



DARTBROOK MINE

BLAST MANAGEMENT PLAN

for Dartbrook Operations Pty Ltd

22 February 2024

DOCUMENT CONTROL

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Client	Dartbrook Operations Pty Ltd
Client Address	GPO Box 3323, Brisbane QLD 4001
Author	James Bailey & Associates Pty Ltd
Author Address	6/127-129 John Street, Singleton NSW 2330
Our Reference	240222 Blast MP

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1. INTRODUCTION

1.1 BACKGROUND

Dartbrook Mine is owned by an unincorporated Joint Venture (Dartbrook Joint Venture) between Australian Pacific Coal (AQC) and Tetra Resources Pty Ltd. Dartbrook Operations Pty Ltd (Dartbrook Operations) is the appointed operating management company and the Mine Operator under Section 5 of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2022*. The Dartbrook Joint Venture will acquire AQC Dartbrook Management Pty Ltd (ABN 62 007 377 577) which is the holder of the Development Consent and Environment Protection Licence), and AQC Dartbrook Pty Ltd (ABN 46 000 012 813) which is the holder of the relevant mining and coal authorities.

Dartbrook Mine is located approximately 10 km north-west of Muswellbrook and 4.5 km south-west of the village of Aberdeen in New South Wales. Dartbrook Mine operated as an underground longwall coal mine from 1993 until December 2006, when it was placed in care and maintenance by the previous owner, Anglo Coal (Dartbrook Management) Pty Ltd. The mine was acquired by AQC in 2017 and remained in care and maintenance throughout AQC's period of ownership.

Dartbrook Mine is authorised by Development Consent DA 231-07-2000 granted under the *Environmental Planning and Assessment Act 1979*. DA 231-07-2000 was granted on 28 August 2001 and has been modified on seven occasions (as summarised in **Table 1**). DA 231-07-2000 enables mining operations to be carried out until 5 December 2027.

Dartbrook Operations is preparing to recommence mining activities in 2024, thereby transitioning Dartbrook Mine from care and maintenance back to an operational phase.

Table 1 Modifications to DA 231-07-2000

Modification	Approval Date	Activities
MOD 1	19 June 2002	MOD1 was an administrative modification to DA 231-07-2000 that altered the conditions regarding blasting notifications and structural inspections.
MOD 2	16 June 2003	MOD2 approved the construction and operation of an additional emergency tailings storage cell at the Coal Handling and Processing Plant (CHPP).
MOD 3	4 November 2003	<p>MOD3 proposed the following changes to the site access arrangements:</p> <ul style="list-style-type: none"> Continued use of Dartbrook Road to provide access to the West Site; and Use of local public roads by traffic associated with Dartbrook Mine. <p>Prior to construction of the Kayuga Mine Access Road, access to the West Site was via Dartbrook Road. It was envisaged that Kayuga Mine Access Road would replace Dartbrook Mine as the primary access to the West Site. However, the Kayuga Mine Access Road was being used by trucks to haul coal to the CHPP. To avoid interactions between haul trucks and private vehicles, MOD3 proposed that Dartbrook Road should continue to be used as the primary access road for mine personnel.</p> <p>MOD3 also sought approval for locally based employees to access the West Site via local roads (Kayuga Road, Dartbrook Road and Blairmore Lane). For employees residing in the surrounding areas, these local roads provide more convenient access than the Western Access Road.</p>
MOD 4	30 March 2004	DA 231-07-2000 allowed for truck haulage of coal to the CHPP over an 18-month period. Truck haulage was to be discontinued upon completion of the conveyor system for the Kayuga Seam, which would

Modification	Approval Date	Activities
		enable coal to be transferred to the CHPP via the Hunter Tunnel. MOD 4 extended the duration of truck haulage by 3 months to allow for haulage to continue until the completion of the Kayuga Seam conveyor system.
MOD 5	4 May 2005	MOD 5 facilitated changes to the rejects disposal system at Dartbrook Mine. The approved rejects disposal system involved the commissioning of a pipeline and pumping system for the transportation and disposal of reject materials. Engineering studies indicated that this method would pose significant technical risks due to the variability in relative quantities of coarse and fine rejects produced by the CHPP. MOD5 obtained approval for rejects to be transported to the Rejects Emplacement Area (REA) using trucks.
MOD 6	16 November 2005	MOD 6 provided approval for the following activities: <ul style="list-style-type: none"> • Establishment of four new Run of Mine (ROM) coal stockpiles and expansion of the existing emergency ROM coal stockpile at the CHPP; • Disposal of tailings within the Wynn Seam goaf; and • Operation of a Nitrogen Injection Plant to prevent the oxidation of coal.
MOD 7	11 March 2022	MOD 7 was determined by the NSW Independent Planning Commission (IPCN) on 9 August 2019. The IPCN approved the alternate mining method (bord and pillar mining) but not the proposed five-year extension to the duration of mining operations. Without the extension to operate under DA 231-07-2000 for a further five years, it was impractical to recommence mining at Dartbrook. In November 2019, an appeal was lodged against the IPCN's determination in the NSW Land and Environment Court. The court proceedings were resolved on 11 March 2022, with the proposed five-year extension of mining being approved. As a result, DA 231-07-2000 currently enables mining operations to be undertaken until 5 December 2027.

1.2 BLAST MANAGEMENT PLAN

This Blast Management Plan has been developed in accordance with Condition 6.3 of Development Consent (DA) 231-07-2000. It addresses the blasting required for construction of the Kayuga Seam Access Slot and Blairmore Lane Underpass. **Figure 1** shows the location of the blast sites. Separate Blast Management Plan/s will be prepared for blasting in any other locations required as part of construction or operations, prior to the commencement of blasting.

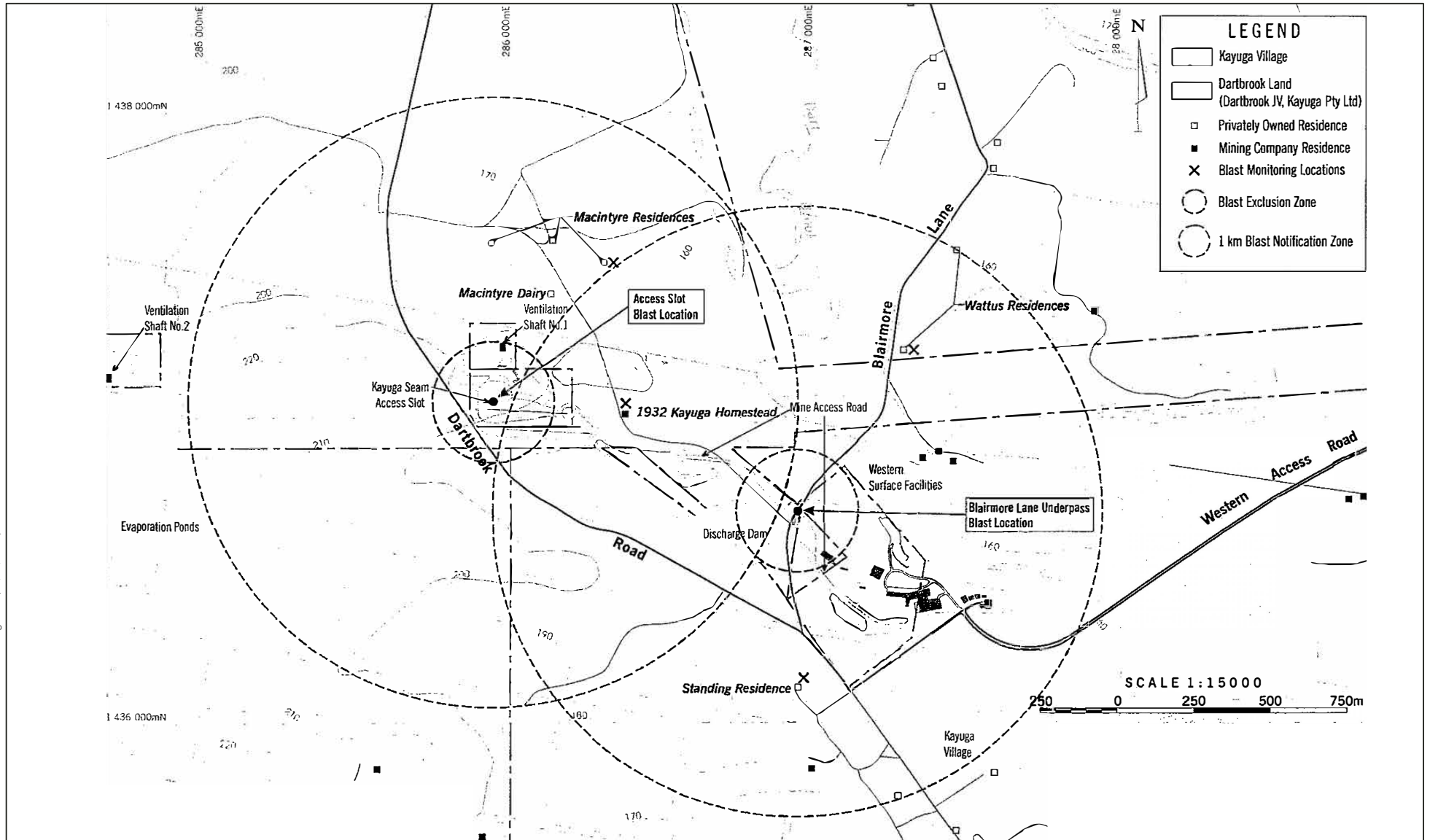
A Road Closure Management Plan is required to be prepared, in accordance with development consent condition 6.3(j), prior to any blasting within 500 m of a public road. The blasts addressed in this management plan are both within 500 m of public roads. A separate Blasting Road Closure Management Plan, to address the closure of Blairmore Lane and Dartbrook Road, has been prepared and is included as **Appendix A** of this document.

1.3 MANAGEMENT PLAN REQUIREMENTS

The primary objective of the Blast Management Plan is to manage and minimise the impact of blasting on the environment and nearby privately owned residences. The objective will be met through the implementation of the management measures specified in this plan.

The specific requirements of the Blast Management Plan are contained in Condition 6.3(f) of DA 231-07-2000. **Table 2** lists these requirements and refers to where each specific requirement is addressed in the management plan.

JBA 2339 DBK - BM F 01 Blast Monitoring Plan (21/02/2024)



DARTBROOK MINE

Blast Monitoring Plan

FIGURE 1

Table 2 Blast Management Plan Checklist

Development Consent Condition		Reference
6.3 Blast Management Plan		This document is the Blast Management Plan which has been prepared to the satisfaction of the Secretary.
(f) The Applicant shall prepare and implement a Blast Management Plan to the satisfaction of the Director-General, prior to the commencement of any blasting. The Plan must include, but need not be limited to, the following matters:		
• compliance standards;		Section 2
• mitigation measures;		Section 4
• remedial action;		Section 7
• monitoring methods and program;		Section 5
• monitoring program for flyrock distribution;		Sections 4.3 and 5
• measures to be undertaken to demonstrate that Dartbrook Mine is achieving best practice in minimising both air blast overpressure and ground vibration levels;		Section 4.1
• measures to protect underground utilities (eg: rising mains, subsurface telecommunications and electric cables), native fauna and livestock nearby;		Sections 4.3 and 4.4
• procedures for the notification of neighbours prior to detonation of each blast; and		Section 4.2
• measures to ensure no damage by flyrock to people, property, livestock and powerlines.		Section 4.3

2. CRITERIA

2.1 OVERPRESSURE AND GROUND VIBRATION

Criteria for overpressure and ground vibration levels due to blasting are specified in Conditions 6.3(a) and (b) and conditions L5.1 and L5.2 of Dartbrook Operations Environment Protection Licence. These are consistent with criteria promulgated by the New South Wales Environment Protection Authority (EPA), which are in turn based on recommendations of the Australian and New Zealand Environment and Conservation Council (ANZECC). The development consent conditions are presented in italics below.

Blasting Overpressure

(a) *The overpressure level from blasting operations on the premises must not:*

- *exceed 115 dB (Linear Peak) for more than 5% of the total number of blasts over a period of 12 months; and*
- *exceed 120 dB (Linear Peak) at any time,*

at any residence or noise sensitive location (such as a school or hospital) that is not owned by the Applicant or subject to a private agreement between the owner of the residence or noise sensitive location and the Applicant as to an alternative overpressure level.

Ground Vibration

(b) *Ground vibration peak particle velocity from the blasting operations must not:*

- exceed 5 mmls for more than 5% of the total number of blasts over a period of 12 months; and
- exceed 10 mmls at any time,

at any residence or noise sensitive location (such as a school or hospital) that is not owned by the Applicant, or subject to a private agreement between the owner of the residence, or noise sensitive location and the Applicant, as to an alternative vibration level.

Although not explicitly stated in the development consent conditions, criteria for ground vibration levels are also required to protect the structural integrity of the 1932 Kayuga Homestead building, located 430 m east of the access slot. This homestead is owned by Dartbrook Operations and is of heritage interest, although not heritage listed (**Figure 1**).

Australian Standard 2187.2-1993 *Explosives -Storage, Transport and Use* recommends maximum peak particle velocities for the protection of various types of structures. Given the heritage value of this homestead, it is considered appropriate to apply the criterion of 5 mm/s, recommended for "structures which may be particularly susceptible to ground vibration", to this building.

2.2 BLASTING TIME AND FREQUENCY RESTRICTIONS

Development consent conditions 6.3(c) and (e), and condition L5.3 of Dartbrook Operations Environment Protection Licence specify that blasting operations may only take place between 9am and 5pm Monday to Friday inclusive, unless otherwise authorised in writing, by the EPA. Development consent condition 6.3(d) and condition L5.4 of Dartbrook Operations Environment Protection Licence state that blasting at the premises is limited to one blast on each day on which blasting is permitted.

3. IMPACT ASSESSMENT

A Blast Impact Assessment for blasting within the Kayuga Seam Access Slot and Blairmore Lane Underpass excavations was undertaken by acoustical consultants. Wilkinson Murray Pty Ltd, and is included in **Appendix B** of this plan. The following sections provide a summary of the assessment.

3.1 ENVIRONMENTAL CONTEXT

3.1.1 Kayuga Seam Access Slot

There will be a single blast on the floor of the Kayuga Seam Access Slot excavation to fracture fresh rock floor material and enable mechanical excavation. The blast location is at the base of the access slot excavation, approximately 34 m below natural ground surface. The proposed maximum instantaneous charge (MIC) is 3 kg, expressed as kg ANFO equivalent. It should be noted that this is a small-scale blast in comparison to an open cut mine blast.

The closest privately owned buildings in the vicinity of the blast site that could potentially be affected by blast overpressure and vibration are:

- McIntyre residence, which is approximately 585 m north of the Access Slot; and
- McIntyre dairy, which is approximately 465 m north of the Access Slot.

In addition to these buildings, the 1932 Kayuga Homestead is located 430 m east of the access slot. This homestead is of heritage interest, although not heritage listed, and is owned by Dartbrook Operations. Additional restrictions on blast vibration levels at this property are proposed in order to protect the structural integrity of the building (**Section 2.1**).

3.1.2 Blairmore Lane Underpass

It is anticipated that a single blast will be fired within the new mine access road excavation in the vicinity of Blairmore Lane. The blast is required to fracture a band of fresh rock material and enable mechanical excavation. The MIC for the blast is 10 kg. It should be noted that whilst this is a larger blast than the access slot blast, it is still a small-scale blast in comparison to an open cut mine blast.

The closest privately owned residence in the vicinity of the blast site that could potentially be affected by blast overpressure and vibration is the Standing residence, which is approximately 540 m south of the blast site.

3.2 PREDICTED VIBRATION AND OVERPRESSURE LEVELS

Predictive equations were used to calculate the median and 5% exceedance values for overpressure and ground vibration at the nearest residences or buildings. **Table 3** shows the calculated values.

Table 3 Calculated Overpressure and Vibration Levels

Residence / Building	Distance from blast site	Blast Overpressure, dB (L)				Ground Vibration PPV, mm/sec			
		Median	5% Exceedance	Criterion		Median	5% Exceedance	Criterion	
				5% Exceedance	Absolute Maximum			5% Exceedance	Absolute Maximum ¹
Kayuga Seam Access Slot									
1932 Kayuga Homestead	430	103	116	-	-	0.09	0.4	5	5
McIntyre ² Dairy	465	102	115	-	-	0.08	0.3	10	10
McIntyre Residence	585	100	113	115	120	0.05	0.2	5	10
Blairmore Lane Underpass									
Standing Residence	540	104	117	115	120	0.2	0.7	5	10

Table 3 indicates that predicted vibration levels for both blasting locations are well within relevant criteria.

Overpressure levels due to blasting at the access slot are also predicted to be within relevant criteria at the closest privately owned residences. A minor exceedance of 1 dB is predicted for the 5% exceedance criteria at the 1932 Kayuga Homestead, however, this property is owned by Dartbrook Operations. For blasting at the Blairmore Lane Underpass, median overpressure levels for blasts are well within the criterion, although calculated 5% exceedance overpressure levels exceed the relevant criterion at the nearest private residence. The 5% exceedance level is calculated based on an assessment of a number of blasts conducted over a range of "typical" blasting practices and meteorological conditions, including adverse meteorological conditions.

¹ The blasting impact prediction methodology developed by Wilkinson Murray (Appendix B) is based on an assessment of the probability and possible range of blasting impacts depending on potential variation of relevant parameters including ground conditions, weather conditions, blast design and blast mitigation measures. Absolute maximum values are not meaningful in this context and are not specified in the table. However Wilkinson-Murray considers that if predicted blast impacts are within the 5% exceedance criteria, exceedances of absolute maximum criteria are highly unlikely.

²

The blast at this location will be carefully designed and fired only under favourable meteorological conditions to ensure that the blast overpressure level is within the criteria at this residence. Details of proposed blast management and control measures are provided in **Section 4**.

4. BLAST MANAGEMENT AND CONTROL MEASURES

4.1 BEST PRACTICE CONTROL MEASURES

Best Practice blast management procedures will be implemented at the Dartbrook Mine. These will include procedures to minimise air blast overpressure and ground vibration levels from blasting activities on the Dartbrook Mine site. This will be achieved by:

- Use of noiseless initiation systems to minimise overpressure pulses from surface detonating cord and detonators;
- Adequate stemming lengths to ensure full confinement of explosive charges. This will be achieved by:
 - Using adequate stemming lengths in normal length holes;
 - Use of scaled depth of burial techniques to calculate stemming lengths in shallow holes;
 - Increased stemming lengths where the collar of the hole is full of water and the hole is not dewatered prior to loading;
 - Increased stemming lengths where soft overburden is present in the collar region of the blast hole; and
 - Notwithstanding the above, use of a stemming depth of at least 3 m for the Blairmore Lane Underpass blast.
- Use of good quality stemming. This may be drill cuttings or imported gravel, if necessary;
- Assessment of weather conditions which may result in adverse blast impacts, prior to approving blasting. Real-time wind speed and direction data from the Dartbrook Meteorological Station, 3 km east of the Blairmore Lane Underpass blast, is available to the Dartbrook Environmental Officer with a 10 second delay. The Dartbrook Environmental Officer will radio this information to the shotfirer and blasting at the Blairmore Lane Underpass will not take place if the wind direction is toward the nearest private residences from the blasting location;
- Implementation of standard operating procedures for drilling, loading, stemming and initiation of blastholes and blasts;
- Investigating the possibility of reducing the MIC for the Blairmore Lane Underpass blast and adopting a reduced MIC, if practicable;
- Strict adherence to blast loading and initiation designs; and
- Monitoring blast overpressure and vibration at the closest private residences and sensitive locations.

4.2 COMMUNITY NOTIFICATION

Notification of emergency services, local councils, and residents in relation to public road closures during blasting is discussed in the Blasting Road Closure Management Plan (**Appendix A**). Local residents and the broader community will receive prior notification of blasting through the proposed blasting road closure notifications (i.e. both the proposed blasts require public road closures).

In accordance with development consent condition 6.3(g), Dartbrook Operations will provide all residents within one kilometre of blasting locations with prior written notification of the blasting program and of their right to a structural inspection in accordance with development consent condition 6.3(h). The notification will be given at least two weeks prior to the commencement of blasting. The one kilometre radius around each blasting location is shown in **Figure 1**. In accordance with development consent condition 6.3(h), Dartbrook Operations will arrange and pay for a structural inspection of any structure, if requested in writing by the owner of a property, within one km of blasting locations. The inspection will be by a technically qualified person, agreed to by both parties, and will be carried out within 14 days of receipt of the request. Dartbrook Operations will supply a copy of any inspection report, certified by the person who undertook the inspection to the relevant property owner within 14 days of receipt of the request. Due to the small-scale nature of the blasts and low predicted ground vibration levels at the closest private residences, it is unlikely that the blasts will result in any structural damage to privately owned structures.

4.3 MANAGEMENT OF FLYROCK

The generation of flyrock will be managed by incorporating appropriate controls into blast designs. These controls will include selection of stemming lengths and stemming materials to minimise the potential for generating flyrock. These measures will be used to ensure there is no damage to people, property, livestock or power lines from fly rock.

A 200 m exclusion zone for people and livestock will be established around each blast site in accordance with relevant mine safety regulations prior to firing a blast (**Figure 1**). The exclusion zone will be established beyond the expected range of any flyrock with an additional safety margin. All land within this zone is owned by Dartbrook Operations with the exception of public roads. Sections of public roads within 500 m of blasting locations will be closed during blasting (refer to Blasting Road Closure Management Plan). The blast exclusion zone will include mine access roads around the blast sites.

The establishment of this exclusion zone will minimise the risk of any injuries to people or livestock due to flyrock. There is no livestock, or native fauna at risk of injury by flyrock within the blast area. Due to the design and small scale nature of the blasts, flyrock is not expected to be generated. There are no additional measures required for the protection of native fauna and livestock.

4.4 PROTECTION OF UNDERGROUND UTILITIES

Based on the results of the Blast Impact Assessment, predicted ground vibration levels are not expected to damage any underground utilities on neighbouring private land and there are no management measures required for the protection of underground utilities. Should any unexpected damage to underground utilities, or any other private property, occur as a result of blasting on the Dartbrook site, Dartbrook Operations will meet the reasonable cost of repair.

5. MONITORING PROGRAM

Monitoring of ground vibration and overpressure will be conducted for each blast at the nearest private residences, and other sensitive locations, in accordance with development consent conditions 6.3(1) and 6.3(m), and condition M7.1 of the Environment Protection Licence. In accordance with development consent condition 6.3(m), blast monitoring sites have been selected in consultation with the EPA. For the access slot blast, monitors will be located at the McIntyre residence and the 1932 Kayuga Homestead (**Figure 1**). For the Blairmore Lane Underpass blast, monitors will be located at the Standing residence and the Wattus residence (**Figure 1**). Blast monitoring will be conducted in accordance with relevant Australian standards.

The blasts addressed by this management plan are designed to fracture rock rather than throw blasted ground (like many open cut mine blasts). Consequently, generation of flyrock is not anticipated. Any risk of flyrock is further reduced by the small-scale nature of the blasts. Any unexpected flyrock generated by blasting, with the potential to cause a safety risk or impact on underground utilities, livestock or fauna will be noted for each blast.

This information will be used to assess the adequacy of blast design controls in reducing the generation of fly rock for any future blasting.

6. REPORTING

Blast monitoring results will be reported as required by the Dartbrook Development Consent. Reporting will include the following:

- Community Consultative Committee (CCC), Muswellbrook Shire Council (MSC), Upper Hunter Shire Council (UHSC), Mining, Exploration and Geoscience (MEG) and EPA in relevant monitoring reports;
- Department of Planning, Housing and Infrastructure (DPHI), MEG, EPA, Department of Climate Change, Energy, the Environment and Water, National Parks and Wildlife Services (NPWS), MSC, UHSC and CCC in the Annual Review;
- EPA will be notified of any exceedance of the blasting criteria, as soon as practicable after the exceedance becomes known to Dartbrook Operations, in accordance with condition R4.1 of the Environment Protection Licence; and
- Any blasting complaints will be included in the six-monthly complaints report submitted to CCC, DPHI, MSC, UHSC, EPA and MEG.

7. RESPONSE PROCEDURES

Response procedures will be activated by monitored blasting impacts in excess of the criteria specified in this management plan, or a community complaint. If a complaint is received in relation to blasting impacts the following procedure will be followed:

1. The Dartbrook Environmental Officer will be informed of the complaint and details will be recorded in the complaint register;
2. The relevant Sonstruction Supervisor and/or the Dartbrook Environmental Officer will investigate the complaint to determine whether it is related to a Dartbrook Operations blast. If the investigation concludes that the complaint is not due to a Dartbrook Operations blast, the complainant will be notified; and
3. If the complaint is determined to be due to a Dartbrook Operations blast, monitoring data will be reviewed to determine whether blast impacts were in excess of the relevant blast criteria.

Blast monitoring data will be reviewed following each blast. If blast monitoring data indicates that exceedances of blast criteria have occurred, the following procedure will be followed, regardless of whether a complaint has been made:

1. If blast monitoring demonstrates that an air blast overpressure of 115-120 dB (Linear Peak) or a ground vibration level of 5-10 mm/sec occurred at a private residence, the Dartbrook Environmental Officer will be required to determine the circumstances of the blast and the reason for the exceedance. The Dartbrook Environmental Officer should be satisfied that these circumstances would not be repeated.
2. If monitoring demonstrates that an airblast overpressure of 120 dB (Linear Peak) or a ground vibration level of 10 mm/sec has been exceeded at any private residence, the Dartbrook Environmental Officer will be required to immediately ensure that no further blasting occurs under similar circumstances. The reason(s) for the exceedance will be investigated and determined. Where necessary the blast designs/blasting procedures will be revised to prevent any recurring exceedances.

3. The blast monitoring results and any corrective action will be recorded on the complaints register and reported back to the complainant by the Environmental Officer.

It is considered unlikely that any privately owned residences will be affected by impacts from blasting above the criteria (**Section 2.1**). Any complaints in relation to structural damage to privately owned residences or other structures will be investigated in accordance with the Dartbrook Complaints Handling Protocol. The investigation would include the review of blast monitoring results, and where necessary, structural inspection of the house or structure by qualified persons. Dartbrook Operations will meet the reasonable cost of repair of any structural damage to a private residence or other structure, which is proven to be due to blasting undertaken as Dartbrook Mine operations.

8. RESPONSIBILITIES

The key personnel with responsibility for environmental management of blasting activities will be the Dartbrook Environmental Officer, and the contractor's Construction Supervisor(s).

The Dartbrook Extended Environmental Officer will be responsible for ensuring that the requirements of this management plan are implemented while the Construction Supervisor will be responsible for implementing blasting control measures specified in this plan. All blast management work will be completed as directed and to the satisfaction of the Environmental Officer.

Specific responsibilities of the Dartbrook Environmental Officer will include:

- Approval of the blasting time after conducting an assessment of meteorological conditions;
- Investigating any blasting related complaints or monitored exceedances of blast criteria in accordance with the response procedures specified in **Section 7**; and
- Ensuring that all contractors and sub-contractors and their personnel are given adequate training in environmental awareness, legal responsibilities, and blast control methods.

Specific responsibilities of the Construction Supervisor include:

- Implementation of blasting control measures in accordance with the requirements of this management plan;
- Implementation of the Blasting Road Closure Management Plan;
- Blast monitoring as described in **Section 5**; and
- In the event that a blasting related complaint is received, investigating the source and undertaking the response procedures outlined in this plan to identify and mitigate the source.

ABBREVIATIONS

Term	Definition
ANZECC	Australian and New Zealand Environment and Conservation Council
AQC	Australian Pacific Coal Limited
CCC	Community Consultative Committee
CHPP	Coal Handling and Preparation Plant
DA	Development Consent
Dartbrook Operations	Dartbrook Operations Pty Ltd
DPHI	Department of Planning, Housing and Infrastructure
EPA	Environmental Protection Authority
IPCN	Independent Planning Commission
MEG	Mining, Exploration and Geoscience
MIC	Maximum Instantaneous Charge
MSC	Muswellbrook Shire Council
NPWS	National Parks and Wildlife Services
REA	Rejects Emplacement Area
ROM	Run of Mine
UHSC	Upper Hunter Shire Council

APPENDIX A
BLASTING ROAD CLOSURE
MANAGEMENT PLAN

DARTBROOK EXTENDED COAL PROJECT

BLASTING ROAD CLOSURE MANAGEMENT PLAN

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Figure 2	Road Closure Plan – Blairmore Lane Underpass Blast

**DARTBROOK EXTENDED COAL PROJECT
BLASTING ROAD CLOSURE MANAGEMENT PLAN
for
Dartbrook Coal Pty Ltd**

1.0 INTRODUCTION

1.1 BACKGROUND

Dartbrook Coal Pty Ltd (Dartbrook Coal) was granted Development Consent (DA 231-07-2000) on 29 August 2001 to develop an extension to the Dartbrook Underground Coal Mine. The approved development involves the extension of the mine's life for another 21 years and increasing raw coal production from 3.5 Mtpa to 6.0 Mtpa.

1.2 BLASTING ROAD CLOSURE MANAGEMENT PLAN

This Blasting Road Closure Management Plan has been developed in accordance with the development consent conditions for the mine extension and addresses proposed public road closures during blasting in the Kayuga Seam Access Slot excavation and in the excavation for the new mine access road at the Blairmore Lane underpass. Both blasting locations are within 500 m of adjacent public roads.

Figures 1 and 2 show the location of the proposed blasts in relation to the public roads.

A separate Blast Management Plan has been prepared in accordance with development consent condition 6.3(f). This plan addresses the management of blasting impacts.

1.3 MANAGEMENT PLAN REQUIREMENTS

The Blasting Road Closure Management Plan specifies the procedures for public road closures during blasting in accordance with the conditions of the development consent. The specific requirements of the Blasting Road Closure Management Plan are contained in development consent condition 6.3(j). These requirements are listed in Table 1 with a reference to where each specific requirement is addressed in the management plan.

Table 1
Blasting Road Closure Management Plan Requirements Checklist

Development Consent Condition	Reference
<p>6.3 Blast Management and Monitoring</p> <p>(j) The Applicant shall prepare a Road Closure Management Plan to the satisfaction of the Director-General, and in consultation with MSC and SSC prior to the commencement of any blasting within 500 metres of a public road. The Plan shall include, but not be limited to, the following matters:</p>	<p>This document is the Road Closure Management Plan which has been prepared consultation with MSC and SCC, and to the satisfaction of Planning NSW prior to the commencement of any blasting within 500 m of a public road.</p>
<p>(i) details of the proposed safety management measures during the period of the road closure and blast;</p>	<p>Section 3</p>
<p>(ii) details of the procedures for closing Dartbrook Road and the period which the road will be closed during blasting activities;</p>	<p>Section 3</p>
<p>(iii) methods for ensuring the safety of road users and the general public during the blast period;</p>	<p>Section 3</p>
<p>(iv) strategies for informing road users and the local community of the proposed road closure;</p>	<p>Section 3</p>
<p>(v) details of the procedures for permitting the passage of emergency vehicles during the road closure. This shall also include details of the proposed methods for sufficiently notifying emergency service providers of the proposed times and period of the road closures;</p>	<p>Section 3.1</p>
<p>(vi) methods for clearing the road of any debris resulting from a blast; and</p>	<p>Section 3.2</p>
<p>(vii) details of the disruptions that are likely to occur during the closure period.</p>	<p>Section 3.4</p>

1.4 OBJECTIVE

The primary objective of the Blasting Road Closure Management Plan is to ensure the safety of public road users during blasting. This objective will be met through the implementation of the management procedure specified in Section 3.

2.0 BLASTING OPERATIONS

2.1 KAYUGA SEAM ACCESS SLOT

A single blast will be fired in the floor of the Kayuga Seam Access Slot excavation to fracture fresh rock floor material and enable mechanical excavation. The blast location is at the base of the access slot excavation, approximately 34 m below natural ground surface, and approximately 100 m from Dartbrook Road (Figure 1). Dartbrook Road is a dual lane sealed rural road linking Dartbrook and the Kayuga Village, and providing access to isolated rural residences. There is an alternative route via the New England Highway.

The risk of generation of flyrock will be minimised by careful blast design and selection of appropriate stemming lengths and stemming materials. The risk of flyrock reaching Dartbrook Road will be further reduced by the small-scale nature and relatively low charge weight of the blast, as well as the shielding of the blast provided by the access slot excavation.

The access slot blast is scheduled to be fired in October 2002. It should be noted that this is a small-scale blast in comparison to an open cut mine blast.

2.2 BLAIRMORE LANE UNDERPASS

It is anticipated that a single blast will be fired within the new mine access road excavation in the vicinity of Blairmore Lane. The blast is required to fracture a band of fresh rock material and enable mechanical excavation. The blast location will extend up to 30 m either side of the centreline of Blairmore Lane within the road excavation, and is within 500 m of a section of Dartbrook Road (Figure 2). Blairmore Lane is a single lane sealed rural road linking Aberdeen and the Kayuga Village, and providing access to isolated rural residences. There is an alternative route via the New England Highway.

The risk of generation of flyrock will be minimised by careful blast design and selection of appropriate stemming lengths and stemming materials. The risk of flyrock reaching Blairmore Lane or Dartbrook Road will be reduced by the relatively small-scale of the blast and the relatively low charge weight of the blast.

The access road blast is scheduled to be fired in October 2002. During this time Blairmore Lane will be diverted around the mine access road underpass construction site. The temporary blasting road closure will extend beyond the section of road diverted for construction to establish a 500 m exclusion zone from the blast site (Figure 2).

It should be noted that whilst this is a larger blast than the access slot blast, it is still a small-scale blast in comparison to an open cut mine blast.

3.0 ROAD CLOSURE PROCEDURE

3.1 PUBLIC NOTIFICATION

Muswellbrook Shire Council, Scone Shire Council, and any local residents directly affected by blasting road closures, will be notified in writing of the blast date, time, location, and road closure details one week before the proposed blast. Blasting road closure notices will be placed in local papers and broadcast over local radio in the week prior to the blast. Notices will also be posted at each end of the affected sections of road for 1 week prior to a blast. Local emergency services including fire, ambulance, and police will be notified in writing at least 7 days prior to a blasting road closure.

3.2 ROAD CLOSURE

An exclusion zone will be established on public roads by temporary road closures in the vicinity of a blast, to ensure the safety of public road users. The exclusion zone will be established in accordance with relevant mine safety regulations or Workcover regulations and any other relevant regulations and will include any sections of public roads within 500 m of the location of a blast. This is well beyond the expected range of any flyrock and includes an additional safety margin.

Trained traffic control personnel will set up manned road closure barricades on the public road to establish the exclusion zone. Five minutes prior to the anticipated firing time, the road will be closed and checked to ensure that it is clear of people and any vehicles. Road closure signage will be generally in accordance with AS1742.3-1996 (Manual of uniform traffic control devices, Part 3: Traffic control devices for works on roads, Section 3.13 - Blasting Work Signs) and RTA's Traffic Control at Work Sites Guidelines (Figures 1 & 2). After the blast is completed and the "all clear" has sounded the road will be inspected and cleared of any debris prior to being re-opened to traffic.

3.3 EMERGENCY VEHICLES

If an emergency vehicle, such as fire, ambulance, or police, need to use the road for emergency purposes at the time of a road closure, the traffic controller will contact the shot firer to delay the blast, and allow emergency vehicle access.

3.4 TRAFFIC DISRUPTION

The temporary blasting road closures are expected to take approximately 20 minutes. A single blast is expected at each location, and consequently a total of two separate road closures are expected to be required. Due to the relatively light traffic volumes utilising these roads, the availability of alternative routes for both roads, and the proposed prior notification of road users, the level of disruption to traffic during the temporary closures is expected to be minor.

4.0 RESPONSIBILITIES

The Construction Supervisor will be responsible for ensuring that the requirements of this management plan are implemented. The Construction Supervisor's specific responsibilities will include:

- issuing the public notices discussed in Section 3.1;
- coordination of road closures with the Shot Firer;
- erection and manning of road closure signs;
- inspection of the closed section of the road prior to the blast; and
- inspection of the road and clearing any debris prior to re-opening the road.

The Dartbrook Extended Project Manager will also have the authority to ensure that the Construction Supervisor's responsibilities are met.

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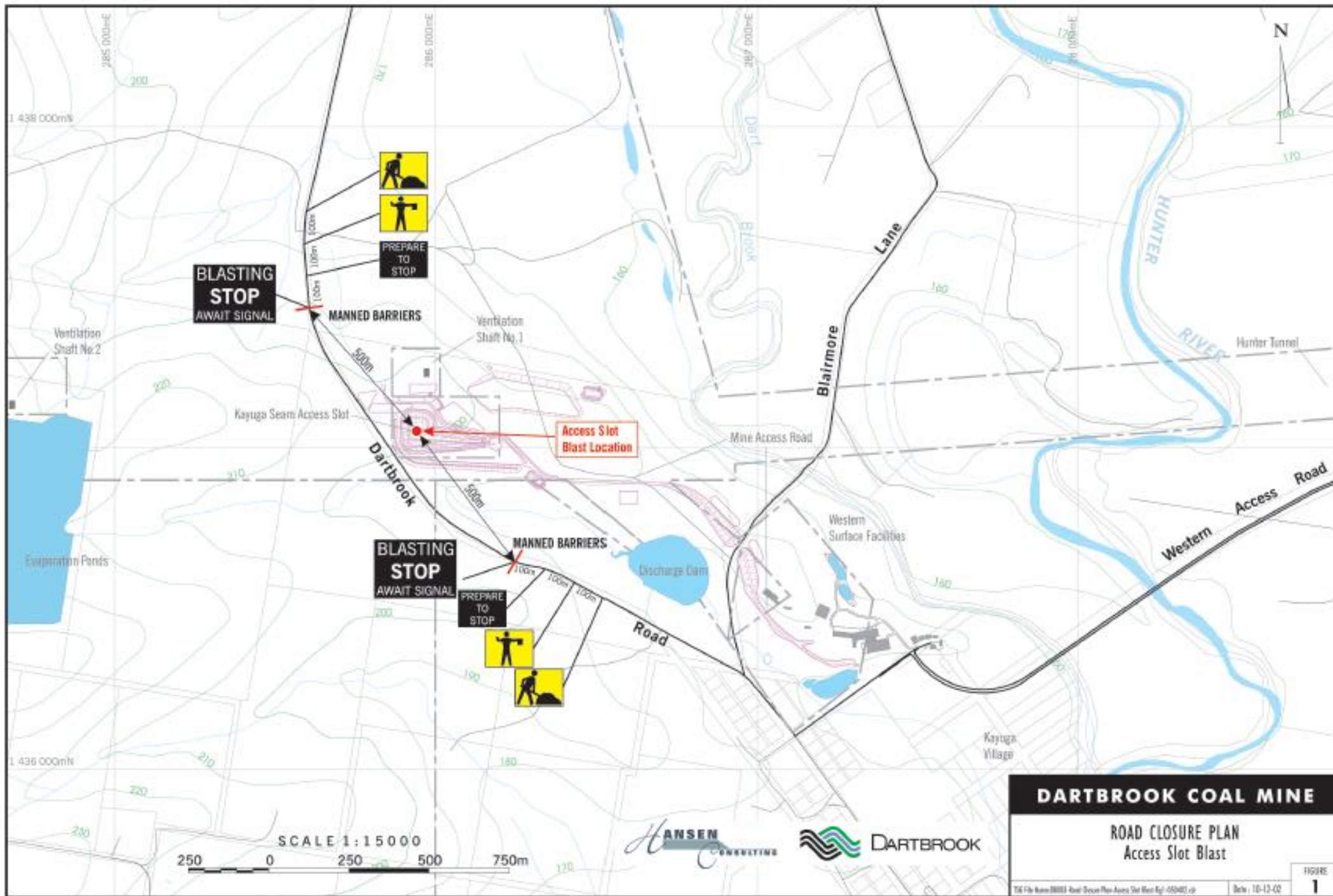
for

HANSEN CONSULTING

Peter Hansen

Director

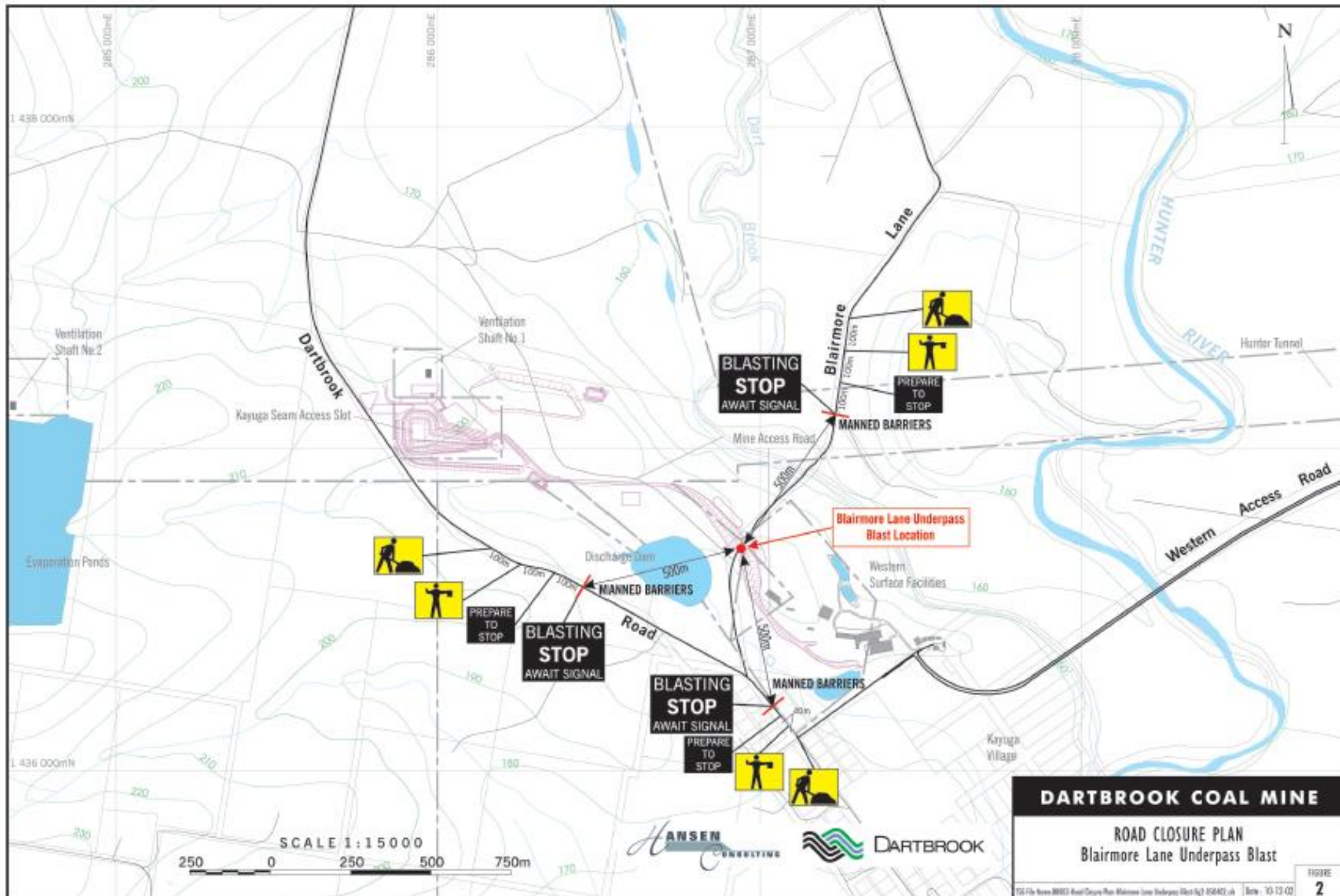
FIGURES



DARTBROOK COAL MINE

ROAD CLOSURE PLAN
Access Slot Blast





APPENDIX B
BLAST IMPACT ASSESSMENT



**ACOUSTICAL CONSULTANTS
WILKINSON MURRAY PTY LTD**

ABN 41 192 548 112 ACN 001 341 395

123 Willoughby Road, Crows Nest, NSW, 2065 Tel: (02) 9437 4611 Fax: (02) 9437 4393 email: acoustics@wimpl.com.au

To:	Company:	Email:
Peter Hansen	Hansen Consulting	peter@hansenconsulting.com.au

Copy:

From:	Date:	Number Of Pages
Rob Bullen	27 March, 2002	(Including This Page)

Subject:	Project No:
Dartbrook Extended Blast Impact Assessment	02081

Peter,

This report provides an assessment of overpressure and vibration impacts from proposed blasting in two areas of Dartbrook Mine:

- blasting on the floor of the Kayuga Seam Access Slot boxcut, to allow excavation of further material using an excavator; and
- blasting at a location close to Blairmore Lane, to allow construction of an underpass for the mine access road.

Criteria

Annoyance and Discomfort

For assessment of annoyance due to blasting, the NSW Environment Protection Authority adopts guidelines produced by the Australian and New Zealand Environment and Conservation Council (ANZECC). The fundamental criteria are that at any residence or other sensitive location:

- the maximum overpressure due to blasting should not exceed 115dB re 10^{-5} Pa for more than 5% of blasts in any year, and should not exceed 120dB for any blast; and
- the maximum peak particle ground velocity should not exceed 5mm/sec for more than 5% of blasts in any year, and should not exceed 10mm/sec for any blast.

These criteria apply at all privately-owned residences surrounding the proposed blast locations.

Structural Damage

For assessment of damage due to ground vibration, Australian Standard 2187.2-1993: "Explosives – Storage, Transport and Use" contains an "informative" appendix specifying recommended limits for peak particle vibration velocity to protect typical buildings from damage. These are:

- "structures that may be particularly susceptible to ground vibration" – 5mm/sec
- "houses and low-rise residential buildings; commercial buildings not included below" – 10mm/sec
- "commercial and industrial buildings or structures of reinforced concrete or steel construction" – 25mm/sec.

For protection against structural damage, the criterion adopted is that peak particle velocities should not exceed 10mm/sec at any building close to the blasting site (including buildings owned by the mining company). Two buildings, identified as the 1827 and 1932 Kayuga Homesteads, are understood to have particular heritage value and may potentially be unusually sensitive to ground vibration. At these buildings, a more conservative criterion of 5mm/sec is recommended.

Predicted Overpressure and Vibration Levels

A paper presented recently at the Explo 2001 blasting conference (attached) sets out a validated methodology for predicting blast overpressure and vibration from Hunter Valley mines. The methodology allows for prediction of both the "median" values of these parameters over a large number of shots, and the "5% exceedance" values. Predictions are based on the distance to the blast and the maximum instantaneous charge (MIC) used, expressed as kg ANFO equivalent. Variability in overpressure and vibration levels is due to a combination of blasting practice, differing ground conditions and, in the case of overpressure, differing meteorology.

The predictive equations described in the above paper were used to calculate "median" and "5% exceedance" values for overpressure and ground vibration from blasting at the two proposed locations, at the nearest residences or buildings. MIC values used for blasting at each location are as advised by the blast designers. These calculated values are shown in Table 1.

Table 1 indicates that predicted vibration levels are all well within relevant criteria for both structural damage and, where applicable, annoyance.

Overpressure levels due to blasting at the boxcut are also predicted to be within relevant criteria, with the exception of a minor exceedance of 1dB for the 5% exceedance value at the 1932 Kayuga Homestead.



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ABN 41 192 548 112 ACN 001 341 395

123 Willoughby Road, Crows Nest, NSW, 2065 Tel: (02) 9437 4611 Fax: (02) 9437 4393 email: acoustics@wmpl.com.au

Table 1 Calculated Overpressure and Vibration Levels

Blast Location	MIC, kg	Residence or Building	Distance from (nearest) blast	Blast Overpressure, dB(L)			Ground Vibration PPV, mm/sec		
				Median	5% Exceedance	Criterion	Median	5% Exceedance	Criterion
Boxcut	3	1932 Kayuga Homestead	430	103	116	-	0.09	0.4	5
		Dairy	465	102	115	-	0.08	0.3	10
		McIntyre	585	100	113	115	0.05	0.2	5
		1827 Kayuga Homestead	675	98	111	115	0.04	0.2	5
Underpass	10	Standing	540	104	117	115	0.2	0.7	5
		"Blairmore Point"	405	107	120	115	0.3	1.2	5



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For blasting at the road underpass, calculated 5% exceedance overpressure levels exceed the relevant criterion at the two nearest residences, although median overpressure levels for all blasts are well within the criteria. This indicates that at this location, care will be required to ensure that the blasts are designed with attention to stemming depth, packing and other details to keep overpressure levels within the range typical for a well-controlled situation. I understand that final blast details cannot be determined until the excavations in which the blasting will be conducted are in place. However, a stemming depth of at least 3m is recommended. I also understand that a reduced MIC compared with that shown in Table 1 may be possible, and if so this should be adopted.

It is also recommended that when blasting at the underpass site, meteorological conditions should be monitored and blasting should not be conducted under conditions of significant wind blowing toward either of the two nearest residences.

It is concluded that with appropriate control measures, overpressure and vibration levels due to the proposed blasting can be controlled to within relevant criteria for overpressure and ground vibration, taking account of both the potential for annoyance and for building damage.

I trust that this report is satisfactory. If you require further information, please do not hesitate to contact me.

Regards,

Rob Bullen
Director