Environmental Management System

Rix's Creek Mine

Incorporating both Rixs Creek South & Rixs Creek North

Rix's Creek Pty Ltd.

BLAST MANAGEMENT PLAN

Doc No:	Blast Management Plan
Doc Owner:	Environmental Officer Rixs Creek Pty Ltd

Approval: Environment Manager
The Bloomfield Group

Signed: C Knight

Date: 24/07/2019

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1. Introduction

1.1 Background

The **Rix's Creek Mine (RCM)** (hereafter referred to as the Mine) is an open cut coal mine owned and operated by Bloomfield Collieries Pty Ltd (Bloomfield). The Mine comprises the original Rix's Creek Mine, now known as **Rix's Creek South (RCS)** and the former Integra Open Cut Mine now known as **Rix's Creek North (RCN)**.

Approved operations within the Mine areas include:

- For RCS: (DA 49/94, as modified) North Pit, Pit 2 and Pit 3 (also known as West Pit), rail loadout infrastructure and CHPP; and,
- For RCN: (PA 08_0102, as modified) North Open Cut (Fallbrook Pit), South Pit and extended South Pit (Camberwell Pit), CHPP and the rail loadout infrastructure.

Relevant infrastructure associated with the Mine includes open cut pits and mobile plant, CHPP, rail loading infrastructure, tailings dams and associated clean and dirty water storage facilities.

This Blast Management Plan (BMP) forms part of a series of Environmental Management Plans for the Rixs Creek Mine encompassing the RCS operation and RCN operation.

Whilst this BMP is dynamic and changes will be made as warranted over time, the formal life of this Plan is three years, beginning on the date of formal acceptance of the plan by the Department of Planning and Environment (DP&E).The document will be reviewed and amended as outlined in Section 7.2.

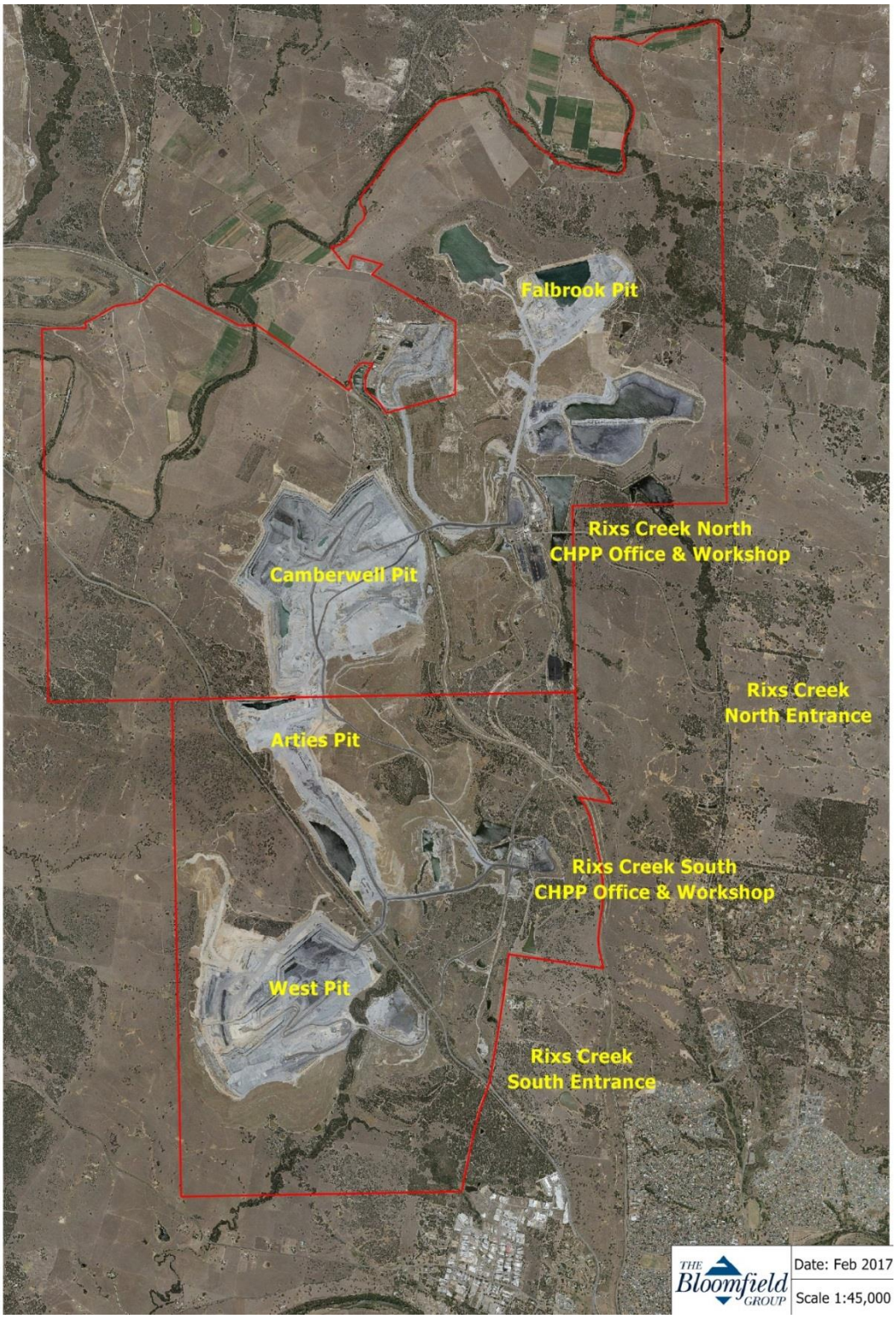


Figure 1-1 Rix's Creek Mine Location Plan detailing Rix's Creek South and Rix's Creek North

1.2 Statutory Requirements

Surface Blasting operations at the Mine must be conducted in accordance with the provisions of:

- NSW Department of Planning & Environment - Project Approval, Rix's Creek North (08_0102), (as modified).
- NSW Department of Planning and Environment – Develop Consent DA 49/94, (as modified)
- Work Health and Safety Act 2011
- Work Health and Safety Regulation 2011
- Work Health and Safety (Mines) Act 2013
- Work Health and Safety (Mines) Regulation 2014
- Explosives Act 2003
- Explosives Regulations 2013
- MDG 1012 Use of explosives in underground coal mines
- AS 2187.1 - 1998: Explosives – Storage, Transport and Use, Part 1 - Storage
- AS 2187.2 – 2006: Explosives – Storage, Transport and Use, Part 2 – Use of Explosives
- AS 2187.0 –1983: Storage transport and use – Terminology
- Australian Explosives Code – Third Edition – April, 2009
- The Bloomfield Group Integrated Management System Explosives Management Plan (2015)
- Australian Explosives Industry and Safety Group Inc (AEISG) Code of Practice

1.2.1 Rixs Creek North

The operations at RCN are subject to the conditions contained in the Project Approval 08_0102 (as modified). All of the requirements for the Plan are addressed in this document, as detailed in Appendix A. The Statement of Commitments in the Open Cut Project EA assessments makes certain commitments in respect of blast management at the Complex. Such commitments have been addressed in this BMP. Appendix A sets out the relevant commitments and where they are addressed in the BMP.

The specific requirements relating to blasting and for a BMP are contained (Schedule 3, Condition 11-19), are as *follows:*

"Blasting Criteria

11. The Proponent must ensure that the blasting on site does not cause exceedances of the criteria in Table 9.

Table 9: Blasting criteria

Receiver	***Airblast Overpressure (dB(Lin Peak))***	***Ground Vibration (ppv(mm/s))***	***Allowable Exceedance***
Residence on privately-owned land	*115*	*5*	*5% of the total number of blasts over a period of 12 months*
	120	*10*	*0%*

Main Northern Railway culverts and bridges	-	*25*	*0%*
All public infrastructure	-	*50*	*0%*

However, these criteria do not apply if the Proponent has a written agreement with the relevant landowner or infrastructure owner to exceed the criteria, and the Proponent has advised the Department in writing of the terms of this agreement.

Blasting Hours

12. *The Proponent must only carry out blasting on site between 9am and 5pm Monday to Saturday inclusive.*
No Blasting is allowed on Sundays, public holidays, or at any other time without the written approval of the Secretary.

Blasting Frequency

13. *The Proponent must not carry out more than:*
   (a) 1 blast a day in the northern mining area unless an additional blast is required following a blast misfire;
   (b) 2 blasts a day in the existing Camberwell south pit, and then 1 blast a day when the mining moves from this pit into the western mining area unless an additional blast is required following a blast misfire; and
   (c) 10 blasts a week on site, averaged over any 12 month period.

Property Inspections

14. *If the Proponent receives a written request from the owner of any privately-owned land within 2 kilometres of the approved open cut mining pits on site for a property inspection to establish the baseline condition of any buildings and/or structures on his/her land, or to have a previous property inspection report updated, then within 2 months of receiving this request the Proponent must:*
   (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary to:
      - *establish the baseline condition of the buildings and/or structures on the land or update the previous property inspection report; and*
      - *identify any measures that should be implemented to minimise the potential blasting impacts of the project on these buildings and/or structures; and*
   (b) give the landowner a copy of the new or updated property inspection report.

Property Investigations

15. *If any landowner of privately-owned land within 2 kilometres of any approved open cut mining pit on site claims that the buildings and/or structures on his/her land have been damaged as a result of blasting on site, then within 2 months of receiving this request the Proponent must:*
   (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, 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 Proponent must repair the damages to the satisfaction of the Secretary.

If the Proponent or landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Secretary for resolution.

Operating Conditions

16. *The Proponent must:*
   (a) implement best blasting management practice on site to:

- *protect the safety of people and livestock in the surrounding area;*
- *protect private or public property in the surrounding area;*
- *minimise the dust and fume emissions of the blasting; and*

(b) co-ordinate the blasting on site with the blasting at nearby mines (including Ashton, Rix's Creek and the Mount Owen Complex) to minimise cumulative blasting impacts;

(c) co-ordinate the blasting on site with nearby underground mines (including Integra Underground) to minimise operational disturbance and to ensure the safety of underground personnel; and

(d) operate a suitable system to enable the public to get up-to-date information on the proposed blasting schedule on site, to the satisfaction of the Secretary.

17. The Proponent must not undertake blasting within 500 metres of:

(a) Middle Falbrook Road or Stony Creek Road without the approval of Council;

(b) the New England Highway without the approval of the RMS; and

(c) the Main Northern Railway without the approval of the ARTC.

18. The Proponent must not carry out blasting in the northern or western mining areas that is within 500 metres of any privately-owned land or land not owned by the Proponent unless:

(a) the Proponent has a written agreement with the relevant landowner to allow blasting to be carried out closer to the land, and the Proponent has advised the Department in writing of the terms of this agreement; or

(b) the Proponent has:

- *demonstrated to the satisfaction of the Secretary that the blasting can be carried out without compromising the safety of the people or livestock on the land, or damaging the buildings and/or structures on the land; and*
- *updated the Blast Management Plan to include the specific measures that would be implemented while blasting is being carried out within 500 metres of the land.*

19. The Proponent must prepare a Blast Management Plan for the project to the satisfaction of the Secretary.

This plan must:

(a) be prepared in consultation with OEH, and then submitted to the Secretary for approval;

(b) describe the blast mitigation measures that would be implemented to ensure compliance with the relevant condition of this approval;

(c) describe the measures that would be implemented to ensure that the public can get up-to-date information on the proposed blasting schedule on site;

(d) include an agreed strategy for the management of potential blast interactions with Integra Underground, including details of agreed:

- *systems for the prior and timely notification of scheduled blasting and subsidence activities;*
- *personnel evacuation and safety protocols for specific blast events; and*
- *procedures and protocols for managing the interaction of the two mines; and*

(e) include a blast monitoring program to evaluate the performance of the project; and

(f) include a protocol that has been prepared in consultation with the owners of the nearby mines (including Ashton, Rix's Creek and the Mount Owen Complex) for minimising and managing the cumulative blasting impacts of the mines.

The Proponent must implement the approved management plan as approved from time to time by the Secretary."

1.2.2 Rixs Creek South

The operations in RCS are subject to the conditions contained in the Development Consent DA49/94, (as modified).

The specific requirements relating to blasting and for a BMP are contained (Condition 12), are as follows:

"Blasting Criteria

12. The Applicant must ensure that the blasting on site does not cause exceedances of the criteria in Table 1.

Table 1: Blasting criteria

Receiver	Airblast Overpressure (dB(Lin	Ground Vibration (ppv(mm/s))	Allowable Exceedance
Residence on privately- owned land	115	5	5% of the total number of blasts over a period of 12 months
	120	10	0%
Main Northern Rail	-	25	0%
Public roads	-	100	0%
All other public	-	50	0%

However, these criteria do not apply if the Applicant has a written agreement with the relevant landowner or infrastructure owner to exceed the criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

Blasting Hours

12A. The Applicant must only carry out blasting on site between 9am and 5pm Monday to Saturday inclusive. No blasting is allowed on Sundays, public holidays, or at any other time without the written approval of the Secretary.

Operating Conditions

12B. The Applicant must:

(i) implement best blasting management practice on site to:

- *protect the safety of people and livestock in the surrounding area;*
- *protect private or public property in the surrounding area;*
- *minimise the dust and fume emissions of the blasting; and*

(ii) co-ordinate the blasting on site with the blasting at nearby mines (including Ashton, Rix's Creek North and the Mount Owen Complex) to minimise cumulative blasting impacts;

(iii) co-ordinate the blasting on site with nearby underground mines (including Integra Underground) to minimise operational disturbance and to ensure the safety of underground personnel; and

(iv) operate a suitable system to enable the public to get up-to-date information on the proposed blasting schedule on site,

to the satisfaction of the Secretary.

12C. The Applicant must not undertake blasting within 500 metres of:

(i) the New England Highway without the approval of the RMS; and

(ii) the Main Northern Railway without the approval of the ARTC.

Blast Management Plan

12D. The Applicant must prepare a Blast Management Plan for the project to the satisfaction of the Secretary. This plan must:

(i) be prepared in consultation with OEH, and then submitted to the Secretary for approval by 30 April 2017;
(ii) describe the blast mitigation measures that would be implemented to ensure compliance with the relevant condition of this approval;
(iii) describe the measures that would be implemented to ensure that the public can get up-to-date information on the proposed blasting schedule on site;
(iv) include a blast monitoring program to evaluate the performance of the project; and
(v) include a protocol that has been prepared in consultation with the owners of the nearby mines (including Ashton, Rix's Creek North and the Mount Owen Complex) for minimising and managing the cumulative blasting impacts of the mines.

The Applicant must implement the approved management plan as approved from time to time by the Secretary.

12E. The Applicant must not carry out blasting that is within 500 metres of any privately- owned land or land not owned by the Applicant unless:
(i) the Applicant has a written agreement with the relevant landowner to allow blasting to be carried out closer to the land, and the Applicant has advised the Department in writing of the terms of this agreement; or
(ii) the Applicant has:
- *demonstrated to the satisfaction of the Secretary that the blasting can be carried out without compromising the safety of the people or livestock on the land, or damaging the buildings and/or structures on the land; and*
- *updated the Blast Management Plan to include the specific measures that would be implemented while blasting is being carried out within 500 metres of the land."*

1.2.3 Environmental Protection Licence

All activities at the Mine will be conducted in accordance with the following relevant NSW Environment Protection Authority (EPA) Environmental Protection Licence (EPL): 3391

1.3 Relationship with Other Environmental Documentation

The relationships between this BMP and other environmental documentation held by the Mine are shown conceptually in Figure 1.2.

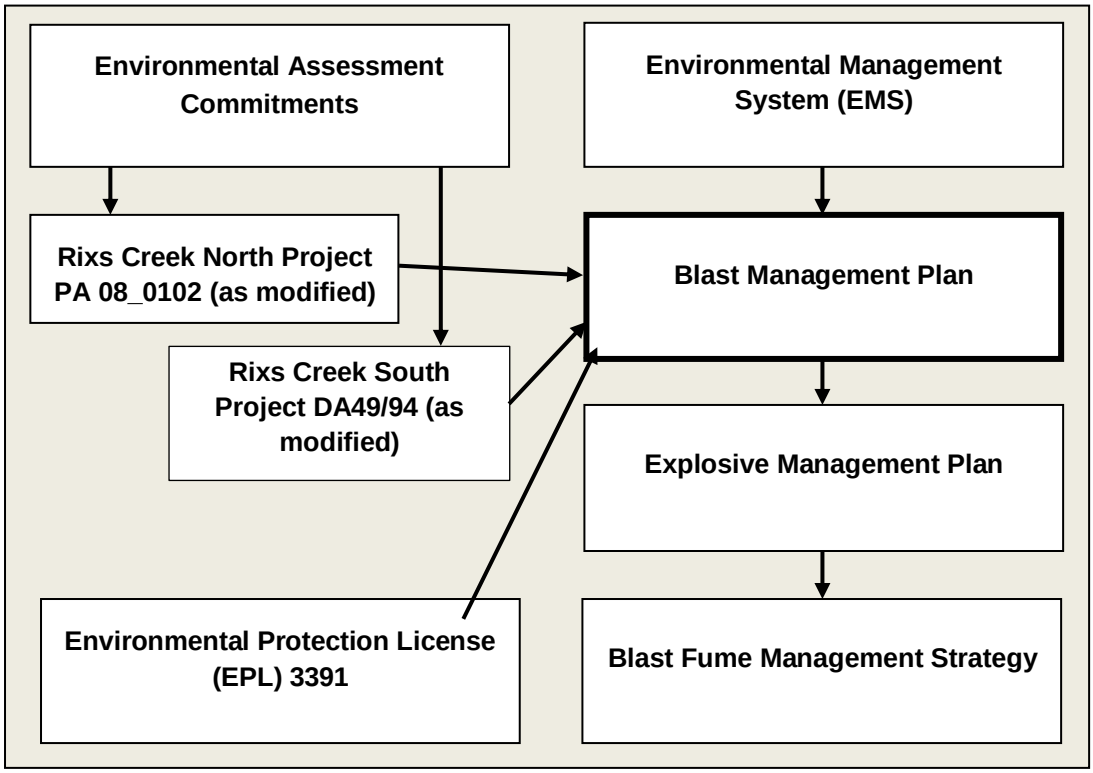


Figure 1-2 BMP Connections to other environmental documents

1.4 Plan Objectives and Performance Indicators

The objectives of the Blast MP and the associated performance indicators are set out in Table 1-1.

Table 1-1 Plan Objectives and Performance Indicators

Objectives	Performance Indicators
Compliance with legislative requirements.	• Airblast or ground vibration not to exceed criteria nominated in Project Approval, RCN Table 9 – Blasting Criteria (condition 11) and RCS Table 1 – Blasting criteria (condition 12) reiterated below this table • Blasting to be conducted in accordance with Project Approval Blasting Criteria (conditions 11, 12, 13) and Operating Conditions (16 - 18) (outlined below); • No flyrock beyond mine boundary, or unplanned flyrock events; • Minimisation of off-site odour, dust and fume emissions.
Control the blast process from design to implementation, initiation and evaluation.	Comply with Project Approval requirements.
Identify the risks and hazard associated with blasting, including control and/or mitigation.	Safely blast and comply with Project Approval requirements.
Implement best practice measures for the management and minimisation of dust and noxious fumes from surface blasting.	Mitigation of dust and fumes.
Assure the safety of the public, site personnel and surrounding properties from flyrock.	No flyrock incidents resulting in personal injury or property damage.
Establish effective communications and active links between the Open Cut and Underground Operations and with surrounding mining operations in regard to blast scheduling	Effective communication with surrounding mines through established email notifications to nominated mine personnel.
Ensure the safe operation of the H V Coking Coal P/L under Open Cut blasting activities.	• Blasts within the North Open Cut (currently on Care and Maintanance) shall be designed with consideration of

Objectives	Performance Indicators
	impacts to the safety of workers at Integra Underground. • Effective communication. • No blast related incidents involving HV Coking Coal P/L underground.
Comply with relevant coal industry legislation	Compliance with legislation.
Limit the risk of damage to surface infrastructure by controlling blast vibration and flyrock at: • Possum Skin Dam; • Tailings Dams; • Envirogen Power Generation Site; • Overland Conveyor Belts; • Underground portal and surrounding highwall; • ARTC Main Northern Rail Line cuttings, embankments and infrastructure; and • New England Highway and Local Public Roads.	No blast vibration exceedances or flyrock incidents.

Table 1.2 outlines blasting criteria as per Rixs Creek North Project Approval 08_0102 and Rixs Creek South DA49/94, however, these criteria do not apply if the Proponent has a written agreement with the relevant landowner or infrastructure owner to exceed the criteria, and the Proponent has advised the Department in writing of the terms of this agreement.

2. Existing and Planned Operation

Rix's Creek Mine (RCM) comprises both the Rix's Creek North (RCN) and Rix's Creek South (RCS) Mining and Infrastructure Areas. The status of the mining areas is as follows;

- RCN Fallbrook Pit, which is the most northern open cut mining area (Currently on Care and Maintanance), located between the site tailings dams and a major mine water storage dam known as Possum Skin Dam;
- RCN South Pit, which forms a significant part of the overburden emplacement area for the Extended South Pit (Western Extension);
- RCS, North Pit, Arties Pit which forms a significant part of the overburden emplacement area for RCS West Pit.
- RCN Western Extension will be the primary areas of open cut mining activities at RCN and will operate 24 hours a day;
- RCS West Pit will be the primary areas of open cut mining activities at RCS and will operate 24 hours a day;

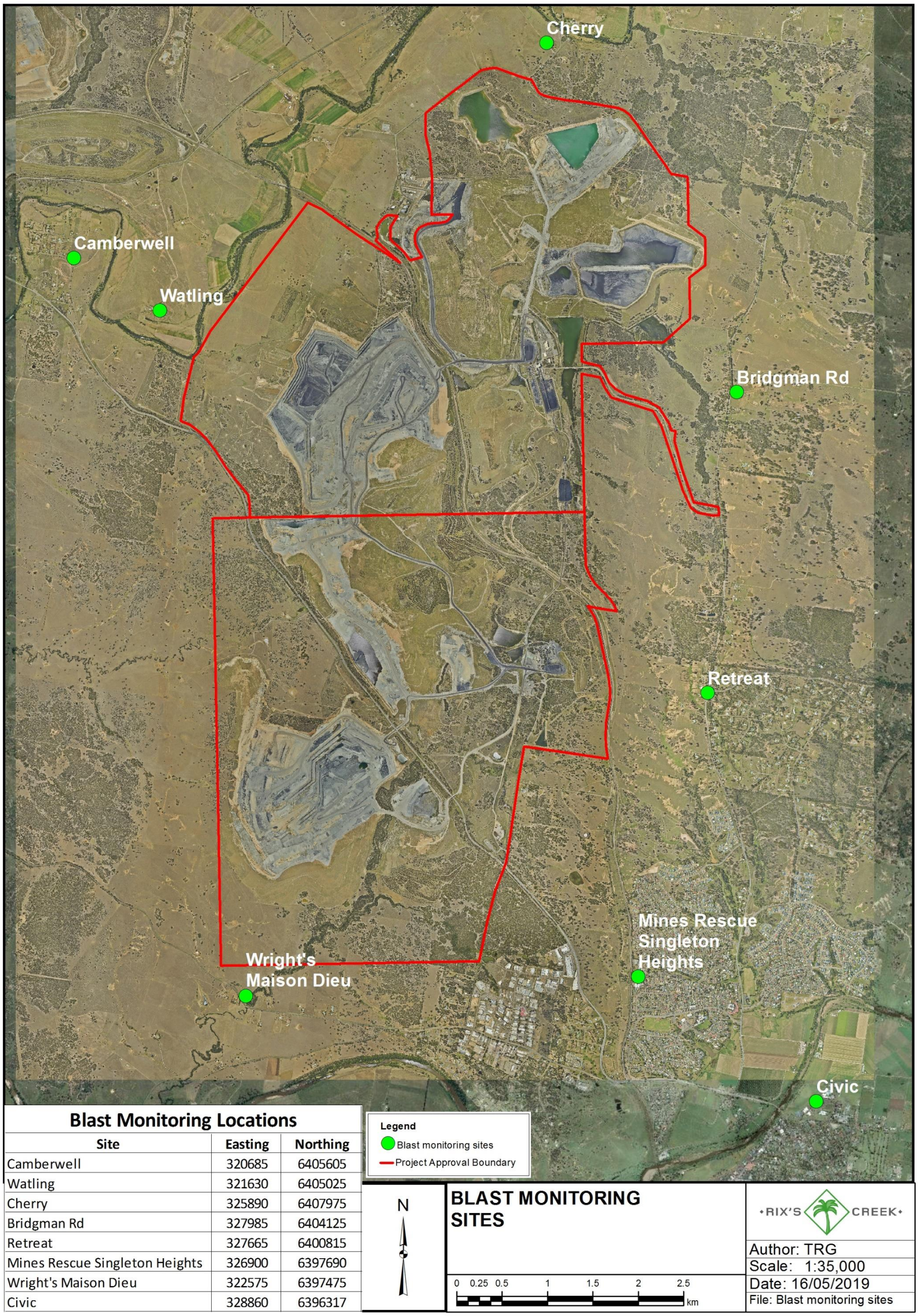
Blasting operations planned under this BMP will occur at Rix's Creek North in the Western Extension of the South Pit and at Rix's Creek South in the West Pit.

Under the Current MOP no mining is planned to be undertaken in the Falbrook Pit during the term of the MOP. When mining is planned to commence in the Falbrook Pit the blast monitoring location will need to be reviewed in line with EPL requirements to monitor at the nearest affected residence.

The HV Coking Coal underground surface facilities are 2.2 km from the Western Extension (Camberwell) pit where open cut operations will be undertaken. Given the blasting limits for maximum vibration of 10 mm/sec and 120 $dB_{(l)}$ overpressure at the Dulwich property which is located between the active mining operation in the western extension (at some 550 m) and the underground surface facilities (2.2 km), blasting impacts at the underground will be low at approximately 1 mm/sec.

Table 2.1 Compliance Blast Monitors

Blast Monitor Name	Easting	Northing
Bridgman Road	327985	6404125
Camberwell	320685	6405605
Cherry	325890	6407975
Mines Rescue, Singleton Heights	326900	6397690
Retreat	327665	6400815
Watling	321630	6405025
Wright's Maison Dieu	322575	6397475
Civic	328860	6396317



Blast Monitoring Locations

Site	Easting	Northing
Camberwell	320685	6405605
Watling	321630	6405025
Cherry	325890	6407975
Bridgman Rd	327985	6404125
Retreat	327665	6400815
Mines Rescue Singleton Heights	326900	6397690
Wright's Maison Dieu	322575	6397475
Civic	328860	6396317

Figure 2-1 Rix's Creek Mine Blast Monitoring Locations

3. Roles and Responsibilities

The roles and responsibilities of the Mine staff in respect of this BMP are presented in Table 3-1**.**

Table 3-1 Roles and Responsibilities

Role	Responsibilities
Mine Manager	• Ensure adequate resources are available to enable effective implementation of this BMP; and • Ensure implementation of the BMP. • Authorise the BMP and future amendments.
Senior Environmental Officer	• Review the BMP as required; • Act as the interface for environmental matters between government authorities, private industry, contractors, community groups and the wider community; • Inform the relevant Operations Manager, Manager of Mining Engineering and Sustainability Manager of unexpected or serious environmental impact issues pertaining to blasting; and • Promptly notify the relevant regulatory agencies of any incidents or non-compliances.
Environmental Officer	• Ensure that all individuals from the open cut workforce with responsibilities under this Plan are competent to carry out those responsibilities; • Ensure that all relevant open cut personnel are aware of, and understand, their responsibilities as stated in the BMP; • Ensure that training material is developed and provided, commensurate with target group, (e.g. workforce, supervisors, persons delegated specific duties under the plan); and • Ensure any systems and procedures are developed and implemented in accordance with the requirements of the BMP. • Co-ordinate blasting on site (email notification) with the blasting at nearby mines (including Ashton, Glendell and Mt Owen Mines) to minimise the cumulative blasting impacts of the mines. A minimum 5 minute delay between Rix's Creek Mine and surrounding mine blasting is adopted; • Ensure correct notification is provided to potentially affected persons as nominated on the list of neighbours to be contacted prior to blasting, including information relating to blast location and safe area for blast evacuation;
Drill and Blast Engineer	• Prior to blasting within the North Open Cut (Fallbrook Pit) to minimise risks to underground and infrastructure and surface personnel.at the Integra Undergroud Mine. (please note that the North Open Cut, being the most northern void north of TD2 and south of Possum Skin Dam, is currently on Care and Maintenance). • Ensure pre blast notifications have been conducted; • Ensure that the traffic control protocol is in place;

Role	Responsibilities
	• Review weather conditions and blast in accordance with relevant Explosive Management Plan and Blast Fume Management Strategy); and • Ensure all blast notification signs are updated prior to each blast.
Shot firer	• Receive notification from all sentries that they are in place and the blast site is evacuated and secure; • Postpone the blast or give authorisation (to be in the blast zone if shot is already fired but not cleared). Stand down all sentries after the "all clear".
Mine Surveyor	• Provide and maintain accurate mine plans; and • Accurately mark out and record each blast pattern according to the blast design.
Surface Sentries/ Road Guards	• Contact the Shot firer to confirm he/she is in place and his/her section of the Pit or road is cleared for firing; • Hold traffic until the 'all clear' is given; and • Stand down once given the 'all clear' and permit normal traffic flow.
Employees and Contractors	• Work in accordance with standards and requirements of the BMP and associated standards and procedures; and

4. Monitoring

The airblast and ground vibration from all blasts are monitored with an automatic triggering system at the following locations (Figure 2-1):

> Dulwich, Cherry, Watling, Camberwell Village, Bridgeman Rd (On Company owned land adjacent to Lambkin property), Retreat, Maison Dieu 9 (Wrights), Singleton Heights (Mines Rescue Station), and Civic.

No mining operations will be undertaken in the North Open Cut (Fallbrook Pit) for the foreseeable future so the other blast monitoring sites will not be reinstated. The number of blast monitors and location of the monitoring sites has been rationalised based on advice received from blasting consultant Terrock. Monitoring sites not reinstated are:-

> Bridge, Cheetham, Craven, Lambkin, Langdon, McInerney, Moran, Possum Skin Dam and Tailings Dam 2

Blast monitors will be installed, serviced and calibrated by a qualified service provider. The equipment will meet Australian Standards for blast monitoring.

The wave traces of the measurements recorded are inspected to ensure they reflect a blast event and are not due to a false (non-blast) trigger such as a wind or person/animal induced event. The peak values measured of blast events are compared to compliance limits.

Each blast will be video recorded for later analysis. This will be used in the assessment of blast performance including fume, dust, fly rock, fragmentation and face burst.

5. Management Measures

5.1 Preventative Measures

Blasting operations are managed by deployment of an engineered blast design. Quality control activities are conducted during the deployment to ensure the accuracy of explosive loading.

The 'startling' effect of blasts on neighbours is mitigated by:

- Prior to blasts, notifying neighbours on a contact list
- Liaising with Drill & Blast Engineers/Co-ordinators at adjacent mines to co-ordinate blast times.

When blasting within 500m of Stoney Creek Road (or within 500m of any other road impacted as mining progresses) road closures will be required to minimise risk associated with flyrock. Authority for road closures will be gained from Singleton Shire Council (SSC) in the case of Stoney Creek Road and Roads and Maritime Services (RMS) for closure of the New England Highway (NEH).

Application will be made to SSC for authority to close Stoney Creek Road prior to recommencement of operations within the Fallbrook Pit. As previously noted, no mining activity or blasting is planned in the Fallbrook Pit during the period of the current MOP. No mining in the Western Extension at RCN will be undertaken with 500mm of the NEH so no approval is currently required from RMS .

Rix's Creek South currently hold a Road Cccupancy Licence (Lic. No: 983746) and Speed Zone authorisation (LIC/SZA 983746/001) with RMS to close the New Engalnd Highway when blasting within 500 metres of the Highway. This is reviewed annually.

5.1.1 Environmental Blast Design

Each blast is designed according to the Blast Design Flowchart shown as Figure 5.2**.** The blast specification for each blast is designed to ensure compliance with ground vibration and air blast limits to ensure the safety of site personnel and the public, and to protect public and private infrastructure.

Blast Specifications

Where possible, blasting at the RCM is conducted using the nominal blasting specifications shown in Table 5-1. The specifications may need to be altered to comply with accepted vibration limits at privately owned houses and public/private infrastructure. The specifications are also modified for interburden seams less than 9m thick to control flyrock and air blast. The regulatory limits are discussed in *Section 4* of this report.

Table 5-1 Open Cut nominal blasting specifications

Blast hole diameter (range):			147 – 310 mm Nominally 229 mm			
Face height (range):			1.5 - 40m			
Stem height (minimum):			1.5 m No Maximum stemming is set as some holes may be completely stemmed after face profiling for Airblast control			
Explosive column (range):			0.5- 35m			
			Face Height (m)			
Explosive	**Charge mass/m(kg)**	**Stemming Height**	**9**	**12**	**15**	**20**
			Charge Mass (kg)			
ANFO	32.6	4.0	163	260	352	520
HA 1.1	44.0	4.0	220	352	484	704
HA 1.3	53.0	4.0	265	424	583	848

HA = Heavy ANFO (1·1 - 1·3 are the specific gravity of the explosives)

Initiation of blasts is made by both electronic, detonating cord and pyrotechnic products. The initiation timing and direction of each blast is considered on its individual merits to ensure minimised impact to neighbouring residences and infrastructure.

5.1.1.2 Ground Vibration

The aim of ground vibration design is the limitation of charge mass to control the ground vibration to within the regulatory limits for all privately owned houses and private/public infrastructure. The ground vibration limits are shown in Table 5-2**.**

The basis of ground vibration design is known as the Scaled Distance Site Law Formula:

$$PPV = K_v \left(\frac{\sqrt{m}}{D} \right)^{1.6} \quad [1]$$

Where: PPV = peak particle velocity (mm/s)

m = charge mass/hole (kg)

D = distance (m)

K_v =site constant

Ground Vibration Limits

The recommended peak ground vibration levels at the houses and important infrastructure is listed in Table 5-2.

Table 5-2 Recommended Peak Ground Vibration Levels

ITEM	PPV LIMIT	REFERENCE
HOUSES Ground Vibration: ≤ 5mm/s for 95% of blasts in 12 months ≤ 10mm/s for all blasts *(Airblast ≤ 115 dBL for 95% of blasts)*	≤ 10mm/s for all blasts	EPA Environmental Protection Licence
TD2 & POSSUM SKIN DAM	≤ 10mm/s	Dams Safety Committee
UNDERGROUND PORTAL(* Note North Open Cut on care and maintenance). Normal operations Portal traffic control required Damage observation limit	<10mm/s >10mm/s 25mm/s - 50mm/s	Interim Limit to stop traffic passing through portal at Blast time. Other Hunter Valley Mines Possible Upper Limit
HIGHWALL STABILITY Damage observation limit	25mm/s - 50mm/s	Interim damage observation limit Possible Upper limit
CONVEYORS Without specific investigation With investigation	50mm/s 100mm/s	Other Hunter Valley mines' experience
COLLIERY PIT (TOP)	18mm/s	BS 7385.2 no damage limit at 10hz frequency

The structures that will most likely restrict blasting operations, over the life of mine are:

- Dulwich Homestead
- Cherry House (North Open Cut)
- Possum Skin Dam (North Open Cut)
- Underground Portal and Highwall (North Open Cut)

- Underground Surface Conveyor (North Open Cut)
- ARTC Rail Line and Infrastructure
- New England Highway
- Bridge over New England Highway
- Cut & Cover Tunnel over New England Highway
- Optic Fibre communication cable.

5.1.1.3 Airblast Overpressure

Airblast from open pit blasting is a pressure wave(s) that is transmitted through the air at the speed of sound. The airblast is measured as decibels Linear (dBL). Airblast limit criteria is defined in the Project Approvals

The airblast resulting from a blast can be affected by meteorological reinforcement. Under certain meteorological conditions at the time of a blast, the air blast levels may be increased by up to 20 dBL at distances beyond about 1 kilometre from a blast. The conditions that may cause this increase are:

- Temperature inversion;
- Wind speed increasing with altitude; and
- Change of wind direction above the surface.

Rix's Creek Mine has a Envmet predictive forescast tool that predicts overpressure enhancement due to meteorological conditions. See Section 5.2 for an example of the overpressure enhancement model output. Parameters specific to the blast are fed into the model used to predict the overpressure enhancement under the predicted weather conditions. If weather predicitons are unfavourable, the blast is rescheduled when more favourable meterological conditions are prevailing

5.1.1.4 Flyrock

The issues with flyrock are:

- the mandatory requirement for stopping traffic on any road for all blasts less than 500m from the road;
- Blasting protocols for blasting near ARTC rails and infrastructure;
- Exclusion zones for the evacuation of personnel (determination of the exclusion zone will take into account "line of sight" and ensure a conservative standoff where line of sight cannot be avoided);
- Safe clearance distance for mobile plant and fixed infrastructure;
- Possible increase in stemming height when blasting near adjoining properties; and
- Statutory reporting of any flyrock that lands outside of the exclusion zone.

RCN has adopted the following conservative Evacuation Zones for its blasting operations:

In front of a face blast (direct line of sight)	500m
Other directions from blasts	300m
For pre-split blasts	150m

The distances may be varied at the discretion of the Drill and Blast Coordinator or Mine Supervisor.

Within the pit, the determination of exclusion zones is the responsibility of the Drill and Blast Engineer, Mine Manager and Shotfirer. The maximum throw distance determinations given herein are intended as a guide to the responsible personnel and do not remove the regulatory responsibilities from mine personnel.

A 500m exclusion zone requiring traffic to be stopped on any road is very conservative, however may be increased at the instruction of the drill and blast engineer, drill and blast supervisor personnel or shot personnel to ensure where line of sight presents an increased likelihood of flyrock damage.

5.1.1.5 Dust and Fumes

A concerted effort is being made at the Mine to mitigate the amount of fumes generated from a blast. Using the Code of Practice developed by the Australian Explosives Industry and Safety Group Inc. (AEISG), a Blast Fume Management Strategy is attached as Appendix B.

A dust and fume dispersion model is used to schedule blasting activities to minimise the impact to surrounding sensitive receptors with an example of the model output displayed in Figure 5.1. This model is used as one component in the decision making process for scheduling blasts.

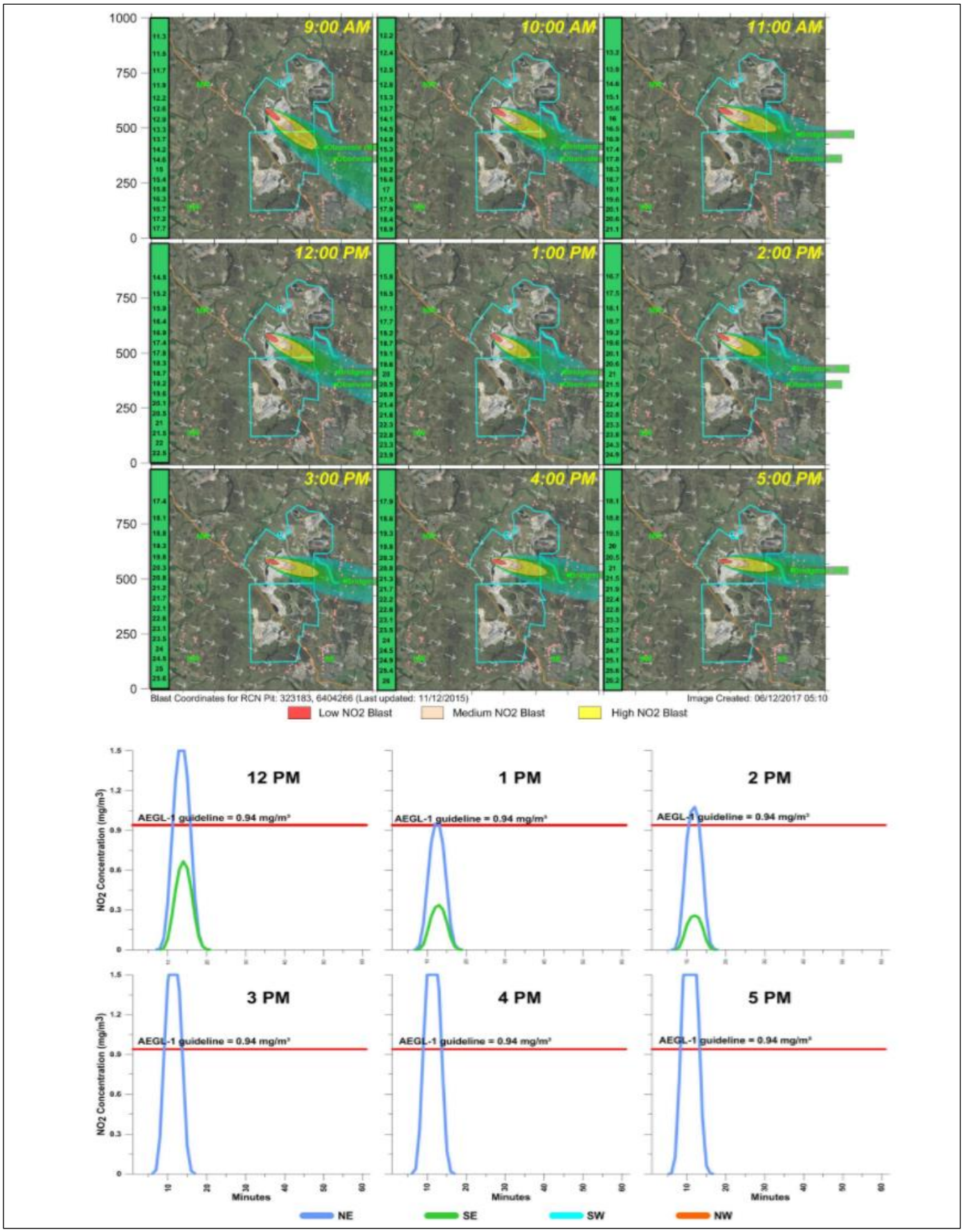


Figure 5-1 Dust and Fume Plume Predictive Model Output

5.1.1.6 ARTC Rail Lines and Infrastructure

Procedure 2029 - Blasting Adjacent to the Main Northern Railway - details the process undertaken by Integra when blasting activities are undertaken within 500 metres of the Main Northern Railway lines. Rixs Creek North has no current intention to blast within 500 metres of the Main Northern Railway Line but should RCN blast within 500m of the railway line in the future, this procedure will be reviewed and re-implemented.

5.1.1.7 Road Closure Procedures

Closure of Stoney Creek Road when blasting occurs within 500m of the road is undertaken in accordance with an annual Singleton Shire Council approval and Procedure, Road Closure - North Open Cut.

Closure of the New England Highway when blasting in the West Pit at RCS is undertaken in accordance with the six monthly approval Road Occupancy Licence from RMS.

5.1.1.8 Refires or Misfires

Where a misfire occurs the shotfirer will seek to address the misfire and refire as soon as is safely possible.

Figure 5-2 Open Cut Blasting Flowchart

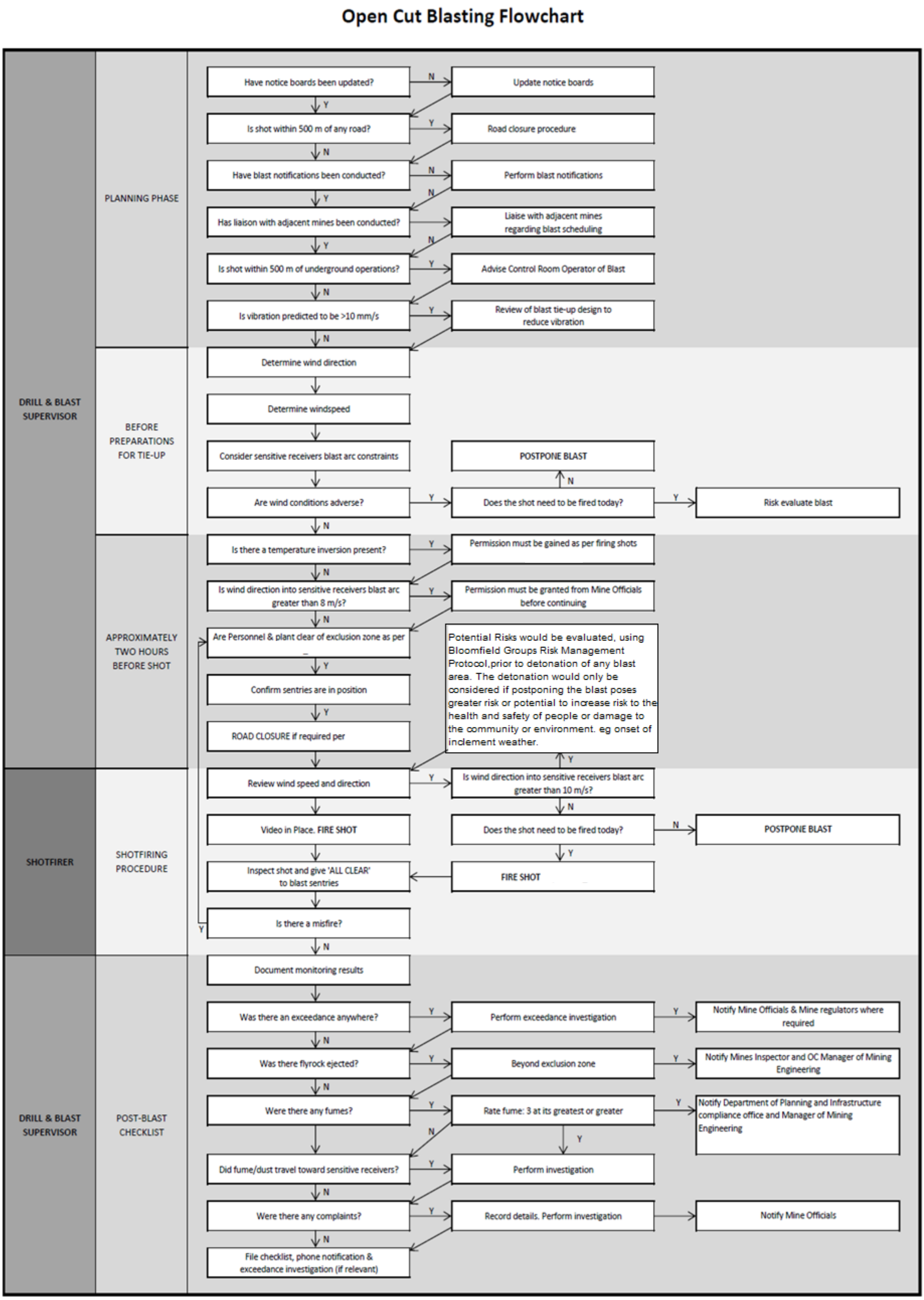


Figure 5-2 Open Cut Blasting Flowchart

5.1.2 Design Implementation

The blast is drilled and loaded in accordance with the design for the particular blast and procedures outlined in the *Explosive Management Plan, Blast fume Management Plan and Blasting Check sheet for Rix's Creek.* The blasts are duly fired according to the procedures outlined in Figure 5-2**.**

An essential component of the blast design is monitoring the environmental outcomes, assessment and analysis of the results and a review loop to progressively upgrade and refine the predictive models used in the design, as shown in **Figure 5-2**. This included the review of monitoring wave traces and video of the blast.

5.2 Postponing a Blast

Under weather conditions which are likely to result in unacceptable blasting impacts a blast will be postponed (refer Shot firing Procedure in Figure 5-*2).*

Review of the predictive models for overpressure enhancement, blast fume & plume. The drill & blast engineer will determine if a blast will proceed or be postponed. These models are based on weather forecasts for the site.

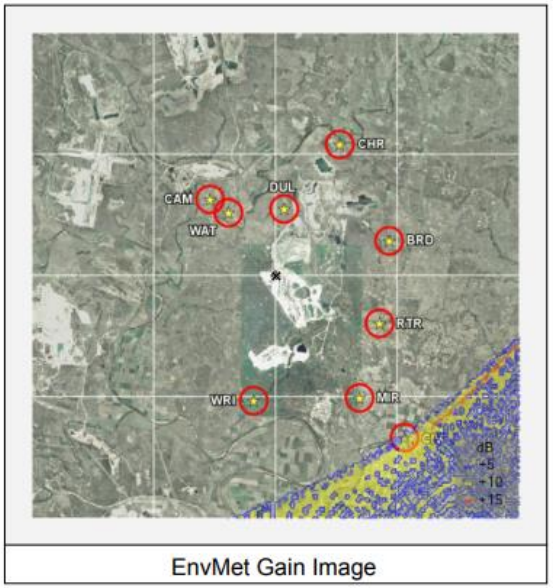
Envmet model predicts overpressure enhancement due to meteorological conditions. See Figure 5.3 for an example of the overpressure enhancement model output. Parameters specific to the blast are fed into the model used to predict the overpressure enhancement under the predicted weather conditions.

EnvMet Research Project
envmet.terrock.com.au

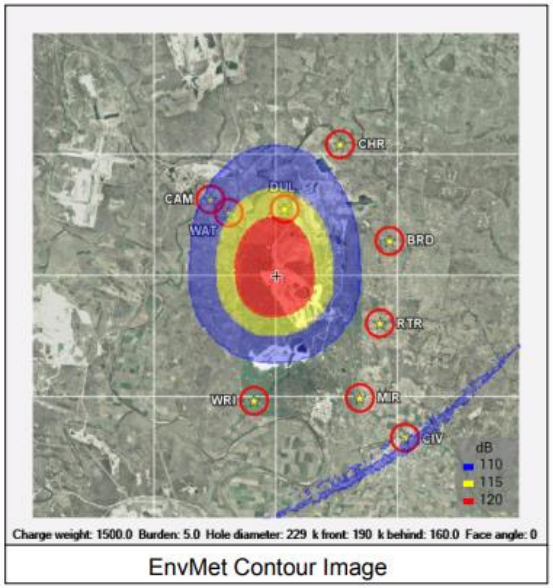
ENVMET PREDICTIONS

Site: Rixs Creek - North
Date: 2017-12-18
Time: 1030

Altitude (m)	Temperature (C)	Wind Speed (m/s)	Wind Direction (Degrees)
11.475	27.378	1.376	295.064
45.930	26.606	1.507	300.903
91.968	26.095	1.590	305.044
137.742	25.644	1.666	308.039
183.687	25.212	1.754	310.233
230.237	24.782	1.865	311.961
276.531	24.361	2.010	313.139
323.004	23.935	2.208	314.032
370.091	23.516	2.501	314.606
416.923	23.107	2.964	314.996
463.939	22.731	3.835	315.533
511.585	22.451	5.807	319.028
559.449	22.435	7.854	322.692
607.562	22.510	9.035	322.624
659.529	22.416	9.715	320.807
719.909	22.253	10.347	318.151
789.312	22.182	11.167	314.914
867.500	22.222	11.775	311.151
950.510	22.182	11.527	308.136
1034.240	21.990	11.014	306.852
1118.690	21.742	10.711	307.673
1290.360	21.092	9.862	308.109
1643.510	19.270	7.931	298.301



EnvMet Gain Image



EnvMet Contour Image

Figure 5-3 EnvMet Overpressure Enhancement Model Output

Blast fume & plume model predictions indicate the path fume – Nitrous Oxide and dust clouds potentially generated from a blast are likely to traverse. The model predicts three levels of NOx production - High, medium & low. See Figure 5.1 for an example of the Fume and Plume model output.

5.3 Corrective Measures

The blast design based on appropriate site constants and its correct implementation by the shot firing crew is usually effective in controlling ground vibration, air blast and flyrock from blasting operations. The effectiveness of the processes outlined in Figure 5- in controlling vibrations to comply with regulatory limits is determined by the routine compliance monitoring at the monitoring stations. Observations and video review of flyrock containment and classification of dust and fume behaviour provides a basis for evaluation of the effectiveness of controlling these emissions.

The assessment of the emissions is part of the blast assessment process and review loops shown schematically in the Blast Design Procedure in Figure 5.2

Whenever the air blast readings exceed 115 dBL or the ground vibration readings exceed 5 mm/s at any monitor, investigations are conducted to ascertain the cause of the elevated reading. When the air blast reading is in excess of 115 dBL, the following analyses are conducted to establish:

- If the high reading was a blast event or some other event, such as wind, by examination of the wave trace record for:
    - Characteristic air blast wave shape;
    - Elapsed time between P wave and air blast arrivals;
    - Blast duration; and
    - Where in the blast the peak value occurs;
- Any visible evidence of high velocity gas emissions by examination of video replay;
- The possible effects of wind using regression analysis to compare airblast levels at wind affected and non-wind affected monitors;
- Wavefront reinforcement analysis to determine the possible effects of drill pattern and initiation sequence; and
- Meteorological reinforcement analysis to determine any role of meteorological conditions.

When the ground vibration exceeds 5 mm/s the following analyses are conducted to determine if the peak value was a form of blast event or some other extraneous vibration source:

- Examination of the wave trace for characteristic wave shape and frequency;
- Time of the trigger;
- Time of the peak reading relative to the ground vibration arrival; and
- Wavefront reinforcement analyses.

The analysis outlined will determine if the peak readings were the blast event or not. If they were not, predictions can be made of the peak air blast and/or ground vibration. If the peak readings were from the blast, the section of the blast responsible may be identified and the blast design and loading reviewed to ascertain the cause. If the elevated air blast levels were due to deficient blast design and/or loading practices, these can be corrected for future blasts.

Observation and characterisation of fume emissions should lead to a correlation to blasting practice, and strategies developed for modification that may lead to mitigation.

5.4 Blast Management Coordination and Cumulative Protocol

Prior to firing a blast at Rix's Creek Mine, an email notification is sent to near by neighbouring mines including Integra Underground, Ashton and Mount Owen Complex with the schedule of the approximtate time that the blast is to be released and the approximate location of the blast within the open cut operations.

Nearby mines also provide the scheduled times of the blasts to be released from their operations. The Rix's Creek Environmental Department or Drill and Blast Engineer review the nearby mines scheduled blast information to ensure that it doesn't align with Rix's Creek Mine scheduled blast times.

At Rix's Creek North open cut, the current blast area resides within the extended west pit operations. Integra Underground mine falls well outside the 500m exclusion zone when Rix's Creek North blasts within the extended west pit operations. Integra Underground Mine is notified of intended times of blasts being fired at Rix's Creek North open cut.

The Rix's Creek North, Northern open cut is currently in Care and Maintenance. Therefore no blasts will be fired within the Northern open cut operations in the near future. Previously, mining operations at the former Integra Coal Open Cut (currently called Rix's Creek North) site did not impact Integra Underground mine area. If future open cut mining does have the potential to impact upon Integra Underground Mine area, procedures and protocols will be developed with consideration of impacts to the safety of workers at Integra Underground, and included in future updates to this management plan.

A protocol between the Mining companies has been developed where Nominated Environmental personnel from each mine meet quarterly to discuss the noise, blasting and air quality management at each site and methods to address cumulative impacts.

The protocol includes the following Mining Operations;

- Ashton Coal
- Mount Owen Complex
- Ravensworth Operations
- Integra Underground
- Rix's Creek Mine

6. Complaints Handling

Any complaint received relating to blasting issues will be managed in accordance with the Environmental Management Strategy and complaints protocal, which is based on the requirements of the site's EPL.

The Mine periodically receives complaints/concerns from residents in the surrounding area about blasting issues and building damage concerns either directly or via a government agency. The complaint handling process is demonstrated in Figure 6-1.

All complaints received are promptly actioned by management and personal contact with the complainant is made as soon as practicable. Where corrective actions are appropriate, these are undertaken.

To overcome the disturbance or 'startling' effect of blasting, any resident who identifies they wish to be notified prior to each blast will notified.

The Community and Blasting Hotline is advertised on the Bloomfield Group website for Rix's Creek: 02 49302665.

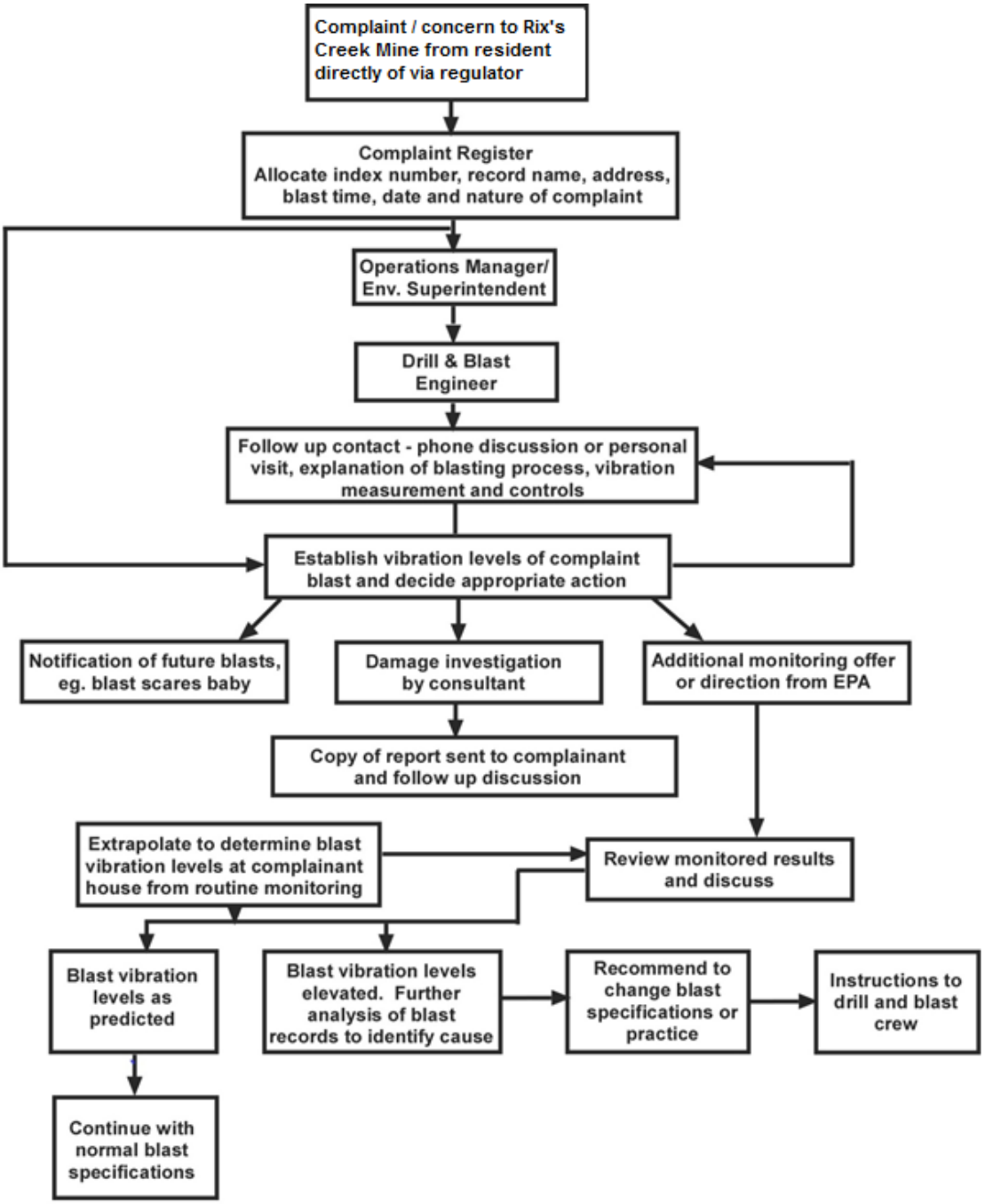


Figure 6-1 Complaint management process flow chart

7. Reporting and Review

7.1 Reporting

Ground vibration and air blast readings in excess of the 10 mm/s / 120 dB(L) limit must be reported immediately to both the EPA, Resources Regulator (RR) and Department of Planning & Environment (DPE) followed by a report of the investigation into the causes of the exceedence.

Internal Bloomfield Mining Operations Significant Incident Investigation undertaken and report compiled following an investigation of the blast and reported to senior management and authorities.

Blast results and interpretations will be reported internally after each blast, summarised monthly and included in the Annual Review Report.

The Monthly and Annual reports will include:

- No. of blasts fired
- No. of vibration measurements at each monitoring station
- No. of blasts ≥ 5 mm/s
  ≥ 115 dBL
- No. of exceedences ≥ 10 mm/s
  ≥ 120 dBL

These results are reported on the Bloomfield Group website under the Rix's Creek operation.

The Annual Review Report will provide a summary of complaints, the concerns and complaints received, plan showing the complaint locations and remedial action taken.

A copy of the Annual Review Report will be forwarded to relevant stakeholders including, but not limited to, RR. EPA and DPE and displayed on the website when approved.

7.2 Plan Reviews

The review of this document will be in line with the Environmental Management Strategy for the site. That is, reviews will be conducted every three years, after independent environmental audits, annual reviews and as required by relevant Project Approval requirements. The purpose of the review is to ensure that the BMP remains suitable, adequate and effective.

The monitoring data will be reviewed as it is collected and at strategic milestones in the mine life, including Annual Review reporting periods. The BMP will be modified as required to reflect changes to mine plans, monitoring results or in response to stakeholder comments. Any major modifications will be made in consultation with OEH and submitted for consideration of approval by the DPE.

8. References

Australian Coal Association Research Project (2002), Project C9040, “Structure Response to Blast Vibration”

Integra Mine Complex Project Approval 08_0101 and 08_0102, dated 26 November 2010.

Rix’s Creek Pty Ltd Environmental Protection Licence (#3391)

The Bloomfield Group Integrated Management System Explosives Management Plan (2015)

The Bloomfield Group Integrated Management System Blast Fume Management Strategy (2013)

The Bloomfield Group Integrated Management System Incident Investigation Procedures (2014)

The Bloomfield Group Integrated Management System Incident Investigation Guide (2014)

9. Glossary

TERM	DEFINITION
AEISG	Australian Explosive Industry and Safety Group (Inc)
ARTC	Australian Rail Track Corporation
Authorised Person OC	Person appointed in writing by the Manager of Mining Engineering to carry out specific duties under the Shotfiring and Explosives Management System.
Approved	Has the meaning in the Work Health and Safety (Mines) Act 2013 & Work Health and Safety (Mines) Regulation 2014. (*Approved by the Chief Inspector.* This could apply to use of non-permitted explosives)
Blasting Operations	Include: - Priming a cartridge; - Charging and stemming a hole; - Connecting the detonator into a round of shots; - Coupling a shotfiring cable or lead-in line into a detonator circuit, circuit tester or exploder; - Testing a shotfiring circuit; or - Firing a shot or round of shots
Burden	The distance between a blast hole and a free face, or the distance between rows of holes in a blast pattern.
Competent Person (CP)	Person appointed in writing by the Manager of Mining Engineering to carry out specific duties under the Shotfiring and Explosives Management System.
Danger Zone	An area in which a person may be injured or machinery may sustain damage as a result of shot firing activities.
Exploder	Any electrical apparatus approved for the purpose of initiating detonators in a mine.
Explosive	Includes detonation cord, detonators, relays, signal tubes, signal tube starters, primed cartridge or similar devices.

Misfire	An occurrence where: - Testing before firing a shot reveals broken continuity which cannot be rectified; or - Any shot, or whole or part of a round, fails to explode when an attempt is made to fire it.
Shot	A charge of explosive (in a cartridge) placed in a shot hole in coal or other rock (or stone) for the purpose of breaking the coal or rock (or Stone).
Shotfirer	A person appointed by Mine Management to conduct shotfiring as part of the Shotfiring and Explosives Management System.
Spacing	The distance between holes in a row of holes in a blast pattern.
Stemming Height	The appropriate length of stemming material loaded on top of the explosive column in a blast hole to control fly rock and limit air blast.
Stemming Material	Inert coarse material, such as crushed gravel about 1/10th hole diameter, loaded into the blast hole to confine the gaseous energy and prevent it from venting into the atmosphere.
Underground Sentry	Person appointed competent by the underground mine manager to act as a sentry for the underground during shot firing.
Underground Surface	The area in which the Underground mine manager is statutorily responsible.
Underground Surface Attendant	Person trained and appointed competent by the underground mine manager to carry out all required surface duties.
Underground Workings	All workings underground accessed from the Underground pit portals. The Underground mine manager is statutorily responsible for this area.

APPENDIX A - APPROVAL CONDITIONS AND EA COMMITMENTS

Table A1 Approval Conditions and EA Commitments – Where They Are Addressed in the BMP

<table>
<tr><th>Approval Condition RCN</th><th>BMP Reference</th></tr>
<tr><td>
Blasting Criteria

11. The Proponent shall ensure that the blasting on site does not cause exceedances of the criteria in Table 9 (below).
<table>
<tr><th>Receiver</th><th>Airblast Overpressure (db(Lin Peak))</th><th>Ground Vibration (ppv(mm/s))</th><th>Allowable Exceedance</th></tr>
<tr><td rowspan="2">Residence on privately-owned land</td><td>115</td><td>5</td><td rowspan="2">5% of the total number of blasts over a period of 12 months</td></tr>
<tr><td>120</td><td>10</td></tr>
<tr><td>Main Northern Railway culverts and bridges</td><td>-</td><td>25</td><td>0%</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 Proponent has a written agreement with the relevant landowner or infrastructure owner to exceed the criteria, and the Proponent has advised the Department in writing of the terms of this agreement.
</td><td>1.4 (p. 6)

5.1.1.2,

(p.19)</td></tr>
<tr><td>Blasting Hours

12. The Proponent shall only carry out blasting on site between 9am and 5pm Monday to Saturday inclusive. No blasting is allowed on Sundays, public holidays, or at any other time without the written approval of the Director-General.</td><td>1.4 (p. 6)</td></tr>
<tr><td>Blasting Frequency

13. The Proponent shall not carry out more than:

(a) 1 blast a day in the northern mining area unless an additional blast is required following a blast misfire;

(b) 2 blasts a day in the existing Camberwell south pit, and then 1 blast a day when the mining moves from this pit into the western mining area unless an additional blast is required following a blast misfire; and

(c) 10 blasts a week on site, averaged over any 12 month period.</td><td>1.4 (p. 6)</td></tr>
<tr><td>Property Inspections

14. If the Proponent receives a written request from the owner of any privately-owned land within 2 kilometres of the approved open cut mining pits on site for a property inspection to establish the baseline condition of any buildings and/or</td><td>1.4 (p. 8-9)</td></tr>
</table>

structures on his/her land. Or to have a previous property inspection report updated, then within 2 months of receiving this request the Proponent shall: *(a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General to:* *• establish the baseline condition of the buildings and/or structures on the land or update the previous property inspection report; and* *• identify any measures that should be implemented to minimise the potential blasting impacts of the projects on these buildings and/or structures; and* *(b) give the landowner a copy of the new or updated property inspection report.*	
Property Investigations 15. If any landowner of privately-owned land within 2 kilometres of any approved open cut mining pit on site claims that the buildings and/or structures on his/her land have been damaged as a result of blasting on site, then within 2 months of receiving this request the Proponent shall: (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, 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 Proponent shall repair the damages to the satisfaction of the Director-General. If the Proponent or landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Director-General for resolution.	1.4 (p. 8-9)
Operating Conditions 16. The Proponent shall: (a) implement best blasting management practice on site to: • protect the safety of people and livestock in the surrounding area; • protect private or public property in the surrounding area; • minimise the dust and fume emissions of the blasting; and (b) co-ordinate the blasting on site with the blasting at nearby mines (including Ashton, Rix's Creek and Mt Owen mine) to minimise the cumulative blasting impacts of the mines; (c operate a suitable system to enable the public to get up-to-date information on the proposed blasting schedule on site, to the satisfaction of the Director-General. 17. The Proponent shall not undertake blasting within 500 metres of: (a) Middle Falbrook Road or Stony Creek Road without the approval of Council; (b) the New England Highway without the approval of the RMS; and(c) the Main Northern Railway without the approval of the ARTC.	1.4 (p. 8-9)

18. The Proponent shall not carry out blasting in the northern or western mining areas that is within 500 metres of any privately-owned land or land not owned by the Proponent unless: (a) the Proponent has a written agreement with the relevant landowner to allow blasting to be carried out closer to the land, and the Proponent has advised the Department in writing of the terms of this agreement; or (b) the Proponent has: • demonstrated to the satisfaction of the Director-General that the blasting can be carried out without compromising the safety of the people or livestock on the land, or damaging the buildings and/or structures on the land; and • updated the Blast Management Plan to include the specific measures that would be implemented while blasting is being carried out within 500 metres of the land.	
Blast Management Plan 19. The Proponent shall prepare and implement a Blast Management Plan for the open cut mining operations on site to the satisfaction of the Director-General. This plan must: (a) be prepared in consultation with DECCW, and submitted to the Director-General for approval by the end of March 2011; (b) describe the blast mitigation measures that would be implemented to ensure compliance with the relevant condition of this approval; (c) describe the measures that would be implemented to ensure that the public can get up-to-date information on the proposed blasting schedule on site; (d) include a blast monitoring program to evaluate the performance of the project; and (e) include a protocol that has been prepared in consultation with the owners of the nearby mines for minimising and managing the cumulative blasting impacts of the mines.	1.4 (p. 8-9)
EA Commitments RCN	**BMP Reference**
G8 Continued implementation of the existing Explosive Hazard Management Plan to ensure the safety of employees and the public during explosives handling and blasting operations	Refer to Explosives Management Plan
G9 Restrict blasting to between the hours of 9.00am and 5.00pm Monday to Saturday, unless blasts outside this time are required for misfire re-blast, emergency or safety reasons.	1.4 (p. 8)
G10 Blast design and implementation to be undertaken by a suitably qualified blasting engineer and/or experienced shot-firer to ensure ANZEC Guidelines are met at all non-project related residences surrounding the Open Cut Project Area.	Table 3-1(pp. 12-13); Table 5-1(p.16)
G11 Refine blast mitigation measures and operating procedures as required based on monitoring results.	5.3 (p. 30)

G12 Provide notification on the morning prior to a blast of blast times to local residents and others who request to be included on the notification list.	5.1, Table 3-1(p. 16)
G13 Use aggregate as the stemminq material (not drill dust) in order to fully contain the explosives within the blasthole.	5.1.1.3 (p.21)
G14 In the case of the Part Pit Extent (ie. Rixs CreekNorth is unable to acquire Residence 153 or negotiate an agreement with the owner) blasting will not be undertaken within a 500m Exclusion Zone surrounding the 'Dulwich' residence and 200m from the property boundary until such time that it can demonstrate to the Director-General that blasting can be undertaken without an unacceptable risk to the resident, residents, their stock or residence.	Conditions for Western Extension

APPENDIX B – The Bloomfield Group Integrated Management System Explosives Principal Control Plan (2017) & The Bloomfield Group Integrated Management Fume Management Strategy (2017)

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INTRODUCTION

This Plan describes the Bloomfield Explosives Principal Control Plan, as required under c26(6) of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* and *AS2187 Explosives – Storage, transport and use*.

SCOPE

The Plan applies at all Bloomfield Mining Operations. The provisions in the *Explosive Act 2003, Explosive Regulation 2013, Work Health and Safety (Mines and Petroleum Sites) Regulation 2014, AS2187 Explosives – Storage, transport and use* and *Australian Explosive Code* have all been considered when constructing this Plan.

The System is integrated with the Bloomfield Group Health and Safety Management System and operates in conjunction with other appropriate Bloomfield Mine Site and Group Management Systems. Controls related to Security Sensitive Dangerous Substance storage and handling have been based on a risk assessment conducted as per the *Risk Management System.*

DEFINITIONS

Nominated Person	The person nominated on the Licence to store, under the *Explosives Regulation 2013*, required by any corporate entity associated with the Bloomfield Group. This person is the magazine keeper.
Shot Firer	A person, who holds a valid Blasting User's Licence and has also been deemed competent by Bloomfield management to be responsible for the loading, tying and firing of a shot.
Blasting Supervisor	A person who has been given the responsibility by Bloomfield management to design and supervise the blasting operations within the Open Cut. As a minimum they must be the holder of an Unsupervised Handling Licence.
Explosive Handler	A person who holds a valid Unsupervised Handling Licence and undertakes the role of assisting the Shot Firer on the shot.
Security Sensitive Ammonium Nitrate	Any of the following: ❑ ammonium nitrate that is not a dangerous good of Class 1; ❑ ammonium nitrate emulsions, suspensions or gels containing greater than 45% ammonium nitrate; ❑ ammonium nitrate mixtures containing greater than 45% ammonium nitrate; but does not include ammonium nitrate solution.
Security Sensitive Dangerous Substance	A dangerous substance deemed by the administrating authority to be security sensitive; such as ammonium nitrate.
Explosives Precursors	Substances prescribed in the regulations as explosive precursors. Security Sensitive Dangerous Substances are explosive precursors. These substances do not satisfy the criteria to be deemed as Class 1 Dangerous Goods, but are suitable to be used in the manufacture of Class 1 Explosives.
Inner Exclusion Zone	The zone or area around a blasting location or shot where access is restricted during the preparation and charging operations.
Outer Exclusion Zone	The zone or area from which all persons and equipment susceptible to damage are removed from prior to the initiation of the blast.

GENERAL PROVISIONS

This Principal Control Plan has been developed in consultation with appropriate members of the Bloomfield workforce in accordance with the *Consultation, Representation & Participation Management System*. Significant deviations from or modifications to the System are managed, at the time, in accordance with the *Risk Management System*.

The competence of personnel involved in the implementation of this Plan is managed in accordance with the *Training and Competency Management System*.

The nominated person on the Licence to store is responsible for the management of Security Sensitive Dangerous Substances.

ANY BREACH OR POTENTIAL BREACH OF SECURITY RELATED TO SECURITY SENSITIVE DANGEROUS SUBSTANCES IS IMMEDIATELY REPORTED TO THE LOCAL POLICE, SAFEWORK AND NSW DEPARTMENT OF INDUSTRY: RESOURCES & ENERGY; IN THAT ORDER OR PRIORITY.

SYSTEM COMPONENTS

The Explosives Management Plan comprises the following components:

- ❑ Purchasing and supply of explosives.
- ❑ Storage and issue of explosives including magazine control.
- ❑ Transport of explosives on Site.
- ❑ Pre Shot Firing.
- ❑ Priming blast holes.
- ❑ Loading blast holes.
- ❑ Tying up shots.
- ❑ Shot Firing.
- ❑ Post Shot Firing.
- ❑ Other considerations regarding loading and firing of shots.
- ❑ Reports and reporting.
- ❑ Hot work near loaded shots.
- ❑ Special precautions.
- ❑ Emergency measures.
- ❑ System audit and review.

PURCHASING, SUPPLY AND DELIVERY

Bloomfield mining operations have in place supply agreements with licensed explosives manufacturers and suppliers, to supply and deliver only authorised explosives and explosive precursors (as per the *Explosive Regulation 2013*).

Suppliers have in place appropriate computer security controls to manage inappropriate access to ordering information and the potential for misdirected orders.

All purchasing of explosives is controlled through the Blasting Supervisor and an order confirmation process is in place between the supplier and the relevant supervisor.

All explosives brought to and used on site are supplied with their related Safety Data Sheet (SDS) and are appropriately packaged and labelled in accordance with the *Australian Explosives Code*.

Deliveries are conducted by appropriately licensed and competent drivers as arranged by the supplier in accordance with their Transport Security Plan and relevant procedures. Contact by the supplier with the mine site (e-mail, phone contact or fax), to confirm the delivery schedule, is made prior to the dispatch of the delivery.

This operation is supervised by Bloomfield in accordance with the *Contractor Management Plan*.

STORAGE AND ISSUE

Explosives are stored under the management of the Nominated Person listed on the Licence to store. This person is responsible for all duties attributed to the Magazine Keeper. Explosives are stored in licensed magazines, which comply with Australian Standard AS 2187.1 and the explosive manufacturers' guidelines.

The magazines are included in the Mining Supervisor Inspection District and are checked in accordance with the *Mine Inspection System*.

The use of radios, mobile phones, pages and tools is not permitted within a magazine, if that magazine contains explosive products.

Stock Management

The Magazine Keeper is responsible to ensure that:

- ❑ All stock movements are recorded in the appropriate magazine stock control books.
- ❑ Monthly stock-takes are performed where actual stock levels are reconciled against stock movements.
- ❑ Any evidence of theft or unaccounted stock losses are immediately reported to the local police, SafeWork and NSW Department of Industry: Resources & Energy.

Magazine Key Management

The keys to the magazines are locked in a combination locked security safe. Access to these keys is controlled so that only persons who hold an Unsupervised Handling Licence can gain access. A "sign out / sign in" system is used to manage the identification of key location at any time. The person who has signed out a magazine key has the responsibility to maintain its security while in their possession. If the magazine keys become mislaid this is reported to the magazine keeper and if deemed stolen, reported to the local police, SafeWork and NSW Department of Industry: Resources & Energy.

Magazine placement and design

Magazines are located in accordance with Australian Standard AS 2187.1. Magazines are positioned such that they can be observed during day-to-day operations. It is expected that unusual activities at the magazines would be observed and reported through to the relevant site supervisor. Magazine rules are displayed in each magazine.

The maximum capacity for each magazine is as per the capacity set out in the license conditions:

- ❑ Magazine 1 3,000 kg (Rix's Creek) & 5,000 kg (Bloomfield),
- ❑ Magazine 2 10,000 detonators.

Explosives storage (Storage of Security Sensitive Dangerous Substances)

Only personnel holding an Unsupervised Handling Licence are permitted to receive or issue explosives from magazines. The receipt and issue of explosives is done in a controlled manner such that the packaging is not damaged.

An accurate record is kept of all explosives received into, issued from and returned to the magazine. This record records the date, quantity & name of the person issuing and/ or receiving the explosives.

Whenever the magazine is unattended it is secured and locked.

Magazines must be secured and vacated during an electrical storm. Access to the magazines is prohibited during an electrical storm.

Old stock is used first. Any surplus and/ or deteriorated explosives are appropriately packaged and disposed of in conjunction with the relevant supplier and in accordance with their recommended procedures.

Magazine Maintenance

No maintenance is undertaken on a magazine unless it has been approved in writing by the Magazine Keeper. If hot work is required, the magazine is cleared of all explosive products, the timber lining removed prior to hot work commencing and a hot work permit issued by the magazine keeper.

The magazine keeper is to ensure that vegetation, dry undergrowth and other combustible products do not accumulate within 10m of the magazine.

MANAGEMENT OF SPILLAGE OF SECURITY SENSITIVE DANGEROUS SUBSTANCES

In the event that a spillage of Security Sensitive Dangerous Substances occurs, the material is cleaned up and disposed of in a suitable manner in conjunction with the relevant supplier and in accordance with their recommended procedures.

If the spillage is of a magnitude that it represents a significant risk of environmental harm, then it is reported immediately to the site Environmental Officer.

TRANSPORT OF EXPLOSIVES

Explosive transport on site is conducted in accordance with the requirements of the Explosives Regulation 2005, in particular the Australian Explosives Code. Vehicles are equipped with appropriate signs and fire extinguishers and are driven in accordance with the *Mine Transport Management Plan (Roads or Other Vehicle Operating Areas)*.

Conveyance of bulk explosives and explosive precursors

Bulk Security Sensitive Ammonium Nitrate is brought to site by contracted specialists who are appropriately inducted and are conversant with the relevant provisions of the *Mine Transport Management Plan (Roads or Other Vehicle Operating Areas)*.

Bulk Security Sensitive Ammonium Nitrate is stored on site in purpose built storage vessels that are operated under contract by the explosive supplier. These vessels are established in an area separated from general roads but in an area which is readily observable by people during their day-to-day activities. It is expected that unusual activities in this area will be observed and reported through the usual channels to the relevant supervisor.

The following conditions apply when bulk Security Sensitive Ammonium Nitrate is taken to a shot:

- ❑ A MY Safe Job is completed.
- ❑ All vehicles used are 'fit for purpose'.
- ❑ All explosives delivery truck operators are escorted to the shot area for at least their first delivery to that shot and when subsequent changes to shot locations are made during a shift.
- ❑ Prior to loading operations, all explosive truck operators are made aware of any particular hazards associated with a shot such as: any sharp drops or edges, interactions with other traffic and/ or other issues peculiar to the shot.
- ❑ When it is necessary for the loading truck to change rows they are directed across the rows by a Shot Firer or Explosive Handler.

Conveyance of explosives issued from an on site magazine

Explosives are under the control of a person holding an Unsupervised Handling Licensed; being a Shot Firer or Explosive Handler. Initiating explosives are generally transported in the mine's designated shot firing vehicle; with boosters and detonators kept separated during transport. When loaded this vehicle is not left unattended when off site. While on site, a loaded vehicle may be left unattended for short periods, such as crib breaks. During this time the vehicle and all storage compartments are locked and the keys kept under the control of a person holding an Unsupervised Handling Licence.

Explosives are transported under the following conditions:

- ❑ The quantity of explosives conveyed into the mine during the shift matches the quantity estimated to be required for that shift.
- ❑ Before explosives are loaded into a vehicle the storage compartments are cleared of all extraneous materials.
- ❑ Explosives are carried in their original packages and packed securely so as to prevent movement during transportation.
- ❑ Detonators are separated from any explosive or detonating cord during transport.
- ❑ Where practical, once explosives are taken from the magazine, they are kept in the explosives vehicle until required on the shot.
- ❑ Where explosives are removed from the explosive vehicle at the shot they are kept in their original packages and stacked in a neat and tidy manner within the confines of the designated loading area.
- ❑ At the end of the shift all unused explosives are returned to the magazine.
- ❑ Smoking is prohibited within ten (10) metres of any shot firing activity.
- ❑ Smoking is prohibited within ten (10) metres of any vehicle which may be carrying explosives.
- ❑ Personnel are prohibited from smoking in all vehicles.

Vehicle Maintenance

Maintenance on vehicles that are not cleared of explosive material presents a significant risk to health and safety. Prior to maintenance being undertaken a suitable risk assessment, MY Safe Job or JSA, is undertaken. The vehicle is checked for and cleared of any explosive materials, including residues. No major repairs or maintenance is carried out on a shot firing vehicle whilst it is carrying explosives.

DRILL PAD PREPARATION

During drill pad preparation the following procedure applies:

- ❑ The drill pad area is delineated prior to the windrows being decreased. The delineation is designed to direct traffic away from the shot area while still keeping designated access ways for vehicles working on the shot area;
- ❑ Delineation is conducted through a risk based approach for each area and consists of a combination of windrows and markers (i.e. witches hats and/ or delineators). Hazards addressed include:
  - ♦ height of drop over;
  - ♦ number of vehicles that will be travelling in and around the area;
  - ♦ type of vehicles that will be travelling in and around the area.
- ❑ Windrows are then decreased to allow drilling of the front row holes. If the drop over is greater than 2 metres a track mounted machine is used to push the windrow over. Note: This does not exclude using a rubber tyred machine to remove some of the windrow material;
- ❑ New drill pad windrows are at least half the wheel height of the explosive truck/s used and are delineated with markers no further than 50 metres apart;

- ❑ Prior to loading operations the Shot Firer/s will establish access ways for the explosive truck/s. These access ways maximise separation of the explosive truck/s from the low wall windrow;
- ❑ Drill pad surface to be prepared for safe movement (i.e. level/ fill/ grade where required).

SHOT DESIGN

Shots are designed by the Blasting Supervisor and encompass the geology, blast geometry, charging method and initiation of the shot. The design outcomes are always aimed at:

- ❑ Minimising flyrock, overpressure, and blast fume;
- ❑ Minimising the risk of misfire; and
- ❑ Achieving necessary movement or fracturing of ground.

If blasting is required to be conducted in abnormal conditions or locations, an appropriate risk assessment is carried out (as per the *Risk Management System*) addressing all phases of the drill and blast operation.

Any secondary blasting performed on site is conducted under the control of the Blasting Supervisor.

The Mine Manager or Deputy Manager personally inspects any new mining areas for the existence of live overhead power lines and the appropriate adjustments are made.

Demarcation of the Shot

Shot pads are delineated in the following manner:

- ❑ Prior to loading operations, witches hats and shot firing/blasting signs are placed in conspicuous locations (nominally at 15m and 50m intervals respectively) around the perimeter of the shot. Signs used for delineation purposes may need to be weighed down to prevent them from blowing over.
- ❑ Other items such as white posts with reflectors and barrier tape hung between them may also be used to assist in delineating shots;
- ❑ Red flashing lights may also be placed at suitable locations (nominally at 50m intervals) around the loaded shot. All lights used from delineation purposes should be checked to ensure they are in working order.
- ❑ All demarcation devices are placed having due regard to access onto the shot for both light vehicles and earthmoving plant.

If a loaded shot can be reached/ accessed by any machine (above or below) delineation is placed around the edge of the shot.

Only machinery and persons specifically authorised by the Shot Firer or Mining Supervisor are permitted to enter the delineated area. This demarcated area is known as the Inner Exclusion Zone.

DRILLING BLAST HOLES

The accuracy of the drill pattern determines the outcome of the shot. The following procedure is applied when drilling blast patterns:

- ❑ The drill pad is prepared prior to the drill rig entering the area.
- ❑ The driller is informed of the design of the drill pattern by:
  - ♦ Receiving a copy of the proposed drill pattern,
  - ♦ Discussing the pattern at the start of the shift with the Mining Supervisor and / or Blasting Supervisor.

- ❑ The pattern is marked out, if required, to control its placement (in critical shots all the holes may be individually marked, whereas on parting shots the starting points only may be delineated).
- ❑ During the drilling process anything of an unusual nature (eg. cracks, dykes etc) is recorded on the drill shift notes and passed onto the Blasting Supervisor or Mining Supervisor.

IT IS FORBIDDEN TO DRILL INTO KNOWN BUTTS. IF A BUTT EXISTS IN THE DRILL PAD THE NEW HOLE IS DRILLED AT LEAST 0.5m CLEAR OF THE BUTT.

Varying Depths of Drill Holes (shallow or varying cover conditions)

Due to the varying site conditions, environmental factors and rock properties encountered specific Standard Work Procedures (SWP) have been developed. These SWP's describe the drilling of different depths at each Mining Operation and are located on *http://MOMS*. The drill pattern is designed to meet the requirements of each Mining Operation's Development Consent and Environment Protection Licence (i.e. overpressure and vibration).

Proximity of Explosives to Drilling Operations

Adequate clearances between explosives, people and plant must be maintained during explosive loading operations including:

- ❑ Explosives or explosive precursors being conveyed in bulk are not taken nearer than 15 metres to a working area except for the purpose of charging a blast hole.
- ❑ Under special circumstances, such as to re-drill a hole, a drill rig may be permitted closer than the specified distance. In this case the following conditions are applied:
  - ♦ the distance between charged holes and re-drilling is determined by the Blasting Supervisor, Shot Firer, Mining Supervisor, Manager or Deputy Manager;
  - ♦ the re-drilling is conducted under the supervision of the Blasting Supervisor, Shot Firer, Mining Supervisor, Manager or Deputy Manager;
  - ♦ as part of the re-drilling operation, due regard is given to the depth of holes, angle of holes and explosive charge weight.
- ❑ If clearing an area adjacent to loaded holes is required, the task is conducted under the supervision of the Blasting Supervisor, Shot Firer, Mining Supervisor, Manager or Deputy Manager.

PRIMING BLAST HOLES

Prior to charging any blast hole with bulk explosive, the hole must first be primed. During the priming operation the Shot Firer and Explosive Handlers adhere to the following principles:

- ❑ Initiating explosives are laid out in a uniform and orderly manner on the shot;
- ❑ Detonators and boosters are placed adjacent to the hole collar;
- ❑ Verification that a detonator with the correct delay timing is used;
- ❑ Detonators are not forced through a booster;
- ❑ Boosters are lowered down the blast hole, not dropped;
- ❑ Boosters are lowered in a manner that minimises the risk of losing the booster down the blast hole and protects the integrity of the downline;
- ❑ The downline is curled and placed in a position at the top of the blast hole that minimises the risk of it falling down the hole and also the risk of being driven over by vehicles on the shot.

Packaging waste is disposed of in accordance with the Mine's waste disposal practices. Before disposal, all packaging is checked to ensure no explosive items are still present.

LOADING BLAST HOLES

The shot loading operation is under the direct control of a Shot Firer appointed by the Manager. The loading of a shot is managed under the conditions outlined below:

- ❑ Prior to loading operations commencing the access ways between blast holes will be prepared for vehicle and pedestrian access (i.e. Grade with Loader where required);
- ❑ The loading of blast holes is as per the instruction of the Blasting Supervisor.
- ❑ Any variation to the loading is reported to the Blasting Supervisor.
- ❑ The depth of each hole is measured:
  - ♦ prior to loading to determine the charge weight, and then;
  - ♦ after loading the blast hole, to determine that the correct stemming column depth is achieved.
- ❑ If the correct stemming column depth is not achieved, then the Shot Firer informs the Blasting Supervisor who determines the required course of action (see stemming below).
- ❑ During loading of bulk explosive product, the Explosive Handler and Shot Firer are to take measures to prevent the booster / downline from being lost down the hole and to protect the integrity of the downline.
- ❑ Boosters are to be raised to the appropriate height from the base of the blast hole (see next section).
- ❑ When wet hole explosive products are being used, the booster must be pulled into the product.
- ❑ Explosive product densities are to be verified by the explosive supplier operators.
- ❑ When charging with ANFO or Heavy ANFO products ensure that the explosive truck delivery auger is positioned directly over the blasthole.
- ❑ When charging with wet hole product ensure that the explosive truck product hose is lowered to the bottom of the blast hole and that the hose is withdrawn at a rate that ensures that the hose outlet is always "in" the product.
- ❑ Wet hole product loading is stopped at 1.0 to 1.5m below collar height to allow for gassing expansion

Booster Height

The correct positioning of the booster within the bulk explosive is important for the effective detonation of the bulk explosive. Listed below are guidelines that are used to determine the appropriate booster locations. Note: exact measurements are not necessary, approximate heights will suffice.

- ❑ Dry holes:
  - ♦ Hole depth < 10m: Booster height 0.5 to 1m from bottom of the hole;
  - ♦ 10m < Hole depth < 20m: Booster height 1 to 2 m from bottom of the hole;
  - ♦ Hole depth >20m: Booster height 2 to 3m from bottom of the hole.
- ❑ Wet holes:
  - ♦ Whole depth < 20m: Booster is to be placed at the bottom of the hole at the commencement of charging and then "pulled" into the product to a depth of 0.5 to 1m from the bottom of the hole.
- ❑ Backup booster:
  - ♦ For holes greater than 20m a second booster should be positioned in the top 1/3 of the hole;
  - ♦ For wet holes the booster is not positioned until the bulk explosive comes up to the top 1/3 of the hole.

Persons permitted onto a shot during loading process

Traffic in blast areas is kept to a minimum, and limited to essential traffic only. These being the shot firer vehicle(s), clean up loader, stemming truck and explosive delivery vehicles. All other vehicles are to remain outside the Inner Exclusion Zone.

Typically access is restricted to the Blasting Supervisor, Shot Firer, Explosive Handlers, Mining Supervisor, explosive supplier and stemming operators. On occasions other persons are permitted on the shot for the purposes of (as appropriate):

- ❑ Directing or conducting loading operations;
- ❑ In the case of emergency;
- ❑ To examine/ resolve any safety/ operational related problems;
- ❑ To carry out any required inspections;
- ❑ Activities associated with meeting Bloomfield's Duty of Care to employees.

Stemming

Standard practice is to use crushed aggregate as stemming material, but drill cuttings can be used at the discretion of the Shot Firer under suitable conditions. However crushed aggregate must be used at all times at Rix's Creek North.

The Shot Firer and Explosive Handlers are to take particular care that the downline is not damaged or lost down the hole during stemming operations.

Stemming column less than design depth

Where the stemming column is less than the required depth, the Shot Firer discusses the situation with the Blasting Supervisor and the following measures are typically applied:

- ❑ An attempt is made to reduce the charge weight by washing out the hole with water and reducing the blast product to the correct stemming height.
- ❑ If the required depth of stemming column is not reached for a particular hole then a decision is made to determine whether the hole can be detonated.
- ❑ Where the stemming material is determined to be of adequate quality but not the correct depth, a load of suitable material, such as coal washery reject, may be placed over the hole under the supervision of the Shot Firer.

Delivery of Stemming

Stemming material is brought to site by people who are appropriately inducted and are conversant with the relevant provisions of the *Mine Transport Management Plan (Roads or Other Vehicle Operating Areas).*

The following conditions apply when stemming is taken to a shot:

- ❑ All vehicles used are "fit for purpose".
- ❑ All stemming delivery operators are escorted to the shot area for at least their first delivery to that shot and when subsequent changes to shot locations are made during a shift.
- ❑ Prior to loading operations, the stemming delivery operators are made aware of any particular hazards associated with a shot such as, any sharp drops or edges, interactions with other traffic and/ or other issues peculiar to the shot.
- ❑ Stemming trucks are restricted from accessing blast areas until given specific instructions by the Shot Firer.
- ❑ When it is necessary for the stemming truck to change rows they are directed across the rows by the Shot Firer or Explosive Handler.
- ❑ All downlines are laid out in a regular and tidy manner such that they are not damaged during the stemming loading operation.
- ❑ Skid-steer loader operators handling the stemming are made aware of the pattern layout and hazards related to the particular shot.

SLEEPING SHOTS

In general shots are fired soon after they are loaded and tied in. On some occasions it may be necessary to delay firing a shot or sleep the shot. Where it is deemed necessary to sleep a shot for an extended period, an appropriate explosive product is selected to meet the explosive manufacturer's recommended sleep times.

Sleeping shots are sign-posted as per the procedures required for charging and firing shots. Entry to sleeping shots is restricted to authorised persons only.

Specific conditions that are considered when setting up sleeping shots include the ground temperature and the presence of water in the blast holes.

Ground Temperature

Where there is any query related to the ground temperature of blast holes the Blasting Supervisor is informed prior to the explosives being loaded. Ground temperature measurements are taken to determine the course of action that is followed.

Water in the holes

When water is encountered in the blast holes (of a shot that is to be slept), the appropriate wet hole product is selected to suit the expected time duration that the product is to be slept.

SHOT FIRING EQUIPMENT

Only Nonel (non electrical) detonators are used on site. If Electronic detonators are introduced as the standard means of initiating a shot, it will only be following a detailed risk assessment to define the hazards involved and to establish the appropriate controls (including separations from energised cabling and management of static electricity).

Electronic detonators for specific purpose one-off shots are not used without the specific permission of the Mine Manager and only then after an appropriate risk assessment has been performed.

Nonel Starters

A Nonel starter is used to fire shots and while it is in use it is under the care of the Shot Firer at all times. At all other times it is securely locked away.

Prior to firing each shot the Nonel starter is visually checked as fit-for-purpose. Damaged starters are reported and not used; they are either repaired or replaced.

Other Equipment

Other shot firing equipment includes:

- ❑ Measuring tapes;
- ❑ Wooden Sticks used to secure down lines;
- ❑ Approved Cord cutters;
- ❑ Shovels;
- ❑ Witches hats;
- ❑ Barrier tape;
- ❑ White posts with reflectors;
- ❑ Signs;
- ❑ Wooden pegs.

TYING UP A SHOT

The Blasting Supervisor:

- ❑ Designs the tie up procedure for each shot,
- ❑ Informs the Shot Firer of the sequence to be used,
- ❑ Inspects the shot for any irregularities and makes the appropriate adjustments to the tie up sequence.

To minimise the risk of misfire, the following principles are used:

- ❑ Initiating explosives are tied in a manner that ensures that the direction of detonator blast will propagate the initiation of the joined explosive item.
- ❑ A tail of 200 to 300mm is left on the Nonel signal tube.
- ❑ The number of leads in a bunch block does not exceed manufacturer's recommendations.
- ❑ The control row is only tied up after approval has been given by the Blasting Supervisor, to ensure the environmental conditions are adequate on that day, to fire the shot.
- ❑ When using detonating cord:
  - ♦ Trunk line delays are used to initiate cord;
  - ♦ Detonating cord and Nonel tube are not to be placed together in a bunch block;
  - ♦ Connect a J-Hook 250 – 300mm from the bunch block;
  - ♦ Bury the bunch block and detonating cord to minimise noise and risk of cut-off.
- ❑ Conectadet leads are pulled straight when connecting the control row;
- ❑ No knots are tied into any leads.
- ❑ The shot is walked by the Shot Firer after the tie up has been completed.

Precautions once shot is tied up

If the shot cannot be fired after the shot is tied up the main control row is disconnected. All signs, witches hats, red flashing lights and other demarcation devices are left around the perimeter of the shot to indicate loaded holes.

If an electrical storm approaches after a shot is tied up and it is determined by the Blasting Supervisor, Shot Firer or Mining Supervisor that the storm could constitute a risk, the Mining Supervisor:

- ❑ Sets up a nominal 500 metre exclusion zone for all mining operations; and
- ❑ Ensures that the area is not re-entered until it is assessed that the danger has passed.

UNUSED EXPLOSIVES

All unused explosives are returned to the magazine at the end of the shift, unless they are to be used on the next shift, in which case the following conditions are applied:

- ❑ The explosives are assigned to the on-coming Shot Firer by the off-going Shot Firer;
- ❑ The type and number of explosives used on the first shift are recorded in the shot firer's diary;
- ❑ The on-coming Shot Firer is shown the information so that they can enter the total usage into the magazine book once they return the unused explosives to the magazine.

If the on-coming shift is not going to use the leftover explosives the number and type returned is entered into the magazine book.

FOR THE PURPOSE OF THIS PLAN, EXPLOSIVES THAT HAVE BEEN PLACED IN THEIR CORRECT POSITION ON A SHOT ARE DEEMED TO HAVE BEEN USED.

SHOT FIRING

Shot firing is controlled under the following general conditions:

- ❑ Prior to firing a shot, the shot firer determines the area of influence of the blast, which is called the Outer Exclusion Zone.
- ❑ Prior to firing a shot the relevant *Blasting Checklist* is completed by the Shot Firer.
- ❑ All persons and equipment within the Outer Exclusion Zone are removed to points of safety.
- ❑ Once the area is cleared in preparation for the shot, no person is allowed to re-enter the Outer Exclusion Zone, without the specific permission of the Shot Firer until the "All Clear" signal is given.
- ❑ The lead in line is not laid out and connected to the control row until all sentries are in place and the Outer Exclusion Zone has been established.
- ❑ The lead in line is secured in a manner that does not pull on the initiation point.
- ❑ Once the lead in line has been laid out and connected to the shot, the Shot Firer cannot leave the shot.
- ❑ A blasting cap is not placed into the Nonel Starter until after the Shot Firer has made their blasting announcement over the radio (see *Communication* below).
- ❑ The Shot Firer keeps their hands clear from the shell end of the Nonel starter.
- ❑ Shot firing is conducted at regular, routine firing times and if this is not the case, specific instructions are given regarding specific shots.

Prevention of access during blasting

In order to control access to the shot the following conditions apply:

- ❑ The Shot Firer determines:
  - ♦ all of the access points to the shot,
  - ♦ the number of sentries required to secure the shot,
  - ♦ a safe position to locate sentries for the blast.
- ❑ After posting the sentries the Shot Firer inspects the Outer Exclusion Zone of the blast to ensure that all people and equipment have been withdrawn to a place of safety.
- ❑ Once positioned, the sentries do not allow access to any person without the approval of the shot firer.

NO PERSON, OTHER THAN THE SHOTFIRER OR COMPETENT PERSON IS TO ENTER THE OUTER EXCLUSION ZONE UNTIL THE ALL CLEAR IS SOUNDED OR THE SHOTFIRER HAS PERSONALLY DIRECTED THEM TO DO SO.

Communication

Communication regarding a shot is controlled as follows:

- ❑ The mine two-way radio performs the main line of communication between the shot firer and sentries,
- ❑ Under certain circumstances mobile phone communication may be required between two sentries, with the Shot Firer controlling all communications under these situations;
- ❑ Prior to firing the shot, the Shot Firer makes an announcement over the radio regarding the shot to be fired including any appropriate instructions;
- ❑ The Shot Firer initiates the two way radio audible siren to indicate radio silence for the blast,
- ❑ The Shot Firer indicates thirty (30) seconds remaining before the shot is fired, this time delay is to enable anyone to reply in case they have a concern about the shot.

When major public roads are closed for shot firing, the closure is overseen by the Mine Manager or Deputy Manager.

Blast notification	On the day of the blast, the anticipated shot time is indicated on appropriately placed blast advisory signs. Where there is an agreement to advise neighbouring property owners of a blast time, contact is made, by the Environmental Officer, prior to blast time.
POST SHOT INSPECTION	Once a shot has been fired and all the associated dust and fume has dispersed, the Shot Firer conducts an inspection of the area; assisted by the Blast Supervisor or Explosive Handler if necessary. The inspection is to determine that the shot has been fully initiated. The inspection also looks at what remedial action (if any) needs to be taken after the shot. This information is conveyed to the Mining Supervisor or senior official to determine a likely course of action. This post blast inspection is recorded through the relevant *Blasting Checklist.*
MISFIRES	If a shot fails to fire, either fully or partially or at a later time a misfire is discovered, the following provisions for handling a misfire are applied. A misfire is a notifiable incident under c128(5)(j) of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*.
Shot fails to explode on initiation	If a shot fails to explode, the Shot Firer attempts to re-fire the shot by again delivering a sharp blow to the striker of the Nonel Starter. If the shot again fails to explode, the Shot Firer replaces the striker and/ or the other various components of the initiation set-up (primer, Nonel lead-in line etc) with components, from different batches as appropriate, and fires the shot. During this operation the shot site security remains in place i.e. the sentries and radio silence remain in place. AT NO STAGE IN THIS PROCEDURE IS THE SHOT LEFT UNSUPERVISED.
Misfire is discovered during the inspection after firing	If a misfire is discovered after the shot is fired, the situation is managed under the following conditions: ❑ If the surface or down line chord is exposed and available to be used again the Shot Firer notifies the Mining Supervisor that a misfire has occurred and that the misfire is to be fired; and ❑ The misfired hole(s) are checked to ensure that there is sufficient burden and stemming to contain any unexploded explosive left in the hole; and ❑ If more than one hole misfires, the Shot Firer ensures that each hole is connected together in an appropriate fashion; and ❑ An attempt is made to fire the misfired shot. If, the misfired shot cannot be refired then the Shot Firer: ❑ Takes all action necessary to make the area safe, which may include barricading off the area using conspicuously located blasting signs until such extra action is taken; ❑ Notifies the Mining Supervisor of the misfire and any action taken, before sounding the general "ALL CLEAR" over the radio; ❑ Personally (before leaving the mine) advises the most senior mining official on duty of the occurrence of the misfire and the details of what action has been taken; ❑ Records the facts of the misfire in his daily shot firing records. The Mining Supervisor records the facts of the misfire in the shift inspection book.

Misfire is discovered at any other time

If a misfire is discovered at any other time the situation is managed under the following conditions:

- ❑ If the misfire is discovered during the mining operation the person who discovers the misfire, or suspects that a misfire is present, immediately takes the following steps:
  - ♦ Withdraw to a safe place,
  - ♦ Notify any people in the area so that they can withdraw to a safe place,
  - ♦ Immediately report the situation to the Mining Supervisor.
- ❑ The Mining Supervisor then ensures that:
  - ♦ The area is barricaded off and takes any other action as deemed necessary to make the area secure,
  - ♦ The area is not disturbed until a shot firer is present,
  - ♦ The most senior mining official on duty is notified of the occurrence of the misfire and the details of the action taken,
  - ♦ The facts of the misfire are recorded in the shift inspection book.

A shot firer is notified of the situation (by the Mining Supervisor or other mining official) and attends the site of the misfire.

Procedure once shot firer is notified

The Mining Supervisor and the Shot Firer decide which is the most appropriate of the actions to take:

- ❑ Refire the misfired shot using guidelines above for re-firing a misfire; or
- ❑ Wash out the explosive and recover the booster (THIS IS ONLY TO BE ATTEMPTED IF THE BOOSTER MOVES FREELY. THERE IS TO BE NO PULLING ON THE SIGNAL TUBE DOWN LINES TO ATTEMPT TO PULL THE BOOSTER OUT); or
- ❑ If the booster cannot be easily removed the hole is to be re-stemmed (after washing out the explosives) and the booster fired; or
- ❑ Dig the shot out under the supervision of the Mining Supervisor and/or Shot Firer.

OTHER CONSIDERATIONS WHEN FIRING A SHOT

Where mining operations require blasting to be carried out within 500 metres of a public road then prior to the blast, the traffic flow along the road is stopped as per the approved traffic control procedures by site personnel who have received the appropriate RMS approved training.

Closure of public roads

When major public roads are closed for shot firing, the closure is overseen by the Manager or Deputy Manager.

Blasting Times

Where possible shot firing is carried out between 9 am and 5 pm, Monday to Saturday. Shot firing at other times is only allowed after consultation between the Manager, Deputy Manager and Blasting Supervisor.

Weather

Adverse weather conditions will influence the firing of a shot. The Manager, Deputy Manager and Blasting Supervisor determine under which climatic conditions a shot can be fired.

The factors considered include but are not limited to, wind strength, wind direction, likelihood of blast fume, cloud cover and the size and type of shot to be fired.

Electrical Storms	In the event that an electrical storm approaches: ❑ All loading activity is ceased. ❑ All personnel are evacuated from the area. ❑ Where a drill is operating in close proximity to the loaded shot, the drill is removed to a safe distance, as determined by the Mining Supervisor or Shot Firer, from the loaded pattern. ❑ No one is to approach the shot area during the storm. ❑ No one to approach the magazines in an electrical storm. ❑ Magazines are to be vacated in an electrical storm.
Overpressure and Ground Vibration Monitoring	Monitoring stations are established at a number of locations (including off site) to monitor ground vibration and overpressure relating to the shots fired in the various pits. The locations may change to suit the area being shot. The Environmental Officer consults with the Blasting Supervisor regarding the appropriate monitoring locations and any other specific considerations to be monitored are taken into account. Blast monitoring data is regularly reviewed and reported internally and externally as appropriate.
Adjacent Mines	Where adjacent mines may be affected, we will provide notification of our scheduled blasting activities.
REPORTS AND REPORTING	The blast design and loading is specified by the Blasting Supervisor for each shot. Any variation from the design is brought to the attention of the Blasting Supervisor by the driller or Shot Firer on the shot.
General	The Shot Firer records any variation to loading on a shot in the daily diary used to report on daily explosive usage. Holes with a variance are marked for inspection by the blasting supervisor.
Drilling Reports	On each shift the driller completes a shift report on the drilling completed. Any variations or unusual circumstances with respect to drilling are recorded for the Blasting Supervisor to inspect.
Charging and Blast Reports	The Shot Firer on the shot, records in the daily shot firing diary all the information regarding the quantity of explosives used in each shot. This information forms the basis of the shot firing report once the shot is fired.
Charging Variations	The Shot Firer notes any variations to the charging details. The variation in charging is relayed to the Blasting Supervisor. The Blasting Supervisor decides on a course of action to be taken with respect to the charging variation.
Firing the Shot	During the process of firing the shot any abnormal fume or dust cloud, excessive noise or abnormal ejection of material is recorded in the shot firing report by the Shot Firer.

Misfires	Any misfire or suspected misfire found during the post blast inspection is recorded in the shot firing report along with the corrective action taken by the Shot Firer. The Shot Firer informs the Mining Supervisor of any misfire or suspicion that there may be a misfire in a shot. Misfired shots are reported to the NSW Department of Industry: Resources & Energy.
Communication of loading details	The Blasting Supervisor communicates to the Shot Firer the loading details for each shot. Where loading is carried out over a number of shifts or days the information recorded in the Shot Firers' daily diary forms the basis for communication between shifts.
HOT WORK NEAR LOADED SHOTS	In the event that hot work is required to be conducted on plant, which is within 10m of a loaded blast hole, a Hot Work Permit is required.
SPECIAL PRECAUTIONS	Where shot firing is carried out in abnormal circumstances, the Blasting Supervisor conducts an appropriate assessment of the situation and implements any procedures that are necessary to carry out the shot firing. Examples of abnormal circumstances include (but may not be limited to) the following: ❑ Hot ground & high temperature blasting, ❑ Firing near underground workings, ❑ Firing over old workings.
HOT GROUND AND HIGH TEMPERATURE BLASTING	Hot ground is defined as ground with a temperature of >55°C but <100°C. High temperature blasting is conducted in ground with a temperature >100°C but <150°C. The Rix's Creek and Bloomfield lease areas do not indicate the likelihood of encountering any hot or high temperature blast holes. If the conditions change to include blasting in such ground, appropriate procedures will be developed at the time.
Temperature Measurement	An instrument suitable for measuring in the specified temperature range is used and the instrument is located in the blast hole for a sufficient length of time to give a stable reading.
Types of Explosives	The supplier of explosives will be consulted to determine the correct explosives (designed specifically for hot ground or high temperature blasting) that may be used.
Charging	Appropriate procedures are developed in association with the explosive manufacturer prior to charging in hot ground or high temperature blasting.
FIRING NEAR UNDERGROUND WORKINGS	No active underground workings are currently planned at any Bloomfield Mining Operation. Blasting near underground workings will be included in the appropriate risk assessment if underground operations are introduced.

FIRING OVER OLD WORKINGS

Where shot firing is to take place over old workings a plan indicating the extent of old workings is developed to indicate where the location of the holes are in relation to the old workings.

Holes that may break through into old tunnels are stopped approximately five (5) metres short of the tunnel. If, upon examination of the pattern, the Blasting Supervisor needs to change the stand off, it can be changed to suit the application.

If holes do break through into old workings, the base of the hole will be blocked, commonly with an airbag, and cuttings put down the hole to stem (plug) the base of the hole. The depth of the plug is designed to suit the application and quantity of explosive to be placed in the hole.

EMERGENCY MANAGEMENT

Potential hazards, relating to or resulting from the drill and blast operations, which could trigger an emergency, have been identified. Their methods of control are based primarily on prevention and are listed below. Emergencies are managed through the relevant *Emergency Response Principal Control Plan.*

Potential Hazard	Method of Control
❑ Fire on a shot, at a magazine, at an AN Bin	❑ Housekeeping rules and prohibition of ignition sources from loaded shots, explosive storage areas and explosive transport equipment. ❑ Explosives carrying vehicles equipped with fire extinguishers. ❑ Relevant *Emergency Response Principal Control Plan.* ❑ Water is the medium to use on Ammonium Nitrate fires.
❑ Significant blast fume towards road/ traffic or occupied buildings	❑ Weather watch provisions. ❑ *Blast Fume Management Strategy*
❑ Fly rock onto public roads	❑ Shot design and traffic control provisions. ❑ Certified traffic control personnel.
❑ Lightning strike	❑ Weather watch provisions. ❑ Electrical storm shot area evacuation procedure. ❑ Design of magazines (lightning protection etc).
❑ Security threat related to explosives components	❑ Security of magazine keys and initiating devices. ❑ Design and positioning of magazines. ❑ Supervisor inspections. ❑ *Security Threat Standard Work Procedure.*

AUDIT AND REVIEW

The ongoing effectiveness and efficiency of this Principal Control Plan is monitored as part of the operation's day-to-day management. Feedback from this and other more formal reviews and/ or following special occurrences, form the basis for System improvement and re-design.

Internal auditing of this document is carried out as per the *Internal Audit Management System*.

Ongoing review of this document is as per the *Systems Review Management System*.

DOCUMENT MANAGEMENT

Copies of this document are managed under the *Document Management System*. This document and other relevant documents are kept on site and are available to all employees and contractors (as appropriate).

CONSULTATION

This Principal Control Plan has been developed/ reviewed in consultation with relevant members of the workforce as appropriate to the impact and influence of the intent of the Principal Control Plan.

SUPPORT DOCUMENTS

- ❑ *Explosive Act 2003*
- ❑ *Explosive Regulation 2013*
- ❑ Work Health and Safety (Mines and Petroleum Sites) Regulation 2014
- ❑ *AS2187 Explosives – Storage, transport and use*
- ❑ *Australian Explosives Code*
- ❑ *Risk Management System*
- ❑ *Training and Competency Management System*
- ❑ *Contractor Management Plan*
- ❑ *Mine Inspection System*
- ❑ *Mine Transport Management Plan (Roads or Other Vehicle Operating Areas)*
- ❑ *Emergency Response Principal Control Plan Bloomfield*
- ❑ *Emergency Response Principal Control Plan Rix's Creek*
- ❑ *Fire and Explosives Principal Mining Hazard Management Plan*
- ❑ *Blasting Checklist*
- ❑ *Internal Audit Management System*
- ❑ *Systems Review Management System*
- ❑ *Document Management System*
- ❑ *Consultation, Representation & Participation Management System*

REVISION HISTORY

13	Updated from Explosives Management Plan	31/01/2017	Simon Dagg	Luke Murray
12	Updated to include Rix's Creek North	22/12/2015	Simon Dagg	Luke Murray
11	Update to document style and document owner	09/04/2015	Amy Cameron	Renata Roberts
10	Updated Drill Pad Preparation and Loading Blast Holes sections	19/07/2013	Simon Dagg	Garry Bailey
9	Document format changes, removal of Blast Fume Management Strategy	27/02/2013	Simon Dagg	Garry Bailey
8	Inclusion of Blast Fume Management Strategy	20/11/2012	Simon Dagg	Garry Bailey
7	Update to tying up a shot section	25/09/2012	Simon Dagg	Garry Bailey
6	Inclusion of Blasting Checklist references	05/12/2011	Simon Dagg	Garry Bailey
5	Inclusion of varying depths of drill holes section	24/01/2011	Keren Halliday	Garry Bailey
4	Inclusion of drill pad preparation section	13/02/2009	Simon Dagg	Reg Crick
3	Inclusion of explosive legislation provisions	03/09/2007	Shayne Holman	Reg Crick
2	Inclusion of security sensitive dangerous goods provisions	24/10/2006	Max Geyer	Reg Crick
1	Inclusion of document management provisions	05/11/2004	Max Geyer	William Cant

Rev.	Description	Date	Drawn	Approved
0	Original Issue	25/09/2002	Max Geyer	William Cant

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INTRODUCTION

This Blast Management Strategy addresses the likely causes of gases from blasting, the controls that should be used to mitigate excessive blast fumes and the procedure for management of excessive blast fumes should they occur.

SCOPE

Blast Fumes across the Bloomfield Group are managed according to this Blast Fume Management Strategy.

DEFINITIONS

Dewatered Hole	A blast hole which has had rain or surface water removed using an in-hole pump or other mechanical means.
Dynamic Water	Water that is in motion (i.e. flowing water).
Dry Hole	A blast hole which contains no detectable water.
Wet Hole	A blast hole which contains any amount of detectable water.

RISK MITIGATION The following table summarises potential contributing factors and potential controls for blast fume mitigation.

CONTRIBUTING FACTORS	CONTROLS
Meteorological Conditions	
Weather Forecast	❑ Review rainfall forecasts for planned sleep time of shot and select products according to manufacturer's recommendations ❑ Minimise sleep time for non-wet hole products if rain is predicted ❑ Bench design for water runoff ❑ Seal product column with water resistant product ❑ Seal top of stemmed holes with gas bag ❑ Seal top of stemmed holes with drill cuttings to minimise water ingress ❑ Consistent energy matched blast design for wet-hole products ❑ Use hole savers to minimise runoff from bench entering holes
Blast Design	
Priming	❑ Review blast design and follow manufacturer's instructions on explosive product initiation
Hole depth	❑ Reduce bench height where applicable ❑ Ensure adequate relief in deep holes ❑ Follow manufacturer's recommendations on product selection and blast design for deep holes, for example decking where appropriate
Decked holes	❑ Appropriate separation of explosive decks
Initiation of explosive quantities	❑ Reduce blast size in order to reduce total explosive quantity being initiated in the one blast event where applicable ❑ Reduce powder factor where applicable
Product Selection	
Use of non-water-resistant products	❑ Follow manufacturer's recommendations on product selection ❑ Regular education on product recommendations from current supplier ❑ Discipline in on-bench practices
Interaction with adjacent product columns	❑ Understand geology of each shot and design blast (timing & product) to match, for example reduction of powder factor where applicable ❑ Follow manufacturer's recommendations on product selection ❑ Obtain appropriate technical assistance if required to ensure optimal result
Desensitisation of explosive product	❑ Follow manufacturer's recommendations on compatibility of initiating systems with explosives
Geology	
Strata condition	❑ Understand geology of each shot and design blast (timing & product) to ensure adequate relief in weak/soft strata, for example considering the incorporation of a free face, reduction of powder factor, modified timing ❑ Minimise blast size and depth where applicable ❑ Follow manufacturer's recommendations on product selection ❑ Use of hole liners where applicable ❑ Monitor holes which are slumped or require excessive product to reach stemming height, but where water is not present

CONTRIBUTING FACTORS	CONTROLS
Geology	
Presence of water in holes	❑ Minimise sleep time of shot ❑ Follow manufacturer's recommendations on product selection ❑ Measure recharge rates if dewatering, and choose products according to manufacturer's recommendations ❑ Monitor slumped holes to build understanding of pit hydrology ❑ Understand hydrology of pit and plan blasting to avoid interaction between explosives and dynamic water (either natural or from other pit operations) ❑ Use of hole liners where applicable ❑ Ensure appropriate loading practices are followed during charging ❑ Ensure primer is positioned in undiluted product ❑ Insert gas bag to separate mud/sediment from explosive charge ❑ Use hole savers to minimise runoff from bench entering holes
Timeframe between drilling & loading	❑ Minimise time between drilling & loading where applicable ❑ Use blast hole cameras to ascertain hole condition in critical areas ❑ Use hole savers ❑ Mine planning to ensure benches are unaffected by back break from earlier blasts, for example presplits, buffers ❑ Optimise drilling practices to minimise hole damage though rock cracking
Clay content	❑ Maintain a low powder factor where applicable, giving consideration to the water resistance of the products used and how this may impact sleep time ❑ Use of hole liners where applicable ❑ Use of the *Rix's Creek Geological Information,* including a typical vertical cross section diagram (see Attachment A) ❑ Use of the *Rix's Creek Geological Information,* including a typical vertical cross section diagram (see Attachment A)
On Bench Practices	
Knowledge of hole condition	❑ Dip all holes prior to loading ❑ Identify wet, dewatered and dry holes during the loading process and use this information as a basis for product selection ❑ Measure recharge rate of dewatered holes and choose products according to manufacturer's recommendations ❑ Minimise time between drilling & loading where applicable (i.e. in soft and clay strata). Note: Enough time should be allowed for any dynamic water in the hole to be identified ❑ Use blast hole cameras to ascertain hole condition in critical areas ❑ Minimise sleep time
Drill plan	❑ Maintenance of accurate drilling records and review of blast design if required to compensate for inaccuracies
Run-off design	❑ Load wet holes first and dip remaining holes prior to loading. Adjust product selection according to manufacturer's recommendations

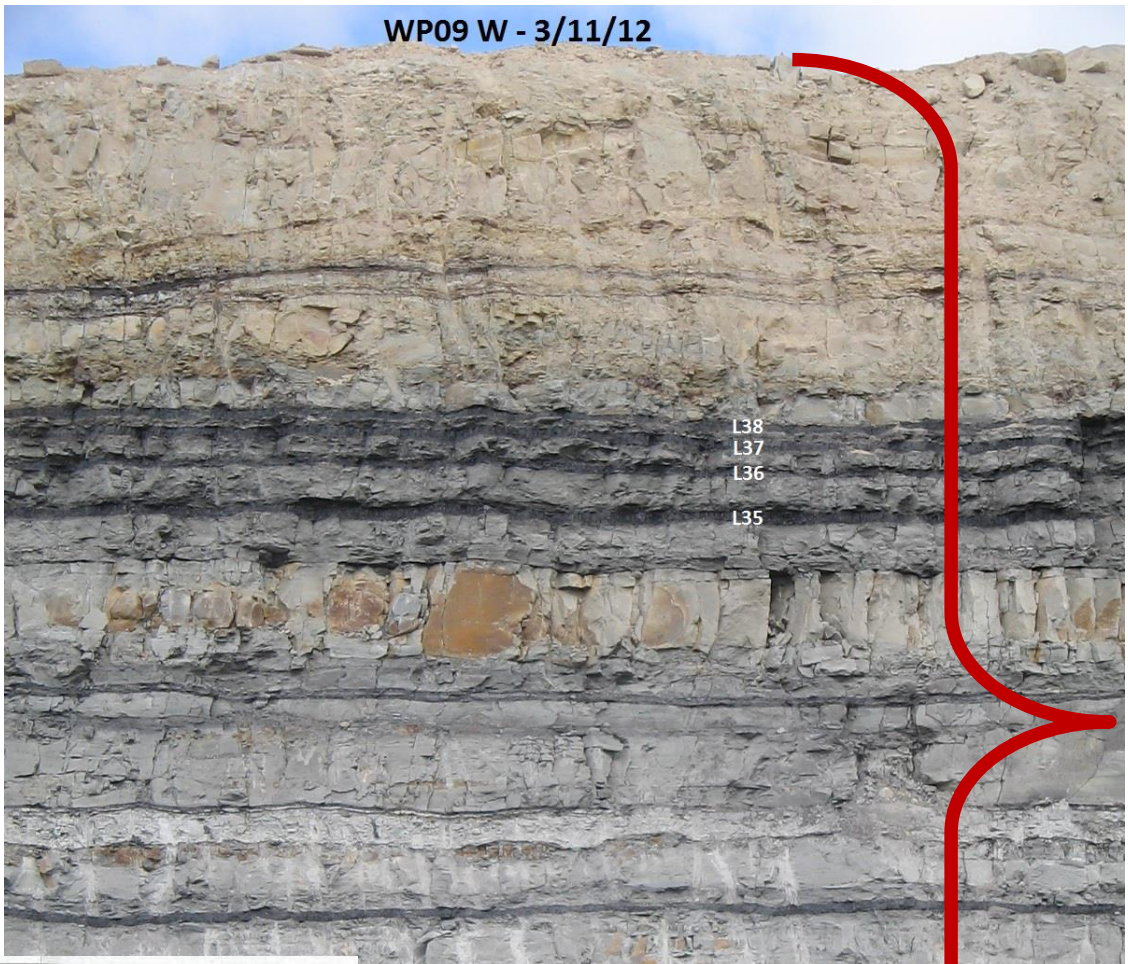
TABLE 1 RISK MITIGATION TABLE

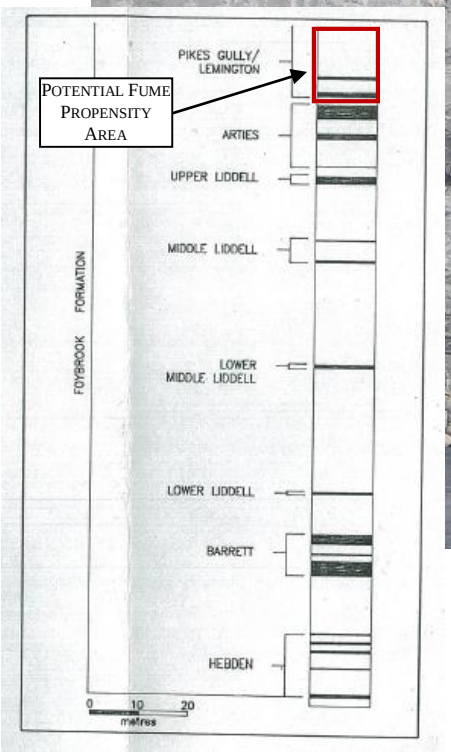
RATING AND RECORD KEEPING	Fumes are rated using the Visual NOx Fume Rating Scale that forms part of the relevant *Blasting Checklist*. Records of these ratings are kept on site for at least two years. Where a risk of post blast fume is identified the blast is videoed for a minimum duration of one minute following the blast in order to capture any post blast fume until it dissipates, leaves the site or leaves view of the camera. Video Footage is stored on the server, which is regularly backed up.
INCIDENT REPORTING	In the instance of a blast where fumes produced are rated as a minimum of three at its highest extent as it leaves the site the Compliance Officer of the Department of Planning and Infrastructure in Singleton shall be notified. Any further reporting will be determined by the factors that contributed to the incident and carried out as per the *Incident Investigation Procedures*.
EMERGENCY RESPONSE	Any Blasting Incident will be dealt with as per the *Emergency Management Control Plan* and *to an Environmental Incident Emergency Response Management System*.
AUDIT AND REVIEW	The ongoing effectiveness and efficiency of this Management System is monitored as part of the operation's day-to-day management. Feedback from this and other more formal reviews and/ or following special occurrences, form the basis for System improvement and re-design. Internal auditing of this document is carried out as per the *Internal Audit Management System*. Ongoing review of this document is as per the *Systems Review Management System*.
DOCUMENT MANAGEMENT	Copies of this document are managed under the *Document Management System*. This document and other relevant documents are kept on site and are available to all employees and contractors (as appropriate).
CONSULTATION	This Management System has been developed/ reviewed in consultation with relevant members of the workforce as appropriate to the impact and influence of the intent of the Management System.
SUPPORT DOCUMENTS	❑ *Blasting Checklist* ❑ *Incident Investigating Procedures* ❑ *Emergency Management Control Plan* ❑ *Environmental Incident Emergency Response Management System* ❑ *Internal Audit Management System* ❑ *Systems Review Management System* ❑ *Document Management System* ❑ *Consultation, Representation and Participation Management System*
ATTACHMENTS	❑ Rix's Creek Geological Information

REVISION HISTORY

Rev.	Description	Date	Drawn	Approved
1	Identification of internal Document Change	01/02/2017	Scott Munro	Luke Murray
0	Removed for Explosives Management Plan	27/02/2013	Simon Dagg	Garry Bailey

ATTACHMENT 1 – RIX'S CREEK GEOLOGICAL INFORMATION





APPENDIX C – Evidence of Consultation in Development of Management Plan

Christopher Knight

From: John Hindmarsh
Sent: Wednesday, 22 March 2017 9:18 AM
To: 'rog.hcc@environment.nsw.gov.au'
Cc: Luke Murray (imurray@rixs.com.au); Garry Bailey; Chris Quinn; Hannah Bowe
Subject: Rix Creek -Management Plan to be prepared in consultation with OEH
Attachments: BMP Rixs Creek Mine V1-2 Final 170321.pdf

Dear Sir,

Rixs Creek is required to consult with OEH in the preparation of the Blast Management Plan as a requirement of DA 49/94 Mod 8 which come into effect December 2016.

Extracts from the consent are as follows:-

Blast Management Plan

12D. The Applicant must prepare a Blast Management Plan for the project to the satisfaction of the Secretary. This plan must:
(i) be prepared in consultation with OEH, and then submitted to the Secretary for approval by 30 April 2017;
(ii) describe the blast mitigation measures that would be implemented to ensure compliance with the relevant condition of this approval;
(iii) describe the measures that would be implemented to ensure that the public can get up-to-date information on the proposed blasting schedule on site;
(iv) include a blast monitoring program to evaluate the performance of the project; and
(v) include a protocol that has been prepared in consultation with the owners of the nearby mines (including Ashton, Rix's Creek North and the Mount Owen Complex) for minimising and managing the cumulative blasting impacts of the mines.

The Applicant must implement the approved management plan as approved from time to time by the Secretary.

In complying with these requirements please find attached the following Management Plan provided for consultation with the OEH.

- Blast Management Plan

If OEH has any comments please provide them to me so they may be incorporated into the plans to allow the plans to be submitted to DPE for approval by 30th April 2017.

Thanking you.

John Hindmarsh
Senior Environmental Officer

•RIX'S CREEK•

Rix's Creek Mine
PO Box 4, EAST MAITLAND NSW 2323

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Website: www.bloomcoll.com.au

Christopher Knight

From: John Hindmarsh
Sent: Tuesday, 21 March 2017 2:44 PM
To: Natasha Ryan (Natasha.ryan@epa.nsw.gov.au); hunter.region@epa.nsw.gov.au
Cc: Garry Bailey; Luke Murray (imurray@rixs.com.au); Chris Quinn; Hannah Bowe
Subject: Rix Creek -Management Plans to be prepared in consultation with EPA
Attachments: BMP Rixs Creek Mine V1-2 Final 170321.pdf; RixsCreekAQMP_170124_V1 2_Final 20170320.pdf

Hi Natasha,

Rixs Creek is required to consult with the EPA in the preparation of Management Plan as a requirement of DA 49/94 Mod 8 which come into effect December 2016.

Extracts from the consent are as follows:-

Noise Management Plan

11. The Applicant must prepare a Noise Management Plan for the project to the satisfaction of the Secretary. This plan must:
    (i) be prepared in consultation with the EPA, and then submitted to the Secretary for approval by 30 April 2017;
    (ii) describe the measures that would be implemented to ensure:
        - compliance with the noise criteria and operating conditions of this approval; and
        - best management practice is being employed;
    (iii) describe the noise management system in detail;
    (iv) include a noise monitoring program that:
        - uses a combination of real-time and supplementary attended monitoring measures to evaluate the performance of the project;

Air Quality & Greenhouse Gas Management Plan

14A. The Applicant must prepare an Air Quality & Greenhouse Gas Management Plan for the project to the satisfaction of the Secretary. This plan must:

(i) be prepared in consultation with EPA, and then submitted to the Secretary for approval by 30 April 2017;

(ii) describe the measures that would be implemented to ensure:
- compliance with the air quality criteria and operating conditions of this approval; and
- best practice air quality management is being employed;

(iii) describe the air quality management system in detail;

(iv) include an air quality monitoring program that:
- uses a combination of real-time monitors and supplementary monitors to evaluate the performance of the project;
- includes a protocol for determining any exceedances of the relevant conditions of this approval;
- adequately supports the proactive and reactive air quality management system;
- includes $PM_{2.5}$ monitoring (although this obligation could be satisfied by the regional air quality monitoring network if sufficient justification is provided);
- evaluates and reports on the effectiveness of the air quality management system and the best practice air quality management measures; and

(v) include a protocol that has been prepared in consultation with the owners of nearby mines (including Integra Underground, Ashton, Rix's Creek North and the Mount Owen Complex) to minimise the cumulative air quality impacts of the mines.

The Applicant must implement the approved management plan as approved from time to time by the Secretary.

In complying with these requirements please find attached the following Management Plans provided for consultation with the EPA.

- Air Quality & Greenhouse Gas Management Plan; and
- Noise Management Plan.

If the EPA has any comments please provide them to me so they may be incorporated into the plans to allow the plans to be submitted to DPE for approval by 30th April 2017.

Thanking you.

John Hindmarsh
Senior Environmental Officer

Rix's Creek Mine
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Website: www.bloomcoll.com.au

APPENDIX D – Copy of Approval - DPE

NSW GOVERNMENT Planning & Environment

Planning Services
Resource Assessments
Contact: Megan Dawson
Phone: 9274 6391
Email: megan.dawson@planning.nsw.gov.au

Mr John Hindmarsh
Senior Environmental Officer
Rix's Creek Mine
PO Box 4
East Maitland NSW 2323

John

Dear Mr ~~Hindmarsh~~,

Rix's Creek (DA 49/94) and Rix's Creek North (MP 08_0102)
Approval of Combined Management Plans

I refer to your email dated 21 March 2017 seeking the Secretary's approval to combine the following management plans for Rix's Creek and Rix's Creek North coal mines:

- Air Quality & Greenhouse Gas Management Plan;
- Blast Management Plan;
- Noise Management Plan; and
- Environmental Management Strategy.

Considering the two sites are now operated by Bloomfield Collieries as an integrated complex, the Department accepts this approach. Under condition 18C of Schedule 2 of DA 49/94 and condition 4 of Schedule 5 of MP 08_0102, the Secretary agrees to your request to combine the above management plans/strategies.

If you wish to discuss this matter, please contact Megan Dawson on 9274 6391.

Yours sincerely,

Howard Reed 28-3-17

Howard Reed
Director Resource Assessments
as nominee of the Secretary

NSW Department of Planning & Environment, GPO Box 39, SYDNEY NSW 2001
www.planning.nsw.gov.au

Planning, Industry & Environment

Planning and Assessment
Energy and Resource Assessments
Name: Bailey Williams
Phone: 8275 1306
Email: bailey.williams@planning.nsw.gov.au

Mr Chris Knight
Environment Manager
The Bloomfield Group

By email: cknight@bloomcoll.com.au

Dear Mr Knight

Rix's Creek Mine (DA 49/94 and MP 08_0102)
Review of Management Plans

I refer to your email dated 24 July 2019, seeking the Secretary's approval of three updated management plans for the Rix's Creek Mine (DA 49/94 and MP 08_0102), including the:

- Noise Management Plan (dated 24 July 2019) (condition 11 of Schedule 2 of DA 49/94 and condition 10 of Schedule 3 of MP 08_0102);
- Air Quality and Greenhouse Gas Management Plan (dated 24 July 2019) (condition 14A of Schedule 2 of DA 49/94 and condition 27 of Schedule 3 of MP 08_0102); and
- Blast Management Plan (dated 24 July 2019) (condition 12D of Schedule 2 of DA 49/94 and condition 19 of Schedule 3 of MP 08_0102).

The Department has reviewed these plans and considers that they address the relevant conditions of consent. As such, the Secretary has approved these plans. Please ensure that final untracked copies of these documents are provided to the Department by 8 August 2019 and are uploaded to the company's website.

Should you have any enquiries in relation to this matter, please contact Bailey Williams on the details listed above.

Yours sincerely

Howard Reed 31.7.19

Howard Reed
Director, Resource Assessments
as nominee of the Secretary

Planning, Industry & Environment

Mr Chris Knight
Environment Manager
PO Box 4
East Maitland, NSW, 2323

08/02/2020

Dear Mr Knight

Rix's Creek South Continuation Project (SSD 6300)
Blasting within 500 metres of a public road or land

I refer to your letter, dated 17 December 2019, providing information to demonstrate that blasting can be carried out within 500 metres of a public road or land, in accordance with Condition B18(b) of Schedule 2 of the consent for the Rix's Creek South Continuation Project (SSD 6300).

The Department notes that there are three land parcels and one public road within 500 metres of the blasting zone for SSD 6300. The Department understands that the land parcels owned by Singleton Council and Crown Lands are unoccupied; that Bloomfield has an agreement with the owner of the third land parcel; and that Bloomfield has a Road Occupancy Licence to allow for road closures during blasting.

The Department also understands that procedures for carrying out blasting within these zones are outlined in the existing approved Blast Management Plan, required in accordance with the existing development consent for Rix's Creek Coal Mine (DA 49/94).

Accordingly, the Secretary is satisfied that blasting can be carried out closer to the public road or land without compromising the safety of people or livestock or damaging buildings and infrastructure.

If you wish to discuss the matter further, please contact Melanie Hollis on 8127 2043.

Yours sincerely

Matthew Sprott
A/Director
Resource Assessments (Coal & Quarries)

As nominee of the Secretary