys included birds, wind in trees, insects, aircrafts, dog bark, local residential noise, distant and residential traffic.

6.2 Discussion of Results - Location N2

Monitoring results for N2 during the September 2017 quarter were dominated by local traffic that was mostly constant during all four attended measurements. Quarry emissions were inaudible on all four occasions, therefore satisfying the relevant daytime noise limit of 38dBA. The quarry was not operational during the evening period therefore satisfying the evening noise limit of 35dBA. Extraneous sources measured include local traffic, birds, wind in trees, local residential noise, insects, birds, aircraft and distant traffic.

6.3 Discussion of Results - Location N3

Quarry noise was audible on two of four occasions during the September 2017 survey period with contributions of <34dBA on both occasions, therefore satisfying the daytime criteria of 37dBA. Teven quarry was not operational during the evening period therefore satisfying the evening criteria of 35dBA. Non-quarrying noise sources included birds, wind in grass, insects, aircrafts, distant and local traffic.

6.4 Discussion of Results - Location N4

Quarry noise emissions were audible during both daytime attended noise surveys at N4 for the September 2017 quarter. The relevant daytime noise limits of 37dBA were satisfied as Holcim emissions ranged from <34dBA to <36dBA at this monitoring location. It is noted that Teven Quarry was not operational during the evening period, therefore satisfying the evening noise limit of 35dBA. Local traffic was the dominant source at this receiver with other non-quarrying sources including wind in grass and trees, birds, aircraft, insects and distant traffic all audible throughout the four attended measurements.

6.5 Discussion of Results - Location N5

Holcim Quarry was inaudible on all four monitoring occasions throughout the September 2017 monitoring quarter at N5. Therefore, quarry emissions satisfied the relevant daytime noise limit of 38dBA It is noted that the quarry was not operational during the evening period and therefore satisfied the evening noise limits 35dBA. Local traffic was the dominant source at this receiver with other non-quarrying sources including wind in trees, birds (ducks), distant traffic, insects, and aircraft noise all audible during the September 2017 quarter.

7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment for VGT Pty Ltd on behalf of Holcim Pty Ltd at the Teven Quarry, Teven, NSW. The assessment was completed to assess the quarry's compliance with the relevant criteria outlined in their Conditions of Consent for relevant surrounding residential receivers. It is again reaffirmed that the quarry was not operational during the evening period on 20 September 2017 although measurements were completed as per the EPL which is considered a comprehensive assessment approach.

Attended noise measurements were undertaken on both 20 September 2017 and 21 September 2017 at representative monitoring locations, quarry noise contributions were compared against the relevant criteria. The assessment has identified that noise emissions generated by Teven Quarry comply with relevant statutory noise criteria specified in the Conditions of Consent at all assessed residential receivers.

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Appendix A - Glossary of Terms

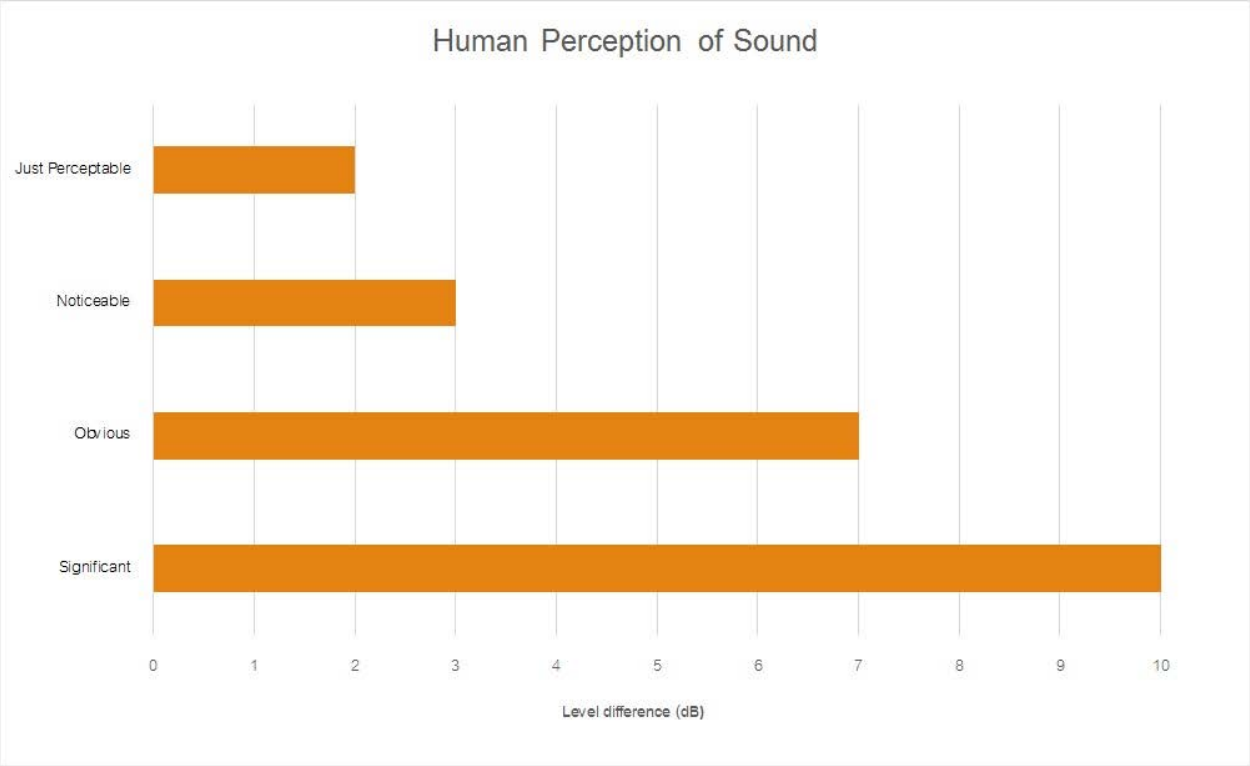
Table A1 provides a number of technical terms have been used in this report.

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.
LAmax	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (LW)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by : = 10.log10 (W/Wo) Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts.

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

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA	
Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



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Quarterly Noise Monitoring Assessment

Teven Quarry, December 2017

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

December 2017

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Muller Acoustic Consulting

Document Information

Quarterly Noise Monitoring Assessment

Teven Quarry, Teven, NSW

December 2017

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

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MAC170439RP4	Final	22 December 2017	Oliver Muller	

CONTENTS

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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 Teven Quarry ('the quarry'), Teven, NSW.

The monitoring has been conducted in accordance with the Teven Noise Management Plan and in general accordance with relevant conditions outlined in the Development Consent (ref: SSD 6422); at five representative monitoring locations. This assessment has been undertaken during Quarter 4, December 2017, and forms part of the noise monitoring program for the quarry.

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

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- NSW Department of Planning and Environment, Development Consent (SSD 6422), 2015; 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 of the Teven Quarry Development Consent (2015), outlines the applicable noise criteria for residential receivers surrounding the quarry site.

Table 1 reproduces relevant criteria for each of the receivers as outlined in Table 2 of the quarry's Development Consent.

Table 1 Noise Criteria

Location[1]	Quarry Operations	
	Period: Day	Period: Evening
	7am – 6pm	6pm – 10pm
	dBA, $L_{Aeq(15min)}$	dBA, $L_{Aeq(15min)}$
R3, R4, R13, R15, R16, R17, R18, R20	38	35
All other receivers	37	35

Note 1: Receiver locations are shown in Figure 1.

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3 Methodology

3.1 Locality

The quarry is located in Teven, NSW approximately 7km west of Ballina, NSW. Receivers in the locality surrounding the quarry are primarily rural. The surroundings of the quarry include bushland and farming pastures. The monitoring locations with respect to the quarry are presented in the locality plan shown in **Figure 1.**

3.2 Noise Monitoring Locations

Table 2 presents details of monitoring locations, representative to receiver locations.

Table 2 Monitoring Locations

Location	Nearest Receiver	Easting	Northing
N1	R7	547017	6810098
N2	R3/R4	548877	6810290
N3	R2	548642	6810801
N4	R10	547729	6810226
N5	R15	547793	6808998

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 NPI. The measurements were carried out using Svantek Type 1, 971 noise analyser on Thursday 14 December 2017. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2004-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

As per the Noise Management Plan, two day and two evening measurements were conducted at each monitoring location. Measurements were of 15 minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source. Extraneous noise sources were excluded from the analysis as to calculate the $LA_{eq(15min)}$ quarry noise contribution for comparison against the relevant noise criteria. It is noted that the quarry was not operational during the evening period therefore quarry noise contributions are not applicable.

FIGURE 1

LOCALITY PLAN

REF: MAC170439

0 150m

KEY

N1 RECEIVER LOCATION

SITE LOCATION

MAC
Muller Acoustic Consulting

*Imagery Source : nearmaps

4 Results

4.1 Assessment Results - Location N1

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N1 for Thursday 14 December 2017 are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location N1

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
14/12/17	09:33 (Day)	71	48	40	Dir: N Wind Speed: 0.5m/s Rain: Nil	Insects 42-50 Local traffic 51-63 Birds 49-60 Wind in trees 46-47 Aircraft 44-51
	Teven Quarry $L_{Aeq(15min)}$ Contribution					Quarry Inaudible
14/12/17	09:50 (Day)	75	58	42	Dir: N Wind Speed: 0.5m/s Rain: Nil	Insects <42 Local residential noise 47-74 Local traffic 43-65 Birds 51-63 Wind in trees 48-52
	Teven Quarry $L_{Aeq(15min)}$ Contribution					Quarry Inaudible
14/12/17	18:02 (Evening)	75	54	43	Dir: NE Wind Speed: 1.5m/s Rain: Nil	Local traffic 48-74 Wind in trees 38-46 Aircraft 41-48 Birds 41-45
	Teven Quarry $L_{Aeq(15min)}$ Contribution					Quarry Inaudible
14/12/17	18:18 (Evening)	72	54	48	Dir: NE Wind Speed: 1.5m/s Rain: Nil	Wind in trees 44-52 Birds 46-51 Local traffic 54-69
	Teven Quarry $L_{Aeq(15min)}$ Contribution					Quarry Inaudible

4.2 Assessment Results - Location N2

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N2 for Thursday 14 December 2017 are presented in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location N2

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
14/12/17	10:17 (Day)	87	67	53	Dir: N Wind Speed: 0.1m/s Rain: Nil	Local traffic 51-83 Insects <50 Birds 49-59 Local residential noise 60-63
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
14/12/17	10:33 (Day)	84	64	43	Dir: N Wind Speed: 0.1m/s Rain: Nil	Insects <42 Birds 42-51 Local traffic 44-79 Local residential noise 44-47
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
14/12/17	18:45 (Evening)	80	57	40	Dir: N Wind Speed: 1m/s Rain: Nil	Birds 47-51 Wind in trees 46-56 Local traffic 46-80
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
14/12/17	19:01 (Evening)	82	58	39	Dir: N Wind Speed: 1m/s Rain: Nil	Birds 44-52 Wind in trees 46-52 Local traffic 45-82 Aircraft 50-54
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible

4.3 Assessment Results - Location N3

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N3 for Thursday 14 December 2017 are presented in **Table 5**.

Table 5 Operator-Attended Noise Survey Results – Location N3

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
14/12/17	10:53 (Day)	63	58	54	Dir: N Wind Speed: 1m/s Rain: Nil	Insects 51-54 Distant traffic <51 Aircraft 55-58
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
14/12/17	11:09 (Day)	63	59	57	Dir: N Wind Speed: 1m/s Rain: Nil	Insects <53 Birds 53-63 Distant traffic <53 Wind in trees <56 Aircraft 58-63
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
14/12/17	19:21 (Evening)	76	54	42	Dir: N Wind Speed: 1.5m/s Rain: Nil	Wind in trees 40-57 Birds <40 Aircraft 51-54
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
14/12/17	19:37 (Evening)	65	59	47	Dir: N Wind Speed: 1.5m/s Rain: Nil	Wind in trees 42-48 Insects 42-63 Birds 55-58 Aircraft 56-64
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible

4.4 Assessment Results - Location N4

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N4 for Thursday 14 December 2017 are presented in **Table 6**.

Table 6 Operator-Attended Noise Survey Results – Location N4

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
14/12/17	11:29 (Day)	81	58	45	Dir: N Wind Speed: 1.2m/s Rain: Nil	Wind in trees <48 Birds 48-53 Insects 44-48 Local residential noise 44-47 Aircraft 46-58 Local traffic 46-81
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
14/12/17	11:45 (Day)	76	61	51	Dir: N Wind Speed: 1.5m/s Rain: Nil	Wind in trees 42-48 Local residential noise 42-51 Insects 50-54 Birds 53-58 Local traffic 50-76
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
14/12/17	19:57 (Evening)	69	66	63	Dir: N Wind Speed: 1.5m/s Rain: Nil	Insects 54-66 Wind in tees 46-54
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
14/12/17	20:13 (Evening)	67	59	47	Dir: N Wind Speed: 1.5m/s Rain: Nil	Insects 64-67 Wind in trees <64 Aircraft 51-54
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible

4.5 Assessment Results - Location N5

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N5 for Thursday 14 December 2017 are presented in **Table 7**.

Table 7 Operator-Attended Noise Survey Results – Location N5

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		LAmax	L_{Aeq}	L_{A90}		
14/12/17	12:03 (Day)	90	63	45	Dir: N Wind Speed: 1.5m/s Rain: Nil	Wind in trees 44-52 Local traffic 48-83 Birds 47-53
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
14/12/17	12:18 (Day)	88	62	45	Dir: N Wind Speed: 1.5m/s Rain: Nil	Wind in trees 42-48 Local traffic 42-84
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
14/12/17	20:30 (Evening)	87	59	40	Dir: N Wind Speed: 1m/s Rain: Nil	Insects 38-41 Distant traffic 39-42 Local traffic 40-77 Aircraft 40-46
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible
14/12/17	20:46 (Evening)	84	54	40	Dir: N Wind Speed: 1.5m/s Rain: Nil	Insects 36-40 Local traffic 41-73 Wind in trees 41-46 Aircraft 43-48
Teven Quarry $L_{Aeq(15min)}$ Contribution						Quarry Inaudible

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5 Noise Compliance Assessment

The compliance assessment for each residential receiver R2, R3/R4, R7, R10 and R15 are presented in **Table 8** and **Table 9** for day and evening assessment periods.

Table 8 Daytime Noise Compliance Assessment

Receiver No.	Monitoring Locations	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
		dBA, $L_{Aeq(15min)}$	dBA, $L_{Aeq(15min)}$	
R2	N3	Nil	37	✓
R3/R4	N2	Nil	38	✓
R7	N1	Nil	37	✓
R10	N4	Nil	37	✓
R15	N5	Nil	38	✓

Table 9 Evening Noise Compliance Assessment

Receiver No.	Monitoring Locations	Quarry Noise Contribution	Quarry Noise Criteria	Compliant
		dBA, $L_{Aeq(15min)}$	dBA, $L_{Aeq(15min)}$	
R2	N3	Nil	35	✓
R3/R4	N2	Nil	35	✓
R7	N1	Nil	35	✓
R10	N4	Nil	35	✓
R15	N5	Nil	35	✓

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6 Discussion

6.1 Discussion of Results - Location N1

Monitoring on 14 December 2017 identified that Teven Quarry noise was inaudible during all four measurements, and therefore satisfied the daytime noise limits of 37dBA. It is noted that the quarry was not operational during the evening period however background measurements were undertaken for completeness and as per the EPL. Extraneous sources audible during the four attended surveys included insects, local traffic, birds, wind in trees, aircraft and local residential noise.

6.2 Discussion of Results - Location N2

Monitoring results for N2 during the December 2017 quarter were dominated by local traffic that was mostly constant during all four measurements. Quarry emissions were inaudible on all four occasions, therefore satisfying the relevant daytime noise limit of 38dBA. The quarry was not operational during the evening period therefore satisfying the evening noise limit of 35dBA. Extraneous sources measured include local traffic, insects, birds, local residential noise, wind in trees and aircraft.

6.3 Discussion of Results - Location N3

Quarry noise was inaudible during all four measurements during the December 2017 survey period, therefore satisfying the daytime criteria of 37dBA. The quarry was not operational during the evening period therefore satisfying the evening criteria of 35dBA. Non-quarrying noise sources included insects, distant traffic, aircraft, birds and wind in trees.

6.4 Discussion of Results - Location N4

Quarry noise was inaudible during all four noise measurements at N4 for the December 2017 quarter, therefore relevant daytime noise limits of 37dBA were satisfied. It is noted that the quarry was not operational during the evening period, therefore satisfying the evening noise limit of 35dBA. Non-quarrying sources include wind in trees, birds, insects, local residential noise, aircraft, local traffic and aircraft all audible throughout the four noise measurements.

6.5 Discussion of Results - Location N5

Quarry noise was inaudible during all four measurements throughout the December 2017 monitoring quarter at N5. Therefore, quarry emissions satisfied the relevant daytime noise limit of 38dBA. It is noted that the quarry was not operational during the evening period and therefore satisfied the evening noise limit of 35dBA. Local traffic was the dominant source at this receiver with other non-quarrying sources including wind in trees, local traffic, birds, insects, distant traffic and aircraft all audible during the December 2017 quarter.

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 Teven Quarry, Teven, NSW. The assessment was completed to assess the quarry's compliance with the relevant criteria outlined in their Conditions of Consent for relevant surrounding residential receivers. It is again reiterated that the quarry was not operational during the evening period on 14 December 2017 although measurements were completed as per the EPL which is considered a comprehensive assessment approach.

Attended noise measurements were undertaken on 14 December 2017 at representative monitoring locations with quarry noise contributions compared against the relevant criteria. The assessment has identified that noise emissions generated by Teven Quarry comply with relevant statutory noise criteria specified in the Conditions of Consent at all assessed residential receivers.

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Appendix A - Glossary of Terms

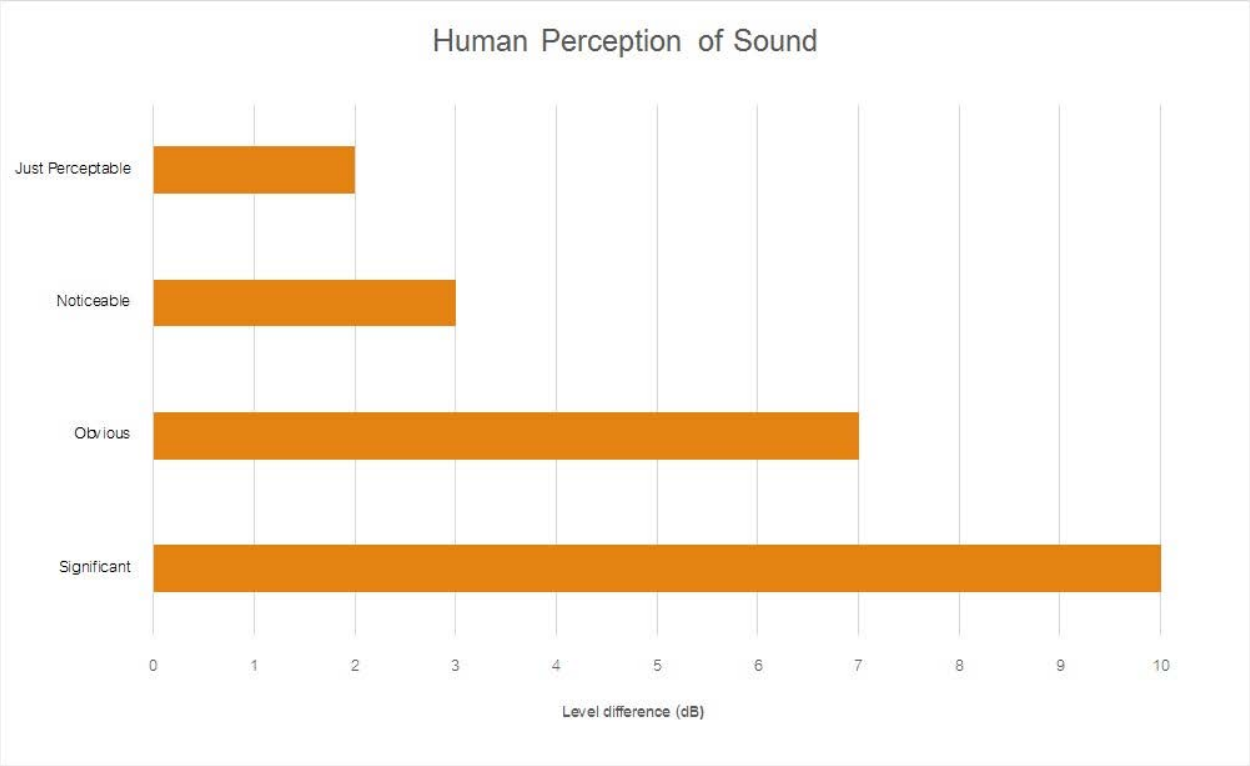
Table A1 provides a number of technical terms have been used in this report.

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

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

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA	
Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



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APPENDIX 2
TRANSPORT SUMMARY

	January				February				March				April				May				June			
	Day	Loads	Split Loads	Trucks	Day	Loads	Split Loads	Truck Movements	Date	Loads	Split Loads	Trucks	Date	Loads	Split Loads	Trucks	Date	Loads	Split Loads	Trucks	Date	Loads	Split Loads	Trucks
S	1																							
M	2	0	0	0													1	48	2	46				
T	3	0	0	0													2	42	2	40				
W	4	0	0	0	1	37	0	37	1	32	1	31					3	54	5	49				
T	5	0	0	0	2	51	2	49	2	85	1	84					4	29	0	29	1	58	2	56
F	6	0	0	0	3	39	0	39	3	116	1	115					5	33	3	30	2	61	1	60
S	7	0	0	0	4	0	0	0	4	0	0	0	1	0	0	0	6	0	0	0	3	0	0	0
S	8				5				5				2				7				4			
M	9	16	0	16	6	48	0	48	6	101	1	100	3	29	1	28	8	49	2	47	5	85	3	82
T	10	42	0	42	7	40	0	40	7	117	0	117	4	33	0	33	9	43	1	42	6	50	5	45
W	11	36	0	36	8	30	1	29	8	114	0	114	5	44	1	43	10	83	1	82	7	33	1	32
T	12	46	1	45	9	25	2	23	9	99	0	99	6	18	0	18	11	56	0	56	8	55	1	54
F	13	27	0	27	10	17	0	17	10	88	1	87	7	39	2	37	12	84	1	83	9	73	2	71
S	14	0	0	0	11	0	0	0	11	35	0	35	8	0	0	0	13	0	0	0	10	0	0	0
S	15				12				12				9				14				11			
M	16	34	2	32	13	31	2	29	13	90	1	89	10	86	1	85	15	99	0	99	12			
T	17	47	0	47	14	34	1	33	14	25	1	24	11	92	2	90	16	117	2	115	13	10	0	10
W	18	30	2	28	15	35	0	35	15	12	1	11	12	96	0	96	17	93	0	93	14	5	0	5
T	19	63	1	62	16	50	1	49	16	5	1	4	13	32	1	31	18	64	1	63	15	38	1	37
F	20	63	0	63	17	31	1	30	17	93	0	93	14				19	51	0	51	16	63	3	60
S	21	0	0	0	18	0	0	0	18	0	0	0	15				20	0	0	0	17	0	0	0
S	22				19				19				16				21				18			
M	23	98	1	97	20	18	0	18	20	12	1	11	17				22	38	5	33	19	34	0	34
T	24	106	0	106	21	31	1	30	21	10	0	10	18	0	0	0	23	89	2	87	20	34	0	34
W	25	53	0	53	22	38	1	37	22	130	1	129	19	112	1	111	24	58	2	56	21	46	1	45
T	26				23	83	2	81	23	107	2	105	20	74	1	73	25	61	1	60	22	36	2	34
F	27	29	0	29	24	92	0	92	24	87	1	86	21	45	1	44	26	35	2	33	23	85	2	83
S	28	0	0	0	25	27	0	27	25	0	0	0	22	0	0	0	27	0	0	0	24	0	0	0
S	29				26				26				23				28				25			
M	30	52	0	52	27	25	1	24	27	110	2	108	24	31	0	31	29	40	2	38	26	63	0	63
T	31	39	0	39	28	0	0	0	28	121	0	121	25				30	77	2	75	27	97	2	95
W									29	97	1	96	26	50	0	50	31	50	3	47	28	67	4	63
T									30	19	0	19	27	46	1	45					29	56	3	53
F									31	10	0	10	28	38	0	38					30	35	4	31
S													29	0	0	0								
S													30											
M																								
TOTAL	**781**	**7**	**774**		**782**	**15**	**767**		**1715**	**17**	**1698**		**865**	**12**	**853**		**1393**	**39**	**1354**		**1084**	**37**	**1047**	
# Dispatch Days	**25**				**24**				**27**				**21**				**27**				**25**			
Daily Average	**31**				**32**				**63**				**41**				**50**				**42**			
Annual Average	**51**																							

Public Holiday
Sunday

	July				August				September				October				November				December			
	Date	Loads	Split Loads	Trucks	Date	Loads	Split Loads	Trucks	Date	Loads	Split Loads	Trucks	Date	Loads	Split Loads	Trucks	Date	Loads	Split Loads	Trucks	Date	Loads	Split Loads	Trucks
S													1											
M													2											
T					1	48	5	43					3	28	2	26								
W					2	103	0	103					4	43	3	40	1	134	1	133				
T					3	84	0	84					5	38	3	35	2	117	3	114				
F					4	46	2	44	1	50	2	48	6	48	2	46	3	132	2	130	1	132	2	130
S	1	0	0	0	5	0	0	0	2	0	0	0	7	0	0	0	4	38	0	38	2	60	0	60
S	2				6				3				8				5				3			
M	3	49	1	48	7	92	1	91	4	62	1	61	9	46	1	45	6	37	1	36	4	172	2	170
T	4	88	0	88	8	82	5	77	5	71	2	69	10	47	1	46	7	94	1	93	5	172	2	170
W	5	51	1	50	9	42	3	39	6	70	3	67	11	63	3	60	8	45	0	45	6	85	0	85
T	6	47	2	45	10	76	2	74	7	43	1	42	12	43	4	39	9	53	0	53	7	163	1	162
F	7	75	2	73	11	63	2	61	8	43	0	43	13	75	2	73	10	49	0	49	8	154	5	149
S	8	21	1	20	12	0	0	0	9	0	0	0	14	0	0	0	11	0	0	0	9	0	0	0
S	9				13				10				15				12				10			
M	10	62	1	61	14	74	2	72	11	80	5	75	16	22	0	22	13	137	2	135	11	100	1	99
T	11	49	3	46	15	55	3	52	12	46	2	44	17	44	0	44	14	139	4	135	12	174	2	172
W	12	52	1	51	16	60	1	59	13	60	2	58	18	21	1	20	15	151	1	150	13	152	1	151
T	13	66	2	64	17	95	4	91	14	48	2	46	19	79	1	78	16	143	2	141	14	79	4	75
F	14	92	1	91	18	70	3	67	15	45	3	42	20	131	1	130	17	151	1	150	15	67	2	65
S	15	0	0	0	19	3	0	3	16	12	1	11	21	0	0	0	18	44	0	44	16	0	0	0
S	16				20				17				22				19				17			
M	17	66	3	63	21	122	1	121	18	70	2	68	23	65	1	64	20	39	5	34	18	56	3	53
T	18	62	0	62	22	63	3	60	19	57	5	52	24	51	1	50	21	47	5	42	19	65	5	60
W	19	72	1	71	23	74	0	74	20	53	4	49	25	66	1	65	22	28	2	26	20	47	2	45
T	20	102	0	102	24	39	0	39	21	119	1	118	26	48	2	46	23	38	2	36	21	21	0	21
F	21	110	0	110	25	46	2	44	22	65	4	61	27	46	3	43	24	53	1	52	22	0	0	0
S	22	0	0	0	26	0	0	0	23	0	0	0	28	0	0	0	25	0	0	0	23	0	0	0
S	23				27				24				29				26				24			
M	24	39	1	38	28	90	3	87	25	111	5	106	30	46	2	44	27	49	2	47	25			
T	25	52	2	50	29	88	2	86	26	71	0	71	31	104	2	102	28	73	4	69	26			
W	26	75	2	73	30	73	1	72	27	39	1	38					29	48	2	46	27	0	0	0
T	27	74	2	72	31	73	2	71	28	21	2	19					30	82	2	80	28	0	0	0
F	28	51	3	48					29	38	2	36									29	0	0	0
S	29	0	0	0					30	0	0	0									30	0	0	0
S	30																				31			
M	31	47	3	44																				
TOTAL		**1402**	**32**	**1370**		**1661**	**47**	**1614**		**1274**	**50**	**1224**		**1154**	**36**	**1118**		**1921**	**43**	**1878**		**1699**	**32**	**1667**
# Dispatch Days		**26**				**27**				**26**				**25**				**26**				**24**		
Daily Average		**53**				**60**				**47**				**45**				**72**				**69**		

Public Holiday
Sunday