



Tarrawonga Coal Pty Ltd

ABN 73 100 742 185

***Blast Monitoring
Program
for the
Tarrawonga
Coal Mine***

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Tarrawonga Coal Mine

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ACRONYMS USED THROUGHOUT THIS REPORT

AEMR	-	Annual Environmental Management Report
BMP	-	Blast Monitoring Program
CCC	-	Community Consultative Committee
CHPP	-	Coal Handling and Preparation Plant
DA	-	Development Application
DECC (EPA)	-	Department of Environment and Climate Change (Environment Protection Authority)
DoP	-	Department of Planning
DPI-MR	-	Department of Primary Industries - Mineral Resources
EIS	-	Environmental Impact Statement
EMS	-	Environmental Management Strategy
GSC	-	Gunnedah Shire Council
IBC	-	Idemitsu Boggabri Coal Pty Ltd
LALC	-	Local Aboriginal Land Council
NSC	-	Narrabri Shire Council
ROM	-	Run of Mine
TCPL	-	Tarrawonga Coal Pty Ltd

1 INTRODUCTION

The Tarrawonga Coal Mine (TCM) is located approximately 15km northeast of Boggabri, 10km north of the Canyon Coal Mine (formerly Whitehaven) and south of, and adjacent to, the Boggabri Coal Mine (**Figure 1**). The mine site covers an area of approximately 661ha contained within ML1579. The mine is being developed by Tarrawonga Coal Pty Ltd (TCPL), a joint venture between Whitehaven Coal Mining Pty Ltd (70%) and Idemitsu Boggabri Coal Pty Ltd (30%).

This Blast Monitoring Program (BMP) has been prepared to ensure that the blasting associated with the Mine's operations are completed such that the required air overpressure and ground vibration criteria are complied with. To ensure this, the BMP for the Tarrawonga Coal Mine has been prepared in accordance with *Condition 4(18)* of DA 88-4-2005. All the relevant conditions associated to blasting and vibration contained within DA 88-4-2005 has been included in **Appendix 1**.

The following sub-sections identify the monitoring locations and the nature of the monitoring equipment to be used, equipment set up and post-blasting procedures, and blast information analysis and reporting procedures. For completeness, and to ensure that this document represents an effective on-site management tool, information on invitations for pre-blasting property inspections, blast notification procedures and complaint management procedures are also recorded.

This Blasting Monitoring Program has been developed on the basis of blasting occurring within the confines of project approval limits which specifies:

- Blasting may only take place between the hours of 9am to 5pm Monday to Friday, and no blasting on Saturday's, Sunday's and Public Holiday's without written approval from the DECC
- A maximum of 1 blast per day

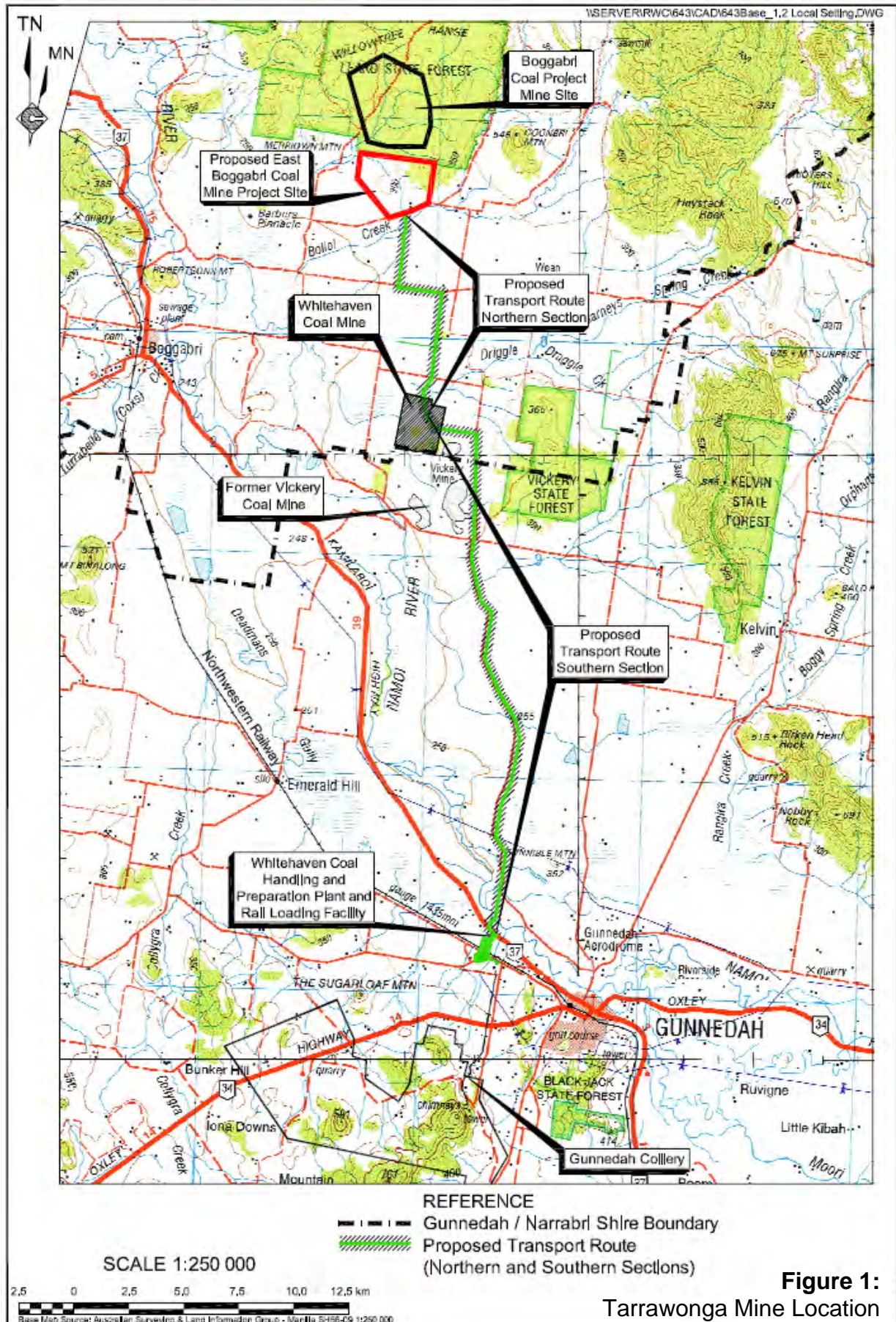


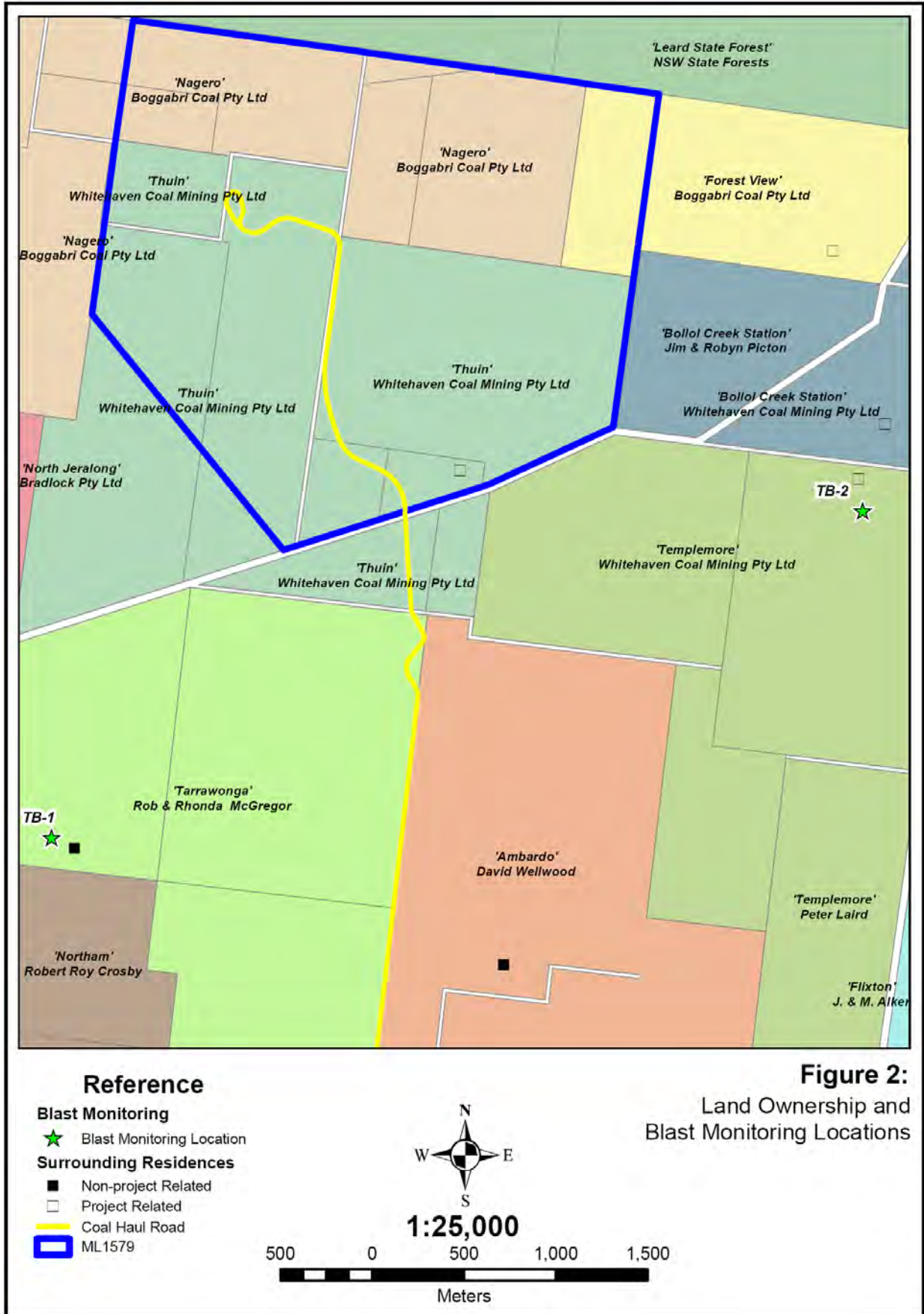
Figure 1:
Tarrawonga Mine Location

2 PRE-BLASTING PROPERTY INSPECTIONS

As a requirement of *Conditions 4(20)* and *4(21)* of DA 88-4-2005, TCPL advised all landowners within a 2km radius of the planned blasting operations on the mine site, and additional landowners as advised by the Director-General, that they were entitled to a property inspection, at least 2 months prior to any blasting. **Figure 2** depicts land ownership and residences around the Project Site.

In the event a written request is made by any of the private landowners / residents within 2km, or any other landowner nominated by the Director-General, TCPL will, within 2 months of receiving the request:

- commission a suitably qualified person, whose appointment has been approved by the Director-General, to inspect the condition of any building or structure on the land, and recommended measures to mitigate any potential blasting impacts; and
- give the landowner a copy of this property inspection report.



3 PRE-BLASTING NOTIFICATION

In addition to notification to each landowner regarding their entitlement to a property inspection, TCPL will provide written notification, at least 2 weeks prior to the commencement of blasting, on the following.

- The company's proposed blasting timetable and duration.
- A plan showing Blast Monitoring Locations.
- The procedure for reporting possible blasting related damage to a residence or other vibration infrastructure (such as water supply or underground irrigation mains), and the entitlement of any landowner within a 2km of proposed blasting activities, to an investigation of the damage claims.
- The disputes resolution procedure of TCPL.

In addition, TCPL will provide specific notification of individual blasts to any person who registers an interest in being notified about the blasting schedule at the mine. Notification will involve:

- a letter, nominating a planned blast date, will be hand delivered on the day before each blast. The letter would provide the indicative time for the blast; and
- a telephone call during the morning of the blast to confirm the blast will proceed at the nominated (or varied) time.

TCPL will also provide the adjacent Boggabri Coal Mine with a copy of its planned blasting schedule on a weekly basis to provide at least one weeks notice of blasts planned within the open cut area.

4 BLAST MONITORING LOCATIONS

Since the establishment of the initial Tarrawonga BMP, approval from DECC has been granted to remove the requirement of blast monitoring at the “Bollol Creek Station” residence as this residence is now considered project related. The “Templemore” residence is also now considered project related, however a blast monitoring will continue at this location so that there are sufficient blast monitoring locations. A variation to Environment Protection Licence (EPL) 12365 has been made which will reflect these changes to blast monitoring locations.

Figure 2 and **Table 1** identify the blast monitoring locations surrounding the Mine. The “Tarrawonga” (TB-1) residence is now the closest non-project related residences with a monitor in place. The “Templemore” (TB-2) residence will remain as a Blast Monitoring Location, even though the property is now project related. TB-2 shall monitor the effects of TCM’s blasting activities to the east and south-east of the mine site

The “Tarrawonga” residence will be at a minimum distance of approximately 3.5km to the south-south-west of future blasting activities. The “Templemore” residence shall be at a minimum distance of approximately 2.1km to future blasting activities.

Air-blast overpressure and ground vibration will be measured at these monitoring locations for all blasts throughout the remaining life of the mine by Orica as the Blasting Contractor. Results of the monitoring will be forwarded to TCPL on the day of each blast. The three nominated blast monitoring locations (referred to as TB-1 and TB-2) are shown on **Figure 2**.

It should be noted that monitoring is not proposed on project related residences, except for “Templemore” (TB-2). However, in the event that the occupier of another project related resident lodges a complaint in relation to blasting, or requests monitoring at the residence, an additional monitor will be deployed.

In addition to the nominated sites, TCPL will also:

- observe flyrock/blast rock distribution for each blast; and
- video each blast to assist in the interpretation of results.

Table 1
Blast Monitoring Locations

Site (see Figure 3)	Property Name	Distance to	
		Closest Remaining Blast (km)	Furthest Remaining Blast (km)
TB-1	“Tarrawonga”	3.5	4.7
TB-2*	“Templemore”	2.1	4.0

* “Templemore” is a project related residence. The monitor shall remain to measure blasting impact to the east and south-east of the mine site

5 BLAST MONITORS

A combination of Texcel μ Mx and Texcel Compact Monitors will be used at Sites TB-1 and TB-2 to monitor air-blast overpressure (dBL) and peak particle velocity in a radial, vertical and transverse direction (mm/s), i.e. ground vibration. All equipment for the measurement of air-blast overpressure will have a lower cut-off frequency of 2Hz, and a frequency bandwidth of 2Hz to 500Hz.

Only calibrated monitors will be used for blast monitoring with copies of calibration certificates or other means of verification available at the Tarrawonga Coal Mine. The date of last calibration is automatically printed on each monitor print-out.

Appendix 2 shows a Blast Monitor Report print-out from Orica Mining Services, from the monitor located on "Bollol Creek Station" of Shot 60 occurring on 15/11/2007. This is the format typical of that, which will be produced by the Tarrawonga Coal Mine.

6 PROCEDURES

6.1 Noise Monitoring Procedures

All aspects of blast monitoring will be undertaken by Orica Explosives in accordance with AS 2187.2-1993- Storage, Transport and Use – Use of Explosives, a copy of which will be retained at the Tarrawonga Coal Mine Site Office.

6.2 Blast Impact Assessment Criteria

In accordance with *Condition 4(13)* and *4(14)* of DA 88-4-2005, the air-blast overpressure and ground vibration impact assessment criteria will be as presented in **Tables 2 and 3**.

Table 2
Air-blast Overpressure Impact Assessment Criteria

Air-blast Overpressure Level (dB(Lin Peak))	Allowable Exceedance
115	5% of the total number of blasts in a 12 month period
120	0%

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

Table 3
Ground Vibration Impact Assessment Criteria

Peak particle velocity (mm/s)	Allowable exceedance
5	5% of the total number of blasts in a 12 month period
10	0%

6.3 Trigger Levels

In recognition of the distance between the proposed blast locations and local residences to be monitored, far field trigger levels of between 0.3mm/s and 0.4mm/s (for ground vibration) and 111.7dB(L) to 111.9dB(L) (for air-blast overpressure) have been adopted for the Tarrawonga Coal Mine.

6.4 Pre-Check

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

- (i) Battery is charged. Note: batteries will be placed on charge immediately following data downloading from each blast.
- (ii) Date and time are correct.
- (iii) Location (Site) for each monitor is marked on the carry case.
- (iv) Instrument “fields” are correctly set to reflect the distance from the blast site to identified monitor location. The instrument fields, i.e. near, medium and far, determine the period of recording for air-blast once the monitor is triggered on either ground vibration or air-blast itself.

Table 4 identifies the distance range between the blast site and the monitor, the appropriate “field” setting and the duration of air-blast (air pressure wave) recording. It is noted that the proposed monitoring locations will require the instrument to be set on the “Far Field” setting.

Table 4
Monitor Settings and Air-blast Recording Times

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

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

- (v) Instrument trigger levels are set to minimize the potential for false initiation of the recording sequence by, for example, wind, but will record air-blast or ground vibration events approaching or greater than the standard vibration criteria of 115dB_L and 5mm/s respectively. For the far field setting, triggers would typically be set between 0.3 and 0.4mm/s and 111.7 and 111.9dB_L.
- (vi) Setting adjustment as necessary.
- (vii) Print off a confirmation of settings from the logger.

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

6.5 Field Set-Up

The instrument will be set up at the pre-selected location at each monitoring point, between 3.5m and 30m from the residence or building to be monitored.

The instrument set-up procedures involve the following steps.

- (i) Insert the soil spike into the ground and level the geophone.
- (ii) Set up microphone.
- (iii) Connect microphone and geophone to the monitor.
- (iv) Turn power on. Powering up the monitor initiates a self check culminating in a VDU advice that the instrument is functioning properly.
- (v) Press "start". Following a countdown sequence, the monitor moves into a "standby mode" awaiting triggering.

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

6.6 Post Blast – In the Field

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

- (i) Press "stop" button.
- (ii) Turn power off.
- (iii) Disconnect microphone and geophone
- (iv) Remove soil spike.
- (v) Pack instrument up.

6.7 Post Blast – At the Office

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

- (i) retrieve / download the data to the office computer;
- (ii) review the data and delete any data pertaining to false triggers, ie. triggers before the blast initiation time;
- (iii) generate a results print-out sheet (in Microsoft Word) and insert relevant data relating to the blast, e.g. blast pattern, hole spacing, number of rows, number of holes, blast-hole diameter, stemming, MIC, explosives type and weight, delay type (interval and duration (ms)) and any relevant comments or observations. An example of a typical results sheet from the Tarrawonga Coal Mine is attached as **Appendix 2**;
- (iv) print off and distribute the results to the nominated recipients. Prior to the commencement of blasting activities, the owner of each building where monitoring is undertaken, will be asked if they would like to receive copies of the

relevant blast results. Result distribution may be by email, fax or in hardcopy as appropriate or requested.

Copies of the printouts, the mine site blast checklist and details such as blast design, charging and tie-in pattern are retained on the mine site files;

- (v) transfer the data for the blast to an Excel spreadsheet; and
- (vi) place monitor battery on charge to await the next blast.
- (vii) In the event of an exceedance of blast criteria, or if a complaint is received, the blast contractor, in consultation with the Environmental Officer, will review video footage of the blast to assist in determination of causes or conditions which may have contributed to the exceedance.

7 FLYROCK DISTRIBUTION MONITORING

Following each blast, the area surrounding the blast site will be inspected and flyrock distribution to the front, rear and both sides of the blast site observed.

8 BLAST CRITERIA EXCEEDANCE MANAGEMENT AND REPORTING

In the event that the monitoring results of a blast identify an exceedance of:

- peak vector sum velocity (ground vibration) – 5mm/s (ppv); and/or
- peak overpressure – 115dB_L,

WCMPL, as the holder of an Environment Protection Licence under the *Protection of the Environment Operations Act 1997*, will report the incident to DECC (EPA) Armidale (6773 7000) and initiate investigations as to the cause. In accordance with the PA 06_0198, Schedule 4, Conditions 3, 4 and 5, any exceedance in blast criteria will also result in notification to the Department of Planning (DoP) and DECC within 24 hours of the occurrence of the exceedance. Additionally, within 6 days of the notification, WCMPL will provide a written report to both DoP and DECC identifying the date, time and nature of the exceedance, the cause or likely cause of the exceedance, the action that has been taken to date relating to the exceedance, and proposed measures to minimise potential for exceedance in future blasts. WCMPL will also report any exceedance in blasting criteria in the Annual Environmental Management Report (AEMR).

It is noted that the above criteria are able to be exceeded for up to 5% of blasts in any one year, but not to exceed a:

- peak vector sum velocity (ground vibration) – 10mm/s (ppv); and/or
- peak overpressure – 120dB_L.

In the event any blast causes these criteria to be exceeded, the DECC and DoP will similarly be notified in accordance with the requirements identified above.

9 BLAST COMPLAINT MANAGEMENT PROCEDURES

Any general complaint received relating to any blast will be managed in accordance with the complaints receipt and response procedure presented in the Tarrawonga Coal Mine Environmental Management Strategy and summarised below.

- (i) Details of the complainant and complaint will be recorded in the complaints log.
- (ii) TCPL representatives will liaise with the complainant to ascertain all details, to identify the nature and source of the complaint and provide supplementary information for the log.
- (iii) Investigations will be initiated to verify or otherwise the basis for the complaint.
- (iv) Results of the investigation will be provided to the complainant together with advice as to any changed blast management practices to be implemented as a consequence of the investigation.

Complaints pertaining to blast-related damage will be managed in accordance with *Condition 4(22)* of DA 88-4-2005, which is included in **Appendix 1**.

10 APPENDIX

10.1 Appendix 1: Blasting and Vibration Consent Conditions

SCHEDULE 4 SPECIFIC ENVIRONMENTAL CONDITIONS

BLASTING AND VIBRATION

Airblast Overpressure Impact Assessment Criteria

13. The Applicant shall ensure that the airblast overpressure level from blasting at the development does not exceed the criteria in Table 10 at any residence on privately-owned land.

Airblast overpressure level (dB(Lin Peak))	Allowable exceedance
115	5% of the total number of blasts in a 12 month period
120	0%

Table 10: Airblast overpressure impact assessment criteria

Note: The overpressure values in Table 12 apply when the measurements are performed with equipment having a lower cut-off frequency of 2 Hz or less. If the instrumentation has a higher cut-off frequency a correction of 5 dB should be added to the measured value. Equipment with a lower cut-off frequency exceeding 10 Hz should not be used.

Ground Vibration Impact Assessment Criteria

14. The Applicant shall ensure that the ground vibration level from blasting at the development does not exceed the criteria in Table 11 at any residence on privately-owned land or noise sensitive location as defined in the DEC's Industrial Noise Policy.

Peak particle velocity (mm/s)	Allowable exceedance
5	5% of the total number of blasts in a 12 month period
10	0%

Table 11: Ground vibration impact assessment criteria

Blasting Hours

15. The Applicant shall only carry out blasting at the development between 9 am and 5 pm Monday to Friday. No blasting is allowed at any other time or on Saturdays, Sundays or public holidays without the written approval of the DEC.

Blasting Frequency

16. The Applicant shall not carry out more than 1 blast a day at the site without the written approval of the DEC.

Monitoring

17. The Applicant shall monitor the airblast overpressure and ground vibration impacts of blasting operations of the development at privately-owned residences of noise sensitive locations as defined in the DEC's Industrial Noise Policy, using the units of measurement, frequency, sampling method, and locations specified in Table 12.

Parameter	Units of Measure	Frequency	Sampling Method	Measurement Location
Airblast overpressure	dB(Lin Peak)	During every blast	AS2187.2-1993 ¹	Not more than 3.5m from a building or structure
Peak particle velocity	mm/s	During every blast	AS2187.2-1993	Not more than 30m from a building or structure

Table 12: Airblast Overpressure and Ground Vibration Monitoring

¹Standards Australia, 1993, AS2187.2-1993: Explosives – Storage, Transport and Use – Use of Explosives.

18. Prior to carrying out any blasting, the Applicant shall prepare (and following approval implement) a Blasting Monitoring Program for the development in consultation with the DEC, and to the satisfaction of the Director-General.

Public Notice

19. During the life of the development, the Applicant shall:
- operate a blasting hotline, or alternate system agreed to by the Director-General, to enable the public to get up-to-date information on the blasting operations at the development; and
 - notify the landowner/occupier of any land within 2 kilometres of planned blasting operations at the development about this hotline or system on an annual basis

Property Inspections

20. At least 2 months prior to carrying out any blasting at the development, the Applicant shall advise all landowners within 2 kilometres of planned blasting operations on the mine site, and any other landowner nominated by the Director-General, that they are entitled to a property inspection.
21. If the Applicant receives a written request for a property inspection from any landowner within 2 kilometres of proposed blasting operations at the development, or any other landowner nominated by the Director-General, the Applicant shall within 2 months of receiving this request:
- commission a suitably qualified person, whose appointment has been approved by the Director-General, to inspect the condition of any building or structure on the land, and recommend measures to mitigate any potential blasting impacts; and
 - give the landowner a copy of this property inspection report.

Property Investigations

22. If any landowner within a 2 kilometres of planned blasting operations at the development, or any other landowner nominated by the Director-General, claims that his/her property, including vibration-sensitive infrastructure such as water supply or underground irrigation mains, has been damaged as a result of blasting at the development, the Applicant shall within 2 months of receiving this request:
- commission a suitably qualified person whose appointment has been approved by the Director-General to investigate the claim; and
 - give the landowner a copy of the property investigation report.

If this independent 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.

If the matter cannot be resolved within 21 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process.

10.2 Appendix 2: Blast Results Sheet

