Walker Quarries

BLAST MANAGEMENT AND EXPLOSIVES CONTROL PLAN

Wallerawang Quarry

VERSION 3.1

May 2022

umwelt
Environmental & Social Consultants

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Prepared by
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on behalf of
Walker Quarries Pty Ltd

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	Name	Date	Name	Date
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V3.1	Alex Irwin	9 May 2022	Alex Irwin	9 May 2022

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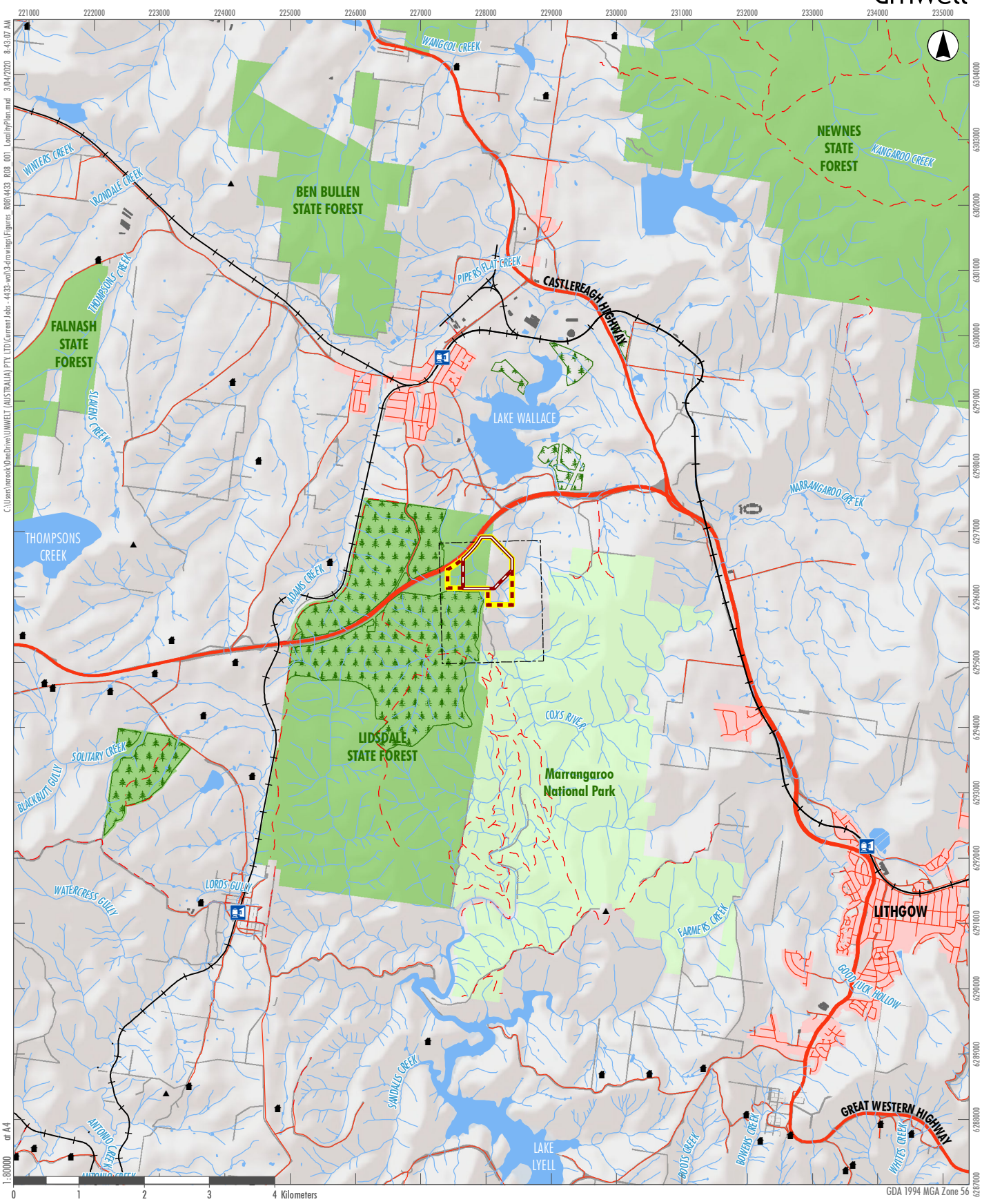
1.0 Scope

This Blast Management Plan (BMP) for the Wallerawang Quarry (the Quarry) has been reviewed and updated by Umwelt (Australia) Pty Ltd (Umwelt) on behalf of Walker Quarries Pty Ltd (Walker Quarries) in accordance with Condition 5 of Schedule 3 of Development Consent DA 344-11-2001 (DA 344-11-2001). This version of the BMP (V3.0) has been prepared following completion of an Independent Environmental Audit (IEA) and IEA Response Plan (20 July 2021), 2021 Annual Review of DA 344-11-2001 (30 September 2021), and notification provided to the Department of Planning, Industry & Environment (DPIE) on 12 October 2021 of the proposed review and revision.

The Quarry is located approximately 8 kilometres (km) northwest of Lithgow (**Figure 1.1**) and is approved to produce 500 000 tonnes per annum (tpa) of hard rock aggregate material and sand. DA 344-11-2001 approves disturbance up to a maximum of 28.6 ha for the purpose of hard rock extraction, processing, stockpiling, management and on-site disposal of non-saleable (overburden) materials, and ancillary infrastructure (**Figure 1.2**).

Potential blasting impacts include the following:

- Air blast overpressure affecting nearby residents.
- Excessive ground vibration resulting in structural damage to nearby residences or infrastructure.
- Dust impact on nearby residents.
- Fume impact on nearby residents.
- Fly rock received at nearby residences or public roads.

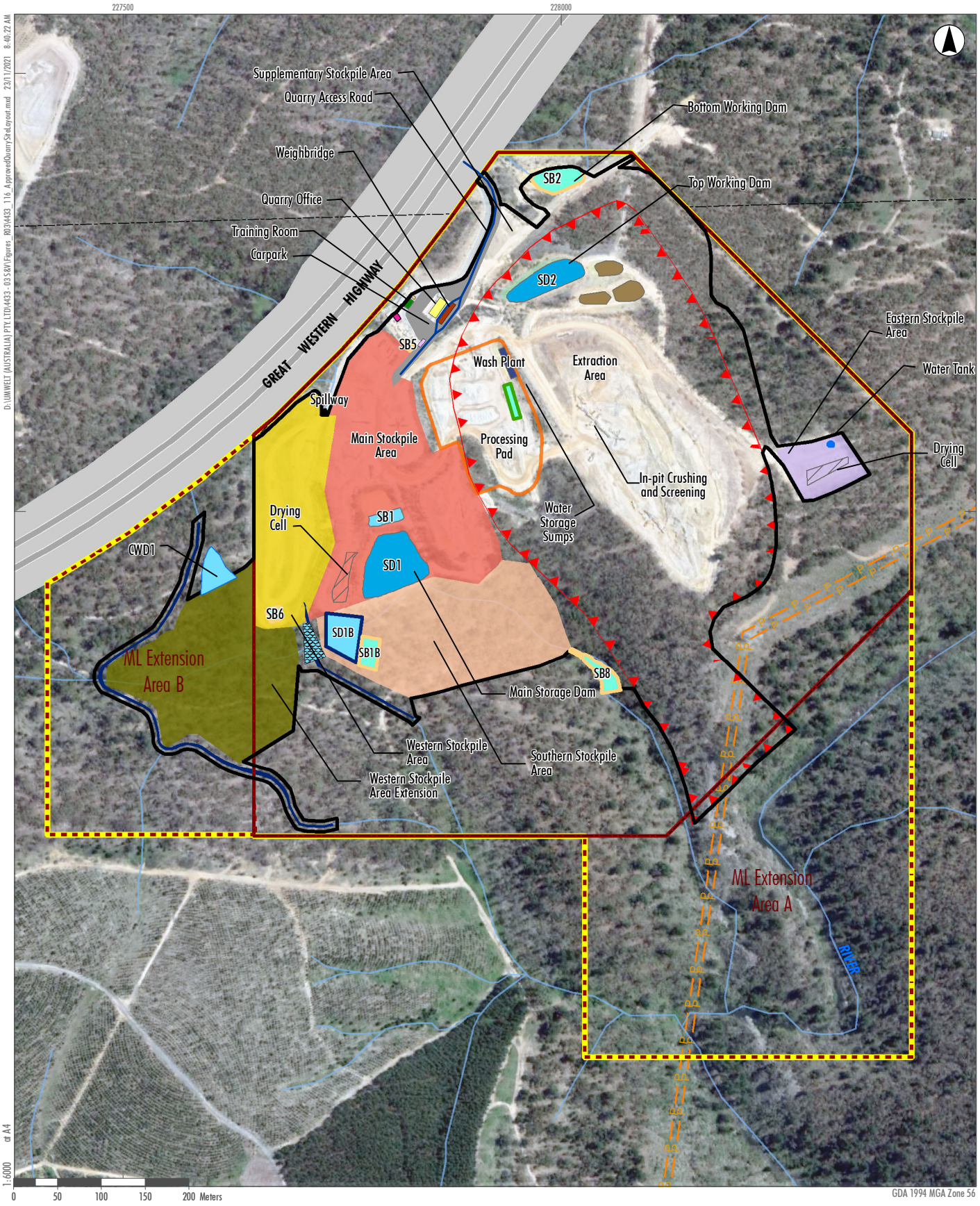


Legend

- Quarry Site Boundary
- Quarry Site ML Extension
- Quarry Site (ML1633)
- EL 4473
- State Forest
- NPWS Estate

FIGURE 1.1

Locality Plan



Legend

- Quarry Site Boundary
- Quarry Site (ML1633)
- Quarry Site ML Extension
- EL 4473
- Disturbed Areas for Modified Operations
- Approved Extraction Area
- Main Stockpile Area (935m AHD)
- Processing Pad
- Southern Stockpile Area (935m AHD)
- Western Stockpile Area
- Western Stockpile Extension (940m AHD)
- Eastern Stockpile Area
- Clean Water Diversion
- Sediment Basins
- Settlement Ponds
- Storage Dam
- Water Tank
- Rock-lined Drain
- Clean Water Dam
- Silt Cells
- P Electricity Transmission Lines

FIGURE 1.2

Approved Quarry Site Layout

Image Source: Nearmap (2020) Data source: Walker Quarries (2019); Umwelt (2019); NSW LPI DTDB (2019); CEH Survey (November 2016)

2.0 Legal and Other Regulatory Requirements

2.1 Development Consent DA 344-11-2001

Conditions 3(6) to *3(9)* of DA 344-11-2001 (as modified on 26 February 2020) provide instructions as to the requirements of Walker Quarries in relation to blasting and vibration management. *Condition 3(10)* requires the preparation of a *Blast Management Plan*. *Conditions 5(3)* to *5(5)* provide instruction on the preparation, review and amendment to consent required management plans.

Table 2.1 identifies each of these conditional requirements relating to blasting and vibration management and identifies the section of this BMECP where each is addressed.

Table 2.1 Blast-Related Conditional Requirements of DA 344-11-2001

<table>
<tr><th>No.</th><th>Condition</th><th>Section</th></tr>
<tr><td>3(1)</td><td>Hours of Operation
The Applicant must comply with the operating hours set out in Table 1.
Table 1: Operating Hours
<table>
<tr><th>Activity</th><th>Permissible Hours</th></tr>
<tr><td>Quarrying operations</td><td>• 7 am to 6 pm Monday to Friday
• 8 am to 1 pm Saturday
• At no time on Sundays or public holidays</td></tr>
<tr><td>Loading and dispatch of trucks</td><td>• May be conducted at any time, provided these activities comply with the noise criteria in Table 2</td></tr>
<tr><td>Blasting</td><td>• 9 am to 5 pm Monday to Friday
• 9 am to 1 pm on Saturdays
• At no time on Sundays or public holidays</td></tr>
<tr><td>Maintenance</td><td>• May be conducted at any time, provided that these activities are not audible at any privately-owned residence</td></tr>
</table></td><td>4.2.1</td></tr>
<tr><td>3(6)</td><td>Airblast Overpressure Limits
The Applicant must ensure that blasting on site does not cause any exceedance of the criteria in Table 3.
Table 3: Blasting Criteria
<table>
<tr><th>Receiver</th><th>Airblast overpressure (dB(Lin Peak))</th><th>Ground vibration (mm/s)</th><th>Allowable exceedance</th></tr>
<tr><td rowspan="2">Any residence on privately-owned land</td><td>120</td><td>10</td><td>0%</td></tr>
<tr><td>115</td><td>5</td><td>5% of the total number of blasts over a period of 12 months</td></tr>
<tr><td>All public infrastructure</td><td>-</td><td>50</td><td>0%</td></tr>
</table>
However, these criteria do not apply if the Applicant has a written agreement with the relevant landowner or infrastructure owner to exceed the limits in Table 3, and the Applicant has advised the Department in writing of the terms of this agreement.</td><td>4 & 5</td></tr>
<tr><td>3(7)</td><td>Property Inspections
If the Applicant receives a written request from the owner of any privately-owned land within 2 km of the site for a property inspection to establish the baseline condition of any buildings and structures on their land, or to have a previous property inspection updated, then within 2 months of receiving this request the Applicant must:
(a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to:
– establish the baseline condition of any buildings and other structures on the land, or update the previous property inspection report; and
– identify measures that should be implemented to minimise the potential blasting impacts of the development on these buildings and structures; and</td><td>6.1.1
6.1.2</td></tr>
</table>

No.	Condition	Section
	(b) give the landowner a copy of the new or updated property inspection report. If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Applicant or the landowner disagrees with the findings of the property inspection report, either party may refer the matter to the Secretary for resolution.	**6.1.2** **6.2.2**
3(8)	**Property Investigations** If the owner of any privately-owned land within 2 km of the site or any other landowner where the Secretary is satisfied an investigation is warranted, or claims in writing that buildings or structures on their land have been damaged as a result of blasting on the site, then within 2 months of receiving this written claim the Applicant must: (a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to investigate the claim; and (b) give the landowner a copy of the property investigation report. If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Applicant must repair the damage to the satisfaction of the Secretary. If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Applicant or the landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Secretary for resolution.	**6.2.1** **6.2.2.3** **6.2.2.3** **8**
3(9)	**Operating Conditions** During blasting operations, the Applicant must: (a) implement best practice management to: • protect the safety of people and livestock; • protect public or private infrastructure and property from damage; and • minimise the dust and fume emissions; (b) operate a suitable system to enable the local community to get up-to-date information on the proposed blasting schedule on site; and (c) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent, to the satisfaction of the Secretary.	 **6.1.3, 6.1.4, 6.1.5,** **6.1.4, 6.1.5** **6.1.4, 6.1.6, 6.1.7** **6.1.1** **6.1.10**
3(10)	**Blast Management Plan** The Applicant must prepare a Blast Management Plan for the development to the satisfaction of the Secretary. This plan must: (a) be submitted to the Secretary for approval within three months of the determination of Modification 1, unless otherwise agreed by the Secretary; (b) describe the measures to be implemented to ensure compliance with the blast criteria and operating conditions of this consent; (c) include measures to manage fly rock to ensure the safety or people and livestock and to protect properties; (d) include a monitoring program for evaluating and reporting on compliance with the blasting criteria in this consent; (e) include local community notification procedures for the blasting schedule, in particular to nearby residences; and (f) include a protocol for investigating and responding to complaints related to blasting operations.	 Noted **6** **6.1.5.** **6.1.10, 7** **6.1.1** **6.2.2.1**

No.	Condition	Section
	The Applicant must implement the Blast Management Plan as approved from time to time by the Secretary.	Noted
5(3)	**Management Plan Requirements** Management plans required under this consent must be prepared in accordance with relevant guidelines, and include: (a) a summary of relevant background or baseline data; (b) details of: • the relevant statutory requirements (including any relevant approval, licence or lease conditions); • any relevant limits or performance measures and criteria; and • the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures; (c) any relevant commitments or recommendations identified in the document's listed in condition 2(c) of Schedule 2; (d) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria; (e) a program to monitor and report on the: • impacts and environmental performance of the development; and • effectiveness of the management measures set out pursuant to condition 2(c) of Schedule 2; (f) contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible; (g) a program to investigate and implement ways to improve the environmental performance of the development over time; (h) a protocol for managing and reporting any: • incident, non-compliance or exceedance of the impact assessment criteria or performance criteria; • complaint; or • failure to comply with statutory requirements; (i) public sources of information and data to assist stakeholders in understanding environmental impacts of the development; and (j) a protocol for periodic review of the plan. Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.	N/A **2.0** **4.0** **6.2, 9.0** **6.0** **7.0** **6.2.2, 8.2** **9.1, 12** **8.0** **9.2** **12.0**
5(3A)	The Applicant must ensure that management plans prepared for the development are consistent with the conditions of this consent and any EPL issued for the site.	**3.0**
5(4)	The Applicant must continue to apply existing approved management plans, strategies or monitoring programs that have most recently been approved under this consent, until the approval of a similar plan, strategy or program under this consent.	**12.0**
5(5)	Within 3 months of the submission of an: (a) incident report under condition 9 below; (b) Annual Review under condition 11 below; (c) audit report under condition 14 below; and (d) any modifications to this consent, the Applicant must review the strategies, plans and programs required under this consent, to the satisfaction of the Secretary. The applicant must notify the Department in writing of any such review being undertaken. Where this review leads to revisions in any such document, then within 6 weeks of the review the revised document must be submitted for the approval of the Secretary.	**12.0**

2.2 Environment Protection Licence 13172

Environment Protection Licence 13172 (EPL 13172) contains a number of conditional requirements relating to blasting.

Table 2.2 identifies each of these conditional requirements and identifies the section of this BMECP where each is addressed.

Table 2.2 Blast-Related Conditional Requirements of EPL 13172

No.	Condition	Section
L5.1	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.	**4.1**
L5.2	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.	**4.1**
L5.3	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.	**4.1**
L5.4	Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 5 mm/sec for more than five percent 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.	**4.1**
L5.5	Blasting in or on the premises must only be carried out between 9:00am and 5:00pm, Monday to Saturday[1]. Blasting in or on the premises must not take place on Sundays or Public Holidays without the prior approval of the EPA.	**4.2.1**
M1.2	All records required to be kept by this licence must be: (a) in a legible form, or in a form that can readily be reduced to a legible form; (b) kept for at least 4 years after the monitoring or event to which they relate took place; and (c) produced in a legible form to any authorised officer of the EPA who asks to see them.	**8.1**
M7.1	To determine compliance with condition(s) L5.1 to L5.4. (a) Air blast overpressure and ground vibration levels must be measured at the most affected residence or noise sensitive location that is not owned by the licensee or subject to a private agreement between the owner of the residence or noise sensitive location and the licensee as to an alternative blasting level – for all blasts carried out in or on the premises; and (b) Instrumentation used to measure the air blast overpressure and ground vibration levels must meet requirements of Australian Standard 2187.2 of 2006.	**6.2** **6.3**

Note 1: Condition 3(1) of DA 3444-11-2001 limits blasting to between 9am and 5pm Monday to Friday and 9am and 1pm on Saturdays.

2.3 Work Health and Safety (Mines and Petroleum Sites) Regulation 2014

Relevant clauses that relate to the explosives control plan from the *Schedule 2 Clause 4* of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* (WHS (MPS) Reg) are listed in **Table 2.3**.

Table 2.3 Blast-Related Conditional Requirements of WHS (MPS) Reg – Schedule 2, Clause 4 Explosives Control Plan

No.	Condition	Comment
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	Walker Quarries do not store or handle explosives on site. An external licenced Contractor is used for all explosives handling.
	(b) the characteristics of relevant explosives and the purposes for which they are to be used	Walker Quarries is not registered under the *Explosives Act 2003*. An external licenced Contractor is used for all Blasting requirements on site.
	(c) the characteristics of the places in which the explosives are to be used	An external licenced Contractor is used for all aspects of the Drill and Blast operation for the Wallerawang Quarry. The external contractors Drill and Blast Safety Management System has been reviewed and accepted in accordance with Cl 22 of the WHS (MPS) Reg.
	(d) the full set of phases for the use of relevant explosives such as the charging and firing phases	An external licenced Contractor is used for all aspects of the Drill and Blast operation for the Wallerawang Quarry. Refer to **Section 6.1.4**.
	(e) the potential for explosives to deteriorate	An external licenced Contractor is used for all aspects of the Drill and Blast operation for the Wallerawang Quarry. No explosives are stored on site.
	(f) the potential for the theft or misuse of explosives	An external licenced Contractor is used for all aspects of the Drill and Blast operation for the Wallerawang Quarry. No explosives are stored on site, the licenced Contractor has control of all aspects of the blasting operation.
	(g) the potential for the ejection of fly rock or other material as a result of the detonation of an explosive.	Refer to **Section 6.1.5.**
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,	Walker Quarries is not licenced under the *Explosives Act 2003* to use, handle or store explosives. An external licenced Contractor is used for all Blasting requirements on site and are only on site on an 'as needs' basis.

No.	Condition	Comment
	(b) the procedures for finding, recovering and disposal of explosives that misfire	Walker Quarries is not licenced under the *Explosives Act 2003* to use, handle or store explosives.
	(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	An external licenced Contractor is used for all Blasting requirements on site and are only on site on an 'as needs' basis.
	(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 licenced 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*, (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.	The external contractors Drill and Blast Safety Management System has been reviewed and accepted in accordance with Cl 22 of the WHS (MPS) Reg.

As noted **Table 2.3,** an external contractor is engaged to undertake used for all aspects of the drill and blast operation at the Quarry. In accordance with Clause 22 of the WHS (MPS) Reg,

> *A contractor must not carry out mining operations or petroleum operations at a mine or petroleum site unless:*
>
> *(a) the contractor:*
>
> *(i) has prepared a contractor health and safety management plan in accordance with subclause (2) and has provided a copy of the plan to the operator of the mine or petroleum site, and*
>
> *(ii) has obtained written notice from the operator that the operator has reviewed the plan and is of the opinion that the plan is consistent with the safety management system for the mine or petroleum site, and*
>
> *(iii) has, so far as is reasonably practicable, implemented the plan, or*
>
> *(b) the contractor:*
>
> *(i) has reviewed the relevant parts of the safety management system for the mine or petroleum site, and*
>
> *(ii) has given the operator of the mine or petroleum site written notice that the contractor has conducted the review and is of the opinion that the safety management system is consistent with the contractor's arrangements to manage the risks to health and safety from mining operations or petroleum operations carried out by the contractor at the mine or petroleum site in accordance with clause 9 and any other requirements under the WHS laws that relate to those operations.*

Appendix 1 provides the Blasting & Explosives Control Management Plan & Site Security Plan and **Appendix 2** the Risk Assessment and Safe Work Method Statement prepared by the drill & blast contractor (Premier Drilling). Walker Quarries has reviewed both documents and provided written acceptance to the contractor (refer to **Appendix 3**).

3.0 Objectives and Outcomes

Table 3.1 presents the objectives and key performance outcomes relating to blasting management for the BMECP and the Quarry.

Table 3.1 Blast Management Objectives and Key Performance Outcomes

Objectives	Key Performance Outcomes
To ensure compliance with the conditions of DA 344-11-2001 and EPL 13172 and reasonable community expectations.	Compliance with all relevant criteria and reasonable community expectations.
To implement appropriate blast management and mitigation measures during all stages of Quarry operation.	All identified blast management and mitigation measures implemented.
To implement an appropriate blast monitoring program to establish compliance or otherwise with relevant criteria during all stages of Quarry operation.	All identified monitoring undertaken in accordance with the relevant procedures and at the relevant intervals.
To implement an appropriate complaints handling and response protocol.	Complaints (if any) handled and responded to in an appropriate manner. All complaints recorded and reported in accordance with annual reporting requirements.
To implement appropriate corrective and preventative actions, if required.	Corrective and preventative actions implemented, if required.
To implement an appropriate incident reporting program, if required.	Incidents (if any) reported in an appropriate manner.

4.0 Blasting Criteria and Limits

4.1 Blasting Criteria

In accordance with *Condition 3(6)* of DA 344-11-2001 and *Condition L4.1* of EPL 13172, the criteria for all on-site blasting activities are presented in **Table 4.1**.

Table 4.1 Blasting Criteria

Location	Air Blast Overpressure (dB(Lin Peak))[1]	Ground Vibration (mm/s)	Allowable Exceedance
Any residence on privately-owned land or noise-sensitive building (i.e. a school or hospital)	120	10	0%
	115	5	5% of the total number of blasts over a period of 12 months
All public infrastructure	-	50	0%

[1] The airblast overpressure values apply when the measurements are performed with equipment having a lower cut-off frequency of 2 Hz or less. If the instrumentation has a higher cut-off frequency a correction of 5 dB should be added to the measured value. Equipment with a lower cut-off frequency exceeding 10 Hz should not be used.

4.2 Other Limits

4.2.1 Blasting Hours of Operation

In accordance with *Condition 3(1)* of DA 344-11-2001 operational hours for blasting will be limited to 9:00am to 5:00pm Monday to Friday and 9:00am to 1:00pm on Saturday. It is noted blasting is unlikely on Saturdays and no blasting will occur on Sundays or public holidays.

Blasting outside these hours will only be undertaken in the event of a misfire or where blasting is required to ensure the safety of the Quarry or Quarry personnel and visitors.

4.2.2 Blasting Frequency

Blasting frequency will be dependent on production, increasing from once (approximately) every 2 months for production up to 150 000 tpa, to once every two weeks at maximum production (500 000 tpa).

5.0 Local Services, Infrastructure and Sensitive Receptors

Figure 5.1 identifies the locations of sensitive infrastructure and receptors, along with the closest distance to blasting activities.

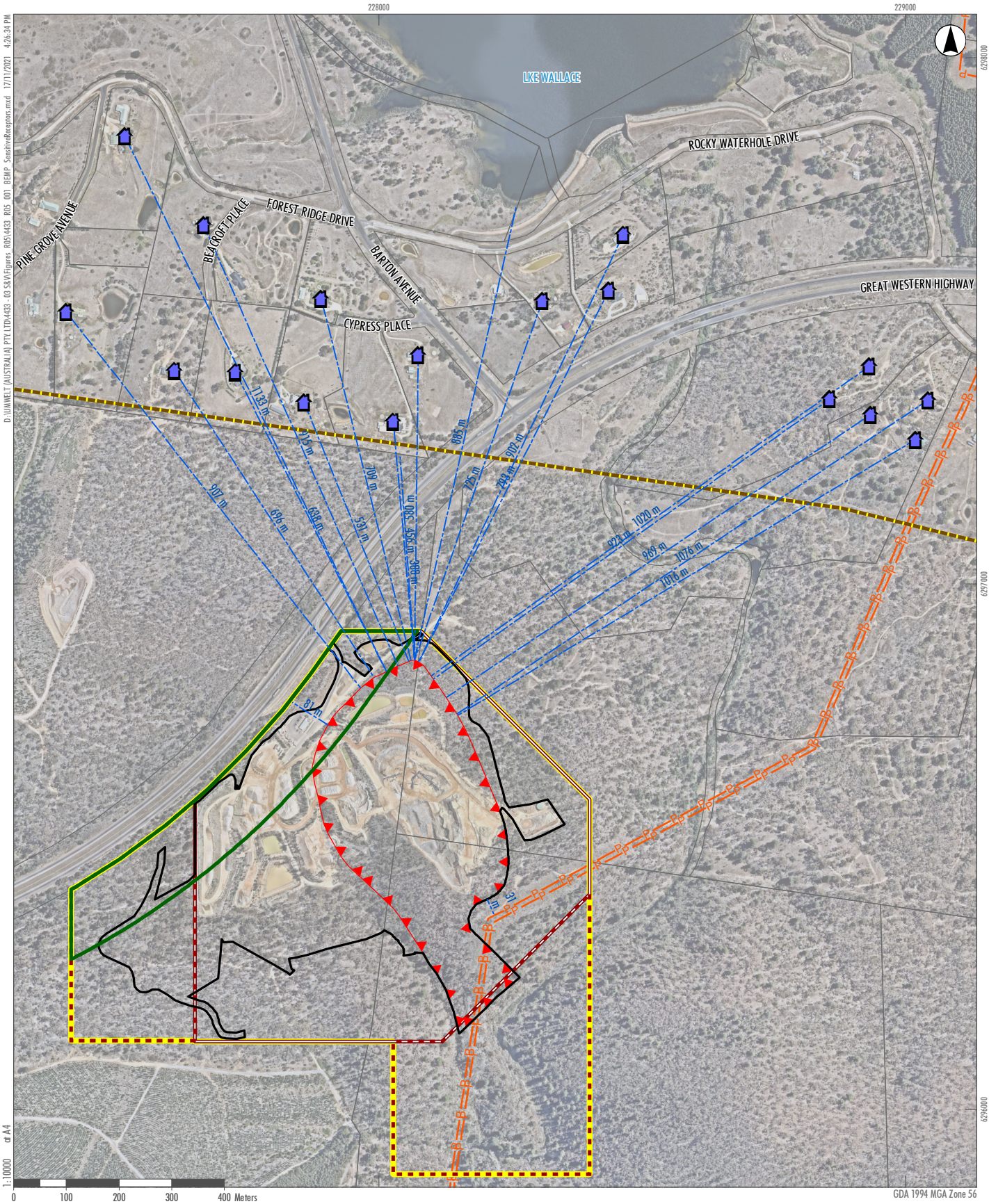
- The Great Western Highway (easement).
- Essential Energy power lines.
- High-pressure gas pipeline (part of the Central West Pipeline of APA Group).
- Lake Wallace dam wall.

It is noted the closest telecommunications cables are located to the north of the Great Western Highway.

Blasting will not be undertaken within 30 m of the identified power lines and 100 m of any communications or other linear infrastructure.

Blasting will remain greater than 150 m from the Great Western Highway. Specific blast controls will be implemented for blasts between 150 m and 300 m from the Great Western Highway to ensure fly rock from blasting does not reach the road surface (refer to **Section 6.1.5**).

Blast monitoring is also undertaken to confirm vibration remains below critical criteria at the Lake Wallace dam wall (**Section 7.0**).



Legend

- Quarry Site Boundary
- Quarry Site (ML1633)
- Quarry Site ML Extension
- Distrubed Areas for Modified Operations
- 150m Buffer to Great Western Highway
- Residence
- Distance to Approve Extraction
- Power Line
- APA Gas Pipeline
- Cadastral Boundary

FIGURE 5.1

Sensitive Receptors

Image Source: Nearmap (April 2020) Data source: Umwelt (2019); NSW LPI DTDB (2019)

6.0 Blast Management System

6.1 Proactive Management

6.1.1 Blasting Schedule Notification

In July 2014, in accordance with now superseded *Condition 2.15* of DA 344-11-2001, Calare Civil Pty Ltd (on behalf of Walker Quarries) provided written notification to 52 property owners within 2 km of the Quarry Site of:

- the proposed blasting timetable and duration
- the procedure available to residents for reporting possible blasting related damage to a residence or other vibration infrastructure (such as water supply or underground irrigation mains), and
- the entitlement of any landowner within 2 km of the proposed blasting activities, to an investigation of the damage claims.

Walker Quarries will complete a review of landowners within 2 km of the Quarry Site at least every two years. Where land ownership has changed, Walker Quarries will provide written notification of the above.

Where individual landowners register an interest in being notified about the blasting schedule at the Quarry, Walker Quarries will provide:

- an email notification the day prior to the blast event, nominating the planned blast date and time
- a telephone call (if requested) during the morning of the blast to confirm the blast will proceed at the nominated (or varied) time.

A blast notification board, detailing the date and time of the next blast is maintained at the Quarry entrance on the Great Western Highway and will be updated at least 24 hours before each blast.

6.1.2 Pre-blast Property Inspections

In accordance with *Condition 3(7)* of DA 344-11-2001, on written request from a resident of a property within 2 km of the Quarry Site, Walker Quarries will commission a "*suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to:*

- *establish the baseline condition of any buildings and other structures on the land, or update the previous property inspection report; and*
- *identify measures that should be implemented to minimise the potential blasting impacts of the development on these buildings and structures; person to undertake an inspection of structures potentially affected by blasting.*"

A copy of the inspection results has been provided to the property owner within 14 days of the inspection. Walker Quarries with retain a copy of the inspection report for reference for future blasting activities.

If there is a dispute over the selection of the suitably qualified, experienced and independent person, or disagreement over the findings of the property inspection report, either party may refer the matter to the Secretary of DPIE for resolution. The Secretary who may refer the matter to an Independent Dispute Resolution Process (**Section 6.2.2.2**).

To date, 26 properties have been inspected.

6.1.3 Meteorological Forecasting

Regional weather forecasts are available from the Bureau of Meteorology (BoM). These data will be reviewed by the Quarry Manager and/or blasting contractor who will check weather conditions for coming blast events and plan accordingly for adverse weather.

Adverse weather in terms of blasting impacts relates to:

- winds in the direction of the closest sensitive receivers, i.e. from the south to southeast quadrants,
- excessively wet conditions during which blast fumes may result, and/or
- conditions likely to be indicative of temperature inversion, i.e. fog or frost conditions.

The Quarry Manager will liaise with the blasting contractor at least 3 days prior to a planned blast event to review weather forecasts. Where it is determined the potential for high winds (from south/southeast), rainfall (>10 mm) or inversion conditions is high (>50%) the blast event will be postponed and rescheduled.

On the day of the planned blast, the Quarry Manager will again review weather conditions in consultation with the blasting contractor.

In the event that unfavourable meteorological conditions (as noted above) are identified, the shot-firer and Quarry Manager will determine whether it is safe to postpone the blast.

6.1.4 Blast Design and Review

Walker Quarries and blast contractors will implement a continuous improvement protocol for blasting through implementation of the following procedures:

- No blasting will be initiated within 30 m of any power line infrastructure, or within 100 m of any other public infrastructure or underground utilities (such as Telstra infrastructure) without the written permission of the agency responsible for managing that infrastructure.
- The drill and blast contractor is required to prepare and implement a *Drill and Blast Safety Management System* (DBSMS). **Appendix 1** provides confirmation that Walker Quarries has reviewed and accepted the contractors DBSMS[1].
- Blast energies are to be minimised as far as possible.
- Electronic detonators will not be used at the Quarry at any time.
- Quality control practices are to be implemented on the ground to ensure blasts are kept within design tolerances.
- High quality stemming products will be used.
- Adequate burden is to be maintained on all faces to prevent blowouts and blast anomalies.
- Each blast will be monitored to confirm compliance with air blast overpressure and ground vibration criteria.
- Following each blast, the area surrounding the blast location will be inspected and fly rock distribution to the front, rear and both sides of the blast site observed.

[1] Premier Drilling, the drill and blast contractor of the Quarry, is currently updating the DBSMS and this version will be appended to the BMP (along with relevant updates to the main text of the BMP) once received.

- Blast contractors, in conjunction with the Quarry Manager, will review blast monitoring records to enable continuous improvement and quality control, resulting in continual development of optimum blast parameters.

6.1.5 Fly Rock Management

As part of the review process following exhibition and assessment of the original EIS for the Wallerawang Quarry, it was determined that closure of the Great Western Highway will not be required subject to the implementation of blast management measures designed to reduce the potential for fly rock.

For blasting undertaken within 150 m of the Great Western Highway:

- blast mats will be used.

For blasting greater 150 m of the Great Western Highway:

- bulk emulsion explosives (rather than bulk ANFO explosives) will be detonated, and
- blast holes will be drilled at an angle to ensure rock is thrown away from the Great Western Highway.

For all blasts:

- stemming will be measured to ensure the specified depth is achieved between the explosive and drill hole collar.

6.1.6 Dust Emissions

The risk of excessive dust emissions from blasting are considered low given the geology of the rock (hard with low fines content) and small to moderate blast size (<30,000t).

The risk will be reduced further by ensuring that blasts are not undertaken under conditions likely to enhance the dispersion of dust, i.e. dry windy conditions. Weather forecast monitoring for excessive wind conditions and adverse wind direction (towards the Great Western Highway and Wallerawang) will be undertaken prior to each blast. If risk of elevated dust emissions is identified, blasting will be postponed to a time with favourable weather conditions.

6.1.7 Blast Fumes

The risk of fume generation from blasting at the Quarry is considered low, due to the low moisture content of the rock, and has not historically been an issue. The primary risk factors for fume generation identified in *Australian Explosives Industry and Safety Group (AEISG) Code of Good Practice: Prevention and Management of Blast Generated NOx Gases in Surface Blasting, Edition 2, 2011* ("the Code"), are identified below along with the measures to be implemented to reduce these risks.

Explosive Formulation and Quality Assurance

- Walker Quarries will employ the services of a licensed blasting contractor that operates under the NSW *Explosives Act 2003* and NSW *Explosives Regulations 2013.*
- Monitoring and calibration of the explosive manufacturing unit will be undertaken to ensure explosive mixing is in the correct proportions will be undertaken.

Geological Conditions

- Blasting will be restricted to confined and hard quartzite formations which presents reduced potential for seepage of explosives into cracks.

- These geological conditions are far less likely to result in energy dissipation through the rock (and incomplete explosion reaction) as weak, clayey and/or unconfined geology.

Groundwater

- Blasting will occur above the groundwater table limiting the potential for water to affect the explosives and detonation.

Blast design

- The depth of blast holes will be less than 20 m and therefore desensitisation of the explosive at depth is unlikely.
- Walker Quarries will employ an experienced blasting engineer to review conditions and design each blast.
- Walker Quarries will commence with conservative assumptions regarding conditions and blast performance.

Explosive product selection

- Bulk emulsion explosives appropriate for wet and dry conditions in hard confined geology.

On bench practices/contamination of explosives

- Blast zones will be maintained free of loose rock and fine materials which could contaminate blast holes and affect explosion.
- Blast holes will be dewatered if subject to heavy rainfall.
- Inspections of blasts before initiation will ensure drilling has been completed as per design.
- Walker Quarries will minimise the time between drilling and charging of blast holes and avoid sleeping blasts to further reduce the potential for contamination.

Each blast will be monitored for evidence of fume (orange or red coloured dust). Should fume emissions be observed, Walker Quarries will implement a review and implement additional mitigation measures in accordance with the Code.

6.1.8 Aboriginal Site Protection

Formal Aboriginal site protection measures, presented to manage blasting within 50 m of AHIMS Site #45-1-2802 in previous versions of this BMP, are no longer required. AHIMS Site #45-1-2802 has been destroyed (in accordance with the approved Aboriginal Cultural Heritage Management Plan (ACHMP) for the Quarry (OzArk, 2020)) and the artefacts contained salvaged and relocated to a location adjacent to the Coxs River (AHIMS Site #45-1-2826) (which is in excess of 50 m from any future blasting activity). All salvage and relocation was undertaken in consultation with the Registered Aboriginal Parties for the Wallerawang Quarry (refer to the Wallerawang Quarry ACHMP (V4, May 2022)) which is documented in Aboriginal Site Impact Recording Form (ASIRF) #45-1-2802.

6.1.9 Blast Monitoring

A program of blast monitoring will be undertaken at nominated residences and the results and performance of the site operations posted on the Walker Quarries website. Monitoring is further discussed in **Section 7.0**.

6.2 Reactive Management

6.2.1 Triggers

Three triggers for reactive management will be applied:

- Blast Complaint. Any complaint received, either directly or via Council, EPA or other regulatory agency, will trigger the implementation of the response and corrective action measures described in **Section 6.2.2.1**.
- Complaint involving structural damage or request for a property inspection (received in writing) by:
    - any owner of private land within 2 km of the Quarry Site,
    - any other landowner where the Secretary is satisfied an investigation is warranted, or
    - any landowner providing a claim in writing that buildings or structures on their land have been damaged as a result of blasting on the site.

  Any request or complaint received in writing will trigger the response and corrective action measures described in **Section 6.2.2.2**. Should a verbal complaints or request be received, the person(s) will be asked to submit their request or complaint in writing.
- Exceedance of blasting criteria established through monitoring. Any record of blasting exceeding the criteria nominated in **Section 4.0** will trigger the response and corrective action measures described in **Section 6.2.2.3**.

6.2.2 Response and Corrective Action

6.2.2.1 Blasting Complaint

A complaints handling procedure is provided in *Section 6.2.1* of the *Environmental Management Strategy*. Following receipt of a complaint, appropriate action will be taken within two working days to determine the cause of the complaint and identify appropriate actions to remediate the complaint source. The following details will be recorded following receipt of any blast-related complaint:

- The date and time of the complaint.
- The method by which the complaint was made.
- Any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect.
- The nature of the complaint.

Within 48 hours of receipt of a complaint, action to identify the cause of the complaint and identify appropriate actions to remediate this will be commenced. On completion of actions to address the complaint, the following information will be added to the complaint register:

- The action taken in relation to the complaint, including any follow-up contact with the complainant.
- If no action was taken, the reasons why no action was taken.

All complaints will be investigated and an appropriate response provided to the complainant.

Should the complaint relate to structure damage to residences within 2 km of the Quarry, the measures described in the following subsection will be implemented. Should the complaint relate to required remediation of any other kind, Walker Quarries will negotiate the necessary actions with the complainant or initiate a dispute resolution procedure in accordance with *Section 6.2.1* of the *Environmental Management Strategy* for the Quarry.

6.2.2.2 Property Inspection

If a complaint involving structural damage to a building or a request for a property inspection is received as identified by the trigger of **Section 6.2.1**, Walker Quarries will commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to investigate the claim within 2 months of receiving this written claim. In the event of a dispute over the selection of the suitably qualified, experienced and independent person, then either party may refer the matter to the Secretary of the DPIE for resolution (as noted in **Section 6.1.2**).

The investigation will involve an inspection of the property and structures is consistent with the request for inspections prior to blasting commencing (**Section 6.1.2**). A copy of the inspection results to the property owner within 28 days of the inspection.

Should the property inspection identify structural damages to confirm the landowner's claim, Walker Quarries will pay for the cost to remediate the damages to the satisfaction of the Secretary of DPIE. Should there be disagreement with the findings of the independent property investigation, then either party may refer the matter to the Secretary of DPIE for resolution. The Secretary of DPIE may refer the matter to an Independent Dispute Resolution Process[2].

6.2.2.3 Blasting Monitoring Exceedance

If monitoring indicates that air blast overpressure or ground vibration exceeds criteria as a result of blasting, the following response and action plan will be implemented.

1. The incident notification process nominated in **Section 8.2** will be implemented.
2. The Quarry Manager (or delegated representative) will review the monitoring results, relevant ground and meteorological conditions and, in consultation with the blasting contractor, make arrangements to alter the blasting design, so that the air blast overpressure or ground vibration levels are reduced.
3. Within two weeks of obtaining any data showing an exceedance of blast criteria, the Quarry Manager will notify in writing any affected property owners or tenants and reiterate their rights to property inspection (refer to **Sections 6.1.1** and **6.1.2**).

Any exceedance of the approved blast criteria will be reported to EPA in the Annual Return and to DPIE in the Annual Review.

[2] Further information on dispute resolution, including a procedural protocol are described in *Section 6.2.2* of the *Environmental Management Strategy* for the Quarry.

7.0 Monitoring

7.1 Meteorological Monitoring

Figure 7.1 identifies the location of a meteorological station installed in accordance with *Condition 3(15)* of DA 344-11-2001 and *Condition M4.1* of EPL 13172. The meteorological station is located away from natural or artificial obstructions and areas with the potential to influence local thermodynamics, e.g. concrete or bitumen surfaces, generally in accordance with the *Approved Methods for Sampling of Air Pollutants in New South Wales*.

The parameters, units of measure, averaging period and frequency recorded by the meteorological station are specified in **Table 7.1** (and are in compliance with *Condition M4.1* of EPL 13172).

Table 7.1 Meteorological Monitoring

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

The measurement of sigma theta, which is standard deviation of horizontal wind direction, is an indicator of atmospheric stability and can be used to estimate the vertical temperature gradient (and therefore temperature inversion). **Table 7.2** identifies the associated Pasquill-Gifford (PG) stability class and associated vertical temperature gradient.

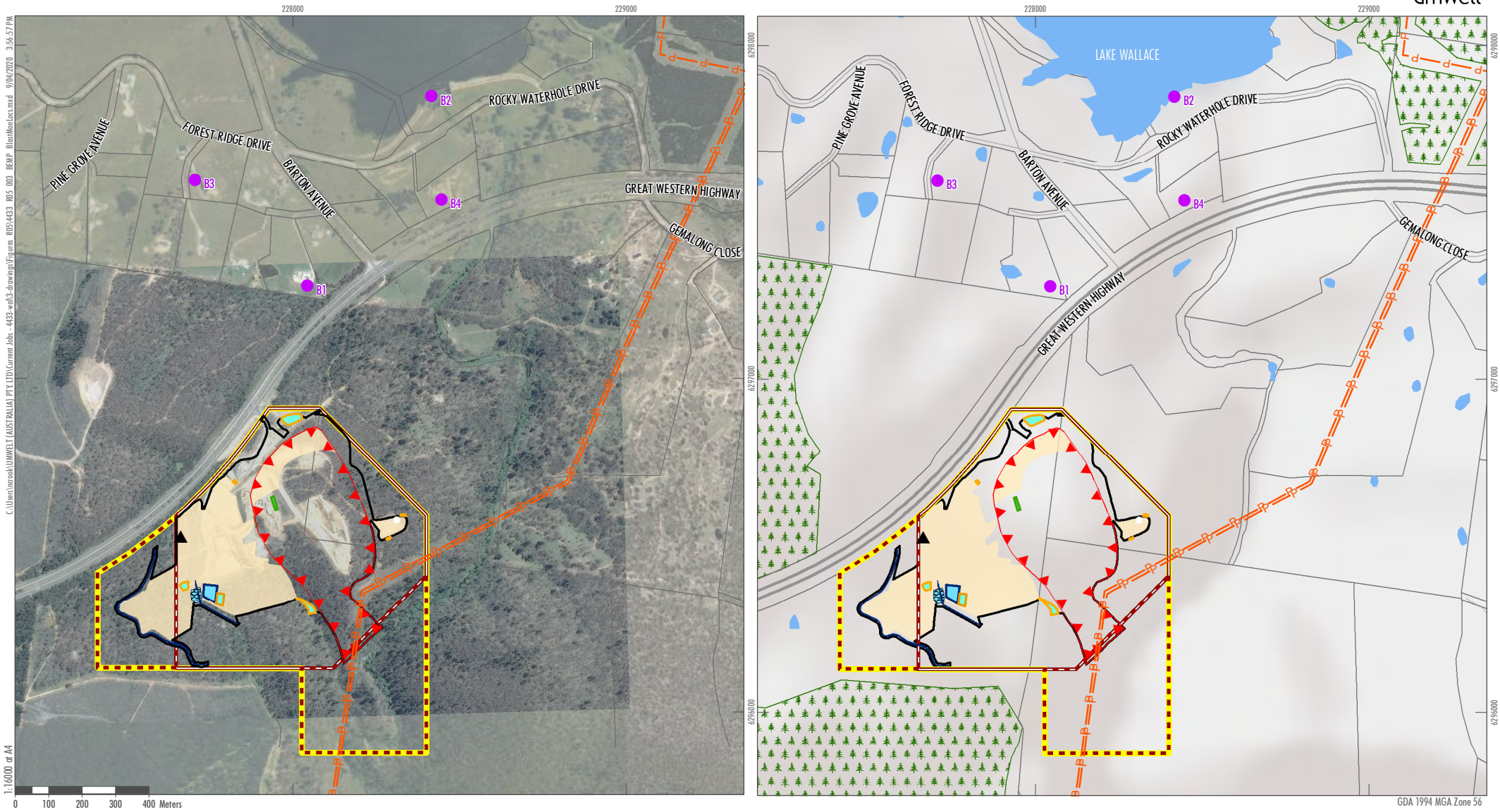
Table 7.2 Sigma Theta, Pasquill-Gifford Stability and Vertical Temperature Gradient

Sigma Theta (°)	Pasquill-Gifford Stability Class	Vertical Temperature gradient (°C/100 m)
25	A	-1.9
20	B	-1.9 to -1.7
15	C	-1.7 to -1.5
10	D	-1.5 to -0.5
5	E	-0.5 to 1.5
2.5	F	1.5 to 4.0
1.7	G	>4.0

7.2 Blast Monitoring Locations

Figure 7.1 displays the three indicative locations for blast monitoring. However, any property within a 2 km radius from the blast may be used to monitor blasting activity, subject to requests and permission from the landowner. At least three blast monitors will be used for each blast event.

One of the nominated monitoring locations is on the dam wall for Lake Wallace, the storage facility for the (now decommissioned) Wallerawang Power Station, and which is just within the 1,100m safety boundary zone (*Dams Safety Act 2015*) of the north-eastern end of the Quarry. This monitoring point utilises a steel plate attached to the concrete dam wall.



Legend

- Quarry Site Boundary
- Quarry Site (ML1633)
- Quarry Site ML Extension
- Distrubed Areas for Modified Operations
- Approved Extraction Area
- Stockpile Areas
- Clean Water Diversion
- Sediment Basins
- Settlement Ponds
- Storage Dam
- Water Tank
- Rubbled Lined Drain
- Blast Monitor
- Meteorological Station

FIGURE 7.1

Blast Monitoring Locations

Image Source: ESRI World Imagery (2019) Data source: Walker Quarries (2019); Umwelt (2019); NSW LPI DTDB (2019); CEH Survey (November 2016)

7.3 Methodology

7.3.1 Equipment and Settings

A combination of Texcel µMx and Texcel Compact Monitors or equivalent will be used to monitor air-blast overpressure (dB(L)) and peak particle velocity in a radial, vertical and transverse direction (mm/s), i.e. ground vibration. All monitoring equipment will meet requirements of Australian Standard 2187.2-2006. All equipment for the measurement of air- blast overpressure will have a lower cut-off frequency of 2 Hz, and a frequency bandwidth of 2 to 500 Hz. Only calibrated monitors will be used for blast monitoring with copies of calibration certificates or other means of verification available on site.

Trigger levels for both air blast overpressure and ground vibration measurements will be set at a reasonable level below the blast impact criteria based on the experience of the Quarry Manager or blasting contractor with conditions at the Quarry. Instrument trigger levels will initially be set between 0.3 and 0.4mm/s and 111.7 and 111.9 dBL. This may be modified over time, if necessary.

7.3.2 Pre-Blast Setup

Prior to monitors being placed in the field, the following aspects will be verified for each instrument:

- Battery is charged. Note: batteries will be placed on charge immediately following data downloading from each blast.
- Date and time are correct.
- Location (Site) for each monitor is marked on the carry case.
- Instrument “fields” are correctly set to reflect the distance from the blast site to identified monitor location. The instrument fields, i.e. near, medium and far, determine the period of recording for air-blast once the monitor is triggered on either ground vibration or air-blast.
- **Table 7.3** identifies the distance range between the blast site and the monitor, the appropriate “field” setting and the duration of air-blast (air pressure wave) recording. It is noted that the proposed monitoring locations will require the instrument to be set on the “Far Field” setting.

Ground vibration will be recorded for a period of 20 seconds following triggering.

Table 7.3 Blast Monitor Settings and Airblast Overpressure Recording Times

Setting	Near Field	Mid Field	Far Field
Distance (Monitor to Blast) (m)	<300	300-1000	>1000
Recording Time (sec)	4	10	20

- Instrument trigger levels are set to minimise the potential for false initiation of the recording sequence by, for example, wind, but will record air-blast or ground vibration events approaching or greater than the standard vibration criteria of 115dBL and 5mm/s respectively. For the far field setting, triggers will typically be set between 0.3mm/s and 0.4mm/s and 111.7dBL and 111.9dBL.
- Settings are finally adjusted and a record of final settings is printed from the logger.

In order to ensure consistency, a sheet identifying the monitor settings for each blast monitoring site will be retained and adjusted as necessary to reflect, for example, increasing or decreasing distances to the blast site and monitoring results.

7.3.3 Instrument Siting

The instrument will be set up at the pre-selected monitoring point, between 3.5 and 30 m from the residence/infrastructure.

The instrument set-up procedures involve the following steps:

- Insert the soil spike into the ground and level the geophone.
- Set up microphone.
- Connect microphone and geophone to the monitor.
- Turn power on. Powering up the monitor initiates a self-check culminating in a display advice that the instrument is functioning properly.
- Press “start”. Following a countdown sequence, the monitor moves into a “standby mode” awaiting triggering.

Prior to initiation, a quarry Site Blast Check List form which includes verification that the monitors are in place and records salient weather data, e.g. wind direction and cloud cover, will be completed and signed by the shot-firer.

Following the completion of each blast, the following activities will be undertaken prior to the monitor being returned to the office for data downloading:

1. Press “stop” button.
2. Turn power off.
3. Disconnect microphone and geophone
4. Remove soil spike.
5. Pack up instrument.

7.3.4 Data Retrieval and Review

On the return of each monitor to the office, the blasting contractor will complete the following tasks:

- Retrieve/download the data from the monitor and save to the office computer.
- Review the data and delete any data pertaining to false triggers, i.e. triggers before the blast initiation time.
- Generate a results print-out sheet (in Microsoft Word) and insert relevant data relating to the blast, e.g. blast pattern, hole spacing, number of rows, number of holes, blast-hole diameter, stemming, MIC, explosives type and weight, delay type (interval and duration (ms)) and any relevant comments or observations.
- Record the name of the person who undertook the monitoring, and the time of measurement, in the results print-out sheet.
- Print off and distribute the results to Quarry Manager and any property owner that has requested to receive copies of the results. Results will be distributed by email, fax or in hardcopy as appropriate.

- Copies of the printouts, the quarry site blast checklist and details such as blast design, charging and tie-in pattern are retained on the Quarry environmental database.
- Place monitor battery on charge to await the next blast.
- In the event of an exceedance of blast criteria, or if a complaint is received, the blast contractor, in consultation with the Quarry Manager will initiate reactive management measures described in **Section 6.2.2**.
- Following the recording and distribution of results, and prior to the next blast occurring, the Quarry Manager and blast contractor will review the results to establish if variations to blast design are required for the next blasting event. Blast design and the continual improvement protocol are described in **Section 6.1.4**.

8.0 Incident Management, Notification and Reporting

8.1 Incident Identification

Condition R2 of EPL 13172 requires that Walker Quarries must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident.

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

- it involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial
- it results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000 (or such other amount as is prescribed by the regulations).

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

An incident which is only as a result of an exceedance of blast criterion, is referred to as a **Non-compliance Incident**.

In accordance with Section 14 of the *Work Health and Safety (Mines and Petroleum Sites) Act 2013 No 54* (WHS Act 2013), a **Notifiable Incident** means:

- the death of a person, or
- a serious injury or illness of a person that is prescribed by the regulations, or
- a dangerous incident prescribed by the regulations.

8.2 Incident Notification

8.2.1 Pollution Incidents

Immediately after Walker Quarries becomes aware of a pollution incident, i.e. without delay the following notifications will be made.

Department of Planning, Industry & Environment

Written notification of the incident will be emailed to the DPIE at the following address: compliance@planning.nsw.gov.au.

Written notification of a pollution incident will:

(a) identify the development and application number,

(b) provide details of the incident (date, time, location, a brief description of what occurred and why it is classified as an incident, i.e. non-compliance or pollution),

(c) identify how the incident was detected,

(d) identify when the Applicant became aware of the incident,

(e) identify any actual or potential non-compliance with the conditions of this consent,

(f) describe what immediate steps were taken in relation to the incident,

(g) identify further action(s) that will be taken in relation to the incident, and

(h) identify a project contact for further communication regarding the incident.

Where any of the above cannot be provided immediately following identification of the incident, e.g. identification of actual or potential non-compliance with the conditions of this consent, this will not be relied upon to delay written notification. If required, the notification will make commitment to provide follow-up information to satisfy any of the above requirements.

Environment Protection Authority

The EPA's Environment Line service (131 555) will be called to provide initial notification and seek guidance on management.

Within seven days of becoming aware of the incident, Walker Quarries will provide written notification of the incident. Walker Quarries will follow instructions provided by the EPA with respect to further actions and reporting.

Other Authorities and Stakeholders

Walker Quarries will also notify other regulatory authorities and local community (as relevant) in accordance with the procedures nominated in the Quarry Pollution Incident Management Response Management Plan (PIRMP).

8.2.2 Non-compliance Incidents

Within seven days of becoming aware of a non-compliance, Walker Quarries will provide written notification to the DPIE by email to compliance@planning.nsw.gov.au.

Written notification of a non-compliance will:

(a) identify the development and application number,

(b) out the condition of this consent that the development is non-compliant with,

(c) why it does not comply and the reasons for the noncompliance (if known), and

(d) what actions have been, or will be, undertaken to address the non-compliance.

It is noted that notification for the purpose of a pollution incident (refer to **Section 8.2.1**), where this describes the non-compliance, satisfies the notification requirements above.

8.2.3 Notifiable Incident (WHS Act 2013)

In the event of a notifiable air-quality incident under the WHS Act 2013, the Quarry Manager will ensure that the regulator and the Secretary of the DPIE are notified after becoming aware the incident has occurred. The regulator and the Secretary of the DPIE will be notified by telephone or by writing (email or facsimile) within 48 hours of the incident occurring.

8.2.4 Complaint

Refer to **Section 6.2.2.1**.

8.3 Incident Management and Reporting

Following identification of an incident, an investigation will be commenced into the source of the pollution, non-compliance or complaint in accordance with the response and corrective actions described in **Section 6.2.2**. Any instruction provided by the EPA with respect to investigations, additional or conditional management or preparation of written reports will be followed.

Within 30 days of the date on which the incident occurred or as otherwise agreed to by the Secretary, the Applicant must provide the Secretary and any relevant public authorities (as determined by the Secretary) with a detailed report on the incident addressing all requirements below, and such further reports as may be requested.

The Incident Report must include:

(a) a summary of the incident,

(b) outcomes of an incident investigation, including identification of the cause of the incident,

(c) details of the corrective and preventative actions that have been, or will be, implemented to address the incident and prevent recurrence, and

(d) details of any communication with other stakeholders regarding the incident.

If the incident was identified following receipt of complaint, the complainant will also be provided with a report confirming the incident, source or cause of the incident, actions taken and ongoing management to prevent subsequent incident (see also **Section 6.2**).

Within three months of the submission of an incident report, the Quarry Manager will review this BMECP and revise if required. Walker Quarries will notify the DPIE in writing that this review is being undertaken. If the review does lead to revision, the Company will submit the revised BMCEP to the DPIE within 3 months of the incident for approval.

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

9.0 Data Management and Reporting

9.1 Review and Recording of Monitoring Data

Walker Quarries will retain records of meteorological monitoring and blast monitoring for a minimum period of four years. Monitoring records will be made available to relevant government authorities following a written request.

9.2 Reporting and publication of monitoring data

Walker Quarries will include a summary of all blast monitoring reports in the Annual Environmental Management Report. That document, once approved by the relevant government agencies, will be published on Walker Quarries website.

In accordance with the requirements of Section 66(6) of the *Protection of the Environment Operations Act 1997*, each month Walker Quarries will publish all monitoring data on Walker Quarries website. The data will be published within 14 days of receipt of results from the blasting contractor.

10.0 Roles and Responsibilities

Table 10.1 outlines the roles and responsibilities of personnel with reference to blasting management.

Table 10.1 Roles and Responsibilities

Role	Responsibilities
Managing Director	Ensure adequate resources are available to implement the BMECP. Ensure suitably trained personnel are available to implement the responsibilities of the Quarry Manager during any time of the Quarry Manager's absence from site.
Quarry Manager, or his/her nominee	Ensure the implementation of the BMECP. Ensure compliance with the BMECP. Ensure blast monitoring results are regularly reviewed/evaluated and uploaded to Walker Quarries website. Ensure reviews of meteorological forecasts are undertaken prior to the commencement of blasting activities. Relocate or postpone relevant activities in the event of adverse weather conditions. Provide primary contact for complaints and supply follow-up information to any complainant. Initiate investigations of complaints as received from the public or government agency. Prepare a report to government agencies or neighbours following a notifiable pollution incident (**Section 7.0**). Inform the Director of identified exceedances of blast criteria and any alterations to blast design or practice that will be implemented to rectify the exceedance. Coordinate the review of the BMECP (**Section 11.0**).
All On-site Personnel	Operate in manner that minimises risks of incidents to themselves, fellow workers or the surrounding environment. Fully implement the relevant control measures within the BMECP. Report any anomalous events to the Quarry Manager. Follow any instructions provided by the Quarry Manager.
All Truck Drivers	Follow any instructions provided by any on-site personnel.

11.0 Competence Training and Awareness

All personnel and contractors working at the Quarry undergo an induction. This induction includes information on blasting procedures and staff responsibilities.

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

12.0 Plan Review

In accordance with the *Environmental Management Strategy*, this BMECP will be reviewed within 3 months of any significant modifications to operations that may influence blast management, any internal or external audits undertaken of the Quarry and following any notifiable incident.

In accordance with the Environmental Management Strategy, and Condition 5(5) of DA 344-11-2001, the BMECP will be reviewed within three months of the submission of an:

a) incident as defined by **Section 8.1**

b) Annual Review[3]

c) an Independent Environmental Audit completed in accordance with *Condition 5(14)* of DA 344-11-2001 and

d) any modifications to this consent.

This will ensure the adequacy of the BMECP and allow for opportunities of adaptive management and continual improvement. Each review will also evaluate the effectiveness of the overall blast monitoring program and continual improvement protocol and whether it should be modified or scaled back.

[3] The Annual Review is due by 30 September each year.

13.0 References

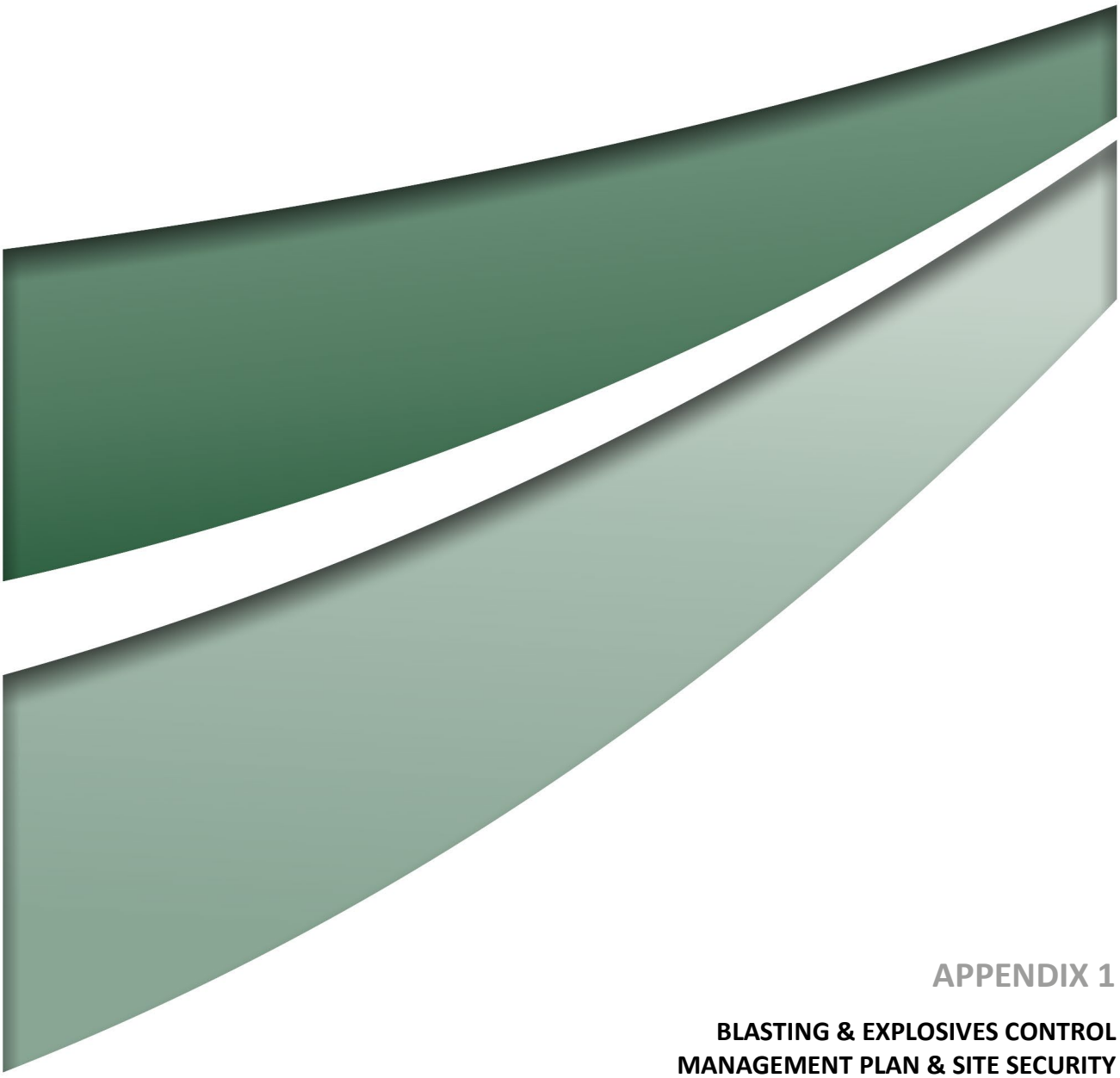
Environmental Protection Authority (EPA) (2013). Requirements for Publishing Pollution Monitoring Data.

Pacrim Environmental (Pacrim) (2001). Environmental Impact Statement Proposed Wallerawang Quarry. Prepared for Sitegoal Pty. Limited, November 2001 (report 01/206.1).

Ramboll Pty Ltd (2019). Wallerawang Quarry Modification Air Quality Assessment. Prepared for Umwelt (Australia) Pty Limited on behalf of Walker Quarries Pty Ltd.

RW Corkery & Co. Pty Limited (RWC) (2018). Environmental Management Strategy for the Wallerawang Quarry, November 2018.

Documentation supplied (and agreed) to Walker Quarries by the Blasting Contractor.



APPENDIX 1

BLASTING & EXPLOSIVES CONTROL MANAGEMENT PLAN & SITE SECURITY PLAN

Premier Drill and Blast PTY LTD
42 Green Street Telarah NSW
Phone: 02 4932 4737
ABN 14 167 900 489

BLASTING & EXPLOSIVES CONTROL MANAGEMENT PLAN & SITE SECURITY PLAN

FOR CLIENT:

WALKER QUARRIES
Wallerawang Quarry
Lot 6, Great Western Highway
Wallerawang, NSW 2845
Site Contacts:
Site: 02 6352 3377
Operations Manager: Trevor Hoffman- 0417 663 222
Quarry Manager: Wayne Chapman- 0413 784 420

REVISION REGISTER

Doc title	Rev.	Date	PDB Manager (Sign and date)	Site Management (Sign and date)
BMP 2021	6	24th November 2021	Peter Andrews	

DISTRIBUTION REGISTER

Document	Holder	Initial Issue Date	Sign
1	Telarah Office Copy	24th November 2021	PA
2	Wallerawang Quarry Copy		

Premier Drill and Blast PTY LTD
42 Green Street Telarah NSW
Phone: 02 4932 4737
ABN 14 167 900 489

Contents

Premier Drill and Blast BEUL Register

Full Name	DOB	State	Licence No.	Category	Expiry Date
Roy Alan Barclay	05 MAY 1965	NSW	05-100307-003	PAC Agricultural, Seismic, Open cut, Above Ground Mining	25-06-2026
Neil Andrew Falconer	24 JUN 1973	NSW	XBLS200264	Above Ground Mining, Open Cut Coal Mining	17-01-2023
Peter Anthony Andrews	27 DEC 1964	NSW	XBLS100563	PAC Agricultural, Seismic, Open Cut, Above Ground Mining	07-08-2026

1.SCOPE AND OBJECTIVES

This Blasting and Explosives Control Management Plan (BMP) details how most aspects of the surface drilling & blasting operations will be managed at the Walker Quarries, Wallerawang, NSW.

The primary objective of this BMP is to ensure the safety of all site personnel, contractors, visitors, neighbours and property that may be affected by the drill and blast operations and;
is intended to set out the control measures to minimise the risks to health and safety associated with the supply and use of explosives at the mine site and outlines the safe supply, use of, life span (birth to death) security and characteristics of explosives.

The further purpose of this management plan is to provide a safe standard work practice for the safe and efficient blasting on projects to maintain compliance with Safety, Environmental and Quality Legislation, Codes of Practice and Relevant Standards.

Furthermore it is to ensure the drill and blast operation is standardised, efficient and meets the objectives as defined in this plan.

This BMP also details how the following management objectives will be met:

- At all times during drilling and blasting operations the health and safety of site personnel, the public, surrounding structures, properties and infrastructure and the environment is held in the highest regards.
- Blasting impacts on the environment comply with the licensing conditions of the project outlined in the site blast management plan.
- The supply, handling and use of explosives shall comply with applicable Acts, Regulations and Standards.
- Materials shattered by blasting can be efficiently excavated by the sites mechanical means.
- Rock outside required lines is left in a sound condition after blasting, through the use of controlled blasting techniques as appropriate and;

The effectiveness of this Blast Management Plan in crucially dependent on the following requirements:

- Procedures are based on risk assessment.
- Procedures reflect industry best practice or create it (the use of documented JSA's at various stages of the drill and blast process)
- A system of continuous improvement is incorporated and utilised on an ongoing basis
- Personnel are competency based trained and assessed in all relevant procedures.

Premier Drill and Blast PTY LTD
42 Green Street Telarah NSW
Phone: 02 4932 4737
ABN 14 167 900 489

2.REFERENCED DOCUMENTS-EMERGENCY CONTACTS

- Work Health and Safety Act Act and Regulation 2011
- Work Health and Safety (Mines and Petroleum Sites) Act 2013
- Work Health and Safety (Mines and Petroleum Sites) Regulation 2014
- Dangerous Goods Act 2003 No. 38
- AS 2187.1-5 Explosives- Storage, transport and use 2006
- NSW Explosives Act 2003 and Regulations 2013,
- Relevant Codes of Practice
- AS2459.1-1988: Guide to the Use of Sound-Measuring Equipment Part 1 - Portable Sound Level Meters
- EPL- Licence No. 13172 & DA 344-11-2001

Emergency Contact Numbers	
Emergency Services-	000
Orica Emergency Response Service-	1800 033 111
Maxam-	1800 833 111
NSW Dept. Of Industry Resources& Energy-	1300 814 609
SafeWork NSW-	131050
Premier Drill and Blast, Operations Manager-	0428 466 788

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3.BMP- AUSTRALIAN STANDARD 2187.2 (2006) CHECKLIST

Objectives for the project: **Drill and blast works for the before mentioned Above Ground Mine Site**		
No.	**AS 2187.2 Requirements**	**Controls and referenced document location within plan.**
1.	Risk assessment associated with project and controls required.	As per Blast Management Plan/ Explosives Control Plan and Site Security Requirements
2.	Site specific requirement.	Above Ground Mine Site
3.	Introduction of blasting within the project.	Blasting has been conducted at this site since 2014 by the current contractor
4.	Control of Blast Process	Premier Drill and Blast- Blast Process Control Plan-Attach.1
5.	Compliance with approval/contract specifications.	Compliance with EPL- Lic. No. 13172 & DA 344-11-2001
6.	Safety of the public, site personnel and surrounding properties.	1. Adherence to this; Blasting and Explosives Control Management Plan. 2. Blasting works only to be carried out as per PDB risk control procedures and control plans. 3. Blast design to incorporate adequate burden and stemming. 4. Sentries for site on day of blast and all persons accounted for.
7.	Submission to regulatory authority/s requirements	Notification to relevant authorities and approvals done prior to any PDB blasting activities for site. Site reporting requirements
8.	Location of blasting/ specifics	As per site address above.
9.	Description of the proposed blasting.	Open cut pit blasting, Finished walls blasting, Drop cuts, Development blasting and boulder blasting
10.	Permits/Licences Required	NSW Blasting Explosives User Licence-Above Ground Mine
11	Identification of responsible persons for project.	As per Sect. 4 Responsibilities
12.	Identification of person/s given approval for explosives use on project.	As per BMP-PDB BEUL Register
13.	Details of risk management assessment for project.	As per Site Blast Management Plan and SWMS
14.	Details of adjacent structures or services that influence blast design.	Great Western Hwy, 33kV Powerlines, HP gas pipeline, Lake Wallace Dam Wall & Registered Aboriginal Site as per site BMP
15.	Details of reports, drawings and records consulted.	As per site required pit plan/s, Site Blast Management Plan
16.	Layout plan of the blast to include drill patterns, hole depths etc.	As per shotfirers blast markout records and Preblast documentation.
17.	Detonation sequence	As per shotfirers blast markout records and Preblast documentation.
18.	Detonation sequence/effective charge mass per delay (MIC)/powder factor.	As per shotfirers blast markout records and Preblast documentation.
19.	Type of explosive to be used and quantity required.	As per shotfirers blast markout records and Preblast documentation.
20.	Method of initiation.	As per shotfirers blast markout records and Preblast documentation.
21.	Type of firing equipment and procedures.	As per BMP & SWMS Load and Initiate Blast
22.	Drilling procedures.	As per SWMS Drilling Operations
23.	Explosive loading and charging procedures.	As per SWMS Load and Initiate Blast
24.	Explosive storage and handling procedures.	As per SWMS Load and Initiate Blast
25.	Security procedures for the site and the blast, including explosives.	As per BMP Sect. 23
26.	Environmental considerations for air-blast overpressure, ground vibration.	Site EPL and Site Blast management Plan
27.	Details of communication systems.	As per SWMS Load and Initiate Blast and Blast Process Control Plan
28.	Warning procedures.	As per SWMS Load and Initiate Blast
29.	Traffic management plan.	As per site requirements
30.	Proposed dates and times of blasting.	As per schedule and/or Pre blast documentation. Only permitted Mon-Fri between 9:00am & 5:00pm
31.	Details of the exclusion zone.	As per Walker Quarries Site Security Plan Sect. 24
32.	Method of notification to owners and occupiers of structures, and providers of services adjacent to the blast.	Notification to adjacent neighbours as per Site BMP
33.	Influence of weather.	As per Site BMP, SWMS Load and Initiate Blast and Blast Process Control Plan
34.	Loading in poor light conditions or reduced visibility.	As per SWMS Load and Initiate Blast and Blast Process Control Plan
35.	Cessation of explosive-related activities during electrical storms.	As per Sect. 21(d)
36.	Misfire management system.	As per Sect. 21(a)
37.	Post blast assessment and inspection procedures.	As per post blast documentation

4.RESPONSIBILITIES

Responsibilities for the drilling and blasting operations at this site are as follows:

All persons are responsible to ensure the safety of themselves and others as set out in the relevant legislation

Premier General Manager

- Authorise the Blast Management Plans for use and implementation.
- Ensure compliance with PDB and Clients plans and systems of work.

Site Production Manager/ Supervisor

- Determine location of blast.
- Prepare bench for mark out and drilling.
- Liaise with Shotfirer on day as to weather conditions and other factors concerning safety and environmental protection,
- Notify neighbours of blasting times.
- Clear blast exclusion zone prior to blasting and ensure security of the blast exclusion zone. Note: The Mine Operator has a legal obligation regarding the security of the site.
- Reporting of incidents to the Relevant Authorities

Drill and Blast manager

- Liaise with site/client management regarding all aspects of blasting operations
- Review and consult with all parties regarding safety management systems and documentation.
- Implement, monitor and review the drilling and blasting process in accordance with the requirements of the site specific policy, plans procedures and regarding blasting requirements and outcomes
- Ensure risk management procedures are employed in all aspects of work.
- Ensure Shotfirers are suitably trained and qualified.
- Ensure all persons are trained and competent to perform required tasks.
- Review shotfirers records periodically
- Monitor and review all associated processes and documentation

Shot firer

- Blast design and ordering of explosives and initiating explosives.
- Co-ordinating personnel, materials and resources to make sure that blasting is carried out in a safe manner.
- Carry out pre and post blast procedures and documentation.
- Supervise blast crew.
- Responsible for the priming, charging, stemming and initiation of each blast
- Take any precautions that are necessary to prevent any person or structure being adversely affected by blasting,
- Ensure safety systems are in place at all times
- Ensure final inspection of initiating systems.
- Account for explosives and accessories,
- Liaise with Client Management at all times,
- Notification of hazards and incidents to relevant management.
- Participate in investigation and reporting of all blasting related incidents, accidents and injuries

Blast crew

- To strictly work as directed by the Shotfirer.
- Report any unusual condition or occurrence.
- Consult with shotfirer if unsure of any procedure

Responsible site security controller/ blast guards

- Maintain communication discipline,
- Stop unauthorised persons from entering their area of responsibility regarding exclusion zone,
- If exclusion zone breached immediately announce ABORT ABORT ABORT,
- Remain alert and in constant audible range of UHF radio,
- Be polite and respectful to the public if required to liaise with.
- Notify Shotfirer of any fly rock

5.CONSULTATION

- Consultation shall take place during all stages of the process between all parties
- Before each blast the Shot firer will conduct a pre-start toolbox meeting with all involved, this meeting covers elements such as safety, design, conditions, quality, environment and other factors. These records are kept in the job pack onsite.
- During the toolbox the Shotfirer will issue load sheets to the MMU crew and the supplier records relevant details of shot design for adherence to the design.
- On arrival to the client site on day of blast, the Shotfirer will report to the Production Manager or Supervisor to ensure the client is ready and generally attend the site prestart meeting
- As the process progresses' the Shot firer will consult with the client using the "Blast Process Control Plan" as to the advancement of the procedure and gain approval to move forward using the "Hold Point" system integrated therein.
- Prior to Blasting operations commencing the Shotfirer will consult with the Blast Crew and MMU Crew. This will ensure all personnel associated with Drill & Blast Activities are aware of all current/planned activities, timings and responsibilities. This is recorded on a consultation record and kept with the blast package.

6.BLASTING AND EXPLOSIVES RISK MANAGEMENT

Potential Hazards and Risk Controls	
Hazard	**Controls**
Unintended or uncontrolled detonation of explosives	Strictly adhere to all Risk Management procedures and documents, No smoking or ignition sources within 10 metres of explosives
Misfire/s	Sect.21(a) Misfires, Shotfirers checks, Shot design and technical knowledge
Working at height	Face demarcation devices, no work to be carried out in front of front row, Persons to work facing open crest at all times
Working below highwall	Marking of exclusion zone, Demarcation devices and communication
Unauthorised entry by persons and/or equipment	Internal of site exclusion zone; signposted and communicated, General site security
Security and loss of explosives	Adherence to Blasting and Explosives Control Plan and Site Security Plan
Adverse weather/ Lightning	Sect.21(d) Electrical storm, Check weather forecast, Use of lightning monitor if deemed necessary, Withdrawal of persons to safe zone if deemed necessary
Manual handling	Do not over exert, placing of stemming materials suitable, rest breaks, not rushing and loaded bucket volume
Working environment	Work to conditions, applicable PPE and clothing
Fly-rock, vibration and/or air blast	Sect. 8, 9& 10 Fly rock, Air Blast and vibration minimisation, Use of industry best practice
Fume	Sect. 21(c) Fume management
Hot or reactive ground	Sect.21(g) Hot or Reactive Ground

7.BLAST DESIGN, SURVEY AND MARK UP

Due to the reasonably fragmented nature of the Quartzite deposit at Wallerawang all blasting characteristics should be similar to those quarry operations of similar geological formations, no hot or reactive ground has yet been encountered and there is no major voiding or underground work near the site.

The Site Management will approve all blast design and blast patterns before blasting commences, this review will involve review of actual blast area, review pre-blast documentation and reviewing during the day of blast; via the Blast Process Control Plan. The blast design will be dictated by the blasting technique to be used; the rock conditions and the required blasting result. Consideration and recording via associated documentation will be given to the following:

- Bench height, geological and hydrological conditions and any other site based factors.
- Nature of face to which shot is fired, i.e. Free or choked
- Number of blast holes and rows of blast holes
- Diameter, length and inclination of blast holes
- Sub drill and stand-off distances from final berms and batters
- Type and density of explosive
- Charge configuration
- Type and size of primer, number of primers per hole, position of primers
- Stemming type and length,
- Pattern type, staggered, rectangular or square
- Burden and spacing
- Designed powder factor
- Initiating system
- Inter-hole and inter-row delays
- Plan view of pattern

Accuracy controls for blasting operations are:

- Explosive density
- Hole depth
- MIC or column rise
- Stemming sufficiency via measurement of charged hole length prior to stemming
- Ensure verification of actual charge weights of bulk explosive used and number of units of down hole and surface initiation explosive and packaged explosive used
- Fly-rock controls
- Airblast controls
- Ground vibration controls

Mark up:

- Using the blast design data the Shotfirer will mark out hole locations on the ground using high visibility survey paint, If client requests a survey will be carried out using a MDL laser. Once downloaded from the MDL laser this data will produce a drill plan and data to be used for further blast design.

- Drill plans will be issued to the drillers showing hole diameter, angle, depth and orientation of holes.

8.FLY-ROCK MINIMISATION

Elimination of fly-rock is an essential requirement for production blasting at all sites.

The following measures may be adopted to prevent fly-rock dependant on insitu conditions:

- Leaving soft / weak material overlying strong rock to act as a natural blast mat.
- Inspection of the quarry face may indicate geological faults/ weak zones of which are to be taken into consideration for blast design and/or explosives placement within the quarry face.
- Leaving a shot rock 'buffer' in front of the free face if required.
- Bench preparation to provide a clean surface on which to drill
- Pattern mark out to be performed prior to drilling. After mark out the Shotfirer shall inspect all face holes and change them according to the contour and angle of the face to minimise face hole under burdening and hence the risk of fly-rock and air over pressure.
- Hole collaring deviation to be regularly reviewed by drill operator and anomalies reported.
- The driller may log and record each hole on a metre by metre basis for the presence of cavities, water, broken rock, soft, medium and hard rock plus any loss of air. As the ground at this operation is fairly consistent only irregularities may be reported. These logs shall be examined by the drill and blast superintendent and shot firer to determine individual hole loading.
- Use of crushed, screened and angular aggregate material of appropriate size (10-15% of the hole diameter.)
- Free faces/ pit design to be directed away from near-by structures as appropriate.
- If the above control methods are found to be inefficient and/or the shotfirer and/or site management deem necessary the use of laser survey and borehole tracking shall be utilised

9.CONTROL OF GROUND VIBRATION

Control of blast induced ground vibration to within the specified limits is required.

- Suitable blast design shall ensure appropriate maximum charge per hole or per deck and delay sequence and timing to ensure each delay event is discrete. All drill and blast design shall be limited to an MIC as defined by the site vibration requirement.
- Ensuring burden and stemming paremeters are not excessive so as to allow for efficient fragmentation whilst consideration for fly-rock is also taken into account.
- Blast design shall ensure that the powder factor suitable as both to high or to low a factor can create excess vibration.
- Ground vibration shall be measured at the sites required monitoring points as set out in the site EPL.

10.AIR OVERPRESSURE OR AIRBLAST

Essentially air overpressure control is based on the management of explosives confinement. There are three potential sources of airblast, each of which requires a different control strategy as defined below

Source	Control
Stemming Release	Stemming material of the correct size loaded in a continuous column of required length. Caution regarding open holes and introducing obstructions and stemming wet holes gradually to avoid bridging Stemming length based on burden and the condition of the collar material of the specific hole.
Rock Release Pulse	Face burdens measured and managed, adjustment to drill pattern. Decking as required to manage under-burdened areas blast hole. Collar locations with particular regards to crowding.
Rock Piston Effect	Face area and delay timing.

To manage airblast the source must first be identified by examination of the blast video and the airblast record. After identification blast design parameters are modified to provide additional confinement as appropriate.

In all cases blast design will only be effective where process parameters variations are incremental and are measured and controlled. Process variation is managed by:

- Competency based training to ensure that drill and blast personnel understand their role and impact in the overall process.
- Review of blast hole position, diameter, depth, explosive column rise, kg, stemming, front row burdens etc
- Recording and reporting the load profile of every hole loaded.
- Adjustment of face hole positions based on face profile to manage the key front row burdens.

Applicable Australian Standards referring to blast monitoring are listed below:

AS2459.1-1988: Guide to the Use of Sound-Measuring Equipment Part 1 - Portable Sound Level Meters

11.DRILLING

Drilling accuracy controls are:

- Setting out of blast pattern
- Survey blast patterns to design blast hole configuration, depth and for measurement of face burdens
- Collar position and hole angle accuracy may require check prior to blast via boretracking.
- Hole depth dipped by drill operator
- Hole drill logs on a metre by metre basis detailing hard, medium or soft, broken ground, wet versus dry holes, presence and extent of cavities and loss of circulation.(If requested by client)
- The shot firer shall use the hole logs to refine individual hole charge weights in order to minimise fly rock and air overpressure.
- Drill units fitted with accurate angle meters to enable conformance to design.

The re-drilling of holes in a charged pattern or within 6 metres of a charged hole shall not be undertaken at any time, unless authorised by the Site manager and Shotfirer. In the event that re-drilling is to be undertaken in a charged pattern the following precautions shall be considered:

- Particular attention shall be given to drilling accuracy and orientation to avoid drilling into any explosives loaded in adjacent holes.
- Removal of any explosive from adjacent holes (i.e. primers or surface units).
- Avoidance of tramming, driving or operating over charged holes.

12.PRE-LOADING CHECKS

The Shotfirer will select holes to be measured to check depths of holes are within the design depths, the Shotfirer will determine corrective actions to be taken should the depths be outside the design.

The Shotfirer will ensure via communication with the site that stemming material is placed on the blast area prior to any explosive accessories being placed on the ground.

Shotfirer to confirm front row holes are within design parameters and/or crest conditions are unchanged since design/mark up stage and make loading changes accordingly.

Warning signs “Explosives in use, no unauthorised entry” shall be erected at the boundary of or entry road to the blast area, only persons authorised by the Shotfirer shall be permitted to enter onto the blast area. Drilling shall be completed prior to the commencement of charging operations. Where redrilling must be carried out drilling shall not be carried out within 6 metres of a charged blast hole.

13.PRIMING AND LOADING

If MMU is required to straddle blast pattern row/s then no leads and primers are to be placed on row to be straddled and/or the rows directly parallel and adjacent to where the MMU will be travelling on the blast pattern.

At each collar a down-line and primer will be placed ready for assembly before being placed in the blast hole. For double primed holes the top deck down-line and primer will also be placed at the collar ready for assembly.

Ensure that the correct down line timing is being provided. Use down-lines of suitable length wherever possible to avoid minimal or excessive lengths of tubing outside the blast hole.

The tail of the down-line left at the top of the hole must be securely fixed in the drill cuttings or rocks as close as possible to the hole. Be aware that in some cases down-lines can be drawn into blast holes by unknown geological or hydrological conditions.

At this point any surplus primers and detonators will be returned to the magazine and a stock count/check shall be performed by Shotfirer or designated person and supplier . If there is unaccounted for or missing explosives stock at this stage refer to Sect.19(e)

Blast hole charging will use emulsion type bulk explosive and packaged explosives where appropriate. All explosives and blasting accessories will be brought to site on a daily basis as required, and there will be no provision for magazine storage at the site.
The Shotfirer must have his loading plan calculated prior to any loading taking place, making sure that the Maximum Instantaneous Charge will not cause operations environmental conditions to be exceeded.

Blast holes will be primed, then the Shotfirer may allow supplier to proceed to load bulk explosive product into the holes as per the suppliers documented procedures. After loading the product may be required to sit and expand prior to stemming this will be supervised by Shotfirer as will be required stemming lengths. All explosive accessories are to be accounted for by the Shotfirer and the bulk delivery truck will have access to the weighbridge to determine usage by weighing in and out of site.

Product volume usage should be monitored throughout the loading process to ensure design requirements and explosive product variables due to climate etc.

When loading in broken ground or cavities the down lines will be secured after loading, should the product slump or run away then a small top up of an appropriate amount can be added and checked again.

Should a down-line fall down a blast hole, the Shotfirer will attempt to recover it using a fishing device with a hook attached. If the down-line is unable to be retrieved then another primer will be inserted and hole location recorded.

14.STEMMING

Prior to stemming, loaded blast holes shall be measured with a stemming pole to ensure that the correct length of hole is available for stemming material
Overloaded holes shall be remedied (by removing excess charge) prior to stemming. Care shall be taken to ensure that the down-line is not damaged or lost down the blast hole during the placement of stemming material.
All production blast holes shall be stemmed with suitably sized crushed rock aggregate as directed by the Shotfirer.

Lost holes in close vicinity to loaded holes also to be stemmed.
Stemming of wet holes require more caution and avoid pouring rapidly so as to minimise the stemming bridging out.

15.TIE IN PROCEDURE

The Shot Firer shall refer to the blast plan for tie-in plan which includes details such as the point of initiation, design of tie-in, location, sequence and direction of each delay. All tie-ins shall use Nonel surface connections of relative supplier and the appropriate method of clipping used and ensuring all signal tubes are clipped into the block..

At this stage the shot firer and the explosives supplier representative shall conduct a count of the remaining explosive on a type by type basis. The required blast numbers shall be subtracted from the usage count and reconciled against the planned usage to ensure that all explosives are accounted for. If unaccounted for explosives are found/missing at this point refer to Sect. 19(e)

Tie-in of any blast holes shall not commence until all vehicles are removed from the charging area. Once tie-in is completed, ensure that no vehicle is allowed to re-enter the blast area.

Once all connections are made then the connector is placed on the ground with the block opening facing upwards to allow the Shotfirer and Site Management to visually check all connections.

At the completion of the tie-in and prior to firing the shot, the responsible Shot Firer shall "walk the shot" confirming all connections have been correctly made and are in the correct place.

The shot firer shall conduct an inspection of the shot and surrounding area inside the blast charging inner exclusion zone.

16.BLASTING TIMES & ENVIRONMENTAL CONSIDERATIONS

Blasting in or on the premises must only be carried out as per the site Blast Management Plan and the environmental considerations contained within the site EPL, blasting at this particular site will only occur between9:00am to 5:00pm, Monday to Friday. Blasting in or on the premises must not take place on weekends or Public Holidays without the prior approval of the EPA.
As loading of the shot progresses the Shotfirer will communicate with Site Management as to the suitable firing times.
Blast monitoring location/s are also contained within the site BMP.

17.BLAST EXCLUSION ZONES

All blasts require the establishment of an exclusion or evacuation zone prior to firing the shot. The size and location of the exclusion zone shall be an agreed area designated by consultation between all associated parties and such that all persons are at a safe distance from blast area.

The outer zone that adjoins the boundary of the inner zone, and is established prior to the final connections being made. The purpose of the inner zone is to allow work to continue in surrounding areas during loading, but must be controlled to prevent unauthorized access of personnel, plant and equipment.

The inner zone shall be identified by Blast Warning Signs placed by the Shotfirer.

The Shotfirer and authorized persons may remain in the exclusion zone, at a predetermined protected location during firing. Final approval for persons to observe or monitor the shot from within an exclusion zone remains with the Shotfirer, who should not be subject to any external pressure.

The safe clearance distance shall be determined by Shotfirer.

Safe distances would use the following considerations:

- Site Exclusion Zone Plan (as per diagram back page)
- Previous results
- Rock type
- Blast location and free face direction.
- Blasting in a new area.
- Ground conditions
- Blast type and geometry.
- Powder Factor
- Blast-hole load profile (diameter, uncharged length, stemming, density)

18.ESTABLISHING AND DISESTABLISHING THE ZONE

The inner and outer exclusion zones will be cleared by the Site Manager or his delegated person (Security Controller), the Shotfirer and Security Controller will then carry out a visual check of the inner zone, so as to establish that no personnel and/or equipment are within/ in front of the blast area.

All communication will be on UHF Radio (Site Channel).

The “Security Controller” will position himself at a point on site to prevent any person from entering the outer exclusion zone via visual and radio communication means. The Shotfirer’s assistant will within this part of the process place the video camera and set it to record the blast.

The use of explosives in some industries can attract spectators and possibly demonstrators along with strong media involvement. Such possibilities shall be considered for the control and size of the exclusion zone. It is important that control is established and maintained at all levels of the project and the blasting operation should not be promoted as a public display.

19.INITIATION OF THE BLAST AND WARNING PROCEDURES

The time of initiation will be nominated by Shotfirer and Site Management after liaison. The Shotfirer will nominate someone from the blast crew to place monitoring equipment at the designated areas prior to blasting.

30 to 15 minutes prior to firing the blast all quarry personnel shall be removed from the blasting area by the site management/ delegated person and marshalled at the evacuation zone beyond the outer exclusion zone. A head count shall be undertaken by the site management/ delegated person and confirmed with the

Shotfirer prior to firing.
The “Security Controller” shall confirm by radio with the Shotfirer that the quarry is secured and all personnel are accounted for and Sentries are in position for the blast. The Shotfirer will also confirm this.

All personnel shall remain at the evacuation area until the all clear by the Shotfirer for sentries to stand down, remove roadblocks and allow re-entering the quarry area.

The Shotfirer will then connect the lead in line and carry out his own safety checks.
When the Sentries give the “safe to go verbal” to the security controller , the security controller and Shotfirer will then communicate further allowing the security controller to give permission to proceed, the Shotfirer will then confirm he has received and understood the permission to fire signal.

Sentries will only communicate with the Shotfirer unless they cannot control persons in their area of responsibility then they must call “ABORT ABORT ABORT”

Initiation Process:
The Shot firer shall announce the blast process as per following- location of blast, radio silence and sentries to maintain positions> 1 minute to firing time> Sound siren 10>15 seconds, announce 30 seconds till firing> announce 20 seconds to firing> announce 10 seconds till firing/ announce firing thus initiating the blast.

20.POST BLAST PROCEDURES

After the blast the Shotfirer shall announce “blast on the ground” and “going to inspect the blast” Upon then the Shot Firer shall after dust and any possible fume has dissipated, conduct a detailed inspection of the shot for signs of misfire such as

- Unfired blast holes
- Unfired detonators and connections
- Unfired product
- Undisturbed ground
- Overhangs or hang ups

If all charges have been successfully initiated the Shotfirer shall give the all clear by UHF radio so as to give clearance to the “Security Controller” at the evacuation area who will then recall sentries and allow entry to the quarry area.

Following blasting the Shotfirer will provide the Client with a Post Blast Report. The post blast report contains:

- Volume,
- Survey data,
- Blast design,
- Firing Sequence,
- Monitor reports,
- Explosives Delivery dockets

All post blast reports are reviewed by the required parties for accuracy.

21.POSSIBLE EMERGENCY SCENARIOS

21(a)MISFIRES

All site personnel shall be vigilant in identifying misfired explosives. If any personnel suspect that they have found a misfire whilst excavating post blasting, they shall:

- Immediately suspend digging/disturbance of the area
- notify their supervisor
- who shall notify the Shotfirer who will examine the suspected misfire

A misfire shall be determined as follows:

- If an unfired Nonel tube is exposed in a portion of a hole that has been fired, that hole shall be treated as a misfire.
- Columns or portions of unexploded emulsions, cartridges or ANFO should be treated as a misfire until investigated by a shotfirer is carried out, area shall be demarcated at all access points.
- Any unexploded detonator, primer, booster or column of explosive located in the quarry faces and/or blasted material.

If the Responsible Shot Firer determines a misfire during the blast initiation procedure, the following occurs:

<u>Shot shell primer in shot starter fails</u>,
1. Shotfirer notifies blast controller,
2. Replaces,
3. Notifies shot controller,
4. Gains permission and then resumes the initiation sequence.

<u>Detonator at hole #0 fails to initiate blast,</u>
1. Shotfirer notifies blast controller
2. Waits 5 minutes and then investigates cause of misfire
3. Notifies shot controller of issue and estimated rectification time.
4. Removes shot starter from the circuit and rectifies issue, as a rule being faulty lead in line or faulty starter detonator.
5. Notifies shot controller and then resumes the initiation sequence.

19(a)2.If the Responsible Shot Firer suspects or otherwise determines a misfire during the post blast inspection, they shall inform the Blast Coordinator and Site Management of the "Misfire" and

- Advise the estimated time required to deal with it; and/or
- Advise the action to be taken for making the area safe.

Dependant on site procedures, requirements and time required for misfire rectification the following generally occurs.
Following production blasting, road closures will be reopened with traffic to resume normal operation if deemed safe to do so. If the shot firer determines that a misfire is to be dealt with by blasting then this will be treated as a separate blast.
The general area of the misfire is demarcated by signage and visible barriers, shotfirer consults with site management regarding the way forward through an investigative and risk managed approach.

- **A risk assessed approach through the use of the PDB SWMS-Dealing with Misfires must be carried out with regards to dealing with any misfire situation beyond this point.**

1.If a misfire is suspected or identified and is to be left, before clearance is given, its position shall be identified by signs and tapes not closer than 10m to the suspected or identified area by the Responsible Shot Firer.
2.If unfired nonel initiation lines are safe to access and are in a condition suitable for refiring, a suitable means of reconnection and the blast initiation sequence recommenced may be carried out with regards to sufficient burdens.
3.If a misfired charge consists of exposed blasting agent the charge may be re-primed and fired (if necessary, extra burden be placed around the blast hole to prevent fly rock)
4.remove stemming by applying water under pressure through a non-ferrous blowpipe, ensuring that any detonator or explosive which may be susceptible to detonation during this process is not disturbed. When stemming and charge has been removed from a water resistant charge, the primer shall be recovered.
5.If a misfire contains an explosive that is rapidly destroyed by water (e.g. ANFO), the explosive may be washed out, after which the primer shall be recovered.

19(a)3.If re-firing or washing out fails to detonate/remove all explosives or blasting agents in a misfired hole, the Responsible Shot Firer shall:

1.Clean off any rock around the misfire and determine the position of that hole; and
2.Remove the remaining portion of the hole by digging it out under the shot firer's supervision.
3.Redrilling of area may be used as a last resort with the strictest adherence to procedure.
4.No person shall leave unguarded, abandon, discard or otherwise neglect to safely dispose of any explosives recovered in the treatment of misfires.

19(a)4.If explosives are found during excavation, then it shall be reported to site management, whereupon the site management shall carry out the appropriate site procedure/s to make the area safe by:
1.Removing personnel away from the area and if appropriate demarcate the area of suspected misfire and moving production crew/s away from the demarcated area.
2.Reporting potential misfire to Premier Drill and Blast of whom can advise over phone any further procedure to the above and mobilise to site as soon as practicable and deal with the potential misfire in relation to the above procedures; dependent on type of misfire

The Responsible Shot Firer shall report and record all misfires on an “Incident Report form”.

It is the clients and/or the Mine Managers discretion to report misfires to the relevant authorities inspectors. This is generally only done if the misfire cannot be dealt with but dependant on site risk management procedures and with regards that the authority generally prefers to be aware of; for statistical knowledge.

21(b)IN THE EVENT OF AN INJURY TO THE SHOTFIRER

Should the Shotfirer suffer a medical emergency or become injured then generally PDB have more than one suitably experienced Shotfirer in the Blast crew who can assume leadership and take suitable action.

Should another Shotfirer not be onsite then expert advice can be given by calling other PDB Shotfirers who will mobilise to site as soon as practicable.

21(c)IN THE EVENT OF A FUME CREATED

The Shotfirer will consult with the site representative to determine safe locations for Blast guards, taking in to account local weather conditions such as wind strength and direction.

Blast crew and Blast guards are empowered to move location if a fume cloud approaches their position.

When firing on sites where fume is produced PDB will contact Orica technical services for expert advice to minimise fume.

Exposure to nitrogen dioxide can result in delayed health effects that may be potentially life-threatening, although the exposed person may at first appear unaffected. For this reason any exposed should undergo an immediate medical assessment and a continued period of observation at the advice of the treating doctor.

A dear Doctor letter is presented on arrival to the Hospital.

An incident investigation will be carried out after any exposure to fume.

21(d)IN THE EVENT OF AN APPROACHING ELECTRICAL STORM

On the approach of a lightning storm, the Shotfirer will withdraw all persons from the blast area and behind the outer exclusion zone. The Shotfirer will also notify the Site Management immediately of this to ensure that all personnel are withdrawn from the operation to behind the outer exclusion zone or deemed safe area, no people or plant enter the exclusion zone during the storm. PDB shall monitor the storm activity via a “Lightning Detector” and online means. Entry back to the blast area and inside the outer exclusion zone must not happen until after the storm has passed and all lightning activity and thunder has ceased.

21(e)THEFT OR UNEXPLAINED LOSS OF EXPLOSIVES

Refer to Sect. 23-Site Security Plan and,

If upon stock reconciliations there is a stock loss/gain, a complete investigation and recount of all items is to take place.

Potential initial situations to confirm;
Loss of product down drill holes, buried in drill cuttings and/or misplaced.

All documentation is to be reviewed and supplier may be required to contact base magazine keeper to confirm magazine counts, logs and outgoing records.

Any suspected theft or unexplained losses must be reported to the NSW Police, Safework NSW and Department of Industry and Investment- Mines Inspectors immediately.
Do not interfere with site, only make safe then prevent others from accessing as this will assist investigations

PBS will assist authorities to carry out an investigation to determine losses.

21(f)PUBLIC SAFETY AND POTENTIAL PUBLIC ENTRY INTO BLAST AREA

Exclusion zones are cleared of all public and site personnel before each and every blast by the Site Supervisor or Manager; then the Shotfirer will also carry out an inspection before starting the initiation sequence.
Site Security for explosives and blasting activities for the site are set out in Sect.? Site Security Plan
If by chance a potential unauthorised person enters the blast area during the final processes; the process will immediately be aborted.

21(g) MMU EMERGENCY

All licensed explosive carrying vehicles carry Emergency Procedure Guides (EPGs) which are prepared by the manufacturer and specifically applicable to the products being transported. The EPGs are located within a holder attached to the inside of the driver's side door of the vehicle. The EPGs cover the actions to be taken in the case of:

- Vehicle fire
- Vehicle accident or collision - including vehicle roll-over
- Approach of electrical storm

The Shotfirer shall be familiar with the contents of the EPGs applicable to the explosive carrying vehicles.

In any case where a fire is not controlled/ extinguished quickly, the site management must be notified and evacuation of all personnel within the works and surrounding areas within the evacuation radius specified within the EPGs must be executed. Where the area of evacuation includes public areas, the site management or designated person shall contact the police and fire brigade, notify them of the situation and follow their instructions in evacuation of members of the public within the evacuation zone.

Note that the evacuation radius specified by ORICA explosives for their bulk explosive trucks is 1000m.

21(g) HOT AND/OR REACTIVE GROUND

If at any time, any Shot Firer or other person suspects any portion of ground or blast hole of being above normal temperature or suspects reactive ground via an odour; the Shot Firer shall not allow any explosive to be placed there in. Notify Drill and Blast Manager who will contact the explosive supplier technical services for advice.

22.DOCUMENTATION & DETAILS

FOR CONTROL OF DRILL AND BLAST PROCESS

1) Blast Process Control Plan- Attach.1
2) Safe Work Method Statements- Attach.2
3) Environmental conditions at time of blast-(Post Blast Report)
4) Monitoring equipment including type, serial number and locations-(Monitoring Log report)
5) Details of measurements recorded during blast-Monitor Reports, (Post Blast Report)
6) Details of flyrock or fly-(Post Blast Report, Video recording)
7) Details of incidents or complaints-(Post Incident reporting, Site specific)
8) Comment on the results of the blast and proposed modifications required- (PstBR)

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23.SITE SECURITY PLAN AND RISK ASSESSMENT

Authorisation of SWMS/RA

Where the risks after int
Appendix:
ended controls are implemented remain as:

- **High Risks** - must be reviewed and authorised by Manager.
- **Medium Risks** - must be reviewed by Project Supervisors.
- **Low Risks** – Commence work

RISK RANKING CHART				PROBABILITY				
				CERTAIN	LIKELY	POSSIBLE	UNLIKELY	REMOTE
CONSEQUENCES				Commonly Occurs	Has Occurred	Could Occur	Not Likely to Occur	Practically Impossible
Equipment and Operations	Environmental Impact	Personal Injury		A	B	C	D	E
More than $500,000 loss	Catastrophic Environmental Event (publicity)	Fatality or Permanent Disability	1	1	2	4	7	11
Up to $500,000 loss	Major Environmental Event (prosecution)	Major LTI (>7 days lost from work)	2	3	5	8	12	16
Up to $100,000 loss	Serious Pollution (temporary/permanent damage)	Lost Time Injury	3	6	9	13	17	20
Up to $10,000 loss	Minor Pollution (Minor spill – temporary damage)	Medical Treatment Injury	4	10	14	18	21	23
Less than $500 loss/No Damage	Nil Impacts / Affects	First Aid Injury/No injury	5	15	19	22	24	25
LEGEND:	1-6	HIGH RISK	7-15	MEDIUM RISK		16-25		LOW RISK

An acceptable level of risk is a ranking of 16 – 25. These are categorised as **LOW** risk. **High and Medium** risks must be reviewed and authorised as per the authorisation table above.

Item No	Risk Identified	Hazard	Initial Risk			Safety Controls	Residual Risk (after Intended Controls are implemented)		
			P	C	RISK		P	C	RISK
1	Theft of explosives and/or precursors.	• Unsafe use of explosives by untrained persons. • Possible acts of criminal nature.	C	1	H	• All explosives stored and transported by reputable suppliers. • Explosive transport vehicles meet current legislation, standards and codes. • Secure site and only mine personnel on site. • Security checks of explosives personnel • Constant surveillance of explosive vehicles and explosives. • Only licenced personnel overseeing blasting activities. • Only site approved persons involved with blasting activities. • Accurate stocktaking of explosives. • Cradle to grave procedure for explosives. Eg "Process Control Plan". • Reporting theft of explosives to authority's procedure.	D	4	L
2	Unexplained loss of explosives.	• Unsafe use of explosives by untrained persons. • Possible acts of criminal nature. • Possible misfire of misplaced explosive.	C	1	H	• All explosives stored and transported by reputable suppliers. • Security checks of explosives personnel • Known stock volumes entering/exiting site. • Explosive transport vehicles meet current legislation, standards and codes. • Secure site and only mine personnel on site.	D	4	L

Item No	Risk Identified	Hazard	Initial Risk			Safety Controls	Residual Risk (after Intended Controls are implemented)		
			P	C	RISK		P	C	RISK
						• Constant surveillance of explosive vehicles and explosives. • Only licenced personnel overseeing blasting activities. • Only site approved persons involved with blasting activities. • Accurate stocktaking of explosives and consistent testing of densities. • Cradle to grave procedure for explosives. Eg "Process Control Plan". • Reporting "theft of explosives to authority's" procedure. • Accurate blast planning documents and hold points during blast procedure. • Only place on shot what is required.			
3	Possible sabotage of explosives.	• Possible misfire of sabotaged explosives if not identified. • Possible fatality of saboteur.	D	2	M	• Only use reputable licensed supplier and manufacturer. • Security checks of explosives personnel • Explosives vehicles meet current legislation, standards and codes • Licensed supplier explosives vehicles are under electronic surveillance. • Only licensed personnel overseeing blasting operations. • Only site approved persons involved with blasting operations. • Reporting to authorities procedures.	D	5	L

Item No	Risk Identified	Hazard	Initial Risk			Safety Controls	Residual Risk (after Intended Controls are implemented)		
			P	C	RISK		P	C	RISK
4	Unauthorised access to explosives.	• Unsafe use of explosives by untrained persons. • Possible acts of criminal nature.	C	1	H	• Only site approved persons involved with blasting operations. • Security checks of explosives personnel • Secure site and only mine personnel on site. • Follow documented controls.	D	4	L
5	Possible theft of misfired explosives	• Unsafe use of explosives by untrained persons. • Possible acts of criminal nature.	C	1	4	• Thorough examination post-blast for possible misfires. • Training in explosives recognition and awareness for sites. • Dealing with misfires immediately upon identification. • All visitors are escorted on site. • Reporting to authorities procedures.	D	5	24
6	Possible sabotage of nearby major infrastructure and/or protected works.	• Unsafe use of explosives by untrained persons. • Possible acts of criminal nature. • Dangers to the general community.	C	1	4	• Security of explosives • Security checks of explosives personnel • Appropriate site security plans and site procedures. • Reporting to authorities procedures.	D	5	24

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24.EXCLUSION ZONE

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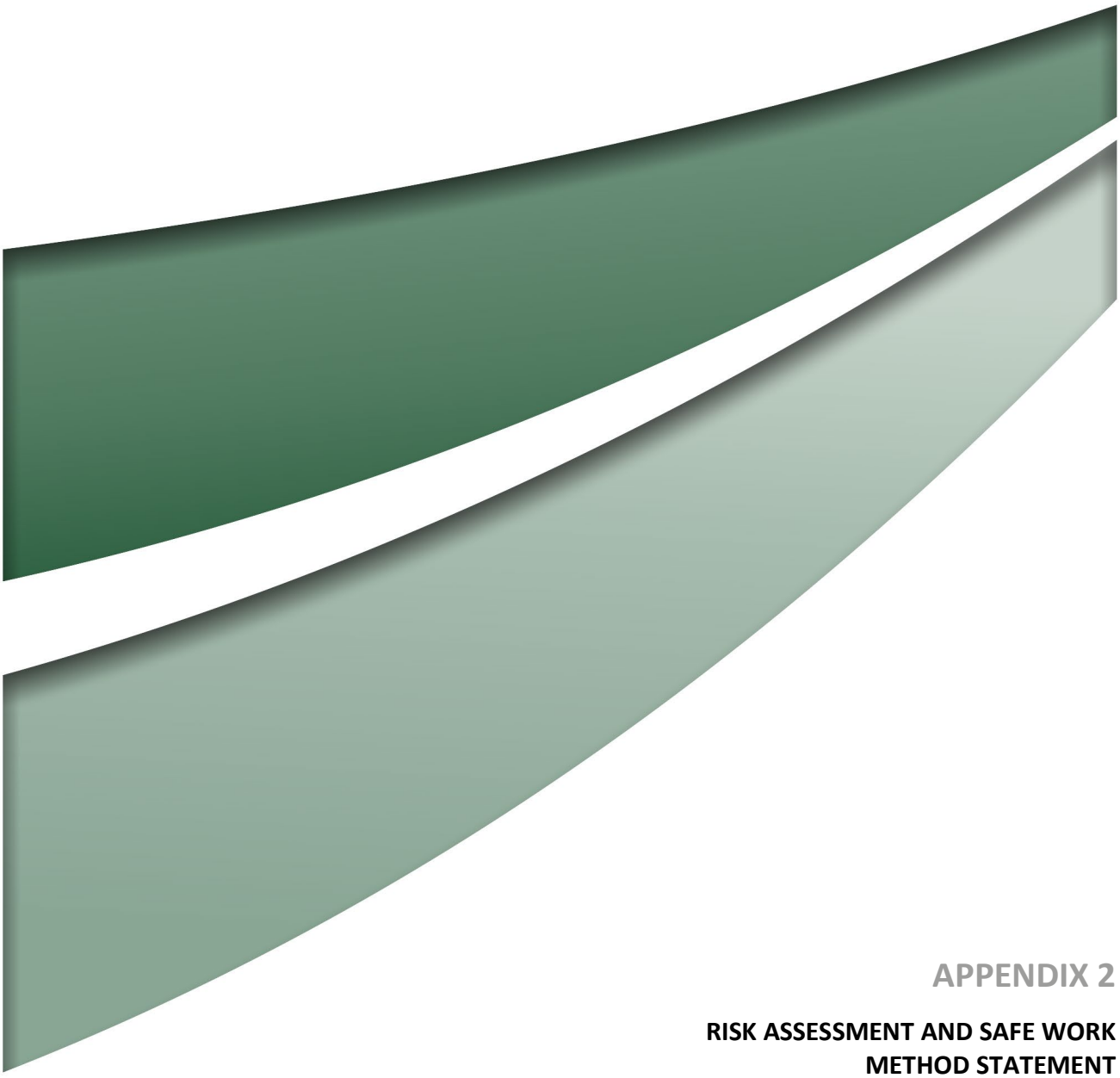

APPENDIX 2

RISK ASSESSMENT AND SAFE WORK METHOD STATEMENT

PROJECT:	PROJECT ADDRESS:	
DESCRIPTION OF TASK Carry out Blasting Activities on Site	DATE PREPARED: 11/02/09	
	DATE REVISED:01-06-2021	REV No: 13

RISK ASSESSMENT AND SAFE WORK METHOD STATEMENT - COMPLIANCE AND COMPETENCY VERIFICATION FORM

Qualifications, Experience, Specific Training Required

- ❑ Blast Explosives User Licence (State of use required)
- ❑ Security clearance
- ❑ WHS Construction Induction (Civil only)
- ❑ Client induction
- ❑ Work Activity Induction
- ❑ First Aid
- ❑ Other

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Telarah NSW 2320
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Equipment required

- ❑ Hard hat
- ❑ Gloves
- ❑ Safety glasses
- ❑ Hearing protection
- ❑ Sun protection
- ❑ High visibility/Protective clothing
- ❑ Respiratory protection
- ❑ Blast flagging/ fencing
- ❑ Warning Signs

Codes of Practice, Legislation, Standards:

- ❑ WHS (Mines & Petroleum Sites) Act 2013
- ❑ WHS (Mines and Petroleum Sites) Regulation 2014
- ❑ Work Health and Safety Act 2011
- ❑ Work Health and Safety Regulation 2017
- ❑ Australian Standard 2187.2 2006 Explosives
- ❑ Explosives Act 2003
- ❑ Explosives Regulation 2013
- ❑ Australian Explosives Code 3rd Edition (Road and Rail Transport)
- ❑ Other State Etc. Requirement (Record Appropriate) below

Administrative controls

- ❑ SDS obtained for Hazardous Substances
- ❑ Chemical controls in place
- ❑ Personal Protective Equipment
- ❑ Signs/ Exclusion Zone established
- ❑ Emergency Procedures in place
- ❑ Appointed First Aid Officer/s
- ❑ Appointed Site Security Controller
- ❑ Training/Informing all persons involved in blasting activity of “Risk Controls”

Permits/Approvals

- ❑ Resources Regulator/ Safework NSW Notification / Approvals
- ❑ Dial Before You Dig Drawings(if required)
- ❑ Authority to Work Permit
- ❑ PDB Process Control Plan

SHOTFIRER: _____ **Signature:** _____ **Date:** _____ Note: Client approval signage pg.17

Title	Date	Author	Revision
SWMS-Carry Out blasting Activities on Site	01-06-2021	NF,PA,JB	13

PROJECT:	PROJECT ADDRESS:	
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Authorisation of SWMS/RA

Where the risks after intended controls are implemented remain as:

- **High Risks** - must be reviewed and authorised by Manager.
- **Medium Risks** - must be reviewed by Project Supervisors.
- **Low Risks** – Commence work

RISK RANKING CHART				PROBABILITY				
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Up to $500,000 loss	Major Environmental Event (prosecution)	Major LTI (>7 days lost from work)	2	3	5	8	12	16
Up to $100,000 loss	Serious Pollution (temporary/permanent damage)	Lost Time Injury	3	6	9	13	17	20
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LEGEND:	1-6	HIGH RISK	7-15	MEDIUM RISK	16-25	LOW RISK

An acceptable level of risk is a ranking of 16 – 25. These are categorised as **LOW** risk. **High and Medium** risks must be reviewed and authorised as per the authorisation table above.

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Item No	Step in Activity	Hazard	Initial Risk			Safety Controls	Residual Risk (after Intended Controls are implemented)			Verified by / Person Responsible
			P	C	RISK		P	C	RISK	
1	Enter site	• Unfamiliar with Site/ Knowledge gaps	C	3	M	• Sign in/ Report to client representative/ Site Management/Supervisory • All persons must undergo site induction, site orientation training provided by client. • Shotfirer & client to agree on “Exclusion Zone” details, site security controller, placement and sentries during initial blasting plans • PDB maintain registry of competent persons regarding explosives use & qualifications	D	4	L	
		• Working outdoors	C	3	M	• Suitable protective clothing & PPE provided by PDB. • Sun screen available. • Hydration	D	4	L	
		• Poor communication	C	3	M	• Consultation with client or site contact on arrival. • Check UHF radio for send and receive. • Site Induction inclusive of Traffic Management Plan • Client and Shotfirer to acknowledge site security controller for the blasting activity & clearance of “Exclusion Zone” during initial blast planning • Communication by site controller to site employees, occupants and nearby residents of blasting activities being undertaken on site and details etc.	E	3	L	

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Item No	Step in Activity	Hazard	Initial Risk			Safety Controls	Residual Risk (after Intended Controls are implemented)			Verified by / Person Responsible
			P	C	RISK		P	C	RISK	
1	Enter site Continued	• Plant and traffic interaction	C	3	M	• Site Induction inclusive of Traffic Management Plan • All PDB vehicles fitted with UHF radio, flashing light & flag • Check UHF radio for send and receive & flashing light functioning • Use call up points and maintain positive contact with mobile plant	E	3	L	
2	Transport of explosives	• Unplanned detonation	D	2	M	• Only authorised personnel shall transport explosives. • Smoking and/or naked flames are not permitted within 10 metres of explosives. • The number of explosives transported on site each day shall be no more than required for use in a single shift. • Explosives shall only be transported in approved packaging. • Any mobile plant/equipment directly associated with transport or charging of explosives is to be compliant with all legal requirements. • Explosives to be transported in locked containers fixed to explosives vehicle.	E	2	L	

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			P	C	RISK		P	C	RISK	
3	Set up Blast Zone	• Unauthorised entry of persons/equipment.	C	3	M	• Demarcate blast zone by placing blasting warning signs out and; • A suitably qualified and experienced shot-firer will control the blast process/area and persons entering that area. • Use cones or other suitable barriers to prevent traffic entering. • Communicate to all & inform unauthorised persons/equipment to move away from blast area. • Notify site contact of any unauthorised persons/equipment. • All persons working in blast zone to be involved in toolbox and sign as well as; • Acknowledge and sign SWMS	D	3	L	
4	Working near edge of benches, and below high-walls	• Loose over hanging material • Fall from height	D	2	M	• A face demarcation device (flagging or bunding) will be placed in front of the front row of the blast area prior. • If above not in place a 2 metre “No Go Zone” to be demarcated with paint and adhered to and acknowledged via toolbox • No person is to work in front of the fall prevention barrier/ “No Go Zone” line. • Eyes on path when moving about close to the edge of benches. • Minimise working facing away from the edge • No work to be carried out above the blast area. • Examination for any overhead potential hazards and if exists; use spotter and	E	2	L	

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			P	C	RISK		P	C	RISK	
						• minimise working in overhang region • If hazard is high risk, communicate with site controller to eliminate risk				
5	Placement of Stemming	• Working near mobile plant	D	2	M	• Shotfirer or dedicated person to direct placing of stemming, spotter • Spotter and plant operator to maintain visual contact and hand signals during stemming placement • Use of handheld UHF if deemed necessary • **Important:** Placing of primers/explosive products; must not to take place until stemming placement has been completed	E	16	L	
6	Prime blast holes	• Manual handling	C	3	M	• Use correct manual handling techniques. • Bend at knees. • Watch step on uneven ground.	D	3	L	

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			P	C	RISK		P	C	RISK	
6	Prime blast holes. Cont.	• Loss of down line	C	4	L	• Secure down line to a rock/anchor when required to prevent it from falling down drill hole. • Hold tail end of down line securely, to prevent loss when lowering primer.	D	4	L	
		• Unplanned detonation of explosives.	D	2	M	• No smoking within blast area. • No tool consisting wholly or partly of metal other than non-ferrous metal is to be inserted into the hole containing explosives. • Any charging operation shall not be closer then 10m to ongoing drilling operations or any other activity utilising mechanical devices / plant. • Shot-firer to ensure that the down line is not damaged or lost during charging and is secured at all times at the top of the hole. • Mobile phone/ UHF radio use on nonel blast area is allowed, person must stop loading activity and do so safely • Segregation of top primer units/ don't insert detonator	E	2	L	
		• Slap snap shoot	C	3	M	• Never pull excessively on a downline, if primer unit jams in hole; double prime and continue loading. • Ensure vehicles/equipment are not allowed entry to blast zone.	D	3	L	

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			P	C	RISK		P	C	RISK	
7	Load product into blast holes	• Over charging of holes	C	3	M	• Blast holes are dipped to determine depth. • Drill logs/report may indicate void areas. • Holes that are longer than design depth must be back filled to design depth. • Blast plan/ Pre start toolbox indicates required kilograms in each hole. • MMU operator to stop delivery when stem height and/or target weight is reached. • If holes are overloaded then use the pipe with ball valve to remove over loaded amount of explosive product. • MMU operator to stop pumping on signal from hose operator when stemming depth is reached • Holes with potential voids should be identified by driller & information passed onto shotfirer to carry out additional risk assessment at back of document/ variation to SWMS & deal with appropriately	D	3	L	
		• Trip on delivery hoses	C	4	L	• Eyes on path. • Be aware of the delivery hose location. • Hose operators to announce when moving hoses if people in area can be affected. • Assist hose handler/s over hose obstructions and drill hole orifices	D	4	L	

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			P	C	RISK		P	C	RISK	
8	Stemming of blast holes	• Unplanned detonation of explosives	D	2	M	• Stemming will only be placed on the blast area before any explosives or explosive accessories are distributed. • Stemming with machinery requires further risk assessment at rear of document; Variation to SWMS constant verbal and visual communication from person on the ground. Machine must not move unless instructed.	E	2	L	
		• Manual Handling	C	4	L	• Use good quality stemming material where available. • Stem wet holes gradually to reduce risk of bridging. • Rotate duties. • Wear gloves if required. • Lift only comfortable size loads. • Watch step on uneven ground. • 2 person in bad areas	D	4	L	
9	Connection of hole to hole initiation system	• Unplanned detonation of explosives	D	2	M	• Blast shall be tied from the last hole towards the front. • Control row/s shall be tied last. • The Shotfirer must inspect all connections once the entire blast has been tied in. • Hole zero must not be connected until immediate blast zone is cleared by “Site Security Controller” and confirmed by the site controller with Shotfirer • No vehicles permitted on blast area.	E	2	L	

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			P	C	RISK		P	C	RISK	
9	Connection of hole to hole initiation system. Cont.	• Prevention of Misfire	D	2	M	• Never allow nonel signal tube to cross over inside "connectadet".connection block insert • Double checking tie up by separate parties. • Do not run lead in line over initiation connections. If unavoidable place insulation barrier between them.	E	2	L	
10	Preparation/ Planning for Initiation of blast & **"Exclusion Zone" establishment**	• Blasting hazards i.e. fly rock	C	2	M	• All persons will be moved to a safe area outside the established exclusion zone. • The Shotfirer in consultation with the client/site security controller; will have determined the exclusion zone. • Before blasting a check will be carried out by the "Site Security Controller" to ensure no person/s and/or equipment are in the exclusion zone. • Blast to be initiated from safe distance • All personnel involved with the blasting activity to be trained in this SWMS and made aware of potential flyrock risk and risk controls	D	3	L	

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			P	C	RISK		P	C	RISK	
10	Preparation for Initiation of blast. blast & **"Exclusion Zone" establishment** Cont.	• Potential excessive over pressure and/or ground vibration	C	3	M	• Blast design including amount of burden, charge weights, depth of charges etc, to be prepared by competent Shotfirer. • Records of previous shots to be analysed and used to adjust subsequent blast design. • All blasts are video recorded for review. • PDB to survey and boretrack blasthole placement and design if requested by client or concerns are raised regarding face profile etc.	D	3	L	
		• Unauthorised persons entering "Exclusion Zone"	C	3	M	• The Shotfirer and client contact will through consultation determine the timing of the blast such that all persons and equipment can be notified and moved to safe areas • All sentries; shall be trained/informed of their duties, have operational UHF radios and; are empowered to stop the blast sequence at any time should unauthorised persons enter the exclusion zone. • Site Security Controller carries out final blast area inspection then proceeds behind sentry line. • Site security controller to verify all persons potentially on site are safe/accounted for/ behind the exclusion zone	D	4	21	

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Item No	Step in Activity	Hazard	Initial Risk			Safety Controls	Residual Risk (after Intended Controls are implemented)			Verified by / Person Responsible
			P	C	RISK		P	C	RISK	
11	Installation/ set up of environmental monitors and video equipment	• Proximity to blast area and correct location of monitors	C	4	L	• Communication and consultation by all parties • Ensure monitors are in locations designated by site licensing requirements	D	4	L	
		• Unsafe/ Incorrect use of drone or video equipment	C	4	L	• Follow OEM instructions for use of equipment • Follow Aviation Authority requirements as set out in • PDB Safe Work Procedure- “Use of Drone”	D	4	L	
12	Sequence of pre- blast process & **Confirmation of “Exclusion Zone”**	• Unauthorised entry to pre-blast site	C	3	M	• Confirmation by the site security controller and sentries must be made regarding security of “Exclusion Zone” • Confirmation by site security controller with the shot firer regarding blasting exclusion zone is clear of all personnel and equipment and is secure from re entry; must be made • Use of audible siren 30 seconds prior to initiation • If using drone a final sweep of area may occur prior to video procedure, however cannot be used; solely as a security measure	D	4	L	

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	DATE REVISED:01-06-2021	REV No: 13

Item No	Step in Activity	Hazard	Initial Risk			Safety Controls	Residual Risk (after Intended Controls are implemented)			Verified by / Person Responsible
			P	C	RISK		P	C	RISK	
12	Sequence of Pre-blast process& **Confirmation of "Exclusion Zone"** Cont.	• Misfire	D	2	M	• Prior to blasting the Shot-firer will carry out pre blast safety checks including a final check of the circuit • The Signal line should be placed such that it cannot be run over or disturbed/ and/or stressing any joints or junctions	D	21	L	
		• Unplanned Initiation	D	2	M	• The Nonel Signal line to the initiation point will be placed/ connected just prior to blasting. • The Signal line will be placed only after the area is cleared of people and plant and confirmed with Site Security Controller by the shotfirer; that no persons will be re entering the blast zone • Do not leave any initiating devices at unattended end of a lead in line. • Confirmation as above, area clear of all non-required persons	E	2	L	
13	Pre-Initiation of blast	• Communication breakdown	D	2	M	• Confirmation between the Shot Firer and the Site Security Controller to confirm area still secure and; SSC hands operation/site over to S.Firer • If communication is broken at this stage/ blasting operations cease and communication issues rectified and; • Blasting operation only recommences upon **confirmation** of "Exclusion Zone" Security and confirmation by all parties as above	C	18	L	

PROJECT:	PROJECT ADDRESS:	
DESCRIPTION OF TASK Carry out Blasting Activities on Site	DATE PREPARED: 11/02/09	
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Item No	Step in Activity	Hazard	Initial Risk			Safety Controls	Residual Risk (after Intended Controls are implemented)			Verified by / Person Responsible
			P	C	RISK		P	C	RISK	
13	Pre-Initiation of blast Cont.	• Potential fly rock	D	2	M	• All persons will be in a safe area outside the established “Exclusion Zone” • Shotfirer in consultation with SSC will have determined the exclusion zone • Blast initiated from safe distance and use of drone; live video feed	D	3	L	
		• Fumes	D	4	21	• Should a cloud of fumes develop from blasting then keep a safe distance upwind from cloud. • Sentries may be required to be notified & requested to move to avoid exposure to fume • Do not enter blast/fume zone until fume has cleared.	E	4	23	
14	Initiate Blast/ Push the button	• Non communication	C	8	M	• Upon communication SF & SSC, operation/site handed over to Shotfirer • All sentries, SSC etc. to have been informed/trained that they are empowered to STOP the blast if concerns are perceived during any time pre-initiation	D	21	L	

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			P	C	RISK		P	C	RISK	
14	Initiate Blast/ Push the button, Cont.	• Non communication				• Shotfirer to announce via UHF; • Location of blast • Maintain radio silence and sentry positions until all clear/safe is given • Announce 60 second countdown begins • Announce 30 seconds and sounds audible siren • Announce countdown 10 sec. To 5 seconds over UHF • This final step in procedure allows for termination of blast initiation by sentries and/or SSC • Announce; “Firing Now” & Initiate Blast • Announce; Blast fired, please maintain radio silence/sentry positions • S.Firer to inspect blast after 5 minutes has elapsed and/or fumes/dust receded				
		• Fumes	C	3	M	• Should a cloud of fume develop, safe distance to be kept, upwind from fume • Sentries may be required notification/ to move so as to avoid exposure • Entry not permitted until fume has dispersed	D	3	L	
		• Fly rock	C	3	M	• All persons involved to be aware of potential/ eyes to the sky • If occurrence, observation of travel and only move/take cover if headed in general direction	C	4	L	

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			P	C	RISK		P	C	RISK	
14	Initiate Blast/ Push the button Cont.	• Misfire of Lead in Line/Blasting cap	D	24	L	• Follow misfire procedures set out in "Explosives Control & Blast Management Plan"	E	25	L	
15	Post Blast inspection	• Slips, trips, falls/ high wall & open face	D	2	M	• Eyes on path • Avoid entry in close proximity to high wall and open face regions • Stay a minimum of 2 metres back from open face, keep observation of open face and high wall regions in close proximity	D	3	L	
15	Post Blast inspection Cont.	• Misfire	C	13	M	• Knowledge of and reference to "Misfire Procedures" and "Explosives Control & Blast management Plan" relevant sections • Misfires to be dealt with only by qualified and experienced Blasting Explosives User	D	21	L	

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			P	C	RISK		P	C	RISK	
15		• Legal/ Reportable	D	3	17	• Shotfirer to inspect blast and report all clear if safe to do so/ Hand operation back over to; Site management/ SSC • Shot firer must report misfires to the relevant Department of industry and investment Mines Inspector or SafeWork if required if misfire cannot be dealt with. • Shotfirer should report misfire regardless if dealt with for statistical purposes only. • Report lost or stolen products if any. • Report fly rock incidents if any. • Report injury or damage if any • Report faulty products if any	E	3	20	
16	• Consult with client on blast outcomes. • Sign off on Blast Process Control Plan, Permit to Work, and Contractor sign In/out Register. • Carry out post blast documentation and forward to client.	• Nil perceived.				•				

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			P	C	RISK		P	C	RISK	
17.	Variation to SWMS>>	•				•				

PROJECT:	PROJECT ADDRESS:	
DESCRIPTION OF TASK Carry out Blasting Activities on Site	DATE PREPARED: 11/02/09	
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Emergency Contacts

Emergency Services 000

Orica Emergency Response 1800 033 111

Maxam Emergency Response 1800 833 111

NSW Dept. Of Industry Resources and Energy 1300 814 609

Safework NSW 131050

QLD Explosives Inspectorate 1300 739 868

All persons working within Blast Zone to acknowledge and sign onto Safe Work Method Statement:

Date	Name	Signature	Date	Name	Signature

Title	Date	Author	Revision
SWMS-Carry Out blasting Activities on Site	01-06-2021	NF,PA,JB	13

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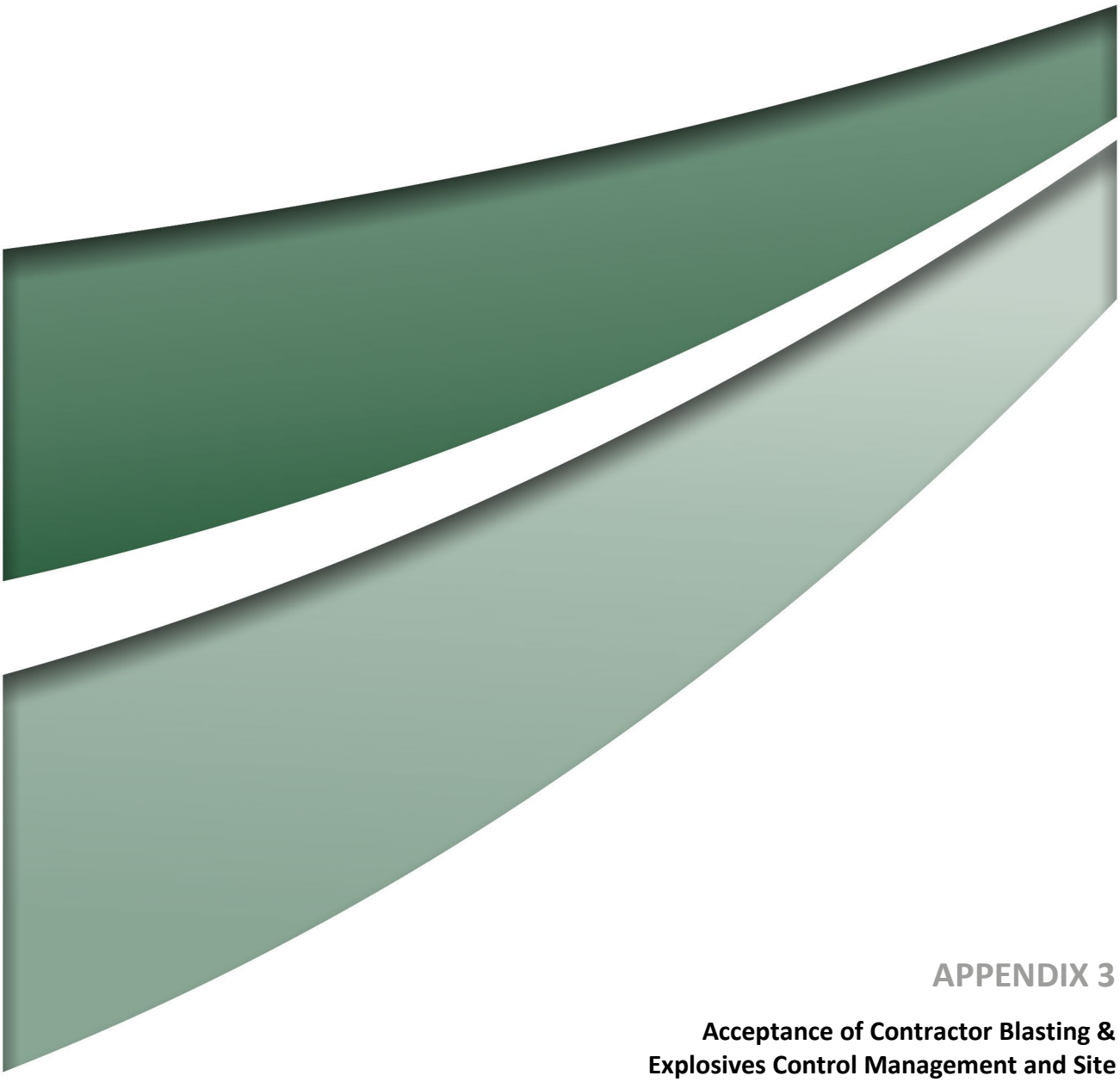
	DATE REVISED:01-06-2021	REV No: 13

CLIENT CONFIRMATION AND REVIEW (to be completed where applicable and as agreed with client):

Reviewed by:_____ (PDB) Signature: _____ Date:_____

Reviewed by:_____ (Client) Signature: _____ Date:_____



APPENDIX 3

Acceptance of Contractor Blasting & Explosives Control Management and Site Security Plan

Walker Quarries

Peter Andrews
Drill & Blast Manager
Premier Drill & Blast Pty Ltd

By email: peter@drillandblast.com.au

06 December 2021

Dear Peter,

Re: Notice under Clause 22 (Mines & Petroleum Regulations 2014)
Wallerawang Quarry

Reference is made to Clause 22 of the Work Health & safety Regulation 2014, which states the following....

> *22 Contractor (Premier Drill & Blast) to prepare plan or use safety management system*
>
> *(1) A contractor (Premier Drill & Blast) must not carry out mining operations or petroleum operations at a mine or petroleum site unless:*
>
> *(a) the contractor (Premier Drill & Blast):*
> *(i) has prepared a contractor health and safety management plan in accordance with subclause (2) and has provided a copy of the plan to the operator of the mine or petroleum site, and*
> *(ii) has obtained written notice from the operator that the operator has reviewed the plan and is of the opinion that the plan is consistent with the safety management system for the mine or petroleum site, and*
> *(iii) has, so far as is reasonably practicable, implemented the plan, or .....*

Walker Quarries (Pty Ltd – the Operator) formally accepts Premiers Drill & Blast (revised) Blasting & Explosives Control Management and Site Security Plan, dated 24th November 2021 (Doc BMP 2021) as per Clause 22 (1) (a) (ii).

Yours Faithfully

W J Chapman.

Wayne Chapman
Quarry Manager
Wallerawang Quarry