Hanson

ABN: 90 009 679 734

Calga Sand Quarry

Air Quality Management Plan

Prepared for

Hanson Construction Materials Pty Ltd

Prepared by

Pacific Environment Limited

and

R.W. CORKERY & CO. PTY. LIMITED

September 2017

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Hanson

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Air Quality Management Plan

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COMMONLY USED ACRONYMS

AHD	Australian Height Datum
AQ	Air Quality
EPA	Environment Protection Authority
EPL	Environment Protection Licence
km	Kilometre
PAC	NSW Planning Assessment Commission
PEL	Pacific Environment Limited
$PM_{2.5}$	Particulate matter less than 2.5 microns in diameter
PM_{10}	Particulate matter less than 10 microns in diameter
μm	Micrometre
RWC	R.W. Corkery & Co Pty Limited
TSP	Total Suspended Particulates

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1. INTRODUCTION

This *Air Quality Management Plan* ('the Plan') has been prepared for the Calga Sand Quarry (the Quarry) on behalf of Hanson Construction Pty Ltd ('Hanson') by Pacific Environment Limited (PEL) and R.W. Corkery & Co (RWC). The Quarry is located on the Somersby Plateau, approximately 1.0km northwest of the Calga Interchange on the M1 Freeway (**Figure 1**). The Plan will be used as a tool to manage air quality-related issues during Stages 3/4, 3/5 and 3/6 of operations.

The Plan has been prepared to satisfy *Condition 3 (9A)* of Development Consent DA 94-4-2004 (DA 94-4-2004) and *Condition 5(3)* of DA 94-4-2004 with regards to general requirements for all management plans. DA 94-4-2004 was approved on 28 October 2005 to permit the operation of Stage 3 of the Quarry and this Plan has been prepared following a modification to DA 94-4-2004 that was approved by the NSW Planning Assessment Commission (PAC) on 13 June 2017.

Condition 3(9A)

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

a) be prepared in consultation with EPA;

b) be submitted to the Secretary prior to operating the crushing system, unless otherwise agreed by the Secretary;

c) describe measures that would be implemented to ensure:

- *compliance with the relevant conditions of this consent;*
- *best practice management is being employed; and*
- *the air quality impacts of the project are minimised during adverse meteorological conditions and extraordinary events;*

d) *describe the proposed air quality monitoring system;*

e) *include a monitoring program that:*

- *is capable of evaluating the performance of the development;*
- *includes a protocol for determining any exceedances of the relevant conditions of consent;*
- *effectively supports the air quality management system; and*
- *evaluates and reports on the adequacy of the air quality management system.*

The Plan describes the approach to the management of air quality issues for operations within the Quarry. **Figure 2** displays the existing layout including the boundary of Stage 3 extraction operations and designated sub-stages. A description of the approved activities within the Quarry that are the subject of the Plan is provided in Section 3.

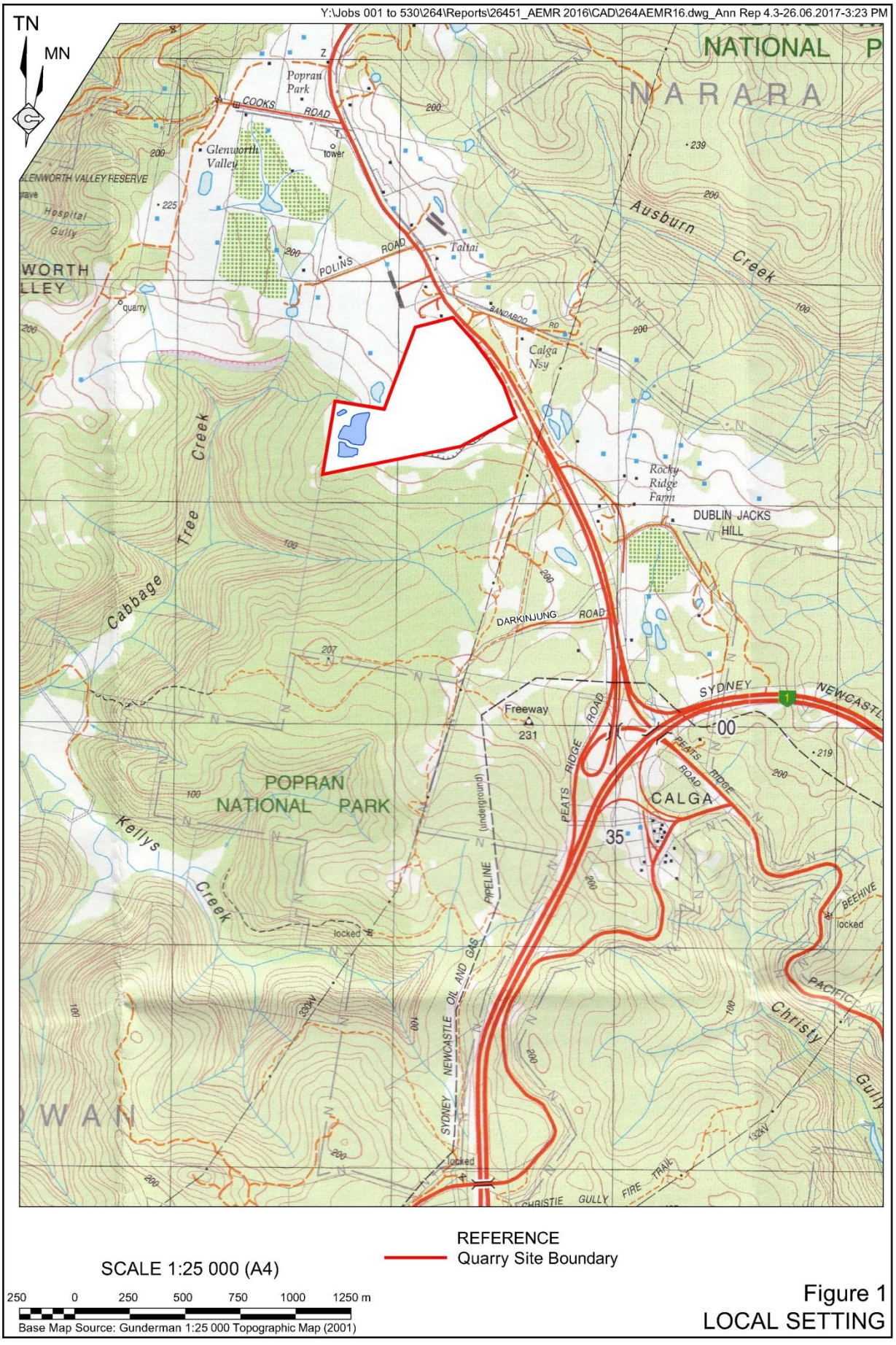
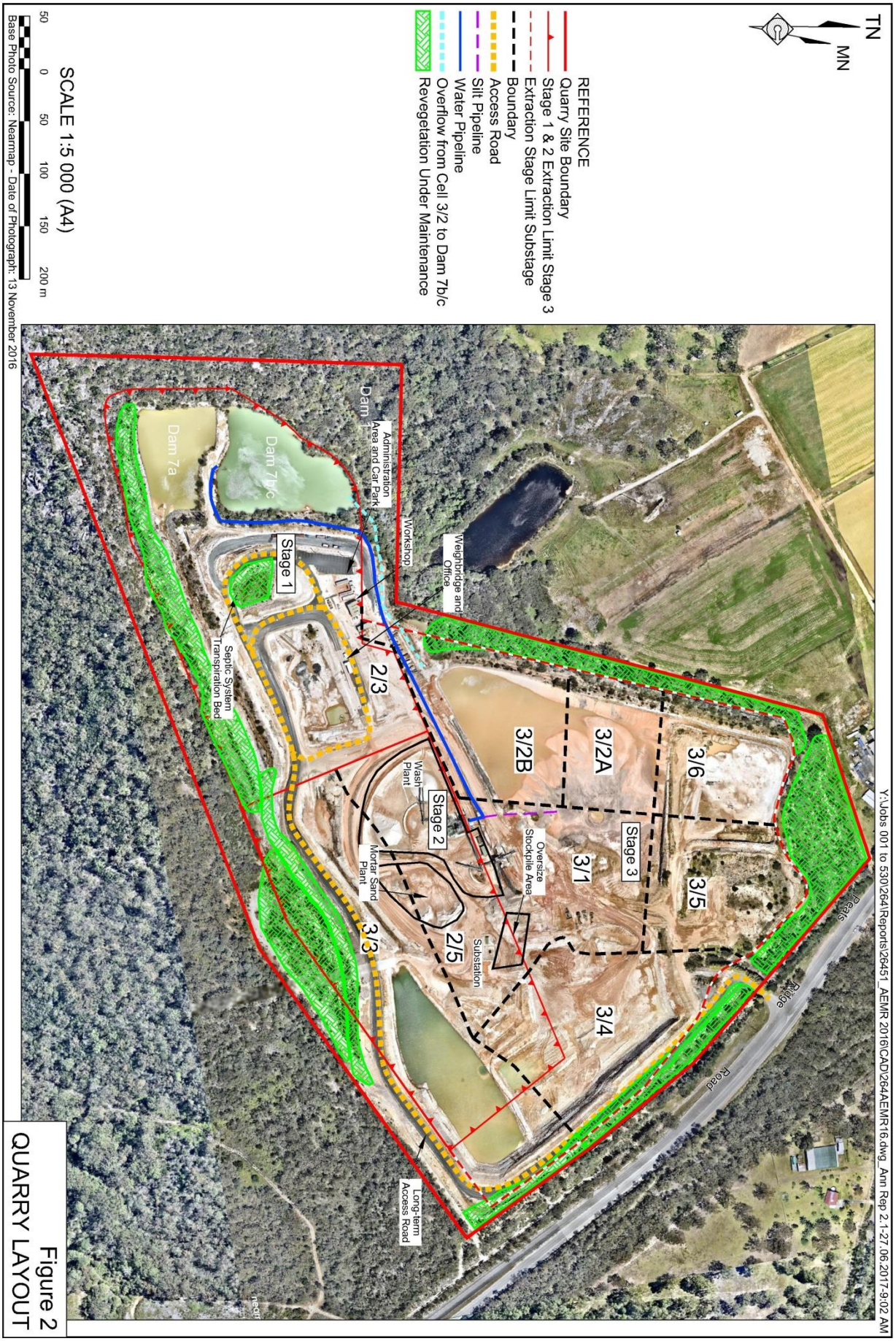


Figure 1
LOCAL SETTING


TN
MN
REFERENCE
Quarry Site Boundary
Stage 1 & 2 Extraction Limit Stage 3
Extraction Stage Limit Substage Boundary
Access Road
Silt Pipeline
Water Pipeline
Overflow from Cell 3/2 to Dam 7b/c
Revegetation Under Maintenance
SCALE 1:5 000 (A4)
50 0 50 100 150 200 m
Base Photo Source: Nearmap - Date of Photograph: 13 November 2016
Y:\Jobs 001 to 530\264\Reports\26451_AEMR 2016\CAD\264AEMR16.dwg, Ann Rep 2-1-27.06.2017-9:02 AM
Dam 7a
Dam 7b/c
Dam
Administration Area and Car Park
Workshop
Weighbridge and Office
Stage 1
Septic System Transpiration Bed
2/3
3/2B
3/2A
3/6
Stage 3
3/1
3/5
Wash Plant
Stage 2
Mortar Sand Plant
Oversize Stockpile Area
Substation
2/5
3/3
3/4
Long-term Access Road
Road
Figure 2
QUARRY LAYOUT

2. OBJECTIVES AND PERFORMANCE OUTCOMES

This Plan describes strategies for minimising and managing air quality (AQ) emissions for the Quarry. The Plan forms part of the Environmental Management System for the operation of the Quarry and has been developed in accordance with the conditional requirements outlined in Section 5.

The objectives of the Plan are to ensure:

- dust management at the Quarry is continually improved;
- any air quality or meteorological alerts are investigated and actions taken are recorded;
- there are no exceedances of the air quality criterion; and
- no complaints are received from the community in relation to dust.

The key performance outcomes from the Plan are:

- compliance with all criteria relating to air quality at the Calga Sand Quarry (see Section 5.3);
- implementation of all identified air quality management and mitigation measures (see Section 7);
- all identified monitoring is undertaken, documented and displayed in accordance with the Plan (see Section 8 and Section 12);
- complaints are handled and responded to in an appropriate manner (see Section 10);
- corrective and preventative measures are implemented, if required (see Section 9); and
- incidents are reported in an appropriate and timely manner (see Section 11).

3. APPROVED ACTIVITIES

The approved activities within the Quarry comprise the full range of activities described in the *Environmental Impact Statement* that accompanied the application for development consent for the Quarry (RWC, 2004) and the *Environmental Assessment Modification 1* (RWC, 2005) and *Environmental Assessment Modification 3* (RWC, 2016). It is noted that the former extraction stages (Stages 1 and 2) are now the location of the current processing area, administration buildings and related infrastructure. This location is at a substantially lower topography than the surrounding landscape.

The Stage 3 extraction area comprises six extraction stages (Stage 3/1 to Stage 3/6). Extraction has been completed in Stages 3/1, 3/2 and 3/3. The approved activities within the Quarry Site for which this Plan relates to includes ongoing extraction in Extraction Stages 3/4, 3/5 and 3/6 and the related processing, product stockpiling, silt management and product despatch.

Preparatory Activities

Extraction has commenced in Stage 3/4 and the necessary preparatory activities have been commenced for Stage 3/5. Overburden previously stockpiled on the surface of Stage 3/5 will be progressively relocated prior to extraction commencing in this stage. It is anticipated that the stockpiled overburden will be placed on Cell 3/1 (and potentially, Cell 3/2) to initiate progressive rehabilitation of these silt cells.

No vegetation clearing or soil stripping is required for operations within Stage 3/4, 3/5 or 3/6.

Extraction of Friable Sandstone

The sandstone is cross-ripped, pushed into operational stockpiles and loaded into a haul truck for transportation to the wash plant. Where needed, a mobile mortar sand plant is used at the Quarry with raw sandstone loaded directly into the hopper of the plant.

On-site Load and Haul Operations

The ripped friable sandstone material is loaded into a haul truck by front-end loader or excavator. Up to four haul trucks are used on site to transport the friable sandstone to the processing area. The route travelled to the processing area by the haul trucks will vary depending on the prevailing stage of extraction. Transportation of friable sandstone to the processing area will occur solely on internal unsealed access roads.

Processing Operations

Processing of the friable sandstone and any imported materials is undertaken by either washing (wash plant) or dry screening (mobile mortar sand plant).

The wash plant comprises:

- a feed bin/hopper;
- a primary jaw crusher to further break and reduce the size of the ripped sandstone;
- a vibrating screen where oversize material is removed;

- a final screen deck where the product is washed and the clay/fine silt content removed;
- a set of cyclones for dewatering the sand products prior to stockpiling; and
- radial stackers.

The primary jaw crusher is the only addition to the existing processing arrangement. The washing operation also requires a water pump and pipeline for the delivery of the slurry containing silts to the active silt cell.

The mortar sand plant incorporates:

- a receival hopper;
- a vibrating screen (a Powerscreen), which is used to separate the oversize material from the sand product; and
- a mobile conveyor belt to distribute the screened sand to stockpiles.

Product Loading and Despatch

Road-registered trucks used for product transportation are loaded from stockpiles located adjacent to the wash plant. All trucks travel from the stockpile areas to the weighbridge and then via the internal sealed access road to the Quarry entrance.

Off-site Transportation of Products

The existing northern entrance off Peats Ridge Road will be retained and used in the current fashion during operations in Extraction Stages 3/4, 3/5 and 3/6. The northern entrance comprises a seagull-type intersection with a left turn deceleration lane provided for trucks entering the Quarry from the south (via the M1 Freeway) and an acceleration lane for trucks exiting the Quarry and heading towards the M1 Freeway to the south.

The internal sealed access road (**Figure 2**) will continue to be used principally by the road-registered trucks entering the Quarry and transporting products from the Quarry but also provide access to the administration buildings for all light vehicles.

Progressive revegetation and maintenance

Areas that are being progressively revegetated and/or maintained are displayed on **Figure 2**. Revegetation and maintenance activities involve weekly work within these areas undertaken by an experienced horticulturalist.

4. CONSULTATION

4.1 GOVERNMENT AGENCY CONSULTATION

DA 94-4-2004 requires that the Plan be prepared in consultation with the EPA. The EPA's standard policy is not to comment on management plans under preparation. **Appendix 1** reproduces the correspondence received from the EPA in this regard. In addition, correspondence from DPE and EPA is also reproduced in **Appendix 1** regarding the proposed air quality network (described in detail in Section 8).

4.2 COMMUNITY CONSULTATION

Consultation with the local community has principally focused on discussions with landholders whose land is either currently being used or is proposed to be used as a location for dust monitoring equipment.

5. LEGAL AND OTHER REQUIREMENTS

5.1 DEVELOPMENT CONSENT DA 94-4-2004 CONDITIONS

A third modification to DA 94-4-2004 was granted by the NSW Planning Assessment Commission (PAC) on 13 June 2017, with *Condition 3(9A)* requiring the preparation of an Air Quality Management Plan. **Table 1** identifies all conditional requirements of DA 94-4-2004 that relate to air quality management and the preparation and review of management plans. **Table 1** also identifies where in the Plan each individual requirement has been addressed.

Table 1
Relevant Conditional Requirements of DA 94-4-2004 for an Air Quality Management Plan

Page 1 of 3

Condition	Section
Schedule 3	
9 - Applicant must: (a) implement best practice management to minimise the dust emissions of the development;	7
(b) regularly assess meteorological and air quality monitoring data and relocate, modify and/or stop operations on site to ensure compliance with the air quality criteria in this consent;	8
(c) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see note d under Table 3);	9.2.3
(d) monitor and report on compliance with the relevant air quality conditions in this consent; and	8, 12
(e) minimise the area of surface disturbance and undertake progressive rehabilitation of the site, to the satisfaction of the Secretary.	7
9A - The Proponent shall prepare and implement a Air Quality Management Plan for the development to the satisfaction of the Secretary. This plan must:	
(a) be prepared in consultation with EPA	4.1
(b) be submitted to the Secretary prior to operating the crushing system, unless otherwise agreed by the Secretary	Noted
(c) describe measures that would be implemented to ensure: – compliance with the relevant conditions of this consent; – best practice management is being employed; and – the air quality impacts of the project are minimised during adverse meteorological conditions and extraordinary events;	7
(d) describe the proposed air quality monitoring system;	9
(e) include a monitoring program that: – is capable of evaluating the performance of the development; – includes a protocol for determining any exceedances of the relevant conditions of consent; – effectively supports the air quality management system; and – evaluates and reports on the adequacy of the air quality management system.	8

Table 1 (Cont'd)
Relevant Conditional Requirements of DA 94-4-2004 for an Air Quality Management Plan

Condition	Section
Schedule 4	
Notification of Landowners/Tenants	
1. If the results of monitoring required in schedule 3 identify that impacts generated by the development are greater than the relevant impact assessment criteria in schedule 3, then the Applicant must notify the Secretary and the affected landowners and/or existing or future tenants accordingly, and provide quarterly monitoring results to each of these parties until the results show that the development is complying with the criteria in schedule 3.	11.2
Schedule 5	
Management Plan Requirements	
3. The Applicant must ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:	
(a) detailed baseline data;	6
(b) a description of:	
– the relevant statutory requirements (including any relevant approval, licence or lease conditions);	5
– any relevant limits or performance measures/criteria; and	5.3
– the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;	5.3, 9.3
(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	7
(d) a program to monitor and report on the:	8
– impacts and environmental performance of the development; and	
– effectiveness of any management measures (see (c) above);	
(e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;	9.4
(f) a program to investigate and implement ways to improve the environmental performance of the development over time;	12
(g) a protocol for managing and reporting any:	
– incidents;	11
– complaints;	10
– non-compliances with statutory requirements; and	9.3
– exceedances of the impact assessment criteria and/or performance criteria; and	9.3
(h) a protocol for periodic review of the plan.	14
Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.	

Table 1 (Cont'd)
Relevant Conditional Requirements of DA 94-4-2004 for an Air Quality Management Plan

Condition	Section
Schedule 5	
Annual Review 10. By the end of March each year, or other timing as may be agreed by the Secretary, the Applicant must submit a report to the Department reviewing the environmental performance of the development to the satisfaction of the Secretary. This review must: (a) describe the development (including any rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year; (b) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against the: • relevant statutory requirements, limits or performance measures/criteria; • requirements of any plan or program required under this consent; • monitoring results of previous years; and • relevant predictions in the documents listed in condition 2(a) of Schedule 2; (c) identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to ensure compliance; (d) identify any trends in the monitoring data over the life of the development; (e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and (f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the development. The Applicant must ensure that copies of the Annual Review are submitted to Council and are available to the Community Consultative Committee (see condition 7 of Schedule 5) and any interested person upon request.	12

5.2 ENVIRONMENT PROTECTION LICENCE

The Quarry currently operates in accordance with Environment Protection Licence (EPL) 11295. **Table 2** identifies conditions that relate to air quality management and where in the Plan the individual requirements have been addressed.

Table 2
Environment Protection Licence 11295 Air Quality Requirements

Requirement	Section
O3.1 All operations and activities occurring at the premises must be carried out in a manner that will minimise dust at the boundary of the premises.	7
O3.2 Activities occurring in or on the premises must be carried out in a manner that will minimise the generation, or emission from the premises, of wind-blown or traffic generated dust.	7

5.3 AIR QUALITY ASSESSMENT CRITERIA

In accordance with *Condition 3(8)* of DA 94-4-2004, all reasonable and feasible avoidance and mitigation measures are employed to ensure that particulate matter emissions generated within the Quarry do not exceed the criteria listed in DA 94-4-2004, at any residence on privately-owned land.

Tables 3, 4 and **5** provide the assessment criteria that will be used to assess air quality performance at the Quarry. The criteria is based on DA 94-4-2004 but have been modified to ensure compliance with current guidelines (at time of preparation) and to account for background conditions. Any modification has involved more conservative criteria.

An exceedance of any of these criteria constitutes an air quality incident. For the purposes of air quality management at the Calga Sand Quarry, air quality incidents are separated into notifiable incidents and non-compliance incidents. These terms and relevant management, notification and reporting protocols are discussed in Section 11.

Table 3
Long-term Criteria for Particulate Matter

Pollutant	***Averaging period***	***Criterion***
Total suspended particulate (TSP) matter	Annual	90µg/m^3
Particulate matter <10 µm (PM_{10})	Annual	25µg/m^3*
* In accordance with *Approved Methods or the Sampling and Analysis of Air Pollutants in NSW (2016)* – (EPA, 2016)		

Table 4
Short-term Criteria for Particulate Matter

Pollutant	***Averaging period***	***[d] Criterion***
Particulate matter <10 µm (PM_{10})	24 hour	[a] 50µg/m^3

Table 5
Long-term Criteria for Deposited Dust

Pollutant	***Averaging period***	***Maximum increase in deposited dust level***	***Maximum total deposited dust level***
[c] Deposited dust	Annual	[b] 2g/m^2/month*	[a] 4g/m^2/month*
* Background deposited dust at the Quarry is 1.7g/m^2/month, therefore the criteria to be used for compliance purposes is 3.7g/m^2/month			

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

The EPA guideline *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (2016)* was released in January 2017 and requires that assessment of annual average PM_{10} satisfy a criteria of 25µg/m^3. For the purpose of assessing compliance at the Quarry, this criteria will be adopted.

6. EXISTING ENVIRONMENT AND POTENTIAL / PREDICTED AIR QUALITY IMPACTS

6.1 SURROUNDING RESIDENCES

Figure 3 shows the location of residences surrounding the Quarry. Some of the owners/tenants of these residences have requested that no monitoring be undertaken at their properties.

6.2 METEOROLOGY

Condition 3(20) of DA 94-4-2004 requires that:

> *"Prior to carrying out any development, the Applicant must establish and subsequently maintain a meteorological station in the vicinity of the development, to the satisfaction of the EPA and the Secretary. The station must as a minimum, unless otherwise authorised by the Secretary, monitor daily rainfall and evaporation in accordance with the requirements in Approved Methods for the Sampling and Analysis of Air Pollutants in NSW.."*

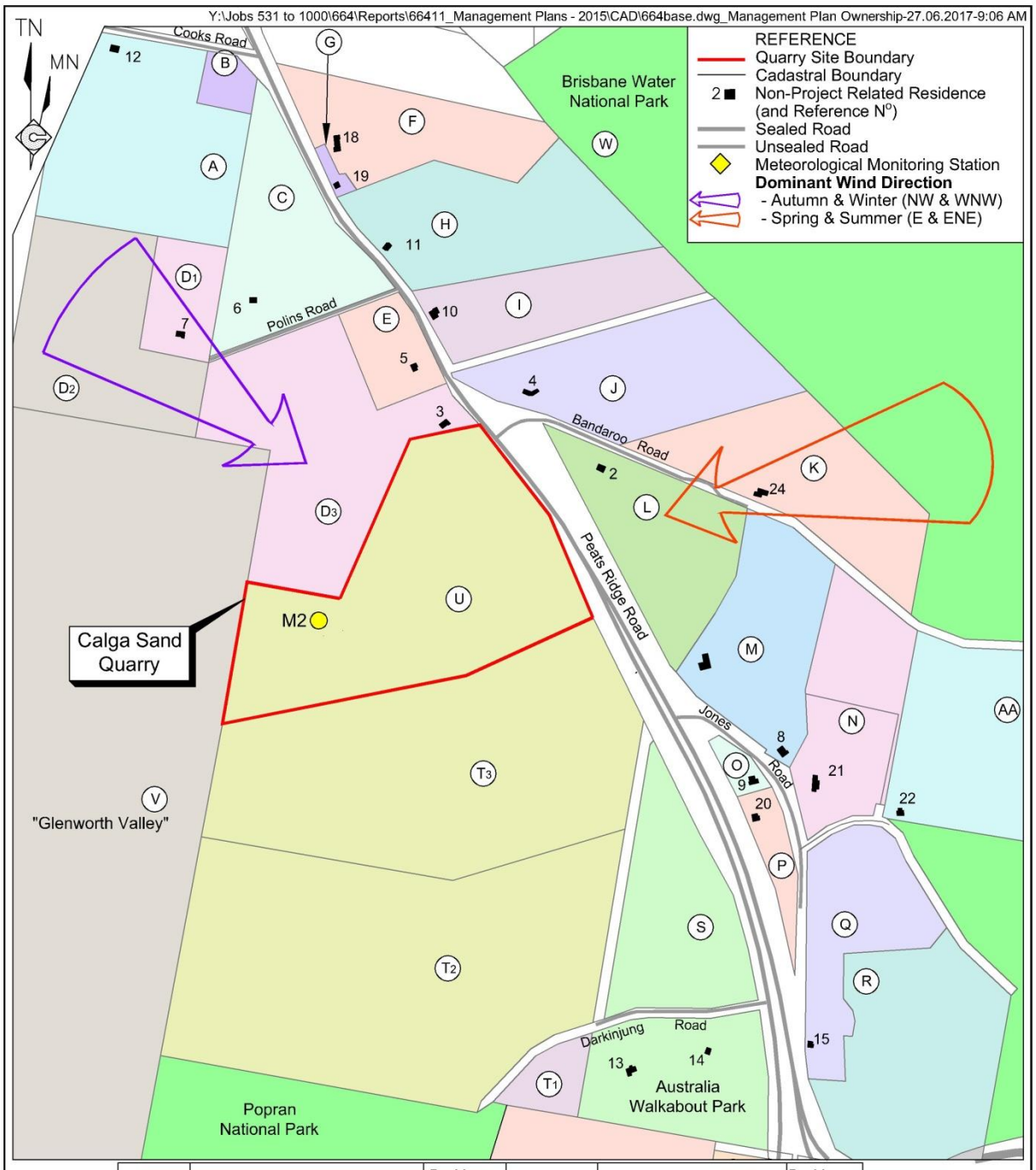
A meteorological station has been operating at the Quarry since 4 January 2006. The location of the meteorological station adjacent to the new administration office is displayed on **Figure 4**.

Annual and seasonal wind roses for 2014 and 2015 are shown in **Figure 5**. The annual wind roses show that northwesterly, west-northwesterly and southwesterly winds were most common in 2014. These winds were also common in 2015, but east-northeasterly and easterly winds were also prevalent. The seasonal wind roses for 2014 and 2015 show that the northwesterly, and west-northwesterly winds were most common in autumn and winter; whereas easterly and east-northeasterly winds were more common in summer and spring.

Sensitive receptors (residences) are located to the south, north and east of the Quarry (see **Figure 3**). Therefore southerly, northerly and westerly winds may impact nearby residences due to activities at the Quarry. Strong winds from these directions combined with dry conditions may result in increased dust deposition impacts from activities at the Quarry. However, for PM_{10}, dry conditions and calm winds may result in elevated PM_{10} concentrations due to lack of dispersion in the lower atmosphere.

6.3 AMBIENT AIR QUALITY DATA

Dust deposition levels have been monitored at the Quarry continually since 2005. Deposited dust is measured at six monitoring locations surrounding the quarry where deposited dust is assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: *Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method*. The locations of the dust gauges are displayed on **Figure 4.**



Property	Owner(s)	Residence Reference	Property	Owner(s)	Residence Reference
A	G.D. & D.A. Marler	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	Hanson Australia Pty Ltd	-
D3	Power Pastoral Holdings Pty Ltd	3	T2	Hanson Australia Pty Ltd	-
E	B. Kashouli	5	T3	Hanson Australia Pty Ltd	-
F	J.& A.V. Serou	18	U	Hanson Australia Pty Ltd	1
G	G.L Gratton-Wilson	19	V	B.A. & B.J. Lawler	-
H	J. Hajje	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			

SCALE 1:15 000 (A4)

250 0 250 500 750 m

Cadastral Information Source: Digitised from LPI DCDB

Figure 3
LAND OWNERSHIP AND SURROUNDING RESIDENCES

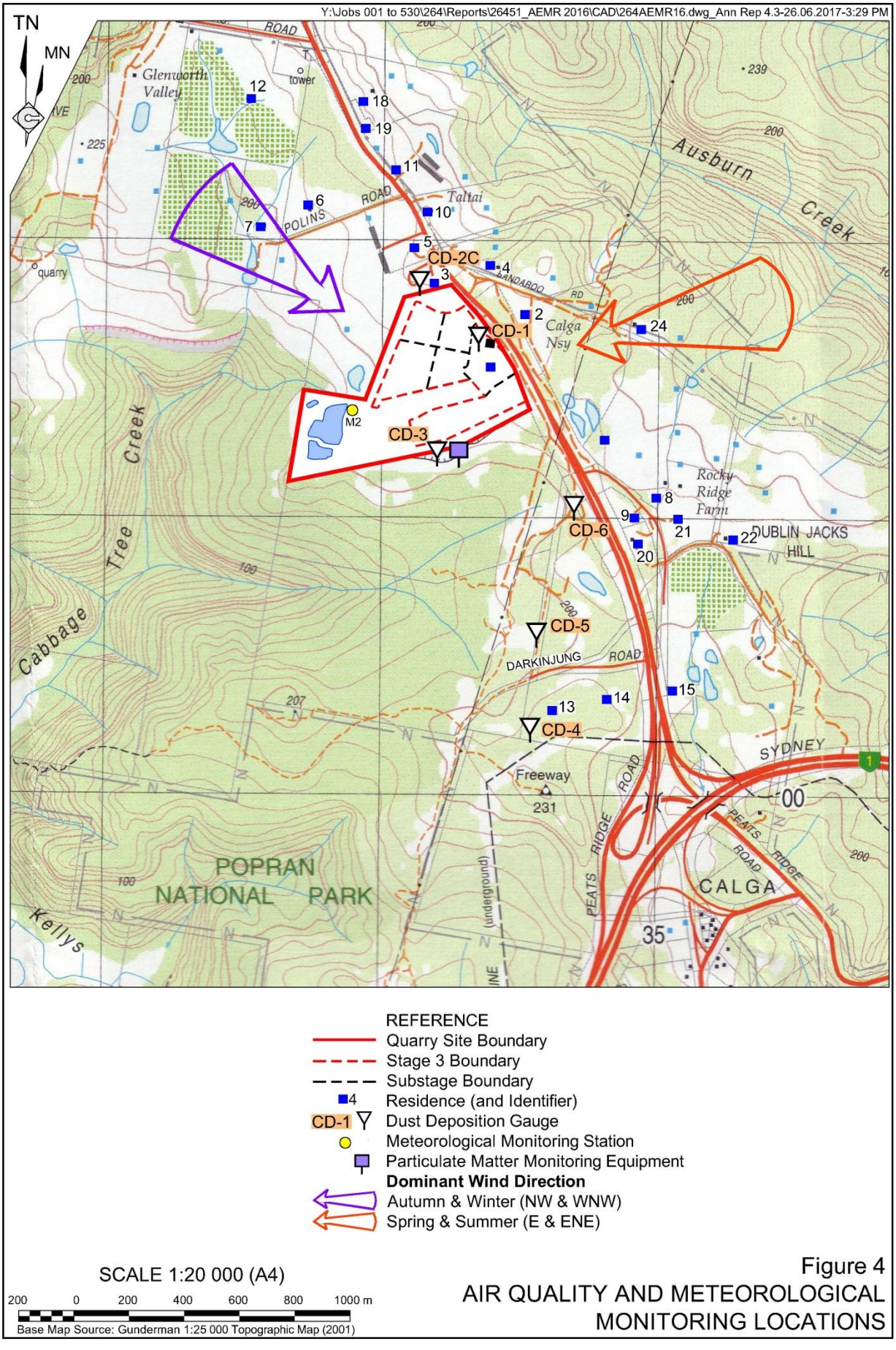


Figure 4
AIR QUALITY AND METEOROLOGICAL MONITORING LOCATIONS

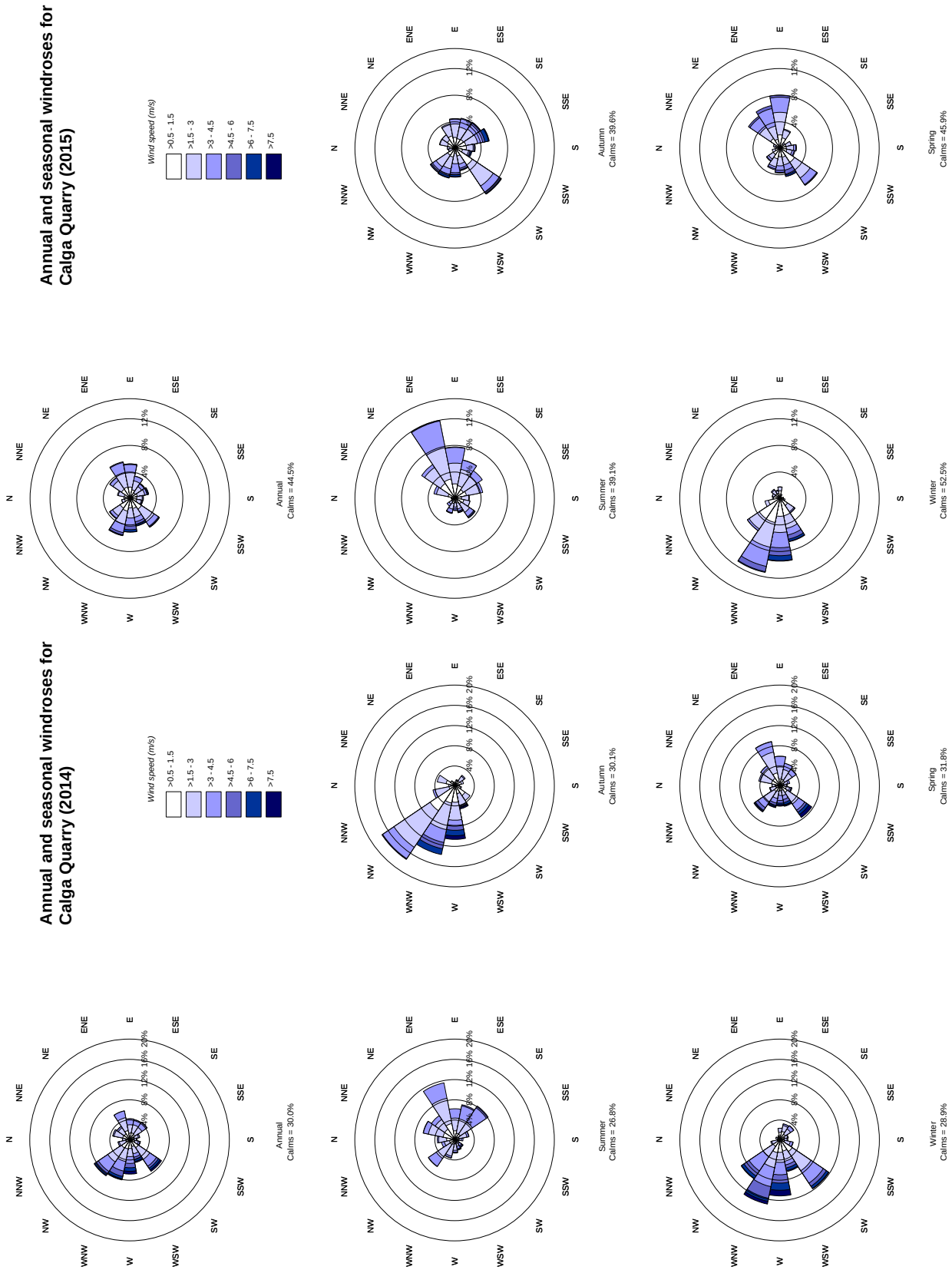


Figure 5 **Annual and Seasonal Wind Roses for Calga Quarry 2014 and 2015 (to September)**

Table 6 presents the annual average dust deposition data for all dust gauges surrounding the Quarry from 2005 to 2016.

Average annual dust deposition levels were less than 3.7g/m^2/month for all years and no exceedances of the NSW EPA air quality criterion for dust deposition were recorded.

Table 6
Average Annual Deposited Dust Monitoring Results 2007 – 2016 (g/m^2/month)

	CD-1	CD-2C	CD-3	CD-4	CD-5	CD-6
2007 Average	1.2	1.7	0.9	1.2	0.9	1.2
2008 Average	0.7	1.1	0.4	0.8	0.4	0.8
2009 Average	2.0	2.6	1.5	1.2	1.2	1.9
2010 Average	1.3	1.1	0.5	0.5	0.5	0.7
2011 Average	2.1	0.8	0.7	0.4	0.3	0.5
2012 Average	1.8	1.3	1.3	0.5	0.3	0.5
2013 Average	1.4	1.1	2.2	0.5	0.4	0.6
2014 Average	1.1	1.7	1.5	0.7	0.5	0.8
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
Source: Hanson (2017)						

6.4 POTENTIAL AIR QUALITY IMPACTS

6.4.1 Dust

Dust at the Quarry is likely generated from the following primary sources, namely:

- haul truck movements on unsealed internal roads;
- wind-blown dust from exposed areas;
- extraction activities, particularly ripping;
- crushing and screening activities; and
- product loading and despatch.

Particulates greater than 30µm in diameter are sufficiently large to settle in a comparatively short distance from their source and may cause amenity impacts, such as dust deposition on window sills.

Particulates less than 10µm in diameter (PM_{10}), and particulates less than 2.5µm in diameter ($PM_{2.5}$) are sufficiently small to remain airborne and are capable of entering a person's airways and contribute to health problems.

6.4.2 Crystalline Silica

Silica (SiO_2) is a naturally occurring mineral composed of silicon and oxygen. It exists in crystalline and amorphous forms depending on the structural arrangement of the oxygen and silicon atoms. Only the crystalline forms are known to be fibrogenic and only the respirable particles (those which are capable of reaching the gas exchange region of the lungs) are considered in determining health effects of crystalline silica. The three most common types of crystalline silica are quartz, tridymite and cristobalite.

Human exposure to crystalline silica occurs most often during occupational activities that involve the working of materials containing crystalline silica products (e.g. masonry, concrete, sandstone), or the manufacture of crystalline silica-containing products. Activities that involve cutting, grinding or breaking of these materials can result in the liberation of particles in PM_{10}, PM_7, PM_4 and $PM_{2.5}$ size ranges. Ambient crystalline silica dust can occur due to natural, industrial and agricultural activities.

It is important to note that the World Health Organization's Concise International Chemical Assessment Document on Crystalline Silica, Quartz (CICAD, 2000) states that "*there are no known adverse health effects associated with the non-occupational exposure to quartz*".

6.5 PREDICTED AIR QUALITY IMPACTS

Background deposited dust levels were measured for the assessment of air quality undertaken for the original EIS (RWC, 2004) and determined to be 1.7g/m^2/month. Therefore, the relevant assessment criteria for deposited dust is 3.7g/m^2/month (i.e. an incremental increase greater than 2.0g/m^2/month above the background level). **Table 6** displays the annual average levels of deposited dust at each of the dust monitoring locations recorded since 2007. These levels demonstrate that the Quarry is currently operating in full compliance with the applicable air quality criterion.

PM_{10} monitoring has not been undertaken at the Quarry to date due to the very low predictions for particulate matter. The most recent assessment of particulate matter emissions was undertaken for the assessment of the proposed Southern Extension to the Quarry. The assessment was undertaken by PEAHolmes (2009). The results of this assessment are considered to provide an appropriate and much more conservative indication of potential impacts associated with approved operations as the assessment was based on operation of two separate processing facilities and a production level of one million tonnes per annum, i.e. 2.5 times the currently approved maximum production level of 400 000 tonnes per annum.

Four modelling scenarios were considered to assess the potential off-site impacts. PAEHolmes (2009) modelled impacts in accordance with the guideline document *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (DEC, 2005) using dispersion models created using the US EPA ISCST3 computer model. **Table 7** provides a summary of the parameters assessed, criteria levels and maximum predicted impacts during a worst case scenario. These results are considered to be a very conservative estimate of potential particulate matter impacts under the proposed modification.

Table 7
Deposited Dust and Particulate Matter Assessment Results and Criteria

Parameter	Criteria (Maximum total or cumulative levels)	Predicted Maximum Cumulative Levels
Annual average PM_{10}	25μg/m^3	2.9μg/m^3
Maximum 24hr Average PM_{10}	50μg/m^3	22μg/m^3
Annual Average Total Suspended Particulates	90μg/m^3	4μg/m^3
Dust Deposition	4.0g/m^2/month or an incremental increase of 2.0g/m^2/month	<1.0g/m^2/month
Source: PAEHolmes (2009)		

This conservative prediction of deposited dust and particulate matter impacts indicates that air quality impacts would remain below existing criteria levels during approved operations, including the crushing system.

There were no predicted exceedances of the assessment criteria for $PM_{2.5}$ or crystalline silica specified in *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* (NSW EPA, 2016).

The predictions presented in the air quality assessment incorporated a level of conservatism due to worst case assumptions and the nature of dispersion modelling. As a result, it is expected that actual ground level concentrations would be lower than those predicted during approved operation of the Quarry.

7. DUST AND PARTICULATE MATTER CONTROL MEASURES

It is noted that the measures adopted by Hanson have been established over many years and shown to be effective in controlling dust. In order to satisfy *Condition 3(9Ac)* of DA 94-4-2004, this Plan must:

> "…*describe the measures that would be implemented to ensure:*
>
> - *compliance with the relevant conditions of this approval;*
> - *best practice management is being employed; and*
> - *the air quality impacts of the development are minimised during adverse meteorological conditions and extraordinary events.*

As outlined in Section 6.4, dust at the Quarry is expected to be mainly generated from wind erosion of exposed areas and dust generated by load and haul activities and from dozer ripping activities. **Table 8** and **Table 9** present general procedures for the management of dust emissions from the Quarry. Note that many of these measures are already adopted on site and their use would be ongoing.

Table 8
Control Procedures for Wind-blown Dust

Source	Control Procedures
Areas disturbed by quarrying	Disturb only the minimum area necessary for quarrying. Reshape, topsoil and rehabilitate completed overburden emplacement areas as soon as practicable after the completion of overburden tipping.
Stockpiles and internal unsealed roads	Maintain stockpiles in a moist condition through watering, if necessary, and use water carts to minimise wind-blown and traffic-generated dust.
Areas disturbed by quarrying	Install bund walls and wind breaks, as required.

Table 9
Quarry-generated Dust and Controls

Source	Control Procedures
Haul Road Dust	All unsealed roads and trafficked areas will be watered as required using the on-site water truck to minimise the generation of dust. All unsealed haul roads will have edges clearly defined with marker posts or equivalent to control their locations. Obsolete roads will be ripped and re-vegetated if they are located on the final landform.
Stockpiles	Stockpiles will only be located in approved areas. Use of minimal heights when loading.
Departing Trucks	Ensure use of wheel wash at all times. Use street sweeper, if required on sealed roads.
Material unloading	Minimise the drop heights between front-end loader buckets and trucks carrying sand, soil or overburden through operator training and education on the management of dust.
Ripping and loading of friable sandstone	Provide enclosed cabs on all mobile equipment used for ripping and loading of friable sandstone.

8. AIR QUALITY MONITORING PROGRAM

8.1 INTRODUCTION

The Plan needs to satisfy *Condition 3(9Ae)* by including details of an air quality monitoring program. The key focus of the Air Quality Monitoring Program is to record sufficient data that demonstrates the health and amenity impacts discussed in Section 6.4 are within the criteria/limits specified in Section 5.3. In the event monitoring data identifies a non-compliance with one or more conditions, Hanson will adopt the key elements of the Air Quality Management System (see Section 9).

In order to assess dust emissions from the Quarry, a continuous particulate matter monitor will be installed to measure PM_{10} emissions. The existing network for the monitoring of deposited dust will be maintained.

8.2 MONITORING EQUIPMENT AND LOCATIONS

Dust monitoring equipment will be installed in accordance with the following standards:

- Australian Standard AS/NZS 3580.1.1:2007 *Methods for sampling and analysis of ambient air – Guide to Siting Air Monitoring Equipment.*
- AS/NZS 3580.10.1:2003 *Methods for Sampling and Analysis of Ambient Air, Determination of Particulates – Deposited Matter – Gravimetric method.*

Table 10 records the locations of all air quality monitoring equipment around the Quarry. The locations of the deposited dust gauges are consistent with those used since 2005 whereas the equipment recording PM_{10} will be located in the vicinity of dust gauge CD-3 (see **Figure 4**).

The particulate matter monitoring equipment will be set to continuous operation and PM_{10} sample results will be collected digitally via a direct download from the equipment. Data would also be collected manually on a monthly basis. The particulate matter monitor would incorporate an SMS alert function (described in Section 9.3).

8.3 MONITORING FREQUENCY

The frequency of air quality monitoring measurements is shown in **Table 10**. The Quarry Manager will be responsible to ensure that sampling is undertaken according to the relevant frequencies and with procedures outlined in Section 8.2.

8.4 METEOROLOGICAL MONITORING

Hanson will ensure that the meteorological station continues to operate in accordance with the guidelines outlined in *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* (NSW EPA, 2016).

The parameters to be measured are summarised in **Table 10** and the location of the meteorological station displayed on **Figure 4.**

Table 10
Air Quality Monitoring Locations and Frequency

Reference*	Location			Frequency
	Easting	Northing	Description	
Dust Deposition Gauges				
CD-1	334460	6301545	At the residence on Lot 2, DP229889, owned by Hanson to the immediate northeast of the quarry processing plant.	Monthly
CD-2	333990	6301890	On Lot 121, DP755221 of F. & J. Gazzana, near the boundary of this property with Lot 188, DP755221 of B. Kashouli and at a northing equivalent to that at the residence on Lot 188, DP755221.	
CD-3	334300	6301240	Adjacent to the southern boundary of the quarry site on Lot 1, DP805359.	
CD-4	334470	6301190	At the northern boundary of Lot 235 DP822125 (Australia Wildlife Walkabout Park) with Lot 2, DP805359.	
CD-5	333570	6301585	On Lot 2, DP805359, to the east of the power line easement	
CD-6	334700	6301025	On cleared land on Lot 1, DP805359 to the east of the power line easement.	
PM_{10}				
PM_{10}	334300	6301240	Adjacent to the southern boundary of the quarry site on Lot 1, DP805359.	Continuous
* See **Figure 4**				

Table 11
Meteorological Monitoring Parameters and Frequency

Parameter	Units	Frequency	Averaging Period	Sampling Method
Rainfall	mm	Continuous	1-hour	AM-4
Temperature @ 2 m	ºC		15 minutes	AM-4
Temperature @ 10 m	ºC			AM-2 and AM-4
Wind Speed @10 m	m/s			AM-2 and AM-4
Wind Direction @ 10 m	Degrees			AM-2 and AM-4
Sigma Theta	Degrees			AM-2 and AM-4
Solar Radiation	W/m^2			AM-4

8.5 COMPLIANCE EVALUATION

Ongoing performance with regards air quality will be established through evaluation of monitoring results against the assessment criteria described in Section 5.3. If monitoring results exceed the relevant criteria level the response and corrective actions specified in Section 9.3.2 would be implemented.

9. AIR QUALITY MANAGEMENT SYSTEM

9.1 INTRODUCTION

This section describes the system behind the plan. It is intended that air quality management is proactive as indicated by the Plan but recognises there may need to be reactive management in response to monitoring result s or complaints. Control measures that would continue to be implemented at the Quarry are considered proactive management, however these are described in Section 7.

9.2 PROACTIVE MANAGEMENT

9.2.1 Operating Hours

All operations will be undertaken in accordance with the approved hours of operation presented in **Table 12**.

Table 12
Operating Hours

Activity	Day	Time
Extraction and processing*	Monday-Friday	7:00am to 6:00pm
	Saturday	7:00am to 4:00pm
	Sunday & Public Holidays	Nil
Delivery and distribution	Monday-Friday	5:00am to 10:00pm
	Saturday	5:00am to 4:00pm
	Sunday & Public Holidays	Nil
Maintenance (if inaudible at neighbouring residences)	Any day	Any time
* Note: Construction activities, such as the construction of the acoustic barrier, must only be carried out between 7:00am to 6:00pm Monday to Friday, and 8:00am to 1:00pm on Saturdays. No construction activities are to be undertaken on Sundays or Public Holidays.		

9.2.2 Meteorological Forecasting

In the event of adverse weather conditions likely to prevail for extended periods of times, areas of the Quarry will be identified where works can be undertaken to minimise noise propagation towards residences. This will generally involve working at lower elevations within the Quarry.

9.2.3 Adverse Meteorological Conditions

This section outlines how compliance with the air quality criteria will be achieved during adverse meteorological conditions. Procedures for dealing with adverse conditions are based upon predictive meteorological forecasting and consideration of the sensitive receptor (residence) locations relative to the Quarry. Sensitive receptors are located to the south, north and east of the Quarry (see **Figure 3**).

During dry conditions, and high wind speeds at the Quarry the Quarry Manager will:

- conduct visual assessment of operations to identify current dust generating sources;
- inform operators to consider dust management options; and
- check availability and operational status of control equipment.

During adverse conditions such as when wind speed is higher than 8m/s and blowing from the south, north or west. The Quarry Manager will:

- curtail activities capable of generating dust in exposed areas;
- increase the frequency and volume of water applied to internal roads in use by haul trucks;
- extend watering activities to exposed areas capable of generating dust; and
- generally, curtail activities capable of generating dust across the Quarry.

All periods of curtailed activities will be recorded for inclusion in the *Annual Review*.

9.2.4 Air Quality Monitoring

The continuous particulate matter monitor will incorporate an SMS alarm that will be sent to the Quarry Manager when pre-determined levels are breached, which would in turn indicate when action is required.

Two PM_{10} concentration trigger levels are applicable for the Quarry.

Trigger Level 1 – Investigation Level

1-hour average PM_{10} concentrations indicate that dust levels are elevated and activities from the Quarry may be contributing to these elevated levels. If Trigger Level 1 is exceeded, Quarry personnel will investigate prevailing winds, determine what activities are occurring on site that may be contributing to elevated dust levels. Site personnel will then be informed that dust emissions are increasing and action(s) may be required.

Trigger Level 2 – Action Level

1-hour average PM_{10} concentrations continue to be elevated and activities from the Quarry are identified as contributing to these levels. If Trigger Levels 2 are breached, remedial action is required and additional dust control measures will be implemented.

Interim trigger values are presented below. It is proposed that trigger levels would be reviewed regularly to ensure they are working appropriately i.e. they are ensuring that dust levels remain below ambient air quality goals.

Trigger Level 1: 1-hour PM_{10} concentrations are above 100µg/m^3 for three consecutive hours. Under Trigger Level 1, the Quarry personnel will determine which way the wind is blowing for the same three-hour period and determine what Quarry activities are most likely contributing to the elevated PM_{10} levels. The Quarry Manager will ensure that control measures and actions

outlined in Section 7 are being implemented. Additional dust control measures to be implemented will depend on the activities occurring on site at the time but may involve:

- increasing the frequency of watering for exposed areas and stockpiles;
- increasing the frequency of watering on unsealed roads; and
- modifying site activities depending on the sources contributing to the elevated levels.

Trigger Level 2: 1-hour PM_{10} concentrations are above 200 µg/m^3 for three consecutive hours and the wind is blowing from the Quarry towards the residences (i.e. blowing from the north, east or west). In the event Trigger level 2 is exceeded at the monitoring location, the Quarry Manager will identify those activities capable of generating dust and instruct that the activity be curtailed until 1-hour PM_{10} concentrations drop below 100 µg/m^3.

9.3 REACTIVE MANAGEMENT

9.3.1 Triggers

Three triggers for reactive management will be applied.

a) Air Quality Complaint. Any complaint received, either directly or via Council, EPA or other regulatory agency, will trigger the implementation of the response and corrective action measures described in Section 10.

b) Exceedance of air quality criteria established through air quality monitoring. Any record of deposited dust or particulate matter exceeding the criteria in Section 5 will trigger the response and corrective action measures described in Section 9.4.

c) Extraordinary events or conditions. Extraordinary events relevant to the Quarry include events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Secretary.

9.3.2 Response and Corrective Actions

Air Quality-Related Complaint

Complaint response and handling protocols are described in Section 10.

Compliance with Dust Deposition Levels

The assessment criteria for dust deposition are applied to a deposition level recorded over one month and averaged over a period of one year. As described in Section 6.5, background levels were established in 2004 at 1.7g/m^2/month, and therefore the most appropriate criteria for consideration of compliance remains to be 3.7g/m^2/month (i.e. an incremental increase greater than 2.0g/m^2/month above the background level).

If monthly dust deposition monitoring results exceed 3.7g/m^2/month, during any month, the following additional analysis will be conducted to determine compliance.

- Obtain meteorological monitoring data for the monitoring period and review the data for the period to determine the dominant wind direction, average wind speeds, percentage calm conditions (less than 0.5 m/s) and significant periods of strong winds (greater than 6 m/s). Calm conditions can result in poor dispersion of activity-dependent emissions from the Quarry. However, wind erosion from exposed surfaces would not be expected to occur under these conditions. Strong winds may also result in wind erosion from other exposed areas in the vicinity of the Quarry.
- Where the dominant winds are not blowing across the Quarry and towards the monitoring location(s), the concentration of deposited dust is unlikely to have resulted from Quarry activities and no further action is required.
- Where the dominant wind is blowing across the Quarry, compare the upwind and downwind sites to determine if other upwind sources are contributing to the total deposited dust level.
- Determine if the wind speeds are conducive to wind erosion from exposed surfaces (strong winds/wind gusts greater than 6 m/s).

Following the investigation of the above, the wind speed, wind direction and the upwind/downwind results will be used to determine the likelihood of the Quarry contributing to elevated levels above the impact assessment criterion.

On the basis of the percentage difference in monthly dust deposition monitoring data between upwind and downwind sites, and comparison of the monthly and daily wind patterns, an indication of the potential contribution from other upwind sources can be inferred.

Additional laboratory analysis may be requested for elevated results to show the percentage contribution of various dust sources (for example, sand) to the total dust level.

Compliance with the 24-Hour PM_{10} goal

Where 24-hour PM_{10} concentrations are above the concentrations indicated for the assessment criteria in Section 5.3, the following additional analysis will be conducted to establish whether a non-compliance has occurred.

- Obtain meteorological monitoring data for the relevant 24-hour period and process the data to determine, dominant wind direction, average wind speeds, percentage calm conditions (less than 0.5 m/s) and significant periods of strong winds (greater than 6 m/s).
- Where the dominant winds are not blowing across the Quarry and towards the monitoring location, the level above the assessment criterion is unlikely to have resulted from Quarry activities and does not represent non-compliance.
- Where the dominant winds are blowing across the Quarry and towards the monitoring location, the following additional analysis is required to determine if dust from the Quarry has contributed to the elevated levels and/or if wind-blown dust from other upwind sources are also contributing.

- Determine if the wind speeds are conducive to wind erosion from exposed surfaces (strong winds/wind gusts greater than 6 m/s) or if calm conditions were prevalent (less than 0.5 m/s).
- Obtain a site activity log for the elevated level day to determine what activities were occurring and characterise the activities based on being wind speed independent, wind speed dependent or wind erosion sources.

On the basis of the wind conditions, the activities occurring on site and the potential contribution from upwind sources, determine the likelihood of the Quarry contributing to elevated levels above the impact assessment criterion. Additional monitoring data for 24-hour PM_{10} can be obtained from other monitoring sites (e.g. the NSW OEH monitoring station at Richmond) to determine if the regional levels of PM_{10} levels were elevated on the day and/or days preceding the localised elevated level.

Additional laboratory analysis may be requested for elevated results to show the percentage contribution of various dust sources (for example, wood smoke, agricultural dust) to the total dust level.

Compliance with the Annual Average PM_{10} criteria

It is noted that the EPA guideline document *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* (NSW EPA, 2016) was released in January 2017 and included an assessment criteria for annual average PM_{10} of 25μg/m^3. This criteria would be used for consideration of compliance for annual average PM_{10} when reviewing monitoring records.

It is noted that the long term assessment criterion is applicable to an averaging period of one year, and until sufficient representative data are collected, compliance with the long term criterion cannot be tested.

The preliminary assessment undertaken for 24-hour PM_{10} concentrations can be applied similarly for annual average PM_{10} impacts by comparing the monitoring data to annual wind patterns and annual average background/regional pollutant levels. Daily varying site activities are not relevant to compliance assessment for annual averages.

Internal Investigation and Corrective Actions

In the event that preliminary investigations indicate that meteorological factors were not relevant to the identified exceedance of the air quality criteria identified in Section 5.3, the exceedance will be investigated to determine the likely cause(s). An investigation will then follow to determine:

- what immediate action(s) need to be taken to fix the problem in the short term, if applicable;
- the root causes of the problem (e.g. management system, equipment design / performance, human factors/behaviour, work environment or training);
- corrective actions required to eliminate the root cause(s);
- action(s) taken to verify effectiveness of corrective action(s) (i.e. what measures and checks are taken to ensure the corrective actions that are in place are effective to prevent any further exceedance); and

- on completion of the investigation, an electronic copy will be forwarded to Development Manager for review/approval of corrective and preventative actions.

Extraordinary Events or Conditions

Extraordinary events include any of the following, relevant to operations at the Quarry. It is noted that air quality criteria do not apply under these conditions.

- Bushfires.
- Prescribed burning.
- Dust storms.
- Sea Fog.
- Fire incidents.
- Any other activity agreed by the Secretary.

During times when these conditions are forecast or observed it would be at the Quarry Manager's discretion to limit or modify operational activities to ensure that air quality impacts are limited as much as practically possible. This may require shutting down or equipment or relocation of activities, where practical, to limit potential dust impacts.

Air quality criteria will still apply during adverse local weather conditions such as high winds during excessively dry periods. The Quarry Production Manager will limit or modify operational activities, as is practical, to minimise the potential of air quality impacts and ensure compliance during these periods

10. COMPLAINTS HANDLING AND RESPONSE

Air quality-related complaints may be received either via one of the following methods.

- Directly via email, telephone call or text message.
- Indirectly via the relevant government agencies.

It remains Hanson's preference that all complaints are directed to the Quarry Manager (or his nominee) rather than via a government agency. This direct contact has proven effective in the past as the cause of the complaint can be quickly identified and the solution(s) adopted.

All complaints are referred to the Quarry Manager (or his nominee), thoroughly investigated and documented in the Quarry *Complaints Register* with the following information recorded.

- Date of the complaint.
- Time of the complaint.
- Name of complainant (if available).
- How the complaint was received.
- Detailed description of the complaint.
- Person who received the complaint.

Once the Quarry Manager is satisfied that the complaint is substantiated, an investigation of the location, source(s) and cause(s) of the complaint will be undertaken. Following investigation of the issue, the Quarry Manager will provide feedback to the complainant that details the investigations undertaken, the results of the investigation and measures implemented to ensure that operations remain compliant. A description of any follow-up investigations and the response provided to the complainant will also be recorded in the *Complaints Register* upon satisfactory closure of the issue.

All complaints received are summarised in the *Annual Review*, which is made publicly available via the Hanson website. Complaints are also summarised in the *Annual Return* document to the EPA.

11. INCIDENT MANAGEMENT

11.1 INCIDENT IDENTIFICATION

DA 94-4-2004 defines an incident as "*a set of circumstances that:*

- *causes or threatens to cause material harm to the environment; and/or*
- *breaches or exceeds the limits or performance measures/criteria".*

In accordance with the definition provided by Section 147 of the POEO Act 1997, harm to the environment is deemed to be material if:

i) it involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial; or

ii) it results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000 (or such other amount as is prescribed by the regulations).

As it relates to this Plan, an incident is not trivial where the emissions could impact human health or where specific clean-up actions are required.

For the purposes of identifying an incident and to guide management and notification actions, Roca has separated incidents into two categories; notifiable or non-compliance incidents. An incident that causes or threatens to cause material harm to the environment is referred to as a *Notifiable Incident*. An incident that is only related to an exceedance of air quality criterion without any impacts upon human health or material harm, is referred to as a *Non-Compliance Incident.*

11.2 INCIDENT MANAGEMENT AND NOTIFICATION

On identification of a notifiable incident, non-compliance incident, or where the action is in response to a complaint related to nuisance emissions (dust deposition), an investigation into the source of the incident or complaint causing emissions will be commenced in accordance with Quarry's *Pollution Incident Response Management Plan*.

DPE and the EPA will be notified as soon as practically possible following any notifiable incident or non-compliance incident.

In accordance with Condition 4(1) of DA 94-4-2004, Hanson will notify affected landowners in writing of any exceedance of assessment criteria. Hanson will provide a copy of the monitoring results to the landowner in a format that will allow the landowner to consider the health risks associated with the exceedance. Hanson will continue to provide monitoring results to affected landowners until compliance is established.

On identification of the source of emissions resulting in or contributing to the incident, the Quarry Manager will implement one or more of the corrective measures identified in the Air Quality Management System (see Section 9). The Quarry Manager will notify the EPA, as soon as practical, following identification of a notifiable incident. Any non-compliance incident that results in non-compliance against air quality criteria but does not result in material harm to the environment will be reported in the *Annual Review* and EPL *Annual Return* documents.

Following implementation and review of the corrective measures, the investigation process and results will be documented. If the investigation is the result of a complaint, feedback will be provided to the complainant in accordance with the process described in Section 9.

11.3 INCIDENT REPORTING

In accordance with Condition 8 of Schedule 5 of DA 94-4-2004, within 7 days of any incident, Hanson will prepare a report describing the incident and summarising the results if investigations or corrective actions implemented in accordance with the Quarry's *Pollution Incident Response Management Plan* or the Noise Management System (see Section 9).

A summary of all incidents, including dates of occurrence, corrective measures taken and their success will be compiled and reported in the *Annual Review* to the DPE and *Annual Return* to the EPA.

12. PUBLICATION OF MONITORING INFORMATION AND REPORTING

Hanson will include all air quality monitoring results within the appendices to the *Annual Review*. That document, once approved by the relevant government agencies, will be published on the Company's website.

In accordance with the requirements of Section 66(6) of the *Protection of the Environment Operations Act 1997,* the *Requirements for Publishing Pollution Monitoring Data*" (NSW EPA, 2012), and the *Web-based Reporting Guideline* (DPE, 2015), Hanson will publish a meaningful summary of all pollution monitoring data on the Hanson website within 14 days of the monitoring results being received. In addition, Hanson will provide a copy of obtained data (the value of each individual monitoring sample) at no cost to any member of the public, when requested**.** The data will be published in a format that summarises raw data, is comprehensible by the general public and also includes all accompanying necessary information.

The following documents will also be available on the Hanson website in accordance with the *Wed-based Reporting Guideline* (DPE, 2015).

- All statutory environmental, planning and cultural heritage approvals.
- Hanson's environmental management strategy documents relevant to the Calga Quarry.
- Compliance related documents including independent audits, *Annual Review* documents and a register of any incidents notified to DPE.
- The community complaints register (updated monthly).
- Minutes of the Community Consultative Committee meetings.

13. PERSONNEL MANAGEMENT

13.1 ROLES AND RESPONSIBILITY

Table 13 outlines the roles and responsibilities of all personnel involved with the operation of the Calga Sand Quarry with respect to management of air quality.

Table 13
Roles and Responsibilities of Personnel with Respect to Management of Air Quality

Role	Responsibilities
Development Manager	Ensure compliance with the Air Quality Management Plan Ensure adequate resources are available to implement the Air Quality Management Plan. Ensure suitably trained personnel are available to implement the responsibilities of the Quarry Manager during any time of the Quarry Manager's absence from site. Coordinate the review of the Plan (see Section 14).
Quarry Manager, or his/her nominee	Ensure the implementation of the Air Quality Management Plan. Ensure air quality monitoring equipment is operating, air quality monitoring results are regularly reviewed/evaluated and entered into the environmental database. Ensure reviews of meteorological forecasts are undertaken on a daily basis prior to the commencement operations. Implementation of the Air Quality Management System (see Section 8). Relocate or postpone dust-emitting activities in the event of adverse (dust enhancing) winds. Provide primary contact for complaints and supply follow-up information to any complainant. Initiate investigations of complaints as received from the public or government agency. Prepare a report to government agencies or neighbours following a notifiable incident (see Section 10). Inform the Development Manager of identified causes of elevated dust emissions and any alterations to site operations that may or has influenced air quality. Ensure employees are competent through training and awareness programs.
All On-site Personnel	Operate in manner that minimises risks of incidents to themselves, fellow workers or the surrounding environment. Fully implement the relevant control measures within the Air Quality Management Plan. Report any anomalous air emissions or extraordinary events to the Quarry Manager. Follow any instructions provided by the Quarry Manager.
All Truck Drivers	Follow any instructions provided by any on-site personnel. Follow all requirements relating to management of air quality within the Driver's Code of Conduct.

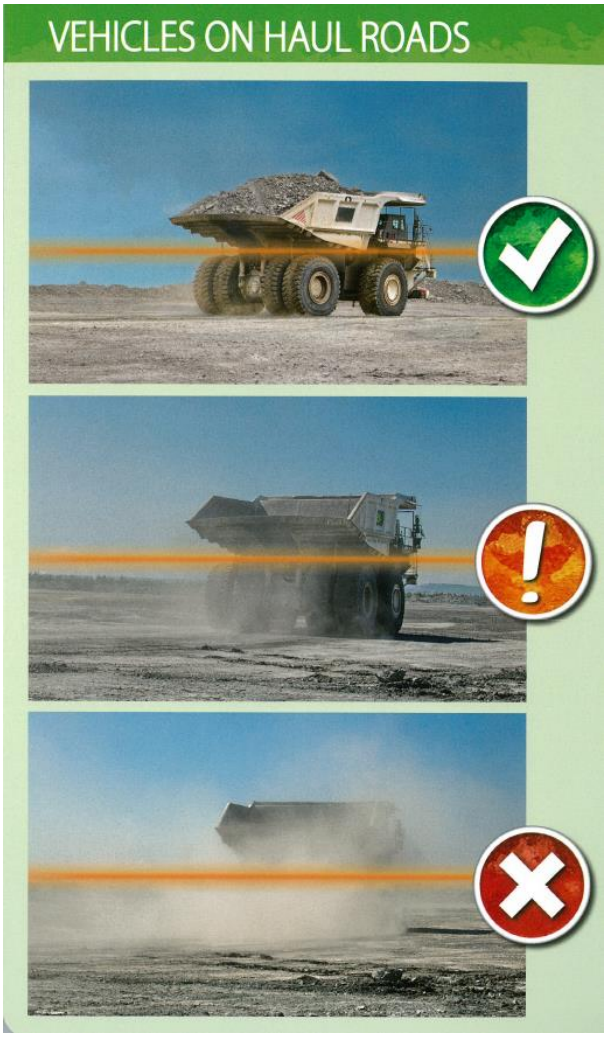
13.2 COMPETENCE TRAINING AND AWARENESS

All personnel and contractors working at the Quarry undergo an induction and annual re-induction. These inductions include information on the management of dust and air quality while working on site.

After completing the induction, workers will sign a statement of attendance and records of this are kept in the administration office.

Regular toolbox meetings are held to discuss whole-of-site production, management, safety and environmental issues. Matters relating to air quality and dust management are raised during these meetings, when necessary. Specifically, on-site personnel are required to notify either the Quarry Manager or his/her nominee in the event dust generated by the haul trucks rises above the wheel arch of the truck. This notification would initiate the despatch of the on-site water truck to water the relevant area(s) on site.

Figure 7 displays the reference material used in the toolbox meetings with respect to dust generated by the off-road haul trucks on site.



Source: NSW Government (2011)

Figure 6 Toolbox Meeting Chart re. Dust Generated by Haul Trucks

14. PLAN REVIEW AND CONTINUAL IMPROVEMENT PROTOCOL

The Plan will be reviewed annually from the date of approval or (in accordance with *Condition 5(4)* of DA 94-4-2004) within three months of submission of an *Annual Review*, an incident report resulting from a notifiable incident, each independent environmental audit and any modification to DA 94-4-2004. This will ensure the adequacy of the Plan and allow for opportunities of adaptive management and continual improvement. This will include a review of monitored air quality levels and updating trigger levels, as necessary, as the Quarry development progresses. Each review will also evaluate the effectiveness of the overall air quality monitoring program and whether it should be modified or scaled back.

Continuous improvement of this Plan will be achieved by the ongoing evaluation of the measured air quality concentrations and dust deposition levels against relevant criteria for the purpose of identifying opportunities for improvement. The continuous improvement process will be designed to:

- identify areas of opportunity for improvement of environmental management and performance;
- determine the cause or causes of non-compliance by reviewing the trigger conditions against any observed events or complaints that may be received. Triggers and responses may be refined where lessons from experience and feedback from stakeholders can inform changes to the Plan;
- develop and implement a plan of corrective and preventative action to address any non-compliance;
- verify the effectiveness of the corrective and preventative actions;
- document any changes in procedures resulting from process improvement; and
- make comparisons with objectives and targets.

REFERENCES

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Appendix 1

Consultation

(Total No. of pages including blank pages = 4)

From: genevieve.seed@planning.nsw.gov.au
Sent: Friday, 2 December, 2016 8:49 AM
To: Cox, Pip (Parramatta) AUS
Cc: Nicholas Warren; Jessie.Evans@planning.nsw.gov.au; Julia.Pope@planning.nsw.gov.au
Subject: RE: Calga Quarry AQMP

Hi Pip

Following discussion with EPA (see below), the Department accepts the proposed air quality monitoring network described in 'comment 1' below. Please include in the revised management plan.

Please let me know if you have any further questions.

Kind regard,

Gen

Afternoon Gen, EF13/3523

Based on our conversation and my knowledge of the site I understand that the Hanson Calga Premises has less than 3 years worth of extractable resource remaining.

In light of this, and the fact that the air quality modelling (which supported the modification proposal and 2004 extension application) does not predict any exceedances of 24 hour average PM10 criteria at nearby receivers, the scale of the operation and the lack of any sensitive receivers (schools, hospitals, nursing homes etc.) close to the Premises, the EPA does not consider that it would be reasonable to require Hanson to invest the funds required to purchase, install and manage a continuous PM10 monitor that complies with the Australian standard.

In this scenario I would consider that Hanson should maintain the current dust deposition gauge network, coupled with a continuous PM10 monitor to assist reactive management at the premises, and for the reasons stated above it would not be a requirement to operate a continuous real time PM10 monitor that complies with the relevant Australian Standard. Alternatively, they could operate a HVAS.

Hope this is of assistance.

Any question don't hesitate to call.

Kind Regards,

Alexander Beavis
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Report pollution and environmental incidents 131 555 (NSW only) or +61 2 9995 5555

From: Cox, Pip (Parramatta) AUS [mailto:pip.cox@hanson.com.au]
Sent: Wednesday, 23 November 2016 1:51 PM
To: Gen Seed <genevieve.seed@planning.nsw.gov.au>
Cc: Jessie Evans <Jessie.Evans@planning.nsw.gov.au>; Driver, Andrew (Parramatta) AUS <Andrew.Driver@hanson.com.au>; Nicholas Warren <nick@rwcorkery.com>
Subject: Calga Quarry AQMP

Good afternoon Gen,

I am writing in respect to DPE comments received on the 7th October 2016, specifically the document titled "Attachment A" in respect to Calga Quarry Management Plans.

Hanson wishes to discuss DPE's comment regarding the Air Quality Monitoring Program. See below for ease of review.

Condition	Department Comment
Prior to carrying out any development, the Applicant shall prepare, and subsequently implement, an Air Quality Monitoring Program for the development, in consultation with EPA, and to the satisfaction of the Director-General. This program must include an air monitoring protocol for evaluating compliance with the air quality impact assessment criteria in this consent.	To date, PM10 monitoring is not undertaken at the site. This condition requires monitoring to evaluate compliance with the air quality criteria in condition 8 of Schedule 3, including PM10 criteria. The Department requests that a HVAS be installed to meet the requirement to monitor PM10, and strong consideration is also given to the use of real-time air monitoring. It is noted that the site is currently seeking to install a crushing system, which has the potential to generate dust emissions.

Comment 1

Department Comment:

To date, PM10 monitoring is not undertaken at the site. This condition requires monitoring to evaluate compliance with the air quality criteria in condition 8 of Schedule 3, including PM10 criteria. The Department requests that a HVAS be installed to meet the requirement to monitor PM10, and strong consideration is also given to the use of real-time air monitoring.

Hanson Response:

Campaign PM10 monitoring has been conducted historically to demonstrate compliance.

Proposed Action:

Hanson proposes to install a "real-time" PM10 air monitor. This enables Hanson to evaluate PM10 performance against condition 8 of Schedule 3. Please note that the Calga AQMP will be amend to have similar air monitoring protocols to the recently approved Hanson's Central Coast Sands (CCS) Quarry AQMP (see attached), whereby the following are employed on site;

- DDGS
- Real time PM10 monitor
- Site AWS

Comment 2

Department Comment

It is noted that the site is currently seeking to install a crushing system, which has the potential to generate dust emissions.

Hanson Response

As the crushing system has not yet been approved it is important that the project is assessed against the requirements of Project Approval DA 94-4-2004.

Myself and RW Corkery would be happy to discuss further should additional information be required.

Kind regards,

Pip Cox
Graduate Environmental Manager

Hanson
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