



# MOUNT PLEASANT OPERATION

## BLAST MANAGEMENT PLAN

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Mr Klay Marchant  
MACH Energy Australia Pty Ltd  
GPO Box 94  
Brisbane QLD 4001

Dear Mr Marchant

**Mount Pleasant Operation (DA 92/97)  
Blast Management Plan**

I refer to your email dated 1 August 2017 submitting a revised Blast Management Plan for the Mount Pleasant Operation, in accordance with condition 17 of Schedule 3 of DA 92/97.

The Department has reviewed this plan and considers that it meets the relevant conditions of consent. As such, the Secretary has approved this plan.

Should you have any enquiries in relation to this matter, please contact Genevieve Seed at the details above.

Yours sincerely,

A handwritten signature in blue ink that reads 'Howard Reed'.

Howard Reed  
**Director**  
**Resource Assessments**

3-8-17

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## 1 INTRODUCTION

The Mount Pleasant Operation (MPO) area is located in the Upper Hunter Valley of New South Wales (NSW), north-west of Muswellbrook and approximately 50 kilometres (km) north-west of Singleton (Figure 1). The villages of Aberdeen and Kayuga are located approximately 5 km north-northeast and 1 km north of the MPO boundary, respectively.

The development application for the MPO was made in 1997. This was supported by an Environmental Impact Statement (EIS) prepared by ERM Mitchell McCotter (ERM Mitchell McCotter, 1997). On 22 December 1999, the then Minister for Urban Affairs and Planning granted Development Consent DA 92/97 to Coal & Allied Operations Pty Ltd. This allowed for the “Construction and operation of an open cut coal mine, coal preparation plant, transport and rail loading facilities and associated facilities” at Mount Pleasant. The consent allowed for the extraction of 197 million tonnes (Mt) of run of mine (ROM) coal over a 21 year period, at a rate of up to 10.5 Mt of ROM coal per year.

The MPO Modification (MOD 1) was submitted for approval on 19 May 2010 with a supporting Environmental Assessment (EA) prepared by EMGA Mitchell McLennan (EMGA Mitchell McLennan, 2010), with the following changes proposed:

- The provision of an infrastructure envelope for siting the mine infrastructure.
- The provision of an optional conveyor/service corridor linking the MPO facilities with the Muswellbrook-Ulan Rail Line.
- Modification of the existing Development Consent DA 92/97 boundaries to accommodate the optional conveyor/service corridor and minor administrative boundary changes.

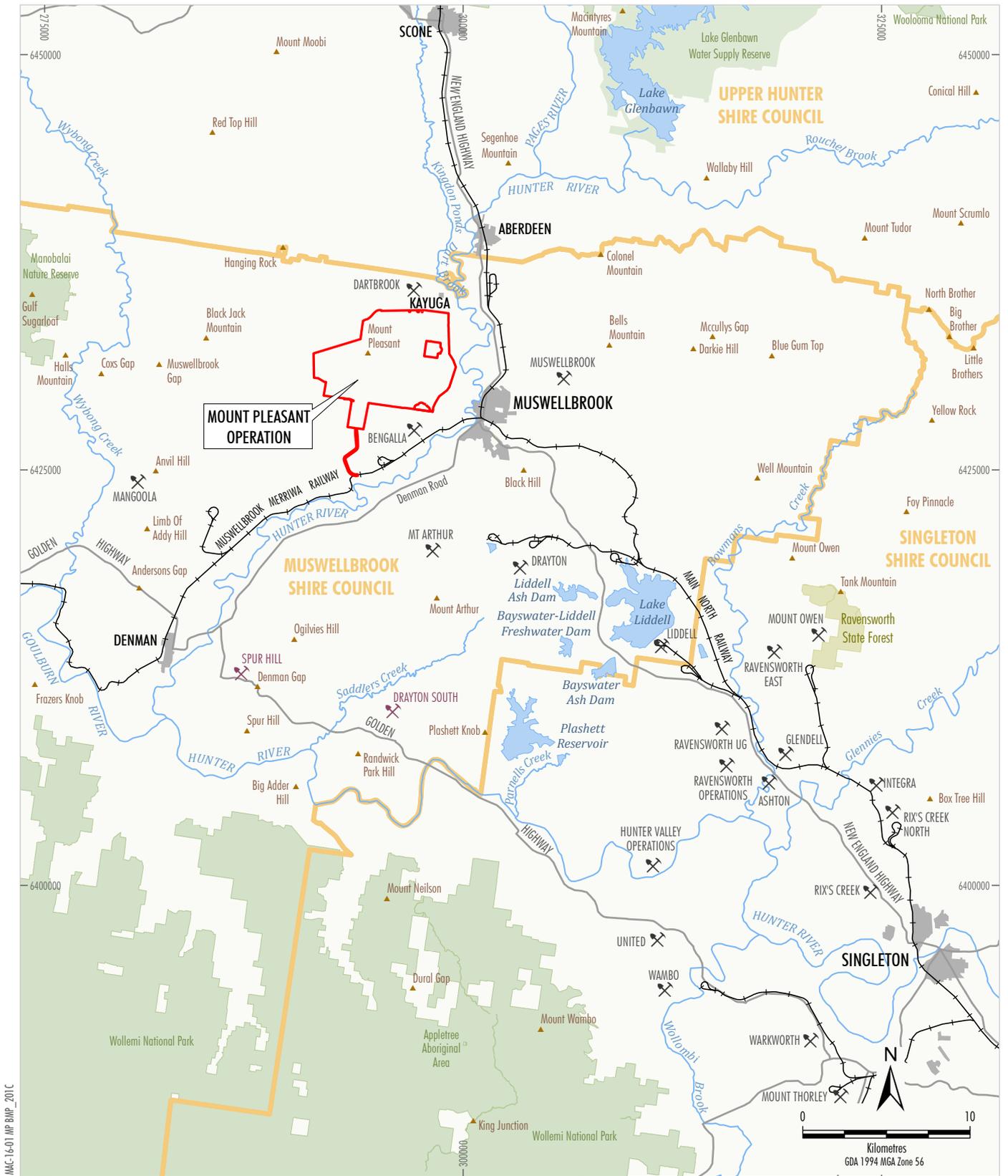
MOD 1 was approved on 19 September 2011.

The MPO South Pit Haul Road Modification (MOD 2) was submitted for approval on 30 January 2017 with a supporting EA prepared by MACH Energy Australia Pty Ltd (MACH Energy) (MACH Energy, 2017).

MOD 2 proposed to realign an indicative internal haul road to enable more efficient access to the South Pit open cut, with no other material changes to the approved MPO.

MOD 2 was approved on 29 March 2017.

The proponent of the MPO is MACH Energy, who purchased the MPO from Coal & Allied Operations Pty Ltd on 26 January 2016 and the acquisition was completed in August 2016.



AMC-16-01 MP BMP\_201C

Source: Geoscience Australia (2006); NSW Division of Resources & Energy (2017); Land and Property Information (2017)



- LEGEND**
- Mining Operation
  - Proposed Mining Operations (Application Lodged)
  - Mining Lease Boundary (Mount Pleasant)
  - Railway
  - Local Government Boundary
  - State Forest
  - National Parks and Wildlife Estate

**MACHEnergy**  
 MOUNT PLEASANT OPERATION  
 Project Location

Figure 1

## 2 PURPOSE AND SCOPE

This Blast Management Plan (BMP) has been prepared by MACH Energy to satisfy the requirements of Condition 17, Schedule 3 under Development Consent DA 92/97 as modified (Table 1). A comprehensive list of all conditions in Development Consent DA 92/97 relevant to blasting is provided in Appendix A.

**Table 1**  
**Specific Development Consent DA 92/97 Conditions**

MPO Development Consent DA 92/97 Schedule 3	Section Where Addressed in this BMP Document
17. <i>The Applicant must prepare and implement a Blast Management Plan for the development to the satisfaction of the Secretary. The plan must:</i>	This document.
<i>(a) be submitted to the Secretary for approval prior to carrying out any blasting on site;</i>	This document is to be approved by the NSW Department of Planning and Environment (DP&E).
<i>(b) describe the measures that would be implemented to ensure compliance with the relevant conditions of this consent;</i>	Sections 6, 9 and 11.
<i>(c) include a road closure management plan, prepared in consultation with Council;</i>	Appendix B.
<i>(d) include a blast monitoring program for evaluating compliance with the relevant conditions of approval; and</i>	Sections 10 and 13.
<i>(e) include a protocol that has been prepared in consultation with the owners of nearby mines (including Bengalla mine) for minimising and managing cumulative blasting impacts of the mines.</i>  <i>The Applicant must implement the approved management plan as approved from time to time by the Secretary.</i>	Section 9.5.3.

This BMP has been prepared to manage blasting related impacts associated with construction and operation of the MPO in accordance with Development Consent DA 92/97.

Blast fume will be managed in accordance with the Blast Fume Management Strategy (Appendix C) developed in accordance with the Australian Explosives Industry and Safety Group Inc. (AEISG) (2011) *Code of Practice Prevention and Management of Blast Generated NOx Gases in Surface Blasting* (Code of Practice).

The BMP applies to all employees and contractors at the MPO and covers all areas within the MPO boundary. The BMP applies to the life of the MPO, including (but not limited to) the period of mining operations specified in Development Consent DA 92/97, which currently permits mining until 22 December 2020. As required by Condition 5, Schedule 2 of Development Consent DA 92/97, the BMP will continue to apply (excluding mining operations) beyond 22 December 2020, as required, until the rehabilitation and any additional undertakings (required by the Secretary of the DP&E, or the Resources and Mining Division within the DP&E [RMD]) have been carried out satisfactorily.

## **2.1 PREVIOUS VERSIONS**

A previous version of the BMP was submitted by MACH Energy and was approved on 8 February 2017. This plan was restricted to initial construction blasting within the borrow pit areas.

## **2.2 CURRENT VERSION**

This version of the BMP has been prepared to replace the BMP described in Section 2.1. Accordingly, and consistent with Condition 17, Schedule 3 of Development Consent DA 92/97, this version of the BMP has been prepared to allow for both construction and operation of the MPO (i.e. including blasting within the borrow pits and open cuts).

### **3 FORMAT OF THE PLAN**

The BMP is prepared with the following sections:

- Section 1: Introduction.
- Section 2: Purpose and Scope – describes particular components of the BMP as specified in Development Consent DA 92/97 conditions.
- Section 3: Format of the Plan.
- Section 4: Statutory Obligations – MACH Energy’s statutory requirements and other obligations applicable to the BMP.
- Section 5: Blast Criteria – outlines the relevant blast criteria applicable to the MPO.
- Section 6: Performance Indicators – outlines the specific performance indicators that MACH Energy proposes to use to guide the implementation of the blast management measures and judge their performance.
- Section 7: Existing Environment – outlines the existing environment including baseline data and sensitive receptors in the vicinity of the MPO.
- Section 8: Blast Impacts and Predictions – outlines the potential impacts of blasting and predictions of previous assessments.
- Section 9: Blast Management and Control Measures – describes the blast management and control measures for all sensitive receivers.
- Section 10: Blast Monitoring Program – outlines the blast monitoring program components including locations, frequency and parameters.
- Section 11: Response Protocols – describes the blasting criteria review protocol, blast fume emergency response and pollution incident response.
- Section 12: Contingency Plan – provides a contingency plan to manage unprecedented impacts and their consequences.
- Section 13: Annual Review and Improvement of BMP – provides details for review and improvement of environmental performance relating to blasting.
- Section 14: Reporting Systems – describes the management and reporting of incidents, complaints and non-compliances.
- Section 15: References – provides references cited in this BMP.

## 4 STATUTORY OBLIGATIONS

MACH Energy's statutory obligations are contained in:

- the conditions of Development Consent DA 92/97 (as modified);
- the conditions of the Commonwealth Approvals (EPBC 2011/5795);
- relevant licences and permits and mining leases (MLs) (ML 1645, ML1708, ML 1709, ML 1750 and ML 1713); and
- other relevant legislation.

Obligations relevant to this BMP are described below.

### 4.1 DEVELOPMENT CONSENT DA 92/97

The conditions of Development Consent DA 92/97 relevant to the content and structure of this BMP are described below. A comprehensive list of all conditions in Development Consent DA 92/97 relevant to blasting is provided in Appendix A.

#### 4.1.1 Blast Management Plan Requirements

Condition 17, Schedule 3 of Development Consent DA 92/97 requires the preparation of a BMP (refer Table 1).

#### 4.1.2 Management Plan (General) Requirements

Condition 2, Schedule 5 of Development Consent DA 92/97 outlines the general management plan requirements that are applicable to the preparation of the BMP. Table 2 presents these requirements and indicates where each is addressed within this BMP.

**Table 2**  
**General Development Consent DA 92/97 Conditions**

MPO Development Consent DA 92/97 Schedule 5	Section Where Addressed in this BMP Document
2. <i>The Applicant must ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:</i>	
<i>(a) detailed baseline data;</i>	Section 7.
<i>(b) a description of:</i>	
<ul style="list-style-type: none"> <li>• <i>the relevant statutory requirements (including any relevant consent, licence or lease conditions);</i></li> </ul>	Section 4.
<ul style="list-style-type: none"> <li>• <i>any relevant limits or performance measures/criteria;</i></li> </ul>	Section 5.
<ul style="list-style-type: none"> <li>• <i>the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;</i></li> </ul>	Section 6.
<i>(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;</i>	Sections 9 and 11.

**Table 2 (continued)**  
**General Development Consent DA 92/97 Conditions**

MPO Development Consent DA 92/97 Schedule 5	Section Where Addressed in this BMP Document
(d) a program to monitor and report on the: <ul style="list-style-type: none"> <li>• impacts and environmental performance of the development;</li> <li>• effectiveness of any management measures (see c above);</li> </ul>	Sections 10 and 14.
(e) a contingency plan to manage any unpredicted impacts and their consequences;	Section 12.
(f) a program to investigate and implement ways to improve the environmental performance of the development over time;	Section 13.
(g) a protocol for managing and reporting any: <ul style="list-style-type: none"> <li>• incidents;</li> <li>• complaints;</li> <li>• non-compliances with statutory requirements; and</li> <li>• exceedances of the impact assessment criteria and/or performance criteria; and</li> </ul>	Section 14.
(h) a protocol for periodic review of the plan. <i>Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.</i>	Section 13.

#### 4.2 LICENCES, PERMITS AND LEASES

Blasting activities at the MPO will be conducted in accordance with a number of licences, permits and leases which have been issued or are pending issue. Key licences, permits and leases relating to blasting at the MPO include:

- ML 1645, ML 1708, ML 1709, ML 1713 and ML 1750 issued under Part 5 of the *NSW Mining Act, 1992* and approved by the Minister for Mineral Resources in December 2010.
- Environment Protection Licence (EPL) 20850 issued under Part 3 of the *NSW Protection of the Environment Operations Act, 1997* (PoEO Act) by the NSW Environment Protection Authority (EPA).
- Mining Operations Plan approved by the RMD.

#### 4.3 OTHER LEGISLATION

Other NSW Acts and Regulations that may be applicable to blasting at the MPO include, but are not limited to, the:

- *Explosives Act, 2003*;
- *Explosives Regulation, 2013*;
- *Roads Act, 1993*;
- *Work Health and Safety Act, 2011*;

- *Work Health and Safety Regulation, 2011;*
- *Work Health and Safety (Mines) Act, 2013; and*
- *Work Health and Safety (Mines) Regulation, 2014.*

## 5 BLAST CRITERIA

### 5.1 DEVELOPMENT CONSENT DA 92/97

Blasting criteria, blasting hours, blasting frequency, property inspections, property investigations and operating conditions are provided in Conditions 10 to 16, Schedule 3 of Development Consent DA 92/97.

The prescribed blasting criteria in Table 7 of Condition 10, Schedule 3 of Development Consent DA 92/97 is presented in Table 3. However, these criteria do not apply if MACH Energy has a written agreement with the relevant infrastructure provider/owner, and MACH Energy has advised the DP&E in writing of the terms of the agreement.

**Table 3  
Blasting Criteria**

Location	Airblast Overpressure (dB[Lin Peak])	Ground Vibration (mm/s)	Allowable Exceedance
<i>Residence on privately owned land</i>	120	10	0%
	115	5	5% of the total number of blasts over a period of 12 months
<i>Historic heritage sites<sup>1</sup></i>	-	10	0%
<i>All public infrastructure</i>	-	50	0%

mm/s = millimetres per second.

<sup>1</sup> The blasting criteria in relation to historic heritage sites applies to each historic heritage site until such a time as the relevant management requirements for the sites have been fulfilled. Refer to Section 9.4.2 for further detail.

### 5.2 OTHER LICENCE CONDITIONS

Blasting criteria and other blast related conditions stipulated in ML 1645, ML 1708, ML 1709, ML 1713 and ML 1750 and in EPL 20850 are generally consistent with those prescribed in Development Consent DA 92/97.

## **6 PERFORMANCE INDICATORS**

### **6.1 BLASTING CRITERIA**

The extent of compliance with the blasting criteria prescribed in Table 3 will be measured by compliance with the relevant criteria at the blast monitoring locations (refer Section 10.1).

### **6.2 BLASTING HOURS**

Unless otherwise agreed with the Director-General (now Secretary), blasting will only be carried out at the MPO between 9.00 am and 5.00 pm Monday to Saturday inclusive. The extent of compliance with the blasting hours restrictions will be measured by compliance with the requirement of Condition 11, Schedule 3 of Development Consent DA 92/97 that no blasting is allowed on Sunday, public holidays, or at any other time without the written approval of the Director-General (now Secretary).

### **6.3 BLASTING FREQUENCY**

Unless otherwise agreed with the Director-General (now Secretary), MACH Energy will carry out a maximum of:

- 1 blast per day; and
- 5 blasts per week, averaged over any calendar year.

A 'blast' refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the mine.

The extent of compliance with the blasting frequency limits will be measured by compliance with the requirement of Condition 12, Schedule 3 of Development Consent DA 92/97 considering however that this condition does not apply to:

- blasts that generate a ground vibration of 0.5 mm/s or less at any residence on privately owned land;
- blasts required to ensure the safety of the mine or its workers; or
- blast misfires, as defined in the definitions of Development Consent DA 92/97.

### **6.4 PROPERTY INSPECTIONS AND INVESTIGATIONS**

The extent of compliance with the requirements of Conditions 13 and 14, Schedule 3 of Development Consent DA 92/97 will be measured through annual reporting and the independent environmental audit.

### **6.5 OPERATING CONDITIONS**

The extent of compliance with the operating conditions prescribed in Condition 15, Schedule 3, will be measured by compliance with this BMP as indicated in annual reporting. Specific performance indicators for fume emissions are described in Section 8.4 (i.e. number of blasts classified as Level 3 or above).

The extent of compliance with the operating condition restrictions to blasting within 500 metres (m) of a public road, prescribed in Condition 16(a), Schedule 3 of Development Consent DA 92/97 will be measured by compliance with the Road Closure Management Plan (Appendix B), which was approved by the Muswellbrook Shire Council (MSC) on 16 May 2017.

The extent of compliance with the operating condition restrictions to blasting within 500 m of land outside the site<sup>1</sup> not owned by MACH Energy will be measured by the requirements of Condition 16, Schedule 3 of Development Consent DA 92/97 considering however that these restrictions do not apply if:

- MACH Energy has a written agreement with the relevant landowner to allow blasting to be carried out closer to the land, and MACH Energy has advised the DP&E (in writing) of the terms of the agreement; or
- MACH Energy has:
  - demonstrated to the satisfaction of the Director-General (now Secretary) that the blasting can be carried out closer to the land without compromising the safety of the people or livestock on the land, or damaging the buildings and/or structures on the land; and
  - updated this BMP to include the specific measures that would be implemented while blasting is being carried out within 500 m of the land.

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<sup>1</sup> The 'site' is defined in Development Consent DA 92/97 as the land listed in Appendix 1 of Development Consent DA 92/97.

## **7 EXISTING ENVIRONMENT**

### **7.1 BASELINE DATA**

Meteorological monitoring is undertaken at the MPO in accordance with Condition 24, Schedule 3 of Development Consent DA 92/97.

In accordance with Condition 15(c), Schedule 3 and Condition 11, Schedule 5 of Development Consent DA 92/97, up-to-date information on the proposed blasting schedule and a comprehensive summary of the monitoring results (including meteorological and blasting data) will be made publicly available on the MACH Energy website (<http://machenergyaustralia.com.au/>).

Blasting and blast monitoring is undertaken at the neighbouring Bengalla Mine in accordance with the requirements of State Significant Development (SSD) 5170 for the Continuation of the Bengalla Mine and is described in the relevant BMP.

Blast monitoring data (including measurements of overpressure and ground vibration at sample points in areas surrounding the mine) is made publicly available on the Bengalla Mine website (<http://www.bengalla.com.au/environment/environmental-monitoring-data/>).

As described in Section 9.2.1, no property inspection reports have been prepared to date.

### **7.2 SENSITIVE RECEPTORS**

Potentially sensitive (non-mine owned) features in the vicinity of the MPO include:

- private dwellings;
- public roads (including Wybong Road, Kayuga Road, Dorset Road and Castlerock Road);
- infrastructure (including 66 kilovolt [kV] and 11 kV electricity transmission lines and telecommunication cables); and
- heritage sites (including Aboriginal and historic heritage sites).

A description of the historic heritage sites is provided in the *Mount Pleasant Historic Heritage Study* (Veritas Archaeology and History Service, 2014) (as updated from time to time). Aboriginal heritage sites are described in the Aboriginal Heritage Management Plan. Copies of these plans are publicly available on MACH Energy's website (<http://machenergyaustralia.com.au/key-results-and-documents/>).

## **8 BLAST IMPACTS AND PREDICTIONS**

Blasting has the potential to result in the following hazards which may present a risk to public safety or property damage, if inappropriately managed:

- airblast overpressure exceedances;
- excessive ground vibration;
- flyrock, dust and debris;
- fumes; and
- misfires.

### **8.1 AIRBLAST OVERPRESSURE**

Blasting generates a transient air pressure greater than the surrounding atmospheric pressure, known as overpressure. An overpressure has the potential to damage buildings and infrastructure.

### **8.2 GROUND VIBRATION**

Energy released after a blast event can result in vibration of the ground which has the potential to damage buildings and infrastructure.

### **8.3 FLYROCK, DUST AND DEBRIS**

Flyrock is any rock material ejected from the blast site by the force of the blast. Flyrock has the potential to damage buildings and infrastructure and poses a risk to public safety.

The amount of dust and debris emitted from the blast site post-blast depends on several factors including the blast design and the rock material being blasted. The dust and debris poses a risk to public safety.

### **8.4 FUMES**

Blasting has the potential to generate post-blast gases (fumes) from the use of ammonium nitrate-based explosives which commonly include nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>) and are known as the Oxides of Nitrogen or NO<sub>x</sub>. Nitric oxide (NO) is invisible, and nitrogen dioxide (NO<sub>2</sub>) ranges from yellow to dark red depending on the concentration and size of the gas cloud (AEISG, 2011).

MACH Energy has developed a Blast Fume Management Strategy (Appendix C) which outlines specific management measures to minimise fumes at the MPO.

In accordance with the AEISG (2011) Code of Practice, MACH Energy will use a fume rating system for all blasts (Appendix C).

The number of blasts classified as Level 3 or above generated annually will be used as an indicator of blasting performance at the MPO.

### **8.5 MISFIRES**

A blast misfire can occur when one or more holes in a blast pattern fail to initiate, which results in a blast event which is different to the pre-blast assessment design.

## 8.6 BLAST PREDICTIONS

### 8.6.1 Environmental Impact Statement (1997)

Chapter 12 of the Mount Pleasant Mine EIS (ERM Mitchell McCotter, 1997) assessed the impacts of blasting for the MPO.

While it was noted that the overpressure and vibration levels predicted were below the criteria of 115 dB(Lin) and 5 mm/s, these were predicted using derived average (i.e. 50%) curves. It was recognised in the EIS that operational personnel would have some years of site-specific experience to draw upon in controlling blasting impacts including use of collected data to determine MPO scaled distance equations and refining blasting techniques before approaching sensitive receptors.

Higher levels of overpressure and vibration are generally associated with poor blast design and/or control of blasting operations, and in the case of overpressure, meteorological conditions. Factors which influence the levels of vibration and overpressure include:

- Design factors:
  - stemming length;
  - burden and spacing;
  - maximum instantaneous charge (MIC) weight; and
  - initiation sequence system;
- Control factors:
  - insufficient and/or quality of stemming;
  - inadequate burden and spacing;
  - overcharging of blast hole; and
  - inadequate delays between blast holes;
- Meteorological factors:
  - low cloud; and
  - presence of a temperature inversion.

It was identified in the EIS that when blasting in the north-east of the North Pit, strict control will be placed on blasting operations to ensure criteria are met at sensitive receptors at south-west Kayuga by:

- varying MIC design;
- no blasting to take place under low cloud conditions or where temperature inversions are inferred; and
- assessment of prevailing weather conditions by correlation of weather station data.

The EIS states that “... a network of blast monitors will be positioned around the area”.

### **8.6.2 Commission of Inquiry (1998-99)**

Appendix C.5 of the *Mount Pleasant Mine Commission of Inquiry – Primary Submission* (Coal & Allied Operations Pty Ltd, 1998) includes details of blast noise calculations (i.e. scaled distance equations) that was requested by the EPA to assist during the assessment to demonstrate the criterion at south-west Kayuga could be met (i.e. with varying MICs and distances).

*The Mount Pleasant Mine Commission of Inquiry – Submission in Reply* (Commissioner's Report) (Planning Environmental & Engineering Consultants, 1999) recognised that with appropriate blasting practice the EPA's criteria for vibration from blasting can be complied with at all relevant locations.

Other commitments of relevance to this BMP include:

- Blast overpressure and blasting would be monitored at select locations, using unmanned monitors with the capability to download information to a central computer.
- Initially, blast locations would be at a distance from residential areas, and monitoring would be used to refine blasting practices, to ensure that as blasting moves closer, relevant criteria will continue to be met.
- A 24-hour complaint hotline would be established, and procedures laid down for recording complaint details, resolving the complaint, and establishing follow-up contact with the complainant if required.

The Commissioner's Report (1999) also recommended that trial blasts be monitored in the vicinity of Racecourse Road to investigate any features of this area (i.e. if there is potential for harmonic enhancement in saturated alluvial soils) which may lead to structural damage of buildings under conditions which would normally be acceptable.

### **8.6.3 MOD 1 Environmental Assessment (2010)**

As the blasting aspects of the MPO remained the same for the MOD 1 EA (EMGA Mitchell McLennan, 2010), no further blasting assessment was undertaken and the EIS (ERM Mitchell McCotter, 1997) and Commission of Inquiry (Coal & Allied Operations Pty Ltd, 1998; Planning Environmental and Engineering Consultants, 1999) blast assessments described in Sections 8.6.1 and 8.6.2 remained unchanged.

## **9 BLAST MANAGEMENT AND CONTROL MEASURES**

### **9.1 PUBLIC SAFETY AND LIVESTOCK**

#### **9.1.1 Public Roads**

A Road Closure Management Plan (Appendix B) has been prepared by MACH Energy which details the specific management measures to minimise impacts when blasting within 500 m of a public road.

#### **9.1.2 Private Landowners**

No blasting within 500 m of land outside the site<sup>2</sup> not owned by MACH Energy will be undertaken unless one of the following conditions has been satisfied:

1. A written agreement has been made with the relevant landowner to allow blasting to be carried out closer to the land. Prior to blasting within 500 m of the land, MACH Energy will advise the DP&E in writing of the terms of the agreement.
2. MACH Energy has updated this BMP to include the specific measures that would be implemented while blasting is carried out within 500 m of the land and has demonstrated to the Secretary of the DP&E that the blasting can be carried out closer to the land without compromising the safety of the people or livestock on the land, or damaging the buildings and/or structures on the land.

As described in Section 9.5.4, private landholders and residents on the pre-blast notification register will be notified prior to blasting.

#### **9.1.3 Livestock**

Studies have been undertaken by Casaday and Lehmann (1967) and Heggies Australia Pty Ltd (Heggies) (2006), into the effects of vibration on livestock animals. The study by Casaday and Lehmann (1967) found that cattle were affected by sonic booms, measuring between 125 dB to 136 dB and that a conservative criterion of 125 dB be adopted for the purposes of assessment of livestock impacts. The study by Heggies (2006) found that cattle are commonly exposed to vibration levels in excess of 200 mm/s during road transportation with no adverse effects on cattle health. It was consequently presumed that there would only be an effect on cattle health at vibration levels well in excess of 200 mm/s.

Based on these two studies, MACH Energy would adopt the following blasting performance criteria for livestock:

- 125 dB(Lin Peak) airblast overpressure (Casaday and Lehmann, 1967); and
- 200 mm/s ground vibration (Heggies, 2006).

If MACH Energy receives a complaint from an owner of livestock within 1 km of an active blasting area regarding impacts on livestock, MACH Energy will investigate and undertake monitoring (as required and in consultation with the landowner) to ensure the performance indicators are being achieved. Locations and monitoring requirements will be determined as required, in consultation with affected landholders.

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<sup>2</sup> The 'site' is defined in Development Consent DA 92/97 as the land listed in Appendix 1 of Development Consent DA 92/97.

## **9.2 RESIDENTIAL LOCATIONS**

No blasting will be undertaken within 500 m of land outside the site<sup>3</sup> not owned by MACH Energy (including privately owned residences) unless the conditions outlined in Section 9.1.2 have been satisfied.

As described in Section 9.5.4, private landholders and residents on the pre-blast notification register will be notified prior to blasting.

### **9.2.1 Property Inspections and Investigations**

In accordance with Condition 1, Schedule 4 of Development Consent DA 92/97, all owners of privately-owned land within 2 km of the approved open cut at the MPO have been notified in writing that they are entitled to a property inspection to establish the baseline condition of any buildings and/or structures.

To date, no written requests for a property inspection have been received by MACH Energy and therefore no property inspection reports have been prepared, nor any other specific measures identified to minimise the potential blasting impacts of the MPO on such buildings and/or structures (as required by Condition 13, Schedule 3 of Development Consent DA 92/97).

Should any owners of privately-owned land within 2 km of the approved open cut claim that buildings and/or structures on their land have been damaged as a result of a blast event at the MPO, an investigation will be conducted by a suitably qualified, experienced and independent person whose appointment has been approved by the Secretary of the DP&E. The investigation will be commissioned within two months of the claim and a copy of the independent property investigation report provided by MACH Energy to the landowner upon its completion.

If the independent property investigation report confirms the landowners claim, and both parties agree with these findings, MACH Energy will repair the damages to the satisfaction of the Secretary of the DP&E.

However, if the landowner or MACH Energy disagrees with the findings of the independent property investigation report, then either party may refer the matter to the Secretary of the DP&E for resolution.

## **9.3 PUBLIC INFRASTRUCTURE**

Development Consent DA 92/97 includes ground vibration criteria of 50 mm/s for public infrastructure (e.g. rail and electrical infrastructure). In accordance with Development Consent DA 92/97, MACH Energy would comply with this limit unless a written agreement to increase this limit is established with the relevant infrastructure owner.

Blast vibration monitoring would be undertaken at a representative location when blasting is within 500 m of public infrastructure, unless otherwise agreed with the relevant infrastructure owner.

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<sup>3</sup> The 'site' is defined in Development Consent DA 92/97 as the land listed in Appendix 1 of Development Consent DA 92/97.

## 9.4 HERITAGE SITES

### 9.4.1 Aboriginal Heritage

Site types present within the MPO area include isolated finds, artefact scatters, scarred trees, knapping floors and stone sources. These site types are not considered to be susceptible to impacts from blasting (as these sites do not have an inherent structural component).

If any site types are identified during the life of the MPO that are more likely to be susceptible to blast vibration (e.g. grinding grooves), a monitoring program would be developed, implemented and included in a subsequent revision of the Aboriginal Heritage Management Plan.

### 9.4.2 Historic Heritage

Historic heritage sites will be managed in accordance with the *Mount Pleasant Historic Heritage Study* (Veritas Archaeology and History Service, 2014) (as updated from time to time).

In accordance with Condition 10, Schedule 3 of Development Consent DA 92/97, MACH Energy will design and manage blast events to limit ground vibration to 10 mm/s at historic heritage sites until they have been managed in accordance with the *Mount Pleasant Historic Heritage Study* (Veritas Archaeology and History Service, 2014) (as updated from time to time) (e.g. excavated, salvaged or demolished). If sites remain in situ, blast vibration monitoring will be undertaken either at the site, or at representative locations, when blasting is within 500 m of the site.

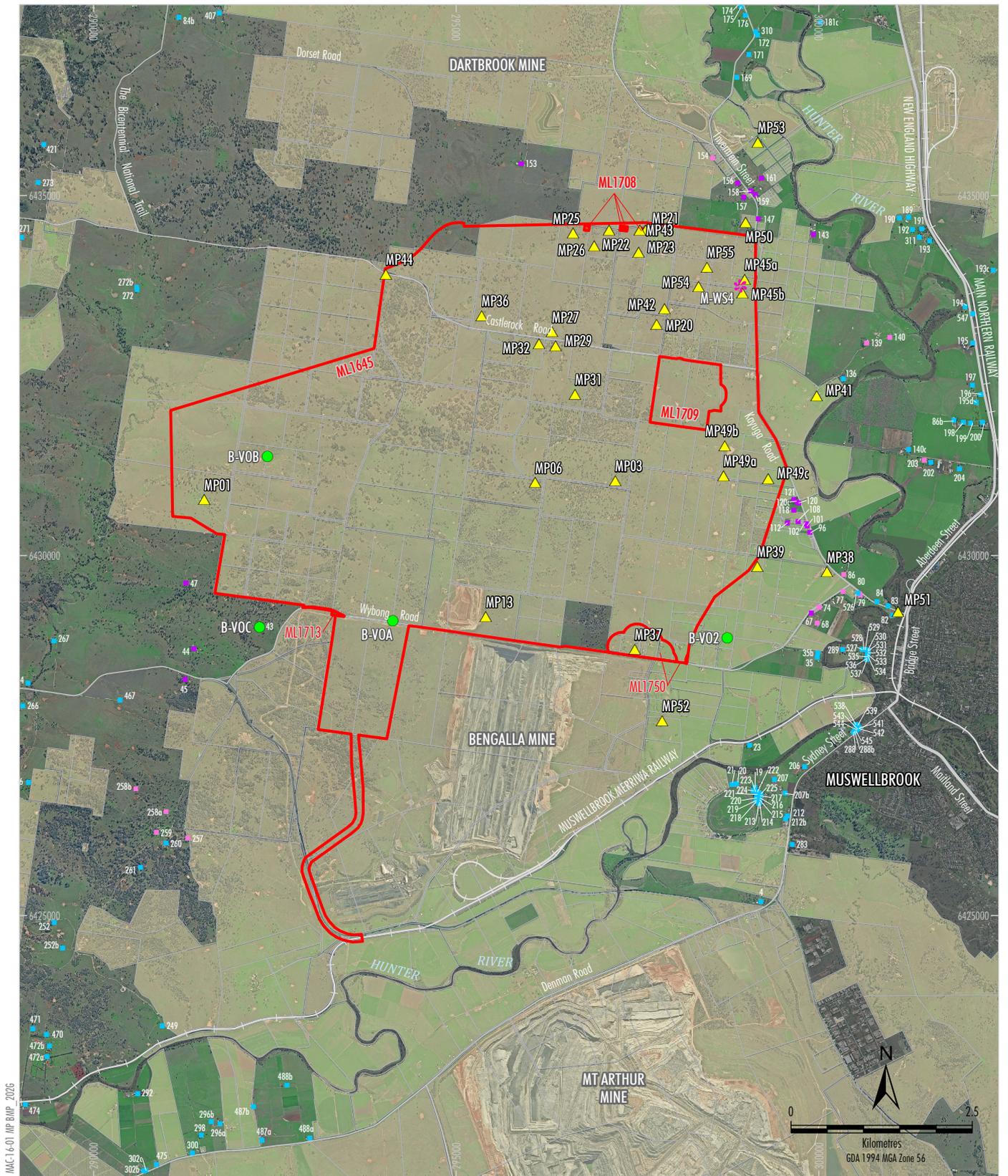
Relevant (i.e. not already managed) historic heritage sites are presented on Figure 2.

## 9.5 BLASTING CONTROLS / PROCEDURES

MACH Energy will design and manage blast events to meet all relevant statutory requirements to protect the safety of the public and livestock in the surrounding area and minimise the risk of impacts to residential locations, infrastructure and heritage sites.

Blast management procedures will include:

- training all relevant personnel on blast-related obligations and explosives management;
- use of appropriate initiation and detonation systems and adherence to blast loading and initiation designs;
- use of adequate burden, stemming lengths and stemming material to confine explosives;
- designing all blasts to comply with airblast overpressure and ground vibration limits;
- monitoring of blasts at all prescribed locations (refer Section 10);
- implementation of procedures to mitigate fumes for all blast events (Appendix C);
- calibration of site-specific blast models over time, using monitored data from previous blasting, to enable refinement and assessment for future blast events (refer Section 9.5.1);
- development of a blast records system which captures sufficient information to allow appropriate characterisation and comparison of blasts and meteorological conditions (refer Section 10.1.2);
- periodic review of blasting procedures to evaluate performance (refer Section 13); and
- evaluation of new technology and alternative blasting methodologies.



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- LEGEND**
- Mining Lease Boundary
  - Mine-owned Land
  - Privately-owned Residence - MPO Acquisition on Request
  - Privately-owned Residence - MPO Mitigation on Request
  - Other Privately-owned Residence
  - Blast Monitoring Site (Vibration/Overpressure)
  - ★ Weather Station
  - Relevant Historic Heritage Sites
  - ▲ Historic Heritage Site Subject to Blast Criteria

Source: NSW Land & Property Information (2017); NSW Division of Resources & Energy (2017); MACH Energy (2017)  
 Orthophoto: MACH Energy (Aug 2016)

**MACHEnergy**  
 MOUNT PLEASANT OPERATION  
 Blast Monitoring Locations

**Figure 2**

### **9.5.1 Pre-Blast Assessments (including Forecasting)**

Prior to each blast event, a pre-blast assessment will be prepared by the Drill and Blast Coordinator.

The pre-blast assessment will consider:

- establishing an appropriate blast exclusion zone based upon the nature of the blast;
- assessment of meteorological (e.g. wind speed and direction) conditions prior to the blast to identify all personnel, publicly accessible areas, private landholders, residential locations, infrastructure and heritage sites that may be affected;
- design of the blast (e.g. right product for the conditions);
- confirmation of radio contact with site personnel (if evacuation of work areas is required); and
- notification of all relevant external stakeholders (including those on the pre-blast notification register [Section 9.5.4]) prior to blasting.

The Drill and Blast Coordinator (or delegate) will review the pre-blast assessment and if it is identified that unfavourable blast conditions are forecast or if factors are present which may significantly increase dust or fume generation, the General Manager will be notified and will review the pre-blast assessment to determine the appropriate course of action.

A 'red light'/'green light' system will be used and refined throughout the life of the MPO, including updates to reflect changes in the mine design, community expectations and land ownership.

A forecasting model will be used as part of the pre-blast assessment system at the MPO to simulate potential dust and fume impacts from a blast event to allow for re-scheduling or re-design as required in advance of the blast event.

### **9.5.2 Dust and Fumes Strategy**

Strategies to minimise dust (during drilling and blasting) at the MPO are described in the Air Quality Management Plan as follows:

- Blasting will be conducted during daylight hours when dispersion conditions are favourable, unless otherwise required for safety reasons.
- Blasting will not be undertaken during adverse weather conditions without the prior approval of the Environmental Superintendent (or delegate).
- Production drill rigs will utilise water injection (or be fitted with dust mitigation, such as sprays) and dust aprons will be lowered during drilling. Production drill rigs will not be operated without adequate dust control.
- Adequate stemming will be used in drill holes at all times.

MACH Energy has developed a Blast Fume Management Strategy (Appendix C) based on the AEISG (2011) Code of Practice, which has considered the following factors and practices to minimise fume emissions for all blasts:

- explosive formulation and quality assurance;
- explosive product selection;
- on bench practices;
- rainfall;

- blast design;
- geological conditions;
- contamination of explosives;
- sleep time; and
- reporting and documenting.

All blasting will be designed to ensure compliance with the relevant conditions from Development Consent DA 92/97 (refer Sections 5 and 6).

### **9.5.3 Coordination with Nearby Mines (Cumulative Blasting Protocol)**

In accordance with Condition 17, Schedule 3 of Development Consent DA 92/97, MACH Energy has prepared a cumulative blasting protocol in consultation with nearby mines for minimising cumulative blasting impacts. This cumulative blasting protocol is detailed below.

The following mines have been identified nearby the MPO (Figure 1) and have been consulted with in respect to cumulative noise management:

- Bengalla Mine (immediately south);
- Mt Arthur Coal Mine (further south);
- Dartbrook Mine (immediately north);
- Mangoola Coal (south-west); and
- Muswellbrook Coal Mine (east).

Prior to each blasting event, MACH Energy will review the scheduled blasts listed on the MSC website (<http://www.muswellbrook.nsw.gov.au/index.php/blasting/blasting-announcements>). Communication via email, fax or telephone to representatives of each of the above mines will be undertaken. During this communication, MACH Energy will confirm with the above mines that the schedule listed on the MSC website is correct. Following communication, blast times will be rescheduled when there is potential for blasts to occur concurrently. Additionally, blasts will be coordinated with nearby mines (including the Bengalla Mine) so that back-to-back closures of public roads are avoided, where practical.

### **9.5.4 System to Notify Public of Blast Schedule**

Up-to-date information on the blasting schedule for residents will be made publicly available on MACH Energy's website (<http://machenergyaustralia.com.au/>).

MACH Energy will also inform the MSC of blast notices for placement on the MSC website: <http://www.muswellbrook.nsw.gov.au/index.php/blasting/blasting-announcements>.

MACH Energy will operate a Community Response Line (Phone Number: 1800 886 889). The Community Response Line is publicly advertised and operates 24 hours per day, seven days a week, to receive any queries (including those blast-related) from neighbouring residents or other stakeholders.

Any private landholder or resident that registers an interest in being informed of the MPO blasting schedule will be included in a pre-blast notification register (including contact details for notification via telephone, email or method otherwise agreed).

Private landholders and residents on the pre-blast notification register will be notified prior to blasting and will be re-notified if a blast event is delayed by more than two hours.

#### **9.5.5 Strict Control – South-West Kayuga**

When blasting in the north-east of the North Pit, strict control will be placed on blasting operations to ensure criteria are met at sensitive receptors at south-west Kayuga by:

- varying MIC design;
- no blasting to take place under low cloud conditions or where temperature inversions are inferred;  
and
- assessment of prevailing weather conditions by correlation of weather station data.

## 10 BLAST MONITORING PROGRAM

### 10.1 AIRBLAST OVERPRESSURE, VIBRATION AND FUME MONITORING

Airblast overpressure, ground vibration and fume monitoring will be conducted for every blast event.

Table 4 summarises the units of measure and sampling methods for each parameter monitored during a blast event.

**Table 4**  
**Units of Measure and Sampling Methods for Parameters Monitored**

Parameter	Units of Measure	Sampling Method
Airblast Overpressure	dB(Lin Peak)	Type 1 Noise Blast Logger
Ground Vibration	mm/s	Geophone Logger (or similar)
NOx Fume	AEISG (2011) Code of Practice Fume Rating System	Observation and Video

The locations of the blast monitoring equipment are outlined in Section 10.1.1.

Performance indicators to evaluate the extent of compliance with the relevant conditions of Development Consent DA 92/97 are provided in Section 6.

#### 10.1.1 Location of Monitoring Equipment

Permanent blast monitoring locations at the MPO are shown on Figure 2 and summarised in Table 5. Additional monitoring locations (portable and permanent) will also be used across the MPO, as required and as described in Table 5. As blasting locations move the location of monitoring will also move and therefore cannot be shown on Figure 2. For example, Table 5 describes that representative monitoring will be undertaken at the privately owned residence nearest any particular blast. Blast monitoring locations will be reviewed and where necessary relocated as a result of changes to the geographical location of the blast event or change to land ownership (where relevant).

Airblast overpressure and ground vibration monitoring will be established prior to commencement of any blasting events at the MPO. The final locations of the monitoring equipment will depend on accessibility and land ownership.

Blast monitoring instrumentation will be installed, calibrated and maintained in accordance with AS 2187.2-2006 *Explosives – Storage and use* and the manufacturer's specifications.

**Table 5**  
**Blast Monitoring Locations**

Location	Site ID	Parameters	Comment
Wybong Road	B-VO2	Airblast Overpressure and Ground Vibration	Permanent monitoring device located between MPO open cut and private receivers to the south-east (including Muswellbrook).
Wybong Road "Hillview"	B-VOA	Airblast Overpressure and Ground Vibration	Network of monitoring sites located on MACH Energy owned land and situated between initial blasting locations and the nearest representative private receiver locations. These initial sites would be utilised to commence validating site blasting laws and gather data for future blast designs.
Tailings Dam	B-VOB		
Wybong Road "Broomfield"	B-VOC		
Aboriginal Heritage Sites (where relevant)	N/A (portable or permanent as suitable)	Ground Vibration	Visual monitoring of representative sites within 500 m for the first blast in each area (e.g. borrow areas and open cut) (Section 9.4.1).
Historic Heritage Sites (where relevant)	N/A (portable or permanent as suitable)	Ground Vibration	Portable or permanent monitoring device to be used at the historic heritage sites (or representative site) when blasting within 500 m (Section 9.4.2).
Public Infrastructure	N/A (portable or permanent as suitable)	Ground Vibration	Portable or permanent monitoring device to be used at a representative location when blasting within 500 m (Section 9.3).
Public Roads (Wybong or Kayuga Road)	N/A (portable or permanent as suitable)	Airblast Overpressure and Ground Vibration	Portable or permanent monitoring device to be used at Wybong and/or Kayuga Road when blasting within 500 m (Appendix B).
Between Blast and Boundary of Premises	N/A (portable or permanent as suitable)	NOx Fume	Location of observation point would vary depending on prevailing weather conditions (Section 10.1).
On-site Weather Station	M-WS4	Wind Speed, Wind Direction, Sigma-theta, Temperature, Temperature Lapse Rate, Relative Humidity, Solar Radiation, Rainfall.	Meteorological conditions recorded continuously in accordance with Condition 24, Schedule 3 of Development Consent DA 92/97.
Nearest Private Receiver	N/A (portable or permanent as suitable)	Airblast Overpressure and Ground Vibration	Portable or permanent monitoring device to be used at a location(s) representative of the nearest private receiver.

### 10.1.2 Monitoring Records

Results of blast monitoring will be kept in a legible form for at least 4 years after each blast event. These records will be made available to any authorised officer of the EPA or DP&E if requested.

The following is recorded for each blast event:

- date and time;
- location and discrete area;
- blast monitoring locations;
- fume characteristics;
- fume classification level;
- meteorological conditions;
- recorded airblast overpressure and vibration at each blast monitoring location; and
- MIC.

A video of each blast will also be recorded.

The above monitoring records would be used, as required, to evaluate compliance with the conditions of Development Consent DA 92/97 as described in Section 13.

### 10.1.3 Racecourse Road

The Commissioner's Report (1999) (refer Section 8.6.2) recommended trial blasts be monitored in the vicinity of Racecourse Road due to complaints of residents regarding impacts from the Bengalla Mine at that time.

Since that time, Bengalla Mining Company has acquired a number of the properties located between Racecourse Road and the MPO. In addition, blast monitoring results for site BOY in the vicinity of Racecourse Road reported in the *Bengalla Annual Environment Management Report 2010* (Bengalla Mining Company, 2011) and *Bengalla Annual Environmental Management Report 2011* (Bengalla Mining Company, 2012) indicate a maximum ground vibration of 1.36 mm/s over 307 blasts, with an average ground vibration of 0.37 mm/s. This is well below the contemporary maximum ground vibration criteria for private dwellings of 10 mm/s (Table 3). Therefore, further trial blast monitoring is not considered to be warranted in the vicinity of Racecourse Road.

## 11 RESPONSE PROTOCOLS

### 11.1 BLASTING CRITERIA REVIEW PROTOCOL

A Blasting Criteria Review Protocol (refer Figure 3) will be implemented following each blast event. The Drill and Blast Coordinator will be responsible for initiation and implementation of the first stage of the Blasting Criteria Review Protocol.

Any exceedance of the blasting criteria in Section 5 will be investigated to determine the likely cause of the exceedance. The Initial Investigation (Figure 3) will consider if it is possible for the exceedance to have been caused by the MPO. This will include for example, review of the timing of the MPO blast versus the exceedance, review of the blast video footage and/or review of recorded waveforms. If the exceedance is possibly related to the MPO, immediate notification to the DP&E and the EPA will be undertaken and the Detailed Investigation will commence.

The Detailed Investigation (Figure 3) will seek to determine:

- whether the exceedance of the criteria was directly related to the blast or if environmental factors contributed to the exceedance;
- the primary cause of the incident;
- any contributing factors which led to the incident;
- whether appropriate controls were implemented to prevent the incident; and
- appropriate recommendations for improvement.

Incident reporting will be conducted as described in Section 14.1. Blast fume and pollution incidents will be investigated and reported as described in Sections 11.2 and 11.3 respectively.

Corrective and/or preventative actions will be assigned to relevant personnel as a result of the investigation. Actions will be communicated through planning meetings and toolbox talks, and outstanding actions will be monitored for their effectiveness upon completion.

All incidents<sup>4</sup> will be recorded and maintained for a period of no less than 4 years.

In the event that the Initial Investigation concludes that an exceedance of the blasting criteria in Section 5 was possibly due to a blasting event at the MPO, MACH Energy will notify (in writing) the affected landholders and tenants of the exceedance as soon as practicable and provide them with regular blast monitoring results, until the results show that the blasting at the MPO is complying with the blasting criteria.

Where an exceedance of the blasting criteria in Section 5 is determined (via the Detailed Investigation) to have been caused by a blast event at the MPO, MACH Energy will, on request, undertake property investigations in accordance with Condition 14, Schedule 3 of Development Consent DA 92/97.

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<sup>4</sup> A set of circumstances that causes or threatens to cause material harm to the environment, and/or breaches or exceeds the limits or performance measures/criteria in Development Consent DA 92/97.

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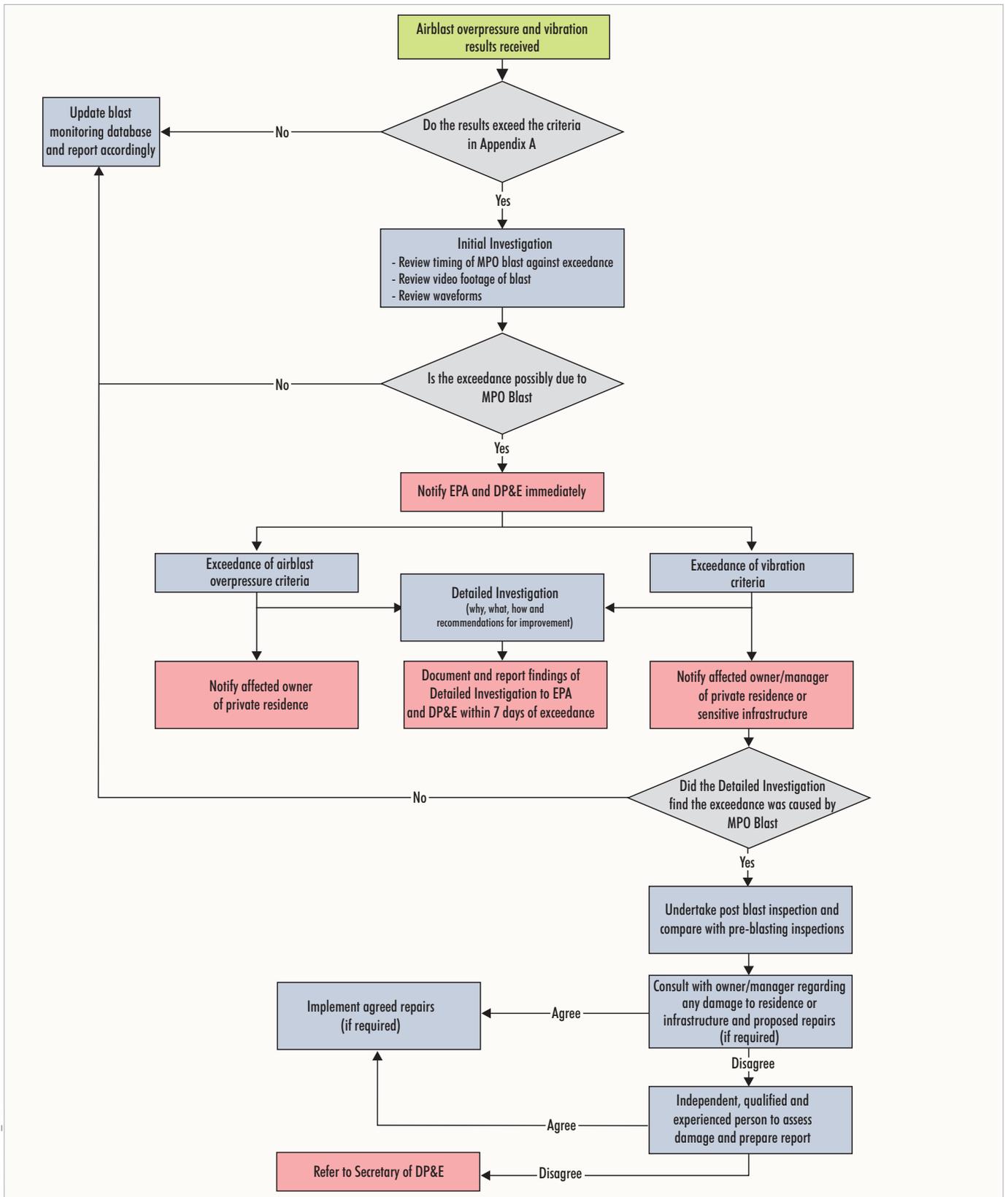


Figure 3

## 11.2 BLAST FUME EMERGENCY RESPONSE

### 11.2.1 On-Site Incident

Any person on-site (whether employee, contractor or visitor) who believes that they may have been exposed to blast fumes should report to their immediate supervisor to be treated according to the treatment protocol described in Section 11.2.3. The immediate supervisor will immediately notify the Environmental Superintendent, who, in turn, will notify the General Manager.

### 11.2.2 Off-Site Incident

As described in Appendix C, if a blast fume of Level 3 or above is expected to leave the site<sup>5</sup>, MACH Energy will notify the surrounding sensitive receivers<sup>6</sup>.

Notwithstanding, in the event that blast fumes rated at Level 3 or above leave the premises, the following actions will be undertaken:

- The Drill and Blast Coordinator will immediately notify the Environmental Superintendent that a fume event has occurred that may put members of the local community at risk.
- The Environmental Superintendent will immediately contact and notify the General Manager<sup>7</sup> of the risk.
- The General Manager will initiate the Pollution Incident Response as illustrated in the Pollution Incident Response Flowchart (Appendix D), including the notification of relevant sensitive receivers.

### 11.2.3 Treatment Protocol

Where a person on-site or a member of the public or community (e.g. off-site) has been exposed to blast fumes (NO<sub>x</sub>) or displays symptoms associated with blast fumes, MACH Energy will declare an incident and commence the Pollution Incident Response as illustrated on the Pollution Incident Response Flowchart (Appendix D), including the notification of relevant sensitive receivers.

In either case (e.g. if the affected person is on-site or off-site), the treatment protocol outlined below would be followed:

1. Activate a Site Emergency by calling “Emergency, Emergency, Emergency” on the designated Radio channel.
2. Initiate First Aid priorities (DRSABCD).
3. Remove the casualty from the area if safe to do so. Do not put yourself or others in danger. Transport the casualty to the First Aid Room. The casualty is to rest calmly in a comfortable position.
4. If the casualty is not exhibiting any respiratory symptoms, request an Oxygen Therapy Unit be on stand-by.
5. Call NSW Emergency Services (Telephone: 000) if external assistance is required and advise of possible exposure to Blasting Fume (NO<sub>x</sub>).

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<sup>5</sup> The ‘site’ is defined in Development Consent DA 92/97 as the land listed in Appendix 1 of Development Consent DA 92/97.

<sup>6</sup> Depending upon the meteorological conditions, residences within a reasonable distance (i.e. up to a maximum of 1 km) downwind of the blast site will be contacted. This is subject to the residences having a valid phone contact.

<sup>7</sup> If the General Manager position is vacant, the Environmental Superintendent will notify the Managing Director.

6. Undertake observations (pulse, respirations, oxygen levels and skin colour) every 15 minutes and document on the First Aid Treatment / Observation Sheet.
7. Request a guide be sent to wait and escort the ambulance on arrival to the relevant location.
8. Comfort and reassure the casualty. MACH Energy Representative to notify the next of kin of the situation.
9. If the casualty is unable to be transported to the First Aid Room, arrange for the Oxygen Therapy Unit and wait for the arrival of the Emergency Services.
10. If trained to do so, administer high concentration oxygen therapy if respiratory signs and symptoms commence (shortness of breath; cyanosis [blue tinge to lips/oral mucosa] etc.).
11. Do not give the casualty anything to drink or eat.
12. Assist the Emergency Services personnel if requested.
13. Request Information (Safety Data Sheet located within the First Aid Room) for Treating Medical Staff accompany Ambulance Officers to the Hospital. The “Information for the treating Doctor sheet” (Department of Natural Resources and Mines, 2011) (see example in Appendix E) and the First Aid Treatment / Observation Sheet is to accompany the casualty.
14. Post sentries to stop unauthorised people from entering the area.
15. Notify the relevant people of the situation who will escalate the information.
16. Investigation to be commenced.

### **11.3 POLLUTION INCIDENT RESPONSE**

MACH Energy has developed a Pollution Incident Response Management Plan as required by Condition O4.1 of EPL 20850.

MACH Energy will investigate and report pollution incidents as described in the Pollution Incident Response illustrated in the Pollution Incident Response Flowchart (Appendix D).

## 12 CONTINGENCY PLAN

In the event that a blast criterion detailed in Section 5 is considered to have been exceeded (during the implementation of the response protocols described in Section 11), MACH Energy will implement the following Contingency Plan:

- The Environmental Superintendent will report the likely exceedance within 24 hours of the exceedance investigation being concluded.
- MACH Energy will then report the exceedance of the blasting criteria to the EPA and DP&E immediately.
- MACH Energy will identify the appropriate course of action (including contingency measures where necessary [refer Section 12.1]) with respect to the identified blast impact(s), in consultation with technical specialists, DP&E and the EPA.
- MACH Energy will, in the event that there is a dispute over the proposed remedial course of action or if the actions conflict with current approvals, submit the appropriate course of the action to the DP&E for approval.
- MACH Energy will implement the approved course of action to the satisfaction of the DP&E.

### 12.1 POTENTIAL CONTINGENCY MEASURES

Potential contingency measures will be reviewed during revisions of this BMP during the life of the MPO. Key potential contingency measures to be implemented (following exceedance of blasting criteria and implementation of the response protocols) may include the following:

- MACH Energy will notify (in writing) the affected landholders and tenants of the exceedance as soon as practicable and provide them with regular blast monitoring results, until the results show that the blasting at the MPO is complying with the blasting criteria.
- MACH Energy will, on request, undertake property inspections and/or investigations in accordance with Conditions 13 and 14, Schedule 3 of Development Consent DA 92/97.
- MACH Energy will, in the event that the exceedance is in relation to a historic heritage site or public infrastructure, undertake a property inspection and/or investigation in accordance with Conditions 13 and 14, Schedule 3 of Development Consent DA 92/97.
- MACH Energy will determine specific measures (as identified by a suitably qualified, experienced and independent person whose appointment has been approved by the Secretary) that may be implemented at a building and/or structure on publicly or privately-owned land to minimise potential blasting impacts within 3 months of the investigation being completed.
- MACH Energy will determine specific measures (as identified by a suitably qualified, experienced and independent person whose appointment has been approved by the Secretary) that may be implemented at a historic heritage site to minimise potential blasting impacts within 3 months of the investigation being completed.
- MACH Energy will re-evaluate blast designs (e.g. MPO specific scaled distance equations – refer Section 8.6) to mitigate the potential for future exceedances of blast criteria, if blast monitoring results indicate this is required.

## **13 ANNUAL REVIEW AND IMPROVEMENT OF BMP**

### **13.1 ANNUAL REVIEW**

In accordance with Condition 3, Schedule 5 of Development Consent DA 92/97 MACH Energy will review and evaluate the environmental performance of the MPO by the end of March each year (for the preceding calendar year) or other such timing as agreed by the Secretary of the DP&E.

In relation to blasting, the Annual Review will:

- include a comprehensive review of the blast monitoring results and complaints records relating to the MPO over the past year, which includes a comparison of these results to evaluate compliance against the:
  - relevant statutory requirements, limits or performance measures/criteria (refer Section 6);
  - monitoring results of the previous years; and
  - relevant predictions in the EIS (refer Section 8.6);
- identify any blast non-compliance over the past year, and describe what actions were (or are being) taken to ensure compliance;
- identify any trends in the blast monitoring data over the life of the MPO;
- identify any discrepancies between the predicted and actual blast impacts of the MPO, and analyse the potential cause of any significant discrepancies; and
- describe what blast-related measures will be implemented over the next year to improve the environmental performance of the MPO.

The Annual Review will be made publicly available on the MACH Energy website in accordance with Condition 11, Schedule 5 of Development Consent DA 92/97.

### **13.2 BMP REVIEW**

In accordance with Condition 4, Schedule 5 of Development Consent DA 92/97, this BMP will be reviewed, and if necessary revised to the satisfaction of the Secretary of the DP&E, within three months of the submission of:

- an Annual Review (Condition 3, Schedule 5);
- an incident report (Condition 7, Schedule 5);
- an Independent Environmental Audit (Condition 9, Schedule 5); and/or
- any modification to the conditions of Development Consent DA 92/97.

Within four weeks of conducting a review of this BMP, MACH Energy will advise the Secretary of the DP&E of the outcomes of the review, and submit any revised documents for the approval of the Secretary.

In accordance with Condition 4A, Schedule 5 of Development Consent DA 92/97, MACH Energy may submit a revised BMP for the approval of the Secretary at any time, and may also submit any revision to this BMP required under Development Consent DA 92/97 on a staged basis.

If agreed with the Secretary of the DP&E, a revision of this BMP required under Development Consent DA 92/97 may be prepared without undertaking consultation with all parties nominated under the relevant Condition of Development Consent DA 92/97.

This BMP will be made publicly available on the MACH Energy website, in accordance with Condition 11, Schedule 5 of Development Consent DA 92/97.

## 14 REPORTING SYSTEMS

In accordance with Condition 2, Schedule 5 of Development Consent DA 92/97, MACH Energy has developed protocols for managing and reporting the following:

- incidents;
- complaints;
- non-compliances with statutory requirements; and
- exceedances of the impact assessment criteria and/or performance criteria.

In accordance with Condition 8, Schedule 5 of Development Consent DA 92/97, MACH Energy will provide regular reporting on the environmental performance of the MPO on the MACH Energy website.

Blast monitoring and management will be reported as part of the Annual Review described in Section 13.1 and in accordance with the reporting requirements of EPL 20850.

### 14.1 INCIDENT REPORTING

An incident is defined as a set of circumstances that causes or threatens to cause material harm to the environment, and/or breaches or exceeds the limits or performance measures/criteria in the Development Consent DA 92/97.

In the event that the Initial Investigation component of the Blasting Criteria Review Protocol (Section 11.1 and Figure 3) concludes that an exceedance of the relevant blast criteria has occurred (i.e. an incident), the event will be reported to the DP&E and EPA immediately.

The reporting of incidents will be conducted in accordance with Condition 7, Schedule 5 of Development Consent DA 92/97 and in accordance with the protocol for industry notification of pollution incidents under Part 5.7 of the PoEO Act. MACH Energy will notify the Secretary of the DP&E and any other relevant agencies, in accordance with the Pollution Incident Response Management Plan, immediately after the authorised person becomes aware of the incident which causes or threatens to cause material harm to the environment. MACH Energy's Pollution Incident Response Flowchart is provided in Appendix D.

Within seven days of the date of the incident, MACH Energy will provide the Secretary of the DP&E and any other relevant agencies with a detailed report on the incident. The report will:

- describe the date, time and nature of the exceedance/incident;
- identify the cause (or likely cause) of the exceedance/incident;
- describe what action has been taken to date; and
- describe the proposed measures to address the exceedance/incident.

MACH Energy will also provide regular monitoring results to the affected landowners and tenants until the results show that the MPO is complying with the relevant criteria.

## 14.2 COMPLAINTS

MACH Energy will maintain a Community Hotline (Phone Number: 1800 886 889) that is dedicated to the receipt of community complaints, enquiries or information. The Community Hotline will be publicly advertised in a variety of MACH Energy's public communication tools and will be available during construction and operating hours, to receive any complaints or enquiries from neighbouring residents or other stakeholders.

MACH Energy has developed a procedure which outlines its commitment to receiving, responding to and maintaining a record of phone calls from the community. This procedure is supported by a Community and Stakeholder Engagement Database.

Following receipt of a complaint via the Community Hotline (or otherwise), MACH Energy will undertake the following procedure:

1. Within 24 hours of receiving the complaint, respond to the complainant.
2. Implement immediate action in response to the complaint, if necessary.
3. Record initial details of the complaint in the Community and Stakeholder Engagement Database and communicate a summary of the complaint to relevant MACH Energy personnel.
4. Undertake an investigation into the cause of the complaint, identify actions to address the complaint and assign to responsible personnel.
5. Communicate outcomes of the investigation and any actions undertaken/proposed to be undertaken to the complainant.
6. Record investigation and follow up details in the Community and Stakeholder Engagement Database and undertake any other complaints reporting requirements as necessary.

The following details will be recorded in the Community and Stakeholder Engagement Database:

- the date and time of the contact;
- the method by which engagement was made;
- any personal details provided or, if no such details were provided, a note to that effect;
- the nature of the contact;
- relevant monitoring results and meteorological data at the time of the contact;
- the actions taken by MACH Energy in relation to the contact, including any follow-up that is required with the person contacting the MPO; and
- if no action was taken by MACH Energy, the reasons why no action was taken.

In the event of a complaint, investigations will commence within 24 hours of contact to ensure the likely cause of the complaint is determined (e.g. considering meteorological conditions and nature of mining activities) and, where practical and/or required, mitigating actions will be executed. This investigation will be used to develop appropriate mitigation measures (if relevant) that will be presented to the party who contacted the MPO. Consideration will also be given to how adjustments to existing management/operational approaches could be applied across the MPO, if appropriate.

In accordance with Condition 11, Schedule 5 of Development Consent DA 92/97, the Community and Stakeholder Engagement Database will be updated monthly and made available on the MACH Energy website.

### **14.3 NON-COMPLIANCES**

Compliance with all approvals, plans and procedures will be the responsibility of all personnel (staff and contractors) employed on or in association with the MPO.

The Environmental Superintendent will undertake regular inspections, internal audits and initiate directions identifying any remediation/rectification work required, and areas of actual or potential non-compliance.

MACH Energy will notify the Secretary of the DP&E and any other relevant agencies of any incident associated with the MPO that causes or threatens to cause material harm to the environment immediately after MACH Energy becomes aware of the incident. Within seven days of the date of the incident, MACH Energy will provide the Secretary of the DP&E and any other relevant agencies with a detailed report on the incident.

In addition, within two weeks of obtaining monitoring results showing an exceedance of the criteria detailed in Development Consent DA 92/97 and completion of the protocol for determining if an exceedance is a non-compliance, MACH Energy shall, in accordance with Condition 2, Schedule 4 of Development Consent DA 92/97, notify affected landowners and tenants in writing of the exceedance, and provide regular monitoring results to each of these parties until the MPO is complying with the relevant criteria.

A review of the MPO compliance with all conditions in Development Consent DA 92/97, MLs and all other approvals and licences will be undertaken prior to (and included within) each Annual Review. The Annual Review will be made publicly available on the MACH Energy website in accordance with Condition 11, Schedule 5 of Development Consent DA 92/97.

### **14.4 EXCEEDANCES**

Details regarding the response protocol, including reporting procedures, for the exceedance of MPO blasting criteria are outlined in Section 11.

## 15 REFERENCES

- Australian Explosives Industry and Safety Group Inc (2011) *Code of Practice Prevention and Management of Blast Generated NOx Gases in Surface Blasting*.
- Bengalla Mining Company (2011) *Bengalla Annual Environment Management Report 2010*.
- Bengalla Mining Company (2012) *Bengalla Annual Environment Management Report 2011*.
- Casaday and Lehmann (1967) *Response of Farm Animals to Sonic Booms*.
- Coal & Allied Operations Pty Ltd (1998) *Mount Pleasant Mine Commission of Inquiry – Primary Submission*.
- Department of Natural Resources and Mines (2011) *Prevention and management of blast fumes*. Version 2. Queensland Government.
- EMGA Mitchell McLennan (2010) *Mount Pleasant Project Modification Environmental Assessment*.
- ERM Mitchell McCotter (1997) *Mount Pleasant Mine Environmental Impact Statement*.
- Heggies Australia Pty Ltd (2006) *Report on Vibration Effects in Transported Cattle*. Appendix D of the Albion Park Quarry Extension Revised Blast Management Plan. Accessed from: <http://www.clearybros.com.au/system/files/f1/f36/f43/o382/Blast%20Management%20Plan%2018%20Nov%202015.pdf>
- MACH Energy Australia Pty Ltd (2017) *Mount Pleasant Operation (DA 92/97) – South Pit Haul Road Modification*.
- Planning Environmental & Engineering Consultants (1999) *Mount Pleasant Mine Commission of Inquiry – Submission in Reply*.
- Veritas Archaeology and History Service (2014) *Mount Pleasant Historic Heritage Study*.

**APPENDIX A**

**BLAST RELATED DEVELOPMENT CONSENT DA 92/97 CONDITIONS**

**Table A1  
Blast Related Development Consent DA 92/97 Conditions**

Development Consent DA 92/97		BMP Section																			
<b>Schedule 3</b>																					
<p><b>Blast Management Plan</b></p> <p>17. The Applicant must prepare a Blast Management Plan for the development to the satisfaction of the Secretary. This plan must:</p> <ul style="list-style-type: none"> <li>(a) be submitted to the Director-General for approval prior to carrying out any blasting on site;</li> <li>(b) describe the measures that would be implemented to ensure compliance with the relevant conditions of this consent;</li> <li>(c) include a road closure management plan, prepared in consultation with Council;</li> <li>(d) include a blast monitoring program for evaluating compliance with the relevant conditions of approval; and</li> <li>(e) include a protocol that has been prepared in consultation with the owners of nearby mines (including the Bengalla mine) for minimising and managing cumulative blasting impacts of the mines.</li> </ul> <p>The Applicant must implement the approved management plan as approved from time to time by the Secretary.</p>		<p>This document (refer Table 1)</p>																			
<p><b>Blasting Criteria</b></p> <p>10. The Applicant must ensure that the blasting on the site does not cause exceedances of the criteria in Table 7.</p> <p>Table 7: Blasting Criteria</p> <table border="1"> <thead> <tr> <th align="center">Location</th> <th align="center">Airblast Overpressure (dB[Lin Peak])</th> <th align="center">Ground Vibration (mm/s)</th> <th align="center">Allowable Exceedance</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Residence on privately owned land</td> <td align="center">120</td> <td align="center">10</td> <td align="center">0%</td> </tr> <tr> <td align="center">115</td> <td align="center">5</td> <td align="center">5% of the total number of blasts over a period of 12 months</td> </tr> <tr> <td>Historic heritage sites</td> <td align="center">-</td> <td align="center">10</td> <td align="center">0%</td> </tr> <tr> <td>All public infrastructure</td> <td align="center">-</td> <td align="center">50</td> <td align="center">0%</td> </tr> </tbody> </table> <p>However, these criteria do not apply if the Applicant has a written agreement with the relevant owner or infrastructure provider/owner, and the Applicant has advised the Department in writing of the terms of this agreement.</p>		Location	Airblast Overpressure (dB[Lin Peak])	Ground Vibration (mm/s)	Allowable Exceedance	Residence on privately owned land	120	10	0%	115	5	5% of the total number of blasts over a period of 12 months	Historic heritage sites	-	10	0%	All public infrastructure	-	50	0%	<p>Section 5.1 (refer Table 3)</p>
Location	Airblast Overpressure (dB[Lin Peak])	Ground Vibration (mm/s)	Allowable Exceedance																		
Residence on privately owned land	120	10	0%																		
	115	5	5% of the total number of blasts over a period of 12 months																		
Historic heritage sites	-	10	0%																		
All public infrastructure	-	50	0%																		
<p><b>Blasting Hours</b></p> <p>11. 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.</p>		<p>Section 6.2</p>																			
<p><b>Blasting Frequency</b></p> <p>12. Unless otherwise agreed by the Secretary, the Applicant may carry out a maximum of:</p> <ul style="list-style-type: none"> <li>(a) 1 blast a day; and</li> <li>(b) 5 blasts a week, averaged over any calendar year;</li> </ul> <p>for the development.</p> <p>This condition does not apply to blasts that generate ground vibration of 0.5 mm/s or less at any residence on privately-owned land, or to blasts required to ensure the safety of the mine or its workers.</p> <p>Note: For the purposes of this condition, a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the mine.</p>		<p>Section 6.3</p>																			

**Table A1 (Continued)**  
**Blast Related Development Consent DA 92/97 Conditions**

Development Consent DA 92/97	BMP Section
<b>Schedule 3 (Continued)</b>	
<p><b>Property Inspections</b></p> <p>13. If the Applicant receives a written request from the owner of any privately-owned land within 2 kilometres of the approved open cut mining pit/s 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 Applicant must:</p> <p>(a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties, to:</p> <ul style="list-style-type: none"> <li>• establish the baseline condition of the buildings and/or structures on the land, or update the previous property inspection report;</li> <li>• identify any measures that should be implemented to minimise the potential blasting impacts of the development on these buildings and/or structures; and</li> </ul> <p>(b) give the landowner a copy of the new or updated property inspection report.</p> <p>If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Applicant or the landowner disagrees with the findings of the property inspection report, either party may refer to the Secretary for resolution.</p>	Section 9.2.1
<p><b>Property Investigations</b></p> <p>14. If the owner of any privately-owned land 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 claim the Applicant must:</p> <p>(a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties, to investigate the claim; and</p> <p>(b) give the landowner a copy of the property investigation report.</p> <p>If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Applicant or the landowner disagrees with the findings of the property investigation report, either party may refer to the Secretary for resolution.</p> <p>If this independent property investigation confirms the landowner’s claim, and both parties agree with these findings, then the Applicant must repair the damages to the satisfaction of the Secretary.</p> <p>If the Applicant or landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Secretary for resolution.</p>	Section 9.2.1
<p><b>Blast Operating Conditions</b></p> <p>15. The Applicant must:</p> <p>(a) implement best blasting management practice on site to:</p> <ul style="list-style-type: none"> <li>• protect the safety of people and livestock in the surrounding area;</li> <li>• protect public or private infrastructure/property in the surrounding area;</li> <li>• minimise the dust and fume emissions of the blasting on site; and</li> <li>• minimise blasting impacts on heritage items in the vicinity of the site;</li> </ul> <p>(b) co-ordinate the blasting on site with the blasting at nearby mines (including the Bengalla mine) to minimise the cumulative blasting impacts of the mines; and</p> <p>(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 Secretary.</p>	<p>Section 9</p> <p>Section 9.5.3</p> <p>Section 9.5.4</p>

**Table A1 (Continued)**  
**Blast Related Development Consent DA 92/97 Conditions**

Development Consent DA 92/97	BMP Section
<b>Schedule 3 (Continued)</b>	
<p>16. The Applicant must not undertake blasting within 500 metres of:</p> <p>(a) a public road without the approval of Council; and</p> <p>(b) any land outside the site not owned by the Applicant, unless:</p> <ul style="list-style-type: none"> <li>• 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</li> <li>• the Applicant has: <ul style="list-style-type: none"> <li>- demonstrated to the satisfaction of the Secretary that the blasting can be carried out closer to the land without compromising the safety of the people or livestock on the land, or damaging the buildings and/or structures on the land; and</li> <li>- 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.</li> </ul> </li> </ul>	<p>Section 9.1.1 and Appendix B</p> <p>Section 9.1.2</p>
<b>Blast Related Aboriginal Heritage Management Plan</b>	
<p>36. The Applicant shall prepare and implement a Aboriginal Heritage Management Plan for the development to the satisfaction of the Director-General. This plan must:</p> <p>...</p> <p>(c) include:</p> <ul style="list-style-type: none"> <li>• ...</li> <li>• a description of the measures that would be implemented to: <ul style="list-style-type: none"> <li>- ...</li> <li>- minimise the blasting impacts of the development on Aboriginal objects in the vicinity of the site; ...</li> </ul> </li> </ul>	<p>Section 9.4.1 (and refer to separate Aboriginal Heritage Management Plan)</p>
<b>Schedule 4</b>	
<b>NOTIFICATION OF LANDOWNERS</b>	
<p>1. By the end of December 2011, the Applicant must:</p> <p>(a) notify in writing the owners of:</p> <ul style="list-style-type: none"> <li>• ...</li> <li>• any privately-owned land within 2 kilometres of the approved open cut mining pit on the site that they are entitled to ask for an inspection to establish the baseline condition of any buildings and/or structures on their land, or to have a previous property inspection updated; and ...</li> </ul>	<p>Section 9.2.1</p>
<p>2. As soon as practicable after obtaining monitoring results showing:</p> <p>(a) exceedance of the relevant criteria in Schedule 3, the Applicant must notify the affected landowner and tenants in writing of the exceedance, and provide regular monitoring results to each of these parties until the development is complying with the relevant criteria again; ...</p>	<p>Section 11.1</p>

**APPENDIX B**  
**ROAD CLOSURE MANAGEMENT PLAN**

## MOUNT PLEASANT OPERATION ROAD CLOSURE MANAGEMENT PLAN

<b>Document ID:</b>	00843853		
<b>Company:</b>	MACH Energy Australia Pty Ltd		
<b>Effective Date:</b>	16/05/2017	<b>Status:</b>	Final
<b>Endorsed By:</b>	Klay Marchant	<b>Revision Number:</b>	V3

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## 1 INTRODUCTION

The Mount Pleasant Operation (MPO) area is located in the Upper Hunter Valley of New South Wales, north-west of Muswellbrook and approximately 50 kilometres (km) north-west of Singleton (Figure 1). The villages of Aberdeen and Kayuga are located approximately 12 km north - northeast and 3 km north of the Project boundary, respectively.

The development application for the MPO was made in 1997. This was supported by an Environmental Impact Statement (EIS) prepared by ERM Mitchell McCotter (ERM Mitchell McCotter, 1997). On 22 December 1999, the then Minister for Urban Affairs and Planning granted Development Consent DA 92/97 to Coal & Allied Operations Pty Ltd. This allowed for the “Construction and operation of an open cut coal mine, coal preparation plant, transport and rail loading facilities and associated facilities” at Mount Pleasant. The consent allowed for the extraction of 197 million tonnes (Mt) of run of mine (ROM) coal over a 21 year period, at a rate of up to 10.5 Mt of ROM coal per year.

The MPO Modification (MOD 1) was submitted for approval on 19 May 2010 with a supporting Environmental Assessment (EA) prepared by EMGA Mitchell McLennan (EMGA Mitchell McLennan, 2010), with the following changes proposed:

- The provision of an infrastructure envelope for siting the mine infrastructure.
- The provision of an optional conveyor/service corridor linking the MPO facilities with the Muswellbrook-Ulan Rail Line.
- Modification of the existing Development Consent DA 92/97 boundaries to accommodate the optional conveyor/service corridor and minor administrative boundary changes.

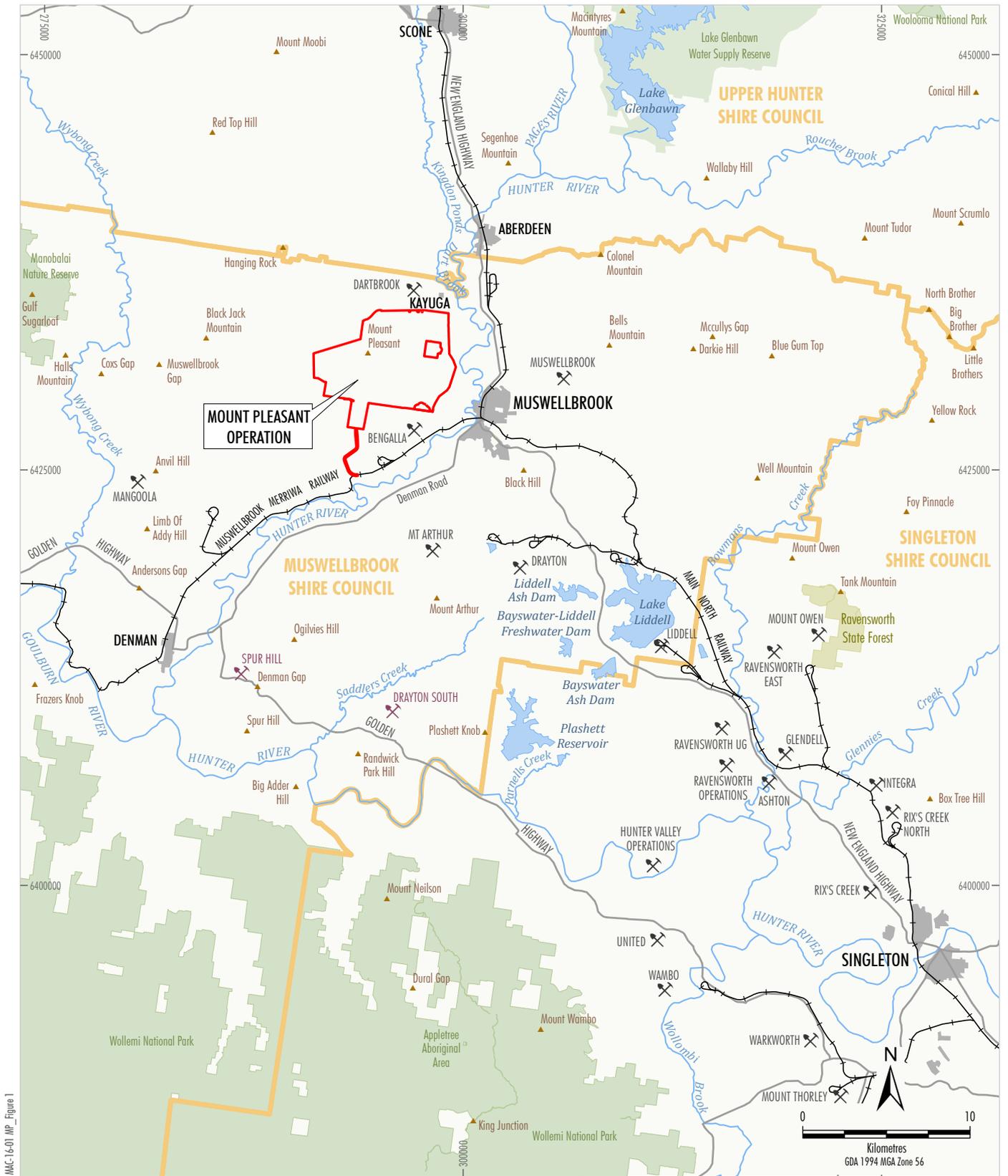
MOD 1 was approved on 19 September 2011.

The MPO South Pit Haul Road Modification (MOD 2) was submitted for approval on 30 January 2017 with a supporting EA prepared by MACH Energy Australia Pty Ltd (MACH Energy) (MACH Energy, 2017).

MOD 2 proposed to realign an indicative internal haul road to enable more efficient access to the South Pit open cut, with no other material changes to the approved MPO.

MOD 2 was approved on 29 March 2017.

The proponent of the MPO is MACH Energy, who purchased the MPO from Coal & Allied Operations Pty Ltd on 26 January 2016 and the acquisition was completed in August 2016.



AMC-16-01\_MP\_Figure 1

Source: Geoscience Australia (2006); NSW Division of Resources & Energy (2017); Land and Property Information (2017)



- LEGEND**
- Mining Operation
  - Proposed Mining Operations (Application Lodged)
  - Mining Lease Boundary (Mount Pleasant)
  - Railway
  - Local Government Boundary
  - State Forest
  - National Parks and Wildlife Estate

**MACHEnergy**  
 MOUNT PLEASANT OPERATION  
 Project Location

Figure 1

## 2 PURPOSE AND SCOPE

This Road Closure Management Plan (RCMP) has been prepared by MACH Energy as a component of the Blast Management Plan (BMP) to satisfy the requirements of Condition 17(c), Schedule 3 under Development Consent DA 92/97 as modified (Table 1).

**Table 1**  
**Specific Development Consent DA 92/97 Conditions**

MPO Development Consent DA 92/97 Schedule 3	Section Where Addressed
<p>17. <i>The Applicant must prepare a Blast Management Plan for the development to the satisfaction of the Secretary. This plan must: ...</i></p> <p>...</p> <p><i>(c) include a road closure management plan, prepared in consultation with Council; ...</i></p>	<p>This document (refer Section 9.3 and Appendices A and B)</p>

This RCMP describes the management of blasting when being carried out within 500 m of a public road and associated traffic controls.

The RCMP applies to all employees and contractors at the MPO and covers all areas within the MPO boundary. The RCMP applies to the life of the MPO, including (but not limited to) the period of mining operations specified in Development Consent DA 92/97, which currently permits mining until 22 December 2020. As required by Condition 5, Schedule 2 of Development Consent DA 92/97, the RCMP will continue to apply (excluding mining operations) beyond 22 December 2020, as required, until the rehabilitation and any additional undertakings (required by the Secretary of the DP&E, or the Resources and Mining Division within the DP&E [RMD]) have been carried out satisfactorily.

The RCMP has been prepared cognisant of Muswellbrook Shire Council (MSC) review comments for blasting and road closure procedures for nearby mine operations (i.e. Bengalla Mine) on the same section of Wybong Road.

### 3 FORMAT OF THE PLAN

The RCMP is prepared with the following sections:

- Section 1: Introduction.
- Section 2: Purpose and Scope – describes particular components of the RCMP as specified in the Development Consent DA 92/97 conditions.
- Section 3: Format of the Plan.
- Section 4: Statutory Obligations – MACH Energy’s statutory requirements and other obligations applicable to the RCMP.
- Section 5: Blast Criteria – outlines the relevant blast criteria applicable to the MPO relating to all public infrastructure.
- Section 6: Performance Indicators – outlines the specific performance indicators that MACH Energy proposes to use to guide the implementation of the blast management measures and judge their performance.
- Section 7: Existing Environment – outlines the existing environment including baseline data and public roads in the vicinity of the MPO.
- Section 8: Blast Impacts and Predictions – outlines the potential impacts of blasting and predictions of previous assessments.
- Section 9: Blast Management and Control Measures – describes the blast management and control measures for all public roads.
- Section 10: Blast Monitoring Program – outlines the blast monitoring program components for public roads including locations, frequency and parameters.
- Section 11: Response Protocols – describes the blasting criteria review protocol, blast fume emergency response and pollution incident response.
- Section 12: Contingency Plan – provides a contingency plan to management unprecedented impacts and their consequences.
- Section 13: Annual Review and Improvement of RCMP – provides details for review and improvement of environmental performance relating to blasting.
- Section 14: Reporting Systems – describes the management and reporting of incidents, complaints and non-compliances.
- Section 15: References – provides references cited in this RCMP.

## 4 STATUTORY OBLIGATIONS

MACH Energy’s statutory obligations are contained in:

- the conditions of Development Consent DA 92/97 (as modified);
- the conditions of the Commonwealth Approvals (EPBC 2011/5795);
- relevant licences and permits and mining leases (MLs) (ML 1645, ML 1708, ML 1709, ML 1750 and ML 1713); and
- other relevant legislation.

Obligations relevant to this RCMP are described below.

### 4.1 DEVELOPMENT CONSENT DA 92/97

The conditions of Development Consent DA 92/97 relevant to the content and structure of this RCMP are described below.

#### 4.1.1 Road Closure Management Plan Requirements

Condition 17(c), Schedule 3 of Development Consent DA 92/97 requires the preparation of a RCMP (refer Table 1).

#### 4.1.2 Management Plan (General) Requirements

Condition 2, Schedule 5 of Development Consent DA 92/97 outlines the general management plan requirements that are applicable to the preparation of the RCMP. Table 2 presents these requirements and indicates where each is addressed within this RCMP.

**Table 2  
General Development Consent DA 92/97 Conditions**

MPO Development Consent DA 92/97 Schedule 5	Section Where Addressed in this RCMP Document
2. <i>The Applicant must ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:</i>	Section 8.4.
<i>(a) detailed baseline data;</i>	Section 7.
<i>(b) a description of:</i>	
• <i>the relevant statutory requirements (including any relevant consent, licence or lease conditions);</i>	Section 4.
• <i>any relevant limits or performance measures/criteria;</i>	Section 5.
• <i>the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;</i>	Section 6.
<i>(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;</i>	Sections 9 and 11.

**Table 2 (continued)**  
**General Development Consent DA 92/97 Conditions**

MPO Development Consent DA 92/97 Schedule 5	Section Where Addressed in this RCMP Document
(d) a program to monitor and report on the: <ul style="list-style-type: none"> <li>• impacts and environmental performance of the development;</li> <li>• effectiveness of any management measures (see c above);</li> </ul>	Sections 10 and 14.
(e) a contingency plan to manage any unpredicted impacts and their consequences;	Section 12.
(f) a program to investigate and implement ways to improve the environmental performance of the development over time;	Section 13.
(g) a protocol for managing and reporting any: <ul style="list-style-type: none"> <li>• incidents;</li> <li>• complaints;</li> <li>• non-compliances with statutory requirements; and</li> <li>• exceedances of the impact assessment criteria and/or performance criteria; and</li> </ul>	Section 14.
(h) a protocol for periodic review of the plan. <i>Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.</i>	Section 13.2.

#### 4.2 LICENCES, PERMITS AND LEASES

Blasting activities at the MPO will be conducted in accordance with a number of licences, permits and leases which have been issued or are pending issue. Key licences, permits and leases relating to blasting at the MPO include:

- ML 1645, ML 1708, ML 1709, ML 1750 and ML 1713 issued under Part 5 of the *NSW Mining Act, 1992* and approved by the Minister for Mineral Resources in December 2010.
- Environment Protection Licence (EPL) 20850 issued under Part 3 of the *NSW Protection of the Environment Operations Act, 1997* by the NSW Environment Protection Authority (EPA).
- the Mining Operations Plan approved by the RMD.

#### 4.3 OTHER LEGISLATION

Other NSW Acts and Regulations that may be applicable to blasting at the MPO include, but are not limited to, the:

- *Explosives Act, 2003*;
- *Explosives Regulation, 2013*;
- *Roads Act, 1993*;
- *Work Health and Safety Act, 2011*;
- *Work Health and Safety Regulation, 2011*;

- *Work Health and Safety (Mines) Act, 2013; and*
- *Work Health and Safety (Mines) Regulation, 2014.*

## 5 BLAST CRITERIA

### 5.1 DEVELOPMENT CONSENT DA 92/97

Blasting criteria, blasting hours, blasting frequency, property inspections, property investigations and operating conditions are provided in Conditions 10 to 16, Schedule 3 of Development Consent DA 92/97.

The prescribed blasting criteria for all public infrastructure in Table 7 of Condition 10, Schedule 3 is presented in Table 3. However, these criteria do not apply if MACH Energy has written agreement with the relevant infrastructure provider/owner, and MACH Energy has advised the DP&E in writing of the terms of the agreement.

**Table 3**  
**Blasting Criteria – All Public Infrastructure**

Location	Airblast Overpressure (dB[Lin Peak])	Ground Vibration (mm/s)	Allowable Exceedance
<i>All public infrastructure</i>	-	50	0%

mm/s = millimetres per second.

### 5.2 OTHER LICENCE CONDITIONS

Blasting criteria and other blast related conditions stipulated in ML 1645, ML 1708, ML 1709, ML 1713 and ML 1750 and in EPL 20850 are generally consistent with those prescribed in Development Consent DA 92/97.

## **6 PERFORMANCE INDICATORS**

### **6.1 BLASTING CRITERIA**

The extent of compliance with the blasting criteria prescribed in Table 3 will be measured by compliance with the relevant criteria at the blast monitoring locations (refer Section 10.1).

### **6.2 BLASTING HOURS**

Unless otherwise agreed with the Director-General (now Secretary), blasting will only be carried out at the MPO between 9.00 am and 5.00 pm Monday to Saturday inclusive. The extent of compliance with the blasting hours restrictions will be measured by compliance with the requirement of Condition 11, Schedule 3 of Development Consent DA 92/97 that no blasting is allowed on Sunday, public holidays, or at any other time without the written approval of the Director-General (now Secretary).

### **6.3 BLASTING FREQUENCY**

Unless otherwise agreed with the Director-General (now Secretary), MACH Energy will carry out a maximum of:

- 1 blast per day; and
- 5 blasts per week, averaged over any calendar year.

A 'blast' refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the mine.

The extent of compliance with the blasting frequency limits will be measured by compliance with the requirement of Condition 12, Schedule 3 of Development Consent DA 92/97 considering however that this condition does not apply to:

- blasts that generate a ground vibration of 0.5 mm/s or less at any residence on privately owned land;
- blasts required to ensure the safety of the mine or its workers; or
- blast misfires, as defined in the definitions of Development Consent DA 92/97.

### **6.4 OPERATING CONDITIONS**

The extent of compliance with the operating conditions prescribed in Condition 15, Schedule 3, will be measured by compliance with this RCMP (and the BMP) as indicated in annual reporting.

The extent of compliance with the operating condition restrictions to blasting within 500 m of a public road will be measured by the requirements of Condition 16, Schedule 3 of Development Consent DA 92/97, considering however that this restriction does not apply if MACH Energy has the approval of MSC (i.e. through implementation of this RCMP).

## 7 EXISTING ENVIRONMENT

### 7.1 BASELINE DATA

Meteorological monitoring is undertaken at the MPO in accordance with Condition 24, Schedule 3 of Development Consent DA 92/97.

In accordance with Condition 15(c), Schedule 3 and Condition 11, Schedule 5 of Development Consent DA 92/97, up-to-date information on the proposed blasting schedule and a comprehensive summary of the monitoring results (including meteorological and blasting data) will be made publicly available on the MACH Energy website (<http://machenergyaustralia.com.au/>).

Blasting and blast monitoring is undertaken at the neighbouring Bengalla Mine in accordance with the requirements of State Significant Development (SSD) 5170 for the Continuation of the Bengalla Mine and is described in the relevant BMP.

Blast monitoring data (including measurements of overpressure and ground vibration at sample points in areas surrounding the mine) is made publicly available on the Bengalla Mine website: (<http://www.bengalla.com.au/environment/environmental-monitoring-data/>).

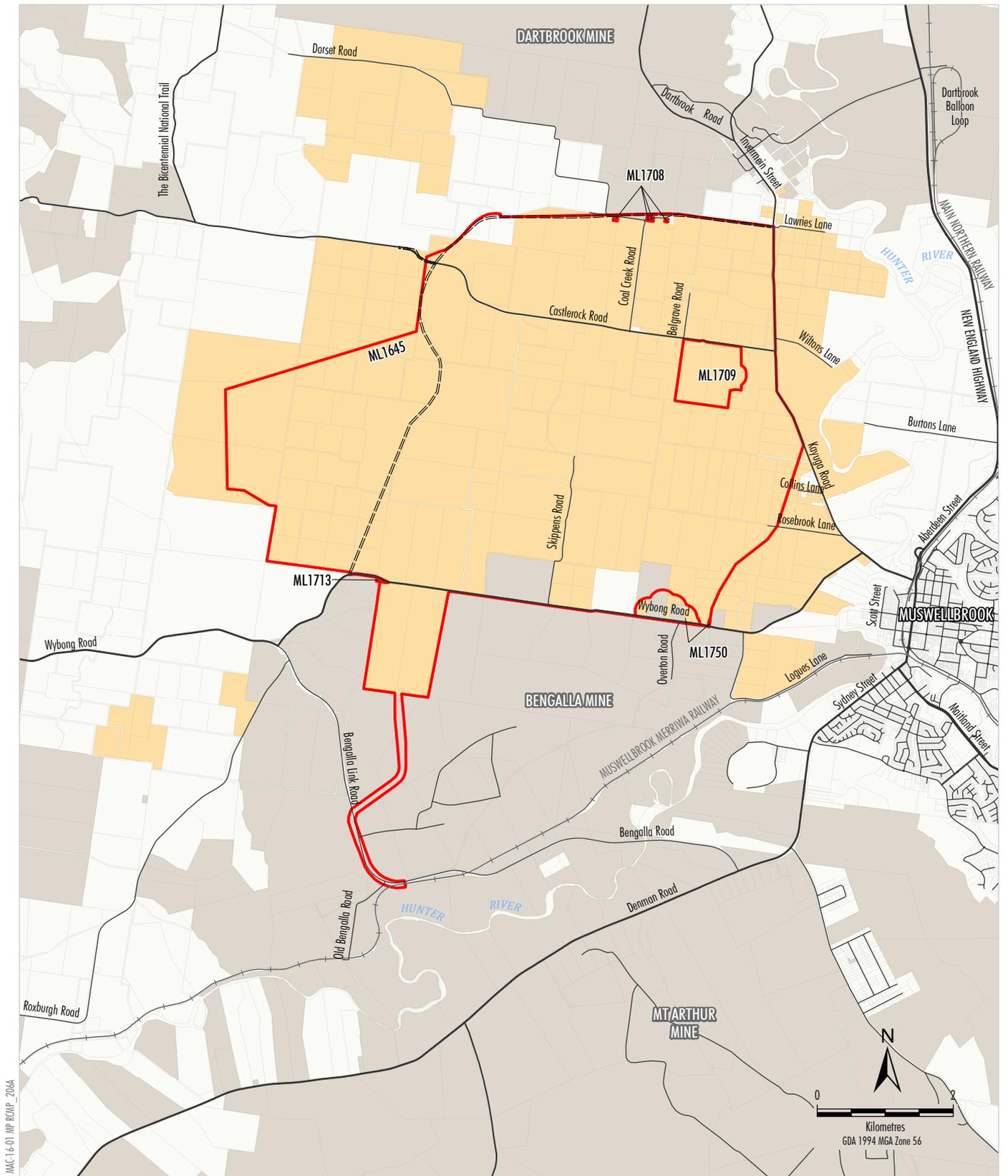
### 7.2 PUBLIC ROADS

The main public roads in the vicinity of the MPO include (Figure 2):

- Wybong Road;
- Kayuga Road;
- Castlerock Road; and
- Dorset Road.

There are also several minor roads and lanes which provide access to surrounding properties off these public roads including:

- Overton Road;
- Skippens Road;
- Logues Lane;
- Rosebrook Lane;
- Collins Lane;
- Wiltons Lane;
- Belgrave Road;
- Coal Creek Road; and
- Lawries Lane.



MAC-16-01 IMP RCOMP\_206A

- LEGEND**
- Mining Lease Boundary
  - Mine Owned (MACH Energy)
  - Mine Owned (Other)
  - Approved Northern and Western Link Road

Source: NSW Land & Property Information (2013); NSW Division of Resources & Energy (2016)

**MACH**Energy  
 MOUNT PLEASANT OPERATION  
 Local Road Network

Figure 2

### **7.2.1 Wybong Road**

Wybong Road is currently the main access route between Muswellbrook township and the western rural areas of the Muswellbrook Shire such as Sandy Hollow, Roxburgh, Mangoola, Wybong and Brogheda/Manobalai. The central section of Wybong Road (between Mangoola Mine entrance and Bengalla Link Road) is the busiest section of the road with over 1,200 vehicles per day. The eastern section of Wybong Road (from Bengalla Link Road to Kayuga Road) does not carry a significant proportion of mine related traffic because all mine traffic is directed to use Bengalla Link Road when travelling to and from southern and eastern destinations (MSC, 2015).

Only the eastern section of Wybong Road will be affected by temporary road closures at the MPO.

### **7.2.2 Kayuga Road**

Kayuga Road is a back road<sup>1</sup> connecting Muswellbrook to Scone and providing access to rural properties and villages (Dartbrook and Kayuga areas). Only a small number of vehicles utilise the northern section of Kayuga Road (approximately 500 vehicles per day). The majority of the traffic on the section of Kayuga Road between the bridge and Wybong Road intersection, turn at the Wybong Road intersection, as Wybong Road is the main access route between Muswellbrook and rural areas in the north west of the Muswellbrook Shire (MSC, 2015).

The only section of Kayuga Road that will be affected by temporary road closures at the MPO is near the intersection of Castlerock Road.

### **7.2.3 Castlerock Road / Dorset Road**

Castlerock and Dorset Roads are narrow sealed rural roads that provide access to a number of farms north of Wybong Road. Castlerock Road extends west from Kayuga Road and turns south to link with Wybong Road, near Ridgelands Road. Dorset Road also extends west from a point further north on Kayuga Road and turns north, becoming a gravel access road. Both roads currently carry only low volumes of traffic (MSC, 2015).

Castlerock Road will be affected by temporary road closures at the MPO as mining operations progressed to the north. Dorset Road will not be affected by temporary road closures at the MPO for several years. Following construction of the Northern and Western Link Road (to Dorset Road), the section of Castlerock Road within the mine footprint will be permanently closed.

This RCMP will be reviewed and revised prior to mining within 500 m of Dorset Road.

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<sup>1</sup> The New England Highway (A15) is the main route between Muswellbrook and Scone.

## **8 BLAST IMPACTS AND PREDICTIONS**

Blasting has the potential to result in the following hazards which may present a risk to public safety or property damage, if inappropriately managed:

- airblast overpressure exceedances;
- excessive ground vibration;
- flyrock, dust and debris;
- fumes; and
- misfires.

### **8.1 AIRBLAST OVERPRESSURE**

Blasting generates a transient air pressure greater than the surrounding atmospheric pressure, known as overpressure. An overpressure has the potential to damage buildings and infrastructure.

### **8.2 GROUND VIBRATION**

Energy released after a blast event can result in vibration of the ground which has the potential to damage buildings and infrastructure.

### **8.3 FLYROCK, DUST AND DEBRIS**

Flyrock is any rock material ejected from the blast site by the force of the blast. Flyrock has the potential to damage buildings and infrastructure and poses a risk to public safety.

The amount of dust and debris emitted from the blast site post-blast depends on several factors including the blast design and the rock material being blasted. The dust and debris poses a risk to public safety.

### **8.4 FUMES**

Blasting has the potential to generate post-blast gases (fumes) from the use of ammonium nitrate-based explosives which commonly include nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>) and are known as the Oxides of Nitrogen or NO<sub>x</sub>. Nitric oxide (NO) is invisible, and nitrogen dioxide (NO<sub>2</sub>) ranges from yellow to dark red depending on the concentration and size of the gas cloud (AEISG, 2011).

In accordance with the AEISG (2011) Code of Practice, MACH Energy will use a fume rating system for all blasts, outlined in the Blast Fume Management Strategy (Appendix C of the BMP).

### **8.5 MISFIRES**

A blast misfire can occur when one or more holes in a blast pattern fail to initiate, which results in a blast event which is different to the pre-blast assessment design.

## **8.6 BLAST PREDICTIONS**

### **8.6.1 Environmental Impact Statement (1997)**

Chapter 12 of the Mount Pleasant Mine EIS (ERM Mitchell McCotter, 1997) assessed the impacts of blasting for the MPO.

### **8.6.2 Commission of Inquiry (1998-99)**

Appendix C.5 of the *Mount Pleasant Mine Commission of Inquiry – Primary Submission* (Coal & Allied, 1998) includes details of blast noise calculations (i.e. scaled distance equations) that was requested by the EPA to assist during the assessment to demonstrate the criterion at south-west Kayuga could be met (i.e. with varying MICs and distances).

*The Mount Pleasant Mine Commission of Inquiry – Submission in Reply* (Commissioner's Report) (Planning Environmental & Engineering Consultants, 1999) recognised that with appropriate blasting practice the EPA's criteria for vibration from blasting can be complied with at all relevant locations.

Other commitments of relevance to this BMP include:

- Blast overpressure and blasting would be monitored at select locations, using unmanned monitors with the capability to download information to a central computer.
- Initially, blast locations would be at a distance from residential areas, and monitoring would be used to refine blasting practices, to ensure that as blasting moves closer, relevant criteria will continue to be met.
- A 24-hour complaint hotline would be established, and procedures laid down for recording complaint details, resolving the complaint, and establishing follow-up contact with the complainant if required.

The Commissioner's Report (1999) also recommended that trial blasts be monitored in the vicinity of Racecourse Road to investigate any features of this area (i.e. if there is potential for harmonic enhancement in saturated alluvial soils) which may lead to structural damage of buildings under conditions which would normally be acceptable.

### **8.6.3 MOD 1 Environmental Assessment (2010)**

As the blasting aspects of the MPO remained the same for the MOD 1 EA, no further blasting assessment was undertaken and the EIS and Commission of Inquiry blast assessments described in Sections 8.6.1 and 8.6.2 remained unchanged.

## **9 BLAST MANAGEMENT AND CONTROL MEASURES**

The pit extents shown in Appendices A and B are for illustrative purposes only for this RCMP. For blasts outside beyond the pit extent shown and within 500 m of a public road, the signage and traffic controls would be relocated appropriately.

### **9.1 PUBLIC ROADS**

#### **9.1.1 Wybong Road**

When blasting is undertaken within 500 m of Wybong Road, the road closure procedure described in Section 9.3 will be implemented along with the Traffic Control Plan (Appendix A).

#### **9.1.2 Kayuga Road**

When blasting is undertaken within 500 m of Kayuga Road, the road closure procedure described in Section 9.3 will be implemented along with the Traffic Control Plan (Appendix B).

#### **9.1.3 Castlerock Road**

When blasting is undertaken within 500 m of Castlerock Road, the road closure procedure described in Section 9.3 will be implemented along with the Traffic Control Plan (Appendix B).

#### **9.1.4 Dorset Road**

No blasting will be undertaken within 500 m of a Dorset Road during the term of this BMP.

#### **9.1.5 Other Minor Roads and Lanes**

Signs will be installed at access to properties to temporarily block access to restricted areas during blasting.

### **9.2 BLASTING CONTROLS / PROCEDURES**

MACH Energy will design and manage blast events to meet all relevant statutory requirements to protect the safety of the public in the surrounding area and minimise the risk of impacts to public roads.

Blast management procedures will include:

- training all relevant personnel on blast-related obligations and explosives management;
- use of appropriate initiation and detonation systems and adherence to blast loading and initiation designs;
- use of adequate burden, stemming lengths and stemming material to confine explosives;
- designing all blasts to comply with airblast overpressure and ground vibration limits;
- monitoring of blasts at all prescribed locations (refer Section 10);
- implementation of procedures to mitigate fumes for all blast events (Section 9.2.2);
- calibration of site-specific blast models over time, using monitored data from previous blasting, to enable refinement and assessment for future blast events (refer Section 9.2.1);
- development of a blast records system which captures sufficient information to allow appropriate characterisation and comparison of blasts and meteorological conditions (refer Section 10.1.2);

- periodic review of blasting procedures to evaluate performance (refer Section 13); and
- evaluation of new technology and alternative blasting methodologies.

### **9.2.1 Pre-Blast Assessments (including Forecasting)**

Prior to each blast event, a pre-blast assessment will be prepared by the Drill and Blast Coordinator.

The pre-blast assessment will consider:

- establishing an appropriate blast exclusion zone based upon the nature of the blast;
- assessment of meteorological (e.g. wind speed and direction) conditions prior to the blast to identify all personnel, publicly accessible areas, private landholders, residential locations, infrastructure and heritage sites that may be affected;
- design of the blast (e.g. right product for the conditions);
- confirmation of radio contact with site personnel (if evacuation of work areas is required); and
- notification of all relevant external stakeholders (including those on the pre-blast notification register [Section 9.2.4]) prior to blasting.

The Drill and Blast Coordinator (or delegate) will review the pre-blast assessment and if it is identified that unfavourable blast conditions are forecast or if factors are present which may significantly increase dust or fume generation, the General Manager will be notified and will review the pre-blast assessment to determine the appropriate course of action.

A 'red light'/'green light' system will be used and refined throughout the life of the MPO, including updates to reflect changes in the mine design, community expectations and land ownership.

A forecasting model will be used as part of the pre-blast assessment system at the MPO to simulate potential dust and fume impacts from a blast event to allow for re-scheduling or re-design as required in advance of the blast event.

### **9.2.2 Dust and Fumes Strategy**

Strategies to minimise dust (during drilling and blasting) at the MPO are described in the Air Quality Management Plan as follows:

- Blasting will be conducted during daylight hours when dispersion conditions are favourable, unless otherwise required for safety reasons.
- Blasting will not be undertaken during adverse weather conditions without the prior approval of the Environmental Superintendent (or delegate).
- Production drill rigs will utilise water injection (or be fitted with dust mitigation, such as sprays) and dust aprons will be lowered during drilling. Production drill rigs will not be operated without adequate dust control.
- Adequate stemming will be used in drill holes at all times.

MACH Energy has developed a Blast Fume Management Strategy based on the AEISG (2011) Code of Practice, which considers the following factors and practices to minimise fume emissions for all blasts:

- explosive formulation and quality assurance;
- explosive product selection;
- on bench practices;
- rainfall;
- blast design;
- geological conditions;
- contamination of explosives;
- sleep time; and
- reporting and documenting.

### **9.2.3 Coordination with Nearby Mines (Minimising Cumulative Impacts)**

In accordance with Condition 5, Schedule 5 of Development Consent DA 92/97, MACH Energy will use its best endeavours to minimise the cumulative impacts of the MPO on the surrounding area.

A communications protocol has been developed with nearby mines (including Bengalla Mine) so that cumulative impacts from simultaneous blast events are minimised. The protocol involves communications (via email, fax or telephone) to be sent and received prior to each blast, and where there is potential for blast events to occur concurrently, for the blast times to be re-scheduled, where practical.

Minimising the cumulative impacts of the MPO on the surrounding area would also be achieved, for example, through review of blast schedules for nearby mines (including Bengalla Mine) and coordinating blast times so that back-to-back closures of public roads are avoided, where practical.

### **9.2.4 System to Notify Public of Blast Schedule**

Up-to-date information on the blasting schedule for residents will be made publicly available on MACH Energy's website (<http://machenergyaustralia.com.au/>).

MACH Energy will also inform the MSC of blast notices for placement on the MSC website: <http://www.muswellbrook.nsw.gov.au/index.php/blasting/blasting-announcements>.

MACH Energy will operate a Community Response Line (Phone Number 1800 886 889). The Community Response Line is publicly advertised and operates 24 hours per day, seven days a week, to receive any queries (including those blast-related) from neighbouring residents or other stakeholders.

Any private landholder or resident that registers an interest in being informed of the MPO blasting schedule will be included in a pre-blast notification register (including contact details for notification via telephone, email or method otherwise agreed).

Private landholders and residents on the pre-blast notification register will be notified prior to blasting and will be re-notified if a blast event is delayed by more than two hours.

### 9.2.5 Strict Control – South-West Kayuga

When blasting in the north-east of the North Pit, strict control will be placed on blasting operations to ensure criteria are met at sensitive receptors at south-west Kayuga by:

- varying MIC design;
- no blasting to take place under low cloud conditions or where temperature inversions are inferred; and
- assessment of prevailing weather conditions by correlation of weather station data.

## 9.3 ROAD CLOSURE PROCEDURE

### 9.3.1 Definitions

**Shotfirer** – a person who has been issued with a permit to act as a Shotfirer in an open cut coal mine by Workcover and is appointed by the General Manager or delegate.

**MPO's nominated Outside Blasting Coordinator** - a person whom has completed training to act as the outside blasting co-ordinator under the direction of the Shotfirer charged with the responsibility of prohibiting any person from entering the Blasting Zone during the duration of the blast.

**Inside Sentry** - a trained person acting under the direction of the Shotfirer charged with the responsibility of prohibiting any person from entering the Blasting Zone during the duration of the blast.

**Outside Sentry** - a trained person acting under the direction of the Shotfirer charged with the responsibility of prohibiting any person from entering the Blasting Zone during the duration of the blast.

*All sentries, located on public roads if directing traffic will be appropriately trained in their duties and certified as competent. As a minimum requirement, these sentries will have satisfactorily completed Road and Maritime Services (RMS) training Course "Traffic Controllers" (or equivalent). Traffic controllers shall wear high visibility clothing meeting the requirements of AS4602 and displaying the logo of their employer and the words "Authorised Traffic Controller".*

### 9.3.2 Responsibilities

**Shotfirer** - is responsible for the shot by using the appropriate MPO blast procedures to ensure all aspects of the blast are safe.

**MPO's nominated Outside Blasting Coordinator** - is responsible for assisting the Shotfirer in ensuring that the area within the Inside Sentry and Outside Sentry is clear and ensuring that public roads are safe for public use post blast.

### 9.3.3 Tools / Equipment and Safety Requirements

Tools and equipment and other safety requirements for this procedure include:

- Traffic Control Plan (Appendices A or B);
- signage;
- road barriers;
- high-visibility clothing;
- sentries satisfactorily completed RMS training Course "Traffic Controllers" (or equivalent).

- registered vehicles; and
- hand-held two-way radios.

#### 9.3.4 In the Week Prior to Blasting

An MPO nominated person will notify the MSC of the intention to blast and date and time of the planned road closure via the MSC website.

An MPO nominated person will also advise the following emergency services via email (or other method determined in consultation with the relevant emergency service) of the date and time of planned road closures, including:

- Fire & Rescue NSW (Muswellbrook Fire Station);
- NSW Rural Fire Service;
- NSW Ambulance;
- NSW Police Force; and
- NSW State Emergency Service.

#### 9.3.5 The Working Day Before Blasting

MPO's nominated Outside Blasting Coordinator will confirm with the Main Switchboard Secretary the scheduled date and time of the blast with the following notifications 24 hours prior to the proposed blast.

- Notification of the public (via the MSC website); and
- Notification of the MPO Environment and Community Manager.

Signs will be posted along the public road in both directions indicating that “***this road is subject to short closures with up to 20 minutes delay for mine blasting purposes***”.

The sign will also display the next blast / closure date, time and contact details, including emergency local contact number.

Blasting will be undertaken during daylight hours only. Public road closures resulting from blasting at the MPO will be scheduled to occur at times which do not impede school bus operations. The buses operate on Wybong Road and Kayuga Road between 8:00 - 8:20 am and 3:40 - 4:00 pm.

Blasting will not occur within 500 m of a road when adverse environmental conditions (or other prevailing conditions) make road closures hazardous.

#### 9.3.6 The Day of Blasting

MPO's nominated Outside Blasting Coordinator will confirm with MPO's Main Switchboard Secretary the scheduled time of the blast for the day. This will then be communicated via MSC's website and updated at least two hours prior to the blast time.

MPO's Main Switchboard Secretary will confirm the scheduled time of the blast for the day via the MSC website and by notifying the MPO Environment and Community Manager, emergency services listed in Section 9.3.4 above, and any other person as agreed to by the MPO Environment and Community Manager.

### **9.3.7 30 Minutes Prior to Blasting**

The Shotfirer will inform MPO's nominated Outside Blasting Coordinator of the anticipated firing time.

All signs will be designed and manufactured to meet the requirements of AS1743. All signs will be manufactured with class 1 reflective labelling.

Before road closure commences, signs and devices at approaches to the closure site will be placed in accordance with the Traffic Control Plan shown in Appendix A or Appendix B, whichever is relevant.

Traffic control will be set out in accordance with *Traffic Control at Work Sites* (RTA, 2010).

The appropriate signs as per the Traffic Control Plan shown in Appendix A or Appendix B will be positioned and spaced as illustrated on the plan for approaching traffic to see. Barrier boards will be placed across the road to prevent the passage of vehicles through the restricted area.

In times of inclement weather (heavy rain, fog, etc. at the time of the blast), in addition to the signs shown in Appendix A or Appendix B, there shall also be a sufficient number of orange flashing beacons positioned prior to and at the road closure to ensure the prominence of that road closure.

### **9.3.8 10 Minutes Prior to Blasting**

The Shotfirer will place both inside and outside sentries in position at their stations. All sentries will have a two-way radio for communication with mining personnel responsible for controlling the blast (i.e. the Shotfirer) and each other.

In addition to this, outside sentries located on the public road shall wear approved high-visibility clothing and shall control traffic using a stop/slow bat. The outside sentries located on the public roads will communicate with each other to ensure that there is no traffic or people within the sentry locations.

MPO's nominated Outside Blasting Coordinator will then clear the blasting area as per normal blasting procedure. When clearing the public road temporary barriers will be placed across the road at each sentry location.

### **9.3.9 Two Minutes Prior to Blasting**

When confirmation has been received from MPO's nominated Outside Blasting Coordinator that the blasting area within the sentries is all clear, the Shotfirer will initiate the two-minute warning at the commencement of the normal blasting procedure.

Due blasting procedure will then be followed with all sentries acting under instruction from the Shotfirer.

### **9.3.10 1 Minute Post Blast**

At the completion of one minute after firing, the Shotfirer will instruct MPO's nominated Outside Blasting Coordinator to inspect the public road for any post-blast fumes, dust, debris or damage.

On inspection of public roads:

- if there is no evidence of post-blasting fumes, dust, debris or damage then MPO's nominated Outside Blasting Coordinator will notify the Shotfirer who will then give permission to re-open the public road; or
- if there is evidence of debris or damage, then MPO's nominated Outside Blasting Coordinator will notify the Shotfirer of such debris or damage. The sentries on the public road will hold the 'stop' position and delay through traffic until such stage as the debris is removed and disposed of lawfully, damage is repaired or controlled traffic conditions put in place. When the road has been given the "all clear", the road will be opened to through traffic and all temporary traffic control signs associated with the closure removed by appropriately qualified traffic controllers. If damage to the road is confirmed to be a direct result of damage arising from MPO's blasting activities, then the following process will be implemented:
  - MSC will be notified of damage immediately by contacting the main phone number 6549 3700; and
  - appropriate traffic management and remediation work will be undertaken ensuring unnecessary delay is avoided and the road restored to the standard required by MSC at no cost to MSC. MPO's nominated Outside Blasting Coordinator will then remove the temporary barriers from across the public road and the sentries will remain in position with the "**SLOW**" sign displayed.

#### **9.3.11 Clearing of the Shot**

After the nominated waiting period, the Shotfirer will proceed with his inspection of the shot. If the shot is clear of any misfires then the Shotfirer will continue with due procedure. If a misfire is located it will be treated as a separate blast and the public road closure procedure will be re-initiated, either at that time or at a later date.

On completion of blasting, the Shotfirer will give permission for all sentries to leave their stations. At this stage, all temporary blasting signs will be removed from the public road.

#### **9.3.12 Emergency Event**

If the sentries placed on the public road encounter any of the following;

- an emergency vehicle (e.g. NSW Police Force, NSW Ambulance, Fire & Rescue NSW, Mines Rescue, etc.);
- a distressed or desperate citizen who insists on passing through; or
- any other situation where individual citizens or authorities object to being stopped,

then the sentry will communicate with the Shotfirer the circumstances.

The Shotfirer will then abort blasting to allow the vehicle to pass through the sentries. Once the vehicle is clear of the blasting area, MPO's nominated Outside Blasting Coordinator will give the Shotfirer the all clear again to recommence the shottfiring procedures.

Sentries working at the stations on the public road are at all times subject to the requirements of the NSW Police Force, other officers of the law and the RMS.

### **9.3.13 Shotfirer's Report**

The Shotfirer's Report shall detail the length of the public road closure and any damage or debris on the public road that may have resulted from the blast.

## 10 BLAST MONITORING PROGRAM

### 10.1 AIRBLAST OVERPRESSURE, VIBRATION AND FUME MONITORING

Airblast overpressure, ground vibration and fume monitoring will be conducted for every blast event at the MPO.

Table 4 summarises the units of measure and sampling methods for each parameter monitored during a blast event.

**Table 4**  
**Units of Measure and Sampling Methods for Parameters Monitored**

Parameter	Units of Measure	Sampling Method
Airblast Overpressure	dB (Lin Peak)	Type 1 Noise Blast Logger
Ground Vibration	mm/s	Geophone Logger (or similar)
NOx Fume	AEISG (2011) Code of Practice Fume Rating System	Observation and Video

The locations of the blast monitoring equipment are outlined in Section 10.1.1.

Performance indicators to evaluate the extent of compliance with the relevant conditions of Development Consent DA 92/97 are provided in Section 6.

#### 10.1.1 Location of Monitoring Equipment

Airblast overpressure and ground vibration monitoring will be conducted at Wybong Road when blasting is within 500 m of Wybong Road. Similarly, airblast overpressure and ground vibration monitoring will be conducted at Kayuga Road when blasting is within 500 m of Kayuga Road.

Other blast monitoring locations at the MPO are described in the BMP.

Blast monitoring instrumentation will be installed, calibrated and maintained in accordance with AS 2187.2-2006 *Explosives – Storage and use* and the manufacturer's specifications.

NOx fume will also be monitored between the blast and boundary of the premises at Wybong Road and Kayuga Road when blasting is within 500 m.

#### 10.1.2 Monitoring Records

Results of blast monitoring will be kept in a legible form for at least four years after each blast event. These records will be made available to any authorised officer of the EPA or DP&E if requested.

The following is recorded for each blast event:

- date and time;
- location and discrete area;
- blast monitoring locations;
- fume characteristics;
- fume classification level;

- meteorological conditions;
- recorded airblast overpressure and vibration at each blast monitoring location; and
- MIC.

A video of each blast will also be recorded.

The above monitoring records would be used, as required, to evaluate compliance with the conditions of Development Consent DA 92/97 as described in Section 13.

## **11 RESPONSE PROTOCOLS**

### **11.1 BLASTING CRITERIA REVIEW PROTOCOL**

A Blasting Criteria Review Protocol (refer Figure 3) will be implemented following each blast event and is described in the BMP.

### **11.2 BLAST FUME EMERGENCY RESPONSE**

#### **11.2.1 Off-Site Incident**

In the event that blast fumes rated at Level 3 or above (refer Section 8.4) leaves the premises, the following actions will be undertaken:

- The Drill and Blast Coordinator will immediately notify the Environmental Superintendent that a fume event has occurred that may put members of the local community at risk.
- The Environmental Superintendent will immediately contact and notify the General Manager of the risk.
- The General Manager will initiate the Pollution Incident Response as illustrated in the Pollution Incident Response Flowchart (Appendix D of the BMP), including the notification of relevant sensitive receivers.

#### **11.2.2 Treatment Protocol**

Where a person has been exposed to blast fumes or displays symptoms associated with blast fumes, their immediate supervisor should be notified immediately.

Where a member of the public or community has been exposed to blast fumes or displays symptoms associated with blast fumes, MACH Energy will declare an incident in accordance with the Pollution Incident Response Management Plan (refer Section 11.3) and notify relevant sensitive receivers.

The *Exposure to NO<sub>x</sub> Gases Event Card* will outline the specific treatment protocol should exposure occur.

### **11.3 POLLUTION INCIDENT RESPONSE**

MACH Energy has developed a Pollution Incident Response Management Plan as required by Condition O4.1 of EPL 20850.

MACH Energy will investigate and report pollution incidents as described in the Pollution Incident Response illustrated in the Pollution Incident Response Flowchart (Appendix D of the BMP).

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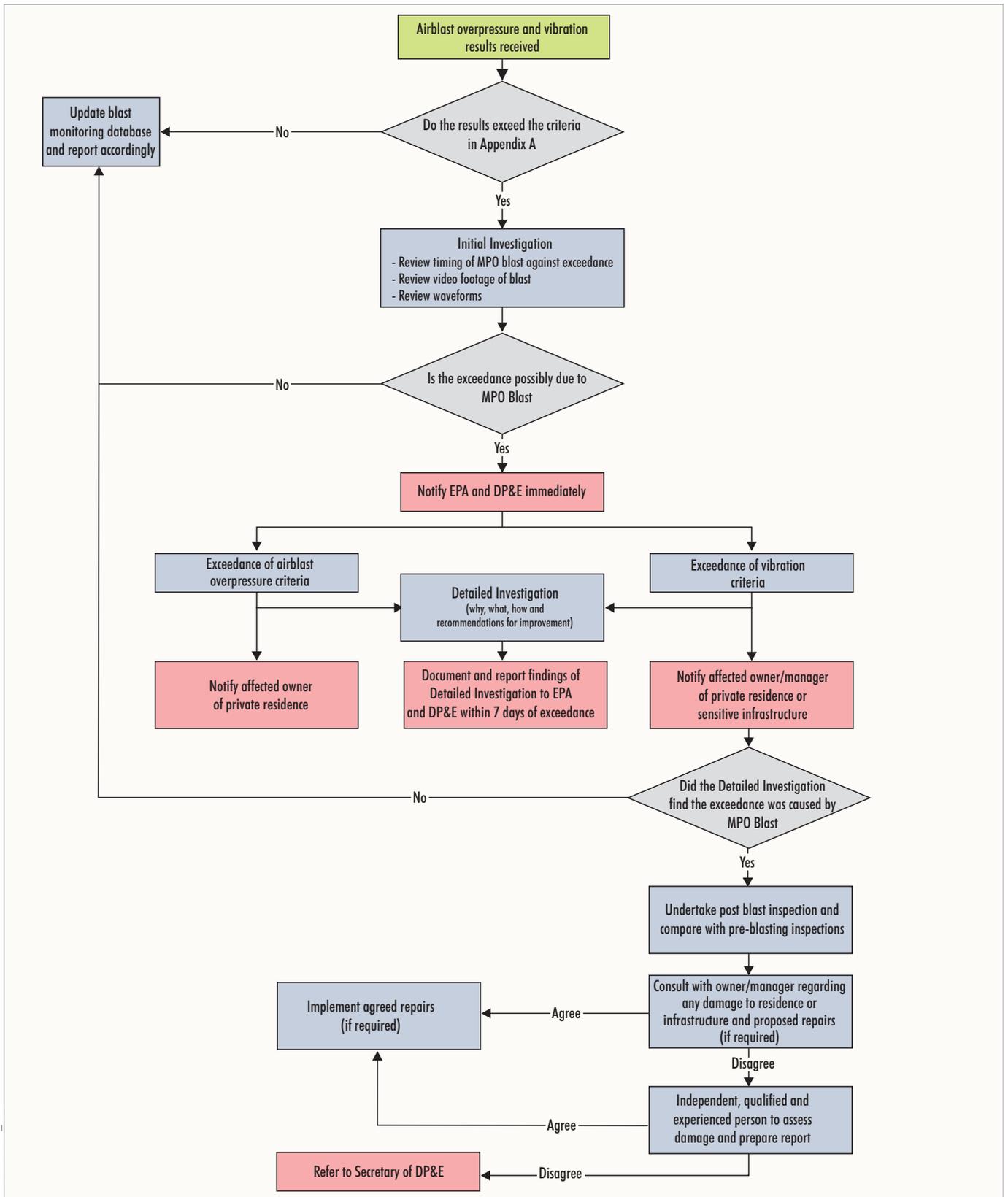


Figure 3

## 12 CONTINGENCY PLAN

In the event that a blast criterion detailed in Section 5 is considered to have been exceeded (during the implementation of the response protocols described in Section 11), MACH Energy will implement the following Contingency Plan:

- The Environmental Superintendent will report the likely exceedance within 24 hours of the exceedance investigation being concluded.
- MACH Energy will then report the exceedance of the blasting criteria to the EPA and DP&E immediately.
- MACH Energy will identify the appropriate course of action (including contingency measures where necessary [refer Section 12.1]) with respect to the identified blast impact(s), in consultation with technical specialists, DP&E and the EPA.
- MACH Energy will, in the event that there is a dispute over the proposed remedial course of action or if the actions conflict with current approvals, submit the appropriate course of the action to the DP&E for approval.
- MACH Energy will implement the approved course of action to the satisfaction of the DP&E.

### 12.1 POTENTIAL CONTINGENCY MEASURES

Potential contingency measures will be reviewed during revisions of the BMP during the life of the MPO. Key potential contingency measures to be implemented (following exceedance of blasting criteria and implementation of the response protocols) are described in the BMP.

## **13 ANNUAL REVIEW AND IMPROVEMENT OF RCMP**

### **13.1 ANNUAL REVIEW**

In accordance with Condition 3, Schedule 5 of Development Consent DA 92/97 MACH Energy will review and evaluate the environmental performance of the MPO by the end of March each year (for the preceding calendar year) or other such timing as agreed by the Secretary of the DP&E.

In relation to blasting, the Annual Review will:

- include a comprehensive review of the blast monitoring results and complaints records relating to the MPO over the past year, which includes a comparison of these results to evaluate compliance against the:
  - relevant statutory requirements, limits or performance measures/criteria (refer Section 6);
  - monitoring results of the previous years; and
  - relevant predictions in the EIS (refer Section 8.6);
- identify any blast non-compliance over the past year, and describe what actions were (or are being) taken to ensure compliance;
- identify any trends in the blast monitoring data over the life of the MPO;
- identify any discrepancies between the predicted and actual blast impacts of the MPO, and analyse the potential cause of any significant discrepancies; and
- describe what blast-related measures will be implemented over the next year to improve the environmental performance of the MPO.

The Annual Review will be made publicly available on the MACH Energy website in accordance with Condition 11, Schedule 5 of Development Consent DA 92/97.

### **13.2 RCMP REVIEW**

In accordance with Condition 4, Schedule 5 of Development Consent DA 92/97, this RCMP will be reviewed, and if necessary revised (to the satisfaction of the Secretary of the DP&E), within three months of the submission of:

- an Annual Review (Condition 3, Schedule 5);
- an incident report (Condition 7, Schedule 5);
- an Independent Environmental Audit (Condition 9, Schedule 5); and/or
- any modification to the conditions of Development Consent DA 92/97.

Within 4 weeks of conducting a review of this RCMP, MACH Energy will advise the Secretary of the DP&E of the outcomes of the review, and submit any revised documents for the approval of the Secretary.

In accordance with Condition 4A, Schedule 5 of Development Consent DA 92/97, MACH Energy may submit a revised RCMP for the approval of the Secretary at any time, and may also submit any revision to this RCMP required under Development Consent DA 92/97 on a staged basis.

If agreed with the Secretary of the DP&E, a revision to this RCMP required under Development Consent DA 92/97 may be prepared without undertaking consultation with all parties nominated under the relevant Condition of Development Consent DA 92/97.

This RCMP will be made publicly available on the MACH Energy website, in accordance with Condition 11, Schedule 5 of Development Consent DA 92/97.

## 14 REPORTING SYSTEMS

In accordance with Condition 2, Schedule 5 of Development Consent DA 92/97, MACH Energy has developed protocols for managing and reporting:

- incidents;
- complaints;
- non-compliances with statutory requirements; and
- exceedances of the impact assessment criteria and/or performance criteria.

These protocols are described in Section 14 of the BMP.

Blast monitoring and management will be reported as part of the Annual Review described in Section 13.1 and in accordance with the reporting requirements of EPL 20850.

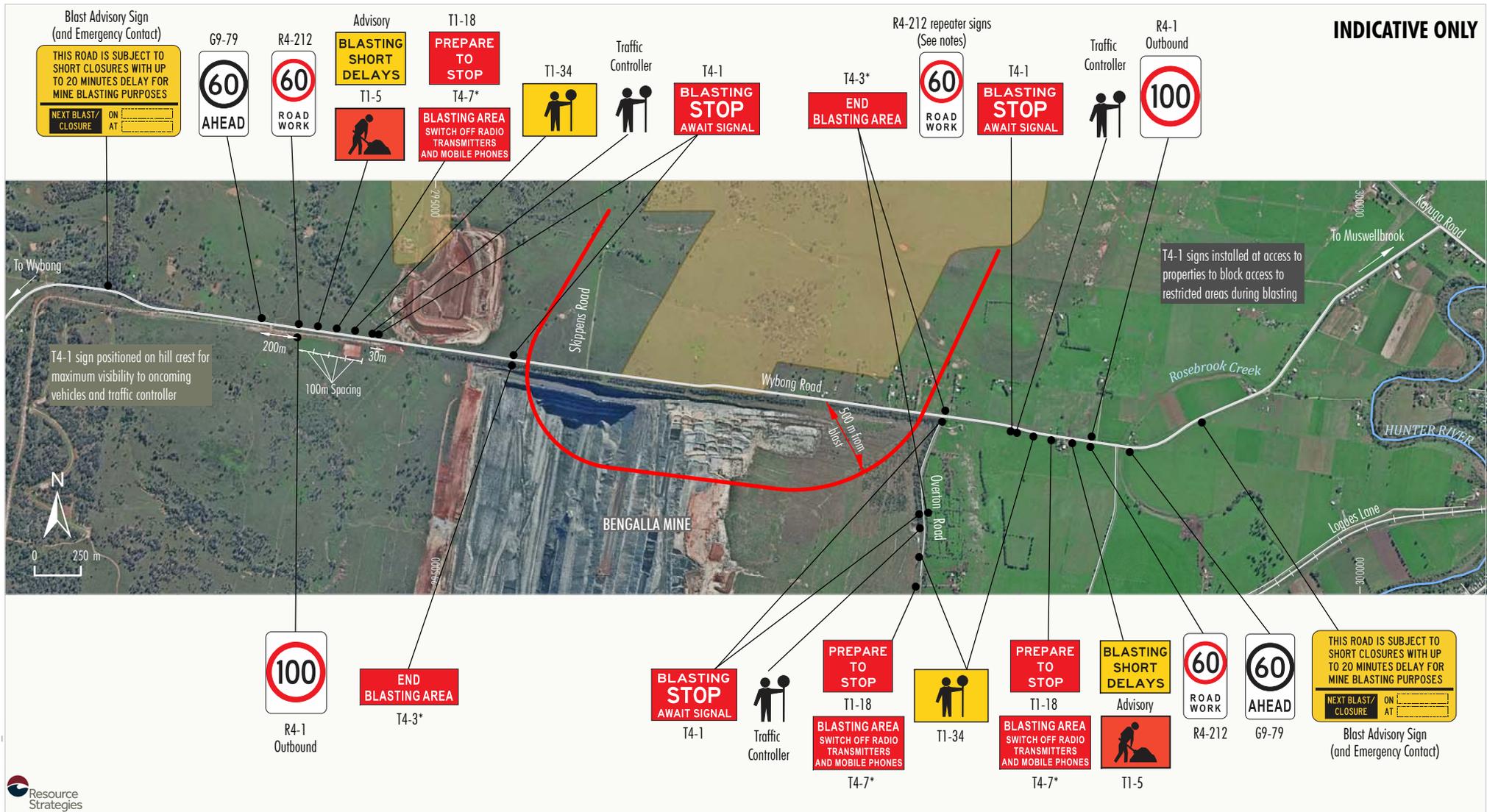
## 15 REFERENCES

- Australian Explosives Industry and Safety Group Inc (2011) *Code of Practice Prevention and Management of Blast Generated NOx Gases in Surface Blasting*.
- Bengalla Mining Company Pty Limited (2011) *Bengalla Annual Environment Management Report 2010*.
- Bengalla Mining Company Pty Limited (2012) *Bengalla Annual Environment Management Report 2011*.
- Coal & Allied (1998) *Mount Pleasant Mine Commission of Enquiry – Primary Submission*.
- EMGA Mitchell McLennan (2010) *Mount Pleasant Project Modification Environmental Assessment*.
- ERM Mitchell McCotter (1997) *Mount Pleasant Mine Environmental Impact Statement*.
- MACH Energy Australia Pty Ltd (2017) *Mount Pleasant Operation (DA 92/97) – South Pit Haul Road Modification*.
- Muswellbrook Shire Council (MSC) (2015) *Muswellbrook Mine Affected Roads – Stage 1 Road Network Plan*. Report prepared by Cardno.
- Planning Environmental & Engineering Consultants (1999) *Mount Pleasant Mine Commission of Enquiry – Submission in Reply*.
- Roads and Traffic Authority NSW (RTA) (2010) *Traffic Control at Work Sites*. Version 4.0.

**APPENDIX A**

**TRAFFIC CONTROL PLAN – WYBONG ROAD**

*[Individual TCPs for each blast will include the Name, Certification Number and Expiry Date of Ticket, and the signature of the person preparing the TCP]*



- NOTES**
- Traffic control to be setout in accordance with Traffic Control at Worksites (RTA, 2010)
  - Signs are folding (except for notification signs) and are provided with latching device to be secure and stable during wind
  - Blasting Short Delays used with Workman T1-5 to better inform motorists
  - Sign spacing is the same for both directions
  - R4-212 signs to be repeated at maximum of 500m spacing
  - Mount Pleasant Operation "Road Closure Procedure" is to be followed
  - \* If electronic detonators are used

 Pit extent shown is for illustrative purposes only. For blasts beyond the pit extent shown and within 500 m of a public road the signage and traffic controls would be relocated appropriately

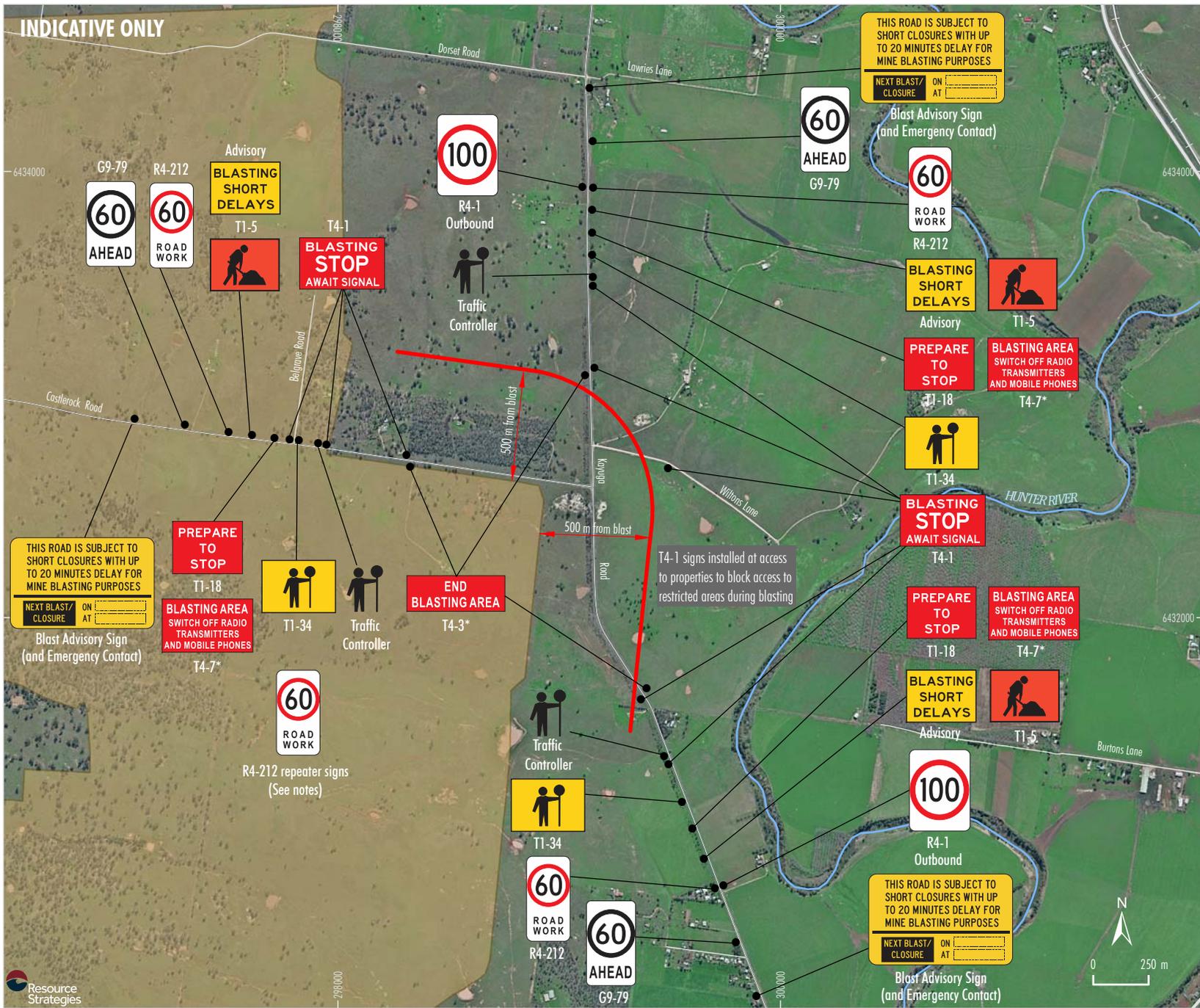
Source: Orthophoto (flown August 2016); MACH Energy (2016); Australian Standard - AS1743 (2016)

**APPENDIX B**

**TRAFFIC CONTROL PLAN – KAYUGA AND CASTLEROCK ROADS**

*[Individual TCPs for each blast will include the Name, Certification Number and Expiry Date of Ticket, and the signature of the person preparing the TCP]*

INDICATIVE ONLY



**NOTES**

- Traffic control to be set out in accordance with Traffic Control at Worksites (RTA, 2010)
- Signs are folding (except for notification signs) and are provided with latching device to be secure and stable during wind
- Blasting Short Delays used with Workman T1-5 to better inform motorists
- Sign spacing is the same for both directions
- R4-212 signs to be repeated at maximum of 500m spacing
- Mount Pleasant Operation "Road Closure Procedure" is to be followed
- \* If electronic detonators are used

 Pit extent shown is for illustrative purposes only. For blasts beyond the pit extent shown and within 500 m of a public road the signage and traffic controls would be relocated appropriately

Source: Orthophoto (flown August 2016); MACH Energy (2016); Australian Standard - AS1743 (2016)

**APPENDIX C**  
**BLAST FUME MANAGEMENT STRATEGY**

## Post Blast Fume Management

Fume is a combination of post blast gases which are predominantly caused by a non-ideal detonation reaction i.e.:

$AN + Fuel = Carbon\ Dioxide + Water + Nitrogen + (Nitrogen\ Dioxide\ [Fume])$  in a non-ideal reaction)

Nitrogen dioxide is the only post blast gas that is visible with a yellow, orange or brown colour. A fume Category Rating has been developed and is used across the MPO in classifying a fume event (Table C1).

**Table C1**  
**Fume Category – NOx Rating Scale**

Level	Appearance	Colour
0 – No Fume (No NOx gas)		
1 – Fume (slight NOx gas)		
1A Localised		
1B Medium		
1C Extensive		
2 – Minor Yellow/Orange Fume		
2A Localised		
2B Medium		
2C Extensive		
3 – Moderate Orange Fume		
3A Localised		
3B Medium		
3C Extensive		
4 – Significant Orange Fume		
4A Localised		
4B Medium		
4C Extensive		
5 – Major Red/Purple Fume		
5A Localised		
5B Medium		
5C Extensive		

NOx = Nitrogen Oxide.

Table E1 is used to assess the intensity of the NOx gases produced from a blast. The extent of the NOx gases also needs to be assessed and this is done on a simple scale from A to C where:

- A = Localised (i.e. NOx gases localised across only a few blast holes).
- B = Medium (i.e. NOx gases from up to 50% of blast holes in the shot).
- C = Extensive (i.e. extensive generation of NOx Gases across the whole blast).

## Fume Minimisation and Prevention

MACH Energy manages blasting activities using all reasonable and feasible measures to minimise and prevent fume generation. Factors identified as being influential in the generation of fume and MACH Energy's associated controls are listed below:

- Explosive formulation and quality assurance:
  - Test explosive densities regularly on bench (cup density).
  - Allow adequate gassing time when loading chemically sensitised product prior to stemming.
  - Visual checks when loading (i.e. checking diesel is being added to ANFO).
  - Quality control with hole and explosive deck lengths, dip and record depths, holes loaded and backfilled to within 200 mm tolerance.
  - Quality checks by explosive supplier including but not limited to periodical calibration of Mobile and Fixed Manufacturing.
- Explosive product selection:
  - Selection of waterproof bulk explosive products.
  - In specific geology types (clay), waterproof bulk explosive product is generally used where shots are unable to be loaded and fired within 3 days.
- On bench practices:
  - Assessment of blast hole conditions.
  - Use of 'holesavers' to limit fall back of material and surface water into the hole.
  - Bench preparation prior to loading (i.e. considering drainage).
  - Loading plan/sequencing.
  - Any loading changes or changes to design are reported and must be discussed with the Drill and Blast Engineer or Drill and Blast Supervisor.
- Rainfall:
  - Cap off dry product with 0.5 m of drill cuttings if light rain predicted.
  - Use wet product if substantial rainfall predicted.
- Blast design:
  - Limit hole depth in overburden blasts to under 20 m.
  - Consider rock strength vs powder factor as over blasting can contribute to fume generation.
  - Ensure sufficient face hole burdens.
- Geological conditions:
  - Consideration of jointing and faulting when designing blasts.
  - Use blast hole liners in places where there is product loss due to cavities, as lack of confinement can contribute to fume generation.

- Contamination of explosive in the blast-hole:
  - Use recommended loading practices to limit explosive contamination.
  - Bottom loading wetholes.
  - Gas bag off water in holes if less than 0.5 m deep.
  - Monitor loaded holes for settling or slumping.
- Sleep time:
  - Ensure sleep times are in line with manufacturer recommendations.

These factors are in line with the AEISG (2011) *Code of Practice Prevention and Management of Blast Generated NOx Gases in Surface Blasting*.

### **Fume Management**

Additional practices that occur across the MPO to manage fume are as follows:

- MACH Energy monitors meteorological conditions at the time of firing the blast to ensure that if fume does occur, the trajectory of plume is known.
- All Blasts at the MPO will be video recorded. Any blast that produces a fume event shall be recorded for a minimum of one (1) minute post blast, or until the fume event has dispersed. Videos shall be kept for a period of not less than one (1) calendar year, from the time of the blast.
- Fume events will be rated using the Fume rating scale (Table E1) and fume ratings will be recorded.
- If a blast fume of Level 3 or above is expected to leave the DA boundary<sup>1</sup>, MACH Energy will notify the surrounding sensitive receivers<sup>2</sup>.

### **Reporting of Fume Events**

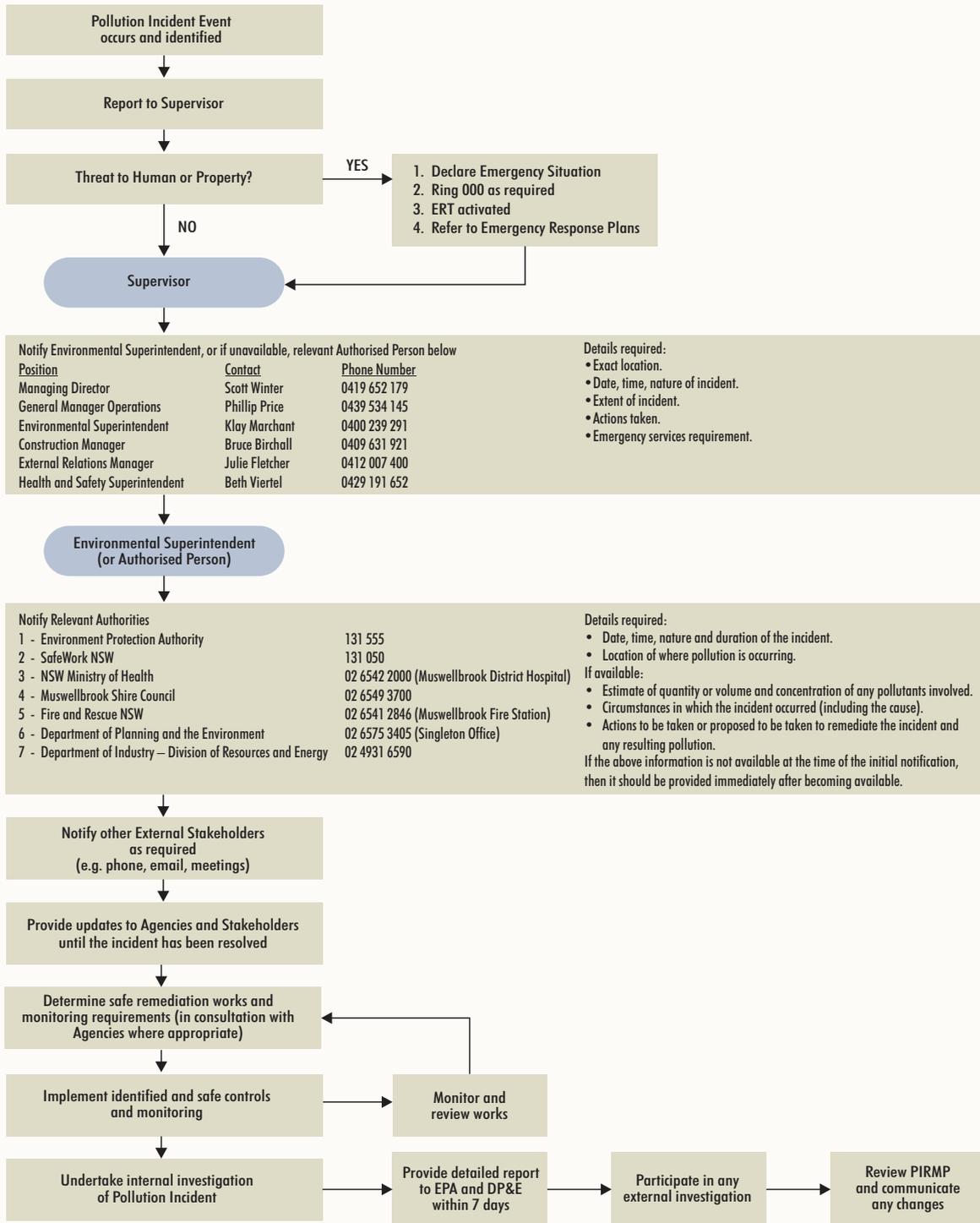
In the event a blast produces a blast fume rating of 4 or 5, or produces a rating of 3 at its highest extent and leaves the DA boundary<sup>1</sup>, the blast must be reported to the DP&E. All notification to the DP&E will be made via the Environmental Superintendent or their delegate.

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<sup>1</sup> The 'DA Boundary' is defined in Development Consent DA 92/97 as the land listed in Appendix 1 of Development Consent DA 92/97.

<sup>2</sup> Depending upon the meteorological conditions, residences within a reasonable distance (i.e. up to a maximum of 1 km) downwind of the blast site will be contacted. This is subject to the residences having a valid phone contact.

**APPENDIX D**  
**POLLUTION INCIDENT RESPONSE FLOWCHART**



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**APPENDIX E**  
**INFORMATION FOR TREATING DOCTOR**

## INFORMATION FOR TREATING DOCTOR

Dear Doctor,

This patient has been exposed to NO<sub>x</sub>. This is a gas usually produced on mines after the use of explosives. NO<sub>x</sub> consists of multiple combinations of nitrogen and oxygen (N<sub>2</sub>O, NO, NO<sub>2</sub>, N<sub>2</sub>O<sub>4</sub>, N<sub>2</sub>O<sub>3</sub>, N<sub>2</sub>O<sub>5</sub>). Nitrogen Dioxide (NO<sub>2</sub>) is the principal hazardous nitrous fume.

NO<sub>x</sub> irritates the eyes and mucous membranes primarily by dissolving on contact with moisture and forming a mixture of nitric and nitrous acids. But this is not the only way injury can occur. Inhalation results in both respiratory tract irritation and pulmonary oedema. High-level exposure can cause methaemoglobinaemia. Some people, particularly asthmatics, can experience significant bronchospasm at very low concentrations.

The following effects are commonly encountered after NO<sub>x</sub> exposure:

### ACUTE

- Cough.
- Shortness of breath.
- Irritations of the mucous membranes of the eyes, nose and throat.

### SHORT TERM

- Pulmonary oedema - **Which may be delayed from 4 to 12 hours.**

### MEDIUM TERM

- RADS (Reactive Airways Dysfunction Syndrome).
- In rare cases, bronchiolitis obliterans, which may take from two to six weeks to appear.

### LONG TERM

- Chronic respiratory insufficiency.

High-level exposure, particularly associated with methaemoglobinaemia, can cause chest pain, cyanosis/shortness of breath, tachypnoea and tachycardia. Deaths have been reported after exposure and are usually delayed. Even non-irritant concentrations of NO<sub>x</sub> may cause pulmonary oedema. Symptoms of pulmonary oedema often show until a few hours after exposure and are aggravated by physical effort.

Before transfer to you, the casualty has been advised to rest and, if any respiratory symptoms were present, should have been administered oxygen. (Refer to treatment notes). The casualty will need to be treated symptomatically, but as a base line it is suggested that the following may be required:

- Spirometry
- Chest x-ray
- Methhaemoglobin estimation.

Because of the risk of delayed onset pulmonary oedema, it is recommended that as a precaution the patient be observed for up to 12 hours. As no specific antidote for NO<sub>x</sub> exists, symptoms will have to be treated when exhibited.

**This information is to be reviewed as a Guide.**