

# Blast Management Plan

(Incorporating a Blast Monitoring Program)  
For the East Guyong Quarry



<b>Document Control</b>			
<b>Draft and Date</b>	<b>Prepared by:</b>	<b>Approved for Release by:</b>	<b>Comments Received From and Date</b>
Original – Sept 2012	K. Oxley (RWC)	M. Gear	DP&I – Nov 2012
Revision 1 – Feb 2013	M. Bland (RWC)	A. Driver	
Revision 2 – Aug 2017	N. Warren (RWC)	P. Riini	L. Evans (DPE)
Revision 3 – June 2019	B. Pignone (Hanson)	A. Driver	M. Hollis (DPIE)
Revision 4 – September 2019	B. Pignone (Hanson)	A. Driver	
Approved By			
Date:			
Review Date:			

# Contents

<b>Blast Management Plan</b>	<b>1</b>
<b>Contents</b>	<b>3</b>
<b>Figures</b>	<b>4</b>
<b>Tables</b>	<b>4</b>
<b>1. Introduction</b>	<b>5</b>
<b>2. Approved Activities</b>	<b>8</b>
<b>3. Legal and other Requirements</b>	<b>10</b>
<b>4. Objectives and Outcomes</b>	<b>16</b>
<b>5. Roles and Responsibility</b>	<b>17</b>
<b>6. Competence Training and Awareness</b>	<b>18</b>
<b>7. Surrounding Residences</b>	<b>18</b>
<b>8. Anticipated Blast-Related Impacts</b>	<b>20</b>
8.1. Introduction	20
8.2. Potential impacts	20
8.2.1. Introduction	20
8.2.2. Airblast Overpressure Structural Impacts	20
8.2.3. Ground Vibration Structural Impacts	20
8.2.4. Blasting Assessment Criteria – Human Comfort	21
8.3. Predicted Levels of Blast Emissions	21
<b>9. Management Measures</b>	<b>22</b>
9.1. Introduction	22
9.2. Operating Hours and Frequency of Blasting	22
9.3. Operating Conditions	23
9.3.1. Blasting Operations	23
9.3.2. Flyrock, Dust and Fume Management Measures	23
9.3.3. Management of Airblast Overpressure	23
9.3.4. Safety Measures	24
9.4. Property Inspections	24
9.5. Property Investigations	25
<b>10. Explosives Control Plan</b>	<b>26</b>
10.1. Introduction	26
10.2. Legal Requirements	26
10.3. Control Measures	27
10.3.1. Explosive Transport, Handling and Storage	27
10.3.2. Blast Planning and Preparation	27
10.3.3. Blast Firing	28
10.3.4. Blast Risk Management	28
10.3.5. Explosives Emergency Response	29
<b>11. Monitoring</b>	<b>30</b>
11.1. Introduction	30
11.2. Blast Monitoring Protocol	30
<b>12. Evaluation of Compliance</b>	<b>30</b>
<b>13. Corrective and Preventative Actions</b>	<b>31</b>
<b>14. Complaints Handling and Response</b>	<b>31</b>
<b>15. Incident Reporting</b>	<b>33</b>
<b>16. Publication of Monitoring Information</b>	<b>33</b>
<b>17. Review</b>	<b>33</b>
<b>Appendices</b>	<b>34</b>

# Figures

<b>Figure 1:</b> Locality Plan (A4 Colour) Dated 15/08/2012 Inserted 15/08/2012.....	7
<b>Figure 2:</b> Site Layout (A4 Colour) Dated 11/07/19 inserted 11/07/2019 .....	9
<b>Figure 3:</b> Surrounding Residences and Blast Monitoring Locations (A4 Colour) Dated 22/2/13 Inserted 26/2/13 .....	19

# Tables

<b>Table 1:</b> Blast-related Project Approval Requirements .....	10
<b>Table 2:</b> Blast Statement of Commitments Requirements .....	14
<b>Table 3:</b> Licence Requirements .....	15
<b>Table 4:</b> Objectives and Key Performance Outcomes .....	16
<b>Table 5:</b> Roles and Responsibilities .....	17
<b>Table 6:</b> Airblast Overpressure Structural Impacts .....	20
<b>Table 7:</b> Ground Vibration Structural Impacts .....	21
<b>Table 8:</b> Predicted Levels of Blast Emissions .....	21
<b>Table 9:</b> Blast Monitoring Locations .....	30

# 1. Introduction

This *Blast Management Plan* (the Plan) has been prepared by Hanson Construction Materials Pty Ltd (Hanson) and R. W. Corkery & Co Pty Limited (RWC) for the East Guyong Quarry (the Quarry). The Quarry is located approximately 22km southeast of Orange and 36km west of Bathurst (**Figure 1**).

This Plan has been prepared in satisfaction of *PA Condition 3(13)* of Project Approval 06\_0193 and describes the following.

- A description of the activities approved under PA 06\_0193.
- Consultation undertaken during preparation of this Plan.
- Identification of legal and other requirements associated with management of blast emissions from the Quarry.
- Identification of the objectives and key performance outcomes for this Plan and the Quarry.
- A description of Quarry personnel roles and responsibilities with respect to Air Quality monitoring.
- A description of inductions, training, awareness and operating protocols to be implemented.
- Identification of surrounding residences and potential blast-related impacts.
- A description of blast management measures that would be implemented during construction and operation of the Quarry.
- A description of blast-related monitoring that will be undertaken.
- Evaluation of compliance with blast criteria.
- A description corrective and preventative actions that will be implemented should exceedance(s) of the relevant criteria be identified.
- A description of complaints handling and response procedures that will be implemented.
- A description of Incident reporting procedures.
- A description of publication of monitoring information.
- Detailing of plan evaluation review requirements.

An Explosives Control Plan is provided in Section 10 and has been prepared in accordance with *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* (Schedule 2, Section 4).

All blasting is undertaken by qualified personnel or contractors that operate under Hanson's safe work management protocols. Hanson currently contracts MAXAM Australia for blasting at the East Guyong Quarry. A Blast Management Safety Plan for the East Guyong Quarry has been prepared by MAXAM Australia and is included as **Appendix 1**. The Blast Management Safety Plan provides the MAXAM Australia protocols for blasting risk identification, risk mitigation, blast planning including blast design, monitoring and specific operational procedures to reduce risks to Quarry personnel, blast contractors and nearby residences.

In addition, a range of other management plans have also been prepared to guide operations within the Quarry. These include the following.

- Aboriginal Cultural Heritage Management Plan.
- Noise Management Plan.
- Environmental Management Strategy.

- Asbestos Management Plan.
- Soil and Water Management Plan.
- Landscape Management Plan.
- Air Quality Monitoring Program.

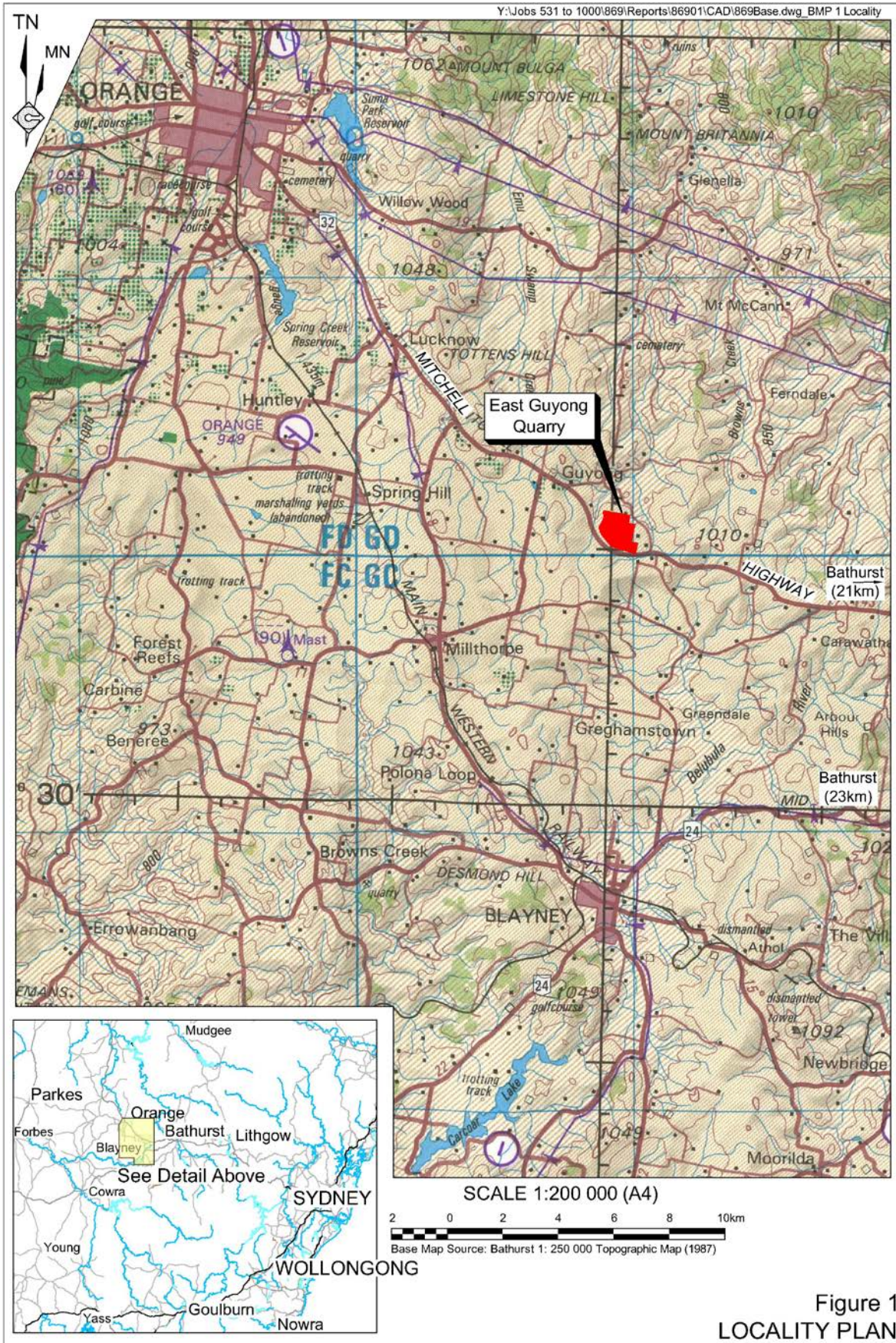


Figure 1  
LOCALITY PLAN

Figure 1: Locality Plan (A4 Colour) Dated 15/08/2012 Inserted 15/08/2012

## 2. Approved Activities

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

- Establishment of an extraction area to extract basalt using standard drill, blast, load and haul techniques.
- Construction and use of a processing plant to process the extracted basalt to produce a range of quarry products, including aggregates and road base, and stockpiling of the resulting products adjacent to the processing plant.
- Construction of a site access road and intersection with the Mitchell Highway.
- Transportation of up to 600 000t per year of quarry products via the Mitchell Highway using truck and dog and B Double trucks.
- No more than 30 laden trucks despatched from the Quarry in any hour, no more than 160 laden trucks despatched from the Quarry on any day (Monday to Friday) and no more than 60 laden trucks may be despatched from the Quarry on a Saturday.
- Construction of a range of bunds and mounds and establishment of native vegetation to provide visual screening for the quarry operations.

The approved quarry life is until 31 December 2042 and the approved hours of operation are as follows.

- Monday to Friday (non-daylight savings) – 6:00am to 6:00pm.
- Monday to Friday (daylight savings) – 6:00am to 8:00pm.
- Saturdays – 7:00am to 1:00pm.
- Sundays and public holidays – nil.
- Product despatch between 5:00am and 10:00pm, Monday to Saturday is permitted following negotiation of agreements with the seven surrounding landholders nominated in Condition 6 of Schedule 3 of PA 06\_0193 and the notification of the Department in writing of the terms of these agreements.



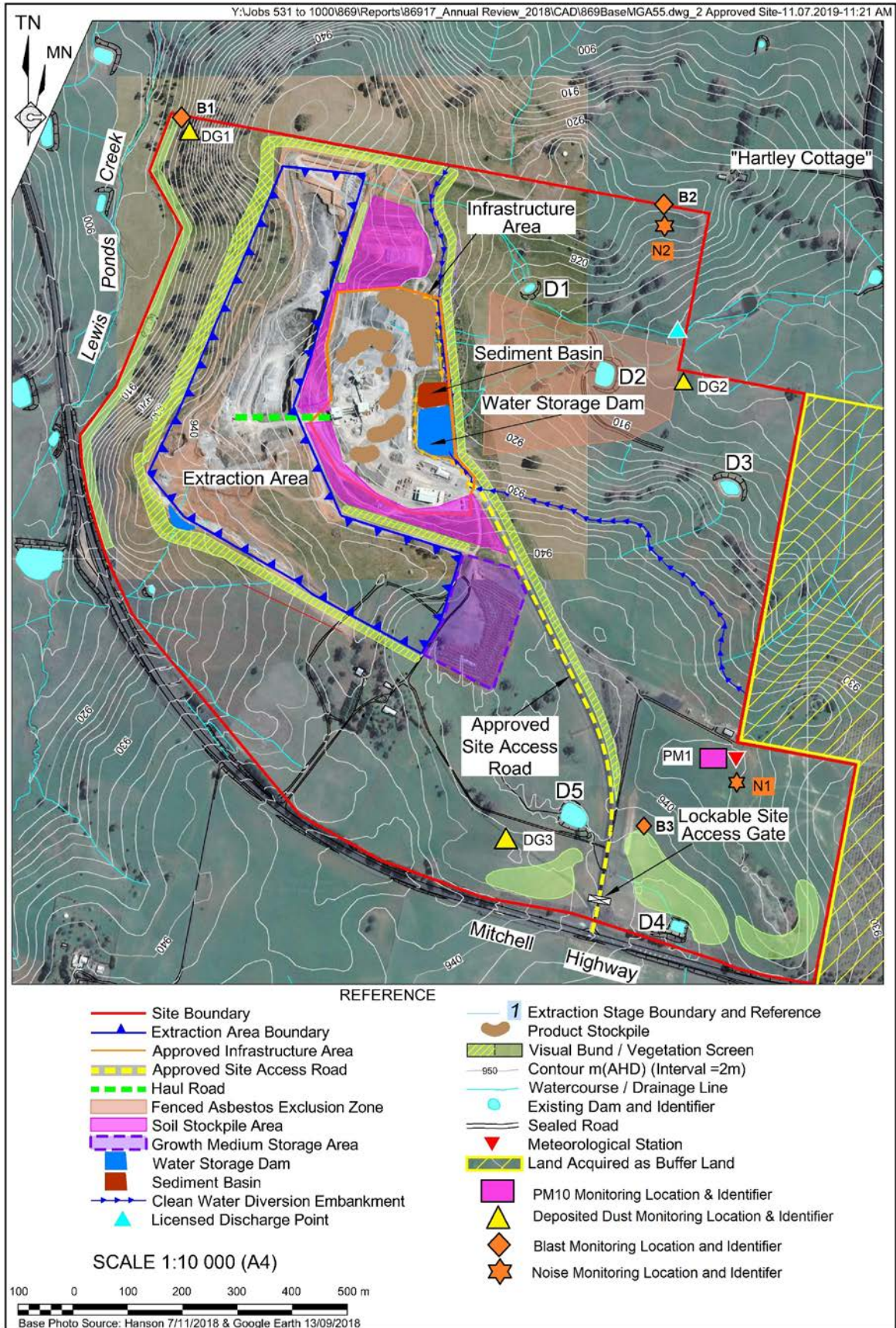


Figure 2: Site Layout (A4 Colour) Dated 11/07/19 inserted 11/07/2019

# 3. Legal and other Requirements

Hanson was granted PA 06\_0193 by the NSW Land and Environment Court on 21 May 2012 pursuant to Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). DA 06\_0193 was amended on 17 April 2019 following the approval of MOD 2. The approval includes the required criteria that Hanson must comply with and sets out the core requirements of this Plan. The approval includes the required criteria that Hanson must comply with during the life of the Quarry and sets out the core requirements of this Plan. Relevant blast-related conditions associated with this approval are reproduced in **Table 1**.

**Table 1: Blast-related Project Approval Requirements**

Page 1 of 4

Schedule (Condition)	Condition	Section Where Addressed						
<b>BLASTING</b>								
3(8)	<p>The Proponent must ensure that the airblast overpressure level from blasting at the project does not exceed the criteria in Table 4 at any residence on privately-owned land.</p> <p>Table 4: Airblast overpressure impact assessment criteria</p> <table border="1"> <thead> <tr> <th>Airblast overpressure level (dB(Lin Peak))</th> <th>Allowable exceedance</th> </tr> </thead> <tbody> <tr> <td>115</td> <td>5% of the total number of blasts in a 12 month period</td> </tr> <tr> <td>120</td> <td>0%</td> </tr> </tbody> </table>	Airblast overpressure level (dB(Lin Peak))	Allowable exceedance	115	5% of the total number of blasts in a 12 month period	120	0%	11
Airblast overpressure level (dB(Lin Peak))	Allowable exceedance							
115	5% of the total number of blasts in a 12 month period							
120	0%							
3(9)	<p>Ground Vibration Impact Criteria</p> <p>The Proponent must ensure that the ground vibration level from blasting at the project does not exceed the levels in Table 5 at any residence on privately-owned land.</p> <p>Table 5: Ground vibration impact assessment criteria</p> <table border="1"> <thead> <tr> <th>Peak particle velocity (mm/s)</th> <th>Allowable exceedance</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>5% of the total number of blasts in a 12 month period</td> </tr> <tr> <td>10</td> <td>0%</td> </tr> </tbody> </table>	Peak particle velocity (mm/s)	Allowable exceedance	5	5% of the total number of blasts in a 12 month period	10	0%	11
Peak particle velocity (mm/s)	Allowable exceedance							
5	5% of the total number of blasts in a 12 month period							
10	0%							
3(10)	<p>Blasting Hours and Frequency</p> <p>The Proponent must carry out blasting on site only between 9.00 am and 3.00 pm Monday to Friday. No blasting is allowed on Saturdays, Sundays and Public Holidays.</p>	9.2						
3(11)	<p>The Proponent may carry out on the site a maximum of:</p> <p>(i) 2 blasts a day; and</p> <p>(ii) 5 blasts a week, averaged over a calendar year.</p>	9.2						
3(12)	<p>Operating Conditions</p> <p>During quarrying operations on site, the Proponent must implement best blasting practice to:</p> <p>(a) conduct blasting operations in accordance with AS 2187.2- Explosive Storage, Transport and Use;</p> <p>(b) minimise fly rock and dust and fume emissions from blasting;</p> <p>(c) protect travellers on the Mitchell Highway;</p> <p>(d) protect the safety of people and livestock and the serviceability of private property and public infrastructure;</p>	9.3 and 10 9.3.2 9.3 and 10 9.3 and 10						

Schedule (Condition)	Condition	Section Where Addressed
	to the satisfaction of the Secretary.	
3(13)	<p>Blast Management Plan</p> <p>The Proponent must prepare and implement a Blast Management Plan for the project to the satisfaction of the Secretary. This plan must:</p> <p>(a) be submitted to the Secretary for approval prior to the commencement of blasting activities; and</p> <p>(b) include:</p> <ul style="list-style-type: none"> <li>▪ a Blast Monitoring Program; and</li> <li>▪ measures to implement the requirements of condition 12.</li> <li>▪ The Proponent must implement the Blast Management Plan as approved by the Secretary</li> </ul>	<p>1</p> <p>11</p> <p>9</p>
3(14)	<p>Blast Monitoring Program</p> <p>The Proponent must prepare and implement a Blast Monitoring Program for the project to the satisfaction of the Secretary. This program must:</p> <p>(a) be submitted to the Secretary for approval prior to the commencement of blasting activities; and</p> <p>(b) include a protocol for evaluating blasting impacts on, and demonstrating compliance with, the blasting criteria in this approval for all privately-owned residences and other structures.</p> <ul style="list-style-type: none"> <li>▪ The Proponent must implement the Blast Management Plan as approved by the Secretary</li> </ul>	<p>1</p> <p>12</p>
3(15)	<p>Public Notice</p> <p>The Proponent must:</p> <p>(a) operate a blasting hotline and advertise the hotline number in a local newspaper at least twice a year, or operate an alternate system agreed to by the Secretary, to enable the public to get up-to-date information on the blasting schedule;</p> <p>(b) publish an up-to-date blasting schedule on its website; and</p> <p>(c) notify the landowner/occupier of any residence within 2 kilometres of the site about the blasting schedule, blasting hotline and its website at least three working days prior to blasting, to the satisfaction of the Secretary.</p>	<p>9.3.4</p> <p>9.3.4</p> <p>9.3.4</p>
3(16)	<p>Property Inspections</p> <p>At least 2 months prior to the commencement of blasting operations at the quarry, the Proponent shall advise the owners of privately-owned land within 2 kilometres of the proposed quarry, that they are entitled to a structural property inspection to establish the baseline condition of buildings and other structures on their property.</p> <p>If the Proponent receives a written request for a structural property inspection from any such landowner, the Proponent must:</p> <ul style="list-style-type: none"> <li>▪ within 2 months of receiving this request, commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, to inspect the condition of any building or structure on the land, and recommend measures to mitigate any potential blasting impacts; and</li> <li>▪ give the landowner a copy of the property inspection report.</li> </ul>	<p>9.4</p> <p>9.5</p> <p>9.5</p>
3(17)	Property Investigations	

Schedule (Condition)	Condition	Section Where Addressed
	<p>If any landowner of privately-owned land within 2 kilometres of blasting operations, or any other landowner nominated by the Secretary, claims that buildings and/or other structures on his/her land have been damaged as a result of blasting at the project after the date of this approval, the Proponent must within 2 months of receiving this claim:</p> <p>(a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, to investigate the claim; and</p> <p>(b) give the landowner a copy of the property investigation report.</p> <p>If the independent property investigation confirms the landowners claim, and both parties agree with these findings, then the Proponent must repair the damage to the satisfaction of the Secretary.</p> <p>If the Proponent or landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Secretary for resolution.</p>	<p>9.5</p> <p>9.5</p> <p>9.5</p> <p>9.5</p>
4(2)	<p>If the results of the monitoring required in Schedule 3 identify that the impacts generated by the project on site are greater than the relevant impact assessment criteria, and there is no negotiated agreement in place to allow the impact, then within 2 weeks of obtaining the monitoring results the Proponent must:</p> <p>(a) notify the Secretary, the affected landowners and tenants (including tenants of quarry owned properties) accordingly, and provide monitoring results to each of these parties until the results show that the project is complying with the relevant criteria in Schedule 3.</p>	15
5(2)	<p>Management Plan Requirements</p> <p>The Proponent must ensure that the Management Plans required under this approval 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 project or any management measures;</li> </ul>	<p>8</p> <p>3</p> <p>3</p> <p>4</p>
5(2) (Cont'd)	<p>Management Plan Requirements (Cont'd)</p> <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 project; 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;</p> <p>(f) a program to investigate and implement ways to improve the environmental performance of the project over time;</p> <p>(g) a protocol for managing and reporting any:</p>	<p>9</p> <p>11</p> <p>12</p> <p>13</p> <p>12</p> <p>15</p>

Schedule (Condition)	Condition	Section Where Addressed
	<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</li> <li>▪ performance criteria; and</li> <li>(h) a protocol for periodic review of the plan.</li> </ul> <p>Note: At the discretion of the Secretary, some of these requirements may be waived where they are either not relevant or necessary.</p>	<p>14</p> <p>12</p> <p>12</p> <p>12</p> <p>17</p>
5(4)	<p>Revision of Strategies, Plans and Programs</p> <p>Within 3 months of the submission of an:</p> <ul style="list-style-type: none"> <li>(a) the submission of an annual review under condition 3 above;</li> <li>(b) the submission of an incident report under condition 6 below;</li> <li>(c) the submission of an independent environmental audit report under condition 8 below; and</li> <li>(d) the approval of any modification of the conditions of this approval,</li> </ul> <p>the Proponent must review, and if necessary revise, the strategies, plans, and programs required under this approval to the satisfaction of the Secretary.</p> <p>Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the project.</p>	17
5(6)	<p>Incident Notification</p> <p>The Proponent must immediately notify the Department and any other relevant agencies immediately after it becomes aware of an incident. The notification must be in writing to <a href="mailto:compliance@planning.nsw.gov.au">compliance@planning.nsw.gov.au</a> and identify the project (including the project application number and name) and set out the location and nature of the incident.</p>	15
5(7)	<p>Non-Compliance Notification</p> <p>Within seven days of becoming aware of a non-compliance, the Proponent must notify the Department of the non-compliance. The notification must be in writing to <a href="mailto:compliance@planning.nsw.gov.au">compliance@planning.nsw.gov.au</a> and identify the project (including the project application number and name), set out the condition of this approval that the development is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.</p> <p>Note: a non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.</p>	15

**Table 2** presents the relevant blast-related commitments from the Statement of Commitments incorporated within PA 06\_0193 and where each is addressed in this Plan.

**Table 2: Blast Statement of Commitments Requirements**

<b>Appendix 2</b>		<b>Section Where Addressed</b>
<b>BLASTING</b>		
Operational Controls	<ul style="list-style-type: none"> <li>▪ Hard rock extraction and processing activities will be as follows:               <ul style="list-style-type: none"> <li>▪ Drill and blasting only to occur during daylight hours Monday to Saturday.</li> </ul> </li> </ul>	9.2
Environmental Management, Monitoring and Auditing	<ul style="list-style-type: none"> <li>▪ The proponent will obtain an Environment Protection Licence for the proposal in accordance with the Protection of the Environment Operations Act 1997. Three years after the commencement of the proposal, and every four years thereafter, the proponent will commission and pay the full cost of an Independent Environmental Audit of the proposal.</li> </ul>	3
	<ul style="list-style-type: none"> <li>▪ Within 7 days of detecting an exceedance of the limits/performance criteria in this approval or an incident causing (or threatening to cause) material harm to the environment, the proponent shall report the exceedance/incident to EPA and any relevant agency. The report will:</li> </ul>	15
	<ul style="list-style-type: none"> <li>▪ describe the date, time and nature of the exceedance/incident;</li> </ul>	15
	<ul style="list-style-type: none"> <li>▪ identify the cause (or likely cause) of the exceedance/incident;</li> </ul>	15
	<ul style="list-style-type: none"> <li>▪ describe what action has been taken to date; and</li> </ul>	15
	<ul style="list-style-type: none"> <li>▪ describe the proposed measures to address the exceedance/incident.</li> </ul>	15
	<ul style="list-style-type: none"> <li>▪ Prior to the commencement of any operations, proponent will implement, publicise and list with a telephone company a contact phone number which will enable the general public to reach a person who can arrange appropriate response action to the enquiry. The proponent will maintain a register to record details of all enquiries received and actions undertaken in response. This record will be made available to the EPA as required.</li> </ul>	14

**Table 3** presents the relevant blast-related requirements from the Environment Protection Licence.

**Table 3: Licence Requirements**

Condition Number	Condition	Section Where Addressed
<b>BLASTING</b>		
<b>Environment Protection Licence</b>		
L5.1	Hours of operation (blasting): blasting activities at the premises are restricted to the following hours: a) Monday to Friday: 9 am to 3 pm; and b) at no time on Saturdays, Sundays or Public Holidays.	9.2
L5.2	The frequency of blasting activities at the premises is restricted to the following: a) maximum of 2 blasts a day; and b) maximum of 5 blasts a week, averaged over a calendar year.	9.2
L5.3	The airblast overpressure level from blasting operations at the premises must not exceed 115dB (Lin Peak) at any noise sensitive locations for more than five per cent of the total number of blasts over each reporting period. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.	11
L5.4	The airblast overpressure level from blasting operations at the premises must not exceed 120dB (Lin Peak) at any time at any noise sensitive locations. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.	11
L5.5	Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 5mm/sec at any noise sensitive locations for more than five per cent of the total number of blasts over each reporting period. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.	11
L5.6	Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 10mm/sec at any time at any noise sensitive locations. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.	11
M4.3	The licensee is required to undertake attended or unattended blast monitoring for every blast event undertaken and in accordance with any relevant Australian Standards to determine compliance with conditions L5.3 to L5.6.	11

## 4. Consultation

The following government agency consultation was undertaken during the preparation of this plan.

- Correspondence outlining planning updates to the Plan as well as consultation requirements was sent to DPIE on 21 June 2019. Ms Melanie Hollis of DPIE responded on 24 June 2019 advising that the Plan was to be submitted within three months of approval of Modification 2 and that any updates or consultation regarding the Plan should be forwarded to DPE at a later date.

## 4.5. Objectives and Outcomes

Table 4 presents the objectives and key performance outcomes for this Plan and the Quarry.

Table 4: Objectives and Key Performance Outcomes

OBJECTIVES	KEY PERFORMANCE OUTCOMES
<b>Blast</b>	
(a) To ensure compliance with all relevant Project approval and Environment Protection Licence criteria and reasonable community expectations.	(i) <u>Compliance with all relevant criteria and reasonable community expectations, as determined in consultation with the relevant government agencies. Compliance is achieved with all relevant criteria nominated in the Project Approval 06_0193 and Environment Protection Licence and reasonable community expectations.</u>
(b) To <del>implement</del> <u>ensure the</u> appropriate blast management and mitigation measures <u>are implemented and maintained</u> during all stages of the Project.	(ii) All identified blast management and mitigation measures are implemented <u>and maintained</u> to the extent required <u>with all relevant criteria</u> .
(c) To <del>implement</del> <u>ensure</u> an appropriate monitoring program <u>is implemented</u> to establish compliance or otherwise with relevant criteria during all stages of the Project.	(iii) All identified monitoring is undertaken in accordance with the relevant procedures, and at the relevant intervals <u>to the standards required within the Department approved management plan.</u>
(d) To <del>implement</del> <u>ensure</u> an appropriate complaints handling and response protocol <u>is in place and regularly reviewed</u> .	(iv) Complaints (if any) are handled and responded to in an appropriate and timely manner <u>with the protocol regularly reviewed for potential improvements</u> .
(e) To <del>implement</del> <u>ensure</u> continual improvement for investigating, implementing and reporting on reasonable and feasible measures to reduce blasting impacts <u>in an efficient and environmentally responsible manner.</u>	(v) An appropriate continual improvement program has been implemented <u>to minimise the potential for adverse impacts to the environment and surrounding neighbours, regularly reviewed and upgraded when required.</u>
(f) To <del>implement</del> <u>ensure</u> an appropriate incident reporting program <u>is in place and regularly reviewed</u> , if required.	(vi) Incidents (if any) are reported in an appropriate and timely manner.



## 5.6. Roles and Responsibility

Table 5 presents the roles and responsibilities for the implementation of this Plan.

**Table 5:** Roles and Responsibilities

ROLES	RESPONSIBILITIES
Operations Manager	Must ensure adequate resources are available to enable implementation of the Plan.
Quarry Manager	Accountable for the overall environmental performance of the East Guyong Quarry operations, including the following outcomes of this Plan. <ul style="list-style-type: none"> <li>▪ Blast controls outlined in Section 9 are implemented.</li> <li>▪ Property inspections and investigations outlined in Section 9.</li> <li>▪ Implementation of blast training and awareness as outlined in Section 6.</li> </ul>
Quarry Supervisor	Manage the implementation of the following components of this Plan. <ul style="list-style-type: none"> <li>▪ Blast monitoring as outlined in Section 11.</li> <li>▪ Evaluation of compliance as outlined in Sections 12 and 13 and related follow-up actions.</li> <li>▪ Complaints handling and response as outlined in Section 14.</li> <li>▪ Incident reporting as outlined in Section 15.</li> <li>▪ Publication of monitoring data and reports as outlined in Section 16.</li> <li>▪ Review of this Plan as outlined in Section 17.</li> </ul>
All personnel	Ensure training and awareness induction has been undertaken. Compliance with this Plan.

## 6.7. Competence Training and Awareness

All relevant Hanson personnel and contractors and their employees will undergo Hanson and site-specific inductions incorporating blast management awareness training as part of the site induction program. The following areas will be covered in the induction.

- Awareness of the blast emission enhancing effects of temperature inversions and the times of day and meteorological conditions under which they may occur.
- Awareness of safety for travellers on the Mitchell Highway, surrounding residents and livestock.
- Awareness of explosive storage, transport and use in accordance with *AS2187.2 Explosive Storage, Transport and Use*.
- Minimising fly rock and dust emissions from blasting.
- Awareness of restricted blast operating hours and frequency.
- Awareness of community complaints protocols.
- Monitoring of blast emissions at required residences.

The Quarry Manager will be responsible for ensuring the appropriate blast management training is included in the induction for the relevant personnel.

## 7.8. Surrounding Residences

**Figure 3** displays the locations of residences within 2km of the Site.

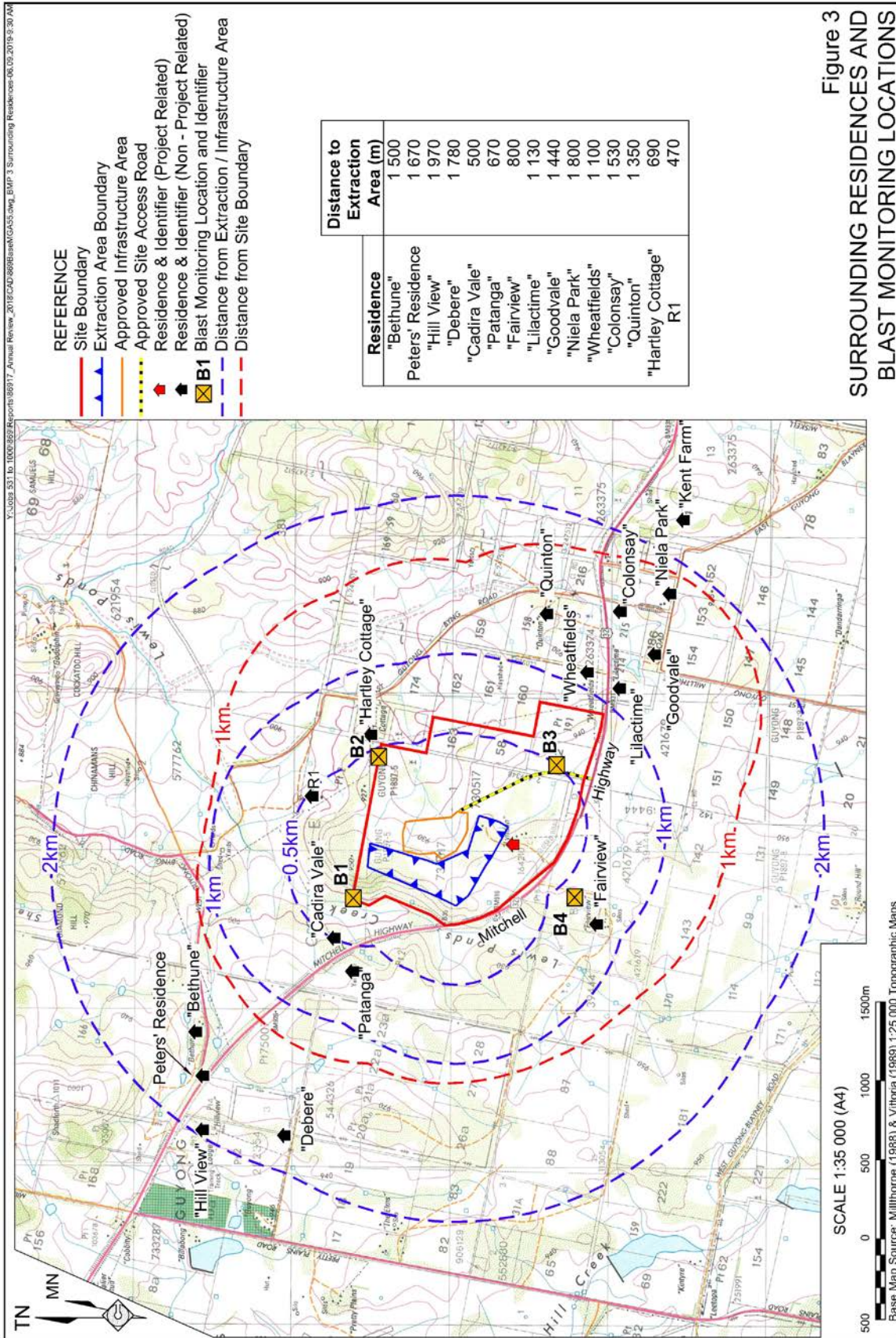


Figure 3  
SURROUNDING RESIDENCES AND  
BLAST MONITORING LOCATIONS

Figure 3: Surrounding Residences and Blast Monitoring Locations (A4 Colour) Dated 22/06/09 / 193  
Inserted 26/24/307/09/19

# 8.9. Anticipated Blast-Related Impacts

## 8.1-9.1. Introduction

This section describes the potential airblast overpressure and ground vibration structural impacts of blasting and the blast emission levels that were predicted during the environmental assessment of the proposed activities. This information was used in the design of mitigation measures and monitoring procedures described in Sections 9 and 11 to ensure best practices are adopted for blast management for the Quarry. In addition, this information will be referred to in ensuring practices are developed for the continual improvement of blast management as described in Section 12.

## 8.2-9.2. Potential impacts

### 8.2-1-9.2.1. Introduction

The following sub-sections are provided as background information for members of the public and others who may be unfamiliar with blasting operations and describes the various blasting-related criteria and impacts on built structures associated with blasting operations.

Air blast overpressure is a pressure wave that travels through the air following a blast, while ground vibration is caused by energy from the blast travelling through the intervening rock strata surrounding the blast location.

### 8.2-2-9.2.2. Airblast Overpressure Structural Impacts

Plaster that has cracked within residences is the type of damage that is monitored in most airblast overpressure complaints. However, it is window panes that fail before any other structural damage. The probability of damage to window panes exposed to a single airblast overpressure event is listed in Table 6 (Heggies 2007).

**Table 6:** Airblast Overpressure Structural Impacts

Airblast Overpressure dB Linear	Level kPa	Probability of Damage	Effects on Window Panes
140	0.2	0.01%	No damage – windows rattle
150	0.6	0.5%	Very occasional failure
160	2.0	20%	Substantial failure
180	20	95%	Almost all fail

Source: Heggies 2007 Modified Table 10

### 8.2-3-9.2.3. Ground Vibration Structural Impacts

Guide values presented in the British Standard BS 7385 that have been assessed to determine the level of ground vibration that minimises risks for cosmetic damage to residential and industrial buildings are listed in **Table 7** (Heggies, 2007).

**Table 7: Ground Vibration Structural Impacts**

Line	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4Hz to 15Hz	15Hz and above
1	Reinforced or framed structures. Industrial or commercial buildings.	50mm/s above 4Hz	50mm/s
2	Unreinforced or light frame structures. Residential or light commercial buildings	15mm/s to 4Hz increasing to 20mm/s to 15Hz	20mm/s to 15Hz increasing to 50mm/s to 40Hz

Source: Heggies 2007 Modified Table 9

### 8.2.4.9.2.4. Blasting Assessment Criteria – Human Comfort

PA Condition 3(8) and 3(9) identify the relevant blasting assessment criteria based not on structural damage criteria, but on human comfort and disturbance criteria, as follows.

- The maximum level for airblast is 115 dB Linear. The level of 115 dB Linear may be exceeded on up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 120 dB Linear at any time.
- The maximum level for ground vibration is 5mm/s. The level of 5mm/s may be exceeded on up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 10mm/s at any time.

### 8.3.9.3. Predicted Levels of Blast Emissions

During the environmental assessment, the predicted levels of airblast overpressure and ground vibration were assessed at the four nearest potentially affected residences to the Quarry (**Figure 3**) with the results presented in **Table 8**.

**Table 8: Predicted Levels of Blast Emissions**

Residence	Distance from Blasting	Ground Vibration (mm/s)	Airblast Overpressure (dB Linear)
“Cadira Vale”	750m – 340m	1.1 – 4.0 mm/s	111 – 119 dB Linear
“Hartley Cottage”	1 250m – 810m	0.5 – 1.0 mm/s	106 – 110 dB Linear
“Fairview”	1 480m – 920m	0.4 – 0.8 mm/s	104 – 109 dB Linear
“Lilactime”	2 025m – 1 720m	0.2 – 0.3 mm/s	101 - 103 dB Linear

Source: Heggies (2007) Modified Table 18

The results of the assessment are as follows.

- Predicted levels of ground vibration at all residences comply with the ANZEC general human comfort criterion of 5mm/s and with the BS 7385 structural damage criterion of 15mm/s at 4Hz.
- Maximum predicted ground vibration level of 4.0mm/s occurs at the “Cadira Vale” residence.
- Predicted levels of peak airblast at all residences comply with the ANZEC general human comfort criterion of 115 dB Linear except at “Cadira Vale”. The result of 119 dB Linear was a worst case

scenario of the closest point of blasting during the life of the Quarry. Section 10.2.3 presents the measures that would be implemented to manage blasting operations during blasting in those sections of the Extraction Area closest to “Cadira Vale”.

It is noted that with the extension of the extraction area to the west (MOD 2, 2019), blasting will occur approximately 25 m closer to “Patanga” than for the approved extraction area which is approximately 650 m distance to the closest point. The western extent of the modified extraction area is approximately 625 m from Patanga, which is approximately 4% closer to the receiver. The blast assessment for this receiver determined:

- With the same maximum instantaneous charge (MIC) blast size and with the same blast design, the resultant airblast would be approximately 0.5 dB (Lin peak) higher, and the resultant ground vibration would be approximately 6% higher.
- To maintain compliance and achieve the same airblast and ground vibration levels either the MIC would need to be reduced by at least 7.5% or the blast design would need to be modified or the blasts would need to be modified with a combination of reduced MIC and alternative blast design.
- Previous blast monitoring reports from January to November 2017 (Hanson, 2017) indicate that the site-specific blasting designs have consistently controlled the production blasts to ensure that airblast and ground vibration levels comply with the limits. This has been achieved through use of restricted quantities of the explosive pre delay and through mitigation techniques such as stemming, drill angle, bench height, hole diameter and hole spacing.
- On this basis, with appropriate blast design it is expected that the modified quarry operations can continue to design and execute blasts to comply with the blasting limits within the EPL and Conditions of Consent.

In order to ensure that blasting emissions remain within the specified ANZEC criteria, a site blast emission site law will be established and is further discussed in Section 11.2.

## 9.10. Management Measures

### 9.1.10.1. Introduction

*PA Condition 3(13)* requires this Plan to describe the blast mitigation measures that will be adopted to ensure compliance with *PA Conditions 3(8)* and *3(12)* (**Table 1**). This section has been prepared in satisfaction of that requirement.

### 9.2.10.2. Operating Hours and Frequency of Blasting

Hanson will ensure that the operating hours and conditions identified in *PA Conditions 3(10)* and *3(11)* (**Table 1**) are strictly complied with.

The Quarry Manager will be responsible for ensuring the operating hours are included in the site induction and that no breaches of this condition will be tolerated.

### **9.3.10.3. Operating Conditions**

#### **9.3.1.10.3.1. Blasting Operations**

*PA Condition 3(12)(a)* requires all blasting to be undertaken in accordance with *AS 2187.2 Explosive Storage, Transport and Use*. The following lists the procedures that will be implemented to satisfy these requirements.

- Blasting will only be undertaken by qualified personnel or contractors.
- Ensure blasting contractors or personnel operate under *AS 2187.2 Explosive Storage, Transport and Use*.

The Quarry Manager will be responsible to ensure blasting is carried out to the relevant standard. An Explosives Control Plan is provided in Section 10.

#### **9.3.2.10.3.2. Flyrock, Dust and Fume Management Measures**

*PA Condition 3(12)(b)* requires all blasting to be undertaken to minimise fly rock, dust and fume emissions from the Quarry operations. To ensure that this requirement is met the following Hanson procedures will be implemented.

- Laser profiling of all blast faces.
- Bore tracking of all front holes to determine any deviations.
- Review of all drill logs to establish the competency of the rock.
- Establishing loading criteria after reviewing bore tracking.
- Adjustment of column height of blast hole, if required.
- Use of quality stemming.
- Avoid blasting in strong wind conditions.
- Minimise time between drilling and loading to reduce blast hole deterioration.
- Minimise moisture content within blast holes to reduce potential fumes.
- Ensure blasting personnel are competent.

The Quarry Manager will be responsible to ensure blasting operations are carried out to the relevant standard and Hanson procedure.

#### **9.3.3.10.3.3. Management of Airblast Overpressure**

As indicated in Section 8.3, airblast overpressure at “Cadira Vale” is predicted to be between 111 dB Linear and 119 dB Linear. As identified in *PA Condition 3(8)*, the relevant criteria for airblast overpressure is 115 dB Linear, with exceedances of this level permitted during no more than 5% of blasts in any 12 month period. In order to achieve compliance with this requirement, Hanson will implement the following when blasting within the section of the Extraction Area closest to “Cadira Vale”, namely during Stage 3 of the Quarry.

- A blasting site law will be established to better predict site-specific blasting impacts during Stages 1 and 2 of the Quarry (see Section 11.2).
- Maximum instantaneous charges will be adjusted to ensure compliance with the 115 dB Linear criteria.

- Blasts will not be initiated, where practicable, during temperature inversions, when low cloud is present or when the wind is blowing from the southeast.

#### **9.3.4.10.3.4. Safety Measures**

*PA Conditions 3(12)(c) and 3(12)(d)* requires the protection of travellers on the Mitchell Highway, people, livestock and the serviceability of private property and public infrastructure. To ensure that this requirement is met, the following will be implemented.

- Review location of blast and its proximity to Mitchell Highway, the presence of landholders or Hanson personnel, livestock, private and public infrastructure and determine the appropriate exclusion zone.
- Where required, blasts would be orientated such that fly rock would be directed away from the Mitchell Highway, residences, infrastructure or locations where people or livestock may be.
- Advise surrounding landholders within 2km of the blast three days prior to blasting of the date and times of blast.
- Advertise the telephone contact for the public to obtain the Quarry's blasting schedule.
- Maintain an up-to-date blasting schedule on Hanson's website.
- Inspect all blasts to determine if fly rock has been propelled outside the blast envelope and investigate any instances as appropriate.
- Design blasts to minimise uncontrolled fly rock.

The Quarry Manager will be responsible to ensure that the relevant safety measures have been implemented prior to blasting within the Quarry.

#### **9.4.10.4. Property Inspections**

*PA Condition 3(16)* requires Hanson, at least 2 months prior to the commencement of blasting operations at the Quarry, to advise the owners of privately-owned land within 2km of the proposed Quarry that they are entitled to a structural property inspection to establish baseline conditions of buildings and other structures on their property. To ensure that this requirement is met, the following will be implemented.

- Advise private landholders within 2km of the Quarry of their entitlement to a structural property inspection at least two months prior to blasting.
- Commission a suitably qualified, experienced and independent person, approved by the Secretary of DPE to inspect the condition of any building or structure within 2 months of receiving a request from a privately-owned landholder.
- Implement relevant recommendations by the independent person to mitigate any potential blasting impacts.
- Make available a copy of the report to the relevant landholder.

The Quarry Manager will be responsible for advising privately-owned residences of their entitlement for a structural property inspection and the potential provision of mitigation measures prior to blasting on site.



### **9.5.10.5. Property Investigations**

*PA Condition 3(17)* requires Hanson to investigate, within two months, any claims regarding blast-related damage to buildings or structures. To ensure that this requirement is met, the following will be implemented.

- On receipt of a written complaint, Hanson will commission a suitably qualified, experienced and independent person, approved by the Secretary of DPE to inspect and investigate the alleged blast-related damage to privately-owned buildings or structures to determine the likely cause of the damage and prepare a report outlining the findings of the investigation.
- Make available a copy of the report to the relevant privately-owned landholder.
- Repair damage if it is confirmed by the report and both parties have agreed to the findings to the satisfaction of the Secretary.
- Refer the matter to the Secretary if both parties do not agree with the findings for resolution.
- Implement an Independent Resolution Process (see *Environmental Management Strategy*) if directed by the Secretary if the matter cannot be resolved within 21 days.

The Quarry Manager will be responsible to ensure claims of damage are managed according to the relevant requirements.

# 10.11. Explosives Control Plan

## 10.1.11.1. Introduction

There will be no storage of explosives or explosive precursors at the Quarry, however the management of explosive material during blast preparation, firing and the management of unexpected situations such as misfires present a risk to the health and safety of Quarry personnel. Section 31 of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* describes the measures required to manage risks to health and safety associated with the use of explosives. In order to satisfy these requirements at the Quarry, Hanson must ensure that explosives are:

- safe to handle;
- fit for their intended use;
- as insensitive as is reasonably practicable to shock, sparks, friction and the environment in which they will be stored, transported and used; and
- so far as is reasonably practicable, simple to store, use, transport and control.

In addition, Hanson must ensure that any dealing with an explosive is in compliance with the *Explosives Act 2003* and *Australian Standard AS 2187 Explosives—Storage, transport and use*.

Hanson ensures that all blast contractors have suitable blast safety protocols in place during blast-related activities.

An Explosives Control Plan has been prepared in accordance with Schedule 2, Section 4 of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* and describes the control measures established through Quarry protocols. It references the MAXAM-Orica Australia Blasting Safety Management Plan (Appendix 1) that is currently implemented for blast operations, given that MAXAM Orica Australia is currently contracted for blast operations.

## 10.2.11.2. Legal Requirements

The legal requirements of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* with regards the Explosives Control Plan are described in Schedule 2, Section 4 of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* and are provided below.

### 4 Explosives control plan

1. An explosives control plan must set out the control measures for risks to health and safety associated with explosives at the mine or petroleum site taking into account:
  - a) *the potential for unintended or uncontrolled detonation of explosives,*
  - b) *the characteristics of relevant explosives and the purposes for which they are to be used,*
  - c) *the characteristics of the places in which the explosives are to be used,*
  - d) *the full set of phases for the use of relevant explosives such as the charging and firing phases,*
  - e) *the potential for explosives to deteriorate,*
  - f) *the potential for the theft or misuse of explosives, and*
  - g) *the potential for the ejection of fly rock or other material as a result of the detonation of an explosive.*

2. An explosives control plan must also set out the following:
- a) *the procedures for inspecting, reporting, isolating and disposing of deteriorated or damaged explosives,*
  - b) *the procedures for finding, recovering and disposal of explosives that misfire,*
  - c) *the inspection, testing, reporting and maintenance procedures in relation to the equipment used at the mine or petroleum site for manufacturing, storing, transporting and delivering explosives,*
  - d) *the procedures and equipment used in storing and transporting explosives at the mine or petroleum site,*
  - e) *the procedures used for the accounting of explosives at the mine or petroleum site,*
  - f) *the arrangements for the keeping of a register identifying persons who are licensed under the Explosives Act 2003 to transport, use, store or handle explosives at the mine or petroleum site,*
  - g) *the procedures for ensuring that any person transporting, using, storing or handling explosives at the mine or petroleum site has any licence necessary under the Explosives Act 2003, and*
  - h) *the procedures in relation to consultation and co-operation to ensure that any transportation, use, storage or handling of explosives at the mine or petroleum site is conducted safely and in accordance with any conditions attached to the licence under which that transportation, use, storage or handling takes place.*

### **10.3.11.3. Control Measures**

#### **10.3.1.11.3.1. Explosive Transport, Handling and Storage**

All blast contractors will need to be licenced and qualified under the *Explosives Act 2003* for the transport, use, storage or handling of explosives. When contractors commence work at the Quarry, the Quarry Manager will review the relevant licences or notification such as they are satisfied that the nominated personnel for each task is suitably qualified and licenced for the transport, handling and storage of explosives to ensure compliance with legislation.

There will be no storage of explosives or explosive precursors at the Quarry. Therefore, all explosives or explosive precursors will be transported to the Quarry and any residual material removed by blast contractors to a suitable licensed magazine or storage facility. To that end, the transport, handling and storage of explosives will primarily be the responsibility of the relevant blast contractor in accordance with Hanson's operating procedures.

Regardless of the above, all vehicles for the transport of explosives shall comply with the Australian Explosives Code (3<sup>rd</sup> Edition) and the Australian Dangerous Goods Code (7<sup>th</sup> Edition) for transport of explosives or Security Sensitive Ammonium Nitrate.

#### **10.3.2.11.3.2. Blast Planning and Preparation**

A thorough blast design process and blast planning procedures will be in place for each blast.

Explosives are carefully chosen based on purpose and blast method to be applied. All products will have the relevant Technical Data Sheet (TDS), Safety Data Sheet (SDS) and Emergency Procedure Guide information available.

Blast sites are prepared by removing unnecessary tools and equipment, nominating a shot fired in charge of the shot, denying unauthorised entry to the blast area and identifying the specifics of the area such as measuring blast holes and priming/loading/stemming.

Materials and equipment are inspected and tested prior to setting up a blast. As described in Section 9.3.2, the following procedures are implemented at the Quarry prior to blasting events to ensure that potential blasting impacts from fly rock, dust and blast fumes are mitigated.

- Laser profiling of all blast faces.
- Bore tracking of all front holes to determine any deviations.
- Review of all drill logs to establish the competency of the rock.
- Establishing loading criteria after reviewing bore tracking.
- Adjustment of column height of blast hole, if required.
- Use of quality stemming.
- Avoid blasting in strong wind conditions.
- Minimise time between drilling and loading to reduce blast hole deterioration.
- Minimise moisture content within blast holes to reduce potential fumes.

#### **10.3.3.11.3.3. Blast Firing**

Only thoroughly inspected and fully functional explosives are used for blasting. In addition, accessories are checked for damage and deterioration prior to preparing the primer.

During the charging phase, explosive column rise is measured to avoid overcharging of blast holes. Holes are dipped after loading to ensure the correct column height is applied and to control ground vibrations. Once charging is complete, tie-up commences and is conducted by approved personnel only. The initiation line and detonator are not connected until firing is imminent. For firing, a blast exclusion zone is established and warning procedures are followed prior to firing. After firing, the exclusion zone remains until the shot firer declares it 'all clear'.

#### **10.3.4.11.3.4. Blast Risk Management**

Risk identification and risk mitigation ensures safe management in accordance with licence requirements for all blasting related operations (see **Appendix 1**). All blasts shall be planned and designed to achieve the required production outcome with minimum impact by blast induced effects on the Quarry and surrounding environment. Primary risks and hazards include the following.

- Excessive blast vibration and/or overpressure causing damage to property in particular at the adjacent properties;
- Perceived levels of vibration and overpressure resulting in community complaint;
- Fly rock impacting personnel or property;
- Blast fumes impacting on those personnel in vicinity of blasting operations
- Explosive transport, security, handling and use.

Blast monitoring is described in Section 11 and the Quarry complaints procedures are described in Section 14.

The shot firer will supervise and sign off all accounting of explosives. Prior to its use on site, each explosive is recorded and identified by name, description, class and quantity.

Theft or misuse of explosives is reported to the Police and the Work Cover and all persons on the blast area must remain on site to provide assistance. The risk of theft or misuse is mitigated by secured storage off site. A reconciliation of explosives takes place before and after loading of the blast.

The risk of potential fly rock is reduced by ensuring a safe and thorough blast design and planning (as described above) and designation of an exclusion zone. Blasts will be directed away from Mitchell Highway, where possible. Blasts have vertical free faces profiled and adjacent blast holes are bore tracked after drilling, which allows for a blast hole design without inadequate burden to prevent fly rock. Stemming lengths will be designed adequately.

The shot firer inspects the shot for visible misfires after fumes have cleared. If misfires are found, a risk assessment is conducted prior to handling the misfire charge. A misfire report must be completed and misfires are managed as outlined in the blast contactors operating protocols.

#### **10.3.5.11.3.5. Explosives Emergency Response**

All emergency response procedures are described in the Pollution Incident Response Management Plan.

# 11.12. Monitoring

## 11.1.12.1. Introduction

PA Condition 3(14) requires that this Plan include a protocol for evaluating blasting impacts and demonstrating compliance with the blasting criteria at all privately-owned residences and structures. This sub-section has been prepared in satisfaction of that requirement.

## 11.2.12.2. Blast Monitoring Protocol

At a minimum, each blast will be monitored for airblast overpressure and ground vibration at the privately-owned residences identified in **Table 9**, subject to landholder agreement. The proposed monitoring locations are illustrated on **Figure 3**. **Table 9** presents the ownership details of the closest resident for each monitoring location. Please note that while the modified extraction area is approximately 625 m from “Patanga”, the site does not contain residency.

**Table 9:** Blast Monitoring Locations

Blast Monitoring Location	Closest Residence	Landowner
B1	“Cadora Vale”	B Munro
B2	“Hartley Cottage”	S Gordon
B3	“Lilactime” “Fairview”	S Warner and S Bestwick D and S Harris
B4	“Fairview” “Lilactime”	D and S Harris S Warner and S Bestwick

Until sufficient blast monitoring data is available to establish a blast emission site law, additional blast monitoring will also be undertaken at additional locations within the Quarry. These locations will be selected for suitability of the relevant base rock type and the proximity of the structures to blasting locations. The addition blast monitoring locations will be reviewed and where necessary modified as a result of changes to the geographical location of blasting or changes to private land ownership. B3 (Fairview) monitoring currently occurs on the haul road within the Quarry site. Blast monitoring locations B1 to B4 would not be modified with the prior consent of the Secretary.

All blast monitoring instrumentation will be installed, calibrated and maintained in accordance with both AS2187.2 - 2006 and the manufacturer’s specifications.

The Quarry Supervisor will be responsible for blast monitoring.

# 12.13. Evaluation of Compliance

A blast monitoring report will be prepared within 7 days of each blast monitoring event. This report will include an assessment of the monitoring results against the criteria identified in PA Conditions 3(8) and 3(9).

The monitoring report will be reviewed by the Quarry Supervisor and a copy included within the Annual Review.

## ~~13.~~14. Corrective and Preventative Actions

In the event that blast monitoring identifies an exceedance of the blast criteria identified in *PA Conditions 3(8) and 3(9)* the exceedance will be investigated to determine the likely cause. The investigation will seek to determine:

- the date and time of the exceedance.
- whether the exceedance of the criteria was directly related to a blast source associated with the Quarry or if any other factors contributed to the exceedance;
- the primary cause of the incident;
- any contributing factors which led to the incident;
- whether appropriate controls were implemented to prevent the incident; and
- corrective and preventative measures that may be implemented to prevent a recurrence of the incident.

If it has been identified that the criteria have been exceeded, Hanson will report and investigate the exceedance in accordance with the procedure identified in Section 15.

Corrective and/or preventative actions will be assigned to relevant Hanson personnel. Actions will be communicated internally through planning meetings and toolbox talks and outstanding actions will be monitored for their effectiveness upon completion.

## ~~14.~~15. Complaints Handling and Response

The *Environmental Management Strategy* as required by *PA Condition 5(1)* includes a detailed complaints handling and dispute resolution procedure. This sub-section records the procedures that would be implemented following receipt of a blast-related complaint.

Blast-related complaints may be received via one of the following methods.

- Directly via the 24-hour, 7 day per week Hanson's general Emergency Line (1800 882 478). This number will be advertised widely in the local media, on signage at the Site entrance and on Hanson's web site [www.hanson.com.au](http://www.hanson.com.au).
- Directly via a dedicated email address which will be advertised in a similar manner to the Community Information Line.
- Indirectly via the relevant government agencies.

All complaints will be registered in a database and responded to within one business day from the receipt of the complaint. The following information will be recorded in the database (where it can be reasonably obtained).

- The date and time the complaint was made.
- The complainant's name.

- The complainant's contact details (e.g. telephone number, email address).
- Details regarding the nature of the complaint.

Following receipt of any blast-related complaint, Hanson will implement the following procedure.

1. The complaint will be reviewed by the Quarry Manager or their delegate to determine the nature, date and time of the blast emission.
  1. Liaison with the complainant to ascertain all details and to identify the nature and source of the complaint and provide supplementary details for the complaints log. Details recorded in the log will include:
    - the date and time of the complaint;
    - the method by which the complaint was made;
    - details of the person making the complaint;
    - the nature of the complaint;
    - action taken in relation to the complaint including any follow-up contact with the complainant; and
    - if no action is taken, the reason why no action was taken.
  2. Should the blast monitoring report indicate that no exceedance of the criteria identified in *PA Conditions 3(8)* and *3(9)*, the Quarry Manager will continue to consult with the complainant in relation to managing blast emissions within the Quarry.
  3. Should the blast monitoring report indicate that an exceedance of the criteria identified in *PA Conditions 3(8)* and *3(9)* the Quarry Manager will notify the Department of Planning and Infrastructure and Environment Protection Authority and will implement the procedures identified in Section 13. In addition, the Quarry Manager will continue to consult with the complainant, as required, in relation to the complaint.
- Initiation of appropriate changes in operating practices or procedures.
- Conducting a follow-up interview with the complainant to determine their level of satisfaction with the response and the resultant outcome.
- In the event that multiple complaints are received from the same individual(s) and Hanson can demonstrate:
  - at least three blast related complaints from the complainant, with demonstrated compliance with the criteria identified in *PA Conditions 3(8, 9, 10, 11)* in each case; and
  - there is documented evidence of a genuine attempt by Hanson to discuss the issue and seek a resolution with the complainant without success;
  - Then Hanson may, in consultation with the relevant government agencies, limit responses to further complaints to Steps 1 and 2 above.

A copy of the complaint report will be supplied to the complainant if requested. The complaints database on Hanson's website will be updated quarterly and a summary of all complaints received in each 12 month period will be included in each Annual Review. The Quarry supervisor will be responsible for the recording of the complaint, response action requirements and updating of the database and website.



## ~~15.~~16. Incident Reporting

In the event that an initial investigation concludes that an exceedance of an environmental criterion was directly attributed to activities associated with the Quarry, as described in Section 12, the event will be reported to NSW Department of Planning and Infrastructure, EPA and the relevant landholder(s) within 24 hours of confirming the exceedance.

Within 7 days of identifying the non-compliance, Hanson will submit a written report with regular updates on the status of the additional mitigation actions to the Secretary of DPE, EPA and, where relevant, the relevant landholder(s). In addition, a copy of all reports will be made publicly available on the Quarry website and will be included in the Annual Review.

The Quarry Manager will be responsible for incident reporting.

## ~~16.~~17. Publication of Monitoring Information

All blast monitoring reports will be made publicly available on the Quarry website and will be included in the *Annual Report*.

All blast exceedance investigation reports will be made publicly available on the Quarry website within 7 days of being finalised and accepted by the EPA.

The Quarry Supervisor will be responsible for incident reporting.

## ~~17.~~18. Review

In accordance with *PA Condition 5(4)*, this *Blast Management Plan* will be reviewed and, if required, revised within 3 months of:

- the submission of an annual review under *PA Condition 5(3)*;
- the submission of an incident report under *PA Condition 5(6)*;
- the submission of an independent environmental audit report under *PA Condition 5(8)*; and
- the approval of any modification to the conditions of PA 06\_0193.

The Quarry Manager will be responsible for the review of this Plan.

# Appendices

(Total No. of pages including blank pages = 5726)

**Appendix 1 Blasting Management Plan**  
**(~~MAXAM-Orica~~ Australia Pty Ltd) (5524 pages)**

# **BLAST MANAGEMENT PLAN**

HANSON EAST GUYONG QUARRY

DATE 28th May 2018



# DOCUMENT CONTROL

This is a controlled document, frequently amended and updated as site conditions change and procedures are amended. This document is controlled by the Author. Check with the Author that you have the latest copy before using this document. The revision in use will be identified by the date and time of printing shown on the bottom of each page.

## DOCUMENT TITLE

Blast Management Plan – Hanson East Guyong Quarry

## DOCUMENT LOCATION

<https://blastiq.orica.com/Sites/UpdateDocument/ebc1938d-99c7-4ac7-88f9-aea5094c9e0e>

## VERSION

Version 1.0, Issued 28th May 2018

## DISTRIBUTION LIST

	<b>NAME</b>	<b>POSITION</b>
1	Chloe Quinn	Orica -Territory Manager - NSW Quarries and Construction
2	Jonathon Keller	Orica - Senior Blast Technician - NSW Quarries and Construction
3	Scott Blair	Orica - Blast Engineer - NSW Quarries and Construction
4	Brenden Wood	Orica - Plant Supervisor – Marulan Plant
5	Pere Riini	Hanson – East Guyong Quarry Manager

---

Reviewer: *Jonathon Keller*     *Orica - Senior Blast Technician - NSW Quarries and Construction*

---



# DISCLAIMER

## Blast Management Plan – Hanson East Guyong Quarry

### Client: Hanson - East Guyong Quarry

Author: Jonathon Keller  
Senior Blast Technician - NSW Quarries and Construction  
[jonathon.keller2@orica.com](mailto:jonathon.keller2@orica.com)  
(+61) 0423 849 246  
Orica Australia Pty Limited  
Date 25<sup>th</sup> May 2018

#### **Disclaimer:**

This Information, consisting of a technical report, is provided in good faith by Orica Australia Pty Ltd, for the sole consideration and use of the recipient and on the understanding and expectation that it will not be communicated to or relied upon by any other person or organisation. No responsibility or duty toward any other person or entity is assumed, expressly or by implication, by Orica or by any of its related or subsidiary entities.

In preparing this Information, Orica has relied upon information provided and requirements communicated to it by the recipient, but is not able to anticipate or control the circumstances and conditions under which the Information may be relied upon by the recipient. Accordingly, Orica, on behalf of itself and its subsidiary and related entities, expressly excludes to the fullest extent permitted by law, all liability of whatever nature and however arising, including by reason of any actual or alleged negligence on the part of Orica and/or its related or subsidiary entities, servants or agents, directly or indirectly out of or in connection with its provision of the Information and/or reliance upon the Information by the recipient or by any other person, entity or organisation.

No express or implied warranties are given except to the minimum extent provided by law. The total liability of Orica, its related or subsidiary entities, in respect of all matters arising out of or in connection with the provision of the Information or the reliance upon it by any person, entity or organisation, shall not exceed the amount paid or payable to Orica as consideration for the provision of the Information.

# CONTENTS

<b>DOCUMENT CONTROL</b>	<b>2</b>
<b>DOCUMENT TITLE</b>	<b>2</b>
<b>DOCUMENT LOCATION</b>	<b>2</b>
<b>VERSION</b>	<b>2</b>
<b>DISTRIBUTION LIST</b>	<b>2</b>
<b>REVISION LIST</b>	<b>3</b>
<b>DISCLAIMER</b>	<b>4</b>
<b>HANSON EAST GUYONG QUARRY</b>	<b>8</b>
<b>LOCATION</b>	<b>8</b>
<b>SCOPE OF WORK</b>	<b>9</b>
<b>OVERVIEW OF BLAST MANAGEMENT PLAN</b>	<b>10</b>
<b>INTRODUCTION</b>	<b>10</b>
<b>SAFETY IN HANSON EAST GUYONG</b>	<b>11</b>
<b>LEGISLATIVE REFERENCES, CODES OF PRACTICE AND STANDARDS</b>	<b>11</b>
<b>SITE RISK ASSESSMENT</b>	<b>11</b>
<b>ORICA SHOTFIRER'S STANDARD OPERATING PROCEDURES</b>	<b>12</b>
<b>ORICA SITE INFORMATION SHEET (SIS)</b>	<b>12</b>
<b>CUSTOMER SITE RISK REVIEW</b>	<b>12</b>
<b>DRILLING PROCEDURES</b>	<b>12</b>
<b>CUSTOMER SITE PROCEDURES</b>	<b>12</b>
<b>SPECIFIC WH&amp;S AND BLAST MANAGEMENT ITEMS</b>	<b>13</b>
<b>HIGH RISK CONSTRUCTION ACTIVITIES</b>	<b>13</b>
<b>RESPONSIBLE PERSONS</b>	<b>14</b>
<b>CONSULTATION</b>	<b>15</b>
<b>ELECTRICAL EQUIPMENT</b>	<b>15</b>
<b>PERSONAL PROTECTIVE EQUIPMENT (PPE)</b>	<b>15</b>
<b>HAZARDOUS SUBSTANCES</b>	<b>15</b>
<b>LIFTING EQUIPMENT</b>	<b>15</b>
<b>PLANT</b>	<b>16</b>
<b>SUPPLY OF EXPLOSIVES</b>	<b>16</b>

<b>WORKPLACE INSPECTION AND AUDITING</b>	<b>16</b>
<b>WARNING SIGNS AND CONTROL MEASURES</b>	<b>16</b>
<b>ACCIDENTS AND INCIDENTS</b>	<b>16</b>
<b>FIRE PROTECTION</b>	<b>16</b>
<b>ENVIRONMENTAL LIMITS</b>	<b>16</b>
<b>MONITORING</b>	<b>16</b>
<b>DUST CONTROL</b>	<b>17</b>
<b>FUME CONTROL</b>	<b>17</b>
<b>PERMITS AND LICENCES REQUIRED</b>	<b>17</b>
<b>ORICA JOB PACK</b>	<b>17</b>
<b>BLASTIQ – BLAST DATA/RECORD MANAGEMENT</b>	<b>17</b>
<b>RISK ASSESSMENT - BLASTING OPERATIONS</b>	<b>18</b>
<b>COMMUNICATE &amp; CONSULTATION STEPS:</b>	<b>18</b>
<b>CONTEXT OF RISK ASSESSMENT</b>	<b>19</b>
<b>IMPLEMENTATION PLANS</b>	<b>19</b>
<b>STANDARD OPERATING PROCEDURES</b>	<b>20</b>
<b>DEVELOPMENT SIGN OFF</b>	<b>22</b>
<b>APPENDIX A - ORICA RISK ASSESSMENT</b>	<b>23</b>
<b>BLASTING RISK ASSESSMENT TABLE</b>	<b>23</b>
<b>POTENTIAL LIKELIHOOD</b>	<b>23</b>
<b>ORICA INTERNAL HAZARD MANAGEMENT TABLE</b>	<b>24</b>
<b>POTENTIAL CONSEQUENCE EXAMPLES</b>	<b>24</b>
<b>BLASTING RISK EVALUATION GUIDE (ISEE)</b>	<b>25</b>
<b>APPENDIX B - SITE SPECIFIC PRE-BLAST FIRING CHECKLIST</b>	<b>32</b>
<b>APPENDIX C – MISFIRE FLOW CHART</b>	<b>33</b>
<b>APPENDIX D - INCIDENT REPORTING</b>	<b>35</b>
<b>APPENDIX E – BLAST CALL PROCEDURE</b>	<b>35</b>
<b>APPENDIX F- BLAST EVENT CHECKLIST</b>	<b>37</b>



<b>APPENDIX G – BLAST CLEARANCE AND SENTRY MAP</b>	<b>38</b>
<hr/>	
<b>APPENDIX H – EXPLOSIVES CONTROL PLAN</b>	<b>39</b>
<hr/>	
<b>UNINTENDED OR UNCONTROLLED DETONATION</b>	<b>40</b>
<b>CHARACTERISTICS OF EXPLOSIVES, PLACE OF USE AND PHASES OF USE</b>	<b>41</b>
<b>POTENTIAL FOR DETERIORATION</b>	<b>42</b>
<b>POTENTIAL FOR THEFT OR MISUSE OF EXPLOSIVES</b>	<b>42</b>
<b>POTENTIAL FOR FLY ROCK</b>	<b>43</b>
<b>PROCEDURES FOR INSPECTING, REPORTING, ISOLATING AND DISPOSAL OF DETERIORATED OR DAMAGED EXPLOSIVES AND HANDLING OF MISFIRES</b>	<b>43</b>
<b>INSPECTION, TESTING, REPORTING AND MAINTAINANCE OF EQUIPMENT</b>	<b>44</b>
<b>STORAGE AND TRANSPORT OF EXPLOSIVES AT THE QUARRY</b>	<b>44</b>
<b>ACCOUNTING FOR EXPLOSIVES</b>	<b>45</b>
<b>REGISTER OF LICENSES</b>	<b>45</b>
<b>CONSULTATION AND CO-OPERATION</b>	<b>46</b>
<b>APPENDIX I – RELEVANT LICENSES</b>	<b>47</b>
<hr/>	
<b>LICENSE TO TRANSPORT AND MANUFACTURE</b>	<b>47</b>
	<b>47</b>
<b>LICENSE TO STORE</b>	<b>48</b>
	<b>48</b>
<b>APPENDIX J – JOB SAFETY AND ENVIRONMENT RISK ASSESSMENT</b>	
<b>SHOT FIRING</b>	<b>49</b>
<hr/>	
	<b>50</b>
	<b>51</b>
	<b>52</b>
	<b>53</b>

# HANSON EAST GUYONG QUARRY

## LOCATION

Hanson East Guyong Quarry is located approximately 22km Southeast of Orange NSW and 36km west of Bathurst NSW on the Mitchell Hwy, East Guyong NSW (Figure 1). The Quarry is located approximately 250km from the Orica Marulan Plant.



*Figure 1 – Hanson East Guyong Quarry Location*

# SCOPE OF WORK

This Blast Management Plan (BMP) has been prepared for the East Guyong Quarry. This plan outlines:

- The basis for ensuring safe practices and procedures for blasting at the site are adopted.
- How the safety and minimisation of impact on personnel, plant and property both on site and at any neighbouring sites from blast effects will be achieved and maintained
- Proposed methods of blasting to ensure compliance with national recognised standards for blast emissions.

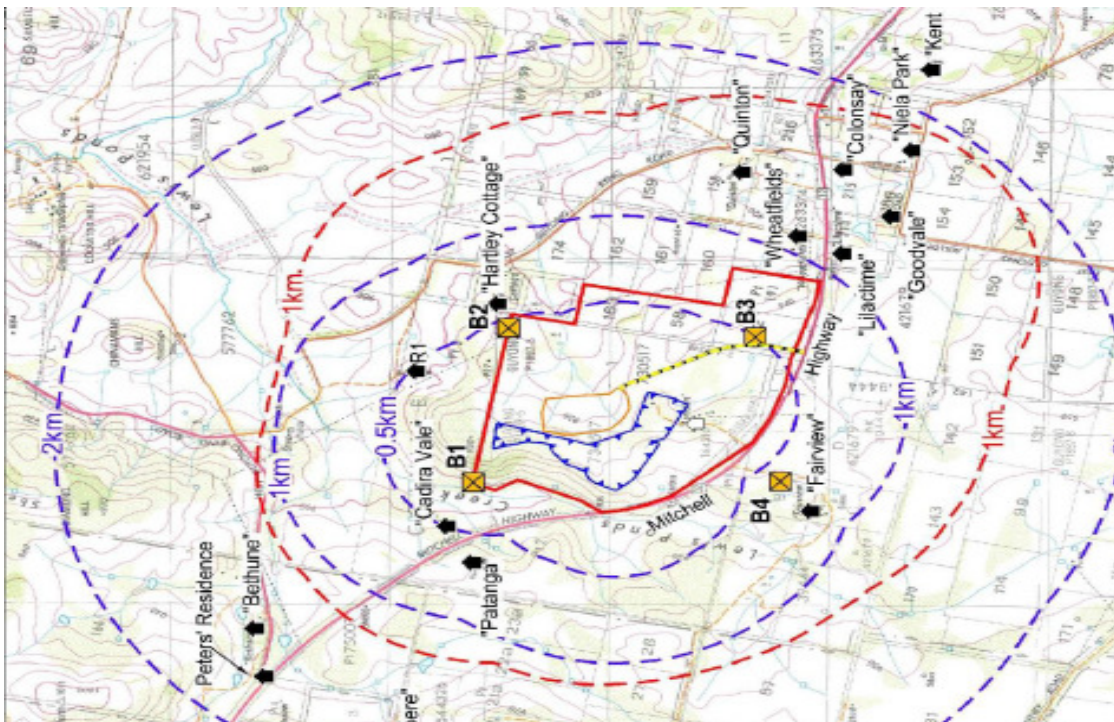
Orica Quarry and Construction Services (Orica Q&C) have been engaged by Hanson to provide a Total-Load-Service (TLS) to the East Guyong Quarry.

The rock type in this area is predominately large Columnar Basalt with areas of massive structure, the rock density is measured at 2.7g/cc

Blasting is permitted to take place on site between the hours of 9am and 3:00pm Monday to Friday, excluding public holidays.

Blast monitoring is to be conducted at four localities surrounding the quarry, "Cadira Vale", "Hartley Cottage", "Fairview" and "Lilacime", however, monitoring may be requested at other locations. Overpressure and Vibration measurements results will be reported the Quarry after the blast event has occurred to ensure compliance has been adhered to. Blast results will be analysed and uploaded to Orica's blast management system BlastIQ™ within 24 hours of the blast event. Locations can be identified using the following map and have also been located using RTK rover equipment.

Production blasts will be designed to be within 0.9-1.0 powder factor, and loaded primarily with wet bulk products consisting of Centra™ Gold 1.2 g/cc and Centra™ Gold Greater GT 1.2g/cc.



# OVERVIEW OF BLAST MANAGEMENT PLAN

## INTRODUCTION

The objective of the BMP is to ensure the safety of all personnel is maintained and appropriate environmental controls are in place. A Blast Management Plan is required to conform to AS2187.2.

Parts of this plan may be required to be changed and modified as risks are identified or evolve, agreements are reached with stakeholders and as further information on blasting impacts comes to hand or if legislation changes. These changes will be communicated to affected parties as they occur by Hanson.

This BMP incorporates all aspects of explosive application at Hanson East Guyong site, including:

- Planning,
- Transport,
- Blast preparation,
- Charging/stemming,
- Tying up or scanning/logging,
- Firing the blast,
- Monitoring,
- Reporting and
- Compliance

The process of developing the Blast Management Plan commences with a site visit by Orica personnel to record and assess the Site Safety Management Plans are in place on the customer site. Orica personnel conduct a Risk Assessment to identify risks that people may be exposed to while working on the customer site.

The Blast Management Plan comprises the following documents;

- Site Information Sheet – Site specific guidelines developed by Orica Technical Services for pattern, loading and initiation design.
- Customer Site Risk Review – A review of safety processes already existing at the site.
- Risk Assessment – Assessment of all risks associated with blasting operations at the site. Identifies site-specific gaps in exiting procedures, including the Shotfirer's Standard Operating Procedures.
- Shotfirer's Standard Operating Procedures - a set of existing Orica Procedures that are used to manage blasting operations and control blasting risk. A copy of these is readily available to the shotfirer either in hard copy or electronically.
- Customer Site Procedures

# SAFETY IN HANSON EAST GUYONG

Hanson East Guyong operate under the “Zero Harm” environment.

*“No job is too important that it cannot be done safely”.*

Take 1 and safety observations are conducted on a regular basis through all areas of the quarrying process, including blasting. Where Take 1 and safety observation have been conducted and issues identified in Blast Management then these observations will be used to investigate changes to the BMP if necessary.

## LEGISLATIVE REFERENCES, CODES OF PRACTICE AND STANDARDS

The following have been identified as specifically relevant to the activities to be undertaken:

- Explosives Act of 2003 (NSW)
- Explosives Regulation of 2005 (NSW)
- Australian Standard 2187.2 Use of Explosives
- Australian Explosives Code (AEC) (6th Edition)

## SITE RISK ASSESSMENT

The attached Risk Assessment specifies the following information required by AS2187.2;

- Details of adjacent structures or services that influence the blast design.
- Details of reports, drawings and records consulted.
- Environmental considerations for airblast overpressure, ground vibration.
- Testing for Reactive Ground and or Evidence of Elevated Temperature
- Details of communication systems
- Warning procedures.
- Traffic management plan.
- Details of the exclusion zone.
- Influence of weather.
- Loading in poor light conditions or reduced visibility.

# ORICA SHOTFIRER'S STANDARD OPERATING PROCEDURES

The Shotfirer's Standard Operating Procedures are a full set of procedures that refer to other important documents generated by the blast design and execution process. These are the Site Information Sheet (SIS), and the Job Pack. The SIS contains the drill and blast design parameters agreed with Site management, and other important aspects including environmental considerations, MIC, general layout parameters, and tolerances. The Job Pack contains the actual working documents, including survey data, actual blast layout, site plan and Risk Assessments. Together these documents address the following items of the Blast Management Plan specified by AS2187.2.

## ORICA SITE INFORMATION SHEET (SIS)

The SIS is developed by Orica Technical Services to aid Orica Surveyors and Shotfirers in best design practices for the results required on that site. Should the need arise for practices outside of the SIS Technical Services approval must be granted before proceeding.

## CUSTOMER SITE RISK REVIEW

The attached Customer Site Risk Review specifies the following items required by AS2187.2;

- Permits/licenses required for the project.
- Identification and position of the person responsible for the project including project safety and security.
- Identification and position of person who has given approval to use explosives on the project.
- Key appointments and responsibilities.
- Shotfirer's details.

## DRILLING PROCEDURES

Drilling procedures will be managed by Hanson's drilling procedures.

## CUSTOMER SITE PROCEDURES

The Site is responsible for managing the following aspects of the Blast Management Plan;

- Notification to owners and occupiers of structures, and providers of services adjacent to the blast.

# SPECIFIC WH&S AND BLAST MANAGEMENT ITEMS

## HIGH RISK CONSTRUCTION ACTIVITIES

The following High-Risk Construction Activities are expected to occur on this job:

Entering a Trench more than 1.5m deep	N
Using explosives;	Y
Entering a confined space;	N
Using a hazardous substance;	N
Working where the person could fall at least 2.0m;	Y
Doing asbestos work or demolition work;	N
Working near moving powered mobile plant at a workplace;	Y
Working in, over or adjacent to water where there is a risk of drowning;	N
Working on, or adjacent to, a road or railway;	N
Working on or near a pressurised gas distribution mains or pipes;	N
Working near exposed energised electrical installation;	N
Other work that could result in death or bodily harm:	N

**The following activities are NOT covered by this risk assessment as these are activities to be undertaken by other parties:**

- Drilling Blastholes - the Hanson drilling operator/supervisor is to prepare and implement their own Work Method Statement.

# RESPONSIBLE PERSONS

## Licences and Technical Appointments

Person	Skill / Competency / Licence	Expires
Aaron Sasse	NSW Expl Licence #XBLS – 200976/ Orica Surveyor. Shotfirer and Surveyor Responsibility	12/02/2023
Mark Yeadon	NSW Expl Licence #XBLS – 200801 Shotfirer Responsibility	18/04/2021
Brian Rhall	NSW Expl Licence #XBLS – 200309 Shotfirer Responsibility	14/04/2023
Cameron Ingles	Orica Surveyor Surveyor Responsibility	N/A
Daniel Genge (TSR)	Senior Blasting Technician NSW Expl Licence #XBLS – 101954 Blast Design and Risk Management	27 August 2018
Jonathon Keller (TSR)	Senior Blasting Technician NSW Expl Licence #XBLS – 101832 Blast Design and Risk Management	24 July 2018
Chloe Quinn	Orica Territory Manager Overarching Operational Responsibility	
Brenden Wood	Orica Marulan Supervisor Operational Responsibility	

The Shotfirer and Technical Services representative (TSR) for each blast in a project may vary from time to time. The responsible Shotfirer for each blast is named on the front of the Orica Job Pack Folder and within the blast details page in Orica's Blast Management System BlastIQ™.

The Orica Shotfirer will provide supervision of Orica activities. The Shotfirer will inspect and assess the work area before starting work and will have the final authority regarding all aspects of the work related to Orica's contract while onsite.

The Orica Technical Services representative is responsible for cross checking the Shotfirer's work and updating the Site Information Sheet and blast designs as required when the blast design parameters change.



## CONSULTATION

Orica Quarry Services operate a system of blast classification from Class 3 (simple blasts) to Class 6 (complex blasts). The blast design must be cross checked and reviewed by others, with the level of review being commensurate with the class of blast. Full details are contained in the Orica Shotfirer's Work Instructions (SWI's).

Orica use the "Take 5" system for conducting daily pre-start assessment of working conditions and on-the-spot hazard assessment. If further risk assessment is deemed to be required, JSERA forms are utilised requiring sign-off from its participants, and further controls implemented.

Orica uses a centralised data base (Enablon™) to manage incident reporting and auditing processes.

## ELECTRICAL EQUIPMENT

Orica may require the following equipment to be brought to site:

- Laptop computer and chargers,
- Video camera and charger,
- UAV/Drone,
- Survey Equipment and Charger and
- Electronic Blasting equipment and charger.

## PERSONAL PROTECTIVE EQUIPMENT (PPE)

The minimum standard of PPE required by Orica is:

- Hard Hat, Safety Boots, Safety Glasses
- Long sleeves and long trousers (hi-visibility)
- Hearing Protection, Respiratory Protection, Face Shields if required
- Category 5 Gloves When operating (gloves to be carried on persons at all times).
- Dust Masks (when required e.g. working near drill)

## HAZARDOUS SUBSTANCES

The Orica Technical Service representative will provide Safety Data Sheets to the client for all explosives and ancillary chemical items brought on site. Up to date SDS's for all Orica products can be obtained from [www.oricamining.com](http://www.oricamining.com) and BlastIQ™. A full set of SDS's will be supplied to site upon request.

## LIFTING EQUIPMENT

Orica do not plan to bring any lifting equipment to site.

## PLANT

Orica propose to bring light vehicles (Shotfirer & Surveyor Vehicles) and a Heavy Rigid Explosives Mobile Manufacturing Unit (MMU) to site. All MMU's operate under the NHVAS (National Heavy Vehicle Accreditation Scheme). For further details contact the local Territory Manager. (All vehicles to be inspected and approved by Hanson prior to use on site).

## SUPPLY OF EXPLOSIVES

All explosives and related accessories will be supplied by Orica from their licenced plant at Marulan, NSW. All unused initiating explosives will be securely stored in the registered magazines on the Shotfirer's vehicle prior to leaving site (reconciliation to be carried out by both Hanson and Orica prior to shotfiring vehicle leaving site). All unused bulk explosive precursors will be returned to Marulan in the MMU. All stock is reconciled to ensure nothing is missing. (lock Mags at all time)

## WORKPLACE INSPECTION AND AUDITING

Orica has a number of internal auditing processes to ensure company standards are being upheld and to maintain quality levels. If any further detail is required regarding these audits please contact the plant supervisor.

## WARNING SIGNS AND CONTROL MEASURES

Warning signs and flagging will be erected around the blast area. The blast area is designated by the Shotfirer and is generally 10m from the last loaded blast holes.

## ACCIDENTS AND INCIDENTS

All accidents and incidents are to be reported to Hanson and Orica. See the list in Appendix D for details of contacts to be notified.

## FIRE PROTECTION

Fire extinguishers on light and heavy vehicles are checked daily as part of the Orica Pre-Start checklist. Light Vehicles are equipped with one 1.5kg dry chemical extinguisher.

## ENVIRONMENTAL LIMITS

All blasts will be designed to generate overpressure and ground vibration results below those limits specified in the blasting consent approvals, specifically below 115dB overpressure and 5mm/s peak particle velocity at the nearest affected residence.

## MONITORING

Overpressure and vibration monitoring will be conducted by trained Orica personnel using Instatel Minimate blast monitors upon request from Hanson. Current monitoring is conducted by Hanson. Monitors are calibrated regularly and monitoring practices are outlined in the Shotfirer's Work Instructions which complies with the recommendations set out in Australian Standard 2187.2 Appendix J.

## DUST CONTROL

Dust is produced during blasting from the initial detonation and from rocks breaking against each other. The rock geology will contribute greatly to the dust generated during blasting. Where dust produced from blasting activities is a concern, dust control measures can be put into place. These include:

- Firing only with favourable wind conditions
- Wetting down the floor areas in front of the blast to minimise the dust cloud which is generated from the floor dust. (client responsibility)

## FUME CONTROL

Fume produced from blasting can be caused by many factors including geological conditions, poor product formulation resulting in incomplete reactions, insufficient water resistance, as well as the degree of confinement. Product quality will be managed through quality control e.g. regular auditing and the use of the correct bulk emulsion products. Where possible, blasts will not be confined as designs will be planned to blast towards the free face.

## PERMITS AND LICENCES REQUIRED

All blasting permits and licences have been obtained for this project by Hanson.

## ORICA JOB PACK

The blast designs and blast records will be contained in the standard Orica "Job pack". A job pack is prepared for each blast and is kept on file by the local Orica plant office and within BlastIQ™. The job pack contains all standard records of the blast including:

- Pre-blast survey data and boretraking (if applicable);
- As-drilled depths and locations of all blast holes;
- Record of short or blocked blast holes;
- As-loaded record of all short or blocked blast holes;
- Types and quantities of initiating explosives and packaged explosives used;
- Types and quantities of bulk explosives used;
- Initiation plan including charge mass per delay (MIC) and method of initiation;
- Vibration and Air blast records.

## BLASTIQ – BLAST DATA/RECORD MANAGEMENT

Orica will utilise the online BlastIQ™ Blast management system to store all records and data associated with blasting at the Hanson East Guyong Site.

# RISK ASSESSMENT - BLASTING OPERATIONS

Assessment designed to comply with AS / NZS 4360:2004 "Risk Management"

Main elements: (from AS / NZS 4360:2004)

- Communicate & Consult
- Establish Context
- Identify Risks
- Analyse Risks
- Evaluate Risks
- Treat Risks
- Monitor & Review

## COMMUNICATE & CONSULTATION STEPS:

- Consider costs, payment and liability for Orica conducting the risk assessment.
- Physically visit and "walk" the area of any blasting proposal.
- Convene a meeting in a location with whiteboard / write-up capability.
- Gather a team of persons familiar with the site and blasting objectives.
- Review the objectives of any blasting proposal.
- Specify a "typical" blast design that might be anticipated.
- List potential hazards associated with setting up, charging and firing a blast.
- Describe the expected environmental and other potential effects of such a blast.
- Locate site plans covering the full potential range of vibrations, airblast, and flyrock.
- Highlight circles of radius around blast site (e.g. 10 m, 50 m, 100 m, 200 m, etc.)
- Identify all equipment, services, and facilities within target ranges.
- Use the assessment sheets provided to identify the hazards, determine the risk and identify the controls associated with each potential target or hazard.
- Document these on the risk management forms.
- Determine whether each hazard can be safely reduced and managed.
- Arrange to draft site-specific operational procedures covering all aspects of the blasting process.
- After completion, have qualified persons review the draft and when completed produce the final Site Information sheet for inclusion into the documentation.
- Ensure every appropriate person on site is familiar with the assessments and the procedures in place to ensure safety.
- Measure and record blast outcomes and effects.
- Complete summary report after blasting as required by law and site procedures.

## CONTEXT OF RISK ASSESSMENT

- Regulation requirements
- Other activities in the area
- Associated tasks
- Site layout
- Property in non-safety zone
- Internal property damage
- Power lines, underground services
- All weather conditions
- Timing of activity
- Safety equipment needed
- Visitors and contractors
- Uneven surfaces
- Vehicle suitability
- Operator competence
- Delays in charging / firing
- Neighbours
- Traffic/ Speed limits
- Restricted areas / Signs
- Face / ground conditions
- Geology
- Off-spec drilling, lost holes
- Oversize
- Toe
- Backbreak
- Airblast, Vibration
- Evacuation areas, Road blocks

**The Risk Assessment process can be either Orica's or Hanson's. It must be agreed upon and communicated to both parties.**

## IMPLEMENTATION PLANS

The following plans and responsibilities have been identified and must be executed:

ACTIONS	PERSON
Obtain necessary permits/notifications	Hanson
Conduct explosives awareness TBT (as requested)	Orica TSR
Review Blast Designs as required	Orica TSR
Design, load and fire the blasts	Orica
Conduct Vibration and Overpressure Monitoring when requested by QM/SSE	Orica SF
Video the blasts	Orica SF
Advise neighbours of blasting (where required)	Hanson
Advise providers of services adjacent to the blast of blasting	Hanson
Prepare a written blast clearance plan with sentry locations marked	Hanson and Orica
Provide good quality clean 10-20mm aggregate for stemming as required for each blast	Hanson
Provide appropriate cover material if blasts require extra cover for any reason	Hanson
Provide bunding, signage and flagging for demarcating blast area	Hanson and Orica
Provide an appropriately prepared bench for desired blast area	Hanson
Site specific procedure for misfire management	Orica
Provide Blast Guards for each blast where necessary	Hanson
Drill blastholes to specified design	Driller/Hanson

All personnel involved in Risk Assessment meeting to sign off	ALL
All personnel involved in job to sign onto this document	ALL

## STANDARD OPERATING PROCEDURES



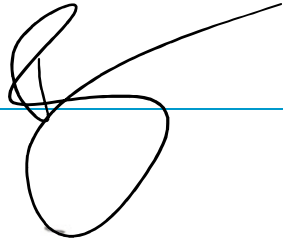

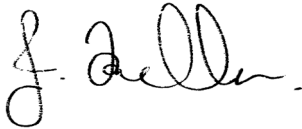
BLAST MANAGEMENT REQUIREMENT	REFERENCE DOCUMENT
Layout plan of the blast including drilling pattern and hole depths.	Job Pack / SIS / SSOP-04
Detonation sequence/effective charge mass per delay (MIC)/powder factor.	Job Pack / SIS / SSOP-01, 04, 05
Type of explosive to be used and quantity required.	Job Pack / SIS / SSOP-04
Method of initiation.	Job Pack / SIS / SSOP-05
Type of firing equipment and procedures.	Job Pack / SIS / SSOP-35, 37
Explosive loading and charging procedures.	Job Pack / SIS / SSOP-04 & SSOP-21 to SSOP-33
Explosive storage and handling procedures.	SSOP-06, 07
Security procedures for the site and the blast, including explosives.	SSOP-06, 07, 08, 09
Proposed dates and times of blasting.	SSOP-01
Cessation of explosive-related activities during electrical storms.	SSOP-14
Misfire management system.	SSOP-41
Post blast assessment and inspection procedures.	SSOP-40
Provision for post-blast comments.	SSOP-40
Signature spaces for the plan author, shotfirer and person who approves the plan.	SSOP-01
Drill records and logs	Job Pack

## BLAST RECORDS

Details of the blast should be taken and maintained, including but not limited to the following:

Environmental conditions at the time of the blast.	SSOP- 43
Monitoring equipment including type, serial number and location.	SSOP-34, 43
Details of measurements recorded during the blast.	SSOP-34, 43
Details of flyrock.	SSOP-40, 43
Details of incidents and complaints.	SSOP-40, 43
Comment on the results of the blast.	SSOP-40, 43
Proposed modification to the blast plan for future shots.	SSOP-40, 43

# DEVELOPMENT SIGN OFF

NAME	POSITION	SIGN
Pere Riini	East Guyong Quarry Manager Site Quarry Manager Responsibility	
Brenden Wood	Orica Marulan Plant Supervisor Operational Responsibility	
Daniel Genge	Orica Technical Services Technical Services Responsibility	
Chloe Quinn	Orica Territory Manager Overarching Operational Responsibility	
Jonathon Keller	Orica Technical Services Blast Design and Risk management Responsibility	



# APPENDIX A - ORICA RISK ASSESSMENT

## BLASTING RISK ASSESSMENT TABLE

<b>L (Likelihood) X C (Consequence) = R (Risk)</b>
--

Likelihood of Occurrence	Potential Consequences					
	5 Notable	10 Significant	15 Highly Significant	20 Serious	25 Very Serious	30 Catastrophic
Almost Certain	Level II	Level II	Level I	Level I	Level I	Level I
Very Likely	Level III	Level II	Level II	Level I	Level I	Level I
Possible	Level III	Level III	Level II	Level II	Level I	Level I
Unlikely	Level IV	Level IV	Level III	Level III	Level II	Level I
Very Unlikely	Level IV	Level IV	Level IV	Level IV	Level III	Level II
Extremely Unlikely	Level IV	Level IV	Level IV	Level IV	Level IV	Level III

## POTENTIAL LIKELIHOOD

6	Almost Certain	The event will almost definitely occur.
5	Very Likely	A common occurrence. The event is expected to occur in most circumstances.
4	Possible	Event will probably mostly occur - known to have happened in similar situations.
3	Unlikely	The event could occur but not expected.
2	Very Unlikely	The event may occasionally occur at some time but rarely
1	Extremely Unlikely	The event may occur only in exceptional circumstances.

- Note that the risk estimations and “weightings” are subjective and based on the experience and interpretation of those persons contributing to the study. For matters relating to blasting technology and design this is mostly provided by the writer of this report.

Orica Australia takes all reasonable efforts to ensure an accurate understanding of client requirements. The information contained in this report is as accurate and up-to-date as possible based on this understanding. Orica Australia accepts no liability to any person for any injury, loss or damage resulting from the use of or reliance upon the information contained in this report or for any injury, loss or damage resulting from the omission of any information in this report. No expressed or implied warranties are given other than that implied mandatory by Commonwealth, State or Territory legislation.

## ORICA INTERNAL HAZARD MANAGEMENT TABLE

Risk	Who Signs Off	Type of Investigation
Level IV	Shotfirer / Supervisor	Site visit, sign off note in job pack
Level III	TS Blasting Engineer	Site visit, report in job pack
Level II	Snr TS Engineer / Project / Business Mgr.	Site visit, Risk report in job pack
Level I	Must be reduced	Cannot accept work

## POTENTIAL CONSEQUENCE EXAMPLES

	Notable	Significant	Highly Significant	Serious	Extremely Serious	Catastrophic
<b>Safety &amp; Health</b>	1 Minor Injury	Single MTI	Single LWC or Multiple MTI	Permanent disability or Multiple LWC	Single Fatality	Multiple Fatality
<b>Environment</b>	Very Minor pollution	Minor Local pollution	Evident Pollution local concern	Significant Local pollution	Major Local pollution	Extremely Severe pollution
<b>Reputation and Image</b>	Minor issue 1 complaint	Local issue 10 complaints	Local media 100 complaints	Regional or state media	National media coverage	Headlines, corporate damage
<b>Services / Business Interruption</b>	Minor re-connection required	Minor temporary loss of resource	Short-term supply loss of major resource	Medium term supply loss for major resource	Long term loss of production and/or major resource	Permanent loss of production and/or major resource
<b>Business Liability</b>	>\$5000	>\$50,000	>\$200,000	>\$1m	>\$15m	>\$50m

# BLASTING RISK EVALUATION GUIDE (ISEE)

The Journal of Explosives Engineering, July/ August 2000

Concern	Primary Impacts	Controls
Flyrock	Damage and Injury	Pre-qualification requirements, blasting controls (blast mats-burden requirements) stemming requirement blast plan reviews, and inspection work.
Structural damage to buildings	Damage claims, work delays or suspension	Pre-qualification requirements, blasting controls, blast plan submittals and reviews, careful inspection of work, public education, effects monitoring and pre, blast condition surveys.
Damage to rock slopes and final excavation walls	Rock fall, remedial slope repairs, work disruption	Evaluate in situ condition of slopes and install additional support is needed. Develop blasting controls and carefully monitor the work.
Damage to buried pipes and utilities	Unrealistic restrictions or total ban on blasting	Pre-qualification requirements, blasting (controls, blast plan submittals and reviews, careful inspection of work, effects monitoring and blasting effects evaluation study by expert.
Startled people	Complaints	Inform neighbours before each blast.
Damaged water wells or aquifers	Blasting prohibition or project delays	Blasting controls, pre-blast / post blast inspections, effects monitoring and blasting effects evaluation study by expert
Environmental Impacts or other Animal Effects	Disapproved EIS, blasting prohibition or delays	Blasting controls, pre-blast and/or post blast inspections, and blasting impacts and mitigation study by expert.
Work or business disruption	Financial damage claims and/or organised opposition to the work	Public education, blasting controls, monitoring and schedule blasting during non-working hours.
Contractual Claims and Legal Actions	Financial damages	<i>Owners and Engineers:</i> Have appropriate experts review contract documents and specifications. Prepare pre-qualification requirements to ensure personnel can perform the work, and carefully inspect and document all non-conforming work.  <i>Contractors:</i> Carefully evaluate all available documents-including all geotechnical information, attend pre-construction meetings, document all efforts to conform and barriers to conformance

Blasting Job Safety & Risk Assessment Form – Hanson East Guyong Quarry						Date 25/05/2018			
Event or Activity	Potential Hazards & Effects	L	C	R	Possible Elimination Measures	Responsibility/ Comments	L	C	R
Design Blast	Poor Blast Design may lead to safety, environmental or productivity problems (fly rock, vibration, misfires, hard digging).	5	15	75	Blasts designed according to SIS.  If class of blast increases to Class 4 and above, Tech Services Rep is engaged for design and loading review.  Adopt design measures to reduce the risk of misfires, fly rock and vibration.	Orica Surveyor to conduct blast survey, including face profiling and designate correct class of blast for review responsibilities.  Orica SSOP	2	10	20
Establish Safe Work Area	Benches not prepared adequately.	5	15	75	Hanson to establish benches with sufficient drainage to enable MMU access. If it is raining it will be necessary to ensure road access for MMUs, this may require sheeting the road.		3	10	30
Establish safe work area	Danger of falling  Working around large earth moving equipment.	5	15	75	Use of 2m rule when working near crests.  Ensure all blast areas are clearly marked and signed before loading commences	Orica SF to confirm adequacy of controls before starting work.  TMP and Orica SSOP	1	10	10
Mark Out Pattern	Mark out holes in wrong place  Marks may get moved or lost	5	5	25	Orica to use adequately trained survey personnel.  Hanson to ensure drill area is well demarcated.	Orica SSOP	3	5	15

Blasting Job Safety & Risk Assessment Form – Hanson East Guyong Quarry						Date 25/05/2018			
Event or Activity	Potential Hazards & Effects	L	C	R	Possible Elimination Measures	Responsibility/ Comments	L	C	R
Drill Blast holes	Holes drilled to wrong depth or in wrong place – fail to achieve grade.  Holes blocked after drilling or redrills not remedied – poor fragmentation  People drive over drill pattern and block holes	3	10	30	Holes to be drilled to design, all holes to be dipped and checked by Orica SF before charging.  All holes to be protected with a plug (bag or hat).  Drill area to be demarcated with signs or flagging	Orica SF  Driller  Driller / Hanson	1	10	10
Secure Worksite	Other activities or people in work area may interfere, hot work while loading or near stored explosives may cause unplanned explosion.  Snap, Slap, Shoot.	3	20	60	No other trades, activities or machines to be working in Blast area while explosives loading activities are underway. Blast area appropriately signed and demarcated before loading commences.  No vehicles on shotplan unless separate risk assessment completed.  Sources of ignition controlled	Orica SF and Crew  Orica SSOP  TMP	1	20	20
Select Blast Time	Blast time not correct causing rushing	5	10	50	Blast times to be agreed between Shotfirer and Hanson		1	10	10

Blasting Job Safety & Risk Assessment Form – Hanson East Guyong Quarry						Date 25/05/2018			
Event or Activity	Potential Hazards & Effects	L	C	R	Possible Elimination Measures	Responsibility/ Comments	L	C	R
Transport Explosives to worksite	Interaction between Orica SF vehicle and other vehicles – collision, fire, explosion	3	25	75	Orica personnel to contact site personnel via two-way when driving in quarry. Vehicle with explosives signs displayed appropriately	Orica SSOP	1	25	25
Store Explosives at worksite	Theft, Loss	3	25	75	Explosives to remain under control of SSAN cleared Orica person or locked in Vehicle. Daily reconciliation of quantities used. Theft or loss to be reported.	Orica SSOP	1	25	25
Set out Stemming	Stemming in wrong place or not enough will cause blast delay and excessive fatigue	5	5	25	Orica Shotfirer to ensure sufficient stemming is available and set out to Orica requirements.	Hanson to supply 10-20mm aggregate and loader to place it.	1	5	5
Check and Load Blast holes	Incorrect quantity of explosives loaded – vibration / fragmentation problems  Explosives blocked in blast hole – fly rock / air blast.	5	15	75	Orica Shotfirer responsible for ensuring correct quantity is loaded and reconciled.  Exclusion zone.  Work area must be free of standing water.  Prepare contingency for dealing with blocked holes (extra false burden and machine to place it).	Orica SF and crew  Orica SSOP        Orica and Hanson, separate risk assessment required if placing false burden with machinery near loaded holes.	2	10	20

Blasting Job Safety & Risk Assessment Form – Hanson East Guyong Quarry						Date 25/05/2018			
Event or Activity	Potential Hazards & Effects	L	C	R	Possible Elimination Measures	Responsibility/ Comments	L	C	R
Stem Blast	Insufficient stemming – fly rock and air blast.  Damage to initiation system – misfire.	4	20	80	Shotfirer to dip all holes before stemming. Use experienced personnel to ensure correct quantity of stemming in each hole.  Appropriate exclusion zone executed.  Orica Shotfirer or engineer to supervise.	Orica Shotfirer and SSOP  Blast controller	2	10	20
Tie Up Blast holes	Incorrect initiation sequence may cause excessive vibration.  Missed connection will cause misfire.	5	15	75	Orica Shotfirer to follow SIS or obtain review from Orica TSE.  The Orica Shotfirer is to inspect shot as per Orica SSOPs, this is to be carried out in conjunction with a designated Hanson supervisor  Electronic Blasting Systems (EBS) will require the Hanson supervisor to visually see the Hardware pre-blast report	Hanson and Orica  Orica SSOP	2	10	20
Clear Blast Area	Failure to clear could result in death or injury	4	25	100	Hanson and Orica to develop blast clearance plan and brief blast sentries.	Hanson and Orica	1	25	25

Blasting Job Safety & Risk Assessment Form – Hanson East Guyong Quarry						Date 25/05/2018			
Event or Activity	Potential Hazards & Effects	L	C	R	Possible Elimination Measures	Responsibility/ Comments	L	C	R
Fire Blast	Breakdown in blast clearance – personnel in area	4	20	80	Written blast clearance plan required.  Personnel and machines to be cleared beyond specified clearance zones.  Sentries at all entrance points.	Blast Controller to ensure blast area is secured prior to handing site over to Orica SF	1	20	20
Fire Blast	Vibration from blasting without control may cause nuisance or damage	4	15	60	Control Charge Weight. Monitor vibration.		1	10	10
Fire Blast	Overpressure from blasting without control may cause nuisance or damage	4	10	40	Ensure adequate face burdens and stemming. Use good quality stemming. Monitor airblast.		1	10	10
Fire Blast	Flyrock (from blasting without control) within blast clearance area may cause damage to equipment or infrastructure	4	15	60	Ensure adequate face burdens and stemming. Use good quality stemming. Treat exceptions according to SSOP.		2	10	20
Fire Blast	Flyrock (from blasting without control) outside blast clearance area may cause damage, injury or death.	4	25	100	Ensure adequate face burdens and stemming. Use excellent quality stemming. Clearance zone 500m around blast. Prepare written blast clearance plan.	Blast Controller to prepare blast clearance plan (flyrock Calculation)	1	25	25
Fire Blast	Poor fragmentation/toe may lead to low productivity	4	15	60	Ensure that blasting parameters are implemented to manage fragmentation and environmental as required.		4	15	60



Blasting Job Safety & Risk Assessment Form – Hanson East Guyong Quarry						Date 25/05/2018			
Event or Activity	Potential Hazards & Effects	L	C	R	Possible Elimination Measures	Responsibility/ Comments	L	C	R
Check for misfires	Misfires pose a high threat to drillers, excavator operators and future users of spoil	3	20	60	<p>Train excavator operator to identify misfires and what to do if found.</p> <p>Hanson to contact Orica if any misfires are found.</p> <p>Orica Shotfirer to follow directions in SSOP for handling misfires.</p> <p>Misfire Flowchart is to be followed (see Appendix C)</p>	Orica to conduct TBT for operators if requested	1	10	10
Review WMS					This WMS is to be reviewed every 12 months or as deemed appropriate				

# APPENDIX B - SITE SPECIFIC PRE-BLAST FIRING CHECKLIST

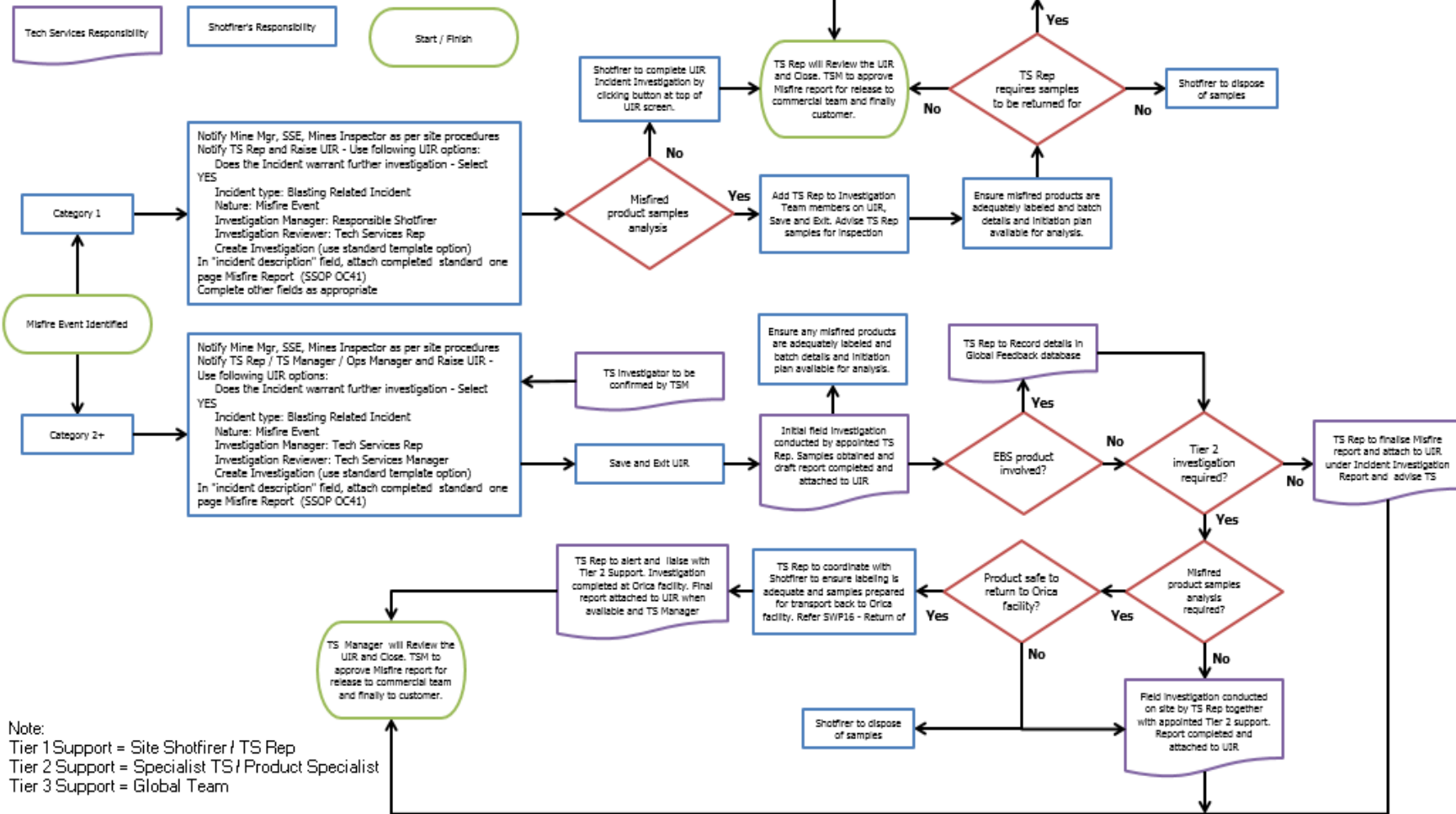
The following page contains a checklist used to highlight actions specific to the site that are to be completed during loading and before each firing.

Pre-Blast Checklist	By	Completed	Comments
<b>Minimum 1 day before loading</b>			
Neighbours notified	Hanson		
Stemming onsite, ready to place	Hanson		
<b>Day of the blast (start of shift)</b>			
Neighbours notified of blasting if required	Hanson		
Blast Clearance plan in place	Hanson & Orica		
<b>30 minutes before the blast</b>			
Blast Guards report to Blast Controller	Hanson		
Arm Monitors	Orica		
Setup video	Orica		
Begin clearing the area of personnel	Hanson		
<b>15 minutes before the blast</b>			
Blast guards to be at guard position	Hanson		
Orica begin retreat to firing point	Orica		
Blast Controller meet Orica at firing point (or remain in radio contact at known location)	Hanson & Orica		
<b>After the blast</b>			
Inspect blast	Orica		
Confirm blast has been fired and give the all clear	Orica		

# APPENDIX C – MISFIRE FLOW CHART

The following page contains a flow chart of the preferred methodology for dealing with a misfire

# Flowchart detailing UIR Misfire Reporting and Investigation Process and Associated Responsibilities of Shotfirer and Tech Services Personnel.



Note:  
 Tier 1 Support = Site Shotfirer / TS Rep  
 Tier 2 Support = Specialist TS / Product Specialist  
 Tier 3 Support = Global Team

## Misfire Category Definitions

- Cat 1 (Minor)** - Can be resolved by the shotfirer with the blast guards in place. UIR is raised with investigation managed by shotfirer and reviewed by local TS Engineer.
- Cat 2 (Significant)** Results in blast being delayed to the point it cannot be refired within the permissible blast window, e.g. major surface shutdown, unsafe to fire or product found during excavation. Engineer and reviewed by TS Manager. UIR is raised with investigation managed by local TS
- Cat 3 (Serious)** - Requires considerable time and effort to recover, resulting in significant delay causing a major disruption to the mining cycle. UIR is raised with investigation managed by experienced TS Engineer nominated by TS Manager and reviewed by TS Manager. Resolution process may be managed by the Commercial Manager.
- Cat 4 (Catastrophic)** Unrecoverable misfire situation resulting in a potential significant consequential loss to DMS. UIR is raised with investigation managed by nominated TS Engineer and reviewed by TS Manager. Resolution process may be managed by Level 4 management.

# APPENDIX D - INCIDENT REPORTING

NAME	POSITION	CONTACT DETAILS
Pere Riini	Quarry Manager	<a href="mailto:pere.riini@hanson.com.au">pere.riini@hanson.com.au</a> – 0438 244 437
Chloe Quinn	Territory Manager (ORICA)	<a href="mailto:Chloe.quinn@orica.com">Chloe.quinn@orica.com</a> - 0436 007 225
Brenden Wood	Plant Manager (ORICA)	<a href="mailto:brenden.wood@orica.com">brenden.wood@orica.com</a> – 0423 108 571
Jonathon Keller	Technical Services (ORICA)	<a href="mailto:jonathon.keller2@orica.com">jonathon.keller2@orica.com</a> - 0423 849 246

# APPENDIX E – BLAST CALL PROCEDURE

## SHOTFIRER

- **Shotfirer: Carry out radio check with blast guard and monitor sentry**
- *Blast Guard: Confirm monitor in position and ready with sentry*
- **Shotfirer: “Blast guard, confirm you are in position and the quarry is clear”**
- *Blast Guard: “Quarry is all clear” or “quarry is not clear please wait”*
- **Shotfirer: “Attention all personnel, there will be a blast in the main pit @ (blast location and level) in 1 minute, please maintain radio silence until the shot is fired and the all clear is given, radio discipline may be release in case of an emergency**
- **Shotfirer: Start warning siren – sound for 30 seconds**
- **Shotfirer: “Firing the blast in 10 seconds”**

- **Shotfirer: 10,9,8,7,6,5 (radio silence with radio disengaged)**
- **Shotfirer: “Firing the blast now” – wait 2 seconds with radio disengaged)**
- **Shotfirer: “The blast has been fired, please maintain radio silence until the all clear has been given”.**
- **Shotfirer: “Blast guard, the blast has been inspected and found to be safe (if area is unsafe report through immediately) you may resume work in the pit”**
- *Blast Guard: Inform operators to return to work and monitor sentry to return to the quarry.*

*If there are any reasons to stop the shot, immediately call “**ABORT, ABORT, ABORT**”, once everything is all clear to proceed, the blast control and blast firing process **MUST** be started again.*

## **BLAST GUARD**

- *Shotfirer: Carry out radio check with blast guard and monitor sentry*
- **Blast Guard: Confirm monitor in position and ready with sentry**
- *Shotfirer: “Blast guard, confirm you are in position and the quarry is clear”*
- **Blast Guard: “Quarry is all clear” or “quarry is not clear please wait”**
- *Shotfirer: “Attention all personnel, there will be a blast in the main pit @ (blast location and level) in 1 minute, please maintain radio silence until the shot is fired and the all clear is given, radio discipline may be release in case of an emergency*
- *Shotfirer: Start warning siren – sound for 30 seconds*
- *Shotfirer: “Firing the blast in 10 seconds”*
- *Shotfirer: 10,9,8,7,6,5 (radio silence with radio disengaged)*
- *Shotfirer: “Firing the blast now” – wait 2 seconds with radio disengaged)*
- *Shotfirer: “The blast has been fired, please maintain radio silence until the all clear has been given”.*
- *Shotfirer: “Blast guard, the blast has been inspected and found to be safe (if area is unsafe report through immediately) you may resume work in the pit”*
- **Blast Guard: Inform operators to return to work and monitor sentry to return to the quarry.**

# APPENDIX F- BLAST EVENT CHECKLIST

## Blast Event Checklist

AUSQC&NZ Blast Documentation

### Blast Details

Shot No.		Customer	
Firing Date		Quarry / Site	
Firing Time		Location / Pit	
Exclusion Start Time		Blast Controller	
UHF / Radio Channel		Shotfirer	

### Morning of Blast

Check Item	Initial on completion	Date / Time
Time of blast and exclusion zone agreed with Quarry/Site Manager or relevant customer personnel		
Blast boards and/or signage updated with blast times		
Environmental monitoring locations and installation personnel selected		
Exclusion zone inspected for at-risk items such as equipment and services. Customer advised as required		
Blast Guard meeting held to discuss guard locations and blast procedure. Use aerial photograph where possible to ensure all potential access routes covered.		

### Blast Guarding Plan

No.	Blast Guard Name	Blast Guard Mobile Number	Blast Guard Location	Trained*
1				= Yes
2				= Yes
3				= Yes
4				= Yes
5				= Yes

\*Note. All blast guards to be trained in relevant blast guarding requirements and responsibilities prior to taking position.

## Blast Event Checklist

AUSQC&NZ Blast Documentation

### Clearance and Pre-firing Checks (Guide only, use where no site-specific checks available)

30 minutes prior to blast

Check Item
Blast Controller to broadcast blast type, time and location
Blast guards to be sent to agreed positions
Exclusion zone cleared of people and equipment
Check positive radio communications with all guards

10 minutes prior to blast

Blast Controller/Shotfirer to broadcast time until blast and location
Shotfirer to conduct roll call of blast guards confirming that they are in position and area is secured
ExeITM Initiation – connect lead in line and run to firing position
Electronic Initiation – complete programming and circuit testing, arm blast box
Confirm all monitors installed and monitoring commenced
Confirm to blast controller that blast is ready to fire

Countdown to blast

At 3 minutes to blast, sound audible warning siren of 3 short blasts
At 2 minutes to blast, call Shotfirer to call for radio silence and broadcast shot location and "2 minutes till shot is fired"
At 1 minute to blast, sound audible warning siren for 1 minute
Complete final visual inspection of blast area from firing position prior to firing
Connect ExeITM lead in line to initiating device
Broadcast "15 seconds to firing"
When countdown complete, fire the blast

Immediately after blast

Wait for minimum 2 minutes after ExeITM shot, or 5 minutes after Electronic shot, then inspect blast for performance and misfires.
If no misfires, give "all-clear" advice to blast controller, and stand down all blast guards
If misfires present, assess risk and follow site misfire procedures

# APPENDIX G – BLAST CLEARANCE AND SENTRY MAP





# APPENDIX H – EXPLOSIVES CONTROL PLAN

An *Explosives Control Plan* has been prepared in accordance with Schedule 2, section 4 of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* and aims to address the criteria set out from the below extract from the Regulation.

## *4 Explosives Control Plan*

1. *An explosives control plan must set out the control measures for risks to health and safety associated with explosives at the mine or petroleum site taking into account:*
  - a) *The potential for unintended or uncontrolled detonation of explosives,*
  - b) *The characteristics of relevant explosives and the purpose for which they are to be used,*
  - c) *The characteristics of the places in which the explosives are to be used,*
  - d) *The full set of phases for the use of relevant explosives such as the charging and firing phases,*
  - e) *The potential for explosives to deteriorate,*
  - f) *The potential for the theft and misuse of explosives, and*
  - g) *The potential for the ejection of fly rock or other material as a result of the detonation of an explosive.*
  
2. *An explosives control Plan must also set out the following:*
  - a) *The procedures for inspecting, reporting, isolating and disposing of deteriorated or damaged explosives,*
  - b) *The procedures for finding, recovering and disposal of explosives that misfire,*
  - c) *The inspection, testing, reporting and maintenance procedures in relation to the equipment used at the mine or petroleum site for manufacturing, storing, transporting and delivering explosives,*
  - d) *The procedures and equipment used in storing and transporting explosives at the mine or petroleum site,*
  - e) *The procedures used for the accounting of explosives at the mine or petroleum site,*
  - f) *The arrangement for keeping a register identifying persons who are licensed under the Explosives Act 2003 to transport, use, store or handle explosives at the mine or petroleum site,*
  - g) *The procedures for ensuring that any person transporting, using, storing or handling explosives at the mine or petroleum site has any license necessary under the Explosives Act 2003, and*
  - h) *The procedures in relation to consultation and co-operation to ensure that any transportation, use, storage or handling of explosives at the mine or petroleum site is conducted safely and in accordance with any conditions attached to the license under which that transportation, use, storage or handling takes place.*

# UNINTENDED OR UNCONTROLLED DETONATION

## a) The potential for unintended or uncontrolled detonation of explosives

There are a number of key scenarios Orica has identified where there is potential for unintended or uncontrolled detonation of explosives, as per below. For each of these scenarios the key control measures for risks to health and safety are covered by Orica's SSOPs (referenced below). In addition to this the site specific Blast Management Plan in conjunction with the job specific Risk Assessment, Toolbox Talk and Traffic Management Plan (stored in Blast IQ online interface).

### 1. Transportation

- SSOP-OC-07 Transporting Explosives to & from Magazine
- SSOP-OC-08 Resolving and Reporting Stock Discrepancies
- SSOP-OC-11 Maneuvering Vehicles Around the Blast

In the event of an emergency onsite or in transit the Emergency Procedure Guides in both the Mobile Manufacturing Unit (MMU) and Shotfiring Vehicles (SFV) should always be referenced. These guides will help to determine the hazards, personal protective equipment and correct emergency response for those goods if they are involved in the fire situation in conjunction with Customer Site Emergency Plan.

### 2. Misfire

- SSOP-OC-09 Identifying and Managing Blast Hazards
- SSOP-OC-10 On Bench Hazards
- SSOP-OC-33 Tie In
- SSOP-OC-37 Connect Blast Initiation
- SSOP-OC-38 Firing the Blast
- SSOP-OC-41 Handling Misfires
- SSOP-OC-42 Misfire Documenting Responsibilities

### 3. Poor Handling Practices

- SSOP-OC-01 Tools for Managing the Blast Process
- SSOP-OC-08 Resolving and Reporting Stock Discrepancies
- SSOP-OC-30 Problems when Loading
- SSOP-OC-32 Disposal of Explosives
- SSOP-OC-36 Blast Guard Duties

### 4. Equipment Maintenance

- Orica utilizes the SAP Redbook Maintenance System

5. Hot and Reactive Ground
  - SSOP-OC-09 Identifying and Managing Blast Hazards
  - SSOP-OC-10 On Bench Hazards
6. Lightning
  - SSOP- OC-14 Lightning

## CHARACTERISTICS OF EXPLOSIVES, PLACE OF USE AND PHASES OF USE

- (b) the characteristics of relevant explosives and the purposes for which they are to be used,
- (c) the characteristics of the places in which the explosives are to be used,
- (d) the full set of phases for the use of relevant explosives such as the charging and firing phases,

The characteristics of relevant explosives and the purposes for which they are to be used are covered in Orica's Technical Data and Safety Data Sheets and can be found online <http://www.oricaminingservices.com/au/en/page/markets/quarry>. Products regularly used on site include:

- Centra™ Gold
- Centra™ Gold ES
- Centra™ Gold GT System
- Exel™ Connectadet™ Detonators
- Exel™ Millisecond Detonators
- Centra™ Gold GT System
- Pentex™ H Booster
- uni tronic™ 600 Detonator

To ensure that relevant explosives are used in the charging and firing phases Orica utilizes a Blast Design approval process through our Blast IQ online interface. This is covered in the below SSOPs: The basic phases in sequence are survey, design, markout, boretrack and dip holes, design loading and initiation, charge/fire.

- SSOP-OC- 2 Blast Class Definitions
- SSOP-OC- 3 Blast Class Responsibilities
- SSOP-OC- 4 Blast Load Designs
- SSOP-OC- 5 Initiation and Design

## POTENTIAL FOR DETERIORATION

The potential for deterioration of explosives at East Guyong poses a low risk, due to the nature of load, tie and shoot in a short timeframe usually within 1 working day. This presents a low risk for bulk emulsion products to deteriorate, given they are freshly manufactured for immediate use and are loaded and fired in a short timeframe.

Deterioration of explosive accessories such as downlines and surface connectors are managed with appropriate storage, stock rotation and use by date protocols.

Deterioration due to dynamic ground conditions, such as ground water or silt are covered in the blast design process to identify any potential and will be covered in the job specific risk assessment.

### **(e) the potential for explosives to deteriorate,**

Monitoring and control for the deterioration of explosives is covered in the below SSOPs:

- SSOP-OC- 6 Magazines
- SSOP-OC-32 Disposal of Explosives

## POTENTIAL FOR THEFT OR MISUSE OF EXPLOSIVES

The potential for theft or misuse shall be controlled by the job specific JSERA and the Orica SSOP's. The shotfirer shall maintain under control of all explosives on the blast site at all times and operates under the Orica SSOP. The shotfirer shall also prevent unauthorized access to explosives, blast site and equipment.

Reconciliation of all explosives takes place before firing and the blast is not fired until all explosives have been accounted for.

### **(f) the potential for the theft or misuse of explosives,**

All incidents that involve a discrepancy in the reconciliation of explosive stock, either at the blast site or at the magazine are covered in the below SSOPs. These also cover the process of reconciling, stocktaking and reporting suspected loss or theft of explosives.

- SSOP-OC- 6 Magazines
- SSOP- OC-08 Resolving and Reporting Stock Discrepancies

# POTENTIAL FOR FLY ROCK

**(g) the potential for the ejection of fly rock or other material as a result of the detonation of an explosive.**

Key control measures to eliminate the ejection of fly rock or other material as a result of the detonation of an explosive is assessed at all stages of the blast cycle. This includes the initial design, quality control (i.e. boretracking and face profiling), loading practices and finally exclusion zones and firing. The following SSOPs summarize the control measures to ensure a safe and efficient blast outcome:

- SSOP-OC-4 Blast Load Design
- SSOP-OC-5 Initiation and Design
- SSOP-OC-21 Check Blast Loading Design
- SSOP-OC-30 Problems when Loading
- SSOP-OC-35 Shotfirers Pre-firing Planning Meeting
- SSOP-OC-36 Blast Guard Duties

# PROCEDURES FOR INSPECTING, REPORTING, ISOLATING AND DISPOSAL OF DETERIORATED OR DAMAGED EXPLOSIVES AND HANDLING OF MISFIRES

**(a) the procedures for inspecting, reporting, isolating and disposing of deteriorated or damaged explosives,**

**(b) the procedures for finding, recovering and disposal of explosives that misfire,**

Once a blast has been fired to ensure the area is clear of explosive product or deteriorated/damaged explosives the below SSOPs are followed.

- SSOP-OC-40 Post Blast Inspection

In the event of a misfire the below SSOPs summarise key steps taken to report, isolate and dispose (if safe to do so) and are also described in this BMP and risk assessment.

- SSOP-OC-32 Disposal of Explosives
- SSOP-OC-41 Handling Misfires
- SSOP-OC-42 Misfire Documenting Responsibilities

# INSPECTION, TESTING, REPORTING AND MAINTAINANCE OF EQUIPMENT

**(c) the inspection, testing, reporting and maintenance procedures in relation to the equipment used at the mine for manufacturing, storing, transporting and delivering explosives,**

Orica utilizes a SAP Redbook Maintenance System to inspect, test and report maintenance related tasks associated with the manufacturing, storing, transporting and delivering explosives.

## STORAGE AND TRANSPORT OF EXPLOSIVES AT THE QUARRY

No explosives or explosives precursors are stored on site, other than the explosives and explosive accessories brought to site for immediate use for each individual blast event. All unused explosives or explosive precursors will be returned to Orica's licensed magazines off site upon job completion.

**(d) the procedures and equipment used in storing and transporting explosives at the mine,**

Transportation of explosives products to the mine/ quarry is covered under Orica's License to Transport and controlled under the following SSOPs.

- SSOP-OC-07 Transporting Explosives to & from Magazine
- SSOP-OC-08 Resolving and Reporting Stock Discrepancies
- SSOP-OC-11 Maneuvering Vehicles Around the Blast

# ACCOUNTING FOR EXPLOSIVES

## **(e) the procedures used for the accounting of explosives at the mine,**

For explosive product control onsite and in the event of a discrepancy in explosive products on site Orica personnel will follow the below SSOPs:

- SSOP-OC- 6 Magazines
- SSOP- OC-08 Resolving and Reporting Stock Discrepancies

In addition to these procedures, the shotfirer will have an IE/HE issues log, with recorded amounts of explosive accessories taken to site, counted and recorded amounts returning to Orica magazines and reconciled against design amounts required for each individual blast.

# REGISTER OF LICENSES

## **(f) the arrangements for the keeping of a register identifying persons who are licenced under the *Explosives Act 2003* to transport, use, store or handle**

**explosives at the mine,**

## **(g) the procedures for ensuring that any person transporting, using, storing or handling explosives at the mine has any licence necessary under the *Explosives Act 2003*,**

Orica maintains training records and licensing register for each employee which is monitored and updated monthly. Individual Unsupervised Handling Licensing (UHL) is provided to site on induction and updates provided as required. A person shall not commence any work identified in Orica's SSOPs without completing the required training and receiving appropriate appointment.

This document also provides details of suitably licensed personnel nominated to be shotfirer's for this site (refer pg. 14, Responsible Persons). It outlines the type of license and expiry date of the license.

Hi-Quality may also implement a system of monitoring of licenses held and expiry dates, such as the site induction process.

Copies of licenses/qualifications all personnel expected to conduct work at Hi-Quality Menangle have been provided to site.

# CONSULTATION AND CO-OPERATION

**(h) the procedures in relation to consultation and co-operation to ensure that any transportation, use, storage or handling of explosives at the mine is conducted**

**safely and in accordance with any conditions attached to the licence under which that transportation, use, storage or handling takes place.**

Orica holds the following licensing against the Kurri Kurri Technical Centre and relevant vehicles to ensure that any transportation, use, storage or handling of explosives at the mine is conducted safely and in accordance:

- License to Manufacture Explosives XMNF100002
- License to Transport XTRN10012

The following operating procedures ensure these activities are conducted safely and in accordance with any conditions attached to licensing. A person shall not commence any work identified in this procedure without completing the required training and receiving appropriate appointment.

- SSOP-OC-06 Magazines
- SSOP-OC-07 Transporting Explosives to and from Magazines
- SSOP-OC-08 Resolving and Reporting of Stock Discrepancies

Copies of the relevant licenses can be found in this document.

In conjunction with the above procedures set out, attached in *Appendix J*, is a job by job specific JSERA used each time blasting activities take place on site and can be amended on a case by case basis as the shotfirer, blast crew and site representatives undertake each blast operation.



# APPENDIX I – RELEVANT LICENSES

## LICENSE TO TRANSPORT AND MANUFACTURE



SafeWork NSW  
92-100 Donnan Street, Gosford, NSW, 2250  
Locked Bag 2906, Lisarow, NSW, 2252 | DX 731 Sydney  
T: 02 4321 5000 | Customer Service Centre 13 10 50  
contact@safe-work.nsw.gov.au | www.safe-work.nsw.gov.au  
ABN: 61 913 830 179

Licence Number: XTRN10012

### Licence to Transport

Issued under and subject to the provisions of the NSW Explosives Act and the NSW Explosives Regulation

**Issued to:** Orica Australia Pty Ltd  
**Trading As:**  
**Business Address:** 1151 George Booth Dr,  
RICHMOND VALE, NSW, 2323  
**Date of Expiry:** 06/09/2021

#### AUTHORISATIONS

The licence holder is authorised to: Transport, Possess  
Authorisations are subject to the Licence Conditions and Class of Explosives listed below.

#### Class of Explosives:

1.1B	1.5D
1.1D	1.6N
1.4B	5.1 Ammonium Nitrate
1.4D	5.1 Ammonium Nitrate Emulsion
1.4S	

Refer to licence addendum for quantities

#### Licence Conditions:

It is a condition of a licence to handle explosives and/or explosive pre-cursors that the holder must comply with the requirements of the NSW Explosives Act and Regulation, as well as the SafeWork NSW General Explosives Licence and Security Clearance Conditions – September 2013.

#### Nominated Responsible Person:

Paul S Harrison, UHL100105, 11/10/2020



Licence Number: XMNF100002

### Licence to Manufacture Explosives

Issued under and subject to the provisions of the NSW Explosives Act and the NSW Explosives Regulation

**Issued to:** ORICA AUSTRALIA PTY LTD  
**Trading As:** Orica Mining Services  
**Business Address:** 1151 George Booth Dr, RICHMOND VALE NSW 2323, AUSTRALIA  
**Date of Expiry:** 15/06/2021

#### AUTHORISATIONS

The licence holder is authorised to: Manufacture, Supply, Possess, Store, Export  
Authorisations are subject to the Licence Conditions and Class of Explosives listed below.

#### Class of Explosives:

1.1B  
1.1D  
5.1  
5.1  
5.1

Refer to licence addendum for quantities

#### Licence Conditions:

It is a condition of a licence to handle explosives and/or explosive pre-cursors that the holder must comply with the requirements of the NSW Explosives Act and Regulation, as well as the SafeWork NSW General Explosives Licence and Security Clearance Conditions - September 2013. No restriction on Manufacture. Quantities relate to Store ONLY

#### Nominated Responsible Person:

Paul Stanley Harrison, UHL100105, 11/10/2020



*Murphy*

**Licence Number:** XSTR100077

## Licence to Store Explosives

Issued under and subject to the provisions of the NSW Explosives Act and the NSW Explosives Regulation

**Issued to:** ORICA AUSTRALIA PTY LTD  
**Trading As:** Orica Mining Services  
**Business Address:** 1151 George Booth Dr, RICHMOND VALE NSW 2323, AUSTRALIA  
**Date of Expiry:** 13/06/2022

### AUTHORISATIONS

The licence holder is authorised to: Possess, Store

Authorisations are subject to the Licence Conditions and Class of Explosives listed below.

#### Class of Explosives:

1.1B  
1.1D  
1.4B  
1.4S  
5.1

*Refer to licence addendum for quantities*

#### Licence Conditions:

It is a condition of a licence to handle explosives and/or explosive pre-cursors that the holder must comply with the requirements of the NSW Explosives Act and Regulation, as well as the SafeWork NSW General Explosives Licence and Security Clearance Conditions - September 2013.

#### Nominated Responsible Person:

Paul Stanley Harrison, UHL100105, 11/10/2020

# APPENDIX J – JOB SAFETY AND ENVIRONMENT RISK ASSESSMENT SHOTFIRING

The following job specific JSERA has been developed to control the hazards associated with the explosives control plan. It is the responsibility of the shotfirer to complete this and amend if necessary if items become not applicable or new hazards present themselves on a case by case basis.

Completion of these is required for every blast and are stored in the Orica job pack and on BlastIQ™ for each blast job number.

**JOB SAFETY & ENVIRONMENT RISK ANALYSIS (Full JSERA)**

Study Summary

Job No. : MQS 2003-3 Date Created : 11/09/2017  
 Study Type : Job Safety & Environment Risk Analysis Status : Approved  
 Study Title : Shotfiring  
 Site : New South Wales Plant : Manulan  
 Plant Area (Optional): On-Bench Plant Item (Optional): Shotfiring

Start Date(dd/mm/yy) : 11/09/2017 Review Required:  Yes  No  
 Review Date : 11/09/2019 Completion Date : 11/12/2019  
 JSERA Steward : Brenden Wood/AU/EXP/ORICA, Amanda McKenna/AU/EXP/ORICA  
 Authorised Approver(s) : Chloe Quinn/AU/ORICA  
 JSERA Actioner(s) :  
 Related Documents: Quarry Services Standard Shotfiring Operating Procedures (SSOP) Site Information Sheets (SIS's)

JSERA Team Members	Job Roles	Organisation
Brenden Wood Amanda McKenna Brian Rhall	Site Supervisor Site administration 2IC/Shotfirer	Manulan QS

**JOB SAFETY & ENVIRONMENT RISK ANALYSIS PREPARATION WORKSHEET**

Job Title :	Initiated By :	Date Initiated :
Shotfiring	Brenden Wood/AU/EXP/ORICA	11/09/2017

Brief Description of Task(s)	Basis of Safety Issues	Workgroups Involved/Affected
Load, Fire & Execute Blast	Trips, slips, falls, manual handling, bench protection	Operations

Critical Systems Affected (tick):  Critical Instruments  Mechanical Protection  Procedural Protection

Precautions Required:

Relevant Past Incidents:	Relevant Codes and Model Procedure Requirements:	Additional Risk Assessments & Statutory Compliances:

JSERA Approver(s)	Comments:	Approval Status	Date Approved
Ray K Whackett/AU/EXP/ORICA		Approved	19/06/2015

**JOB SAFETY & ENVIRONMENT RISK ASSESSMENT**

JSERA Type :	Site General	Date JSERA Performed :	11/09/2017
Job Title :	Shotfiring	Job Role / Function :	Shotfirer
Job Type:	Job Safety & Environment Risk Analysis	Business Group :	Q&C

**Risk Ranking of Task Steps**

Job Task Steps	S, H or E?	Potential Hazards and Effects	Existing or Currently Proposed Risk Control Measures	[C] Consequence	[L] Likelihood	[R] Risk
Item [01]: Transport of Explosives and personnel to site Job/Function : Stakcrew Additional Controls? <input type="radio"/> Y <input type="radio"/> N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input checked="" type="checkbox"/> E	Theft & Road Accident	All IE & HE to be stored under direct supervision of the shotfirer whilst on site or locked in shotfirer's vehicle. All unused IE & HE will be returned to magazine. Fatigue management processes. Low risk driver training. Licensed explosive transport vehicles.	Category 3.1	Very Unlikely	Level IV
Item [02]: Site Access Job/Function :		Personnel not inducted or qualified to access site. Personnel not	All personnel to do a Generic Induction, plus a site specific	Category 3.1	Unlikely	Level III

Blascrew Additional Controls? <input type="radio"/> Y <input type="radio"/> N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input type="checkbox"/> E	familiar with site traffic management plan. Interaction with other vehicles or heavy earthmoving equipment.	induction. Positive communication and follow site traffic management plan.				
Item [03]. Establish Blast Area Job/Function : Blascrew Additional Controls? <input type="radio"/> Y <input type="radio"/> N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input type="checkbox"/> E	Access to unauthorized personnel. Loss or theft of explosives. Other activities occurring on site in close proximity to the blast area.	Blast area will be demarcated with signs, bollards and flagging as required. No activities permitted within 6m of blast loading area otherwise a separate risk assessment to be conducted documenting controls ie earthen barriers etc. Shotfirer or assistant to supervise blast area at all times once loading commences until blast is cleared.	Category 2	Very Unlikely	Level IV	
Item [04]. Blast Bench Preparation Job/Function : Blascrew Additional Controls? <input checked="" type="radio"/> Y <input type="radio"/> N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input type="checkbox"/> E	Slip / Trip / Fall , tripping over on uneven ground or falling over crest.	Blast area to be cleaned off of all loose debris as per bench prep requirements. Eyes on path. Complete JSE/RA. Reinstale 2m demarcated line.	Category 2	Unlikely	Level IV	
Additional Controls Required:		Driving near/over unloaded holes whilst placing stemming near hole collars-bridged/collapse d holes or stemming filling holes.	Spotter used whilst stemming placement if happening, plus hole plugs to be left in until stemming has been placed on bench	Category 1	Likely	Level III	
Item [05]. Blast Bench Preparation Job/Function : Shotfirer Additional Controls? <input type="radio"/> Y <input checked="" type="radio"/> N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input type="checkbox"/> E	Potential for holes to be loaded with wrong product or quantity.	Holes to be labelled as per drill plan and any exceptions noted, plus any special loading requirements marked near collar and explained to operators at pre start.	Category 3.1	Likely	Level II	
Item [06]. Load Blasholes Job/Function : Blascrew Additional Controls? <input checked="" type="radio"/> Y <input type="radio"/> N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input checked="" type="checkbox"/> E	J3. Dropped Objects, J4. Slip / Trip / Fall, PP 04. Detonation - Friction, PP 05. Detonation - Impact, PP 06. Detonation - Static, PP 07. Detonation - Heat, PP 08. Detonation - Shock.	Due care taken when placing dets & primers near collar of holes. Eyes on Path. Refer to Orca Standard Shooting Operating Procedures and SIS's. Ensure load sheets are completed for every hole.	Category 3.1	Unlikely	Level III	
Additional Controls Required:		Driving near/over unloaded/loaded holes with MMU near hole collars-bridged/collapse d holes or potential Snap, Slip, Shoot or damage to downlines	Spotter to be used whilst MMU is manovering onto blast bench. Hole plugs to be left in until MMU manovering has been completed. Remove all IS&HE from areas where truck is to be manovered on bench. Refer to Orca Standard Shooting Operating Procedures and SIS's.	Category 3.1	Unlikely	Level III	
Item [07].				Category 3.1	Likely		

Stemming Blasholes Job/Function : Blascrew Additional Controls? <input type="radio"/> Y <input type="radio"/> N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input checked="" type="checkbox"/> E	J1. Manual Handling, J2. Equipment Failure, J4. Slip / Trip / Fall, PP 04. Detonation - Friction, PP 05. Detonation - Impact, PP 06. Detonation - Static, PP 07. Detonation - Heat, PP 08. Detonation - Shock, J25 Explosives Knock-on Effects, KO 01. Sympathetic detonation, KO 03. Excessive shock wave, KO 04. Missiles / projectiles	Directing exercises before commencement. PPE. Eyes on Path. Dip holes after loading with product to ensure correct stem height has been achieved and stem with appropriate stemming material.				Level II
Item [08]. Tie up Blast Job/Function : Shotfirer Additional Controls? <input type="radio"/> Y <input type="radio"/> N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input checked="" type="checkbox"/> E	J2. Equipment Failure, J4. Slip / Trip / Fall, J25 Explosives Knock-on Effects, KO 01. Sympathetic Detonation, KO 03. Excessive shock wave, KO 04. Missiles / projectiles	Eyes on Path. Follow Approved tie up plan and any deviation recorded. Refer to Orca Standard Shooting Operating Procedures and SIS's.	Category 3.1	Unlikely	Level III	
Item [09]. EXCEL Tie up Blascrew Additional Controls? <input checked="" type="radio"/> Y <input type="radio"/> N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input checked="" type="checkbox"/> E	J4. Slip / Trip / Fall -uneven ground. Holes bring out of sequence. CONNECTADET shutdown.	Trained personnel. Eyes on Path. Follow Approved tie up plan and any deviation recorded & report problems to Shotfirer. Contact Tech. Serv. Engineer. Refer to Orca Standard Shooting Operating Procedures and SIS's. Clip & Silt to check Connectadet is secure & aligned. Once row is tied and complete-walk back along that row checking for any missed connections-proceed to next row.	Category 1	Extremely Unlikely	Level IV	
Additional Controls Required:		J4. Slip / Trip / Fall -uneven ground. Holes bring out of sequence. CONNECTADET shutdown.	PERFORMED by SHOTFIRER, final check of tie up before firing	Category 1	Very Unlikely	Level IV	
Item [10]. ELECTRONIC Log/Scan Dets and Holes Wire Tie up Job/Function : Blascrew Additional Controls? <input checked="" type="radio"/> Y <input type="radio"/> N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input checked="" type="checkbox"/> E	J4. Slip / Trip / Fall -uneven ground. Holes bring out of sequence	Trained personnel. Eyes on Path. Follow Approved scan/log path plan and any deviation recorded & report problems to Shotfirer. Contact Tech. Serv. Engineer. Refer to Orca Standard Shooting Operating Procedures and SIS's. Twist detonators for Leakage & Errors and record results.	Category 1	Very Unlikely	Level IV	
Additional Controls Required:		J4. Slip / Trip / Fall -uneven ground. Holes bring out of sequence.	PERFORMED by SHOTFIRER / Assistant, final check of Scanned/Logged Dets against scan/log	Category 1	Very Unlikely	Level IV	

			Set, plus a final check of Testing Detonators for Leakage & Errors before firing. Plus a reconciliation of sets scanned/loaded against IE Issue Log.			
Item [11]. Blast Area Clearance Job/function : Shotfirer Additional Controls? ○ Y ○ N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input checked="" type="checkbox"/> E	Shotfirer may not have line of sight to all access points. Accesses not guarded. Potential for blast delay due to lost communication or confusion at blast time	Number and location of blast guards to be decided by Shotfirer in consultation with Site Supervisor / mine manager. Orica to develop blast clearance procedure. Choose agreed radio channel. All site personnel and assets to be outside exclusion zone.	Category 2	Unlikely	Level IV
Item [12]. Fire Blast and hand site back to Customer Job/function : Shotfirer Additional Controls? ○ Y ○ N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input checked="" type="checkbox"/> E	Fire Shot-Fly rock. Injury to personnel or public and equipment. Possible fume event- could endanger personnel within exclusion zone or just on perimeter.	Stemming control. Blast design followed. Machines and personnel outside the exclusion zone. Blast design reviewed- > Class 4. Competent Shotfirer. Correct communication as per site requirements. Firing procedure as per Orca Standard Shotfiring Operating Procedures and SIS's. Shotfirer to give 'ALL CLEAR!'	Category 3.1	Very Unlikely	Level IV
Item [13]. Flyrock outside blast clearance area Job/function : Blastcrew Additional Controls? ○ Y ○ N	<input checked="" type="checkbox"/> S <input checked="" type="checkbox"/> H <input checked="" type="checkbox"/> E	Damage to excavating equipment, private property, injury to personnel or public.	Control stemming heights by measuring stemming quantities. All crew trained in stemming practices. Survey of face and front row holes to ensure adequate burden. Clearing/guarding procedures. Best practice blast design, peer reviewed. Loading in accordance with Standard Shotfiring Operating Procedures and SIS's. Adequate exclusion zone. All site personnel evacuated to outside clearance zone.	Category 3.1	Very Unlikely	Level IV
Item [14]. Blast Fumes Job/function : Shotfirer Additional Controls? ○ Y ○ N	<input checked="" type="checkbox"/> S <input checked="" type="checkbox"/> H <input checked="" type="checkbox"/> E	Fumes from blast may cause annoyance or irritation to nearby personnel or public. Fumes may pose a hazard to people on worksite.	Noticeable fume not expected. Shotfirer will not announce 'ALL CLEAR!' until fume has dispersed. No personnel to re-enter clearance area until visible fume has dispersed.	Category 2	Very Unlikely	Level IV

Item [15]. Sleeping Shots Job/function : Shotfirer Additional Controls? ○ Y ○ N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input type="checkbox"/> E	Security of shot overnight.	Security Guard will be placed on blast overnight when sleeping shot. Guard will be issued with written handover instructions as per standard Orca Procedures.	Category 2	Extremely Unlikely	Level IV
Item [16]. Weather/Water/Lightning Job/function : Shotfirer Additional Controls? ○ Y ○ N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input checked="" type="checkbox"/> E	Lightning / Storms may occur during loading.	Be prepared to cancel shot if storms are approaching. Be prepared to stop loading and secure blast clearance zone if lightning approaches. Shotfirer to monitor weather conditions.	Category 3.1	Extremely Unlikely	Level IV
Item [17]. Working Under Highwalls Job/function : Blastcrew Additional Controls? ○ Y ○ N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input checked="" type="checkbox"/> E	J3. Dropped Objects, J4. Slip / Trip / Fall-potential for falling objects from highwall or highwall level	Use 'Highwall Risk Assessment' to determine whether it is safe to work under high wall. Consult with Site Supervisor, as well as Orca personnel-Site Manager, Tech Services and ASB.	Category 3.1	Unlikely	Level III
Item [18]. General Site Conditions Job/function : Blastcrew Additional Controls? ○ Y ○ N	<input checked="" type="checkbox"/> S <input checked="" type="checkbox"/> H <input checked="" type="checkbox"/> E	Dust and Noise. Weather- hot/humidity conditions.	Use appropriate PPE and consult with site with site supervisor to water or stop dust producing works in near by areas. Ensure personnel on bench keep hydrated and take regular breaks. MMU operators to rotate as per hose handling procedures as per JSEIRA. MGD 1007-1. Keep an eye on your work mates, if they have any of the symptoms of Heat Exhaustion/Stroke help them out.	Category 3.1	Likely	Level II
Item [19]. Job/function : Blastcrew Additional Controls? ○ Y ○ N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input type="checkbox"/> E	Collision with other vehicle	Site specific traffic management plan to be drawn on back of JSEIRA and to include position of vehicles on bench	Category 3.1	Very Unlikely	Level IV
Item [20]. Job/function : Blastcrew Additional Controls? ○ Y ○ N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input type="checkbox"/> E	Plant operators working in close proximity in front of face being loaded with explosives. Operators causing unplanned detonation	A stand off zone of 50 metres to be set up in front of the face being loaded with explosives bunding or cones to be set up as an exclusion zone 50 metres from face. Shotfirer to ensure the exclusion zone is set up prior to loading of blast. Blast signage to be put in place	Category 3.1	Very Unlikely	Level IV

		Exclusion zone to be monitored at all times by blast crew No plant to work within 10m of the shot perimeter in all other directions		
--	--	--	--	--

Item [21] Job/function : Blastcrew Additional Controls? <input type="radio"/> Y <input type="radio"/> N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input type="checkbox"/> E	Wet holes being top loaded Detonator leads being sucked into blast hole by slumping product - run always Detonator leads not secured	QuarrySafe items to be used at all times To distinguish between wet and dry holes - Yellow for wet holes - Purple for dry holes To distinguish between top and bottom decks in a decking application, yellow for bottom deck and purple for top. Green to identify holes that require special practices or examination by shotfirer. Designed to be reusable.	Category 3.1	Very Unlikely	Level IV
Item [22] Job/function : Blastcrew Additional Controls? <input type="radio"/> Y <input type="radio"/> N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input type="checkbox"/> E					
Item [23] Job/function : Blastcrew Additional Controls? <input type="radio"/> Y <input type="radio"/> N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input type="checkbox"/> E					
Item [24] Job/function : Blastcrew Additional Controls? <input type="radio"/> Y <input type="radio"/> N	<input checked="" type="checkbox"/> S <input type="checkbox"/> H <input type="checkbox"/> E					
Item [25] Job/function : Additional Controls? <input type="radio"/> Y <input type="radio"/> N	<input type="checkbox"/> S <input type="checkbox"/> H <input type="checkbox"/> E					

Action	By Whom	Due Date	Action Status	Action Taken

Additional Comments:

Signatures:

/ We have read and understand this JSERA and will apply the hazard control measures as listed.

Name (Print)	Signed	Date	Name (Print)	Signed	Date

[Share Action Link](#)

Revision Table:

Template

[Template Name:](#) REVISION TABLE

Content:

Rev	Status	Date	Details of Change

Created By: Richard Clarke/AU/EXP/DR/CA

Date Created: 16/06/2015







**Appendix 2 Consultation (1 page)**

**From:** [Melanie Hollis](#)  
**To:** [Pignone, Belinda \(Parramatta\) AUS](#)  
**Subject:** East Guyong Management Plans  
**Date:** Monday, 5 August 2019 2:19:32 PM

---

Hi Belinda

Please see the below comments in relation to the Blast and Soil and Water Management Plans.

#### **Blast Management Plan**

- The key performance outcomes list in Table 4 should be strengthened to include definitive outcomes.
- Figure 3 should be updated to show the new extraction area.
- Sections 8.3 and 11.2 should include a reference to “Patanga”.

#### **Soil and Water Management Plan**

- Review whether Tables 2 and 3 are more appropriately located in Section 3, rather than Section 4.
- The first two bullets points should be revised to include dates when the plan was referred to agencies for consultation and any response received.
- The key performance outcomes list in Table 4 should be strengthened to include definitive outcomes.

Please provide revised copies for these plans for review by 26 August 2019.

Kind Regards

#### **Melanie Hollis**

Senior Planning Officer  
Resource Assessments  
Level 30, 320 Pitt Street | GPO Box 39 | Sydney NSW 2001  
T 02 8217 2043 E [melanie.hollis@planning.nsw.gov.au](mailto:melanie.hollis@planning.nsw.gov.au)



**Planning,  
Industry &  
Environment**



Subscribe to our [newsletter](#)

*The Department of Planning, Industry and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.*



**Please consider the environment before printing this e-mail.**