Hanson

ABN: 90 009 679 734

Annual Review

for the period
1 January 2017 to 31 December 2017

for the

East Guyong Quarry

Project Approval 06_0193

Prepared by:

R.W. CORKERY & CO. PTY. LIMITED

March 2018

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ABN: 90 009 679 734

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Prepared for:

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Ref No. 869/15

March 2018

R.W. CORKERY & CO. PTY. LIMITED

Table 1
Title Block

Name of operation	East Guyong Quarry
Name of operator	Hanson Construction Materials Pty Ltd
Development consent / project approval #	PA 06_0193
Name of holder of development consent / project approval	Hanson Construction Materials Pty Ltd
Mining Lease #	N/A
Name of holder of mining lease	N/A
Water licence #	80AL722920
Name of holder of water licence	Hanson Construction Materials Pty Ltd
MOP/RMP start date	N/A
MOP/RMP end date	N/A
Annual Review start date	1 January 2017
Annual Review end date	31 December 2017
I, Pere Rinii, certify that this audit report is a true and accurate record of the compliance status of the East Guyong Quarry for the period 1 January 2017 to 31 December 2017 and that I am authorised to make this statement of behalf of Hanson Construction Materials 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); Section 307A, 307B and 307C (false or misleading application/information/documents – maximum penalty 2 years imprisonment or $22,000, or both).*	
Name of authorised reporting officer	Pere Rinii
Title of authorised reporting officer	Quarry Manager
Signature of authorised reporting officer	
Date	29 March 2018

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1. STATEMENT OF COMPLIANCE

Table 2
Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	Yes / No
PA 06_0193	Yes
EPL 20191	Yes

Table 3
Non-compliances

Relevant Approval	Condition #	Condition Description (summary)	Compliance Status	Comment	Where Addressed in Annual Review
No non-compliance issues occurred during the reporting period.					

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.*
Administrative non-compliance	*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).*

2. INTRODUCTION

2.1 SCOPE AND FORMAT

This *Annual Review* has been prepared for the East Guyong Quarry (the Quarry) in accordance with the requirements of Condition 5(3) of Project Approval PA 06_0193 (PA 06_0193). The Quarry is owned and operated by Hanson Construction Materials Pty Ltd (the Company) and located approximately 22km by road southeast of Orange and 36km west of Bathurst (**Figure 1**). This report documents the works undertaken and environmental performance from 1 January to 31 December 2017 (the reporting period).

PA 06_0193 was granted by the Land and Environment Court on 21 May 2012 and was modified to permit a revised access route on 24 December 2012. A copy of PA 06_0193 is reproduced as **Appendix 1**. Condition 5(3) of PA 06_0193 is reproduced below.

> "By 31 March 2012, and annually thereafter, the Proponent shall review the environmental performance of the project to the satisfaction of the Director-General. This review must:
>
> (a) describe the works (including rehabilitation) that were carried out in the previous calendar year, and the works that are proposed to be carried out over current calendar year;
>
> (b) include a comprehensive review of the monitoring results and complaints records of the project over the past 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 EA;
>
> (c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
>
> (d) identify any trends in the monitoring data over the life of the project;
>
> (e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and
>
> (f) describe what measures will be implemented over the next year to improve the environmental performance of the project."

The information presented within this *Annual Review* has been prepared based on information compiled by R.W. Corkery & Co. Pty Limited and provided by Hanson. It should also be noted that although this *Annual Review* has been prepared based upon the approval and licencing requirements applicable for the reporting period, the report generally follows the format and content requirements identified in the *Annual Review Guideline* dated October 2015.

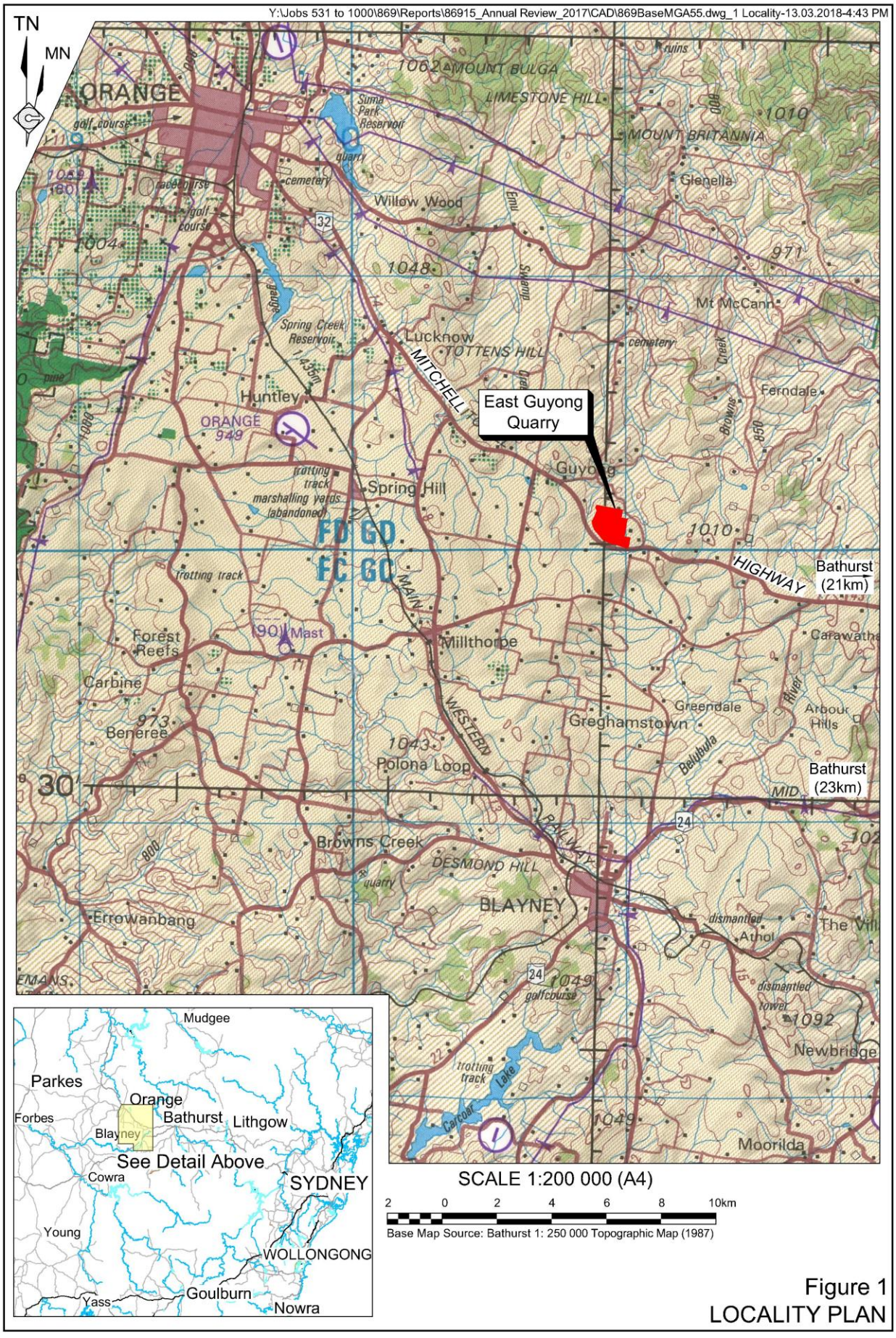

Figure 1
LOCALITY PLAN

2.2 THE COMPANY

Hanson Construction Materials Pty Ltd operates over 50 quarries in Australia and supplies aggregates, sand and premixed concrete materials for the construction industry. The Company also produces precast concrete. The Company is a subsidiary company of Heidelberg Cement which internationally employs approximately 60 000 people at more than 3 000 locations in around 60 countries.

2.3 OVERVIEW OF OPERATIONS

2.3.1 Approved Activities

The approved activities at the Quarry comprise the following (**Figure 2**).

- Development and use of an extraction area to extract basalt using standard drill, blast, load and haul techniques.
- Construction and use of a processing plant to process the extracted basalt to produce a range of quarry products, including aggregates and road base, and stockpiling of the resulting products within an identified Infrastructure Area.
- Use of a site access road and intersection with the Mitchell Highway.
- Transportation of up to 400 000t per year of quarry products via the Mitchell Highway using truck and dog and B-Double trucks.
- Construction of a range of bunds and mounds and establishment of native vegetation to provide visual screening for the quarry operations.

2.3.2 Hours of Operation

The approved hours of operation are as follows.

- Monday to Friday (non-daylight savings) – 6:00am to 6:00pm.
- Monday to Friday (daylight savings) – 6:00am to 8:00pm.
- Saturdays – 7:00am to 1:00pm.
- Sundays and public holidays – nil.

Condition 6 of Schedule 3 in PA06_0193 permits transportation activities between 5:00am and 10:00pm Monday to Saturday following negotiation and provision of written agreements with seven nominated surrounding landholders. Such an agreement has been reached and was approved by the Secretary on 10 September 2015. A copy of this approval is provided as **Appendix 2**.

All activities during the reporting Period were undertaken within the approved hours of operation.

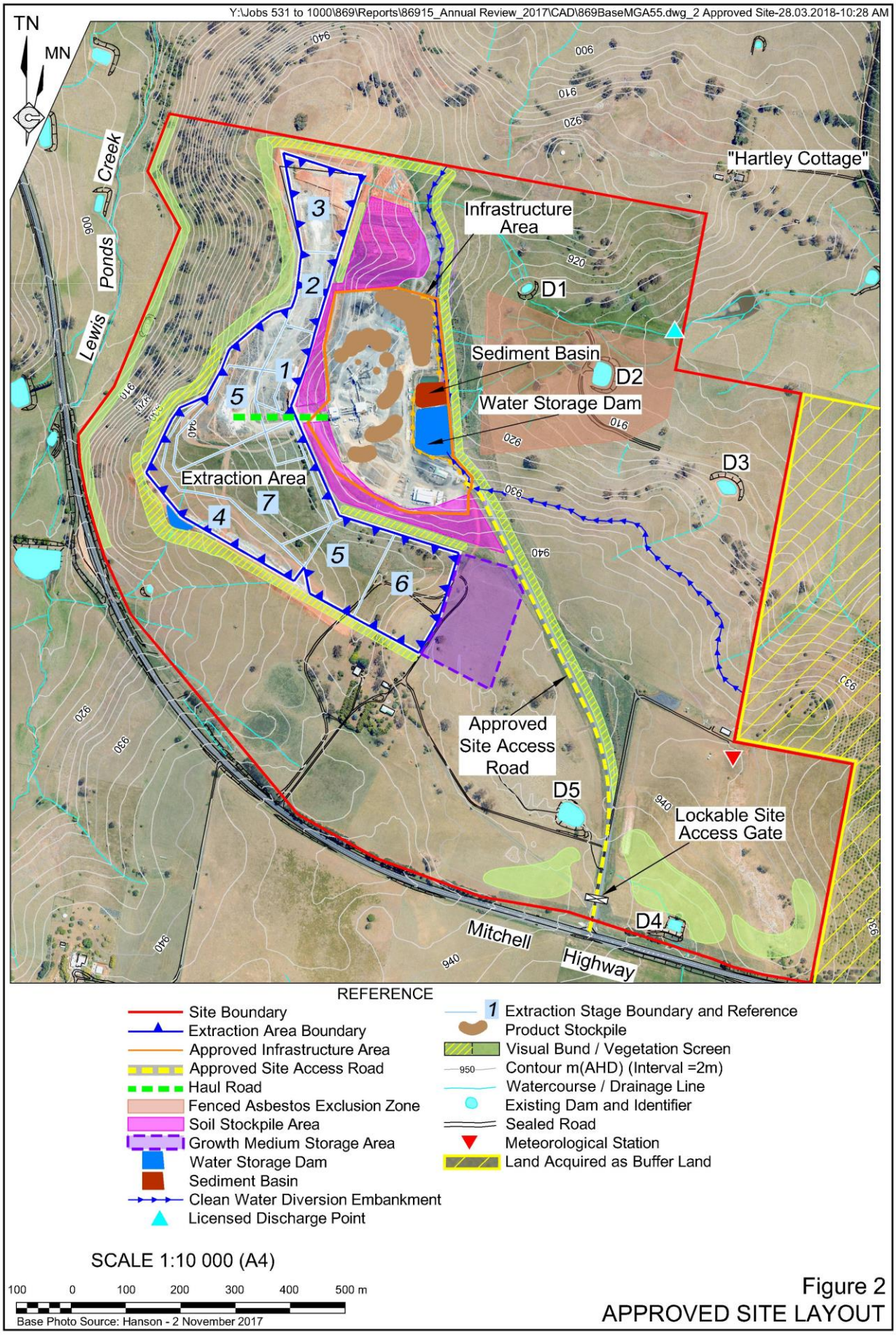

Figure 2
APPROVED SITE LAYOUT

2.3.3 Employment

During the reporting period, employment at the Quarry increased to 25 full-time operational staff, including 8 staff involved in extraction and processing activities and 17 staff involved in transportation activities. This has increased from 22 full time employees in 2016 and was due to employment of additional transportation personnel. Employment is expected to remain consistent with this level during the next reporting period.

2.4 KEY PERSONNEL CONTACT DETAILS

The key personnel contact names, position and phone numbers are as follows.

Name	Position	24 Hour Contact
Pere Rinii	Quarry Manager	0438 244 437

2.5 MANAGEMENT OF DOCUMENT PREPARATION

This document has been prepared by Mr Nicholas Warren (B.Sc., M.Bus., M.Env.Sc.), Senior Environmental Consultant with assistance from Mr Andrew Bridle (B.A (Outdoor Ed.), M. Env.Mgmt) both with R.W. Corkery & Co Pty. Limited (RWC).

Mr Pere Riini, (Diploma of Surface Operations Management, Production Managers Permit), Quarry Manager, Hanson Construction Materials Pty Ltd provided technical input and information on Quarry operations and environmental performance during the reporting period.

3. APPROVALS

Table 4 presents the approvals and licences held in relation to the Quarry.

Table 4
Approvals and Licences

Consent/Lease/Licence	Issue Date	Expiry Date	Details / Comments
Project Approval PA 06_0193	21/5/2012 Modified 24/12/2012	31/12/2042	Issued by the Department of Planning
Environment Protection Licence EPL 20190	13/11/2012 Variation 3/11/2015	-	Issued by the Environment Protection Authority
Groundwater Access Licence 80AL722920	10/03/2014	-	Issued by the Department of Primary Industries – Office of Water Share component 40ML

On 15 September 2015, the Company received approval from the Department of Planning and Environment (DPE) to extend transportation operating hours in accordance with note (a) of Condition 6(3) within PA06_0193 and following the negotiation of written agreements with the owners of the following privately-owned residences (see Section 9 and **Figure 6**).

- "Fairview"
- "Hartley Cottage"
- "Lilactime"
- "Quinton"
- "Cadira Vale"
- "Wheatfields"
- "Cadira"

As a result, transportation operating hours are now permitted between 5:00am and 10:00pm Monday to Saturday. The approval correspondence is included as **Appendix 2**.

On 3 November 2015, the Company received approval for a variation to Environmental Protection Licence (EPL) 20190 to permit the receipt, storage and processing of waste concrete from regional concrete batching plants for use as a blend material in final products and to vary noise limits in accordance with approval of extended transportation operating hours (see Condition L4.6 of EPL20190). The approval documentation provided by the Environmental Protection Authority (EPA) is provided as **Appendix 3**.

Hanson are planning to seek a second modification to PA 06_0193 to permit an extension of the approved Extraction Area and to modify the annual production limit. Hanson is finalising the application with submission currently planned for the second quarter of 2018.

Table 5 presents the documentation used by Quarry management to guide day-to-day operations at the Quarry. It is noted that Hanson are currently in the process of addressing comments on the Landscape Management Plan and Environmental Management Strategy with these documents expected to be submitted to DPE for final approval by 7 April 2018.

Table 5
Quarry Documentation

Document Title	Date Finalised/Approved
Supporting Documentation for Project Approval	
Environmental Assessment	21/5/2012
Environmental Assessment Modification 1	24/12/2012
Asbestos Management Plan	21/5/2012
Environmental Management Plans	
Environmental Management Strategy	Submitted, yet to be approved
Noise Management Plan	20/2/2013
Blast Management Plan	20/2/2013
Air Quality Monitoring Program	20/2/2013
Soil and Water Management Plan	20/2/2013
Landscape Management Plan	Submitted, yet to be approved
Aboriginal Cultural Heritage Management Plan	20/2/2013
Crisis Management Plan	Not required
Emergency Management Plan	Not required
Pollution Incident Response Plan	Not Required

It should be noted that all management plans are regularly reviewed in accordance with Condition 4 of Schedule 5 of PA 06_0193. As Hanson is currently proposing to modify PA 06_0193, it has been confirmed that the next review and update of management plans will occur following determination of this application. This does not apply to the Landscape Management Plan and Environmental Management Strategy, as per the above.

4. OPERATIONS SUMMARY

4.1 INTRODUCTION

Figure 3 presents an overview of the Quarry layout at the end of the current reporting period while **Figure 4** presents an overview of the anticipated layout of the Quarry at the end of the next reporting period. In addition, **Plates 1** to **12** present views of the Quarry on 23 February 2018.

4.2 EXTRACTION OPERATIONS

Table 6 presents the material movements during the reporting period and the anticipated movements during the next reporting period.

Table 6
Production Summary – tonnes

Material	Approved limit (specify source)	Previous reporting period (actual)	This reporting period (actual)	Next reporting period (forecast)
Topsoil inventory (cumulative)	None	26 000	2 000	5 000
Overburden moved	None	160 000	10 000	30 000
Raw feed extracted	None	352 388	334 169	400 000
Product transported off site	400 000 (PA 06_0193 (*Condition 2(6)*)	303 920	331 746	400 000
Source: Hanson Construction Materials Pty Ltd				

Overburden stripped in preparation for blasting and extraction activities was used to construct the amenity bunds within the property boundary including that to the south and to the north of the Extraction Area.

A total of 16 blasts were initiated during the reporting period. **Table 7** presents relevant information in relation to each blast. All blasts were production blasts and occurred within the approved extraction area (see **Plate 7**, **Plate 8** and **Figure 3**).

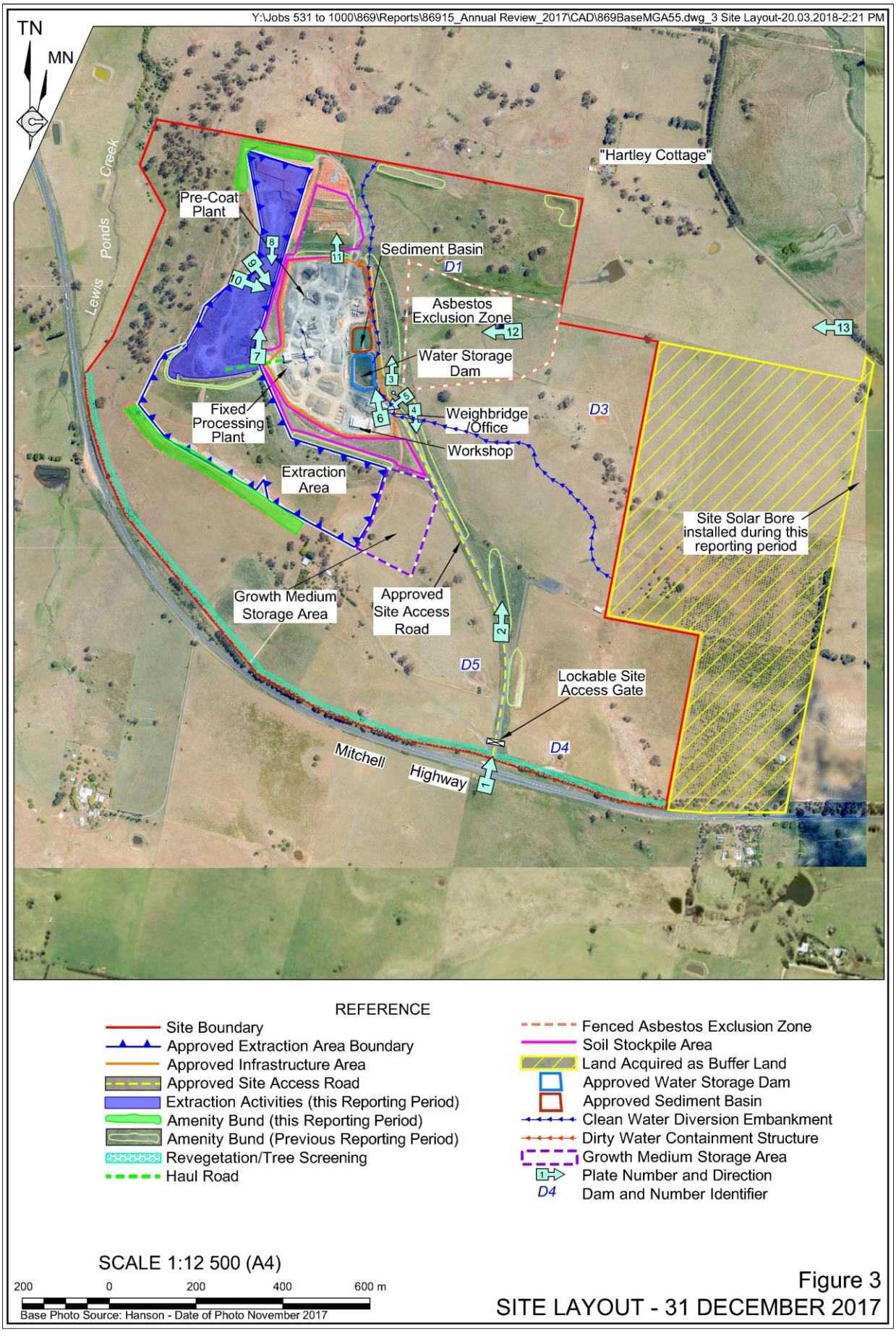

Figure 3
SITE LAYOUT - 31 DECEMBER 2017

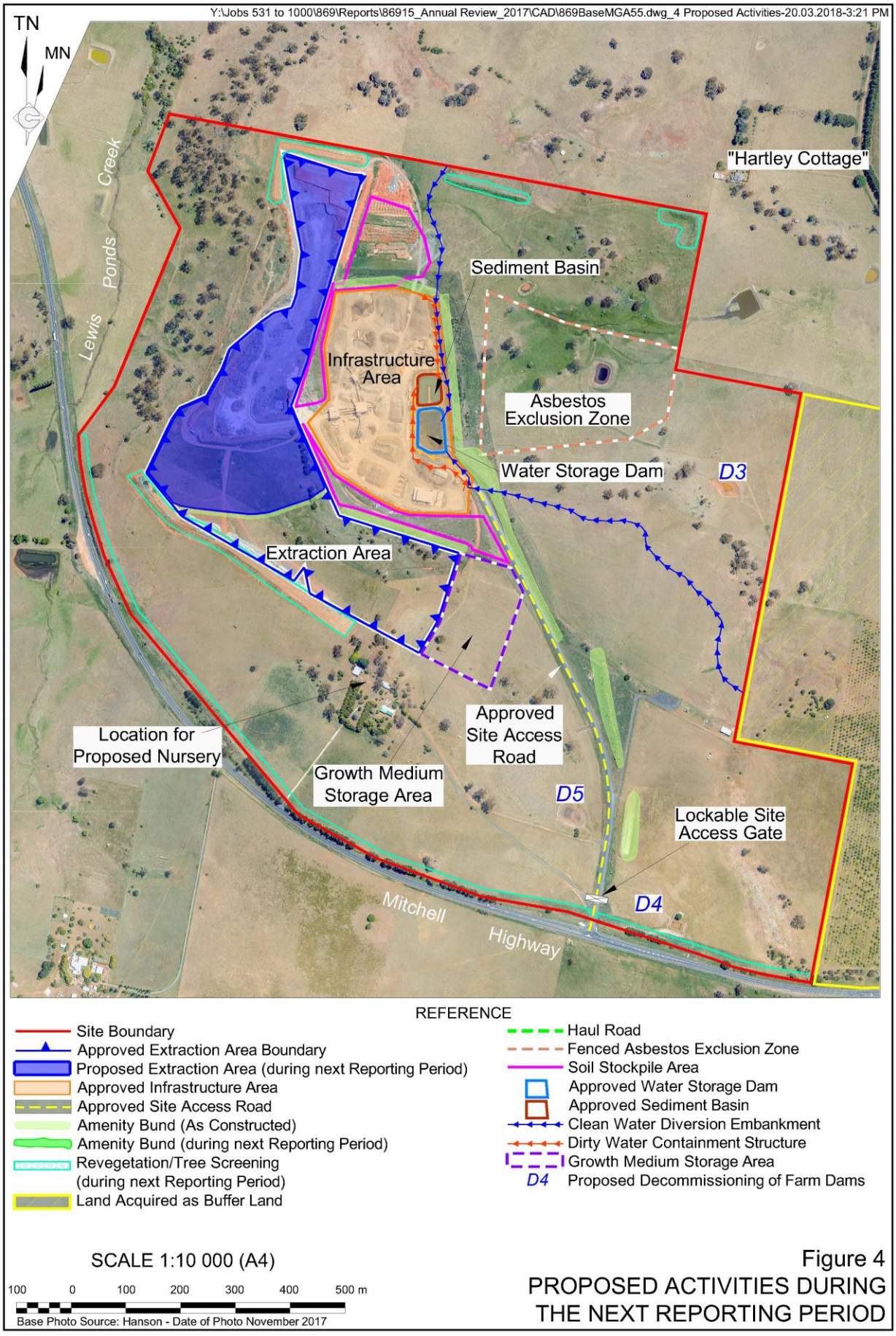

Figure 4
PROPOSED ACTIVITIES DURING THE NEXT REPORTING PERIOD

Plate 1: View of the Site Access Road looking north from the access gate
(Ref: Plate 1)

Plate 2: View of amenity bund and tubestock planting along Site Access Road
(Ref: Plate 2)

Plate 3: View of tubestock planted on amenity bund along eastern boundary of the Infrastructure Area
(Ref: Plate 3)

Plate 4: View to the south of Site Access Road, amenity bunds and groundcover
(Ref: Plate 4)

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Plate 5: View of Site Office, Weighbridge and Workshop buildings
(Ref: Plate 5)

Plate 6: View of Weighbridge (foreground) and Water Storage Dam
(Ref: Plate 6)

Plate 7: View from the access point of the Extraction Area of the active face
(Ref: Plate 7)

Plate 8: View to the south of Extraction Area from the active face
(Ref: Plate 8)

Plate 9: View of the southern section of the Infrastructure Area including the Fixed Processing Plant
(Ref: Plate 9)

Plate 10: View of the northern section of the Infrastructure Area including the Pre-Coat Plant and various aggregate stockpiles
(Ref: Plate 10)

Plate 11: View to the south of topsoil in Growth Medium Storage Area
(Ref: Plate 11)

Plate 12: View of fencing and warning signs limiting access to a rock outcrop that contains naturally occurring asbestos
(Ref: Plate 12)

Table 7
Blasting Operations during the Reporting Period

Blast Date	Blast Time	Date initiated	Volume of Blast (bcm)
Blast 1701	12:37	24 January 2017	5 320
Blast 1702	12:43	22 February 2017	6 604
Blast 1703	11:41	22 March 2017	5 980
Blast 1704	13:14	20 April 2017	5 820
Blast 1705	13:17	9 May 2017	7 901
Blast 1706	11:41	6 June 2017	4 409
Blast 1707	12:27	5 July 2017	8 275
Blast 1708	13:09	25 July 2017	5 137
Blast 1709	13:33	29 August 2017	2 348
Blast 1710	13:33	29 August 2017	5 221
Blast 1711	12:15	22 September 2017	5 598
Blast 1712	10:03	3 October 2017	6 456
Blast 1713	10:15	6 October 2017	6 976
Blast 1714	13:01	9 November 2017	5 160
Blast 1715	11:58	28 November 2017	8 532
Blast 1716	10:31	19 December 2017	7 658
Source: Hanson Construction Materials Pty Ltd			

The Company has continued to refine blasting and blast monitoring procedures throughout the reporting period through the following measures.

- Review of each of the four blast monitors and results by Hanson and the blast contractor technical staff following each blast event.
- Applying any proposed modifications to blast design in single steps to evaluate the impact of each modification independently.
- Modification of the blasting pattern following review of previous blast results to reduce powder factors.

4.3 OTHER OPERATIONS

4.3.1 Construction Operations

During the reporting period, progressive construction of amenity bunds continued, principally those to the south and to the north of the extraction area. No infrastructure construction occurred during the reporting period. A solar powered bore was installed during the previous reporting period to provide backup access to water during dry periods, and this started pumping in January 2017 (see **Figure 3**).

There are no quarrying infrastructure construction activities planned during the next reporting period. Hanson has commenced preparation of an area within the property boundary for use as a nursery area (see proposed location on **Figure 4**) to improve the success rate with planting activities (see Section 8 for more details).

4.3.2 Processing Operations

Processing operations required use of the Fixed Processing Plant and Pre-coat Plant during the reporting period (see **Figure 3**, **Plate 9** and **Plate 10**).

During the reporting period, a system for additional dust suppression that applies the Polo Citrus dust suppression products was installed at the feeder for the cone crusher and prior to material entering the screening plant. The suppressant is combined with water to create a foam that suppresses dust dispersion from the processing plant.

4.3.3 Product Transportation

Product transported off site during the reporting period was approximately 331 746 tonnes of material, which is below the approved annual transportation volume of 400 000 tonnes.

4.4 NEXT REPORTING PERIOD

Blasting for extraction operations are expected to continue during the next reporting period, with further blasts undertaken once or twice a month subject to market and internal demand from the Company's other operations. The Company anticipates that production will remain consistent with that achieved in 2017 (see **Table 3**).

Construction of the amenity bunds to the south and to the north of the extraction area will continue during the next reporting period (see **Figure 4**).

Processing activities using the Fixed Processing Plant and Pre-coat Plant are proposed to continue during the next reporting period, with the amount of material to be processed dependant on the demand for the Quarry's products from internal and external customers.

Product transport during the next reporting period will depend on client demand over the year but is not expected to exceed the approved transport volume (see **Table 3**).

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

Correspondence from the Department of Planning and Environment regarding the Annual Review 2016 was provided on 18 April 2017. **Table 8** describes the information that the Department requested to be included in the 2017 Annual Review and where in this document that information is provided.

Table 8
Actions from the Previous Annual Review

Action Required from Previous Annual Review	Action Taken by the Operator	Where Discussed in Annual Review
Ensure any deviations from the predictions in the EIS are discussed.	Comparison of monitoring results to relevant EIS predictions are included throughout this document.	Various
Include the certification in Table 1 and Statement of Compliance (Table 2) required under the Post-approval requirements for State significant mining developments – Annual Review Guideline dated October 2015.	These tables have been included as Section 1.	Section 1
Provide trends of noise monitoring results for the last three years.	Noise monitoring has been considered against historic monitoring results.	Section 6.4
Provide details of agreed post rehabilitation land uses and report against rehabilitation performance indicators as per Table 8 of the Post-approval requirements for State significant mining developments – Annual Review Guideline dated October 2015.	A summary of rehabilitation progress against the proposed short and medium term progressive rehabilitation commitments has been provided. However, it is noted that the Landscape Management Plan was submitted to DPE in 2013 and feedback was provided in February 2018.	Section 8
Include the times of blasts conducted during the reporting period and trends of blast monitoring results.	Blast times and discussion around blast monitoring trends is provided.	Section 4.3 and Section 6.5
Include wind data wind roses when available.	Wind rose data drawn from Orange Airport meteorological station is provided. The Quarry meteorological station is due for a service in the second quarter of 2018 to recalibrate the anemometer. Wind rose date will be available from that time.	Section 6.2
Provide comparative data and a discussion of trends for complaints received.	There were no complaints in 2017, however, historic trends have been reviewed.	Section 9.2
Evidence of the review of the rehabilitation bond and all strategies, plans and programs is provided in accordance with Condition 35 of Schedule 3 of PA 06_0193 and Condition 4 of Schedule 5 of PA 06_0193.	Reference to plan review is provided in Section 3.	Section 3
Ensure that DPE is notified of all incidents within 7 days of the incident occurring.	This comment is noted, however there were no issues that required reporting during the reporting period.	Section 10
Provide access to the Traffic Management Plan and the Drivers Code of Practice on the Hanson website.	Noted	No addressed in this review
Provide schedule for establishing long-term groundwater quality criteria.	Long-term groundwater criteria will be provided in an update to the Soil and Water Management Plan that will be submitted following determination of the pending modification application.	Section 6.8

It is also noted that an outcome of the Annual Review 2016 was that DPE requested that an Air Quality Assessment be prepared to review air quality management at the Quarry. An Air Quality Review was conducted by RWC in November 2017 (see **Appendix 4**), which identified several practical measures that could be implemented to improve the air quality monitoring program and implementation of air quality management practices. These recommendations are presented in **Table 9** and a comment on Hanson's progress implementing these measures is provided.

Table 9
Air Quality Review 2017 Recommendations

Recommendation	Comment / Progress
Commission a service/maintenance of the on-site AWS and anemometer.	Hanson has commissioned a service of this equipment, but the technician has not yet been able to arrange a suitable time to visit the Quarry. This will occur in the second quarter of 2018.
Ensure that exposed surfaces (topsoil stockpiles or amenity bunding) has a stabilising groundcover established as soon as possible following completion of stockpiling works to limit dust lift off.	Hanson has undertaken a campaign of hydro-mulching on constructed amenity bunds to provide a stabilising groundcover. The southern amenity bund will be shaped and seeded during 2018 to provide a permanent cover.
Consider placing a fourth dust gauge to the southwest of the Quarry extraction area and processing and stockpiling area to monitor deposited dust in this location and complement the existing dust monitoring network.	This dust gauge has yet to be installed as Hanson has not been able to arrange a suitable time for the technician to visit the Quarry.
Consider relocating the PM_{10} monitor to the south or the northeast of the extraction area and processing and stockpiling area in light of prevailing winds.	Once the anemometer on the meteorological station is recalibrated, Hanson will finalise a suitable location for the particulate matter monitor.
Review the possibility of implementing automatic text message or email triggers from the PM_{10} monitoring equipment to relevant Quarry personnel.	This has been implemented, although Quarry personnel are yet to need these updates.
Implement a program of training for relevant staff to access and review PM_{10} monitoring data in a meaningful way.	Hanson has commenced development of this system so that data can be automatically accessed online by personnel and downloaded for publishing. This is expected to be implemented by the end of the second quarter of 2018.
Ensure that PM_{10} data is reviewed on at least a weekly basis to identify any exceedances.	PM_{10} data is reviewed internally on a weekly basis to check for non-compliance issues. This complements the text message and email trigger alerts that are received by the Quarry Manager.
Ensure that all exceedances are reported to the relevant stakeholders as soon as practically possible, investigated internally and a report prepared and submitted to relevant stakeholders in a timely manner. The report should describe the results of the investigation, including the likely source of the particulate matter, operational activities occurring at the time and measures to be implemented to prevent further exceedance.	This recommendation is noted and would be implemented, as required.

6. ENVIRONMENTAL PERFORMANCE

6.1 INTRODUCTION

Environmental monitoring is undertaken to determine the degree of impact the construction and production operations are having on the environment. Assessment of these results can establish if environmental management systems are being successfully applied in the short term and if the management systems need to be amended.

Appropriate environmental monitoring, apart from satisfying necessary statutory requirements, demonstrates to the local community and relevant authorities the Company's commitment to the protection of the environment.

The following sub-sections present the results of the various monitoring programs undertaken throughout the reporting period. Where appropriate, results of the previous years' monitoring are also presented for comparative purposes.

Figures 5 and **6** provide monitoring locations referred to in this section.

A program of regular aerial photography commenced in late 2013, with further flights planned annually. Aerial photograph captured on 2 November 2017 has been used in the preparation of **Figures 2** to **5**.

6.2 METEOROLOGICAL MONITORING

Table 10 presents the meteorological monitoring results recorded by the Company's automated meteorological monitoring station (also displayed in **Figure 5**). In addition, long term-average climate data from the Bureau of Meteorology-operated Orange Airport AWS (Station No 063303) is provided for comparison.

Due to a malfunction with the automated meteorological monitoring station, temperatures readings at 2m above ground level were not consistently available. Readings at 10m above ground level have been reported. Maximum temperature records at the Quarry during the reporting period were generally quite close to the long-term temperatures records whilst minimum temperatures were significantly higher than average, suggesting lower than average daily temperature variations throughout the year.

Rainfall variability can be considered through comparison of annual and individual month records at the Quarry with those recorded during 2015 and 2016. In summary, total rainfall during 2017 was significantly lower than that in both 2015 and 2016, however individual months varied. When compared with the long-term average recorded at the Orange Airport AWS, there is significant variance across the year, with total rainfall well below the long term average. It is noted that rainfall in March 2017 was almost double the long-term average, however there was very little rainfall in June, and the Quarry generally received lower rainfall each month than the long-term average.

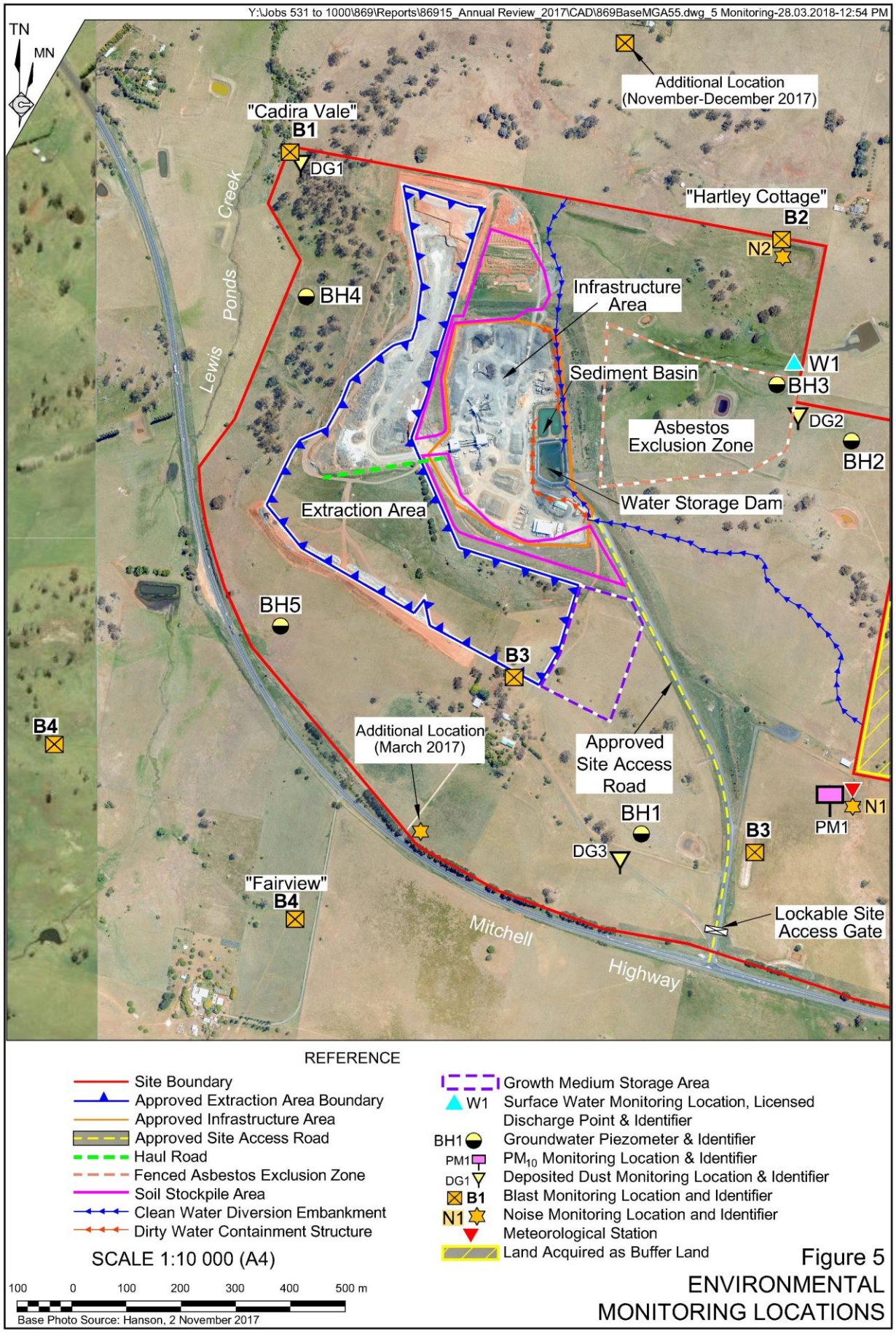

Figure 5
ENVIRONMENTAL MONITORING LOCATIONS

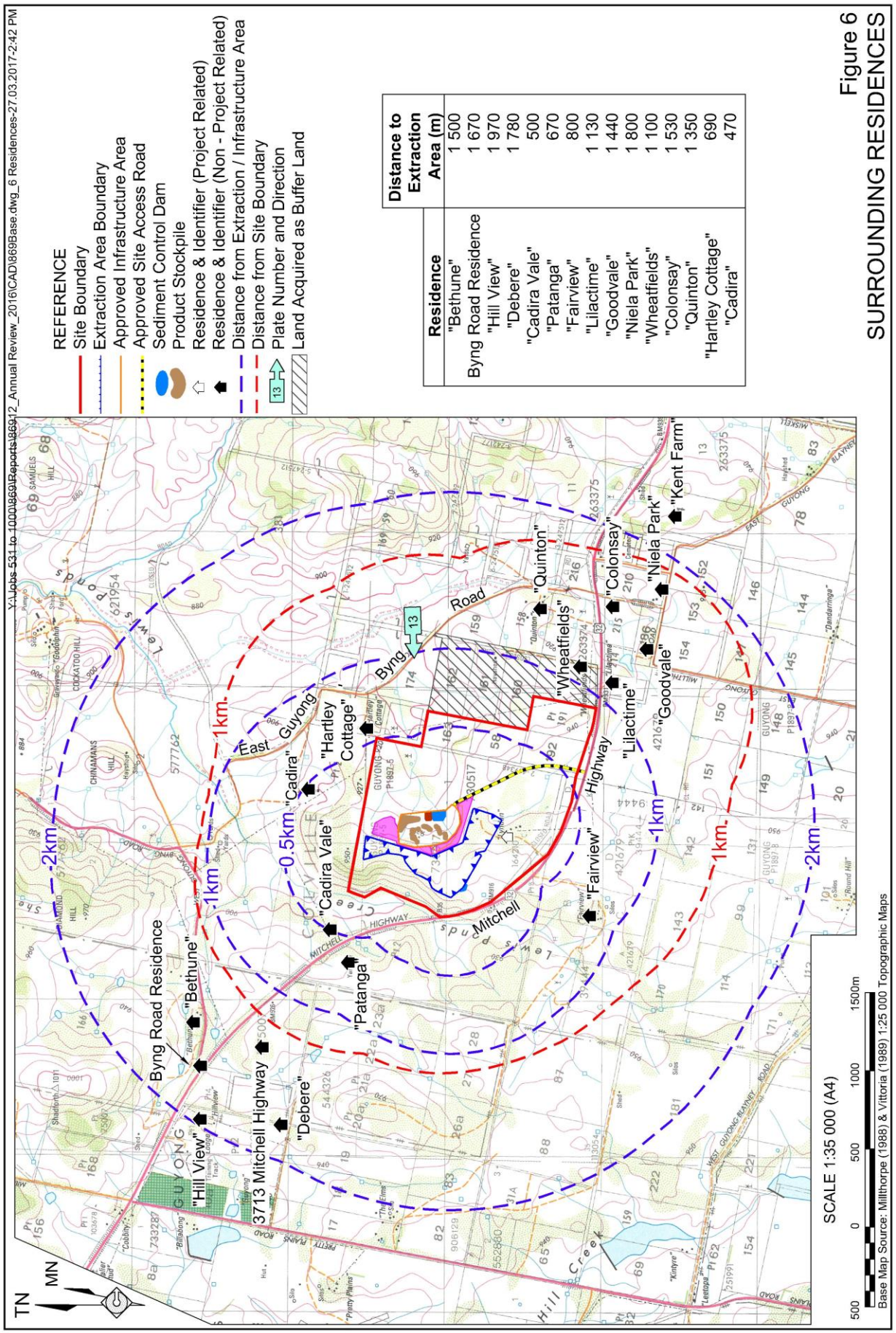
REFERENCE
Site Boundary
Extraction Area Boundary
Approved Infrastructure Area
Approved Site Access Road
Sediment Control Dam
Product Stockpile
Residence & Identifier (Project Related)
Residence & Identifier (Non - Project Related)
Distance from Extraction / Infrastructure Area
Distance from Site Boundary
Plate Number and Direction
Land Acquired as Buffer Land
Residence
"Bethune"
Byng Road Residence
"Hill View"
"Debere"
"Cadira Vale"
"Patanga"
"Fairview"
"Lilactime"
"Goodvale"
"Niela Park"
"Wheatfields"
"Colonsay"
"Quinton"
"Hartley Cottage"
"Cadira"
Distance to Extraction Area (m)
1 500
1 670
1 970
1 780
500
670
800
1 130
1 440
1 800
1 100
1 530
1 350
690
470
Figure 6
SURROUNDING RESIDENCES
Y:\Jobs 531 to 1000\869\Reports\86912_Annual Review_2016\CAD\869Base.dwg_6 Residences-27.03.2017-2:42 PM
TN
MN
SCALE 1:35 000 (A4)
500 0 500 1000 1500m
Base Map Source: Millthorpe (1988) & Vittoria (1989) 1:25 000 Topographic Maps

Table 10
Meteorological Monitoring Results

Year		Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
Average Temperature (ºC)														
2014	Maximum	28.8	N/A	N/A	17.7	14.1	10.3	9.1	11.2	14.4	20.2	25.7	25.6	-
	Minimum	13.5	N/A	N/A	8.1	5.0	2.9	1.1	0.9	3.9	6.6	9.8	12.0	-
2015	Maximum	30.1	31.2	29.8	24.6	19.0	14.3	N/A	N/A	N/A	N/A	N/A	N/A	-
	Minimum	6.6	9.9	1.8	1.2	-1.1	-3.1	-4.8	-3.2	-0.6	4.3	2.6	7.0	1.7
2016	Maximum	34.2	33.1	31.1	26.5	21.5	13.3	15.4	15.3	16.7	21.6	25.1	30.5	23.7
	Minimum	8.5	8.4	5.9	6.7	-2.2	-3.4	-1.1	-1.7	1.8	1.8	1.6	8.9	2.9
2017	Maximum	28.6	28.1	22.6	17.2	13.5	11.2	10.3	10.5	14.9	19.6	21.2	25.0	18.6
	Minimum	21.7	26.3	13.6	7.8	4.8	2.5	2.0	2.2	4.7	8.3	9.8	14.2	9.8
Long Term Average[1]	Maximum	27.2	26.0	22.9	18.5	14.1	10.9	9.7	11.2	14.8	18.2	21.8	24.7	18.3
	Minimum	12.8	12.6	9.8	5.4	2.5	1.3	0.5	0.9	3.2	5.6	8.4	10.5	6.1
Rainfall (mm)														
2014	Total	17.4	N/A	N/A	50.0	40.6	108.2	56.6	42.0	37.4	58.8	33.8	77.8	-
	No. of Rain Days	6	N/A	N/A	10	18	21	20	13	6	5	6	12	-
	Max Daily Rainfall	15.4	N/A	N/A	17.0	20.8	27.2	18.4	16.6	18.6	38.4	12.2	29.8	-
2015	Total	59.2	54.6	25.8	151.0	48.6	34.6	84.4	76.6	16.0	30.0	88.0	68.0	736.8
	No. of Rain Days	6	7	4	18	14	19	19	15	8	6	10	7	133
	Max Daily Rainfall	26.6	26.4	12.0	25.2	30.8	13.0	13.8	18.2	7.4	11.8	25.0	37.6	37.6
2016	Total	111.4	0.2	52.8	35.8	66.0	154.6	93.8	95.2	194.2	63.6	46.8	73.6	988.0
	No. of Rain Days	11	1	9	6	10	23	15	14	19	15	9	11	143
	Max Daily Rainfall	20.2	0.2	21.2	20.4	27.6	30	39.4	35.6	48.6	15.2	31.4	52.6	52.6
2017	Total	45.8	15.0	119.2	23.2	36.6	5.0	20.4	43.6	18.4	55.4	86.4	105.2	574.2
	No. of Rain Days	8	4	10	6	13	15	10	9	6	6	9	11	107
	Max Daily Rainfall	35.4	10.6	42.6	11.0	12.4	1.4	13.6	19.2	10.6	27.6	32.8	44.4	44.4
Long Term Average[1]	Total	60.3	77.0	68.9	42.1	48.7	79.8	76.6	84.1	79.8	73.6	79.4	91.0	900.2
	No. of Rain Days	8.1	7.9	8.0	7.8	12.5	18.2	18.8	15.6	11.5	9.2	9.6	9.1	136.3
	Max Daily Rainfall	69.0	89.0	109.6	68.0	50.4	57.2	40.8	74.0	46.8	61.0	80.0	94.0	109.6

Note 1: Long-term average data source - Orange Airport AWS (Station No 063303) – Updated 21 March 2018

Source: Hanson Construction Materials Pty Ltd

Annual wind rose data (9:00am and 3:00pm) recorded at the Orange Airport meteorological station (Station No. 063303) is provided in **Figure 7**. The data indicates variable winds throughout the day with winds featuring from the southwest throughout the year. Winds from the north and northeast also feature in the mornings, while winds from the west also feature in the afternoon.

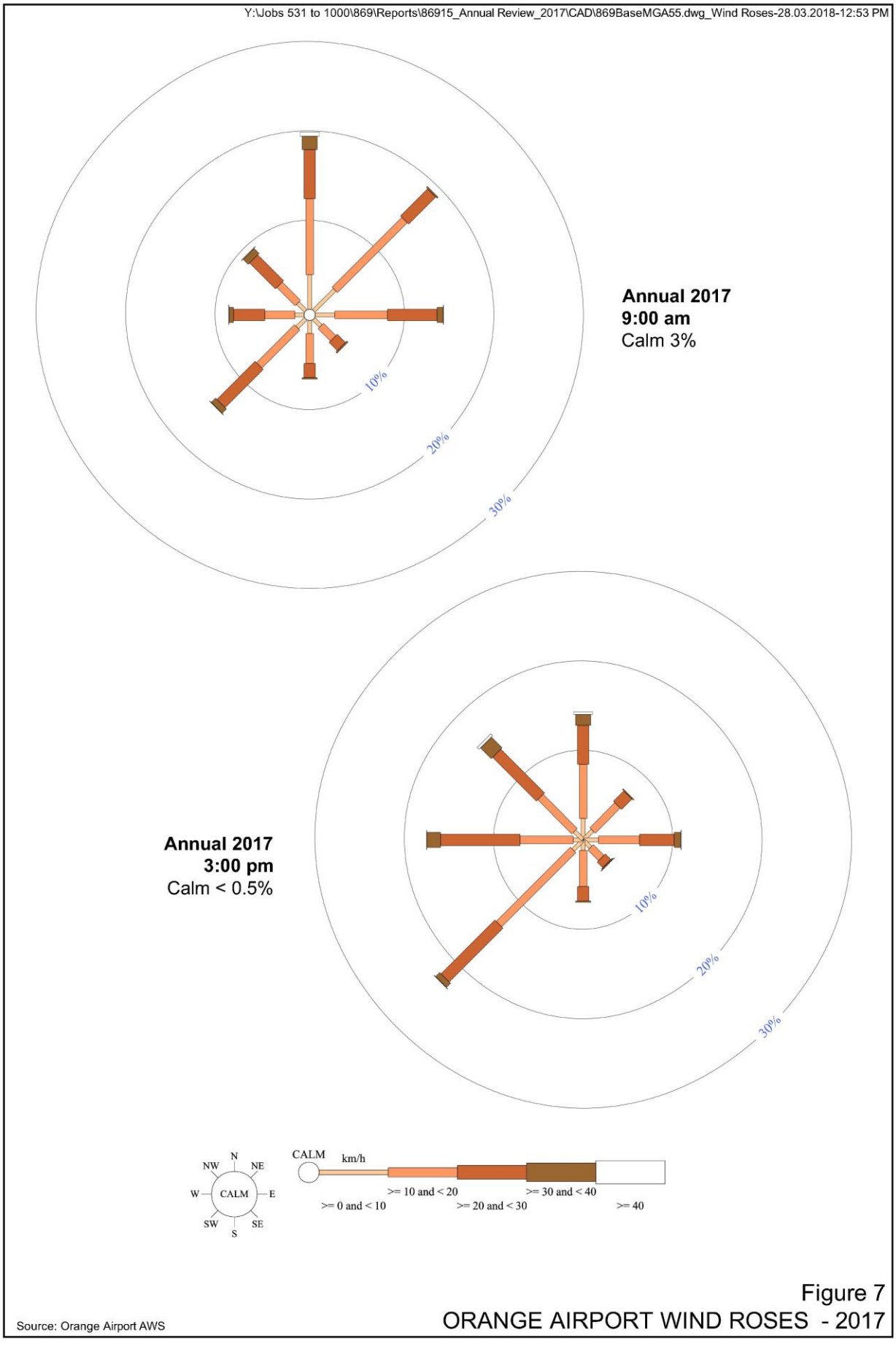

Figure 7
ORANGE AIRPORT WIND ROSES - 2017

Source: Orange Airport AWS

6.3 ASBESTOS

6.3.1 Predicted Impacts and Performance Criteria

The *Asbestos Management Plan* prepared by Greencap/NAA Limited (formerly Noel Arnold and Associates Pty Ltd) and dated May 2012 was approved by the Land and Environment Court and appended to Project Approval PA06_0193. That document identifies the control measures to be implemented by the Company, as well as documenting the Asbestos Fibre Air Monitoring Protocol, Notification Protocol and Exceedance Protocol and measures to be implemented in the event of exposure to Naturally Occurring Asbestos.

In summary, Paragraphs 6.2 and 6.6 of the *Asbestos Management Plan* require the following stages of asbestos monitoring.

1. Background monitoring at a range of locations for a minimum of five days prior to commencement of intrusive works.
2. Daily control and personal monitoring during intrusive works.
3. Weekly control and personal monitoring for a three month period following the conclusion of intrusive works.
4. Monthly control and personal monitoring for the period between 4 and 15 months following the conclusion of intrusive works.
5. Bi-monthly control and personal monitoring for the period from 16 months following the conclusion of intrusive works during the life of the Quarry.

Intrusive Works are defined as "any works for site infrastructure that have the potential to disturb soil or rock on the Infrastructure Area."

Stage 1 was completed during the 2012/2013 reporting period. All "intrusive works" ceased with the completion of the Fixed Processing Plant in September 2014. As a result, the Company transitioned from Stage 3 to Stage 4 monitoring in January 2015. In April 2017 the Company was due to transition to bi-monthly monitoring consistent with Stage 5 of the monitoring program, however has continued to monitor monthly. Due to a delay in delivery of the fibre monitors in January 2017, Hanson was not able to undertake monitoring in that month. Two campaigns of monitoring were undertaken in February to account for the missed months.

The Company will continue monitoring consistent with Stage 4 during 2018 and transition to Stage 5 following review of the program with Greencap/NAA Limited. It should also be noted that during the next reporting period, Hanson is planning to review the Asbestos Fibre Monitoring program in light of historic results.

6.3.2 Monitoring Procedure and Criteria

Monitoring of airborne asbestos fibres is undertaken using a small pump that draws a known volume of air through a filter. The filter collects dust particles in the air. The filters are sent to Greencap/NAA Limited (formerly Noel Arnold and Associates Pty Ltd) on the day they are collected for analysis and reporting in accordance with paragraphs 6.7 to 6.9 of the *Asbestos Management Plan.*

In implementing Stage 5 of the *Asbestos Management Plan*, the Applicant undertakes asbestos sampling on days when rain is not falling and potential exists for airborne dust to be generated.

Fibre concentrations are analysed by Greencap/NAA Limited (formerly Noel Arnold and Associates Pty Ltd), a NATA-accredited laboratory, using phase contrast microscopy in accordance with the procedure identified in Paragraph 6.8 of the *Asbestos Management Plan.*

All fibres are counted initially, with those samples exceeding the Quantification Limit of 0.01 fibres/mL further analysed, to determine whether the fibres are asbestiform or non-asbestiform. In accordance with Paragraph 6.10 of the *Asbestos Management Plan* this assessment would be undertaken by an approved external laboratory using scanning electron microscopy or transmission electron microscopy.

The Asbestos Impact Assessment Criterion (AIAC) is 0.01 asbestos fibres/mL.

Table 11 presents a summary of the asbestos performance criteria and actions to be implemented in the event of an exceedance of the criteria.

Table 11
Asbestos Monitoring Performance Criteria

Criteria	Limit	Action in the Event of Exceedance
Quantification Limit	0.01 fibres/mL	• Cease intrusive works and isolate and secure the work area. • Employ dust suppression techniques. • Notify relevant stakeholders. • Send samples for further analysis by an approved laboratory. • If no exceedance of AIAC resume works.
Asbestos Impact Assessment Criterion	0.01 asbestos fibres/mL	• Implement a 25m exclusion zone around the monitoring location. • Engage NATA accredited asbestos consultant or licensed asbestos assessor to assist in the investigation and provide appropriate advice. • Notify relevant stakeholders. • Implement recommended measures prior to resuming work.
Source: Asbestos Management Plan – After Section 8		

6.3.3 Measured Performance

In accordance with Condition 5(10)(a) of PA06_0193, all asbestos monitoring certificates are presented on the Quarry's website and provided as **Appendix 6**. In summary, samples were taken on the following days.

- 2 February 2017
- 3 February 2017
- 31 March 2017
- 3 April 2017
- 31 May 2017
- 2 June 2017
- 31 July 2017
- 2 August 2017
- 29 September 2017
- 3 October 2017
- 4 December 2017
- 5 December 2017

The Company analysed a total of 90 samples over these dates at locations within the Infrastructure Area and at strategic locations within the Quarry Site to accurately determine background conditions.

No samples exceeded the Quantification Limit during the reporting period and as a result, no samples required further testing to determine whether the Asbestos Impact Assessment Criterion has been exceeded.

6.3.4 Discussion and Analysis

No samples exceeded the quantification or screening limit for airborne asbestos fibres. As a result, the Company contends that the management measures implemented to date would appear to have been effective in protecting the health of the Company's employees and contractors, as well as the health of the surrounding community. The Company will continue to implement the identified management measures and monitoring procedures during the next and subsequent reporting periods.

It should be noted that no monitoring samples have exceeded the quantification or screening limit for airborne asbestos fibres since monitoring commenced in July 2012.

6.4 NOISE

6.4.1 Predicted Impacts and Performance Criteria

Table 12 identifies the predicted operating noise levels at four representative residences surrounding the Quarry (**Figure 6**) and **Table 13** identifies the relevant noise-related performance criteria for residences surrounding the Quarry Site identified by Condition 3 of Schedule 5 of PA 06_0193.

Table 12
Predicted Operating Noise Levels

Receiver[1]	Stage	Daytime (0700-1800)		Evening (1800-2200)		Night-time (2200-0700) calm	
		Predicted L_{Aeq} (15 minute) noise level	L_{Aeq} (15 minutes) intrusive criterion	Predicted L_{Aeq} (15 minute) noise level	L_{Aeq} (15 minute intrusive criterion)	Predicted L_{Aeq} (15 minute) noise level	L_{Aeq} (15 minute) intrusive criterion
"Cadira Vale"	1	22	35	20	35	20	35
	4	29		21		21	
	7	28		23		23	
"Fairview"	1	25	36	22	35	23	35
	4	36		22		22	
	7	31		25		25	
"Lilactime"	1	23	35	22	35	22	35
	4	20		19		19	
	7	22		20		20	
"Hartley Cottage"	1	29	35	29	35	29	35
	4	32		27		27	
	7	28		27		27	

Note 1: See Figure 6

Source: Heggies (2007a) – Modified after Table 11

Table 13
Noise-related Performance Criteria

Location	Day dB(A)[1]	Evening dB(A)[1]	Night dB(A)[1]
Surrounding Residences[2]			
"Hartley Cottage"	35	35	35
"Cadira Vale"	35	35	35
"Lilac Time"	35	35	35
"Fairview"	36	35	35
All other privately owned land	35	35	35
Intermediate Monitoring Locations[3]			
Location N1	43	43	43
Location N2	50	50	50

Note 1: Units = LAeq 15 minutes
Note 2: See **Figure 6**
Note 3: See **Figure 5**

Section 11.2.2 of the *Noise Management Plan* identifies that noise monitoring would be undertaken at two intermediate locations, namely Locations N1 and N2 (**Figure 5**), within land owned by the Company as a screening mechanism and to ensure that residents of the surrounding properties are not unduly inconvenienced as a result of the attended monitoring program. In 2012, Mr Dick Godson of SLR undertook an assessment of equivalent noise levels at Locations N1 and N2 for preparation of the Noise Management Plan for the Quarry (RWC, 2013) that would ensure compliance with the noise criteria identified in Condition 3(5) of PA06_0193. **Table 13** also presents the results of that assessment as the noise level criteria to be applied at these locations.

The Company will initially undertake monitoring quarterly at Locations N1 and N2. In the event that the noise levels identified in **Table 13** are exceeded, there is a substantiated noise-related complaint, or a landholder exercises their rights under Condition 4(3) of PA 06_0193 to request an independent review of noise-related impacts, attended noise monitoring would be undertaken at surrounding residences.

6.4.2 Measured Performance

Quarterly attended noise monitoring programs were undertaken during the reporting period by EMM Consulting Pty Limited (EMM). The resulting reports are presented as **Appendix 7**.

All noise monitoring was undertaken under the following operational conditions.

- extraction of basalt using standard drill, blast, load and haul techniques;
- processing of extracted basalt and stockpiling; and
- transportation of quarry products.

Noise monitoring was undertaken at intermediate locations N1 and N2 (see **Figure 5**) during each monitoring campaign. An additional location was included in the attended noise for the March 2017 monitoring campaign at the request of the Quarry Manager. This location was

chosen to assess noise levels to the south of the extraction area and infrastructure area. It represents the potentially worst affected residence to the south (i.e. "Fairview") and was selected due to the northerly winds (i.e. source to receiver) present at the time of the measurements. Appropriate criteria at the additional monitoring location has not been calculated, however the monitored noise levels at this location have been inferred from the criteria applicable at the nearest privately-owned residence.

The noise monitoring results are summarised in **Table 14**, **Table 15**, **Table 16** and **Table 17**.

6.4.3 Discussion and Analysis

It is noted that in accordance with the Industrial Noise Policy (INP), a modification factor of five decibels has been applied in situations where low frequency noise attributable to the Quarry was identified and where there is a difference of 15 decibels or more between 'C' weighted and 'A' weighted noise levels. In October 2017, the EPA published the Noise Policy for Industry. Although assessment of noise levels from Quarry operations continue to apply under the INP, the transitional arrangements for the Noise Policy for Industry require that the treatment of tonal or low frequency noise in accordance with this policy applies regardless of when the approval was granted. Therefore, EMM Consulting treated low frequency noise in accordance with the Noise Policy for Industry (EPA, 2017) in the final campaign of monitoring in 2017 and applied a modifying factor to recorded noise levels. There were no instances where modified noise levels due to low frequency noise caused an exceedance of the relevant criteria.

Several instances were recorded where wind speeds greater than 3m/s were identified. In these instances, the noise limits do not apply (see Condition L4.7 of Environment Protection Licence 20190).

Noise levels at locations N1 and N2 complied in all instances during the reporting period. Noise monitoring results at the additional location during March 2017 indicated noise levels ≤35dB(A) and therefore noise levels at the closest privately-owned residence are considered to be compliant with the relevant noise assessment criteria.

In summary, the attended monitoring program undertaken throughout the reporting period confirmed that the Quarry satisfied requirements with regards to the assessment criteria that apply at the Quarry. This is consistent with the predictions included in the Environmental Assessment Report (EA) (Hanson, 2009) and Noise Management Plan (RWC, 2013) and the results of previous noise monitoring at the Quarry. In 2016, noise levels at locations N1 and N2 were generally slightly higher than in 2017 while in 2015 noise levels were generally comparable with those in 2017. There is no identifiable trend in monitored noise levels.

Monitored noise levels generally remain within the approved criteria and predictions made in the EA. The noise criteria provided in PA 06_0193 is generally 35dB(A), suggesting that noise levels were predicted to be generally lower than the rating background noise level and minimum assumed for assessment under the Industrial Noise Policy. However, Hanson is aware that noise predictions made in the EA are based on worst-case scenario events and therefore would require monitoring during the next reporting period.

Table 14
Noise Monitoring Results – 2 March 2017

Location	Time (hrs)	Attended Noise Monitoring Results (dB(A))					Criteria dB(A)	Met conditions[1]		Comments
		Total measured				Site Contribution 3		Wind Speed (m/s)	Wind Direction (degrees from North)	
		L_{eq}	L_{max}	L_{90}	C-A	L_{eq}				
N1	08:22	55	83	37	≥15	35[2] (30+5)	43	3.1	106	Site audible for approximately five minutes (excavator tracks). Other sources include consistent traffic noise from the Mitchell Highway and bird noise.
	09:35	42	62	33	≥15	34[2] (29+5)	43	2.0	351	Site audible for approximately three minutes (crushing plant, engine revs and excavator noise). Other sources include consistent bird noise and traffic noise from the Mitchell Highway. A quad bike was audible for approximately six minutes.
N2	08:45	40	57	34	≥15	36[2] (31+5)	50	2.7	82	Site audible (predominantly crushing plant, engine revs and excavator noise). Other sources included consistent bird noise, frequent animal noise and traffic noise from the Mitchell Highway.
	09:01	38	60	35	≥15	38[2] (33+5)	50	2.0	97	Site audible (predominantly crushing plant and engine revs). Other sources included consistent bird noise, frequent traffic noise from the Mitchell Highway and occasional animal noise.
Additional location	09:57	69	86	38	≥15	37[2] (32+5)	N/A	3.5	23	Site audible (crushing plant) in between car passbys on the Mitchell Highway. Other sources include consistent insects. A plane was audible for approximately three minutes.

Note 1: Meteorological data was recorded at BOM AWS located at Orange Airport (at a height of 10m above ground).

Note 2: A penalty factor of 5dB has been applied to these results to account for the low frequency component. This is applied when 'C' weighted noise minus 'A' weighted noise is greater than 15dB in accordance with the Industrial Noise Policy.

N/A Not Applicable.

Source: EMM (2017a) – Table 2

Table 15
Noise Monitoring Results – 15 June 2017

Location	Time (hrs)	Attended Noise Monitoring Results (dB(A))					Criteria dB(A)	Met conditions[1]		Comments
		Total measured				Site Contribution		Wind Speed (m/s)	Wind Direction (degrees from North)	
		L_{eq}	L_{max}	L_{90}	C-A	L_{eq}				
N1	08:19	45	62	39	≥15	40[2] (35+5)	43	1.5	5	Site audible (Engine revs, reversing alarms and bangs). Other sources include consistent traffic noise from the Mitchell Highway, frequent bird noise and a plane.
	09:24	38	49	34	≥15	39[2] (34+5)	43	1.3	357	Site audible (crushing plant and engine revs). Other sources included occasional bird noise and traffic noise from the Mitchell Highway.
N2	08:43	43	56	39	≥15	43[2] (37+5)	50	1.2	0	Site audible (crushing plant, engine revs and reversing alarms). Other sources included frequent bird noise and traffic noise from the Mitchell Highway.
	08:59	42	54	38	≥15	40[2] (35+5)	50	1.4	359	Site audible (crushing plant and engine revs). Other sources included occasional bird noise, frequent traffic noise from the Mitchell Highway and a nearby car.

Note 1: Meteorological data was recorded by the East Guyong Quarry site's weather station located near location N1.

Note 2: A penalty factor of 5dB has been applied to these results to account for the low frequency component. This is applied when 'C' weighted noise minus 'A' weighted noise is greater than 15dB in accordance with the Industrial Noise Policy.

Source: EMM (2017b) – Table 2

Table 16
Noise Monitoring Results – 20 September 2017

Location	Time (hrs)	Attended Noise Monitoring Results (dB(A))					Criteria dB(A)	Met conditions[1]		Comments
		Total measured				Site Contribution		Wind Speed (m/s)	Wind Direction (degrees from North)	
		L_{eq}	L_{max}	L_{90}	C-A	L_{eq}				
N1	08:39	36	58	32	≥15	34[2] (29+5)	43	1.1	122	Site just audible including crushing plant and reversing alarms. Other sources include consistent traffic noise from the Mitchell Highway and frequent bird noise.
	09:50	38	57	31	≥15	34[2] (29+5)	43	1.7	296	Site just audible including crushing plant and engine revs. Other sources included frequent traffic noise from the Mitchell Highway, frequent bird noise, occasional livestock noise and planes.
N2	09:05	37	56	35	≥15	39[2] (34+5)	50	1.4	53	Site audible including crushing plant, engine revs and reversing alarms. Other sources included frequent bird noise and occasional traffic noise from the Mitchell Highway.
	09:21	40	66	34	≥15	40[2] (35+5)	50	0.8	231	Site audible including crushing plant, engine revs and reversing alarms. Other sources included frequent bird noise, occasional traffic noise from the Mitchell Highway and a plane.

Note 1: Meteorological data was recorded by the East Guyong Quarry site's weather station located near location N1.

Note 2: A penalty factor of 5dB has been applied to these results to account for the low frequency component. This is applied when 'C' weighted noise minus 'A' weighted noise is greater than 15dB in accordance with the Industrial Noise Policy.

Source: EMM (2017c) – Table 2

Table 17
Noise Monitoring Results – 7 December 2017

Location	Time (hrs)	Attended Noise Monitoring Results (dB(A))					Criteria dB(A)	Met conditions[1]		Comments
		Total measured				Site Contribution		Wind Speed (m/s)	Wind Direction (degrees from North)	
		L_{eq}	L_{max}	L_{90}	LFN mod. factor	L_{eq}				
N1	08:12	42	59	40	0 dB[2]	37	43	4.4	304	Site consistently audible including crushing plant, engine revs and reversing alarms. Other sources include frequent bird noise, wind gusts and occasional traffic noise from the Mitchell Highway.
	09:26	45	63	41	0 dB[2]	38	50	6.0	305	Site consistently audible including crushing plant, engine revs and reversing alarms. Other sources include frequent bird noise, wind gusts/wind in trees and a plane.
N2	08:36	44	69	40	0 dB[2]	38	50	4.7	302	Site consistently audible including crushing plant, engine revs and reversing alarms. Other sources include frequent bird noise, wind gusts and occasional traffic noise from the Mitchell Highway.
	08:51	43	70	40	0 dB[2]	38	50	4.9	314	Site consistently audible including crushing plant, engine revs and reversing alarms. Other sources include frequent traffic noise from the Mitchell Highway, bird noise and a plane.

Note 1: Meteorological data was recorded by the East Guyong Quarry site's weather station located near location N1.

Note 2 A low frequency noise modifying factor only applied during assessable meteorological conditions. In this case wind speed was greater than 3m/s during all periods and therefore a modifying factor does not apply.

Source: EMM (2017d) – Table 3

6.5 BLASTING

6.5.1 Public Notices, Property Inspections and Property Investigations

Condition 3(15) of PA 06_0193 requires the Company to:

- operate a blasting hotline and advertise the hotline number in a local newspaper at least twice a year, or operate an alternate system agreed to by the Director-General, to enable the public to get up-to-date information on the blasting schedule;
- publish an up-to-date blasting schedule on its website; and
- notify the landowner/occupier of any residence within 2 kilometres of the site about the blasting schedule, blasting hotline and its website.

The blasting hotline (02 6368 7130) was advertised in the public notice section of the *Western Advocate* (Bathurst) and *Central Western Daily* (Orange) in February and October 2017. In addition, blasting schedules for the coming month are published on the quarry website each month. Finally, the Company provides written notification of planned blasts to all residents within 2km of the Site prior to each blast.

6.5.2 Predicted Impacts and Performance Criteria

Table 18 identifies predicted blasting-related impacts at surrounding residences (**Figure 6**). **Table 19** presents the airblast overpressure and ground vibration performance criteria identified in Conditions 3(8) and 3(9) of PA06_0193.

Table 18
Predicted Levels of Blast Emissions

Residence	Distance from Closest Blasting	Ground Vibration (mm/s)	Airblast Overpressure (dB Linear)
"Cadira Vale"	750m – 340m	1.1 – 4.0mm/s	111 – 119dB Linear
"Hartley Cottage"	1 250m – 810m	0.5 – 1.0mm/s	106 – 110dB Linear
"Fairview"	1 480m – 920m	0.4 – 0.8mm/s	104 – 109dB Linear
"Lilactime"	2 025m – 1 720m	0.2 – 0.3mm/s	101 – 103dB Linear
Source: Heggies (2007a) Modified Table 18			

Table 19
Blasting-related Performance Criteria

Allowable exceedance	Airblast overpressure level (dB(Lin Peak))	Peak particle velocity (mm/s)
5% of the total number of blasts in a 12 month period	115	5
0% of the total number of blasts in a 12 month period	120	10

In order to minimise inconvenience for surrounding residents, the *Blast Management Plan* identifies three blast monitoring locations within land owned by the Company, with a fourth located adjacent to the access road for the "Fairview" residence (**Figure 5**).

In addition to the above criteria, Conditions 3(10) and 3(11) of PA06_0193 permit blasting between 9:00am and 3:00pm, Monday to Friday. No blasting is permitted on Saturdays, Sundays or Public Holidays. The Company may initiate up to:

- two blasts per day; and
- five blasts per week, averaged over a calendar year.

6.5.3 Measured Performance

Table 20 presents the results of blast monitoring during the reporting period.

Table 20
Blast Monitoring Results

Date		B1 (Cadira Vale)		B2 (Hartley Cottage)		B3 (Front Gate)		B4 (Fairview)	
		Ground Vibration (mm/s)	Air Blast (dB)	Ground Vibration (mm/s)	Air Blast (dB)	Ground Vibration (mm/s)	Air Blast (dB)	Ground Vibration (mm/s)	Air Blast (dB)
Criterion	**95%/yr**	**5**	**115**	**5**	**115**	**5**	**115**	**5**	**115**
	100%	**10**	**120**	**10**	**120**	**10**	**120**	**10**	**120**
24/01/2017		4.47	110.1	1.22	114.3	0.66	102.7	1.08	113.6
22/02/2017		4.91	105.1	1.14	105.3	NT	NT	1.53	108.8
22/03/2017		4.78	113.2	1.09	113.5	0.37	108.7	1.14	105.6
20/04/2017		4.80	107.7	1.52	109.6	0.37	111.0	1.14	105.6
09/05/2017		4.96	113.4	1.21	112.1	NT	NT	1.26	114.0
06/06/2017		3.99	113.8	0.87	114.1	0.41	110.6	0.83	106.5
05/07/2017		3.43	107.6	0.46	110.1	0.00[3]	0.0[3]	0.64	95.1
25/07/2017		4.85	109.0	0.73	102.0	0.69	88.7	0.73	110.8
29/08/2017[2]		3.27/NT	109.0/NT	0.55/NT	111.7/NT	0.17/NT	109.7/NT	NT/0.77	NT/104.2
22/09/2017		3.45	109.2	0.48	110.9	NT	NT	NT	NT
03/10/2017		2.68	105.8	NT	NT	0.47	102.7	NT	NT
06/10/2017		4.28	109.2	0.83	108.0	NT	NT	NT	115
09/11/2017		4.09	114.2	0.57	084.5	NT	NT	0.59	107.8
28/11/2017		2.83	100.8	NT	NT	NT	NT	0.82	83.0
19/12/2017		4.82	110.1	0.50	084.5	NT	NT	1.73	109.4

Note 1: NR = No reading was recorded for this blast event
Note 2: Production Shots 1709 / 1710 occurred on the same date
NT = Blast Monitor Not Triggered

Source: Hanson Construction Materials Pty Ltd

Blast monitoring was also undertaken at the Cadira property on 28 November 2017 and 19 December 2017. The results of the monitoring are presented in **Table 21**.

Table 21
Blast Monitoring at Cadira Property 2017

Date	Ground Vibration (mm/s)		Air Blast (dB)	
	Criteria	Monitored Record	Criteria	Monitored Record
28 November 2017	5 (95% of records)	0.00[1]	115 (95% of records)	0.0[1]
21 December 2017	5 (95% of records)	0.00[1]	115 (95% of records)	0.0[1]
Note 1: Blast Monitor Not Triggered				
Source: Hanson Construction Materials Pty Ltd				

6.5.4 Discussion and Analysis

The criterion of 5mm/s for ground vibration and 115dB for air blast overpressure was not exceeded in 2017. Blasting results therefore satisfied the criteria presented in **Table 19**. Similarly, the criteria were not exceeded in 2016 or 2015. The blast monitor at the Cadira Vale property has continued to register relatively higher results than at other locations (albeit within criteria levels). This is most likely a factor of the proximity of this property relative to the blast locations in the northern section of the extraction area.

EMM reviewed the blast monitoring results in reports dated 22 March 2017, 27 June 2017, 10 October 2017 and 15 December 2017 (**Appendix 6**) and noted that the air blast overpressure and ground vibration monitoring results satisfied relevant criteria.

It is noted that the resident at the Cadira property has requested that blast monitoring be undertaken due to concerns about structural damage at the property resulting from blasting activities. Hanson is confident that the blasting activities are not the cause of structural damage at this property. Blast activities during the reporting period failed to trigger the monitor at this location, supporting the conclusion that blast activities are not the cause of structural damage. It is acknowledged that a structural assessment of the property undertaken on 15 June 2016 was unable to rule out blasting activities as a cause of cracking, therefore, Hanson will continue to implement monitoring at this location at the request of the landowner.

6.6 AIR QUALITY

6.6.1 Predicted Impacts and Performance Criteria

Table 22 presents the predicted cumulative air quality impacts at the closest potentially affected residences to the Quarry (**Figure 6**). **Tables 23** and **24** present the air quality performance criteria presented in Condition 3(18) of PA06_0193.

Table 22
Predicted Cumulative Air Quality Impacts – Stages 1, 3 and 7

Receptor[1]	Stage	Cumulative Depositional Dust annual average (g/m^2/month)[2]	Cumulative PM_{10} 24-hour average ($\mu g/m^3$)[3]	Cumulative PM_{10} annual average ($\mu g/m^3$)[4]
Performance Criteria		**4.0**	**50**	**30**
"Cadira"	1	1.7	39	15
	3	1.8	40	15
	7	1.8	39	15
"Hartley Cottage"	1	1.9	43	15
	3	2.1	44	16
	7	2.0	44	16
"Quinton"	1	1.7	39	15
	3	1.7	39	15
	7	1.7	39	15
"Lilactime"	1	1.7	40	15
	3	1.7	42	15
	7	1.7	40	15
"Fairview"	1	1.7	39	15
	3	1.8	39	15
	7	1.8	42	16
"Cadira Vale"	1	1.7	39	15
	3	1.7	39	15
	7	1.7	39	15

Note 1: See **Figure 6** for location
Note 2: Total includes ambient air quality level of $1.6g/m^2$/month plus predicted contribution by the Quarry
Note 3: Total includes varied ambient air quality levels plus predicted contribution by the Quarry
Note 4: Total includes ambient air quality level of $13\mu g/m^3$

Sources: Heggies (2007b) – Modified from Tables 8, 9, 10

Table 23
Air Quality-related Performance Criteria – Suspended Particulates

Pollutant	Averaging period	Criterion	Basis
Total suspended particulate (TSP) matter	Annual	$90\mu g/m^3$	Total
Particulate matter < 10µm (PM_{10})	Annual	$30\mu g/m^3$	Total
Particulate matter < 10µm (PM_{10})	24 hour	$50\mu g/m^3$	Total

Table 24
Air Quality-related Performance Criteria – Deposited Dust

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	$2g/m^2$/month	$4g/m^2$/month

6.6.2 Measured Performance

6.6.2.1 Total Suspended Particulate Matter

Section 11 of the approved Air Quality Monitoring Program (AQMP) dated February 2013 establishes the procedures to be implemented at the Quarry to satisfy Condition 3(20) of PA06_0193 regarding air quality monitoring. Section 11.3 of the AQMP states:

> *"There are established relationships between PM_{10} and TSP for extractive industries whereby if the PM_{10} long-term impact assessment criterion is satisfied the TSP criterion can also be expected to be satisfied. In view of this, PM_{10} monitoring is proposed as a surrogate for demonstration of compliance with the TSP criterion in **Table 8**, and thus no TSP monitoring is to be undertaken."*

The AQMP was prepared and submitted to DPE in February 2013. In accordance with this program, no monitoring of TSP is undertaken at the Quarry with compliance demonstrated through established compliance with the long-term criteria for PM_{10} (see Section 3.7.2.3 below).

6.6.2.2 Deposited Dust

Deposited dust monitoring commenced at monitoring locations DG1, DG2 and DG3 on 27 February 2013 and continued on a monthly basis during the reporting period. The locations of the deposited dust monitoring locations are shown on **Figure 5**. **Table 25** presents the results of the deposited dust monitoring program for 2017 and the 2016 average for comparison.

Table 25
Measured Performance – Deposited Dust[1]

Start Date	End Date	DG1	DG2	DG3	Criterion[2]
2016 Annual Average		**0.8**	**1.8**	**1.5**	**4.0**
30-Jan-17	7-Mar-17	2.0	0.8	2.4	4.0
3-Mar-17	7-Apr-17	2.9	2.1	0.8	4.0
3-Apr-17	12-May-17	3.8	3.9	2.1	4.0
3-May-17	12-May-17	1.2	1.7	3.8	4.0
2-Jun-17	19-Jun-17	0.3	3.7	0.2	4.0
4-Jul-17	13-Jul-17	0.3	0.4	0.6	4.0
3-Aug-17	23-Aug-17	0.5	3.7	1.1	4.0
4-Sep-17	5-Oct-17	0.4	3.9	0.5	4.0
5-Oct-17	14-Nov-17	0.8	1.5	1.6	4.0
6-Nov-17	4-Dec-17	1.0	0.7	2.5	4.0
Annual Average		**1.3**	**2.2**	**1.6**	**4.0**

Note 1: Units – g/m^2/month
Note 2: Averaged over a 12-month period

Source: Hanson Construction Materials Pty Ltd

All samples recorded in 2017 varied between 0.2g/m^2/month and 3.9g/m^2/month. The 2017 annual averages at Dust Gauges 1 and 2 were somewhat higher than in 2016, while the 2017 annual average at Dust Gauge 3 was slightly higher than in 2016. Deposited dust monitoring results indicate that average annual rates of dust deposition in the vicinity of the Quarry remain below the criterion levels at each location.

6.6.2.3 PM_{10} Concentration

The concentration of PM_{10}, namely that component of suspended particulates with an aerodynamic diameter of 10µm or less, commenced at monitoring location PM1 on 24 January 2012 using a DustTrac PM_{10} monitor (**Figure 5**). **Figure 8** presents the results of the PM_{10} dust monitoring during the reporting period.

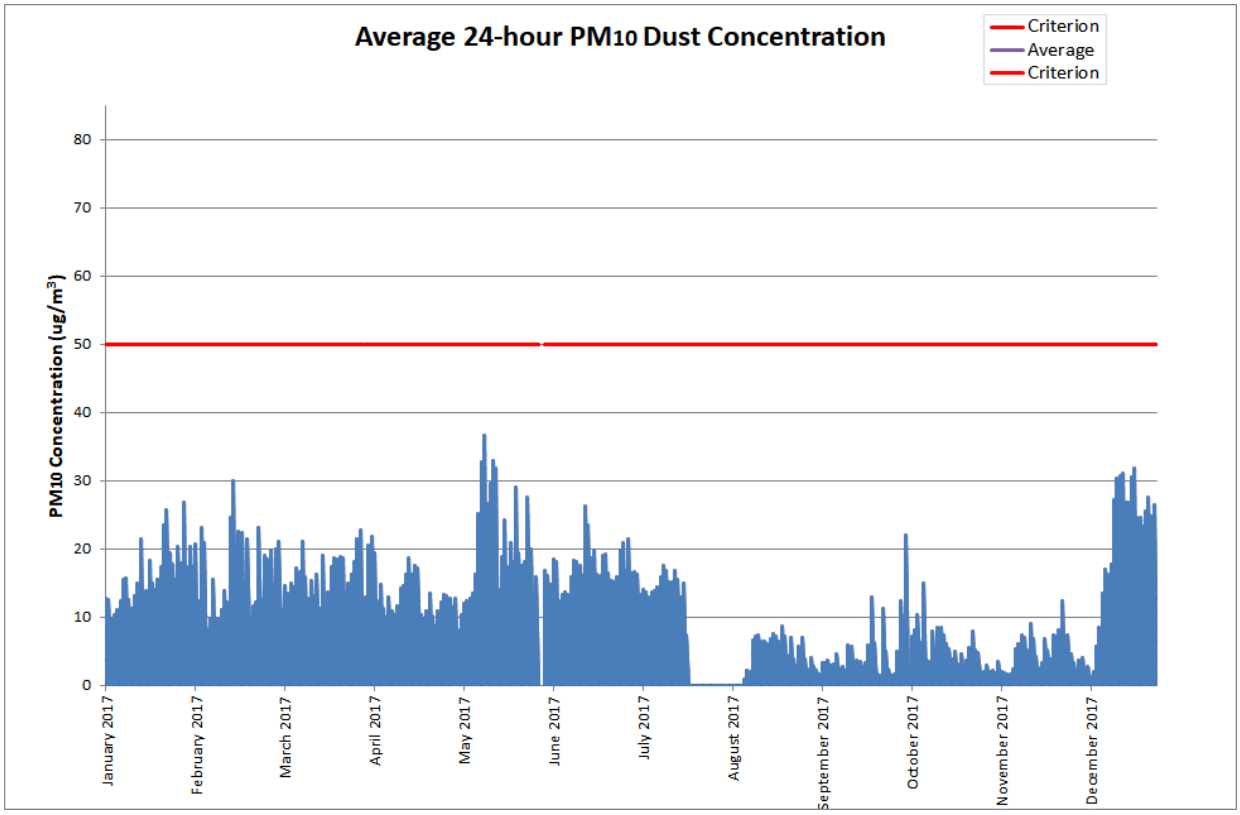

Figure 8
Average 24-Hour PM_{10} Dust Concentration

The criterion for average 24-hour PM_{10} concentrations of 50µg/m^3 PM_{10} was not exceeded during the reporting period. The monitored results for average annual PM_{10} was 12µg/m^3 during the reporting period, which is below the criteria level of 30µg/m^3.

Historic exceedances of the average 24-hour PM_{10} concentrations have generally occurred due to bushfires in the area, with the fine smoke particles registered by the monitor. There were no bush fire events in 2017 that caused a monitored exceedance.

As described in Section 5, an Air Quality Review was undertaken for the Quarry in October 2017 due to several exceedances of average 24-hour PM_{10} concentrations in 2016 that were not notified to DPE in accordance with the conditions of PA 06_0193. The results of the review, recommendations to improve air quality management, and Hanson's progress implementing these recommendations, are presented in Section 5. In summary, there were no exceedances of average 24-hour PM_{10} concentrations during the reporting period, and it is concluded that air quality management is considered to have been successful over the reporting period. It is recognised that the recommendations of the air quality review would improve air quality management, and implementation of these recommendations will continue over the next reporting period.

6.6.3 Discussion and Analysis

The results of dust and particulate monitoring during the reporting period indicate an improvement on recorded dust levels. This may be due partly to weather conditions but is most likely the result of the effort from Hanson to manage dust effectively at the Quarry. Measures that were implemented during the reporting period that may have improved performance include the use of a dust suppressant foam in the processing plant (see Section 4.3.2) and the use of automated water sprays on internal unsealed roads.

6.7 HERITAGE

The Aboriginal heritage assessment for the Quarry identified no objects of Aboriginal or non-Aboriginal heritage significance within the Quarry. Notwithstanding this, Section 8.3 of the *Aboriginal Cultural Heritage Management Plan* identifies that on the first day of ground disturbance within the Infrastructure or Extraction Areas, a sites officer (as agreed by the Aboriginal community) will be commissioned to inspect the ground disturbance. The Company invited the Orange Local Aboriginal Land Council to inspect the Infrastructure Area on 28 May 2013. A copy that letter was presented with the *2012/2013 Annual Review*. No response to either the letter or phone call was received.

The management measures identified in Section 8 of the *Aboriginal Cultural Heritage Management Plan* were implemented during the reporting period and no items of suspected Aboriginal heritage significance were identified.

6.8 TRAFFIC AND TRANSPORT

Construction of the intersection of the Site Access Road and Mitchell Highway was completed on 26 April 2013 with final sealing of the Site Access Road completed in early 2014.

Transportation activities during the reporting period occurred during the approved hours of operation (Section 2.3.2). It is noted that an extension to the approved hours for product despatch was approved on 10 September 2015 following negotiated agreements being reached with surrounding landowners (see **Appendix 2**).

6.9 VISUAL

Operations with the potential to adversely impact visual amenity during the reporting period included earthmoving activities during soil stripping campaigns, and drill and blasting operations within the Extraction Area. The Fixed Processing Plant will remain the most visible feature of the Quarry.

The Company implemented the following management measures during the reporting period to minimise visual amenity impacts associated with its operations (**Figure 3**).

- Planting of tubestock on the amenity bunds on the eastern boundary of the Infrastructure Area.
- Maintenance and continued construction of a temporary amenity bund to the south of the active Extraction Area.
- Progressive construction of a permanent amenity bund to the south and to the north of the Extraction Area.

Plate 13 presents a view from the East Guyong – Byng Road showing the completed visual amenity bund east of the Infrastructure Area. The Company notes that the bund, once revegetated, will screen the majority of the Infrastructure Area from views to the east. This bund is to be planted with 500 tubestock in the third quarter of 2018 in conjunction with the utilisation of hydromulching.

Vegetation to be established on the upper sections of the batter in the northwest section of the Infrastructure Area will soften the visual impact of that section of the Site.

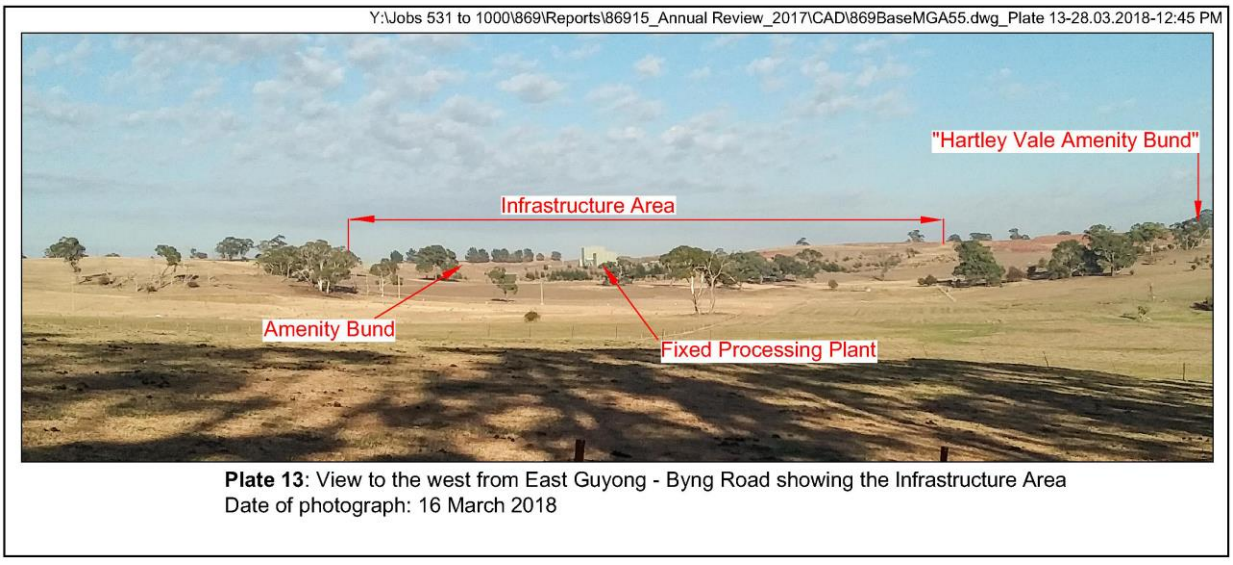

Plate 13: View to the west from East Guyong - Byng Road showing the Infrastructure Area
Date of photograph: 16 March 2018

6.10 WASTE MANAGEMENT

Waste generation during the reporting period was negligible, with general waste placed within skip bins that are serviced monthly by a licenced waste contractor. Liquid wastes, principally waste hydrocarbons generated during equipment servicing, were removed from the Quarry Site on the day they were generated. Ablutions facilities and a septic system are located within the office and weighbridge area.

6.11 EMERGENCY AND HAZARDS

Diesel delivered to the Quarry Site was delivered in bulk by a diesel supplier and stored in a self-bunded diesel tank. Refuelling was undertaken within the Infrastructure Area. Spill kits were available in the site offices and no significant hydrocarbon spills were reported during the reporting period.

Explosives used during the reporting period were transported to Site by the blasting contractor on the day of the blast.

No significant safety hazards occurred during the reporting period.

6.12 BUSHFIRE

Management of bushfire hazards is provided through the *Bushfire Management Plan* which was previously prepared as a sub-section of a *Crisis Management Plan*. That plan outlines procedures to be implemented in the event of a bushfire within or surrounding the Site. The *Bushfire Management Plan* and *Crisis Management Plan* will be reviewed and updated as necessary.

During the reporting period, the Company maintained fire extinguishers within all offices and on all mobile plant. In addition, the Company and construction contractors each maintain separate water carts with fire-fighting capability within the Quarry.

No fires occurred within the Site during the reporting period.

7. WATER MANAGEMENT

A total of 12ML of water was used during the reporting period, mainly for dust suppression within the Quarry. This is within the licenced limit of 40ML per annum. Water was sourced from the water storage dam. No water was discharged from the dam during the reporting period. No other water was imported to site for operational use.

Farm dam D1 was decommissioned in 2016. Dams D3, D4 and D5 will be progressively decommissioned as required.

7.1 SURFACE WATER

7.1.1 Predicted Impacts and Performance Criteria

The Infrastructure Area and Site Access Road are located in a section of the Quarry Site that drains to the north and east, with surface water from disturbed sections of the Site reporting to the existing Dam D2 (see **Figure 2**) within the Asbestos Exclusion Zone, before flowing off Site via the licenced discharge point W1 (**Figure 5**).

Condition L2.5 of the Quarry's Environment Protection Licence 20190 requires that water discharged from licenced discharge point W1 complies with the following water quality performance criteria.

- Total Suspended Solids – 50mg/L.
- Oil and Grease – 10mg/L.
- pH – between 6.5 and 8.5.

The *Soil and Water Management Plan* indicates that monitoring would be undertaken monthly during discharge.

In addition, Section 8.10 of the *Soil and Water Management Plan* identifies that the following data will be recorded in this *Annual Review*.

- Volume of water used for dust suppression purposes.
- Volume of water imported to Site.
- Specific measures implemented as part of the water use reduction program, and their effectiveness.

7.1.2 Measured Performance

No water was discharged from Dam D2 during the reporting period.

Approximately 12ML of water was used during the reporting period for dust suppression purposes via a water cart.

7.1.3 Discussion and Analysis

Water use during the reporting period was well within the licenced allocation of 40ML per annum (see **Table 4**). During the reporting period, water sprinklers were used along some roadways and around some stockpiles to reduce water cart use requirements and simplify dust management measures.

7.2 GROUNDWATER

7.2.1 Predicted Impacts and Performance Criteria

Potential groundwater-related impacts associated with the approved Quarry include drawdown of the regional aquifer of approximately 0.6m as the Extraction Area is extended to its final depth. No significant impacts are anticipated to groundwater quality and flow, surrounding groundwater users or Groundwater Dependent Ecosystems.

Section 11.3 of the *Soil and Water Management Plan* identifies the following groundwater level performance criteria for surrounding non-Quarry related bores.

- standing water level below 10th percentile measured level; or
- standing water level below intake during normal operation of the bore.

Section 11.4 of the *Soil and Water Management Plan* identifies the locations and frequency of groundwater quality monitoring to occur following commencement of extraction operations. Preliminary groundwater quality performance criteria are presented in **Table 26**.

Table 26
Groundwater Quality Performance Criteria

Parameter	Unit	Long-term Assessment Criteria	Initial Assessment Criteria[1]
pH value	pH	6.5-8.5	6.5-8.5
Electrical Conductivity	µS/cm	Greater than 90th percentile groundwater quality as determined by ongoing groundwater quality monitoring	
Bicarbonate Alkalinity as $CaCO_3$	mg/L		
Carbonate Alkalinity as $CaCO_3$	mg/L		
Hydroxide Alkalinity as $CaCO_3$	mg/L		
Total Alkalinity as $CaCO_3$	mg/L		
Chloride	mg/L		
Sulphate	mg/L		
Calcium	mg/L		
Magnesium	mg/L		
Sodium	mg/L		
Potassium	mg/L		
Nitrate as N	mg/L		
Nitrite as N	mg/L		
Total Oxidized Nit. As N	mg/L		
Total Phosphorus as P	mg/L		
Arsenic	mg/L		
Manganese	mg/L		
Iron	mg/L		

Note 1: Applies until revised assessment criteria have been determined in consultation with relevant government agencies following receipt of initial 12 months of groundwater quality data

7.2.2 Measured Performance

Monitoring of groundwater standing levels was undertaken using automated data loggers which record standing water levels every six hours. It is noted that standing water levels are also measured quarterly by Geolyse. **Figure 9** presents the results of monitoring of standing water levels between 1 January 2017 and 31 December 2017 within bore holes BH1 to BH5 (bore locations are provided on **Figure 5**). Long-term monitoring results between 1 January 2013 and 31 December 2017 are presented in **Figure 10**.

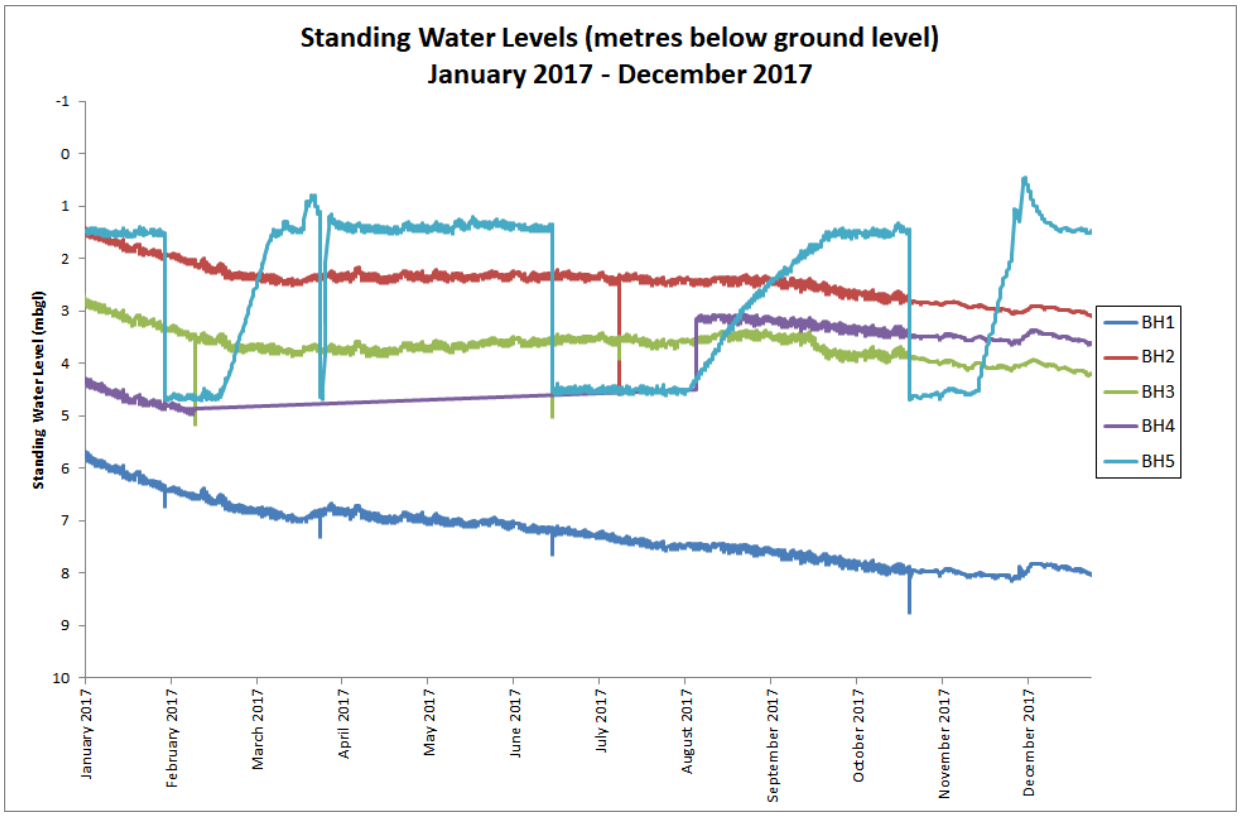

Figure 9
Groundwater Standing Water Levels (January 2017 to December 2017)

Annual groundwater quality monitoring continued in 2017, with field analysis undertaken in July 2017. The results of the field groundwater quality monitoring are presented in **Table 27**. Laboratory analysis of the groundwater samples to measure the suite of analytes displayed in **Table 27** was completed in July 2017. The results of this analysis are provided in **Table 28**.

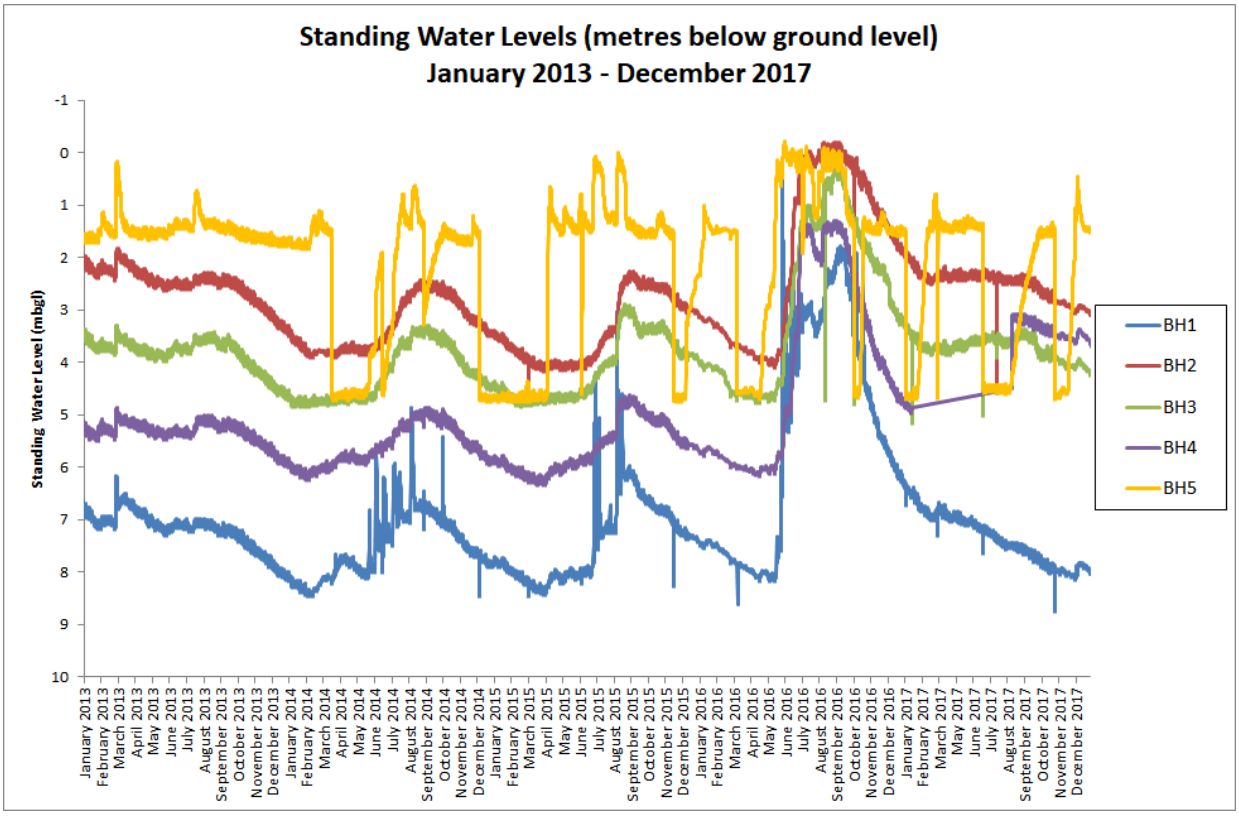

Figure 10
Groundwater Standing Water Levels (January 2013 to December 2017)

Table 27
Groundwater Quality Field Monitoring Results 2017

Bore/Analyte	Units	Criteria	July 2017
BH1			
Temperature	ºC	-	15.2
pH	-	6.5-8.5	6.82
Electrical Conductivity	µS/cm	-	736
BH2			
Temperature	ºC	-	15.5
pH	-	6.5-8.5	6.46
Electrical Conductivity	µS/cm	-	752
BH3			
Temperature	ºC	-	15.2
pH	-	6.5-8.5	6.55
Electrical Conductivity	µS/cm	-	803
BH4			
Temperature	ºC	-	15.4
pH	-	6.5-8.5	6.92
Electrical Conductivity	µS/cm	-	486
BH5			
Temperature	ºC	-	14.8
pH	-	6.5-8.5	6.69
Electrical Conductivity	µS/cm	-	407
Source: Geolyse (2017)			

Table 28
Groundwater Quality Laboratory Assessed Results July 2017

Analyte	Units	Monitoring Bore				
		BH1	BH2	BH3	BH4	BH5
pH	pH units	8.20	8.18	7.28	8.19	7.19
Electrical Conductivity	µS/cm	658	581	316	741	389
Hydroxide Alkalinity	mg$CaCO_3$/L	<1	<1	<1	<1	<1
Carbonate Alkalinity	mg$CaCO_3$/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity	mg$CaCO_3$/L	317	331	347	190	94
Total Alkalinity	mg$CaCO_3$/L	317	331	347	190	94
Sulfate	mg/L	3	3	7	2	2
Chloride	mg/L	11	11	16	9	13
Calcium	mg/L	30	26	15	31	22
Magnesium	mg/L	52	47	14	47	25
Sodium	mg/L	17	14	15	29	12
Potassium	mg/L	4	3	3	19	2
Arsenic	mg/L	0.058	0.054	<0.001	0.002	<0.001
Manganese	mg/L	0.011	<0.001	0.003	0.003	0.038
Iron	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Ammonia (as N)	mgN/L	0.02	<0.01	<0.01	0.02	0.01
Nitrite (as N)	mgN/L	<0.01	<0.01	<0.01	<0.01	<0.01
Nitrate (as N)	mgN/L	4.34	4.6	10.6	4.87	0.22
Nitrite + Nitrate (as N)	mgN/L	4.34	4.60	10.6	4.87	0.22
Total Kjeldahl Nitrogen (as N)	mgN/L	0.7	0.6	0.8	0.5	0.2
Total Nitrogen (as N)	mgN/L	5.0	5.2	11.4	5.4	0.4
Total Phosphorus (as P)	mgP/L	0.11	0.08	0.03	0.20	0.03
Total Anions	meq/L	6.71	6.99	7.53	4.09	2.29
Total Cations	meq/L	6.62	5.85	7.16	3.73	2.63
Ionic Balance	%	0.66	8.84	2.5	4.64	6.99
Source: Geolyse (2017)						

7.2.3 Discussion and Analysis

Standing Water Levels

Periods of manual water level measurement are marked by steep declines in standing water level in some of the bores as the water from the bore is purged for groundwater quality monitoring. The standing water levels are then recorded manually once a period has passed to allow for reasonable equilibration. The relatively sharp drops in water level evident in **Figure 9** display this effect. These fluctuations are not the result of changes in the regional water table but represent a change only in the bores as a result of sampling activity.

The monitoring data presented on **Figure 10** indicate that standing water levels within bores BH2 and BH3 remained relatively stable through the reporting period, although they decreased slightly over the year. Upon review of the long-term records it is concluded that the groundwater table in the vicinity of these bores is returning to an equilibrium level after heavy rainfall, and therefore infiltration, in the last half of 2016.

Due to a data logger malfunction in BH4, no data was recorded between 10 February and 10 August, however the water level had increased somewhat once monitoring resumed. Apart from this, trends were similar to BH2 and BH3. Water level changes in BH1 differed slightly from BH2, BH3 and BH4, with the water level continuing to generally decrease slowly over the year apart from a similar slight temporary increase in water levels in December.

Consistent with previous years, water levels in bore hole BH5 varied consistent with purging during manual water monitoring and previously identified slow equilibration at this location. Hydraulic testing of this bore for the original Environmental Assessment (Hanson, 2009) indicated a permeability of less than 0.0001m/day. The yield of bore BH5 was assessed to be significantly lower than the remaining four monitoring bores as a result of weathering in the vicinity of these bores and the nature of the basalt surrounding bore BH5. Therefore, the Company considers that the fluctuations in groundwater levels at this bore are the result of water within the bore being removed for sampling and very slowly returning to an equilibrium level. The two peaks and preceding increases in the water level at BH5 correspond to the general pattern exhibited in BH2 and BH3 when high rainfall periods caused stabilisation of water levels after the first three months and a small temporary spike in December.

The Company notes that all ground-disturbing activities were well above the regional water table during the reporting period. As a result, the Company contends that the fluctuations in groundwater levels are wholly attributable to natural causes.

Groundwater Quality

Geolyse undertook a single round of groundwater quality monitoring in July 2017 (see **Appendix 8**). The results of the field testing of groundwater samples indicate that the pH within BH2 was slightly below the nominated range of 6.5 to 8.5, measured at 6.46. However, laboratory assessed pH was within this nominated range for all bores.

Monitoring of potential pollutants indicated that the majority of parameters remained below the relevant criteria levels assessed by Geolyse (2017) in the absence of site-specific trigger values. Total alkalinity in BH1 was above the expected level, although this was consistent with historic data. It is noted that nitrate levels have increased at BH3 and BH4 and actually decreased at BH5, although this was after an increase at this location in 2016. Nitrate levels remain within relevant guideline levels.

It is anticipated that the long-term groundwater quality criteria would be established in consultation with the Department of Planning and Environment and Department of Primary Industries - Water during the next reporting period with the planned update to the Soil and Water Management Plan now that sufficient groundwater monitoring results are available.

8. REHABILITATION

8.1 REHABILITATION PERFORMANCE DURING THE REPORTING PERIOD

Limited areas of the Quarry Site were available for rehabilitation during the reporting period. As a result, rehabilitation activities were limited to the continued construction of permanent amenity bunds. Bunds were constructed from overburden stripped during preparations for blasting and extraction activities. Bunds to the south and to the north of the extraction area were progressively shaped as necessary (see **Figure 3**).

The Landscape Management Plan for the Quarry describes that progressive rehabilitation in the short-term (first 5 years of operations) would be limited to construction, shaping and revegetation of permanent amenity bunds, and revegetation of upper benches within the extraction area. At the current stage of development, there are no benches within the extraction area available for revegetation activities. Hanson proposes to continue with shaping of permanent amenity bunds and revegetation of these areas in the short-term. As benches are developed in the extraction area and reach a terminal stage of extraction, a combination of overburden and topsoil would be placed on the benches and the areas revegetated. The Landscape Management Plan proposes that this approach to progressive rehabilitation would also continue in the medium term (that is over the next 5 years of operations).

Hanson has continued to implement weed management practices within the Quarry boundary and these would continue. There has been no need to commission any feral animal management programs at the Quarry.

8.2 ACTIONS FOR THE NEXT REPORTING PERIOD

During the next reporting period, rehabilitation activities will focus on revegetation of the southern bund (see **Figure 4**). Activities will involve final shaping, spreading of topsoil (where required), and revegetation and hydromulching of this bund. Hanson will also continue to construct the visual amenity bund to the north of the Extraction Area during the next reporting period, with final shaping, spreading of topsoil and revegetation to occur in those areas that are completed during this period.

The Company plans to continue progressive revegetation of the Quarry Site during the next reporting period. It is anticipated that approximately 500 tubestock would be planted along the southern and southwestern boundary of the Quarry Site where it is closest to the Mitchell Highway, in conjunction with hydromulching, to develop vegetation screening from this vantage point (see Figure 4).

Revegetation of disturbed sections of the Site would be undertaken in accordance with the procedures identified in Section 10.3.4 of the Landscape Management Plan.

It is proposed that a nursery would be established within the Quarry (see **Figure 4)** to harden tubestock to existing conditions, prior to planting. **Plate 14** demonstrates the location of the proposed nursery.

Plate 14 Proposed Nursery Area

9. COMMUNITY

9.1 CONSULTATION AND COMMUNITY ENGAGEMENT

Two meetings of the East Guyong Quarry Community Consultative Committee (CCC) were held during the reporting period on the following dates.

- 15 May 2017.
- 20 November 2017.

Appendix 5 presents the minutes from each of the meetings. A range of issues were raised and questions or requests for additional information provided during the two meetings during the reporting period. The quarry staff present at the meeting were able to answer all queries or follow up questions for later response. No complaints or significant concerns were raised at the CCC meetings in 2017.

9.2 COMPLAINTS

No complaints were received during the reporting period. This compares to three complaints in 2016 and one complaint in 2015. It should be noted that there is no general trend in the subject of complaints received by the Quarry. Over the last three years, no issue has been raised twice, although it is noted that the concerns of the neighbour at the Cadira property remain for the landowner.

Generally, Hanson considers that it has a positive relationship with neighbours and hopes that the local community trust Hanson to thoroughly investigate concerns raised directly or through the Hanson website.

10. INDEPENDENT AUDIT

In accordance with the requirements of Condition 5(8) of PA06_0193, an Independent Environmental Audit (IEA) of the Quarry is to be completed every three years following the initial audit completed on 12 and 13 November 2013.

An Independent Environmental Audit was undertaken in October 2016. The next IEA is due to be completed by October 2019.

The two actions that resulted from the October 2016 IEA have been resolved by Hanson as follows.

- An administrative breach regarding the timing for the payment of funds into the Community Enhancement Fund was noted in the audit and determined to be outside the control of Hanson due to the need for Cabonne Council to prepare due diligence heritage assessments. A total of $1,500 remains in the fund and Hanson are in consultation with Cabonne Council about the appropriate steps required to initiate gravestone refurbishment. It is understood that Council is facilitating contact with the relatives of the people whose gravestones would be refurbished.
- It was noted that a Driver's Code of Conduct was not approved by DPE. A copy was sent to the Department and the code endorsed on 6 May 2016.

There are no further outcomes of the IEA that require action from Hanson.

11. INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

11.1 INCIDENTS

No incidents were recorded at the Quarry during the reporting period.

11.2 GENERAL COMPLIANCE

The Quarry Manager confirmed that no non-compliances of conditional requirements of PA 06_0193 or EPL 20190 occurred during the reporting period.

Hanson is seeking to modify PA 06_0193 during the next reporting period. It is anticipated that all management plans would be reviewed following any approval of a modification application. This would resolve outstanding administrative compliance issues with regards to management plans.

12. ENVIRONMENTAL MANAGEMENT DURING THE NEXT REPORT PERIOD

In addition to the environmental management measures identified in the various environmental management plans, the Company proposes to implement the following environmental management measures during the next reporting period (**Figure 4**).

- Recalibrate the meteorological station to ensure this is accurately monitoring weather conditions.
- Complete the review of the particulate matter monitor location and re-submit proposed location in an updated Air Quality Management Plan to DPE for approval.
- Continue to refine blasting and blast monitoring procedures.
- Monitor and maintain the surface water controls within the Site.
- Implement a trial to determine the most effective flocculation methodology to ensure that sediment-laden water may be treated effectively prior to discharge.
- Establish long-term assessment criteria for groundwater quality in consultation with the Department of Planning and Environment and the NSW Office of Water when sufficient groundwater monitoring results are available.
- Complete partially constructed amenity bunds and continue constructing additional bunds as indicated on **Figure 4**. Bunds will be shaped to be stable in accordance with the Landscape Management Plan.
- Where a final landform is established for the amenity bunds, they will be stabilised though seeding with a groundcover and, where feasible, hydromulching.
- Re-establish vegetation where previous revegetation programs have failed. The revegetation programs are likely to be implemented in late winter to early spring. Revegetation is planned to include approximately 500 plants.
- Continue to utilise temporary amenity bunds within the Extraction Area until extraction operations have progressed sufficiently that the operations are not visible from surrounding residences or publicly accessible vantage points.
- Progressively establish a nursery at the Quarry to improve performance of revegetation activities.

Hanson has found that there has been mixed success with tubestock planting over previous years due to variable weather patterns and significant dry periods followed by heavy rainfall. In order to better manage tubestock growth and the success rate with planting, it is intended that Hanson will investigate and develop a nursery for tubestock within the Quarry Site (see proposed location marked on **Figure 4**). It is expected that tubestock grown in the nursery will be planted during appropriate weather conditions and when the plants are sufficiently grown to better withstand variable conditions.

13. REFERENCES

EMM (2017a). *East Guyong Quarry Noise Monitoring Report*. March 2016

EMM (2017b). *East Guyong Quarry Noise Monitoring Report*. June 2016

EMM (2017c). *East Guyong Quarry Noise Monitoring Report*. September 2016

EMM (2017d). *East Guyong Quarry Noise Monitoring Report*. December 2016

Hanson (2009). *Environmental Assessment Report, East Guyong Quarry NSW*. September 2009

Heggies (2007a). *Operational and Transportation Noise and Blasting Impact Assessment,* prepared to accompany the application for Project Approval

Heggies (2007b). *Air Quality Impact Assessment,* prepared to accompany the application for Project Approval

RW Corkery & Co Pty Limited (RWC) (2013). *Noise Management Plan (incorporating a Traffic Noise Management Plan) for the East Guyong Quarry – February 2013*