Planning Services
Resource Assessments
Contact: Matthew Sprott
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Mr Klay Marchant
MACH Energy Australia Pty Ltd

By email: klay.marchant@machenergy.com.au

Dear Mr Marchant,

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

I refer to your letter dated 27 January 2017 seeking approval of the Mount Pleasant Operation Blast Management Plan (BMP), version 2. In accordance with condition 17 of Schedule 3 of the development consent for Mount Pleasant Operation (DA 92/97), MACH Energy must submit a BMP to the Secretary for approval prior to carrying out any blasting on site.

The Department notes that Mount Pleasant has a staged approval, and is currently only permitted to undertake construction activities. I understand that MACH Energy is seeking approval of the BMP to commence small-scale blasting on site during this construction stage, for the purpose of establishing borrow pits. All borrow pit blasts would be located within the currently approved disturbance areas. I also note that MACH Energy has committed to updating the BMP prior to conducting blasts for open cut mining operations.

The Department has reviewed the BMP and is satisfied that this plan adequately addresses the applicable consent requirements for small-scale construction-related blasts. Consequently, I wish to advise that the Secretary conditionally approves the Blast Management Plan for construction-related blasts only. MACH Energy is not permitted to undertake blasting within 500 metres of a public road or within 500 metres of privately-owned land.

Lastly, please ensure the effective date on the cover page of the BMP is revised to the date of this letter. Once finalised please ensure a copy of the approved plan is placed on your website.

If you wish to discuss this matter further, please contact Matthew Sprott at the details listed above.

Yours sincerely

Howard Reed 8-2-17
Howard Reed
Director Resource Assessments
as the Secretary's nominee

MOUNT PLEASANT OPERATION

BLAST MANAGEMENT PLAN

Company:	MACH Energy Australia Pty Ltd		
Effective Date:	8/2/2017	**Status:**	Final
Approved By:	Scott Winter	**Revision Number:**	V2

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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.

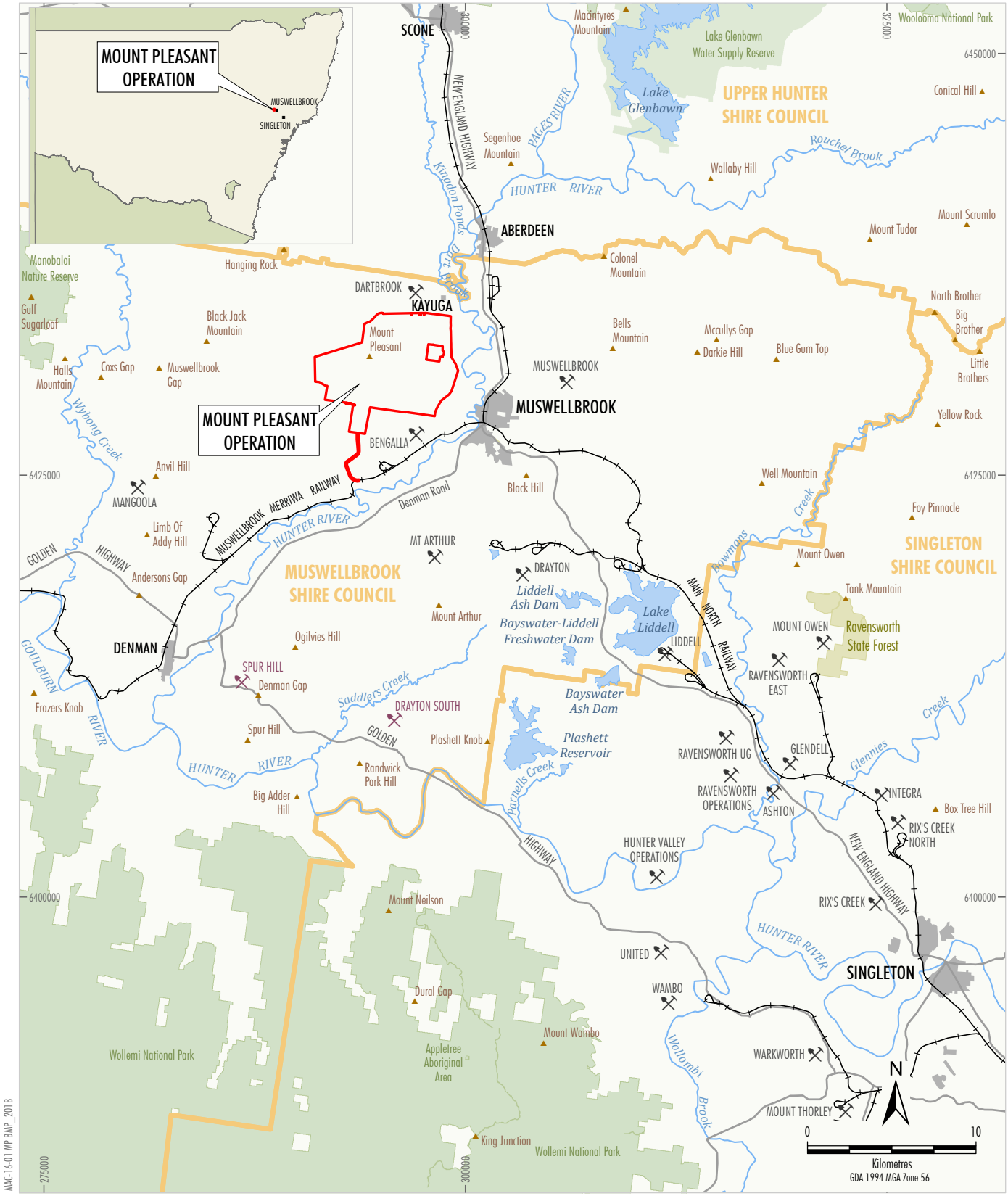
The development application for the MPO was made in 1997. This was supported by an Environmental Impact Statement (EIS) prepared by ERM Mitchell McCotter (ERM Mitchell McCotter, 1997). On 22 December 1999, the then Minister for Urban Affairs and Planning granted Development Consent DA 92/97 to Coal & 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 of run of mine (ROM) coal over a 21 year period, at a rate of up to 10.5 million tonnes 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 boundaries to accommodate the optional conveyor/service corridor and minor administrative boundary changes.

MOD 1 was approved on 19 September 2011.

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



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LEGEND

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

Source: Geoscience Australia (2006); NSW Division of Resources & Energy (2016); Land and Property Information (2016)

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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 NSW Development Consent (DA 92/97) as modified (Table 1).

Table 1
Specific Development Consent Conditions

MPO Development Consent (DA 92/97) Schedule 3	Section Where Addressed in this BMP Document
17. The Applicant shall prepare and implement a Blast Management Plan for the development to the satisfaction of the Director-General. The plan must:	This document.
(a) be submitted to the Director-General for approval prior to carrying out any blasting on site;	This document is to be approved by the Department of Planning and Environment (DP&E).
(b) describe the measures that would be implemented to ensure compliance with the relevant conditions of this consent;	Sections 6, 9 and 11.
(c) include a road closure management plan, prepared in consultation with Council;	No blasting will be undertaken within 500 metres (m) of a public road during the term of this BMP. The BMP will be updated prior to blasting being carried out within 500 m of a public road.
(d) include a blast monitoring program for evaluating compliance with the relevant conditions of approval; and	Sections 10 and 13.
(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.	Section 9.5.3.

This BMP describes the management of blasting associated with initial construction activities (e.g. borrow pits) and open cut operations, including management of overpressure, vibration, flyrock and fume at the MPO. Blast fume will be managed in accordance with a blast fume management strategy 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).

This BMP will be updated prior to blasting being carried out within 500 m of a public road or within 500 m of land outside the site not owned by MACH Energy.

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 the development consent 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 management 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 the NSW 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 and ML 1713); and
- other relevant legislation.

Obligations relevant to this BMP are described below.

4.1 EP&A ACT DEVELOPMENT CONSENT

The conditions of the NSW Development Consent (DA 92/97) relevant to the content and structure of this BMP are described below. A comprehensive list of all conditions in the NSW 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 Conditions

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

Table 2 (continued)
General Development Consent 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: • *impacts and environmental performance of the development;* • *effectiveness of any management measures (see c above);*	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: • *incidents;* • *complaints;* • *non-compliances with statutory requirements; and* • *exceedances of the impact assessment criteria and/or performance criteria; and*	Section 14.
(h) a protocol for periodic review of the plan.	Section 14.

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 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).
- Mining Operations Plan approved by the NSW Division of Resources and Energy.

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 is presented in Table 3. However, these criteria do not apply if MACH Energy has written agreement with the relevant owner of 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
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%*

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 and ML 1713 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 9am and 5pm 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 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 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 by compliance 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 m of a public road will be measured by the requirements of Condition 16, Schedule 3, considering however that this restriction does not apply if MACH Energy has the approval of Muswellbrook Shire Council (MSC).

The extent of compliance with the operating condition restrictions to blasting within 500 m of land outside the site not owned by MACH Energy will be measured by the requirements of Condition 16, Schedule 3, 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.

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.

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 Bengalla 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). Aboriginal heritage sites are described in the Aboriginal Heritage Management Plan.

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_2) and are known as the Oxides of Nitrogen or NOx. Nitric oxide (NO) is invisible, and nitrogen dioxide (NO_2) 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.

Fumes are measured on a simple scale from 0 to 5 and the extent of the fumes are assessed on a simple scale from A to C where:

- A – localised (i.e. fumes localised across only a few blast holes);
- B – medium (i.e. fumes from up to 50% of blast holes in the blast event); and
- C – extensive (i.e. extensive generation of fumes across the entire blast area).

The number of blasts classified as Level 3 or above (refer Figure 2) generated annually will be used as an indicator of blasting performance at the MPO.

Level	Typical Appearance
Level 0 No NOx gas	
Level 1 Slight NOx gas 1A Localised	
1B Medium	
1C Extensive	
Level 2 Minor yellow/orange gas 2A Localised	
2B Medium	
2C Extensive	
Level 3 Orange gas 3A Localised	
3B Medium	
3C Extensive	
Level 4 Orange/red gas 4A Localised	
4B Medium	
4C Extensive	
Level 5 Red/purple gas 5A Localised	
5B Medium	
5C Extensive	

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Source: AEISG (2011)

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Blast Fume Classification Table

Figure 2

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 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 maximum instantaneous charge (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, or where unavailable, monitoring a small trial detonation (e.g. firing a booster) prior to the main blast.

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, 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 (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 OD 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

9.1 PUBLIC SAFETY AND LIVESTOCK

9.1.1 Public Roads

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

Therefore, a Road Closure Management Plan (Appendix B) has not been included in this version of the BMP.

9.1.2 Private Landowners

No blasting will be undertaken within 500 m of land outside the site not owned by MACH Energy during the term of this BMP.

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.

9.2 RESIDENTIAL LOCATIONS

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

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 97/92) includes ground vibration criteria of 50 mm/s for public infrastructure (e.g. rail and electrical infrastructure). In accordance with Development Consent (DA 97/92), 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 when blasting is within 500 m of public infrastructure, unless otherwise agreed with the relevant infrastructure owner.

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 AHMP.

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 97/92), MACH Energy will design and manage blast events to limit ground vibration to 10 mm/s at the historic heritage sites (as defined in the Historic Heritage Study) until they have been managed in accordance with the Historic Heritage Study (e.g. excavated, salvaged or demolished). If sites remain *in situ*, blast vibration monitoring will be undertaken when blasting is within 500 m of the site.

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 (Section 9.5.2);
- 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 9.5.1);
- 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.

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 a minimum blast exclusion zone of 500 m;
- 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 9.2.1]) prior to blasting.

The Drill and Blast Superintendent (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 is described in the Construction Air Quality Management Plan as follows:

- All blasting will be conducted during daylight hours when dispersion is favourable, unless otherwise required for safety reasons.
- Blasting will be avoided during low level temperature inversions.
- Drill rigs will utilise water injection or will be fitted with dust collectors, dust aprons or dust extraction cyclones.
- Blast hole stemming will be used to prevent venting of gases.
- Coarse stemming will be used, not drill fines.
- Blast designs will avoid excessive throws.
- Alternatives will be considered, such as hydraulic breaking, if compatible with noise management requirements.

Prior to blasting in the open cuts, MACH Energy will develop a Blast Fume Management Strategy based on the AEISG (2011) Code of Practice, which will consider the following factors and practices to minimise fume emissions for all blasts:

- domain risk area;
- blast design;
- sleep time;
- explosives quality;
- explosives selection;
- on-bench practices;
- blast initiation;
- ground condition;
- reporting and documenting; and
- training.

Blasts in borrow areas for construction may be undertaken prior to development of the blast fume management strategy as these areas are located well inside the boundary of the MPO (i.e. these blasts would not be within 500 m of a public road or within 500 m of land outside the site not owned by MACH Energy). Blasts for surface borrow pits during construction would generally be less than a quarter of the size of a typical open cut blast. The risks associated with blast fumes from these small scale blasts would be significantly reduced compared to a full scale open cut blast. It is considered that a Blast Fume Management Strategy is not required until blasting in the open cut areas commences. All blasting, including any blasting conducted in borrow areas for construction, will be designed to ensure compliance with the relevant conditions from the Development Consent (DA 92/97) (refer Sections 5 and 6).

9.5.3 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 will be developed in consultation with nearby mines (including Bengalla Mine) prior to blasting within 500 m of public roads. The protocol will involve communications (via email, fax or telephone) to be sent and received prior to each blast.

Minimising the cumulative impacts of the MPO on the surrounding area would be achieved, for example, through review of blast schedules for nearby mines (including Bengalla Mine) or through information obtained via the communications protocol, and subsequently coordinating blast times so that back-to-back closures of public roads are avoided, where practical[1].

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.

[1] As described in Section 9.1.1, no blasting will be undertaken within 500 m of a public road during the term of this BMP. The BMP will be updated prior to blasting being carried out within 500 m of a public road, and would include a Road Closure Management Plan developed in consultation with MSC.

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, or where unavailable, monitoring a small trial detonation (e.g. firing a booster) prior to the main blast.

10 BLAST MONITORING PROGRAM

10.1 AIRBLAST OVERPRESSURE, GROUND 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.

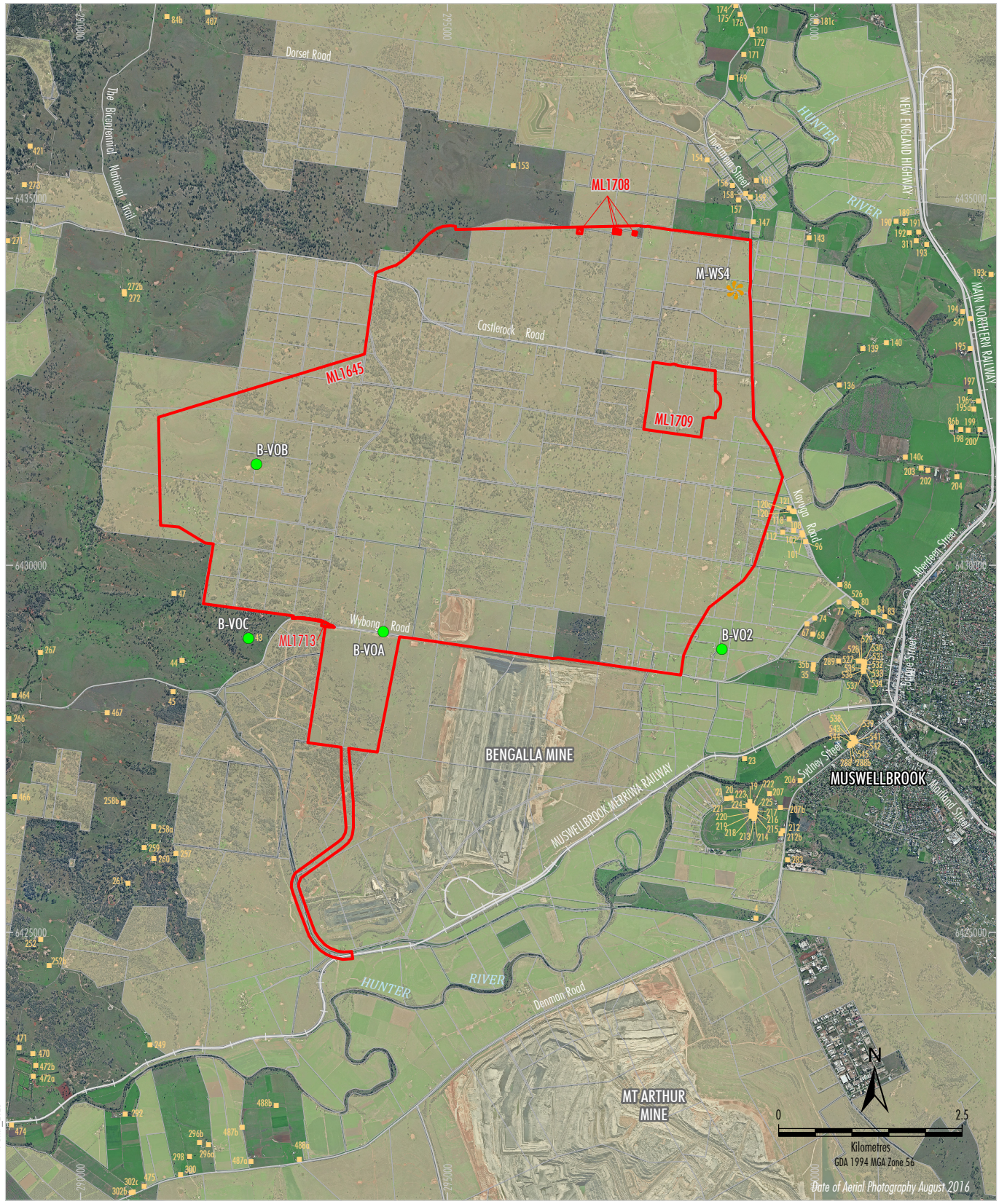
Performance indicators to evaluate the extent of compliance with the relevant conditions of Development Consent (DA 92/97) are provided in Section 6.

10.1.1 Location of Monitoring Equipment

Blast monitoring locations at the MPO are shown on Figure 3 and summarised in Table 5. 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.



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LEGEND

- Mining Lease Boundary
- Mine Owned
- Relevant Privately-owned Residence
- Blast Monitoring Site (Vibration/Overpressure)
- Weather Station

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

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MOUNT PLEASANT OPERATION

Blast Monitoring Locations

Figure 3

Table 5
Blast Monitoring Locations

Location	Site ID	Parameters	Comment
Wybong Road	BOV2	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	Initial network of monitoring sites that are located on MACH Energy owned land and are situated between the initial borrow pit 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 required)	N/A (portable)	Ground Vibration	Visual monitoring of representative sites within 500 m for the first blast in each area (e.g. borrow areas and open cut).
Historic Heritage Sites (where required)	N/A (portable)	Ground Vibration	Portable monitoring device to be used at the historic heritage sites (or representative site) when blasting within 500 m and determined to be necessary in accordance with the Historic Heritage Study (as updated from time to time).
Public Infrastructure	N/A (portable)	Ground Vibration	Portable monitoring device to be used at the public infrastructure (e.g. powerlines) when blasting within 500 m.
Public Roads	-	Airblast Overpressure and Ground Vibration	No blasting will be undertaken within 500 m of a public road during the term of this BMP.
Between Blast and Boundary of Premises	N/A (variable)	NOx Fume	Location of observation point would vary depending on prevailing weather conditions.
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).

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.

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 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 Pty Limited, 2011) and *Bengalla Annual Environmental Management Report 2011* (Bengalla Mining Company Pty Limited, 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 4) 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 investigation 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; and
- whether appropriate controls were implemented to prevent the incident.

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[2] will be recorded and maintained for a period of no less than four years.

In the event that an investigation concludes that an exceedance of the blasting criteria in Section 5 was directly attributed 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 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).

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.

[2] 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).

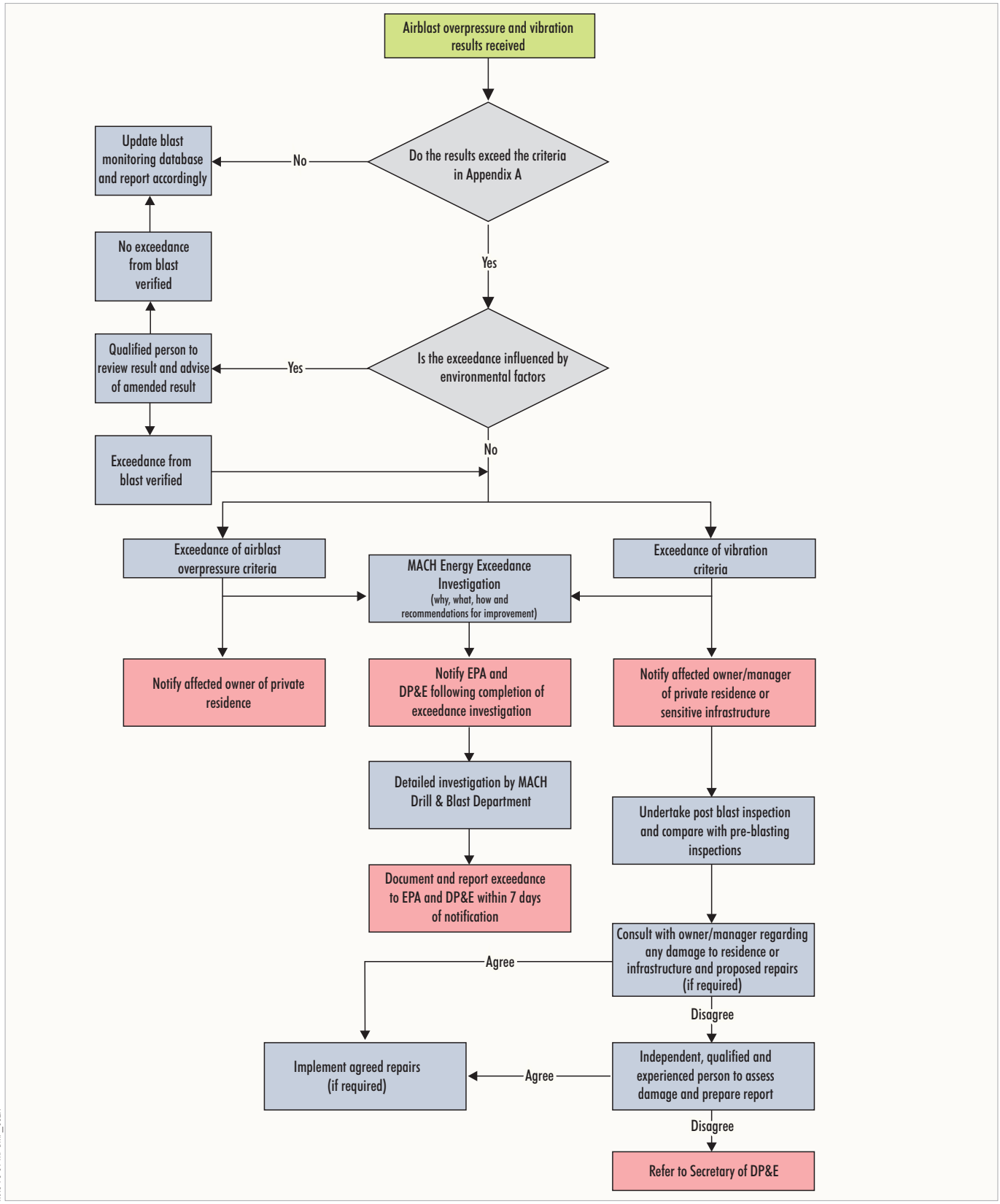

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Figure 4

11.2.2 Off-Site Incident

In the event that blast fumes rated at Level 3 or above (refer Section 8.4) 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[3] of the risk.
- The General Manager will initiate the Pollution Incident Response as illustrated on Figure 3 of the Pollution Incident Response Management Plan (Appendix C), 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_x) or displays symptoms associated with blast fumes, MACH Energy will declare an incident and commence the Pollution Incident Response as illustrated on Figure 3 of the Pollution Incident Response Management Plan (Appendix C), 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 (000) if external assistance is required and advise of possible exposure to Blasting Fume (NO_x).
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.

[3] If the General Manager position is vacant, the Environmental Superintendent will notify the Managing Director.

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” (see example in Appendix D) 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 Flowsheet illustrated in Figure 3 of the Pollution Incident Response Management Plan (Appendix C).

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, undertaken 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 three 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 three 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 March 1 each year or other such timing as agreed by the Secretary of the Department of Planning and Environment[4].

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).

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).

[4] In November 2013, the Secretary (then Director-General) of the Department of Planning and Infrastructure (now DP&E) revised the submission timing of the Annual Review from the end of December to 1 March each year.

14 REPORTING SYSTEMS

In accordance with Condition 2, Schedule 5 of the NSW Development Consent (DA 92/97), MACH Energy has developed protocols which are described in the Environmental Management Strategy for managing and reporting:

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

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

In the event that the Blasting Criteria Review Protocol (Section 11.1 and Figure 4) concludes that a non-compliance of the relevant blast criteria has occurred (i.e. an incident), the event will be reported to the DP&E and EPA immediately upon identifying the exceedance.

Within seven days of notifying the DP&E and EPA of an exceedance, MACH Energy will submit a detailed report to DP&E and EPA that:

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

MACH Energy will also provide regular monitoring results to DP&E, EPA and affected landowners until the results show that the MPO is complying with relevant criteria.

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*.

Casaday and Lehmann (1967) *Response of Farm Animals to Sonic Booms*.

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.*

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

Planning Environmental & Engineering Consultants (1999) *Mount Pleasant Mine Commission of Enquiry – 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

<table>
<tr><th>Development Consent (DA 92/97)</th><th>BMP Section</th></tr>
<tr><td colspan="2">Schedule 3</td></tr>
<tr><td>Blast Management Plan

17. The Applicant shall prepare and implement a Blast Management Plan for the development to the satisfaction of the Director-General. This plan must:
(a) be submitted to the Director-General for approval prior to carrying out any blasting on site;
(b) describe the measures that would be implemented to ensure compliance with the relevant conditions of this consent;
(c) include a road closure management plan, prepared in consultation with Council;
(d) include a blast monitoring program for evaluating compliance with the relevant conditions of approval; and
(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.</td><td>This document (refer Table 1)</td></tr>
<tr><td>Blasting Criteria

10. The Applicant shall ensure that the blasting on the site does not cause exceedances of the criteria in Table 7.
Table 7: Blasting Criteria
<table>
<tr><th>Location</th><th>Airblast Overpressure (dB[Lin Peak])</th><th>Ground Vibration (mm/s)</th><th>Allowable Exceedance</th></tr>
<tr><td rowspan="2">Residence on privately owned land</td><td>120</td><td>10</td><td>0%</td></tr>
<tr><td>115</td><td>5</td><td>5% of the total number of blasts over a period of 12 months</td></tr>
<tr><td>Historic heritage sites</td><td>-</td><td>10</td><td>0%</td></tr>
<tr><td>All public infrastructure</td><td>-</td><td>50</td><td>0%</td></tr>
</table>
However, these criteria do not apply if the 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.</td><td>Section 5.1 (refer Table 3)</td></tr>
<tr><td>Blasting Hours

11. The Applicant shall only carry out blasting on site between 9am and 5pm Monday to Saturday inclusive. No blasting is allowed on Sundays, public holidays, or at any other time without the written approval of the Director-General.</td><td>Section 6.2</td></tr>
<tr><td>Blasting Frequency

12. Unless otherwise agreed by the Director-General, the Applicant may carry out a maximum of:
(a) 1 blast a day; and
(b) 5 blasts a week, averaged over any calendar year;
for the development.

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.

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.</td><td>Section 6.3</td></tr>
</table>

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

Development Consent (DA 92/97)	BMP Section
Schedule 3 (Continued)	
Property Inspections 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 shall: (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to: • establish the baseline condition of the buildings and/or structures on the land, or update the previous property inspection report; • identify any measures that should be implemented to minimise the potential blasting impacts of the development on these buildings and/or structures; and (b) give the landowner a copy of the new or updated property inspection report.	Section 9.2.2
Property Investigations 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 shall: (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to investigate the claim; and (b) give the landowner a copy of the property investigation report. If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Applicant shall repair the damages to the satisfaction of the Director-General. If the Applicant or landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Director-General for resolution.	Section 9.2.2
Operating Conditions 15. The Applicant shall: (a) implement best blasting management practice on site to: • protect the safety of people and livestock in the surrounding area; • protect public or private infrastructure/property in the surrounding area; • minimise the dust and fume emissions of the blasting on site; and • minimise blasting impacts on heritage items in the vicinity of the site; (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 (c) operate a suitable system to enable the public to get up-to-date information on the proposed blasting schedule on site, to the satisfaction of the Director-General.	Section 9 Section 9.5.3 Section 9.5.4

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

Development Consent (DA 92/97)	BMP Section
Schedule 3 (Continued)	
16. The Applicant shall not undertake blasting within 500 metres of: (a) a public road without the approval of Council; and (b) any land outside the site not owned by the Applicant, unless: • 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 • the Applicant has: - demonstrated to the satisfaction of the Director-General 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 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.	Section 9.1.1 Section 9.1.2
Blast Related Aboriginal Heritage Management Plan 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: … (c) include: • … • a description of the measures that would be implemented to: ○ … ○ minimise the blasting impacts of the development on Aboriginal objects in the vicinity of the site; …	Section 9.4.1 (and refer to separate AHMP)
Schedule 4	
NOTIFICATION OF LANDOWNERS 1. By the end of December 2011, the Applicant shall: (a) notify in writing the owners of: • … • 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 …	Section 9.2.1
2. As soon as practicable after obtaining monitoring results showing: (a) exceedance of the relevant criteria in schedule 3, the Applicant shall 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; …	Section 11.1

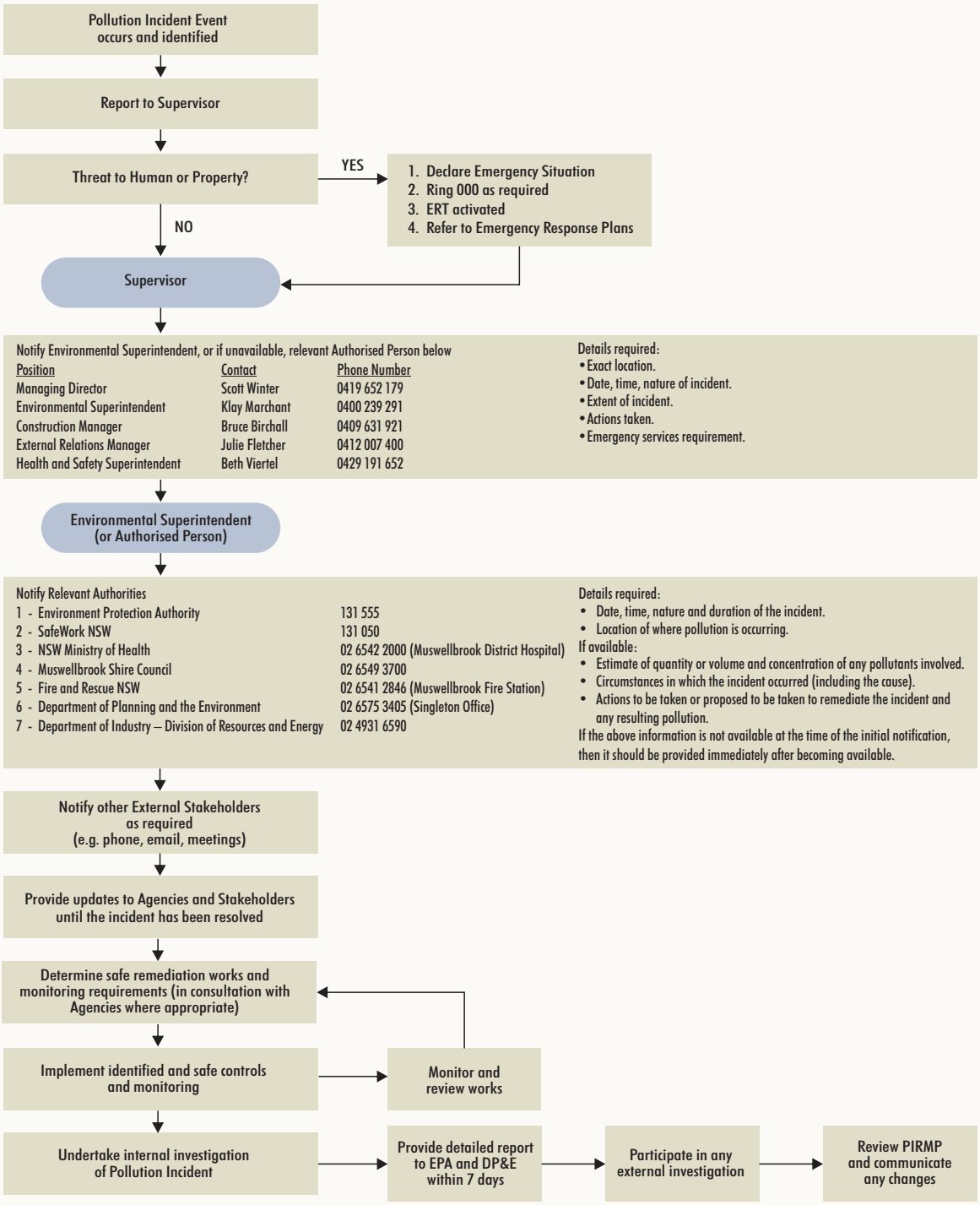
APPENDIX B

ROAD CLOSURE MANAGEMENT PLAN

[*Not included in this Version of the BMP*]

APPENDIX C

POLLUTION INCIDENT RESPONSE FLOWCHART



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MOUNT PLEASANT OPERATION

Pollution Incident Response Flowchart

Figure 3

APPENDIX D

INFORMATION FOR TREATING DOCTOR

Information for treating Doctor

Dear Doctor,

This patient has been exposed to NOx. This is a gas usually produced on mines after the use of explosives. NOx consists of multiple combinations of nitrogen and oxygen (N_2O, NO, NO_2, N_2O_4, N_2O_3, N_2O_5). Nitrogen Dioxide (NO_2) is the principal hazardous nitrous fume.

NOx 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 methhaemoglobinaemia. Some people, particularly asthmatics, can experience significant bronchospasm at very low concentrations.

The following effects are commonly encountered after NOx 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 methhaemoglobinaemia, 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 NOx 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
- Methheamoglobin 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 NOx exists, symptoms will have to be treated when exhibited.

Information provided by Dr Vern Madden, Health Advantage Toowoomba. This information is to be reviewed as a Guide.