Hanson
HEIDELBERGCEMENT Group

Calga Quarry

Annual Review 2020

MARCH 31 2020

CALGA QUARRY
2020 ANNUAL REVIEW

Document Control & Title Block

Document Title	Environmental Management Annual Review – Calga Quarry			
Document Number				
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Draft				
Final	31/03/2020	Belinda Pignone	Paul Slough	Paul Slough

Name of operation	Calga Quarry
Name of operator	Hanson Construction Materials Pty Ltd
Development consent / project approval #	Project Approval 94-4-2004
Name of holder of development consent / project approval	Hanson Construction Materials
Water licence #	
Name of holder of water licence	
Annual Review start date	1 January 2020
Annual Review end date	31 December 2020
Name of authorised reporting officer	Belinda Pignone
Title of authorised reporting officer	Environmental Planning and Compliance Coordinator
Signature of authorised reporting officer	
Date	

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List of Acronyms

ANZECC	Australian and New Zealand Environment Conservation Council
CCC	Community Consultative Committee
DPE	Department of Planning and Environment
DRE	Department of Resources and Energy
EC	Electrical Conductivity
EIS	Environmental Impact Statement
EPA	Environmental Protection Authority
EPL	Environmental Protection Licence
GDE	Groundwater Dependent Ecosystem
SWL	Standing water level
SWMP	Site Water Management Plan
TSS	Total Suspended Solids
TSP	Total Suspended Particulates

1. STATEMENT OF COMPLIANCE

Table 1: Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	
94-4-2004	Yes

Table 2: Non-Compliances

Relevant Approval	**Condition #**	**Condition description (summary)**	**Compliance status**	**Comment**	**Where addressed in Annual Review**
N/A	N/A	N/A	N/A	N/A	N/A

Table 3: Compliance Status for Table 2

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 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

The Quarry is owned and operated by Hanson Construction Materials Pty Ltd. The Quarry is located on the Somersby Plateau, approximately 1.0km northwest of the Calga Interchange on the M1 Freeway (**Figure 1**). **Figure 2** displays the existing layout including the boundary of Stage 3 extraction operations and designated sub-stages.

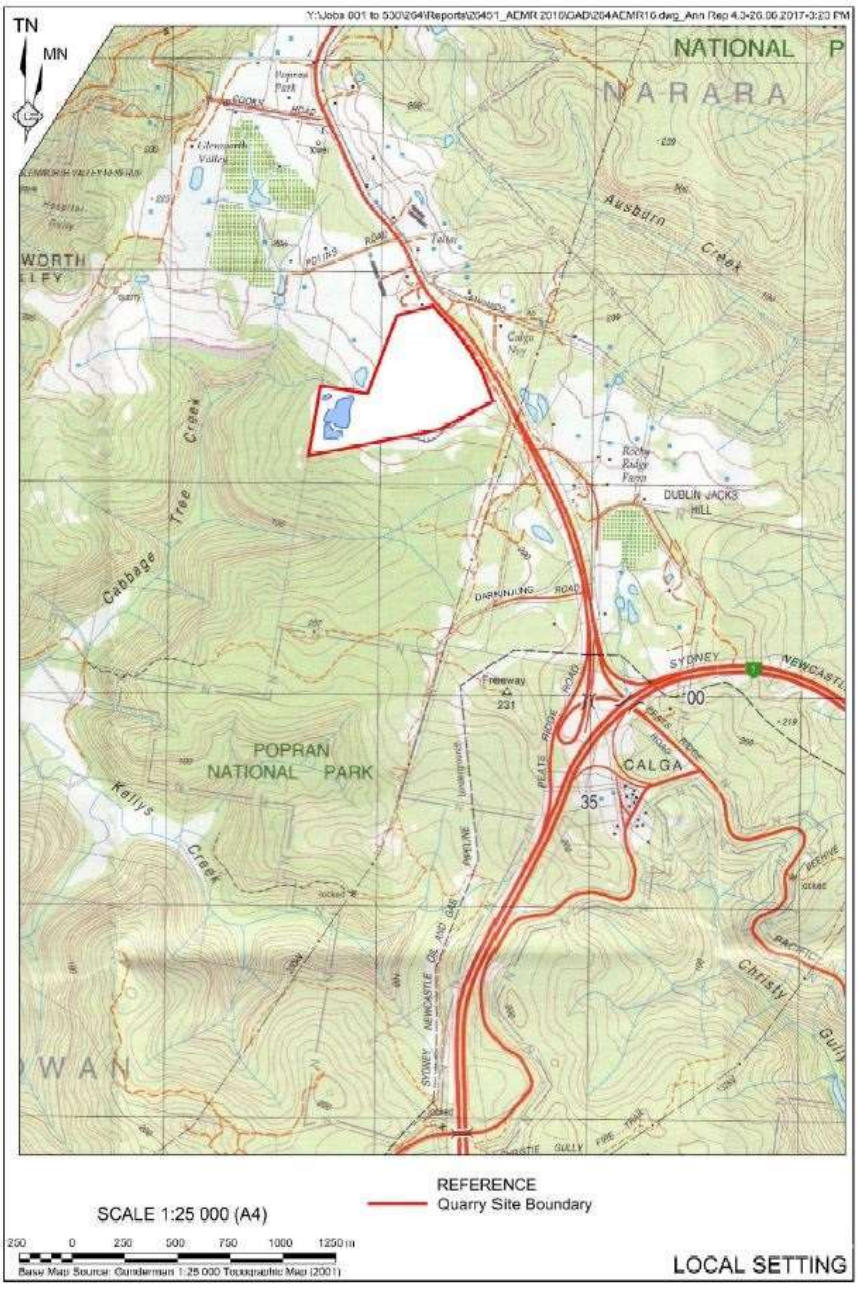


Figure 1: LOCAL SETTING

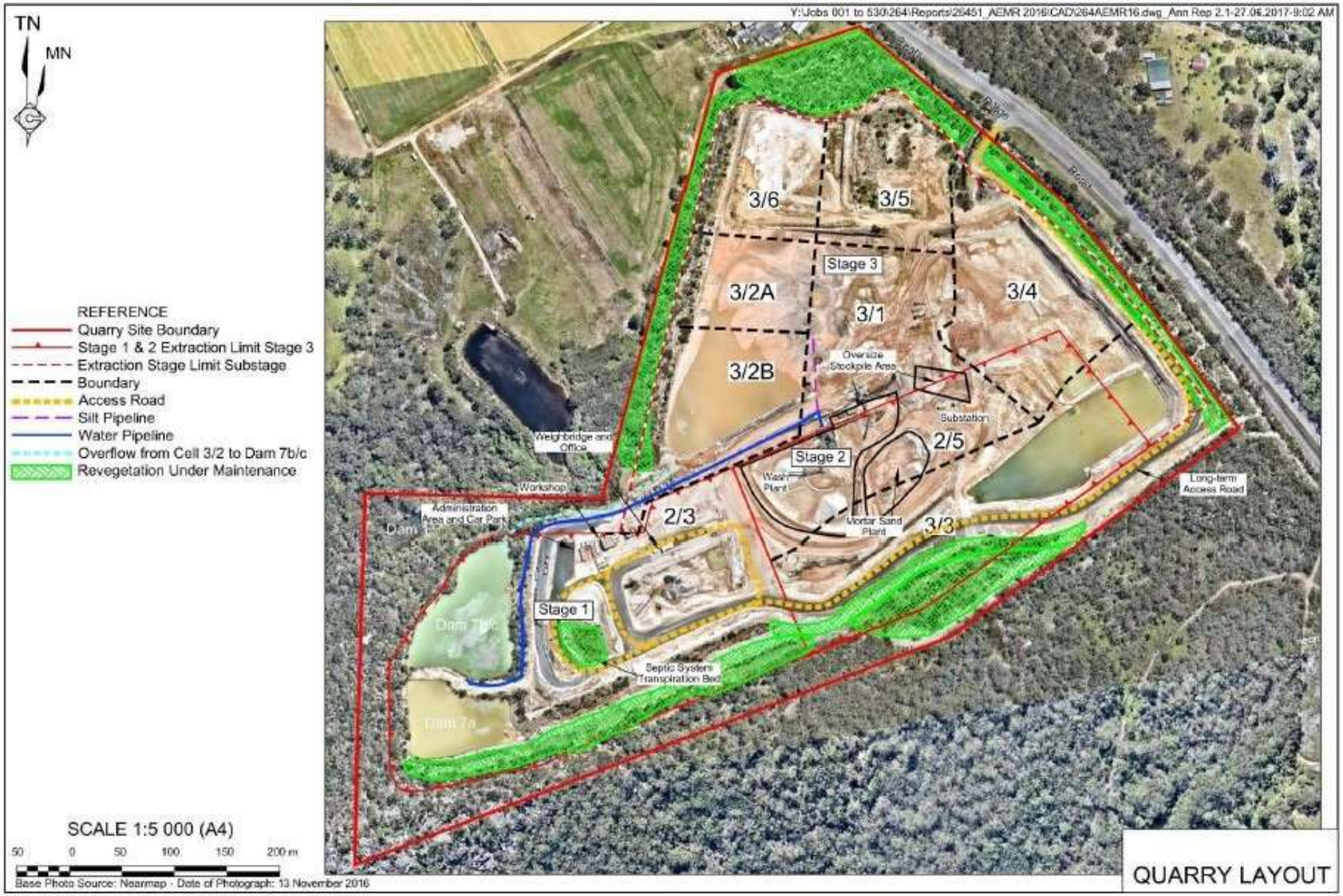


Figure 2: QUARRY LAYOUT

The following personnel are responsible for the ongoing management of the Calga Sand Quarry.

Table 4: QUARRY SITE PERSONNEL ROLES AND RESPONSIBILITIES

Position	Name	Phone	Email
Operations Manager	Scott Whittaker	0418 665 353	scott.whittaker@hanson.com.au
Quarry Manager	Paul Slough	0418 166 212	paul.slough@hanson.com.au
Risk Manager	Alana Houliston	0429 623 907	alana.houliston@hanson.com.au
Development Manager	Andrew Driver	0417 234 774	andrew.driver@hanson.com.au
Environmental Planning and Compliance Coordinator	Belinda Pignone	0439 131 941	belinda.pignone@hanson.com.au

Other persons involved with site management and compilation of quarry-related documentation and monitoring data include:

- Mr Chris Whackett – Project Manager, Toolijooa Environmental Restoration – Mr Whackett is contracted to undertake ongoing weed management and revegetation throughout the Quarry Site; and
- Mr. Colin Davies – Carbon Based Environmental Pty Ltd – Mr Davies is contracted to undertake the monthly collection of water samples, recording of groundwater levels and collection/assembly of deposited dust and meteorological data.

3. APPROVALS

This Annual Environmental Management Report (AEMR) has been prepared in accordance with *Condition 5(4)* of Development Consent DA 94-4-2004 (**Appendix 1**) to record the activities and environmental monitoring undertaken within and surrounding the Calga Sand Quarry during the period 1 January to 31 December 2020 (the reporting period) and to outline the activities and environmental monitoring planned throughout 2020. This condition requires the preparation of a report that:

- Identifies the standards and performance measures that apply to the development (see Section 4);
- Describes the works carried out throughout the last 12 months (see Section 6);
- Describes the works that will be carried out throughout the next 12 months (see Section 12);
- Includes a summary of the complaints received during the past year, and compares this to the complaints received in previous years (see Section 9.2);
- Includes a summary of the monitoring results for the development during the past year (see Section 7);
- Includes an analysis of these monitoring results against the relevant:
    - Impact assessment criteria;
    - Monitoring results from previous years; and
    - Predictions in the EIS and Amendment Report (See Sections 7.1.1, 7.2.3, 7.4.3 and 7.5.3)
- Identifies any trends in the monitoring results over the life of the development (see Section 7.1.1, 7.2.3, 7.5.3 and 7.6.2);
- Identifies any non-compliance during the previous year (see Section 11); and
- Describes what actions were, or are being taken to ensure compliance (see Section 11)

In addition, the following conditions specifically request that the subject information incorporated in this document.

- 3(18) The results of the yearly Water Management Plan review including:
    - Details of the review for each sub-plan (see Sections 7.4, 7.4.1 and 7.5)
    - The results of monitoring (Appendices 2 and 3);
    - The results of the Independent Groundwater Audit (including a copy of the report) (Appendix 3); and

  - Details of the measures undertaken/proposed to address any identified issues (see Sections 7.5, 7.6 and Appendix 3).

- 3(32c) A progress report on the re-vegetation and maintenance of the acoustic barrier (Section 7.6 and Appendix 6).
- 3(35d) A report on waste management and minimisation (Section 6.5)
- 3(39b) Annual production data (Section 6.1)

Within one month of the completion of each AEMR, Condition 5(10) requests that the Applicant:

- Provide a copy of the AEMR to the Council, relevant agencies and the CCC;
- Ensure that a copy of the AEMR is made publicly available at the quarry; and
- A copy of the document is placed on the Applicant's website;

to the satisfaction of the Director-General (now Secretary).

Throughout this document, the land on which the Calga Sand Quarry is located (Lot 1, DP229889) is referred to as the "Quarry Site".

4. STANDARDS AND PERFORMANCE MEASURES

Hanson Construction Materials Pty Ltd (Hanson) is required to operate the approved activities at the Calga Sand Quarry in accordance with the development consent and licences listed in **Table 5**.

Table 5: PROJECT SUMMARY

Consent / Licence		Issue Date	Expiry Date
Development Consent 94-4-2004		28 October 2005	1 July 2030
Environmental Protection Licence No 11295		16 December 2002	24 July
Water Supply Works Approval 20WA211660		5 July 2011	5 July 2021
Water Access Licence 17384	10 ML	27 February 2012	No Expiry
Water Access Licence 27185	51 ML	4 February 2014	No Expiry
Water Access Licence 20019	46 ML	4 February 2014	No Expiry
Water Access Licence 2541	6 ML	14 January 2010	No Expiry

Relevant conditions within DA 94-4-2004 which nominate specific environmental criteria are as follows.

- *Condition 3(2)*: noise emissions (day, evening and night).
    - Each of the relevant criteria are presented in Section 7.1.1 in conjunction with the assembled monitoring results
- *Condition 3(8)*: dust emissions (suspended and deposited).
    - Each of the relevant criteria are presented in Section 7.2.1 in conjunction with the assembled monitoring results

In addition, *Condition 3(20)* requires Hanson to establish and subsequently maintain a meteorological station in the vicinity of the Quarry, to the satisfaction of the then DEC (now EPA) and the Director-General of the Department of Planning (now Secretary of the NSW Department of Planning, Industry & Environment – DPIE). The station is required as a minimum, unless otherwise authorised by the Director-General (now Secretary), to monitor daily rainfall and evaporation in accordance with the requirements in Approved Methods for the Sampling and analysis of Air Pollutants in NSW.

Environment Protection Licence (EPL) 11295 also nominates specific environmental criteria as follows, (as noted above, details of the relevant criteria are presented in Sections 7.1.1 and 7.2.1).

- Noise.
    - Condition L3.1 – noise emission limits (day, evening and night).
    - Condition L3.2 and L3.4 specify the monitoring locations, adjustments due to tonal noise and relevant meteorological conditions for compliance.
- Dust

- EPL 11295 does not nominate any dust criteria; hence reliance is placed on the criteria nominated in Condition 3(8) within DA 9-4-2004.

The performance criteria relevant to assessing groundwater impacts are nominated either in the Site Water Management Plan (Section 8.6) or from the Freshwater Ecosystem Protection Guideline drawn from ANZECC (2000).

All surface water monitoring was undertaken pursuant to the Site Water Management Plan and, for the purposes of assessing compliance; reliance is placed upon the water quality limits nominated within this Plan.

Cumberland Ecology has established five monitoring plots within identified Groundwater Dependent Ecosystems (GDEs) approximately 500m south of the Quarry Site (see Section 8.7). Vegetation type and condition was recorded to establish a baseline for ongoing monitoring of these ecosystems and potential impacts as a result of quarrying activities. The baseline data recorded that the DGEs are in good condition with all species consisting of natives and no sign of nutrient enrichment or invasive species. Groundwater Dependent Ecosystem monitoring is discussed further in Section 8.7.

5. DOCUMENT PREPARATION

The information and data for this report has been drawn for the following documents commissioned or held by Hanson.

- Carbon Based Environmental Pty Limited – 2020 Monthly Dust Deposition, Surface and Ground Waters and Meteorological Station Monitoring Results Summaries (Appendix 1).
- Wilkinson Murray Pty Limited – Compliance Noise Monitoring (Appendix 2).
- EMM Consulting Pty Limited – Calga Sand Quarry 2020 Annual Independent Groundwater Audit (Appendix 3).
- 2020 Biodiversity Environment Report (Appendix 4).
- 2020 CCC Minutes (Appendix 5)

This document has been assembled by Ms. Belinda Pignone (B.Env.Sc.Mgmt) (Environmental Planning and Compliance Coordinator, Hanson). Mr Paul Slough (Quarry Manager) provided technical input and information on Quarry operations and environmental performance during the reporting period.

6. OPERATIONS SUMMARY

Table 6 lists the principle activities / milestones that occurred at the Calga Sand Quarry throughout 2020. Figure presents the location(s) of the activities described reference to operational areas within the Calga Sand Quarry are to either "stages" for extraction areas, i.e. consistent with the terminology in the 2004 EIS, or "cells" for the completed extraction stages used for silt storage.

Table 6: PRINCIPLE ACTIVITIES / MILESTONES DURING 2020

Quarter	Activity
January – March	Extraction within Stage 3/5, all tailings deposited within Stage 3/4. Conduct attended noise monitoring Conduct monthly dust deposition samples, surface water sampling and bi-monthly bore water level monitoring as part of the environmental monitoring. Hold Community Consultative Committee extraordinary meeting No Horticulturist monthly weed control onsite due to COVID-19 face-to-face visits being restricted to essential only. Overburden placement & rehabilitation within Stage 3 tailings Cells 2a&b.
April – June	Extraction within Stage 3/5, all tailings deposited within Stage 3/4. Conduct monthly dust deposition samples, surface water sampling and bi-monthly bore water level monitoring and bi-annual groundwater quality sampling as part of the environmental monitoring. Conduct quarterly attended noise monitoring Conduct annual noise monitoring across three consecutive days Hold Community Consultative Committee meeting No Horticulturist monthly weed control onsite due to COVID-19 face-to-face visits being restricted to essential only. Overburden placement & rehabilitation within Stage 3 tailings Cells 2a&b.
July – September	Extraction within Stage 3/5, all tailings deposited within Stage 3/4.Conduct attended and unattended noise monitoring. No Horticulturist monthly weed control onsite due to COVID-19 face-to-face visits being restricted to essential only. Revegetation maintenance activities to locations 6, 3/1 & 3/2a&b Conduct monthly dust deposition samples, surface water sampling and bi-monthly bore water level monitoring as part of the environmental monitoring.
October – December	Started Extraction within Stage 3/6, all tailings deposited within Stage 3/4.Conduct attended noise monitoring. Conduct six monthly detailed groundwater monitoring report as per environmental monitoring program. No Horticulturist monthly weed control onsite due to COVID-19 face-to-face visits being restricted to essential only. Conduct monthly dust deposition samples, surface water sampling and bi-monthly bore water level monitoring and bi-annual groundwater quality sampling as part of the environmental monitoring. Hold Community Consultative Committee meeting.

	No Horticulturist monthly weed control onsite due to COVID-19 face-to-face visits being restricted to essential only.

6.1 EXTRACTION OPERATIONS

During the reporting period, extraction was conducted in Stage 3/5. Extraction operations involved ripping and pushing up friable sandstone.

Table 7 records the monthly/annual sales of the various products produced at the Quarry during 2020. This data was provided to the Division of Resources & Energy (DRE) in accordance with the requirements of Condition 3(39b).

Table 7: CALGA SAND QUARRY – 2020 SALES

2020	Monthly Sand Sales (tonnes)
January	17308
February	19208
March	14734
April	15174
May	15674
June	13741
July	10704
August	11948
September	10851
October	12363
November	12693
December	9136
Total	**163534**

Table 8: CALGA SAND QUARRY – SUMMARY OF MATERIALS

Material	Approved production limit (specify source)	Previous reporting period (actual)	This reporting period (actual)	Next reporting period (forecast)
Friable Sandstone	4000,000 tonnes (DA 94-4-2004)	344,361 tonnes	163,534 tonnes	160,000 tonnes

6.2 PROCESSING AND PRODUCT STOCKPILING

During the reporting period, sand processing was undertaken using the wash plant. All of the sand extracted was washed to produce a range of concrete sand products.

6.3 OVERBURDEN AND SILT MANAGEMENT

All silt produced from the sand washing process was placed in Stage 3 Cells 3/4 throughout the reporting period. All oversize material was stockpiled within the Quarry Site.

6.4 INFRASTRUCTURE DEVELOPMENT/UPGRADES

Minor alterations were completed during the 2020 reporting period. This included minor landscaping activities and improvements to traffic management on the site.

6.5 WASTE MANAGEMENT

All wastes from the site office and amenities were collected in waste skips and removed from site by a waste contractor, as required. During 2020, the following waste was removed from the quarry.

- Approximately 5,000 litres of oily waste and 10 tonnes of steel were removed for recycling.
- All waste batteries were removed for recycling.
- All oil and fuel filters and oil rags were removed to a licenced waste facility.

7. ENVIRONMENTAL PERFORMANCE

Hanson benchmarks environmental performance against the conditional requirements of DA 94-4-2004 and EPL 11295 as well as the approved environmental management plans. Generally environmental performance complies with expectations.

The Quarry is operated in accordance with an Environmental Management System and the following environmental management plans and monitoring programs.

- Noise Management Plan
- Air Quality Management Plan
- Transport Management Plan
- Surface Water Management Plan
- Groundwater Management Plan
- Landscape Management Plan

In addition, **Table 9** provides a summary of environmental monitoring at the Quarry.

Table 9: ENVIRONMENTAL MONITORING

Monitoring Parameter	**Frequency**
Meteorological Data	Continuous
Laden truck movements	Daily
Quarry products transported	Daily
Noise levels at closest residential receivers (attended)	Quarterly
Noise levels at closest residential receivers (unattended)	Yearly
Deposited dust	Monthly
Air Quality (PM_{10})	Continuous
Surface water monitoring (pH, EC, TDS, TSS and Oil & Grease)	Monthly
Surface water discharge (pH, EC, TSC, TSS, Oil & Grease)	Discharge
Groundwater quality (major anions and cations).	Quarterly
Groundwater level, pH and electrical conductivity	Bi-monthly
Water use	Daily

7.1 NOISE

Noise monitoring was undertaken by Wilkinson Murray (Sydney) Pty Ltd during the reporting period generally in accordance with the approved Noise Monitoring Program prepared in accordance with *Condition 3(7)* of the Development Consent 94-4-2004. Four periods of attended monitoring were conducted on 23rd March, 22nd June, 25th September and 8th January, which yielded valid measurements for inclusion in this report. Monitoring was conducted at four surrounding residences, the locations of which are displayed on **Figure 3**.

7.1.1 Noise Criteria and Results

Table 10 displays the noise criteria for the Calga Sand Quarry at Residence 3 (CN-1) Residence 4 (CN-2), Residence 5 (CN-3), Residence 6 (CN-4), Residence 8 (CN-6) and Residence 13 (CN-9) and the measured noise levels throughout 2020. It is noted in the Industrial Noise Policy that:

> *"A development will be deemed to be in non-compliance with a noise consent or licence condition if the monitored noise level is more than 2dB above statutory noise limit specified in the consent or licence condition."*

A summary of the noise results is included in **Appendix 2** and full copies of all reports are included on Hanson's website. The range of measured noise levels between 2016 and 2019 are also provided for comparative purposes. **Table 11** identifies the applicable noise impact criterion for all residential locations, which have been adopted for the noise monitoring surveys (**Appendix 2**).

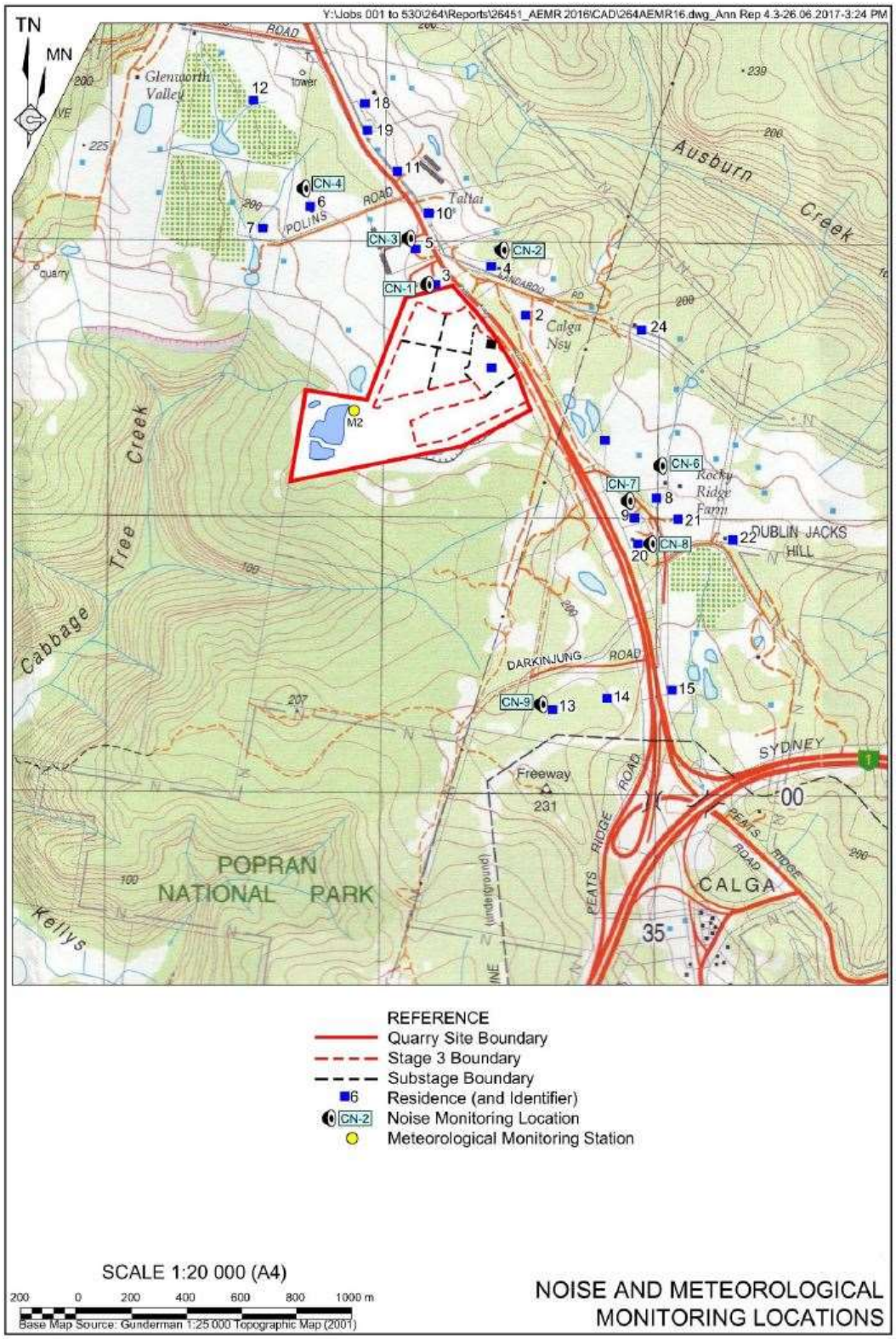


Figure 3: NOISE AND DUST MONITORING LOCATION

The noise monitoring conducted by Wilkinson Murray over 2020 has indicated that the Quarry's noise emissions comply with the acceptable noise levels prescribed in Project Approval 94-4-2004. The results are summarised in **Table 10** below.

Table 10: NOISE LIMIT CRITERIA AND 2020 RESULTS

	Time Period		
	5:00am-7:00am	**7:00am-6:00pm**	**6:00pm-10:00pm**
Residence 3 (CN-1): Power			
Criterion			
Extraction, Processing and transportation @	44	41	38
Product Transportation only @	41	40	37
Monitoring Results			
10/03/16 Attended	-	36	-
19/07/16 Attended	-	33	-
01/07/16 to 19/07/16 Unattended	**60-68**	**50-62**	**45-56**
12/09/16 Attended	-	34	-
19/12/16 Attended	-	35	-
12/04/17 Attended	-	39	-
30/07/17 Attended	-	37	-
23/07/17 to 30/07/17 Unattended	**47-54**	38-**51**	**58-71**
19/12/17 Attended	-	40	-
29/03/18 Attended	-	33	-
17/07/18 Attended	-	35	-
9/07/18 to 17/07/18 Unattended	**42-62**	**42-54**	**55-70**
21/12/18 Attended	-	36	-
29/04/2019 to 1/05/19 Attended (EPL Compliance)	31-41	Inaudible	26-30
26/06/19 Attended	-	41	-
27/09/19 Attended	-	36	-
20/12/19 Attended	-	41	-
23/03/2020 Attended	-	41	-
22/06/2020 Attended	-	41	-
25/09/2020 Attended	-	<35	-
08/01/2021# Attended	-	40	-

Due to adverse weather conditions unsuitable for environmental noise monitoring, the quarterly measurements intended for late December 2020 had to be postponed until early January 2021

	Time Period		
	5:00am-7:00am	**7:00am-6:00pm**	**6:00pm-10:00pm**
Residence 4 (CN-2): King			
Criterion			
Extraction, Processing and transportation	45	40	40
Product Transportation only	43	40	39
Monitoring Results			
10/03/16 Attended	-	37	-
19/07/16 Attended	-	Inaudible	-
01/07/16 to 19/07/16 Unattended	**58-67**	**48-59**	**45-55**
12/09/16 Attended	-	31	-
19/12/16 Attended	-	30	-
12/04/17 Attended	-	33	-
30/07/17 Attended	-	37	-
23//07/17 to 30/07/17 Unattended	**49-57**	**47-64**	**55-73**
19/12/17 Attended	-	Inaudible	-
29/03/18 Attended	-	Inaudible	-
17/07/18 Attended	-	Inaudible	-
9/07/18 to 17/07/18 Unattended	**45-60**	**38-54**	**55-64**
21/12/18 Attended	-	32	-
29/04/2019 to 1/05/19 Attended (EPL Compliance)	31-36	27-28	23-28
26/06/19 Attended	-	39	-
27/09/19 Attended	-	33	-
20/12/19 Attended	-	29	-
23/03/2020 Attended	-	38	-
22/06/2020 Attended	-	38	-
25/09/2020 Attended	-	34	-
08/01/2021# Attended	-	Inaudible	-

Due to adverse weather conditions unsuitable for environmental noise monitoring, the quarterly measurements intended for late December 2020 had to be postponed until early January 2021

	Time Period		
	5:00am-7:00am	**7:00am-6:00pm**	**6:00pm-10:00pm**
Residence 5 (CN-3): Kashouli			
Criterion			
Extraction, Processing and transportation	44	39	38
Product Transportation only	41	40	37
Monitoring Results			
10/03/16 Attended	-	32	-
19/07/16 Attended	-	Inaudible	-
01/07/16 to 19/07/16 Unattended	**58-67**	**48-61**	**43-52**
12/09/16 Attended	-	32	-
19/12/16 Attended	-	<30	-
12/04/17 Attended	-	35	-
30/07/17 Attended	-	33	-
23//07/17 to 30/07/17 Unattended	**45-55**	34-**50**	**53-66**
19/12/17 Attended	-	Inaudible	-
29/03/18 Attended	-	Inaudible	-
17/07/18 Attended	-	Inaudible	-
9/07/18 to 17/07/18 Unattended	**48-65**	39-54	**55-68**
21/12/18 Attended	-	32	-
26/06/19 Attended	-	38	-
27/09/19 Attended	-	31	-
20/12/19 Attended	-	37	-
23/03/2020 Attended	-	38	-
22/06/2020 Attended	-	38	-
25/09/2020 Attended	-	Inaudible	-
08/01/2021# Attended	-	39	-

Due to adverse weather conditions unsuitable for environmental noise monitoring, the quarterly measurements intended for late December 2020 had to be postponed until early January 2021

	Time Period		
	5:00am-7:00am	**7:00am-6:00pm**	**6:00pm-10:00pm**
Residence 6 (CN-4): Townsend			
Criterion			
Extraction, Processing and transportation	35*	35*	35*
Product Transportation only	35*	35*	35*
Monitoring Results			
10/03/16 Attended	-	Inaudible	-
19/07/16 Attended	-	Inaudible	-
01/07/16 to 19/07/16 Unattended	**36-65**	31-**60**	30-**46**
12/09/16 Attended	-	32	-
19/12/2016 Attended	-	Inaudible	-
12/04/2017 Attended	-	Inaudible	-
30/07/17 Attended	-	31	-
23//07/17 to 30/07/17 Unattended	**38-82**	28-**44**	**40-80**
19/12/17 Attended	-	Inaudible	-
29/03/2018 Attended	-	Inaudible	-
17/07/18 Attended	-	Inaudible	-
9/07/18 to 17/07/18 Unattended	**43-63**	39-**53**	**54-64**
21/12/18 Attended	-	Inaudible	-
26/06/19 Attended	-	Inaudible	-
27/09/19 Attended	-	Inaudible	-

	Time Period		
	5:00am-7:00am	**7:00am-6:00pm**	**6:00pm-10:00pm**
Residence 8 (CN-6): Cauchi			
Criterion			
Extraction, Processing and transportation	NP	36	35
Product Transportation only	NP	NP	NP
Monitoring Results			
29/04/2019 to 1/05/2019 Attended (EPL Compliance)	Inaudible	Inaudible	Inaudible
20 December 2019 Attended	-	Inaudible	-
23/03/2020 Attended	-	Inaudible	-
22/06/2020 Attended	-	Inaudible	-
25/09/2020 Attended	-	Inaudible	-
08/01/2021# Attended	-	Inaudible	-
# Due to adverse weather conditions unsuitable for environmental noise monitoring, the quarterly measurements intended for late December 2020 had to be postponed until early January 2021			
Residence 13 (CN-9): Barnard			
Criterion			
Extraction, Processing and transportation	35*	35*	35*
Product Transportation only	35*	35*	35*
Monitoring Results			
29/04/2019 to 1/05/2019 Attended (EPL Compliance)	Inaudible	Inaudible	Inaudible

Note: Bold results identify an exceedance of the nominated criterion – see Section 4.3.3 for discussion of results

@ Criterion proposed are consistent with those determined for Residence 5 (CN-3). It is noted these are not specified in either Development Consent 94-4-2004 or EPL 11295

* Condition 3(2) specifies that the noise criterion at non specified residences should be 35 dB(A)

** Unattended results include all noise sources including traffic on Peats Ridge Road.

+ Source: Tables4.3 and 4-4 Noise Assessment by Wilkinson Murray (May 2004)

TABLE 11: NOISE IMPACT CRITERION FOR ALL RESIDENTIAL LOCATIONS

Residential Location	Day	Evening	Night	Night (La1(1min)
Residence 3 (CN-1) – Power	41	35	35	45
Residence 4 (CN-2) – King	40	35	35	45
Residence 5 (CN-3) – Kashouli	39	35	35	45
Residence 6 (CN-4) – Townstead	35	35	35	45
Residence 8 (CN-6) – Cauchi	36	35	35	45
Residence 13 (CN-9) – Barnard	35	35	35	45

7.1.2 Analysis of Results

Measured noise levels were within the set noise limits indicated in the Noise Monitoring Program. As such, Calga Quarry noise emissions were compliant with the Quarry's Project Approval Conditions of Consent at all nominated noise sensitive monitoring locations that were assessed during all noise surveys.

In Comparison with Noise Impact Assessment Criteria

Attended noise monitoring was generally undertaken during the daytime period at each receptor location between the hours of approximately 10:00am and 3:30pm. All measurements were carried out in accordance with Australian Standard AS 1055-1997 *"Acoustics - Description and measurement of environmental noise"*.

There were no noise exceedances in 2020 during the four periods of noise monitoring attributing to the operations at Calga Quarry.

In Comparison with Previous Years Results

Table 10 records the range of recorded noise levels during the years 2016 to 2020 at the four monitoring locations. In general, the noise levels recorded by attended monitoring during 2020 were within the range of results recorded between 2016 and 2019.

In Comparison with EIS Predictions

The measured noise levels at all monitoring locations were at, or immediately below, the predicted noise levels in the 2004 EIS for the attended monitoring assessments. It is difficult to accurately assess the contribution of Quarry-related noise in the allotted 15-minute period of noise monitoring due to the local noise environment dominated by traffic noise generated from Peats Ridge Road.

7.1.3 Conclusion

Compliance with noise criteria continued throughout 2020 with noise levels comparable to monitored levels from previous years.

7.2 AIR QUALITY

Monitoring of air quality around the Calga Sand Quarry is currently confined to monitoring deposited dust with a PM_{10} monitor installed 2019 and Dust Deposition Gauges located in six different areas in and around the Quarry site.

The Air Quality Monitoring Program nominates that in the event of a sustained annual average dust deposition level of >3.7g/m2/month at a non-project related residence; a program of PM_{10} monitoring would be introduced at the relevant location(s).

Since 2001, three dust deposition gauges (CD-1, CD-2a/2b, and CD-3), located at representative locations within and around the Calga Quarry, have been monitoring deposited dust levels attributable to the activities within the Calga Sand Quarry and other local sources. A further three gauges (CD-4, CD-5 and CD-6) were installed in 2006. Dust deposition gauge CD-2 was relocated in late January 2010 to avoid interference with results from a nearby access road on the adjoining property. The new site is referred to as "CD-2c". **Figure 2** displays the locations of all gauges.

All samples are collected monthly by Carbon Based Environmental Pty Ltd and analysed by the ALS Laboratory Group.

7.2.1 Air Quality Criteria and Predicted Dust Levels

The full set of air quality goals for the Calga Sand Quarry are summarised in **Table 12**.

Table 12: AIR QUALITY GOALS

Pollutant	Averaging Period	Criteria
Total Solid Particulates (TSP)	Annual mean	90 µg/m^3
Particulate matter <10 µm (PM_{10})	Annual mean	30 µg/m^3
Particulate matter <10 µm (PM_{10})	24 hour maximum	50 µg/m^3
Particulate matter <10 µm (PM_{10})	(24-hour average, 5 exceedances permitted per year)	50 µg/m^3
Particulate matter <2.5 µm ($PM_{2.5}$)	Annual mean	8 µg/m^3
Particulate matter <2.5 µm ($PM_{2.5}$)	24 hour maximum	25 µg/m^3
Deposited Dust	Annual mean	4g/m^2/month

The current applicable criterion is for deposited dust which is 2g/m^2/month above the background level of 1.7 g/m2/month or a total of 3.7 g/m^2/month.

Extraction within Stages 3/1 and 3/5 was considered to produce "worst-case" scenarios and modelled to predict the likely deposition levels of particulate material. **Table 13** presents a summary of the model predictions at each of the Residences 1 to 14 for Stage 3/1. The level of activity within Stage 3/3 and 3/4 during the reporting period is considered to remain appropriate for the comparative assessment for the activities during the reporting period.

7.2.2 Results

Deposited Dust

Table 14 displays the monthly monitoring results at each monitoring site for 2020 and the annual average deposited dusts results from 2015 to 2019. Deposited dust monitoring at CD-2b ceased in January 2010, after samples were consistently contaminated by motorcycle activity on a nearby trail. A new monitoring location CD-2c replaced CD-2b in February 2010.

Table 13: SUMMARY DISPERSION MODEL PREDICTIONS DUE TO QUARRY OPERATIONS

	PM10 (µg/m^3)		TSP (µg/m^3)	Dust deposition (g/m^2/month)
Averaging period	**24-hour**	**Annual**	**Annual**	**Month**
Air quality goal	50	30	90	3.7
Residence ID	**Stage 3/1**			
1	15.8	5.1	10.9	0.63
2	21.6	4.1	8.4	0.44
3	11.8	2.2	4.2	0.21
4	14.2	2.1	4.2	0.21
5	5.0	0.9	1.7	0.08
6	6.3	0.8	1.7	0.08
7	8.4	1.3	2.6	0.14
8	4.4	0.6	1.1	0.06
9	9.4	1.4	2.6	0.13
10	4.8	0.6	1.1	0.06
11	2.9	0.4	0.8	0.04
12	1.9	0.3	0.5	0.02
13	2.2	0.3	0.6	0.03
14	1.4	0.2	0.4	0.02

Table 14: DEPOSITED DUST MONITORING RESULTS

	CD-1	CD-2c	CD-3	CD-4	CD-5	CD-6
Residence ID	1	3	5	13	NA	NA
2015 Average	1.2	1.3	0.8	0.6	0.6	0.6
2016 Average	1.4	0.9	1.2	0.6	0.5	0.9
2017 Average	2.9	0.9	1.1	0.6	0.6	0.8
2018 Average	3.7	1.5	1.2	1.0	0.9	1.0
2019 Average	2.1	1.6	1.8	1.4	1.3	1.5
Jan-20	5.9	4.5	7.6	4.5	5.5	5.9
Feb-20	1.2	1.0	0.8	1.1	0.8	0.8

Mar-20	1.1	0.9	0.3	0.2	0.2	0.4
Apr-20	2.2	0.7	1.1	0.7	0.6	0.9
May-20	0.6	0.4	0.5	0.3	N/A	0.5
Jun-20	0.4	0.2	0.4	1.2	0.1	0.3
Jul-20	0.7	0.6	0.6	0.8	2.9	0.3
Aug-20	0.6	0.5	1.3	0.3	0.2	0.3
Sep-20	1.8	1.1	1.5	1.5	0.3	0.6
Oct-20	1.4	1.1	0.3	0.5	0.2	0.5
Nov-20	1.8	1.4	2.8	1.2	1.2	1.6
Dec-20	2.3	1.4	2.7	0.6	0.6	1.4
2020 Average	1.7	1.2	1.7	1.1	1.1	1.1

Results marked with an * indicate an excessively contaminated gauge. Contamination calculation can include bird droppings, vegetation (such as plant matter, algae, pollen and seeds) and insects.
NS = Not sampled- broken bottle/funnel. Gauge fixed and replaced.

Particulate Matter Emissions (PM_{10})

PM_{10} readings are monitored by an e-sampler unit located on the north-east corner of the site area.

The site's PM10 annual average for 2020 was 10.63µg/m^3.

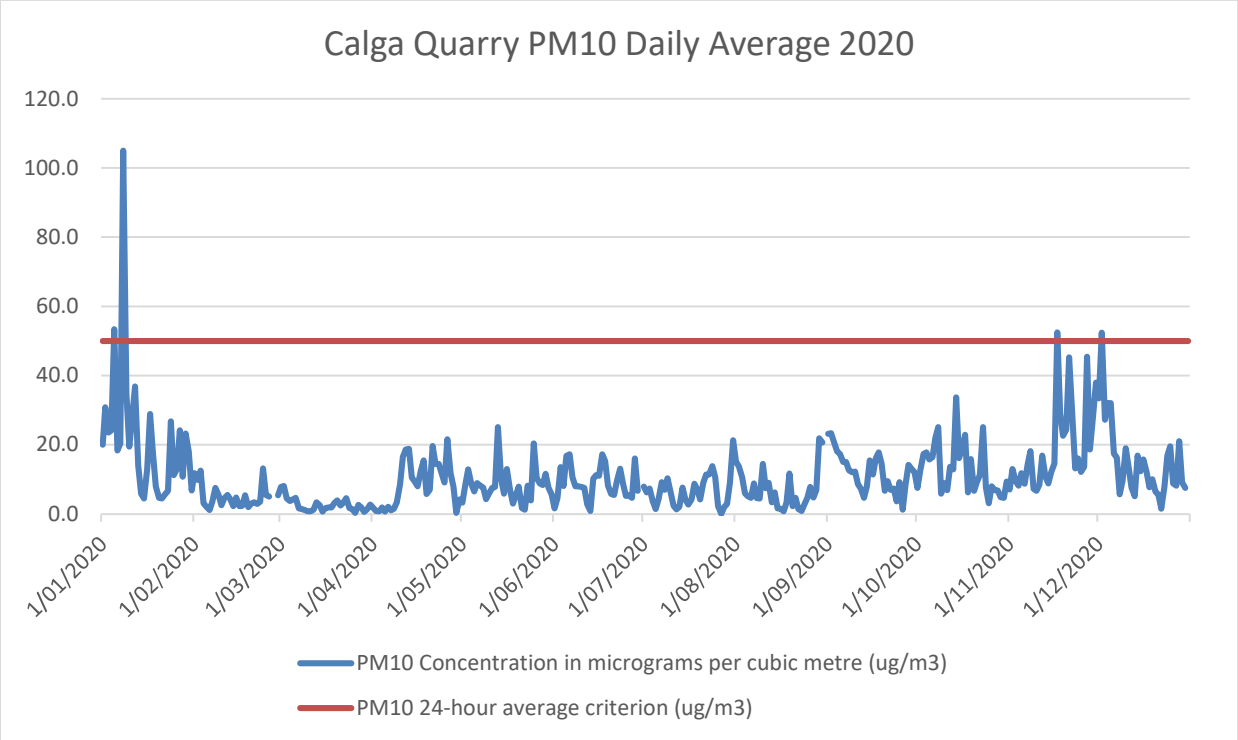


Figure 4: Calga Quarry PM10 monitoring over the 2020 period

The region's annual average PM_{10} reading of 15.92µg/m^3 for the 2020 reporting period was obtained from the Wyong monitoring station, 22.5 KM from the Quarry site (**Figure 5**).

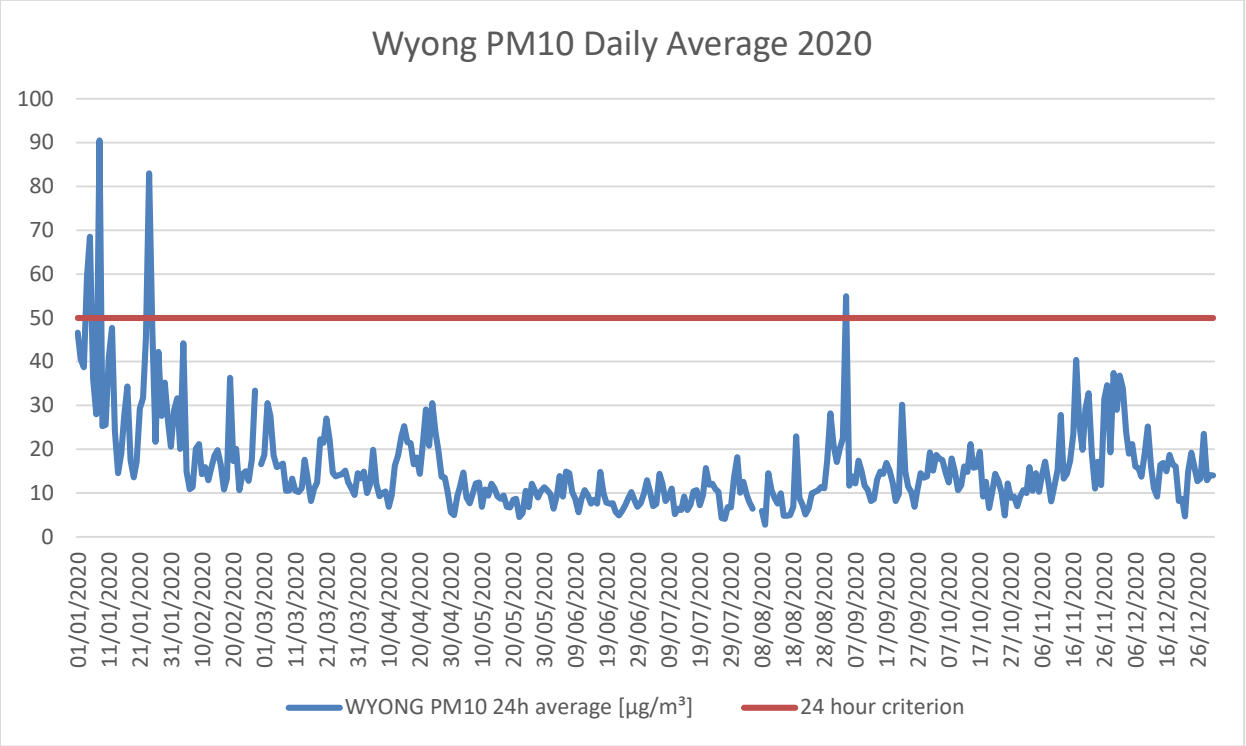


Figure 5: PM10 monitoring over the 2020 period in Wyong

Total Suspended Particles (TSP)

TSP was not monitored in the vicinity of the Quarry. The Air Quality Impact Assessment determined that the PM_{10} to TSP ratio was calculated by a factor of 2. This was applied to the 2020 site E-Sampler PM_{10} data to obtain an indicative TSP value in the absence of TSP readings. The site's annual PM_{10} for 2020 was recorded as 10.63µg/m^3. Therefore, the TSP reading for 2020 is approximately 21.26µg/m^3 (**Table 15**).

Table 15: Total Suspended Particles annual compliance

PM10 annual average	PM10 to TSP ratio	Calculated TSP	TSP criteria	Compliant
10.63µg/m^3	50%	21.26µg/m^3	90µg/m^3	Yes

7.2.3 Analysis of Results

In Comparison with Air Quality Goals

The yearly averages for all monitoring locations were within the nominated goals for deposited dust. There was one occurrence when the monthly deposited dust level was in excess of the 4g/m^2/month annual average criteria. However, the annual average was well below the 4g/m^2/month annual average criteria for all DDG locations.

The relatively high samples recorded at all monitoring locations in January 2020 was during a relatively dry period in the area and are not considered to be indicative of ambient conditions. This is can be seen in Figure 4 and 5 as both follow a trend of high results during the January 2020 period.

In Comparison with Previous Years Results

Average deposited dust levels for all six locations were lower or similar to those recorded in 2019 which would be due to the NSW fires that occurred in 2019.

In Comparison with EIS Predictions

The measured deposited dust levels outlined in **Table 14** are comparatively low and within the nominated goals, hence air quality issues are within predicted limits.

7.3 TRANSPORT

Calga Quarry has remained compliant with stipulated limits regarding transportation of product and has hence remained compliant with the conditions of consent.

7.3.1 Transport Criteria and Results

Schedule 2, Condition 7 states the proponent shall limit product transport to 400,000 tonnes of product per year from the site. **Table 16** provides a summary of the accumulated number of loads of products that were despatched on each weekday during the remainder of the report period for the periods 5:00am to 7:00am, 7:00am to 12:00 noon, 12:00 noon to 5:00pm and 5:00pm to 10:00pm.

Table 16: RECORDED TRUCK LOADS THROUGHOUT 2020

Days	Mon	Tue	Wed	Thu	Fri	Sat	Total
5:00am to 7:00am	120	134	132	121	200	179	886
7:00am to 12:00 noon	322	314	341	312	373	407	2069
12:00 noon to 5:00pm	251	270	231	227	19	201	1199
5:00pm to 10:00pm	100	99	97	70	32	96	494
Total	793	817	801	730	624	883	4648
* Based on an average load of 31.5t				# One load generates two truck movements			

The data in **Table 16** reveals that 63.6% of the products were despatched between 5:00am and 12:00 noon and 10.6% of products were despatched after 5:00pm. Approximately 18.9% of the products were despatched on Saturdays.

Table 17: TRUCK DISPATCH YEARLY COMPARISON

Year (total)	Mon	Tue	Wed	Thu	Fri	Sat	Total
2016	2182	2297	2208	2207	2152	993	12009
2017	2279	2246	2160	2209	2091	985	11970
2018	2202	2037	1878	2084	1917	1202	11320
2019	1821	1677	1796	1865	1919	1070	10148
2020	793	817	801	730	624	883	4648

There were no traffic incidents in the 2020 reporting period, as seen in **Table 16**.

Table 18: TRAFFIC INCIDENTS

Reporting period	Number of incidents	Details of Incident
2015	0	n/a
2016	0	n/a
2017	0	n/a
2018	0	n/a
2019	0	n/a
2020	0	n/a

7.3.2 Conclusion

The Quarry continued to operate the SAP counting system to monitor and manage truck dispatch numbers. New rules incorporated into the SAP reporting software have reduced the number of false positives such as split loads and internal deliveries.

7.4 GROUNDWATER

7.4.1 2020 Groundwater Monitoring

Groundwater monitoring throughout the reporting period was undertaken by Carbon Based Environmental Pty Ltd (CBE) and an audit of the results was undertaken by EMM Consulting Pty Limited (EMM, 2020) in accordance with the requirements of *Condition 3(18)*. The audit reporting is provided in full to the Department as **Appendix 3**.

The approved monitoring network for the Quarry consists of 22 groundwater bores, both within the Quarry Site and on neighbouring properties. Bores CQ1 and CQ2 are no longer being monitored as they have been removed due to advancing extraction activities and bores CP3 and CQ6 have been removed by the respective landowners. Bore CQ9 remains accessible but the casing of the bore has been damaged and water level measurements are not possible. Monitoring during the reporting period involved collection of data on groundwater levels and quality and monitoring for any potential impacts from sand extraction on water supply bores on the neighbouring properties. The locations of the monitoring bores are shown on **Figure 6**. A groundwater bore census identified three additional water supply bores within 500m of the Quarry site. Landowner approval has been received for CP13 and CP15 with monitoring commencing 2019. Landowner of CP14 has refused access for monitoring purposes.

In accordance with the Site Water Management Plan, standing water level (SWL) was measured manually on a bi-monthly basis, in all accessible bores, or automatically using automatic water level recorders installed in fourteen of the bores and set to record the water level every 6 hours.

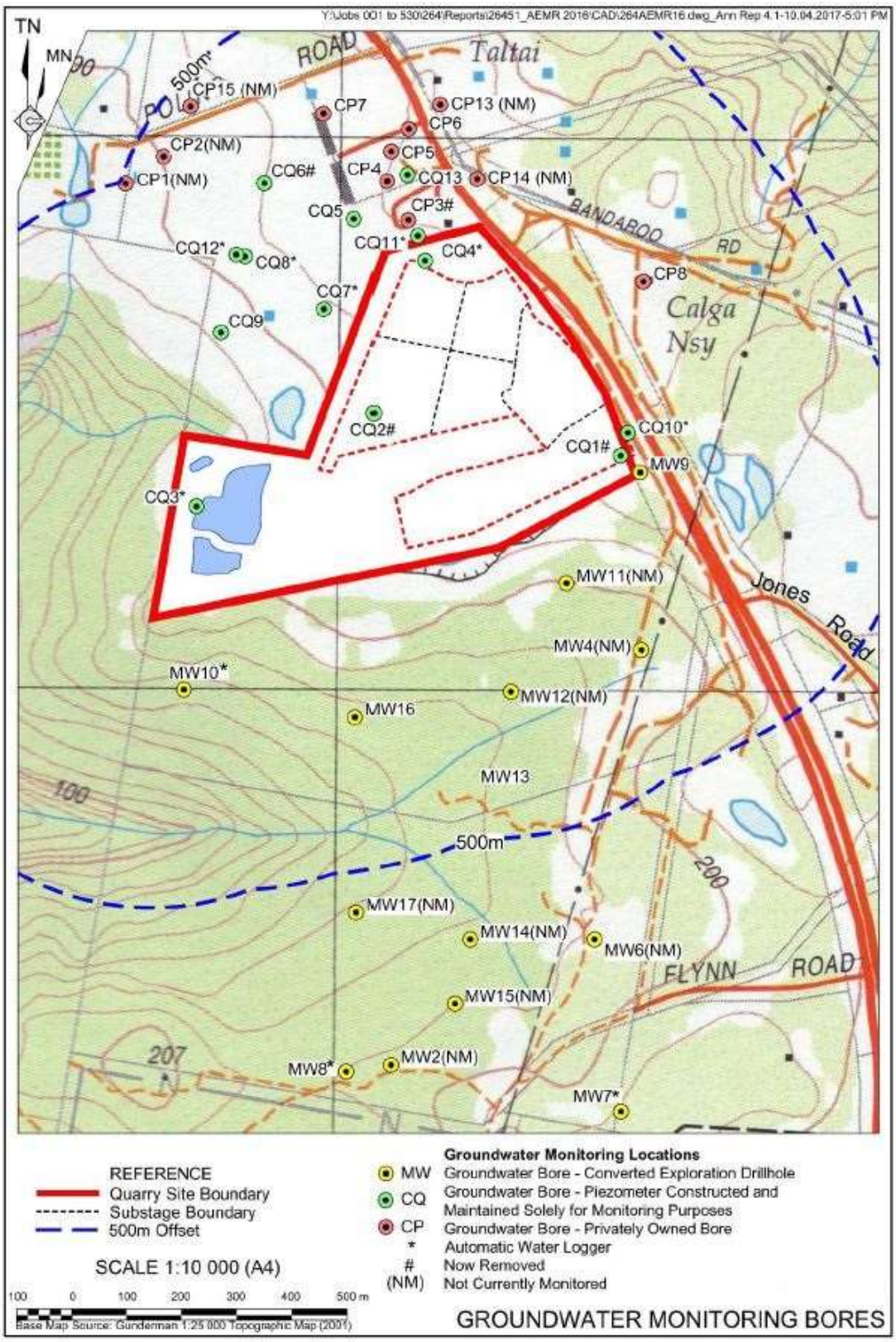


Figure 6: GROUNDWATER MONITORING BORES LOCATED WITHIN 500M OF QUARRY SITE.

Each monitoring bore was sampled bi-monthly (where possible) to determine the electrical conductivity (EC) and pH, and six-monthly for comprehensive laboratory analysis of a full suite of anions, cations and metals. The monitoring results were compiled into monthly Environmental Monitoring Reports by CBE and posted on the Hanson website.

7.4.2 Groundwater Criteria and Results

Groundwater Levels

The criteria relevant to groundwater quality and levels are drawn from the approved Site Water Management Plan (SWMP), dated May 2018 (Section 7.4.1).

It is a requirement to establish that any recorded declining trend in groundwater levels is attributable to climatic conditions or other factors not related to sand extraction activities on the Quarry site. In the event groundwater levels at monitoring bores CQ10 and CQ11 experience drawdowns of >1.0m attributable to sand extraction activities on the Quarry site, then a range of response actions need to be undertaken.

If any private bore on adjoining properties within 500m of the extraction area experiences a loss of yield >10% attributable to the extraction operation on the Quarry site, a range of response actions are also applicable. Monitored groundwater levels are represented in **Appendix 1** and shown graphically as hydrographs, together with rainfall and evaporation data.

Groundwater Quality

The criteria relevant to groundwater quality are drawn from the Site Water Management Plan, dated May 2018. It is nominated that if any private production bore within 500m of the approved extraction area experiences a sustained salinity increase of >20% measured in either EC or total dissolved solids, a range of response actions will be implemented. Field measurements of EC and pH were recorded bi-monthly from all accessible bores. The results of these measurements are tabulated in **Appendix 1**. Samples for comprehensive laboratory analysis were collected 1 April 2020 and 1 October 2020. The results of the laboratory analyses are presented within the Annual Groundwater Audit, which is provided to the Department as **Appendix 3**.

7.4.3 Analysis of Results

Groundwater Levels

Groundwater levels will be presented graphically as hydrographs, together with rainfall and evaporation data within the Annual Groundwater Audit (**Appendix 3**).

Bores CQ3, CQ4, CQ7, CQ8, CD10, CQ11S and D, CQ12, CQ13, MW7, MW8, MW9 and MW10 are equipped with automatic dataloggers. For these bores, both datalogger and manual water levels are recorded, the dataloggers reading at 6 hourly intervals and the manual measurements taken every two months. All other bores are read manually every two months.

Groundwater Quality

A number of exceedances of the ANZECC (2000) guideline values for freshwater ecosystem protection were recorded in 2020; however this remains consistent with records from previous years. These exceedances mostly relate to dissolved metals concentrations, with some exceedances of the nitrate guideline value. A full list of recorded exceedances in shown in **Table 19**. The results confirm that the operation of the Quarry has not affected groundwater quality at any neighbouring groundwater bores.

The ongoing exceedances for dissolved metals are considered to reflect the natural groundwater quality and are not related to the Quarry operations. Exceedances of nitrate, which ranged up to a maximum recorded value of 14.3mg/L in 2020, are believed to be due to the agricultural activities on the neighbouring properties and result either from fertilizer application or possibly from chicken farming. The highest values were detected in off-site monitoring bores or private water supply bores north of the Quarry site. As such, these exceedances are considered not to be related to the Quarry operations.

Table 19: EXCEEDANCES OF ANZECC (2000) FRESHWATER ECOSYSTEM PROTECTION GUIDELINES

Parameter	ANZECC (2018) Freshwater Ecosystem Protection Guideline (mg/L)	Reported Range (mg/L)	Exceedances*
Aluminium	0.055	<1 – 5	All bores
Cadmium	0.0002	<0.0001 – 0.0004	CP6
Copper	0.0014	<0.001 – 0.011	CQ3, CQ5, CQ8, CQ10, CQ11S, CQ11D, CQ12, MW7, MW10, MW13, CP5, CP6, CP7, CP8, CP13, CP15.
Lead	0.0034	<0.001 – 0.015	CQ5, CQ10, MW7, MW17, CP5, CP6, CP7, CP15
Nickel	0.011	<0.001 – 0.046	CP5, CP6
Zinc	0.008	<0.001 – 0.495	CQ5, CQ10, CQ12, MW7, MW13, CP5, CP6, CP7. CP15
Nitrate	0.7	<0.01 – 14.3	CQ4, CQ8, CQ13, CP5, CP6, CP15
* Dissolved metal and nitrate exceedances are considered to be reflective of natural groundwater quality and not a result of quarrying activities.			

The site has followed the 2018 Annual Groundwater Audit recommendation to modify the Site Water Management Plan to exclude arsenic, selenium, boron and mercury from ongoing analytical suite of tests of groundwater quality given the historical lack of exceedances of the ANZECC (2000) guidelines values for these parameters.

7.4.4 Recommendations

The following recommendations are provided as part of the 2020 Annual Independent Groundwater audit:

- a barometric pressure logger to be installed at the project to provide a more accurate conversion of water level readings;
- TDS to be added to the analytical suite, to provide further information regarding salinity increases in landholder (private) bores; and
- monitoring network and analytical suite updated to reflect changes made in Site Water Management Plan, specifically:
    - wells MW7, MW8, MW16 and MW17 are removed from the monitoring network; and
    - arsenic, boron, selenium and mercury are removed from the laboratory analytical suite.

7.4.5 Conclusion

The 2020 groundwater audit confirmed that the quarry operations continue to have only a limited impact on the groundwater system. Additionally, no off-site water quality impacts attributable to the quarry operations have been observed. There have been no reports of loss of yield in any neighbouring production bore within 500m of the Quarry Site during 2020 which can be attributed to declining groundwater levels.

7.5 SURFACE WATER

Monitoring of surface water quality was undertaken monthly by Carbon Based Environmental Pty Ltd. Samples collected were analysed by Australian Laboratory Services for pH, EC, total suspended solids (TSS) and total oil and grease at Site A (Dam 1), Site F (Dam 7b/c – at the overflow) and at Sites B to D when they were flowing (**Figure 6**). Samples are no longer taken at Site E following a request to discontinue sampling by the landowner of "Glenworth Valley". In June 2016, two new sampling sites were introduced to the northwest of the Quarry Site at the end of Polins Road (**Figure 6**). C1 was placed at the northern end of the dam to measure upstream results, and C2 was placed at the southern end to measure downstream results. These results have been reported in this document, however, it is noted that these results are upstream of the Quarry and therefore the results are indicative of background conditions only.

Water management on site was undertaken largely in accordance with the Site Water Management Plan. Water use during the reporting period included that used for the following activities

- Dust suppression
- Washing of product in the wash plant through processing (majority recycled through silt cells)
- Water retention in silt
- Water retention in the sold product (estimated at approximately 7%)

Water use during the reporting period is conservatively estimated to be 111ML. Water use remains within the allocation permitted under the four Water Access Licences held for the Calga Sand Quarry.

Surface water was observed to flow from the Quarry Site four times during the reporting period following prolonged rainfall in January, February, May, August and September 2020. Water samples were taken at surface water monitoring locations. Results are discussed in the document.

7.5.1 Water Quality Limits and Results

Table 18 presents a compilation of the routine monthly surface water monitoring results collected throughout 2019, together with the water quality limits drawn from the approved Site Water Management Plan. Water monitoring was undertaken following one significant rainfall event in March 2019, the results of which are outlined in **Table 20**.

Table 20: ROUTINE SURFACE WATER RESULTS - 2020

	pH	EC	TDS	TSS	O&G
Units	-	uS/cm	mg/L	mg/L	mg/L
Water Quality Limits	+- unit	<1500	NA	<50	<5
A (Dam 1)					

No. of Samples	12	12	12	12	12
Minimum	5.74	57	48	<5	<5
Maximum	6.23	110	78	32	6
Average #	6.12	91.50	62.17	16.00	<5
Standard Deviation #	0.28	15.65	10.84	9.03	N/A
B (Upstream from Dam 1 Overflow)					
No. of Samples	6	6	6	6	6
Minimum	6.38	94	58	<5	<5
Maximum	6.79	103	98	31	<5
Average #	6.59	98.83	78.17	14.00	<5
Standard Deviation #	0.16	3.76	12.69	9.92	N/A
C (Upstream – Background Site)					
C1 (Upstream – Polins Road)					
No. of Samples	12	12	12	12	12
Minimum	6.32	96	48	<5	<5
Maximum	6.85	152	82	33	<5
Average #	6.58	91.58	60.58	11.40	<5
Standard Deviation #	0.14	24.13	12.13	8.22	N/A
C2 (Downstream – Polins Road)					
No. of Samples	12	12	12	12	12
Minimum	5.93	97	54	<5	<5
Maximum	6.61	130	88	20	<5
Average #	6.12	111.17	70.17	8.63	<5
Standard Deviation #	0.18	11.69	11.33	4.93	N/A
D (Upstream – Background Site)					
No. of Samples	7	7	7	7	7
Minimum	5.24	72	42	<5	<5
Maximum	5.46	130	120	7	<5
Average #	5.35	88	70.5	7	<5
Standard Deviation #	N/A	N/A	N/A	N/A	N/A
F (Dam7 b/c)					

No. of Samples	12	12	12	12	12
Minimum	4.78	54	40	<5	<5
Maximum	7.19	119	98	48	<5
Average #	6.20	92.58	68.17	23.78	<5
Standard Deviation #	0.79	17.18	16.19	10.92	N/A

EC = Electrical Conductivity TSS = Total Suspended Solids

TDS = Total Dissolved Solids O&G = Oil and Grease

Samples in **bold** exceed the nominated for the Quarry Site (though may not necessarily relate to the Quarry Site)

[1] Where levels were below the measurable threshold (i.e. <5mg/L), the maximum value of 5mg/L has been assumed for the purpose of preparing a statistical analysis.

Rounded value

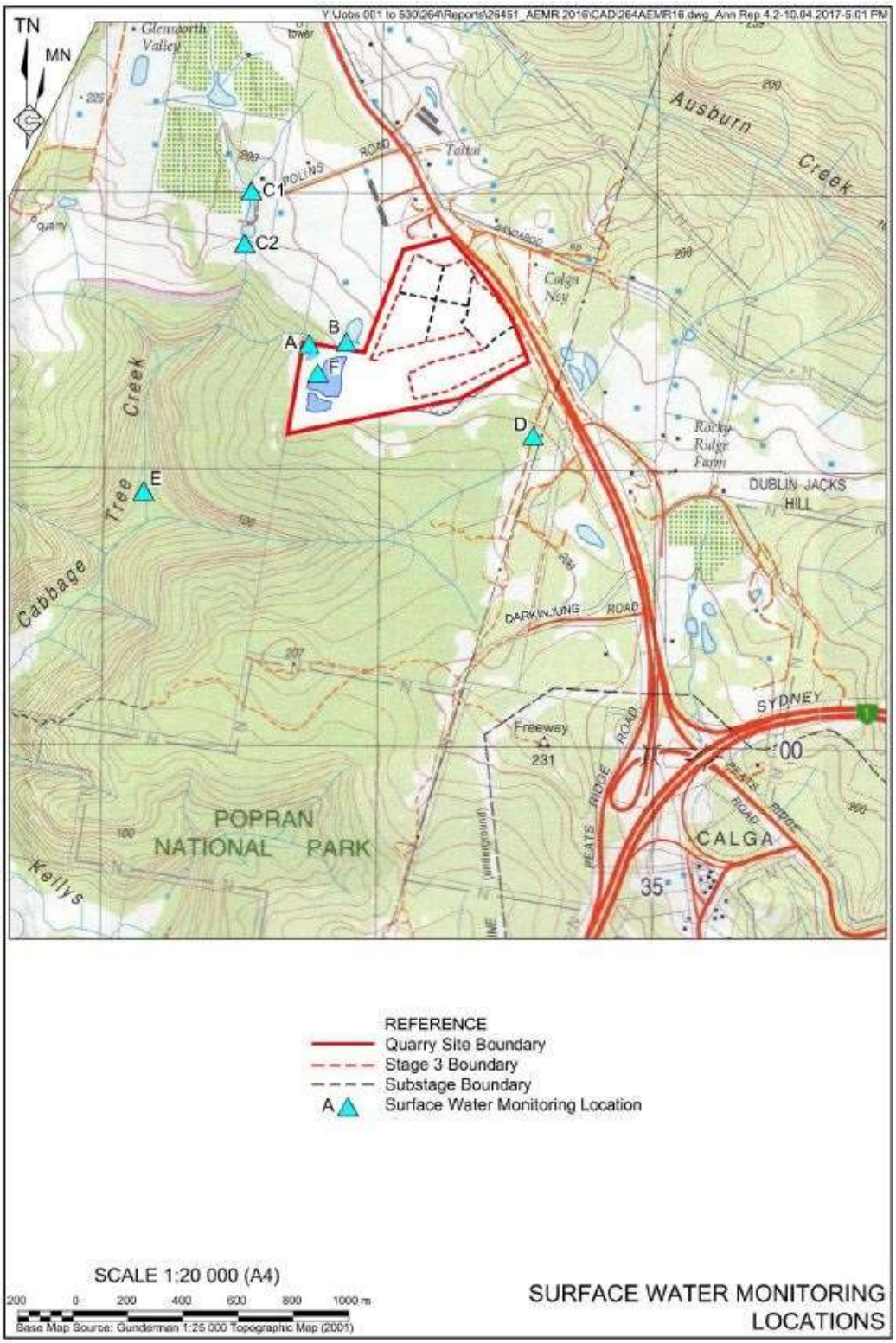


Figure 7: SURFACE WATER MONITORING LOCATIONS

Table 21: SURFACE WATER MONITORING RESULTS – HIGH RAINFALL EVENTS 2020

	pH	EC	TDS	TSS	O&G
Units	-	uS/cm	mg/L	mg/L	mg/L
Water Quality Limits	+- unit	<1500	N/A	<50	<10
A (Dam 1)					
17/01/2020	**6.49**	93	48	6	<5
07/02/2020	**6.17**	72	64	6	<5
27/05/2020	**7.68**	121	103	16	<5
27/07/2020	**6.71**	112	61	26	<5
14/09/2020	**7.09**	125	63	12	<5
B (Upstream from Dam 1 Overflow) – no discharge, sample only					
17/01/2020	6.45	92	52	<5	<5
07/02/2020	6.05	75	80	**32**	<5
27/07/2020	6.73	111	77	28	<5
C (Upstream) – no discharge, sample only					
17/01/2020	6.38	47	102	604	<5
07/02/2020	6.73	71	99	50	<5
27/07/2020	6.67	83	76	80	<5
D (Upstream – Background Site) – no discharge, sample only					
17/01/2020	5.92	60	93	50	<5
07/02/2020	6.73	71	99	50	<5
27/07/2020	5.45	70	62	446	<5
F (Dam 7b/c) – no discharge, sample only					
17/01/2020	**5.99**	92	85	<5	<5
07/02/2020	**6.37**	53	52	84	<5
27/07/2020	**6.73**	82	79	91	<5

EC = Electrical Conductivity
TSS = Total Suspended Solids
TDS = Total Dissolved Solids
O&G = Oil and Grease
NR = Not Recorded
Samples is bold exceed the nominated criteria for the Quarry Site (though may not necessarily relate to the Quarry site)

7.5.2 Analysis of Results

In Comparison with Water Quality Limits

When compared to the water quality limits nominated at the top of **Table 20**, the following comments are relevant.

- pH values in Dam 1 range from 5.74 and 6.23. These values have a range of approximately +- 1.0 pH units, which is consistent with pH levels recorded elsewhere in the catchment, including at upstream locations not influenced by the quarrying operations. These results

are within +- pH units of the baseline pH range established at the upstream background Site D.

- EC values were always well below the 1500uS/c limit. Average Dam EC values were consistent with upstream measurements.
- TSS max values ranged between <5mg/L to 48 mg/L at all sampling sites.
- No oil and grease concentrations were above the 10mg/L limit in 2020 and were generally below the limit of detection.

In Comparison with Previous Years Results

Appendix 1 lists the recorded surface water quality since 2006.

- pH and EC values were comparable throughout the period 2006 to 2020.
- TSS values recorded in 2010 were comparable to those recorded between 2008 and 2014 and generally slightly lower than 2015 and 2018.
- Oil and grease concentrations were generally low, and regularly below the detection limit throughout the period 2006 to 2020.

Significant Rainfall Events

The monitoring results recorded following a significant rainfall event (**Table 21**) were consistent with the monthly monitoring results recorded during 2020. Rainfall was recorded at:

- January – 227.8mm
- February – 228mm
- July – 185mm
- October – 142.8mm

In Comparison with EIS Predictions

The 2004 EIS included predictions that, with the adoption of the proposed design and operational safeguards, any discharge from the Quarry Site should satisfy the EIS predictions. Water Quality at Dam 1 during significant rainfall events was generally consistent with EIS predictions.

7.5.3 Conclusion

The monthly water monitoring undertaken during 2020 established that surface water quality was within the criteria established in the Site and Water Management Plan.

7.6 REHABILITATION AND LANDSCAPE

7.6.1 Introduction

The 2020 rehabilitation program involved regular work undertaken by an experienced horticulturalist on the areas identified in **Figure 7**. Activities include weed management, vegetation management and progressive maintenance of the existing visual and acoustic bund, as required. As part of this rehabilitation program, a seed bank, containing seeds collected from the existing Quarry Site as well as the immediately surrounding area, was established to aid in re-vegetation activities in the future. All weeds amongst revegetation zones, road edges and mustering areas have now been chemically treated or physically removed.

Limited rehabilitation activities occurred in 2020 due COVID-19 face to face restrictions

Figure 8: GROUNDWATER DEPENDENT ECOSYSTEM MONITORING PLOTS

7.6.1 Criteria and Results

There was limited access to the site due to COVID-19 restrictions for rehabilitation personnel. When possible, the weed species targeted by the horticulturalist during the reporting period included Kikuyu, Tagets, African Love Grass, Paspalum, Coreopsis, Cynodon, Sida, Verbena, Setaria and Bidens. Revegetation activities were focused on Revegetation Area 5 with tubestock of mixed plantings planted in the area.

Cumberland Ecology (**Appendix 5**) undertook the annual Biodiversity Monitoring report for 2020. This report noted the following:

- Weed management appears to be effective. Rehabilitation areas have seen a general decrease in weed species richness while native species richness has remained at similar levels when compared with previous monitoring.
- The static nature of native species richness, which is relatively low in the majority of the old rehabilitation areas, is due to a lack of infill planting in these areas that have declined in species richness over time due predominately to the death of historical shrub plantings and the lack of species richness in initial revegetation planting.
- The ground layer of most monitoring quadrats is depauperate of native species. It was noted in previous years that this was likely due to shading by dense *Acacia longifolia* subsp. *longifolia* thickets in some areas.
- Gaps in shrub coverage should be planted out with a diverse array of local provenance native shrubs to improve the species richness in the older rehabilitation areas and their utility to native fauna, along with mass planting of ground layer species as weeds are controlled.
- Rehabilitation is generally being implemented in accordance with the performance criteria and the species required to be represented in the final landform are well represented.
- The presence of Priority Weeds (declared under NSW *Biosecurity Act 2016*) within the Quarry Site is much improved since 2012.
- Fauna Recorded:
    - Wild Dog – *Canis lupus familiaris*
    - Swamp Wallaby – *Wallabia bicolor*
    - Wedge Tail Eagle – *Aquila audax*
    - Red Brow Finch – *Neochemia temporalis*
    - Red-tailed Black Cockatoo – *Calyptorhynchus banksii*

Threatened Flora Species

Cumberland Ecology undertook the Threatened Flora Species survey in summer of 2020. A survey of previously identified location for the threated flora species *Darwinia glaucophylla* and *Hibbertia procumbens* was undertaken at the site in established monitoring areas.

Individuals of *Hibbertia procumbens* and *Darwinia glaucophylla* are abundant in specific areas of the Quarry Site and appear unaffected by extraction activities. As in previous years, additional individuals of both species were located in new areas. Tagged individuals of *D. glaucophylla* are healthy and in good condition.

Groundwater Dependent Ecosystems

In January 2016 Cumberland Ecology were commissioned to survey the area to the south of the Quarry for the presence of GDEs and to establish monitoring plots that would be added to the annual vegetation monitoring undertaken within the Quarry Site. A total of five 20m square monitoring quadrats were established approximately 500m south of the Quarry Site. Three plots were established within Sandstone Hanging Swamps (Groundwater Dependent Wetlands) and two plots were established in Sandstone Ranges Gully Rainforest (baseflow stream). **Figure 7** displays the location of the GDE monitoring plots.

All Groundwater Dependent Ecosystems (GDE) quadrats surveyed in December 2020 had similar species compositions and coverages as the April 2019 and 2017 surveys. At the end of the fifth year of monitoring of Groundwater Dependent Ecosystems (GDE) quadrats, native vegetation in these areas is consistent with the first round of monitoring and there are no observable impacts to GDEs by extraction activities.

It should be noted that the Calga Sand Quarry has been operating since 2004 and the baseline monitoring and the current monitoring has indicated that there have been no impacts to GDEs to date from quarrying activities.

Biodiversity Recommendations

Key recommendations include:

- Eradicate all extant occurrences of Priority Weeds and other weeds of regional concern in quadrats and surrounding rehabilitation areas. *Lantana camara* individuals of a shrub-size were recorded in Quadrats 4 and 5. These have been present since the 2013 survey, have been reproductively mature for several years, and due to seed dispersal the species is spreading throughout the north of the Quarry Site and should be controlled immediately. The species is scattered throughout Rehabilitation Area 1 and Rehabilitation Area 5, occurring in dense clumps in some areas. Additionally, occurrences of *Ageratina adenophora* in the drainage line within Rehabilitation Area 5 should be prioritised for immediate control;
- Continue weed control of other exotic groundcovers within rehabilitation areas, particularly the acoustic bund walls and northern fill area. Some weed species at the time

of the survey were seeding, and this needs to be prevented during future regeneration works to break the cycle of weeds maturing and depositing new seed into the soil seed bank. Large infestations require regular monthly herbicide application for at least six months to a year, and potentially longer until eradicated;

- Weed control efforts require more of a focus on Rehabilitation Areas 1, 4 and 5 in which it appears weed control is not being undertaken. Following a further 6 months of weed control in which weeds are not allowed to set seed, a larger range of native herbs and grasses need to be planted to inhibit weed growth in the future and to increase native species richness in Rehabilitation Areas 1 and 5. A planting list is provided in the report;
- Rehabilitation Areas 1, 2, 3 and 5 are generally species poor and require infill planting in all strata;
- It is recommended that *Acacia longifolia* subsp. *longifolia* is only used as a small percentage of future plantings as it was over-utilised in early rehabilitation at the Quarry Site, and has since died back leaving significant gaps in the shrub layer;
- Older rehabilitation areas with the exception of Rehabilitation Area 7 lack canopy species, which should be planted throughout these areas;
- Continue seed collection, spreading of local native seed, and planting of propagated tubestock;
- Continue to monitor vertebrate pest activity and implement control measures if these are observed in high numbers;
- During regular bushland regeneration activities the slump in Rehabilitation Area 5 should be monitored for further erosion. Where further erosion is observed the following should be implemented:
- Step 1: stabilise the bund wall using a series of staked logs or small benches along the contours and add topsoil;
- Step 2: once bund wall is stabilised and topsoil is spread, plant with tube stocks or spread native seed. Incorporate species that prefer exposed habitats as this wall faces west. Use species tolerant of moisture along the toe and next to the drain;
- Future rehabilitation areas on steep slopes should have soil stabilised prior to planting by using materials such as jute matting to prevent erosion; and
- Continue to monitor the presence and condition of threatened species populations within the Quarry Site on an annual basis.

No actions are recommended concerning GDEs, as recorded vegetation appears to remain unchanged in the years since establishment of the monitoring quadrats, and there is no observable impact of Quarry activities. Vegetation communities in these areas are intact.

8. COMMUNITY

8.1 STAKEHOLDER AND COMMUNITY CONSULTATION

8.1.1 Local Community

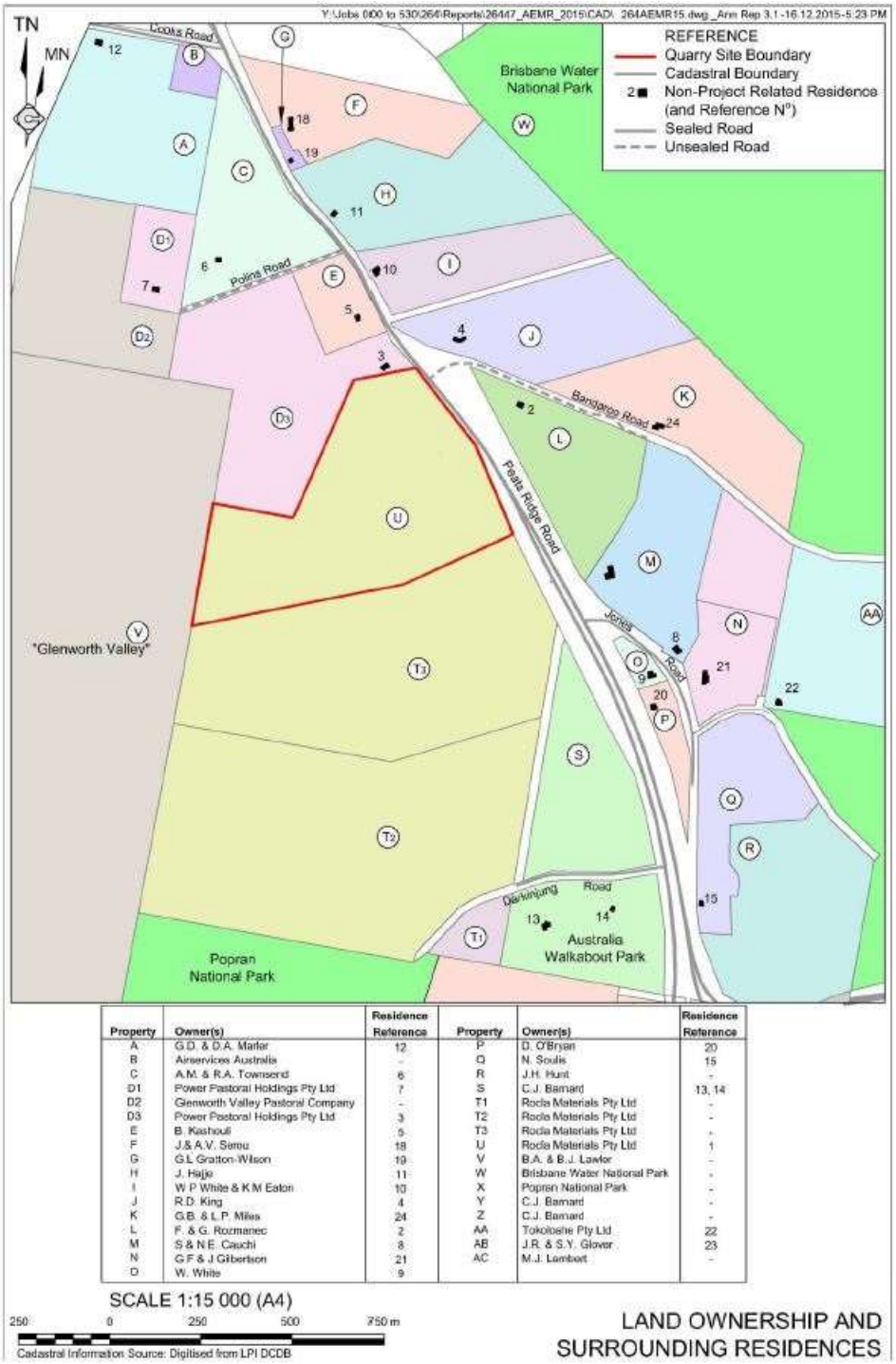
Figure 9 displays the land ownership and residences around the Calga Sand Quarry. The Quarry Manager, Mr Paul Slough, maintained contact with neighbours throughout 2020 principally through direct one-to-one contact, occasional phone contact (call and SMS) and involvement in the Community Consultative Committee.

Two scheduled Community Consultative Committee (CCC) meetings were held at the Calga Sand Quarry on 4th May 2020 and 26 October 2020 to provide the committee with an update on the operation and discuss various issues raised by community members and Hanson personnel.

The number of meetings held is consistent with the requirements on *Condition 5(8)(c)* for at least two meetings each year. The minutes of both meetings are reproduced as **Appendix 6**.

8.1.2 Community Involvement

During the reporting period, no in-person visits from local community representatives and neighbours occurred at the Quarry as part of the Community Consultative Committee Meetings due to COVID-19 restrictions.



Property	Owner(s)	Residence Reference	Property	Owner(s)	Residence Reference
A	G.D. & D.A. Marlar	12	P	D. O'Bryan	20
B	Airservices Australia	-	Q	N. Soulis	15
C	A.M. & R.A. Townsend	6	R	J.H. Hunt	-
D1	Power Pastoral Holdings Pty Ltd	7	S	C.J. Barnard	13, 14
D2	Glenworth Valley Pastoral Company	-	T1	Roda Materials Pty Ltd	-
D3	Power Pastoral Holdings Pty Ltd	3	T2	Roda Materials Pty Ltd	-
E	B. Kashouli	5	T3	Roda Materials Pty Ltd	-
F	J.& A.V. Sereu	18	U	Roda Materials Pty Ltd	1
G	G.L Gratton-Wilson	19	V	B.A. & B.J. Lawlor	-
H	J. Heijo	11	W	Brisbane Water National Park	-
I	W.P White & K.M Eaton	10	X	Popran National Park	-
J	R.D. King	4	Y	C.J. Barnard	-
K	G.B. & L.P. Miles	24	Z	C.J. Barnard	-
L	F. & G. Rozmanec	2	AA	Tokoloshe Pty Ltd	22
M	S & N.E. Cauchi	8	AB	J.R. & S.Y. Glover	23
N	G.F & J Gilbertson	21	AC	M.J. Lambert	-
O	W. White	9			

Figure 9: LAND OWNERSHIP AND SURROUNDING RESIDENCES

8.2 ENVIRONMENTAL COMPLAINTS

Complaints are addressed in accordance with Section 3.3.3 of the Environmental Management System. Complaints management includes the following procedures.

- Complaints may be received by phone, email or mail.
- The complaints phone line number is displayed on the signage at the Quarry entrance, in the Yellow Pages and on the Hanson website.
- Phone calls are connected to a call centre from where the caller is directed to a Regional Risk Manager for NSW or other suitable person.
- All complaints are recorded and referred to the Quarry Manager.
- The Quarry Manager responds immediately by identifying the area of concern and an investigation is commenced by the Quarry Manager or an appropriate delegate.
- If necessary, additional environmental monitoring will be commissioned to confirm compliance or investigate the source of the complaint.
- A summary of the investigation, results and actions taken is recorded in the complaints register and made available on the Hanson website. A copy of the results is also provided to the complainant.

No complaints were received during the reporting period for nearby residences.

9. INDEPENDENT AUDIT

The first Independent Environmental Audit of Hanson operations under PA 08_0143 occurred in July 2018. The audit report identified the following non-compliance issues.

Non-Compliance / Administrative Non-Compliance number	Comments	Hanson Action Details	Dates/Justification
N1	The following practices haven't been implemented RE: minimising noise impacts • Comparative sound level measurements of equipment had not been undertaken • Signs had not been displayed at the exit to the site to remind all drivers to leave in a quiet manner.	Update the requirements for noise monitoring with contractors. Sound power levels are to be monitored in Q4 noise monitoring. Transportation noise impact signage to be placed at quarry exit.	Noise monitoring contractors have been notified of the requirements under the Calga Noise Management Plan 2017. Transportation noise impact signage was installed November 2018.
N2	The approved SWMP does not include impact assessment criteria for groundwater dependent	Revise the SWMP to include impact assessment criteria for groundwater dependent ecosystems (GDEs)	Have communicated with RW Corkerys to update this aspect of the management plan.

	ecosystems (GDEs). The amended SWMP which is awaiting approval includes identification of and monitoring program for GDEs, but does not include impact assessment criteria.		Completed (pending NRAR review of the management plan)
N3	A further bore survey in 2015 identified 3 further bores within 500m of the quarry. Only one of these (CP13) has been tested. CP14 and CP15 not yet tested.	Hanson has received approval for monitoring of CP13 (White property) & CP15 (Glenworth Valley). Hydraulic testing to be performed by P. Dundon for bore CP15. Hanson has not received landowner approval for CP14 (King property).	Approval for CP13 and CP15 completed January 2019. Still waiting on approval from CP14 but at this point in time Hanson might not receive approval from landowners.
N4	Defective continuous water level monitoring equipment not fulfilling monitoring requirements.	Cbased have removed all faulty data loggers and replaced with new units February / early March 2019 (delay on supplier side).	All loggers tested November 2018. New units end of March 2019.
N5	No water level or flow metering equipment as specified by MER (2005) has been installed on any private bore within 500m of quarry.	Hanson is still in discussion with Peter Dundon on feasibility to install equipment to private bores that require water level/flow monitoring equipment.	Completed.
N6	Dust deposition results for CD1 show increasing trend, with monthly results from February 2018 exceeding 12 month annual average criteria, although 12 month average has not exceeded criteria. No formal investigation has been undertaken to assess the cause of the exceedances.	Monthly average over a year period is required in accordance with the conditions of consent. Quarry Management understood the reason of the increasing trend. Commencement of new extraction cell 5 within close proximity 920m) of CD1. As the formal investigation has been undertaken, the report will be generated and filed for future reference.	Completed.
N7	Quarry induction includes section on environmental management and controls, however site specific environmental requirements have not been included.	Contractor Induction documents to outline environmental requirements (noise & dust) have been completed.	Completed.
N8	There is no record of discharge volume from EPL 1 or record of water levels.	Discharge at Point 1, Dam F (licensed discharged point) on 3rd April 2018 as a result of heavy rainfall event. Samples sent to ALS for testing & shown to be below EPL concentration limits. After further investigation discharge water volume has never been recorded from this location. Process of calculating discharge volume to be implemented.	Completed.
N9	Records of water taken had not been maintained. A logbook recording details of water taken was not available, and a meter had not been installed.	Meter installed at production groundwater bore (amenities) & log book in use.	Completed.
N10	Records of water volumes or extraction rates had not been maintained.	Hanson will review the website and ensure the complaints register is uploaded quarterly.	Completed.

A1	While a monitor had been purchased for the site, monitoring of particulate matter (TSP and PM10) had not been implemented at the time of audit.	E-sampler has been installed. Data collection commenced Jan 2019 & to be uploaded onto web. Delay due to equipment failure of two units.	Completed.
A2	The GCS does not correctly describe the basis for provision of a compensatory water supply in accordance with the Consent. The revised SWMP submitted to the department in draft for approval also does not specifically describe a GCS, although the elements of the GCS are included.	SWMP is currently in draft and will be submitted by May 2019.	Completed (pending NRAR review of the management plan)
A3	The Driver's Code of Conduct had not been submitted to the Secretary by 28 July 2017.	Implement process to track compliance requirements. Tracking of compliance requirements developed.	Completed.
A4	While waste transport dockets were available for waste removed from site, the Quarry had not implemented a process to monitor waste generated. A waste register was not maintained.	Site waste reporting spreadsheet implemented.	Completed.
A5	Annual production data was included in the annual review. Annual production data had not been provided to the DRG.	The DRG form was submitted, a copy wasn't available on day of audit.	Completed.
A6	Annual review for 2017 had not been submitted within the required timeframe.	Noted.	Completed.
A7	While it was reported that toolbox meetings had been conducted which included environmental requirements, records sighted did not show evidence of inclusion of environmental issues in inductions.	Toolbox meetings to outline environmental requirements (noise & dust).	Completed.
A8	The register does not include personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect.	Complaints register has been revised to ensure that all required information is included.	Completed.
A9	Noise monitoring was conducted at CN-1. CN-2, CN-3, CN-6. Noise monitoring has not been conducted at CN-9.	Discussions with NMP author clarified the justification on the selection of CN-9 as a noise monitoring point for compliance noise monitoring. Monitoring will now include CN-9.	Completed.

A10	Where complaints had been received, the following issues were identified: • Name of complainant not provided. • Complaints received on 23/01/16 and 13/02/16 were not responded to until approximately 4 hours after the complaint was received (when the site had closed). • Details of who received the complaint were not recorded. • Person conducting the investigation was not recorded.	Complaints register has been revised to ensure that all required information is included.	Completed.
A11	Erosion and sediment control drawings were not available. Erosion and sediment control structures have not been constructed in accordance with DoH (2004).	Sediment drawings available on-site, management plan updated to reflect site restrictions resulting in control structures not being constructed in accordance with DoH (2004) but still providing the correct erosion and sediment control on-site.	Completed (pending NRAR review of the management plan)
A12	While erosion and sediment controls have been implemented, controls were not as described in the management plan. E.g. Cross fall and drainage, Outfall drainage, mitre drains and sand bag weirs have been installed, but actual operations are not as described in the management plan.	Management plan updated to reflect site restrictions resulting in control structures not being constructed in accordance with DoH (2004) but still providing the correct erosion and sediment control on-site.	Completed (pending NRAR review of the management plan).
A13	The Landscape and Rehabilitation Management Plan has not been updated to reflect current arrangements for managing vegetation clearance.	The Landscape and Rehabilitation Management Plan is in draft stage and waiting on the Aboriginal Heritage Management Plan completion and approval, as agreed upon by DPIE.	Will be completed once Aboriginal Heritage Management Plan is updated, as agreed upon by DPIE.
A14	Environmental Management Strategy has not been updated to reflect the current IEA requirements within the development approval	EMS to be updated to reflect current requirement.	Completed.
A15	Groundwater audit reports were not provided on the website.	Groundwater audit reports are provided within the Annual Review, as required by the SWMP.	Completed.
O1.	Community Consultative Committee meeting minutes had been uploaded into the complaints register section of the website.	CCC minutes have been moved to the correct section of the website.	Completed.
O2.	Daily inspections are carried out using the Daily	SWMP will be updated to reflect correct terminology	Completed.

	Toolbox / Shift Handover Record Sheet. Viewed 12/6/18. Uses a tick against each aspect. Leading Hand fills in the report. Not the Quarry Manager.	Monthly site inspection documents to include drainage & sediment control – complete. Monthly site inspection documents to include drainage & sediment control – complete. A monthly inspection has been created incorporating all inspection requirements as noted within the sites management plans.	
O3.	The environmental protection licence for the site requires oil and grease to be monitored, while the Site Water Management Plan requires Total Grease.	SWMP will be updated to reflect correct terminology	Completed (pending NRAR review of the management plan)

The majority of non-compliances were addressed by Hanson following review of the audit results. A timeline for outstanding matters has been provided to DPE with the majority of non-compliances closed out by June 2019. The next Independent Environmental Audit will take place in the 2021 reporting period.

10. INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

Hanson shall notify the relevant government authorities of any incident associated with the Quarry immediately after Hanson becomes aware of the incident, as per the Calga Sand Quarry Pollution Incident Response Management Plan. Within 7 days of the date of the incident, Hanson will provide the relevant agencies with a detailed report of the incident. There have been no reportable incidents in the last reporting period.

11. ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

11.1 INTRODUCTION

The following section provides a brief summary of the operational activities planned throughout 2019 (**Table 24**).

Table 22: SUMMARY OF PROPOSED QUARRY ACTIVITIES

Quarter	Activity
January – March	Extraction within Stage 3/6, all tailings deposited within Stage 3 Cell 4. Conduct attended noise monitoring Conduct monthly dust deposition samples, surface water sampling and bi-monthly bore water level monitoring as part of the environmental monitoring. No Horticulturist weed control & revegetation maintenance activities during this period due to COVID-19 face to face restrictions.

April – June	Extraction within Stage 3 Cells 5&6 all tailings deposited within Stage 3 Cell 4. No Horticulturist weed control & revegetation maintenance activities during this period due to COVID-19 face to face restrictions. Conduct attended noise monitoring. Conduct annual noise monitoring across three consecutive days. Hold Community Consultative Committee meeting. Conduct monthly dust deposition samples, surface water sampling s and bi-monthly bore water level monitoring as part of the environmental monitoring. Overburden placement & rehabilitation within Stage 3 tailings Cells 2a&b.
July – September	Extraction within Stage 3 Cells 5&6 all tailings deposited within Stage 3 Cell 4. Conduct attended noise monitoring Conduct monthly dust deposition samples, surface water sampling s and bi-monthly bore water level monitoring as part of the environmental monitoring. No Horticulturist weed control & revegetation maintenance activities during this period due to COVID-19 face to face restrictions. Overburden placement & rehabilitation within Stage 3 tailings Cells 2a&b, revegetation work to Cell 2a&b.
October – December	Extraction within Stage 3 Cells 5&6 all tailings deposited within Stage 3 Cell 4. Conduct attended noise monitoring No Horticulturist weed control & revegetation maintenance activities during this period due to COVID-19 face to face restrictions. Suitably qualified ecologist to conduct annual rehabilitation and threatened species monitoring, including feral animal survey and noxious weed survey. Conduct monthly dust deposition samples, surface water sampling and bi-monthly bore water level monitoring and bi-annual groundwater quality sampling as part of the environmental monitoring. Hold Community Consultative Committee meeting. Overburden placement & rehabilitation within Stage 3 tailings Cell 1, revegetation work to Cell 2a&b

11.2 EXTRACTION OPERATIONS

Extraction of friable sandstone using mobile machinery will continue to be undertaken by standard ripping procedure and load and haul activities. No blasting is required or used at the Quarry.

Extraction operations will be undertaken in Stage 3/5 and, pending Calga Groundwater Closure Management Plan approval, Stage 3/6 extraction will commence.

11.3 PROCESSING AND PRODUCT STOCKPILING

Processing activities will continue to occur at the plant during 2019. Material is transported by mobile machines to the sand processing plant where the material is processed and moved into stockpiles where it is stored on site for both internal and external sales by road registered trucks. The processed sand resource is primarily used for the manufacture of concrete for the construction industry. A small proportion of sand is used for other purposes, including landscaping and filling.

11.4 OVERBURDEN MANAGEMENT

Overburden material will continue to be placed in Cells 3/1, 3/2A, 3/2B throughout the reporting period.

11.5 SITE INFRASTRUCTURE

It is anticipated that minor alterations will be completed during the 2021 reporting period. This includes minor landscaping activities.

11.6 COMMUNITY INVOLVEMENT

During the reporting period, Hanson personnel intend to again host various visits from local community representatives and neighbours, principally through the Community Consultative Committee meetings.

11.7 WATER MANAGEMENT

Water quality monitoring with be continue in accordance with the EPL, Project Approval Conditions and Water Management Plans. The existing water transfer/recovery system involving Dams 7a and 7b/c will be maintained. Silts will be pumped to Stages 3/3 and 3/4. Return water will continue to be directed to Dam 7b/c where it will settle before being pumped to the wash plant using an electric pump.

The Site Water Management Plan is expected to be updated during the reporting period and water management will continue in accordance with this plan. Until that time, surface water sampling will continue on a monthly basis. Should there be any significant flows off site or rainfall is expected to be >50mm in a day, additional water sampling will also be undertaken.

11.8 AIR QUALITY MANAGEMENT

Hanson will continue to incorporate a range of design and operational safeguards, and operational procedures for the Quarry to ensure that the effectiveness of the air quality controls is optimised throughout all components of the quarry's operations.

11.9 PRODUCT TRANSPORTATION

All product trucks will use the internal haul access road through the site. No changes to how the Quarry is accessed from Peats Ridge Road are proposed during the 2021 reporting period.

11.10 REHABILITATION

During 2020, Hanson will continue with the rehabilitation activities in the areas defined in **Figure 2**. These activities will largely involve planting of Stage 3/2 a&b and some additional native species on the existing acoustic bund and maintenance of previously revegetated areas. During

2021, emphasis will be placed upon continued thinning out the *Acacia longifolia,* additional planting in Revegetation Area 9 and spot spraying and hand weeding across all accessible Revegetation Areas.

11.11 MONITORING

Throughout 2021, the environmental monitoring programs will be continued in the same manner as those conducted throughout 2020.

Appendix 1 – 2020 Monthly Environmental Monitoring Reports

Appendix 2 – 2020 Noise Monitoring Reports

Appendix 3 – 2020 Independent Groundwater Audit

Appendix 5 – 2020 Biodiversity Monitoring Report

Appendix 6 – 2020 CCC Minutes