



**Hy-Tec Industries Pty Limited**

ABN: 90 070 100 702

## **Austen Quarry**

# **Air Quality Management Plan**

August 2019

*Prepared by:*



**R.W. CORKERY & CO. PTY. LIMITED**



This page has intentionally been left blank



# Hy-Tec Industries Pty Limited

ABN: 90 070 100 702

## Austen Quarry

# Air Quality Management Plan

---

**Prepared for:**

Hy-Tec Industries Pty Limited  
ABN: 90 070 100 702  
Unit 4 Gateway Business Park  
63-79 Parramatta Road  
SILVERWATER NSW 2128

Telephone: (02) 9647 2866  
Fax: (02) 9647 2924  
Email: [darryl.thiedeke@hy-tec.com.au](mailto:darryl.thiedeke@hy-tec.com.au)

---

**Prepared by:**

R.W. Corkery & Co. Pty. Limited  
Geological & Environmental Consultants  
ABN: 31 002 033 712

**Brooklyn Office:**

1st Floor, 12 Dangar Road  
PO Box 239  
BROOKLYN NSW 2083

Telephone: (02) 9985 8511  
Email: [brooklyn@rwcorkery.com](mailto:brooklyn@rwcorkery.com)

**Orange Office:**

62 Hill Street  
ORANGE NSW 2800

Telephone: (02) 6362 5411  
Email: [orange@rwcorkery.com](mailto:orange@rwcorkery.com)

**Brisbane Office:**

Suite 5, Building 3  
Pine Rivers Office Park  
205 Leitchs Road  
BRENDALE QLD 4500

Telephone: (07) 3205 5400  
Email: [brisbane@rwcorkery.com](mailto:brisbane@rwcorkery.com)

---

Ref No. 652/41b

August 2019



R.W. CORKERY & CO. PTY. LIMITED

### Document Control

<b>Document Title</b>	Air Quality Management Plan 2019				
<b>Document No.</b>	652/41b				
<b>Version</b>	<b>Issued by –</b>	<b>Date</b>	<b>Distributed to</b>	<b>Comments Rec'd from – Date</b>	
Version 1	D. Reed, N. Warren	15/06/2016	M. Hollis (DPE)	H. Reed (DPE) 10/08/2016	
	D. Reed, N. Warren	14/10/2016	M. Hollis	M. Hollis 22/11/2016	
	D. Reed	November 2016	M. Hollis		
Version 2	D. Reed	March 2017	M. Hollis		
Version 3	N. Warren (RWC)	30/11/2018	M. Hollis (DPE)	M. Hollis 04/12/2018	
Version 3 Final	N. Warren (RWC)	04/12/2018	M. Hollis (DPE)		
Version 4	N. Warren (RWC)	30 July 2019	M. Anderson (DPIE)		
<b>Final</b>	<b>Approved by:</b>	Howard Reed		<b>Date:</b>	23/08/2019

**This Copyright is included for the protection of this document**

<p><b>COPYRIGHT</b></p> <p>© R.W. Corkery &amp; Co. Pty Limited 2019 and © Hy-Tec Industries Pty Limited 2019</p> <p>All intellectual property and copyright reserved.</p> <p>Apart from any fair dealing for the purpose of private study, research, criticism or review, as permitted under the Copyright Act, 1968, no part of this report may be reproduced, transmitted, stored in a retrieval system or adapted in any form or by any means (electronic, mechanical, photocopying, recording or otherwise) without written permission. Enquiries should be addressed to R.W. Corkery &amp; Co. Pty Limited.</p>
---

# CONTENTS

	Page
<b>LIST OF ACRONYMS</b> .....	<b>V</b>
<b>1. INTRODUCTION</b> .....	<b>1</b>
<b>2. LEGISLATIVE REQUIREMENTS</b> .....	<b>1</b>
2.1 DEVELOPMENT CONSENT SSD 6084.....	3
2.2 ENVIRONMENT PROTECTION LICENCE 12323.....	6
2.3 STATEMENT OF COMMITMENTS.....	6
<b>3. OBJECTIVES AND OUTCOMES</b> .....	<b>7</b>
<b>4. LOCAL SETTING</b> .....	<b>7</b>
4.1 CLIMATIC CONDITIONS.....	7
4.2 AMBIENT (BACKGROUND) CONDITIONS.....	9
4.3 RESIDENTIAL AND OTHER SENSITIVE RECEIVERS .....	12
<b>5. POTENTIAL AIR QUALITY IMPACTS AND RISKS</b> .....	<b>12</b>
5.1 PARTICULATE EMISSIONS.....	12
5.2 GREENHOUSE GAS AND OTHER GAS EMISSIONS.....	13
<b>6. AIR QUALITY CRITERIA</b> .....	<b>13</b>
<b>7. AIR QUALITY MANAGEMENT SYSTEM</b> .....	<b>14</b>
7.1 PROACTIVE MANAGEMENT MEASURES.....	14
7.1.1 Operating Hours.....	14
7.1.2 Operational Designs and Controls.....	15
7.1.3 Air Quality Monitoring.....	17
7.2 REACTIVE MANAGEMENT MEASURES.....	17
7.2.1 Triggers.....	17
7.2.2 Response and Corrective Actions.....	17
<b>8. AIR QUALITY MONITORING PROGRAM</b> .....	<b>20</b>
8.1 INTRODUCTION .....	20
8.2 METEOROLOGICAL MONITORING.....	20
8.3 AIR QUALITY MONITORING .....	20
8.4 AIR EMISSIONS MONITORING.....	21
8.4.1 Particulate Matter.....	21
8.4.2 Deposited Dust.....	22
8.5 EVALUATION OF RESULTS.....	24
<b>9. COMPLAINTS HANDLING AND RESPONSE</b> .....	<b>24</b>
<b>10. INCIDENT MANAGEMENT, NOTIFICATION AND REPORTING</b> .....	<b>25</b>
10.1 INCIDENT IDENTIFICATION .....	25

# CONTENTS

	<b>Page</b>
10.2 INCIDENT MANAGEMENT AND NOTIFICATION .....	25
10.2.1 Pollution Incident .....	25
10.2.2 Non-compliance Incident .....	26
10.3 INCIDENT REPORTING .....	26
<b>11. DOCUMENTATION AND PUBLICATION OF MONITORING INFORMATION AND REPORTING .....</b>	<b>26</b>
<b>12. ROLES AND RESPONSIBILITIES .....</b>	<b>26</b>
<b>13. COMPETENCE TRAINING AND AWARENESS .....</b>	<b>27</b>
<b>14. PLAN REVIEW AND CONTINUAL IMPROVEMENT PROTOCOL .....</b>	<b>28</b>
<b>15. REFERENCES .....</b>	<b>28</b>

## ANNEXURES

Annexure 1 24-Hour PM <sub>10</sub> Monitoring Results July 2017 to November 2018 .....	29
Annexure 2 Correspondence Regarding TSP Compliance - Todoroski 2016 .....	33

## FIGURES

Figure 1 Approved Stage 2 Site Layout .....	2
Figure 2 Wind Roses .....	8
Figure 3 Air Quality Monitoring .....	10

## TABLES

Table 1 Air Quality Related Approval Conditions Matrix of SSD-6084 .....	3
Table 2 Air Quality Related Commitments of the Final Statement of Commitments .....	6
Table 3 Objectives and Outcomes .....	7
Table 4 Dust Deposition Monitoring Result Summary .....	11
Table 5 Maximum Annual Particulate Matter Levels .....	11
Table 6 Air Quality Criteria .....	14
Table 7 Operating Hours .....	15
Table 8 Meteorological Monitoring .....	20
Table 9 Roles and Responsibilities of Personnel with Respect to Management of Air Quality .....	27

## **LIST OF ACRONYMS**

DPIE	Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EPL	Environment Protection Licence
HVAS	High Volume Air Sampler
LEP	Local Environmental Plan
RWC	R.W. Corkery & Co. Pty Limited
SSD	State Significant Development

This page has intentionally been left blank





## 1. INTRODUCTION

The Austen Quarry Air Quality Management Plan (“the Plan”) has been prepared in satisfaction of *Condition 12* of Schedule 3 of Development Consent SSD 6084 (SSD-6084) and as an operational tool to assist in the management of air quality-related issues during the operation of the Austen Quarry (“the Quarry”). It will be used by Hy-Tec Industries Pty Limited (Hy-Tec) personnel as the first point of reference for air quality-related issues.

This plan synthesises the recommendations made during the assessments undertaken for the Stage 2 development of the Quarry which was approved in July 2015 and a subsequent modification to SSD 6084 approved in August 2018. The most recent assessment of predicted air quality-related impacts associated with the Stage 2 development of the Quarry is provided in the Statement of Environmental Effects (RWC, 2018) and Air Quality Impact Assessment (Todoroski, 2018).

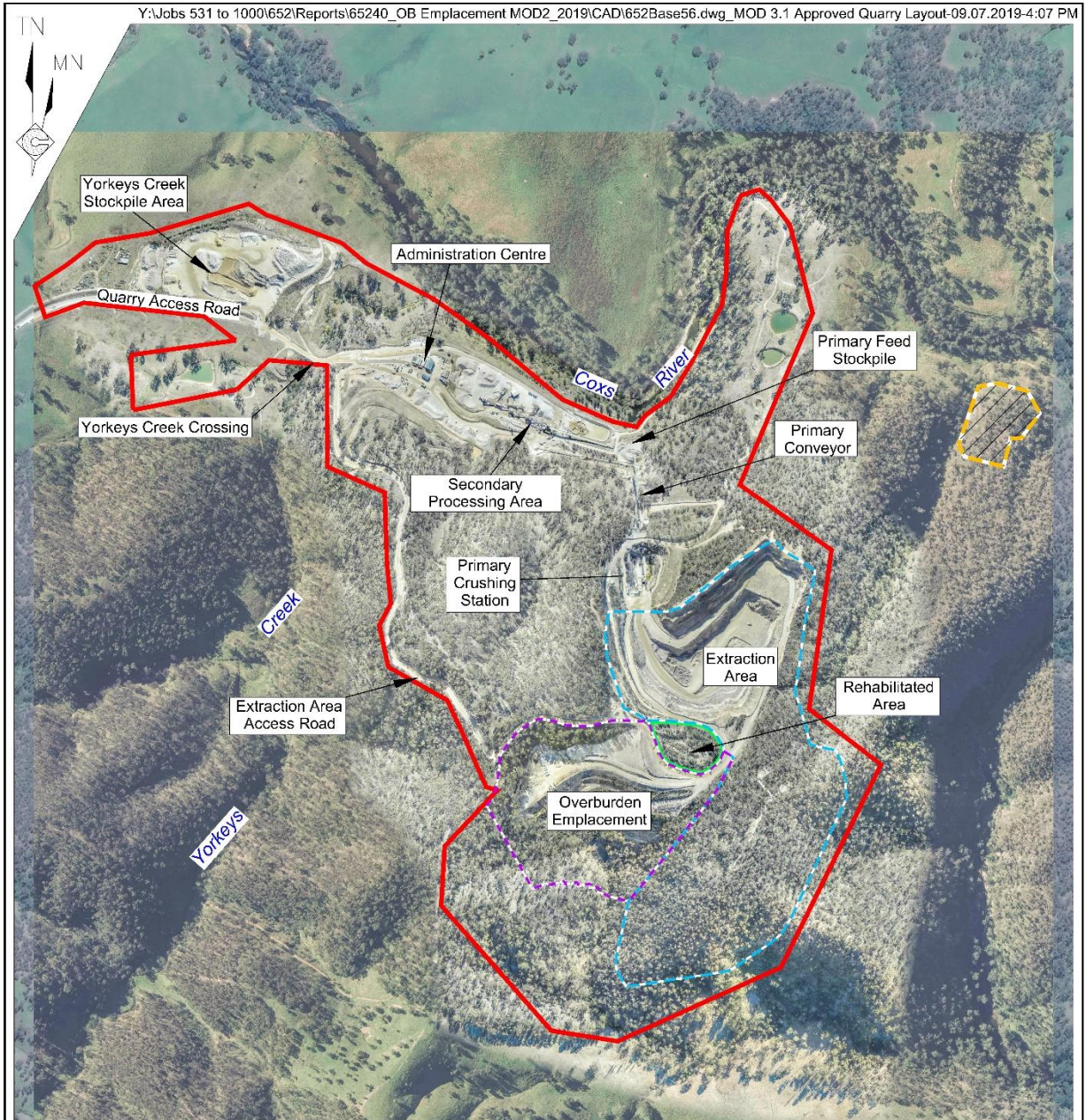
The approved layout is displayed in **Figure 1**. The land within the approved site boundary is referred to as the Quarry Site. The construction and development of Stage 2 of the Quarry involves an increase in depth and lateral extension of the extraction area (as originally approved and subsequently modified by DA 103/94) along an adjacent southwest- northeast trending ridge and a lateral extension and elevation of the existing overburden emplacement. SSD 6084 was modified in August 2018 and in July 2019.

Potential air quality impacts associated with the Quarry include particulate emissions (dust) and greenhouse gas emissions. Activities associated with potential impacts to air quality principally relate to surface disturbance, crushing and screening activities, load and haul of materials, transport of final products and miscellaneous equipment use within the Quarry.

## 2. LEGISLATIVE REQUIREMENTS

Air quality management at the Quarry Site is principally guided by the following sources.

- The relevant conditions of consent provided in SSD 6084.
- The relevant conditions of Environmental Protection Licence 12323.



Note: Some boundaries are coincident

- REFERENCE
- Quarry Site Boundary
  - - - Extraction Area Boundary
  - - - Overburden Emplacement Area Boundary
  - Rehabilitated Area (Offset for Clarity)
  - ▨▨▨▨ Conservation Area H

SCALE (A4)



Quarry Plan Source: Groundwork Plus - January 2019  
 Base Photograph Source: CEH Survey - May 2017 & Google Earth - October 2016 (surrounds)

Figure 1  
 APPROVED QUARRY SITE LAYOUT

- The commitments made in the planning documents that are summarised in the Statement of Commitments (Appendix 3 of SSD 6084).

The following subsections summarise the relevant air quality-related conditions and commitments that are addressed in this plan.

## 2.1 DEVELOPMENT CONSENT SSD 6084

Air quality management at the Quarry is guided by Conditions 10 to 12 of Schedule 3 of SSD 6084. More general requirements for the preparation of management plans are also provided by *Condition 2* of Schedule 5 of SSD 6084, while Condition 5 and Condition 6 of Schedule 3 relate to incident management and reporting requirements that influence air quality management. **Table 1** identifies the air quality-related conditional requirements and identifies where in the Plan individual requirements have been addressed.

**Table 1**  
**Air Quality Related Approval Conditions Matrix of SSD-6084**

Page 1 of 3

Condition	Section																					
<b>Schedule 3</b>																						
<p>Condition 10 – Air Quality Impact Assessment Criteria</p> <p>The Applicant must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 4 at any residence on privately-owned land.</p> <p><b>Table 4: Air quality criteria</b></p> <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Averaging Period</th> <th>Criterion</th> </tr> </thead> <tbody> <tr> <td>Particulate matter &lt; 10 µm (PM<sub>10</sub>)</td> <td>Annual</td> <td><sup>a,d</sup> 25µg/m<sup>3</sup></td> </tr> <tr> <td>Particulate matter &lt; 10 µm (PM<sub>10</sub>)</td> <td>24 hour</td> <td><sup>b</sup> 50µg/m<sup>3</sup></td> </tr> <tr> <td>Particulate matter &lt; 2.5 µm (PM<sub>2.5</sub>)</td> <td>Annual</td> <td><sup>a,d</sup> 8µg/m<sup>3</sup></td> </tr> <tr> <td>Particulate matter &lt; 2.5 µm (PM<sub>2.5</sub>)</td> <td>24 hour</td> <td><sup>b</sup> 25µg/m<sup>3</sup></td> </tr> <tr> <td>Total suspended particulates (TSP)</td> <td>Annual</td> <td><sup>a,d</sup> 90µg/m<sup>3</sup></td> </tr> <tr> <td><sup>c</sup> Deposited dust</td> <td>Annual</td> <td><sup>b</sup> 2 g/m<sup>2</sup>/month      <sup>a, d</sup> 4 g/m<sup>2</sup>/month</td> </tr> </tbody> </table> <p><i>Notes to Table 4:</i></p> <p><i>a Cumulative impact (i.e. increase in concentrations due to the development plus background concentrations due to all other sources).</i></p> <p><i>b Incremental impact (i.e. increase in concentrations due to the development alone, with zero allowable exceedances of the criteria over the life of the development).</i></p> <p><i>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.</i></p> <p><i>d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary.</i></p> <p><i>e "Reasonable and feasible avoidance measures" includes, but is not limited to, the operational requirements in conditions 11 and 12 to develop and implement an air quality management system that ensures operational responses to the risks of exceedance of the criteria.</i></p>	Pollutant	Averaging Period	Criterion	Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	<sup>a,d</sup> 25µg/m <sup>3</sup>	Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	<sup>b</sup> 50µg/m <sup>3</sup>	Particulate matter < 2.5 µm (PM <sub>2.5</sub> )	Annual	<sup>a,d</sup> 8µg/m <sup>3</sup>	Particulate matter < 2.5 µm (PM <sub>2.5</sub> )	24 hour	<sup>b</sup> 25µg/m <sup>3</sup>	Total suspended particulates (TSP)	Annual	<sup>a,d</sup> 90µg/m <sup>3</sup>	<sup>c</sup> Deposited dust	Annual	<sup>b</sup> 2 g/m <sup>2</sup> /month <sup>a, d</sup> 4 g/m <sup>2</sup> /month	6 and 7.1
Pollutant	Averaging Period	Criterion																				
Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	<sup>a,d</sup> 25µg/m <sup>3</sup>																				
Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	<sup>b</sup> 50µg/m <sup>3</sup>																				
Particulate matter < 2.5 µm (PM <sub>2.5</sub> )	Annual	<sup>a,d</sup> 8µg/m <sup>3</sup>																				
Particulate matter < 2.5 µm (PM <sub>2.5</sub> )	24 hour	<sup>b</sup> 25µg/m <sup>3</sup>																				
Total suspended particulates (TSP)	Annual	<sup>a,d</sup> 90µg/m <sup>3</sup>																				
<sup>c</sup> Deposited dust	Annual	<sup>b</sup> 2 g/m <sup>2</sup> /month <sup>a, d</sup> 4 g/m <sup>2</sup> /month																				

**Table 1 (Cont'd)**  
**Air Quality Related Approval Conditions Matrix of SSD-6084**

Page 2 of 3

Condition	Section
<b>Schedule 3 (Cont'd)</b>	
Condition 11 – Operating Conditions The Applicant must: (a) implement best practice management to minimise the dust emissions of the development; (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; (c) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see note d under Table 4); (d) monitor and report on compliance with the relevant air quality conditions in this consent; and (e) minimise the area of surface disturbance and undertake progressive rehabilitation of the site, to the satisfaction of the Secretary.	7.1 8.5 7.2.2 8 and 11 7.1.2
Condition 12 – Air Quality Management Plan The Applicant must prepare and implement an Air Quality Management Plan for the development to the satisfaction of the Secretary. This plan must: a) be submitted to the Secretary for approval at least 3 months prior to the commencement of quarrying operations under this consent, unless otherwise agree by the Secretary; b) describe the 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 development are minimised during adverse meteorological conditions and extraordinary events;	2.1 7 and 8 7 7.2.2
c) describe the proposed air quality management system; d) include an air quality monitoring program that: – is capable of evaluating the performance of the development; – includes a protocol for determining any exceedances of the relevant conditions of consent; – effectively supports the air quality management system; and – evaluates and reports on the adequacy of the air quality management system.	7 8 8.5 8.4 8 8.5
The applicant must implement the Air Quality Management Plan as approved by the Secretary	
Condition 13 – Meteorological Monitoring For the life of the development, the Applicant must ensure that there is a suitable meteorological station operating in the vicinity of the site that complies with the requirements in the Approved Methods for Sampling of Air Pollutants in New South Wales guideline.	8.2
Condition 14 – Greenhouse Gas Emissions The Applicant must implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site.	7.1.2

**Table 1 (Cont'd)**  
**Air Quality Related Approval Conditions Matrix of SSD-6084**

Condition	Section
<b>Schedule 5</b>	
<p>Condition 2 – Management Plan Requirements</p> <p>The Applicant must ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:</p> <p>a) a summary of relevant background or baseline data;</p> <p>b) a description of:</p> <ul style="list-style-type: none"> <li>– the relevant statutory requirements (including any relevant approval, licence or lease conditions);</li> <li>– any relevant limits or performance measures/criteria; and</li> <li>– 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;</li> </ul> <p>c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;</p> <p>d) a program to monitor and report on the:</p> <ul style="list-style-type: none"> <li>– impacts and environmental performance of the development; and</li> <li>– effectiveness of any management measures (see (c) above);</li> </ul> <p>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;</p> <p>f) a program to investigate and implement ways to improve the environmental performance of the development over time;</p> <p>g) a protocol for managing and reporting any:</p> <ul style="list-style-type: none"> <li>– incidents;</li> <li>– complaints;</li> <li>– non-compliances with statutory requirements; and</li> <li>– exceedances of the impact assessment criteria and/or performance criteria; and</li> </ul> <p>h) a protocol for periodic review of the plan.</p> <p><i>Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.</i></p>	<p>4.2</p> <p>2</p> <p>6</p> <p>6 and 8</p> <p>7 and 8</p> <p>8 and 11</p> <p>8.5 and 11</p> <p>7.2</p> <p>8.1, 11 and 14</p> <p>7.2</p> <p>7.2</p> <p>10</p> <p>7.2.2</p> <p>14</p>
<p>Condition 5 – Revisions of Strategies, Plans &amp; Programs</p> <p>Within 3 months of the submission of an:</p> <p>a) annual review under condition 4 above;</p> <p>b) incident report under condition 6 below;</p> <p>c) audit report under condition 8 below; and</p> <p>d) any modifications to this consent,</p> <p>the Applicant must review the strategies, plans and programs required under this consent, to the satisfaction of the Secretary. Where this review leads to revisions in any such document, then within 4 weeks of the review the revised document must be submitted for the approval of the Secretary.</p> <p><i>Note: The purpose of this condition is to ensure that strategies, plans and programs are regularly updated to incorporate any measures recommended to improve environmental performance of the development.</i></p>	<p>14</p>
<p>Condition 6 – Incident Reporting</p> <p>The Applicant must immediately notify the Secretary and any other relevant agencies of any incident. Within 7 days of the date of the incident, the Applicant must provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.</p>	<p>10</p>

## 2.2 ENVIRONMENT PROTECTION LICENCE 12323

Conditions of Environment Protection Licence (EPL) 12323 that relate to air quality include the following.

### Dust

*O3.1 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.*

### Requirement to monitor concentration of pollutants discharged

*M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:*

*M2.2 Air Monitoring Requirements.*

*For EPA nominated points 4, 5 and 6.*

Pollutant	Units of Measure	Frequency	Sampling Method
Particulates – Deposited Matter	g/m <sup>2</sup> /month	Continuous	AM-19

Matters relating to deposited dust monitoring are addressed in this Plan (see Section 8). The Air Quality Management Plan will be updated in accordance with any variations of EPL 12323.

## 2.3 STATEMENT OF COMMITMENTS

The final Statement of Commitments is included as *Appendix 3* of SSD-6084. Air quality-related commitments have been identified in **Table 2**.

**Table 2**  
**Air Quality Related Commitments of the Final Statement of Commitments**

Desired Outcome	Action	Section
Site activities are undertaken without exceeding the nominated air quality criteria.	12.1 Undertake operations in accordance with an Air Quality Management Plan	This Plan
Minimise greenhouse gas emissions from Site related activities.	12.2 Minimise the impacts of greenhouse gases relating to diesel consumption by: a) minimising use of haul trucks through use of an overland conveyor; b) minimising rehandling of overburden and products; c) maintaining and servicing equipment to ensure efficiency; d) minimising the quarry footprint to reduce land disturbance and travel distances; and e) optimising the design of the Processing Plant to f) maximise the use of gravity to move material throughout the plant and maximise energy efficient motors in major equipment.	7.1.2
Record and monitor the local environment regarding dust impacts.	12.3 Continue to monitor dust impacts through: a) the existing deposited dust gauges; and b) on-site meteorological monitoring to record relevant parameters.	8

### 3. OBJECTIVES AND OUTCOMES

The primary objectives of air quality management at the Quarry are to protect the environment and amenity of the surrounding rural setting and to minimise the likelihood of complaints regarding dust nuisance.

**Table 3** details the objectives and outcomes with respect to air quality management of the Quarry Site.

**Table 3**  
**Objectives and Outcomes**

Objectives	Outcomes
(a) To ensure compliance with the criteria of SSD-6084 and reasonable community expectations.	(i) Compliance with all relevant criteria and reasonable community expectations, as determined in consultation with the relevant government agencies.
(b) To implement air quality management and mitigation measures during all stages of Quarry operation.	(ii) All identified air quality management and mitigation measures implemented.
(c) To implement an air quality monitoring program to establish compliance or otherwise with relevant criteria during all stages of Quarry operation.	(iii) All identified monitoring undertaken in accordance with the Plan.
(d) To implement an complaints handling and response protocol.	(iv) Complaints (if any) handled and responded to. All complaints recorded and reported in accordance with annual reporting requirements.
(e) To implement corrective and preventative actions, if required.	(v) Corrective and preventative actions implemented, if required.
(f) To implement an incident reporting program, if required.	(vi) Incidents (if any) reported.

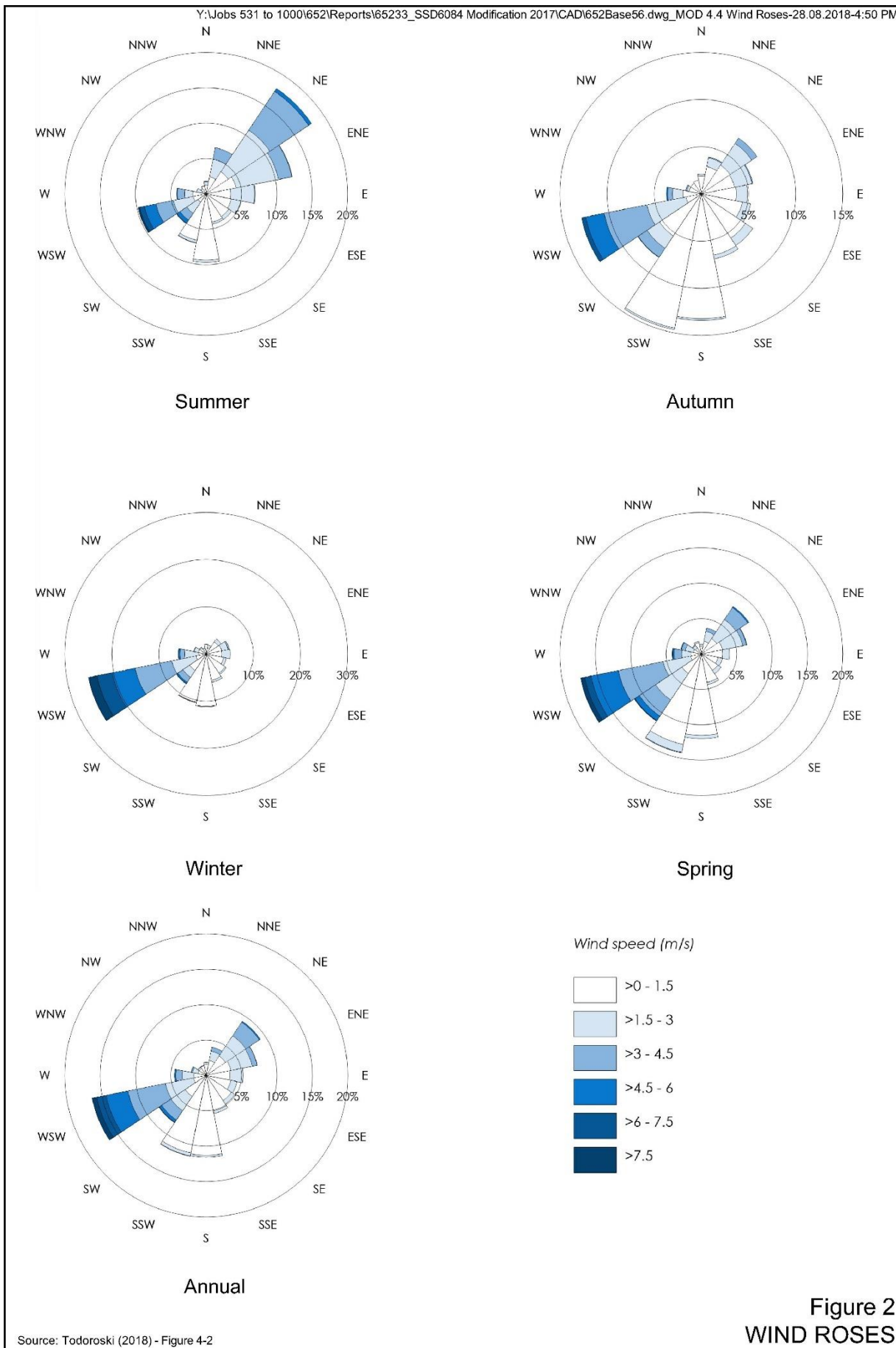
### 4. LOCAL SETTING

#### 4.1 CLIMATIC CONDITIONS

A summary of the climatic conditions relevant for air quality management are presented in this subsection. Moderate wind and relatively high temperature may increase the likelihood of dust lift off from disturbed surfaces and carry dust plumes further from the Quarry Site than under calm conditions. Rainfall periods influence management of dust-related impacts and movement of fine sediment that when dry is more likely to create wind-blown dust impacts.

#### Wind

**Figure 2** presents a summary of wind patterns generated from meteorological data collected during the 2014 calendar year at the Quarry. The wind roses indicate that on an annual basis, prevailing winds are from the west-southwest with light winds from the south-southwest and south persistent throughout the year. The west-southwest winds are more commonly experienced in winter and spring and autumn with winds from the northeast more prevalent during summer. Only sporadic winds from the north, east and southeast are experienced locally throughout the year.





## Temperature

January is the hottest month, having the highest mean temperature of 25.5°C, with November, December, February and March all with mean annual temperatures exceeding 20°C and maximum temperatures exceeding 30°C. The lowest temperatures were evident through June to August with the lowest mean temperature in July of 0.7°C.

## Rainfall and Evaporation

Average monthly rainfall is generally highest from October to March. Statistically, the highest average rainfall occurs in January, however, this tends to be extremely variable, with infrequent, high intensity rainfall events occurring. This is exemplified by the cooler months of

May to August, which have the lowest mean rainfall, with no rainfall being recorded during these months in some years, but also several of the highest recorded monthly totals. Notably, even in ‘dry’ years, there are likely to be periods of heavy rainfall.

Mean monthly evaporation is greater than mean monthly rainfall between September and April, indicating a moisture deficit (and increased likelihood of dust impacts) during this time.

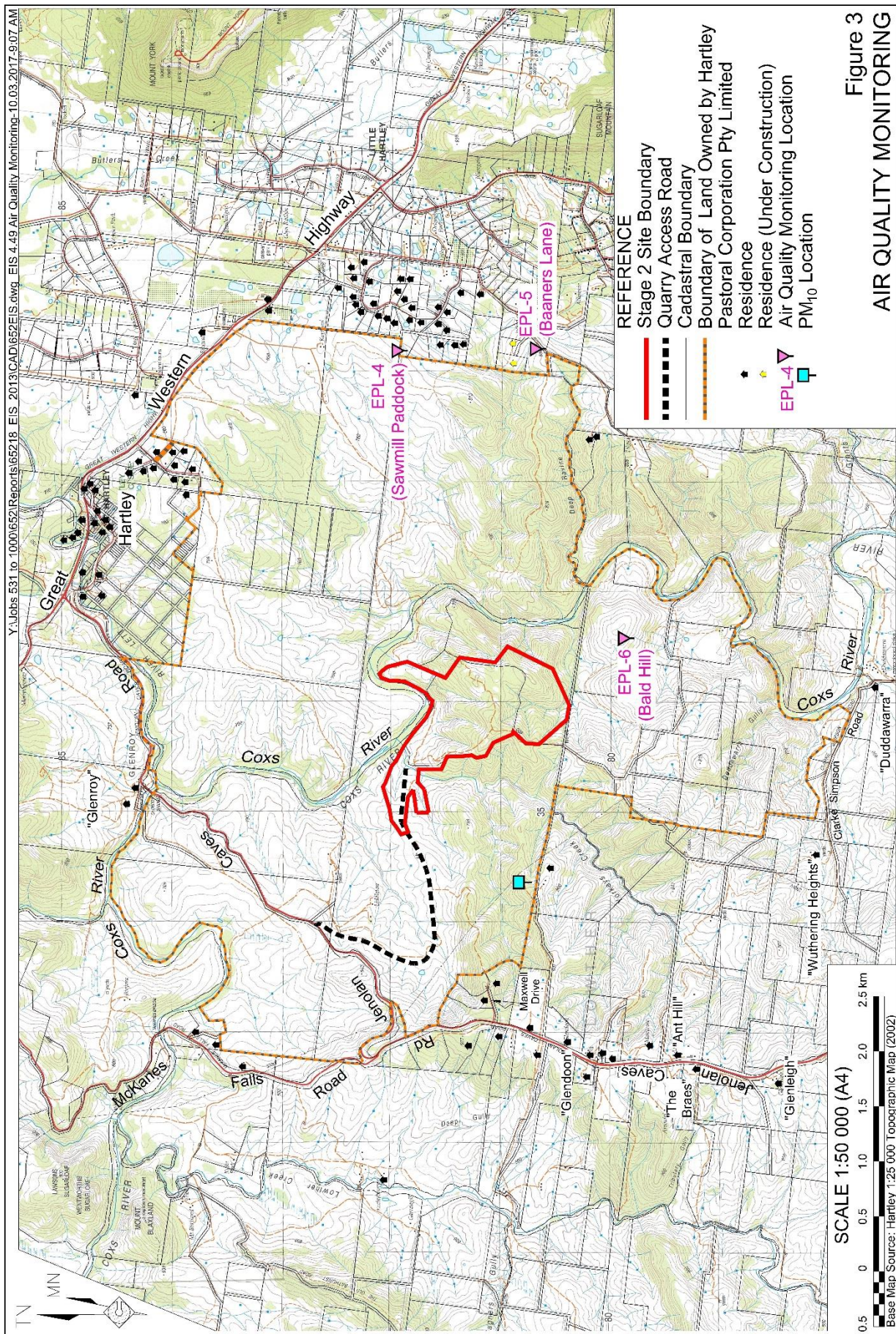
## 4.2 AMBIENT (BACKGROUND) CONDITIONS

Dust generation is the main air quality issue relevant to the Quarry. It is noted that the Quarry is potentially one of the significant sources of dust in the local area. However, dust is also generated by grazing activities, vehicles using Jenolan Caves Road and other local roads as well as residential activities such as wood fired heating.

**Figure 3** presents the air quality monitoring locations used for the existing monitoring program.

Monitoring of particulate matter (PM<sub>10</sub>) has occurred at the Quarry Site since 14 March 2017. Monitoring results for the period from July 2017 to November 2018 (to date) is presented in **Annexure 1**. It is noted that data was not captured for the period from 14 October 2018 to 1 January 2018. A fault with the monitor caused it to stop recording results and the supplier had difficulty replacing the necessary parts to complete the repairs. Regardless, for the period of available data, 85% of records are available. The available 24-hr PM<sub>10</sub> data indicates an average of approximately 8.4µg/m<sup>3</sup>, i.e. well below the annual criterion of 25µg/m<sup>3</sup>. All monitoring results are within the relevant criteria and generally consistent with the predictions made in the 2014 EIS and the most recent air quality assessment (Todoroski, 2018). It is also noted that during days that high particulate matter levels have historically been recorded, the high levels have caused by external factors such as bush fires or regionally experienced dust storms.

Deposited dust monitoring has occurred at locations adjacent to the Quarry Site since 2003, with annual average results presented in **Table 4**.



**Table 4**  
**Dust Deposition Monitoring Result Summary**

Period (July – June)	Location <sup>1</sup>								
	AQD-1 Sawmill Paddock			AQD-2 Baaners Lane			AQD-3 Bald Hill		
	Insoluble Solids (g/m <sup>2</sup> /month)	Ash		Insoluble Solids (g/m <sup>2</sup> /month)	Ash		Insoluble Solids (g/m <sup>2</sup> /month)	Ash	
g/m <sup>2</sup> /month		%	g/m <sup>2</sup> /month		%	g/m <sup>2</sup> /month		%	
2003-2004	0.7	0.3	42.2	1.2	0.5	37.6	0.9	0.2	23.3
2004-2005	0.7	0.5	42.6	0.7	0.3	28.2	2.6	1.5	35.6
2005-2006	2.5	1.7	69.5	0.7	0.4	59.4	2.6	1.5	59.1
2006-2007	2.4	0.7	30.7	0.5	0.4	66.0	2.6	2.1	81.4
2007-2008	2.7	1.2	44.4	0.7	0.4	57.1	1.5	0.6	40.0
2008-2009	4.0	0.5	11.6	0.6	0.4	21.2	1.0	0.6	28.6
2009-2010	2.6	1.7	66.1	2.1	1.9	27.3	2.4	2.4	27.0
2010-2011	0.8	0.6	69.6	0.4	0.2	10.6	1.1	0.4	13.6
2011-2012	0.7	0.2	35.0	0.4	0.1	34.7	0.2	0.2	100
2012-2013	1.1	0.4	39.4	0.8	0.3	40.0	0.6	0.2	36.2
2013-2014	1.2	0.4	33.3	0.8	0.3	37.5	0.7	0.3	42.9
2014-2015	1.1	0.6	57.1	0.4	0.3	81.0	0.7	0.6	34.6
2015-2016	1.6	0.4	23.5	0.7	0.3	38.2	0.6	0.3	48.1
2016-2017	1.1	0.7	42.8	0.7	0.3	41.3	0.8	0.4	44.8
2017-2018	1.9	0.9	48.9	0.5	0.3	58.8	0.6	0.3	41.5
<b>Total Average</b>	<b>1.7</b>	<b>0.7</b>	<b>43.8</b>	<b>0.7</b>	<b>0.4</b>	<b>42.6</b>	<b>1.3</b>	<b>0.8</b>	<b>43.8</b>
Note 1: See Figure 3 for gauge locations									
Source: Hy-Tec									

An assessment of air quality was undertaken by Todoroski Air Sciences for the recent modification application and include dispersion modelling for deposited dust and particulate matter. Section 6 of Todoroski (2018) presents the outcomes of the assessment and pollutant concentration contour diagrams showing predicted incremental (Quarry alone) air quality impacts. **Table 5** presents the maximum annual cumulative dust levels predicted at the most affected residences in the local area.

**Table 5**  
**Maximum Annual Particulate Matter Levels**

Pollutant	Maximum Incremental Impact at Residence	Adopted Background Concentration	Maximum Cumulative Impact at Residence	Criteria	Units
PM <sub>2.5</sub>	0.2	7.5	7.7	8	µg/m <sup>3</sup>
PM <sub>10</sub>	1.6	17.2	18.8	25	µg/m <sup>3</sup>
TSP	3.2	61.9	65.1	90	µg/m <sup>3</sup>
Deposited Dust	0.1	1.2	1.3	4.0	g/m <sup>2</sup> /month

At the time of the assessment, there was insufficient background data to characterise the prevailing background conditions and therefore Todoroski (2018) used representative background data to assess the likely impacts of the ongoing Quarry operation. The results of the contemporaneous assessment undertaken for 24-hour average PM<sub>2.5</sub> and PM<sub>10</sub> concentrations at the residences nearest to the Quarry Site indicate that there would be no additional days (as a result of Quarry operations) when the criteria levels would be exceeded.

It is noted that the maximum incremental impact (as a result of Quarry operations) was 0.2 µg/m<sup>3</sup> for PM<sub>2.5</sub> and µg/m<sup>3</sup> for PM<sub>10</sub>, demonstrating that negligible impacts associated with Quarry operations are expected.

### 4.3 RESIDENTIAL AND OTHER SENSITIVE RECEIVERS

The Quarry Site is located on the large land holding of the Hartley Pastoral Corporation which provides a significant buffer to privately-owned residences.

The majority of land in the vicinity of the Quarry Site is land zoned Rural (General) 1a under the Lithgow *Local Environmental Plan* (LEP). The land owned by the Hartley Pastoral Corporation is operated as pastoral property and used primarily for cattle grazing, sheep grazing, cereal and fodder crops. Other nearby land uses include conservation areas, small rural holdings and limited recreation and tourism associated with Cox's River.

## 5. POTENTIAL AIR QUALITY IMPACTS AND RISKS

### 5.1 PARTICULATE EMISSIONS

Quarry operations with the potential to generate particulate emissions are related to the following specific operational and on-site transportation activities.

- Extraction activities (drilling/blasting, excavator, front-end loaders, bulldozers, trucks loading).
- Crushing and screening (dry only).
- Transfer of materials through conveyors.
- Vehicle movements on unsealed roads.
- Product loading and despatch.
- Wind erosion from disturbed areas.

Airborne contaminants that can be inhaled into the human respiratory system are classified on the basis on their physical properties such as being gases, vapours or particulate matter. Particulate matter refers to a category of airborne particulates, typically less than 30 microns (µm) in diameter. This type of dust is termed Total Suspended Particulate (TSP).

Emissions of particulate matter less than 10µm (termed PM<sub>10</sub>) and less than 2.5µm (termed PM<sub>2.5</sub>) are considered important pollutants to human health as their ability to penetrate the respiratory system can cause cardiovascular and respiratory diseases, pulmonary and heart diseases, as well as reduced lung capacity.

Particles that settle from the atmosphere and deposits on surfaces are characterised as deposited dust and are typically in the upper size range. The deposition of dust on surfaces may be considered a nuisance and can contribute to reductions in amenity and therefore are considered within the assessment, e.g. dust on window sills or cars.

## 5.2 GREENHOUSE GAS AND OTHER GAS EMISSIONS

The primary source of greenhouse gas emissions from the Quarry would continue to be the combustion of diesel by fixed plant power generation and mobile equipment. Based on the increase to annual limits on Quarry product transport to 1.6Mtpa, greenhouse gas emissions are predicted to increase by a proportional amount (i.e. 45% based on an increase from 1.1Mtpa to 1.6Mtpa). However, as greenhouse gas emissions from the previously approved operations were predicted to be approximately 0.0008% of the total annual estimate for national greenhouse gas emissions (based on 2012 emissions), it is not anticipated that significant greenhouse gas emissions would result from the current operations. It is noted that greenhouse gases would also be generated indirectly through the production of the diesel fuel consumed at the Quarry.

The modified operations are also predicted to result in a proportional increase in diesel fumes and blast fumes. However, it is noted that on-site diesel particulate matter emissions are accounted for in the Todoroski (2018) assessment of total particulate emissions. In addition, diesel fumes from Quarry product transport activities would not significantly change in intensity as the approved modifications would not result in truck conveying or significant traffic delays such that the intensity of any diesel fumes would increase. Finally, the blasting activities would continue to be managed to limit misfires and blasting during unfavourable conditions. The total blasting frequency for the operation would not change from the current limit of one blast event per calendar week.

## 6. AIR QUALITY CRITERIA

In accordance with *Condition 10* of Schedule 3 of SSD-6084, the particulate matter and deposited dust air quality criteria at any residence on privately-owned land for all activities undertaken during Stage 2 development are presented in **Table 6**.

For the purpose of demonstrating compliance with the air quality criteria for TSP, monitored records of PM<sub>10</sub> and compliance with annual average criteria for PM<sub>10</sub> will be used to infer compliance with the TSP criteria. It is recognised that PM<sub>10</sub> constitutes approximately 40% of TSP (see confirmation from Todoroski Air Sciences provided as **Annexure 1**) and demonstrating compliance with TSP criteria in this manner is a common and accepted practice. The air quality monitoring program is discussed in detail in Section 8 (i.e. recorded PM<sub>10</sub> divided by 0.4 will be used to assess compliance with TSP criteria).

**Table 6**  
**Air Quality Criteria**

Pollutant	Averaging Period	Criterion	
Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	a,d 25µg/m <sup>3</sup>	
Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	b 50µg/m <sup>3</sup>	
Particulate matter < 2.5 µm (PM <sub>2.5</sub> )	Annual	a,d 8µg/m <sup>3</sup>	
Particulate matter < 2.5 µm (PM <sub>2.5</sub> )	24 hour	b 25µg/m <sup>3</sup>	
Total suspended particulates (TSP)	Annual	a,d 90µg/m <sup>3</sup>	
<sup>c</sup> Deposited dust	Annual	b 2 g/m <sup>2</sup> /month	a,d 4 g/m <sup>2</sup> /month
Notes:			
a Cumulative impact (i.e. increase in concentrations due to the development plus background concentrations due to all other sources)			
b Incremental impact (i.e. increase in concentrations due to the development alone, with zero allowable exceedances of the criteria over the life of the development)			
c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter - Deposited Matter – Gravimetric Method			
d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary			

Similarly, for the purpose of demonstrating compliance with the air quality criteria for PM<sub>2.5</sub>, continuous PM<sub>10</sub> monitoring data will be used as a surrogate for PM<sub>2.5</sub>. As described in Section 4.2 and displayed in Table 5, the maximum incremental impact for PM<sub>2.5</sub> at the most severely impacted residence is predicted to be 0.2µg/m<sup>3</sup>. Todoroski (2018) assumed conservative background dust levels in their assessment and concluded that the maximum cumulative impact from Quarry operations would not exceed 7.7µg/m<sup>3</sup>, being below the criteria level of 8µg/m<sup>3</sup>. It is also noted that the nearest privately-owned residence to the Quarry is located at 781 Jenolan Caves, Good Forest, approximately 1 100m to the southwest of the Quarry. In the rare event that repeated, unexplained exceedances of PM<sub>10</sub> are recorded, PM<sub>2.5</sub> monitoring will be considered in consultation with EPA.

The incremental impact assessment criteria for deposited dust is considered to be the increase in concentrations due to the development alone while the cumulative impact assessment criteria is the criteria increase in concentrations due to the development plus background concentrations due to all other sources. For the purpose of assessing compliance, the results of deposited dust monitoring will be considered against the cumulative impact assessment criteria only, as it is not possible to separate the deposited dust generated by the Quarry-alone from other background deposited dust sources.

## 7. AIR QUALITY MANAGEMENT SYSTEM

### 7.1 PROACTIVE MANAGEMENT MEASURES

#### 7.1.1 Operating Hours

All operations will be undertaken in accordance with the approved hours of operation presented in **Table 7**.

**Table 7**  
**Operating Hours**

<b>Activity</b>	<b>Permissible Hours</b>
<ul style="list-style-type: none"> <li>• Extraction operations</li> <li>• Processing operations</li> <li>• Overburden Management</li> <li>• Stockpile Management</li> </ul>	<ul style="list-style-type: none"> <li>• 6:00am to 10:00pm Monday to Friday;</li> <li>• 6:00am to 3:00pm Saturday; and</li> <li>• At no time on Sundays or public holidays.</li> </ul>
<ul style="list-style-type: none"> <li>• Blasting</li> </ul>	<ul style="list-style-type: none"> <li>• 10:00am to 3:00pm Monday to Friday (except public holidays).</li> </ul>
<ul style="list-style-type: none"> <li>• Loading and Despatch</li> </ul>	<ul style="list-style-type: none"> <li>• 4:00am to 10:00pm Monday to Friday;</li> <li>• 5:00am to 3:00pm Saturdays; and</li> <li>• At no time on Sundays or public holidays.</li> </ul>
<ul style="list-style-type: none"> <li>• Maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• Any time</li> </ul>
Source: SSD-6084 – Table 1	

### 7.1.2 Operational Designs and Controls

To limit the generation of dust from the potential sources of air contaminants identified in Section 5.1, Hy-Tec has and would continue to implement the following design features, dust minimisation and impact mitigation practices.

#### Design Features

- The Northern Ridge within the Quarry area will be retained.
- The primary crushing station is located within the purpose built depression within the extraction area below surrounding ground level. This location limits dust emissions and the distance haul trucks are required to travel from active faces.
- The primary conveyor between the Primary Crushing Station and secondary processing area reduces the distance haul trucks are required to travel.
- Conveyor transfer points are partially enclosed.
- The Quarry Access Road is sealed from Jenolan Caves Road to Yorkeys Creek.

#### Operational Controls and Safeguards

- Surface disturbance activities have been planned to limit the total surface disturbance at any one time.
- Progressive rehabilitation will include initial revegetation to provide a suitable groundcover that limits surface disturbance and the potential for dust lift-off.
- Dust mitigation is incorporated into processing equipment including sprays, covers and enclosures.

- During periods of extended dry weather and/or high winds, when dust emissions have the potential to occur as a result of quarrying activities, dust is managed through the use of a water truck to suppress emissions.
- All other internal roads are surfaced with well graded materials to limit dust lift-off.
- Exposed areas that are not covered in gravel under dry and windy conditions would be watered (visible dust plumes being the trigger for this action).
- All vehicles travelling on internal unsealed roads are limited to a speed appropriate for the conditions and safety, i.e. less than 40km/hr.
- Load sizes would be limited to ensure product does not extend above truck sidewalls.
- Care would be taken to avoid spillage during loading.
- Dump heights from trucks, front-end loaders and conveyors would be minimised.
- As far as practicable, blasts would be scheduled to avoid higher wind conditions, especially when northerly, northwesterly or northeasterly winds prevail (which may result in a plume of particulate matter towards the most affected receiver to the southwest).
- Truck queuing, unnecessary idling of trucks and unnecessary trips would be reduced through logistical planning, where possible.

Hy-Tec has and would continue to implement the following measures to minimise the emissions of greenhouse gases during the ongoing life of the Quarry.

- Optimise quarry design to minimise:
  - travel distances for equipment; and
  - rehandling of overburden, products and by-products.
- Use mobile equipment which is maintained and serviced in accordance with Original Equipment Manufacture (OEM) requirements to maximise efficiency.
- Minimise the quarry footprint to reduce land disturbance and travel distances for mobile equipment.
- Optimise the design of the Processing Plant to:
  - maximise the use of gravity to move material throughout the plant reducing the need for pumping; and
  - maximise the use of energy efficient motors in major items of equipment.

As noted above, the use of conveyors to transfer raw materials from the extraction area to secondary processing area reduces the consumption of diesel fuel by haul trucks and therefore greenhouse gas emissions.



### 7.1.3 Air Quality Monitoring

The existing program of dust monitoring will be continued at the locations nominated in **Figure 3**. The results and performance of the site operations will be discussed with local residents and landholders, where relevant. Monitoring is discussed further in Section 8.

## 7.2 REACTIVE MANAGEMENT MEASURES

### 7.2.1 Triggers

Four 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 7.2.2.
- b) An internal investigation trigger alarm will be programmed into the real time particulate matter (i.e. PM<sub>10</sub>) monitor to give feedback for operations and daily monitored particulate matter levels when dust levels are approaching or likely to approach the criteria levels (see Table 5). The trigger level will be established in consultation with the equipment supplier and modified as needed to suit air quality trend levels and ensure the triggers are providing reliable information to quarry management.

The trigger levels will not represent an exceedance of air quality criteria, but will be used to trigger internal investigation of climatic, operational or other conditions that may have resulted in dust levels that are higher than existing trends in recorded dust levels.

- c) Exceedance of air quality criteria established through emissions monitoring. Any record of dust exceeding the criteria nominated in Section 8 will trigger the response and corrective action measures described in Section 7.2.2.
- d) 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. Adverse weather conditions such as high winds and excessively dry periods would be considered as triggers for reactive management.

### 7.2.2 Response and Corrective Actions

#### Air Quality Complaint

A Complaints and Incidents Procedure for the Austen Quarry is provided in the Environmental Management Strategy. In summary, following receipt of an air quality-related complaint action will be taken within two working days to determine the cause of the complaint and identify actions to remediate the complaint source. The following details will be recorded following receipt of any air quality-related complaint.

- a) The date and time of the complaint.
- b) The method by which the complaint was made.

- c) Any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect.
- d) The nature of the complaint.
- e) The action taken in relation to the complaint, including any follow-up contact with the complainant.
- f) If no action was taken, the reasons why no action was taken.

All complaints will be investigated, and a response provided to the complainant. The investigation will consider the following.

- What activities (and / or equipment) were being carried out or operated at the time of the complaint.
- Whether at the time of the complaint, normal day-to-day activities were being conducted.
- Whether equipment or activities on-site were the potential source of complaint (or whether other activities in the locality may have contributed to the complaint).
- What actions may be carried out to resolve the complaint and / or minimise the likelihood of further complaints.

If monitoring is undertaken to investigate a complaint, the Quarry Production Manager will make the results of the monitoring available for viewing by the complainant, on request.

#### **Air Quality Internal Investigation Trigger**

If PM<sub>10</sub> monitoring indicates that dust levels have exceeded the nominated internal investigation trigger levels and a trigger alarm is received from the monitoring equipment, an investigation will be commenced in accordance with the following response and action plan.

1. After obtaining trigger exceedance information the Quarry Production Manager (or delegated representative) will review meteorological conditions to assess whether these were a factor in the result.
2. The Quarry Production Manager will investigate the source of the emissions, review the activities undertaken at the time and if necessary amend operations to reduce emissions.
3. 24-hour average trigger levels would be used to indicate both operational and environmental triggers. This may include bush fires, regional road works or dust conditions as well as Site conditions.

#### **Air Quality Criteria Exceedance**

If emissions monitoring indicates that the approved criteria has been exceeded, the following response and action plan will be implemented.

1. After obtaining exceedance information the Quarry Production Manager (or delegated representative) will review meteorological conditions to assess whether these were a factor in the result.

2. The Quarry Production Manager will immediately investigate the source of the emissions, review the activities undertaken at the time and if necessary amend operations to reduce emissions.
3. As soon as is practical following a confirmed exceedance of air quality criteria<sup>1</sup>, the Quarry Production Manager will notify DPIE and the EPA of the exceedance and actions being taken to remediate the source of excessive dust. This timing is consistent with that nominated in *Condition 6* of Schedule 5 of SSD-6084.
4. Within 7 days of the date of the incident the Quarry Production Manager will provide a detailed report on the incident to DPIE and the EPA.
5. Within two weeks of obtaining any data showing an exceedance of air quality criteria, the Quarry Production Manager will notify in writing any affected landowners or tenants.
6. Any exceedance of the approved air quality criteria will be reported to EPA in the Annual Return and to DPIE in the Annual Review.

### 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.
- Fire incidents.
- Any other activity agreed by the Secretary.

During times when these conditions are forecast or observed it would be at the Quarry Production Manager's discretion to limit or modify operational activities to ensure that air quality impacts are limited as much as practically possible.

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.

---

<sup>1</sup> It is noted that dust deposition, while monitored monthly, is assessed against an annual average criteria. Therefore, only rolling 12 month average dust deposition level is assessed against compliance criteria (refer to Section 6).

## 8. AIR QUALITY MONITORING PROGRAM

### 8.1 INTRODUCTION

*Condition 12* of Schedule 3 requires that the Air Quality Management Plan include a monitoring program that evaluates performance of the development, measures compliance with the approved air quality criteria and evaluates and reports on the effectiveness of the air quality management system (Section 7).

This subsection describes the air quality monitoring program that will be implemented to meet this condition of consent and assist Hy-Tec to protect the local environment and amenity of the surrounding rural setting and to minimise the likelihood of air quality-related complaints.

### 8.2 METEOROLOGICAL MONITORING

A meteorological station has been operated at the Quarry Site since 2003. *Condition 13* of Schedule 3 of SSD-6084 requires that a suitable meteorological station be operating in the vicinity of the Quarry Site in accordance with the requirements described in the *Approved Methods for Sampling of Air Pollutants in New South Wales*. In addition, Condition M8.1 of EPL 12323 requires monitoring of the parameters, units of measure, averaging period and frequency specified in **Table 8**.

**Table 8**  
**Meteorological Monitoring**

Parameter	Units of Measure	Frequency	Averaging Period
Rainfall	mm	Continuous	24 hour
Sigma theta	°	Continuous	15 minute
Air Temperature	°C	Continuous	1 hour
Wind Direction at 10m	°	Continuous	15 minute
Wind Speed at 10m	m/s	Continuous	15 minute

Meteorological monitoring will be included in a meaningful summary of monitoring results published each month on the Hy-Tec website. The publication of monitoring data is described in Section 11.

### 8.3 AIR QUALITY MONITORING

Deposited dust monitoring will continue to use the three dust deposition gauges (EPL-4, EPL-5 and EPL-6) placed at private receptors to the south and east of the Quarry Site (**Figure 3**). Dust deposition monitoring has been undertaken at these sites since 2003.

*Condition 10* of Schedule 3 of SSD-6084 includes criteria for particulate matter. To demonstrate compliance with these criteria, a real time particulate matter monitor has been installed at the location displayed on **Figure 3**. This location is considered the most appropriate based on the predicted dispersion patterns for particulate matter identified in Todoroski (2018). Air quality impacts at this location would not be enhanced by prevailing winds, however it remains the closest privately-owned residence. Although this is the most appropriate location

for siting monitoring equipment, the location is limited by access to a suitable power supply. The residence at this location only has access to solar power, supported by a battery. The available power at this location is therefore not sufficient to power equipment such as a high volume air sampler or beta-attenuation monitor.

In order that the monitoring of particulate matter concentrations could provide an indication of particulate matter concentrations at Residence 31, Hy-Tec powers the monitoring equipment using a stand-alone solar system. The most appropriate equipment to enable sufficient power supply and monitoring accuracy is an E-Sampler. This equipment or a suitable equivalent will continue to be used to monitor particulate matter. The monitoring methodology for a real time particulate matter monitor is provided in Section 8.4.1.

## **8.4 AIR EMISSIONS MONITORING**

### **8.4.1 Particulate Matter**

#### **8.4.1.1 Methodology**

Monitoring will be undertaken using a real time particulate matter monitor.

Monitoring will be undertaken in accordance with the following documents.

- AS 29221987 Ambient Air – Guide for the Siting of Sampling Units (NSW DECCW Method AM-1).
- NSW DECCW Approved methods for the sampling and analysis of air pollutants in NSW (DECC, 2005).

The monitoring equipment will be set to continuous operation and PM<sub>10</sub> sample results will be collected digitally via a direct download from the equipment. Data will also be collected manually on a monthly basis.

The equipment will be set to provide SMS or email advice once particulate matter reaches trigger levels for a given period. Trigger levels will be established for 24-hour or other incremental averaging period for particulate matter levels so that quarry management can respond accordingly. Protocols for response to these triggers is provided in Section 7.2.

The real time particulate matter monitor will be subject to routine operational checks by quarry personnel on a monthly basis with calibration conducted on the unit at quarterly intervals in accordance with the manufacturer's instructions. The manufacturer also recommends that the equipment is returned to the factory for service and recalibration every two years.

#### **8.4.1.2 Frequency**

Monitoring will occur continuously with data collected and analysed on a monthly basis.

### 8.4.1.3 Analysis

PM<sub>10</sub> data will be analysed on a monthly basis and yield information on:

- average daily (24-hour) PM<sub>10</sub> (µg/m<sup>3</sup>); and
- average annual PM<sub>10</sub> (µg/m<sup>3</sup>), once sufficient data is available .

Compliance with criteria for TSP and PM<sub>2.5</sub> will be inferred through measurement of PM<sub>10</sub> and compliance with PM<sub>10</sub> criteria (see Section 6 and **Annexure 2**).

## 8.4.2 Deposited Dust

### 8.4.2.1 Equipment

Each deposited dust gauge comprises the following components.

- A metal post and holder.
- A glass flagon (4 litre).
- A 150mm diameter glass funnel (and rubber stopper).

Deposited dust gauges have been installed in accordance with Australian Standard AS 3580.10.1-1991 which requires the top of the glass funnel to be 2.0m ± 0.1m above the surrounding ground level.

### 8.4.2.2 Methodology

Deposited dust monitoring will be undertaken in accordance with the following documents.

- AS 2922:1987 Ambient Air – Guide for the Siting of Sampling Units (AM-1).
- NSW DEC Approved methods for the sampling and analysis of air pollutants in NSW (DEC, 2005).
- AS/NZS 3580.10.1:2003 Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter - Deposited Matter – Gravimetric Method (AM-19).

## Site Office Procedures

The following procedures are to be undertaken by site personnel involved in the collection of deposited dust gauges prior to leaving the office.

1. Check all new sample bottles have the required quantity of copper sulphate added.
2. Check all equipment for use in the sample collection / changeover is present and functional.

## Field Procedures

The following procedure is to be adopted for the collection/changeover of sample bottles.

1. Carefully remove the sample bottle and funnel from the sample holder (be careful of spiders etc.).
2. Wash down the inside surface of the funnel with approximately 50mL of distilled water into the sample bottle, brushing using the bottle brush.
3. Remove the stopper and funnel from the sample bottle, taking care not to break the funnel and immediately place a cap on the sample bottle.
4. Complete the labelling of the sampling period on the sample bottle (see example below).

Site:

Sampling Location:

Sample Number:

Sampling Period:

5. Place the stopper and cleaned funnel on the new bottle.
6. Ensure that the new bottle is properly numbered and the commencement date of the sampling period is recorded on the bottle.
7. Replace the new bottle and funnel in the sample holder ensuring the top of the funnel is horizontal.
8. Ensure all relevant data and comments are written on the deposited dust monitoring sheet and chain of custody form before leaving each site. It is a requirement of EPL 12323 (Condition M1.3) that the following elements are recorded for each sample.
  - The date on which the sample was taken.
  - The time at which the sample was taken.
  - The point at which the sample was taken.
  - The name of the person who collected the sample.

Any changes in land use immediately adjacent to the gauge since the last collection period will be documented. These might include any work on local roads or changes to nearby vegetation. Any contamination by extraneous material including vegetation, bird droppings, insects, etc. will be recorded on the deposited dust monitoring sheet and chain of custody.

## Sample Despatch

All surface dust samples are carefully packed and despatched via courier to ALS laboratories in Lithgow for analysis.

The samples are accompanied by the dust monitoring sheet and laboratory submission sheet. Copies of both sheets are to be retained for the Company's records.

#### 8.4.2.3 Frequency

Deposited dust will be measured and documented on a monthly basis. Exposed gauges will be replaced on a monthly basis with analysis conducted at a National Association of Testing Authorities (NATA) accredited laboratory or other approved laboratory for insoluble solids.

#### 8.4.2.4 Analysis

Deposited dust levels will need to be analysed by a NATA registered laboratory in accordance with AS 3580.10.1 – 2003 and yield data on:

- total insoluble solids (g/m<sup>2</sup>/month);
- ash fraction (g/m<sup>2</sup>/month); and
- percentage ash (an indication of organic/inorganic component of dust).

### 8.5 EVALUATION OF RESULTS

A meaningful summary of all air quality and meteorological monitoring data will be prepared each month and reviewed by the Quarry Production Manager before being published on the Hy-Tec website. The summary will include an assessment of the monitoring results against the criteria identified in *Condition 10* of Schedule 3 of SSD-6084. Monitoring results will also be reported in the Annual Review.

In accordance with *Condition 11b* of Schedule 3 of SSD-6084, air quality monitoring records will be reviewed monthly to ensure operations remain compliant with the air quality criteria documented in Section 6 and that the operational management measures implemented to minimise potential dust impacts remain effective. In the event that the air quality monitoring report identifies an exceedance of the relevant criteria, the procedures identified in Section 7.2.2 will be implemented.

## 9. COMPLAINTS HANDLING AND RESPONSE

Hy-Tec has established a complaints management system for the Quarry to ensure that any complaints are recorded, investigated and the feedback provided to the appropriate parties.

Complaints made be made via the following channels.

- Via phone directly to the Quarry on 02 6355 0268.
- Via the online ‘Contact Us’ portal on the Hy-Tec website ([www.hy-tec.com.au/](http://www.hy-tec.com.au/)).
- Via a Government agency such as Lithgow City Council or the EPA.

The management of air quality-related complaints is incorporated into the Air Quality Management System for the Quarry. The procedure for recording, investigating and responding to a noise related complaint is described in Section 7.2.2.



## 10. INCIDENT MANAGEMENT, NOTIFICATION AND REPORTING

### 10.1 INCIDENT IDENTIFICATION

SSD 6084 defines an incident as:

*“An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance”*

Further to this, SSD 6084 defines material harm as follows.

*Material harm.....Is harm that:*

- *involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial, or*
- *results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding \$10,000, (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment)*

*This definition excludes “harm” that is authorised under either this consent or any other statutory approval’*

An incident which causes or threatens to cause material harm to the environment (and may or may not result in an exceedance of air quality criteria) is referred to as a **Pollution Incident**.

An incident which is only as a result of an exceedance of air quality criteria is referred to as a **Non-compliance Incident**.

### 10.2 INCIDENT MANAGEMENT AND NOTIFICATION

#### 10.2.1 Pollution Incident

In the event of an air quality-related incident which is deemed a Pollution Incident (see Section 10.1), the Quarry Production Manager will be notified and the event will be reported to the EPA immediately at the first practical opportunity (and within 24 hours of the incident).

An investigation into the source of the excessive emissions will be immediately commenced and once identified the Quarry Production Manager or delegate will implement one or more of the corrective measures identified in the Air Quality Management System (see Section 7).

Within 7 days of the incident, the Company will submit a report to DPIE confirming the source of the excessive emissions, actions taken and ongoing management to prevent future incident to the regulatory authorities.

### 10.2.2 Non-compliance Incident

On identification of a non-compliance against air quality criteria, which may follow receipt of a complaint, the Quarry Production Manager will be notified and an investigation into the source of the non-compliance or complaint causing emissions commenced in accordance with the response and corrective actions described in Section 7.2.2 including notification protocols, where relevant.

### 10.3 INCIDENT REPORTING

Following implementation and review of the corrective measures, a short description of the incident, actions taken and results of the corrective actions will be documented by the Quarry Production Manager.

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

## 11. DOCUMENTATION AND PUBLICATION OF MONITORING INFORMATION AND REPORTING

Hy-Tec will retain records of meteorological monitoring and emissions monitoring for a minimum period of four years. Monitoring records will be made available to relevant government authorities following a written request.

Hy-Tec will include all emissions monitoring results in the Annual Review. This report evaluates the effectiveness of the management measures implemented, by reporting on the impacts and environmental performance of the development against its performance criteria. That document, once approved by the relevant government agencies, would 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*, each month Hy-Tec will publish a meaningful summary of all EPL required monitoring data on the Company's website. The summary will be published within 14 days of the last sample for that period being collected. In addition, Hy-Tec will provide a copy of obtained data (the value of each individual monitoring sample) free of charge to a member of the public when requested in writing. The data will be provided in a format that includes raw data values if requested, is comprehensible by the general public and also includes all accompanying necessary information. These requirements are presented in detail in *Requirements for Publishing Pollution Monitoring Data*" (EPA, 2013).

## 12. ROLES AND RESPONSIBILITIES

**Table 9** outlines the roles and responsibilities of personnel with reference to management of air quality.

**Table 9**  
**Roles and Responsibilities of Personnel with Respect to Management of Air Quality**

<b>Role</b>	<b>Responsibilities</b>
NSW Quarry Operations Manager	<p>Ensure compliance with the Air Quality Management Plan.</p> <p>Ensure adequate resources are available to implement the Air Quality Management Plan.</p> <p>Ensure suitably trained personnel are available to implement the responsibilities of the Quarry Production Manager during any time of the Quarry Production Manager's absence from site.</p> <p>Coordinate the review of the Plan (see Section 14).</p>
Quarry Production Manager, or his/her nominee	<p>Ensure the implementation of the Air Quality Management Plan.</p> <p>Ensure air quality monitoring results are regularly reviewed/evaluated and entered into the environmental database.</p> <p>Ensure reviews of meteorological forecasts are undertaken on a daily basis prior to the commencement of operations.</p> <p>Implementation of the Air Quality Management System (see Section 7).</p> <p>Relocate or postpone relevant activities in the event of adverse weather conditions, where practical.</p> <p>Provide primary contact for complaints and supply follow-up information to any complainant.</p> <p>Initiate investigations of complaints as received from the public or government agency.</p> <p>Prepare a report to government agencies or neighbours following a notifiable pollution incident (see Section 11).</p> <p>Inform the NSW Quarry Operations Manager of identified causes of elevated dust emissions and any alterations to site operations that may or has influenced the local environment.</p> <p>Ensure employees are competent through training and awareness programs.</p>
All On-site Personnel	<p>Operate in manner that minimises risks of incidents to themselves, fellow workers or the surrounding environment.</p> <p>Fully implement the relevant control measures within the Air Quality Management Plan.</p> <p>Report any anomalous dust or extraordinary events to the Quarry Production Manager.</p> <p>Follow any instructions provided by the Quarry Production Manager.</p>
All Truck Drivers	<p>Follow any instructions provided by any on-site personnel.</p> <p>Follow all requirements relating to management of dust and other emissions within the Driver's Code of Conduct.</p>

### **13. COMPETENCE TRAINING AND AWARENESS**

All personnel and contractors working at the Quarry undergo an induction. This induction includes information on the management of air quality while working on site.

After completing the induction, workers will sign the statement of induction and a record of this is kept in the administration office.

Monthly toolbox meetings are held to discuss whole-of-site production, management, safety and environmental issues. Matters relating to air quality are raised during these meetings, when necessary.

## 14. PLAN REVIEW AND CONTINUAL IMPROVEMENT PROTOCOL

In accordance with *Condition 5* of Schedule 5 of SSD-6084, the Plan will be internally reviewed within 3 months of submission of an Annual Review, an incident report resulting from a notifiable incident, each independent environmental audit and any modification to SSD-6084 to address feedback from these processes. Should changes to the Plan be required, approval for the modified plan would be sought from DPIE. A comprehensive review of all management plans will take place every three years and include review of all management measures to ensure these remain within best practice management. 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 dust emissions and monitoring frequency and methods, as necessary. Each review will also evaluate the effectiveness of the overall monitoring program and whether it should be modified or scaled back.

## 15. REFERENCES

**Benbow Environmental (2014).** *Air Quality Impact Assessment for the Austen Quarry Stage 2 Extension Project*. Prepared on behalf of Hy-Tec Industries Pty Limited.

**R.W. Corkery & Co (2014).** *Environmental Impact Statement for the Austen Quarry Stage 2 Extension Project*. Prepared on behalf of Hy-Tec Industries Pty Limited.

**R.W. Corkery & Co (2018).** *Austen Quarry Stage 2 Extension Project (MOD 1 – SSD 6084) Statement of Environmental Effects*, March 2018. Prepared on behalf of Hy-Tec Industries Pty Limited.

**Todoroski Air Sciences (2018).** *Air Quality Impact Assessment Austen Quarry*. Prepared on behalf of Hy-Tec Industries Pty Limited.

# Annexure 1

## 24-Hour PM<sub>10</sub> Monitoring Results July 2017 to November 2018

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

This page has intentionally been left blank



24-hour PM10 Monitoring Results

Day	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18
1	5.7	1.8	42.8	5.8			8.8	20.1	13.6	3.7	4.2	2.7	6.6	2.0	3.9	12.7	
2	4.5	4.4	22.2	13.2			3.8	4.6	10.7	11.0	4.8	1.9	5.9	10.8	5.2	3.7	7.2
3	4.4	4.3	4.3	15.0			8.0	3.8	12.4	13.3	5.4	4.5	4.3	13.5	3.9	4.8	6.5
4	2.4	0.5	4.5	13.2			7.5	2.7	18.6	12.1	7.0	3.8	5.2	5.5	2.3	3.0	20.6
5	2.8	2.3	4.8	17.5			9.0	3.0	14.9	12.7	6.4	3.1	2.5	4.9	2.2	2.1	6.8
6	1.5	3.2	4.5	5.2			8.6	3.5	6.0	14.4	6.2	2.2	3.7	4.6	4.3	6.3	5.9
7	2.5	3.3	3.0	5.4			7.7	4.9	9.4	17.9	34.0	12.9	5.6	5.8	2.8	2.2	3.2
8	2.7	1.0	3.3	7.4			7.4	4.3	5.1	10.2	24.2	7.0	3.7	2.8	2.0	1.3	4.1
9	2.7	1.7	4.0	4.1			5.8	7.8	3.9	9.9	13.6	1.2	2.7	4.6	4.4	3.7	6.2
10	2.1	2.4	3.1	10.2			6.3	9.5	3.9	20.6	13.1	3.8	6.1	4.5	4.3	6.3	5.7
11	2.0	4.2	3.4	6.8			16.4	9.9	5.9	15.8	0.6	4.5	6.8	4.2	5.8	4.2	4.5
12	3.9	6.0	3.4	2.6			19.2	17.2	9.5	13.1	1.0	5.1	5.3	1.2	7.0	0.4	4.3
13	2.8	5.7	3.7	7.6			11.1	19.7	3.7	9.6	3.1	5.4	5.9	1.7	14.3	1.7	3.6
14	3.2	5.6	3.1				2.5	18.6	12.2	11.6	17.0	6.8	12.2	4.5	7.9	3.1	7.3
15	4.0	3.5	4.9				4.2	20.3	8.6	20.1	21.5	5.1	8.2	4.1	8.8	6.3	4.7
16	4.7	3.9	4.3				11.9	10.2	25.3	4.5	36.1	6.5	5.8	7.8	3.5	6.5	7.6
17	4.2	7.0	2.3				12.5	20.2	18.1	13.5	10.5	0.6	2.9	8.4	8.1	4.4	8.5
18	3.7	2.9	4.1				9.3	20.2	16.6	20.1	9.5	0.9	20.0	5.2	9.1	3.1	5.6
19	1.8	1.2	6.4				5.6	15.3	18.6	9.3	2.8	2.8	19.2	3.5	8.3	2.9	6.4
20	5.1	22.6	5.2				3.9	6.1	11.2	10.1	4.7	9.6	3.6	4.3	3.4	8.5	6.4
21	4.1	7.4	5.0				4.5	4.5	1.6	21.5	3.5	7.8	5.5	3.3	3.6	14.1	17.1
22	3.7	16.5	9.7				11.5	7.4	3.5	13.1	5.9	4.3	7.3	2.1	3.5	9.6	28.6
23	3.2	9.7	11.9				14.8	10.1	7.0	84.0	5.4	5.7	5.5	12.8	5.5	11.5	8.3
24	3.7	2.8	12.0				22.3	5.4	7.3	133.4	10.7	4.6	5.8	11.1	7.2	13.3	2.8
25	4.8	6.5	7.7				14.3	4.0	8.4	79.5	17.6	9.1	8.8	8.7	3.8	8.6	3.7
26	4.8	8.3	6.1				21.1	3.5	6.9	29.6	14.0	7.9	11.3	6.9	3.5	7.1	
27	3.5	2.3	12.3				20.2	7.0	8.2	16.0	12.9	5.7	7.8	12.2	3.6	10.1	
28	3.8	2.1	4.2				20.0	6.2	9.9	11.6	9.4	2.3	7.4	8.4	4.5	13.6	
29	4.7	4.7	3.4				19.7		11.3	2.4	6.4	3.0	5.7	5.6	3.5	25.7	
30	3.1	5.6	3.1				13.5		10.3	3.7	7.1	3.4	8.2	10.7	5.1	9.7	
31	1.6	5.4					9.3		23.4		3.6	7.7	8.2		9.9		
Data %	100%	100%	100%	42%	0%	0%	97%	100%	100%	100%	100%	100%	103%	103%	100%	103%	83%
PM10 average	3.5	5.1	7.1	8.8			11.1	10.7	10.7	21.9	10.4	4.9	6.9	6.4	5.1	6.8	7.9

84%  
8.4

Average Data Capture  
Average 24-hr PM10

24 hr average PM10 data - Austen Quarry 2017-2018

No data faulty Esampler  
24hr result above 50ug/m<sup>3</sup>  
Regional dust storm experienced

Note 1: In 2017/18 repairs to E Sampler were delayed by Ecotech Service department in Melbourne due to spare parts availability.  
Note 2: High results on 23 to 25 April 2018 were likely caused by fires in the area causing high smoke/particulate levels.



This page has intentionally been left blank





# **Annexure 2**

## **Correspondence Regarding TSP Compliance - Todoroski 2016**

(Total No. of pages including blank pages = 8)

This page has intentionally been left blank



Suite 2B, 14 Glen Street Eastwood,  
NSW 2122  
Phone: O2 9874 2123  
Fax: O2 9874 2125  
Email: [info@airsciences.com.au](mailto:info@airsciences.com.au)  
Web: [www.airsciences.com.au](http://www.airsciences.com.au)  
ACN: 151 202 765 | ABN: 74 955 076 914

14 October 2016

NSW Department of Planning and Environment  
c/o  
Daniel Reed  
Strategy and Business Development Analyst  
HY-TEC  
PO Box 6770, Silverwater NSW, 1811  
Via Email: [Daniel.Reed@Hy-Tec.com.au](mailto:Daniel.Reed@Hy-Tec.com.au)

**RE: Review of Air Quality Monitoring and Air Quality Sampling – Austen Quarry, Hartley**

Dear Sir/ Madam,

We have been engaged to provide an air quality monitoring review related to the Austen Quarry (hereafter referred to as the Project). We have been specifically asked to provide a brief outline of appropriate dust monitoring and management practices that need to be implemented to address the Approval Conditions for the Project.

This letter outlines our understanding of the Project and its air quality requirements, the likely existing environment and consideration of potential air quality impacts.

**Background**

The Project is located off Jenolan Caves Road, approximately 3.5 kilometres (km) south southwest of Hartley, NSW. The site is located in a valley near to the Cox's River, with the nearest receptors around the site ranging from approximately 1.7km to 3.1km away.

The Project has been granted approval to extend the life of the quarry by permitting the continued extraction of hard rock (Rhyolite) from a larger area. The current production rate of up to 1.1 million tonnes per annum (Mtpa), and the current operations would remain unchanged. The Project would continue to use drill and blast methods to win material, truck and shovel methods to handle the material and to use the existing equipment to continue to crush material on-site.

**Site observations**

I conducted a site inspection of the operations on Monday 5 September 2016, and inspected all areas of the site.

---

16070588A\_Hartley\_Austen\_Quarry\_Air\_Monitor\_161014\_ATNW

TODOROSKI AIR SCIENCES | [info@airsciences.com.au](mailto:info@airsciences.com.au) | O2 9874 2123

I also spent some time observing the site prior to and after the site inspection from a distance. I did not observe any visible plume of dust, and when on site only observed normal, minor dust emissions within a few metres from the main dust sources.

Overall, I found that the operation has a low risk of any dust impacts at any surrounding receptors due to a range of measures that have been built into the design of the site, and also the relatively large separation distances and wooded areas between the site and most receptors.

For example, the quarry is sheltered within tall rock faces. Areas of rock that could easily be won have not been extracted and remain as very tall steep barriers around the main mining activities (e.g. 20-40 metres (m) high).

The main quarry haul road to the crusher is only 200 to 300m long. The crusher location is quite remarkable in that it is positioned in a deep, narrow, purpose made pit in the rock, such that the loading point is near to the pit floor and close to the pit. This means that haul trucks have a near level, short haul distance.

Whilst these features appear to be targeting noise, they also provide significant shelter from the wind and hence also reduce dust emissions, especially the emissions of coarser sized particles. The output of the primary crusher is conveyed through a hole in the rock onto a surge pile. Rock is then reclaimed from under the pile via a covered conveyor to the secondary crushers and screens. All of the processing plant have dust mitigation measures such as sprays, covers or enclosures fitted.

The main site access road is sealed and generally clean. There is a relatively long narrow haul road from the final processing plant back over the hill to the emplacement area, however this is only used for hauling reject material which requires only two or three movements per day. The unsealed roads on the site are thus easily managed by the water cart.

The nearest sensitive receptors are;

- + one at approximately 1.7km;
- + several at approximately 2.5km; and,
- + the remainder more that approximately 3km away from the site.

Overall in my opinion the risk of any dust impact at any sensitive receptor would be very low.

#### **Approval conditions**

The approval conditions are consistent with those used for mines and extractive industries, and are set out below.

**AIR QUALITY**

**Air Quality Impact Assessment Criteria**

10. The Applicant shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 4 at any residence on privately-owned land.

Table 4: Air quality criteria

Pollutant	Averaging Period	Criterion
Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	a,d 30 µg/m <sup>3</sup>
Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	b 50 µg/m <sup>3</sup>
Total suspended particulates (TSP)	Annual	a,d 90 µg/m <sup>3</sup>
<sup>c</sup> Deposited dust	Annual	b 2 g/m <sup>2</sup> /month   a,d 4 g/m <sup>2</sup> /month

Notes to Table 4:  
a Cumulative impact (ie increase in concentrations due to the development plus background concentrations due to all other sources).  
b Incremental impact (ie increase in concentrations due to the development alone, with zero allowable exceedances of the criteria over the life of the development).  
c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.  
d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary.  
e "Reasonable and feasible avoidance measures" includes, but is not limited to, the operational requirements in conditions 11 and 12 to develop and implement an air quality management system that ensures operational responses to the risks of exceedance of the criteria.

**Operating Conditions**

11. The Applicant shall:

- implement best practice management to minimise the dust emissions of the development;
- 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;
- minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see note d under Table 4);
- monitor and report on compliance with the relevant air quality conditions in this consent; and
- minimise the area of surface disturbance and undertake progressive rehabilitation of the site, to the satisfaction of the Secretary.

The approval conditions require the quarry to implement all reasonable and feasible measures to prevent excessive dust levels, and to implement best management practices. Consistent with mining projects, this would entail dust monitoring and air quality management procedures to be operated on the site.

The Austen Quarry is approximately 10km from any similar extractive industry, and generally speaking in a location where background dust levels would be low.

Only low TSP levels due to the quarry would be expected, especially as it is well sheltered and the main dust producing activities occur within a pit. The air quality assessment for the quarry predicts TSP levels of less than 2µg/m<sup>3</sup> at the most affected receptor, a level less than 2% of the TSP criterion of 90µg/m<sup>3</sup>. It is noted that the NSW Government, i.e. OEH, no longer conducts TSP monitoring, and NSW EPA generally no longer requires TSP to be measured in its licence conditions.

It would not appear likely for there to be any exceedance of the annual average TSP levels at any sensitive receptor due to the operation of the relatively distant quarry. This is consistent with the experience in the

Hunter Valley of NSW where there are approximately 160 dust monitors serving approximately 25 coal mines. Whilst it is relatively common to have exceedances of the 24-hour PM<sub>10</sub> criteria at some of the monitors due to mining activities, there are no known TSP exceedances near any receptor.

The PM<sub>10</sub> fraction of the dust near extractive industries is consistently 40% of the total, thus the TSP levels can be reasonably calculated to be 2.5 times the measured PM<sub>10</sub> level. This approach is used to calculate the likely TSP levels at the Mt Arthur Coal Mine and the Bengalla Coal mine in the Hunter Valley.

For these reasons TSP levels for the Austen Quarry should be calculated by inference to the measured PM<sub>10</sub> level as done in the Hunter. The approach allows the operation to focus on measurement of PM<sub>10</sub>, which is a better indicator of potential impact.

As PM<sub>10</sub> emissions due to the quarry activities have the most potential to exceed criteria, it is understood that a new real-time PM<sub>10</sub> monitor would be installed and that the existing deposited dust monitoring that occurs near the site would continue.

The real-time PM<sub>10</sub> monitor should be installed at the nearest private receptor R31 (see **Figure 1**). However, any frequent occurrences of elevated dust levels would most likely be due to dust from the residence access road, or activities near the house. If this situation arises, the monitor should be re-located to a clearing at a distance intermediate from the quarry and the residence, and preferably on a prevailing wind axis. A monitor closer to the quarry operations is more likely to reflect the trends in the site emissions.

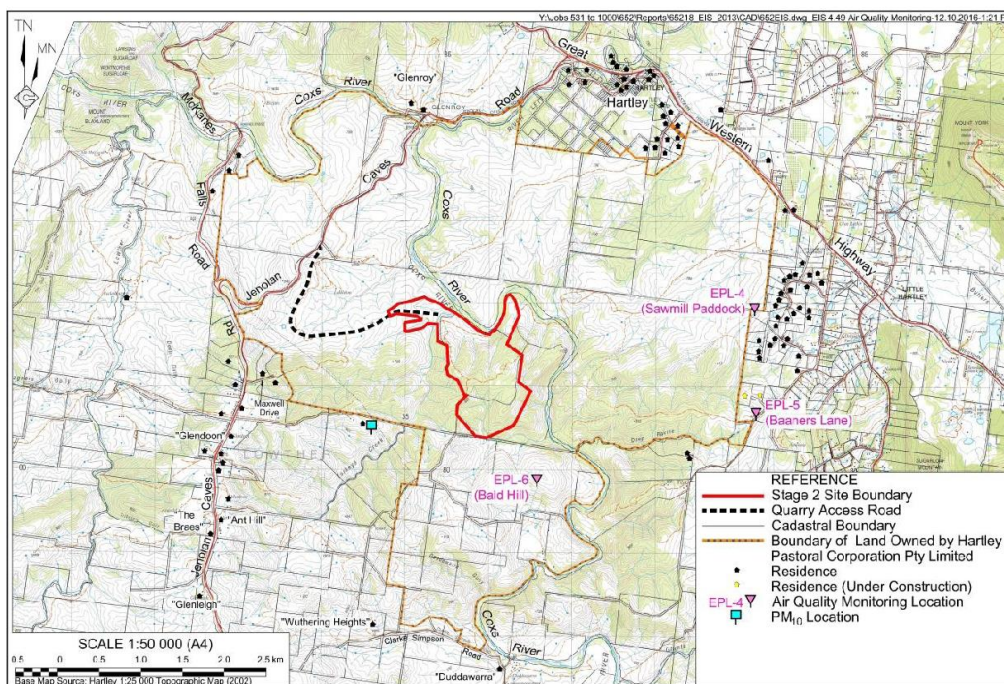
Any monitoring conducted will need to include weather data so that the dust monitoring data can be used to provide quarry staff with a real-time measure showing how the local dust levels are tracking. The air quality management plan should outline that when dust levels reach a pre-defined threshold; this is the signal for operators to check-on and modify site activities to minimise dust. The actions would depend on the threshold level of dust reached. For example, a low threshold for checking on activities, a medium threshold for checking an implementing additional dust mitigation to manage any visible dust and a high threshold to cease any activity from which dust cannot be reasonably controlled.

Operating a site management plan that incorporates real-time dust monitoring in this way, and implementing actions to respond to any measured levels due to the operation, or under extraordinary events such as regional dust storms etc. that are above the defined threshold levels, is a means to reasonably comply with the conditions. This general approach has now been adopted by the EPA at the primary means for managing the dust effects from coal mines in the Hunter Valley.

The air quality management practices that are being implemented at the site, such as checking weather forecasts and scheduling extra watering as appropriate for the coming conditions should continue. With the addition of real-time PM<sub>10</sub> monitoring and an air quality management plan that incorporates actions in response to the real-time monitoring data, as outlined above, means that overall the site would continue to effectively manage dust emissions and hence maintain a low risk of exceeding regulatory requirements.

**Air Quality Sampling**

The current air quality monitoring network at the Project include three dust deposition gauges (see **Figure 1**) in general accordance with the NSW EPA’s *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (NSW DEC, 2007)*.



**Figure 1: Suggested location for PM<sub>10</sub> monitoring**

Suitable locations for additional PM<sub>10</sub> air quality monitoring locations for the Austen Quarry are limited due to the surrounding forest and terrain located to the west, south and east of the quarry and constraints with access to mains power.

Many real-time PM<sub>10</sub> air quality monitors require 240V mains power to operate. As there is limited access to mains power in the area surrounding the quarry, (e.g. the nearest private residence R31 does not have 240V power, or spare solar capacity), these types of monitors would not be a viable option for good dust management. A light-scattering type of instrument such as an e-sampler is suggested, as it can operate on solar and battery power. The device can be easily commissioned in the chosen location or relocated to other locations as required in the future to best manage dust.

It is noted that this type of monitoring equipment is consistent with the current NSW EPA initiatives in the Hunter Valley for large scale coal mining operations, and that the air quality management plan prepared for the operation of the quarry is consistent with and includes all of the above suggestions.

Please feel free to contact me if you would like to discuss or clarify any aspect of the above.

Yours faithfully,  
Todoroski Air Sciences



Aleks Todoroski

