



***Blasting Monitoring
Program
for the
Rocglen Coal Mine***



Whitehaven Coal Mining Pty Ltd

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for the
Rocglen Coal Mine

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ACRONYMS USED THROUGHOUT THIS REPORT

AEMR	-	Annual Environmental Management Report
BMP	-	Blasting Monitoring Program
CCC	-	Community Consultative Committee
CHPP	-	Coal Handling and Preparation Plant
PA	-	Project Approval
DECC	-	Department of Environment and Climate Change
DoP	-	Department of Planning
DPI-MR	-	Department of Primary Industries - Mineral Resources
EA	-	Environmental Assessment
EMS	-	Environmental Management Strategy
GSC	-	Gunnedah Shire Council
LALC	-	Local Aboriginal Land Council
NSC	-	Narrabri Shire Council
WC MPL	-	Whitehaven Coal Mining Pty Ltd

1 INTRODUCTION

The Rocglen Coal Mine (the mine), previously known as the Belmont Coal Project, is located approximately 25km north of Gunnedah and 23km south east of Boggabri (see **Figure 1**). Project Approval (PA) 06_0198 was granted for the mine by the Minister for Planning on 15th April 2008. The mine is being developed by Whitehaven Coal Mining Pty Ltd (WCMPL), a subsidiary company of Whitehaven Coal Limited, as an open cut mining operation.

The mine site covers an area of approximately 366ha within Exploration Licence (EL) 5831 and Consolidated Lease (CL) 316. The limit of open cut mining is an area of 114.1ha within the Project Site.

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 Rocglen Coal Mine has been prepared in accordance with *Condition 3(22)* of PA 06_0198. All relevant Project Approval conditions have 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 Saturday
- A maximum of 2 blasts per day
- A maximum of 5 blasts per week, averaged over a 12 month period.

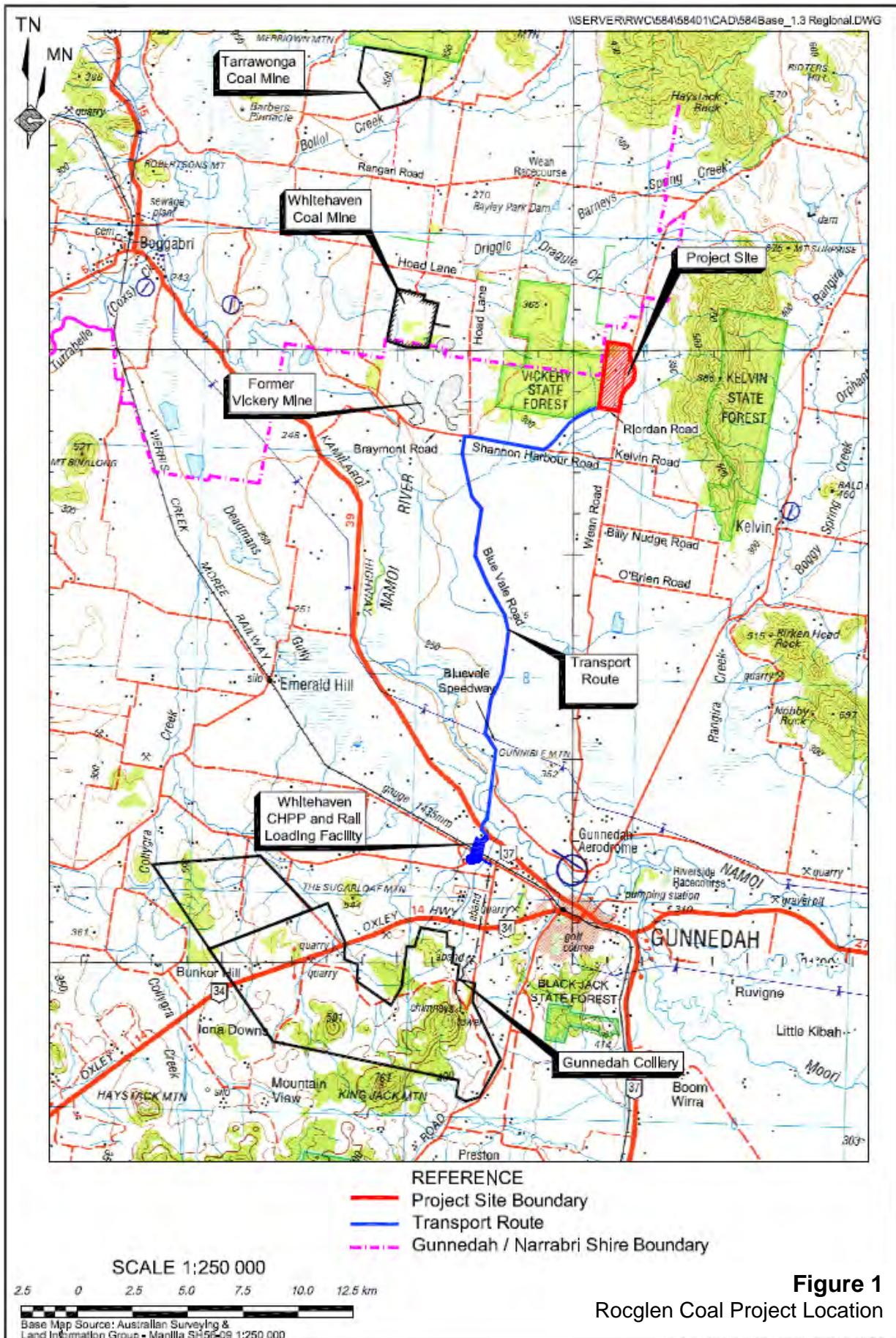


Figure 1
Rocglen Coal Project Location

2 PRE-BLASTING PROPERTY INSPECTIONS

As a requirement of *Conditions 3(19) and 3(20)* of PA 06_0198, the owners of “Costa Vale”, “Surrey” and “Brolga”, all landowner residences within a 2km radius of the planned blasting activity (other than those owned by WCMPL) have been advised in writing of their entitlement to a property inspection prior to the commencement of blasting activities. **Figure 2** depicts land ownership and residences around the Project Site. Copies of the letters sent to the appropriate landowners / residents are provided as **Appendix 2**.

In the event a written request is made by any of the contacted landowners / residents, WCMPL will:

- identify a suitably qualified person to undertake the inspection and forward details of the preferred inspectors qualifications and experience to the Director-General of the Department of Planning for approval;
- commission the completion of the property inspection; and
- provide a copy of the inspection report to the relevant landowner / resident.

The inspection and report will be completed within 3 months of receiving the written request for the property inspection.

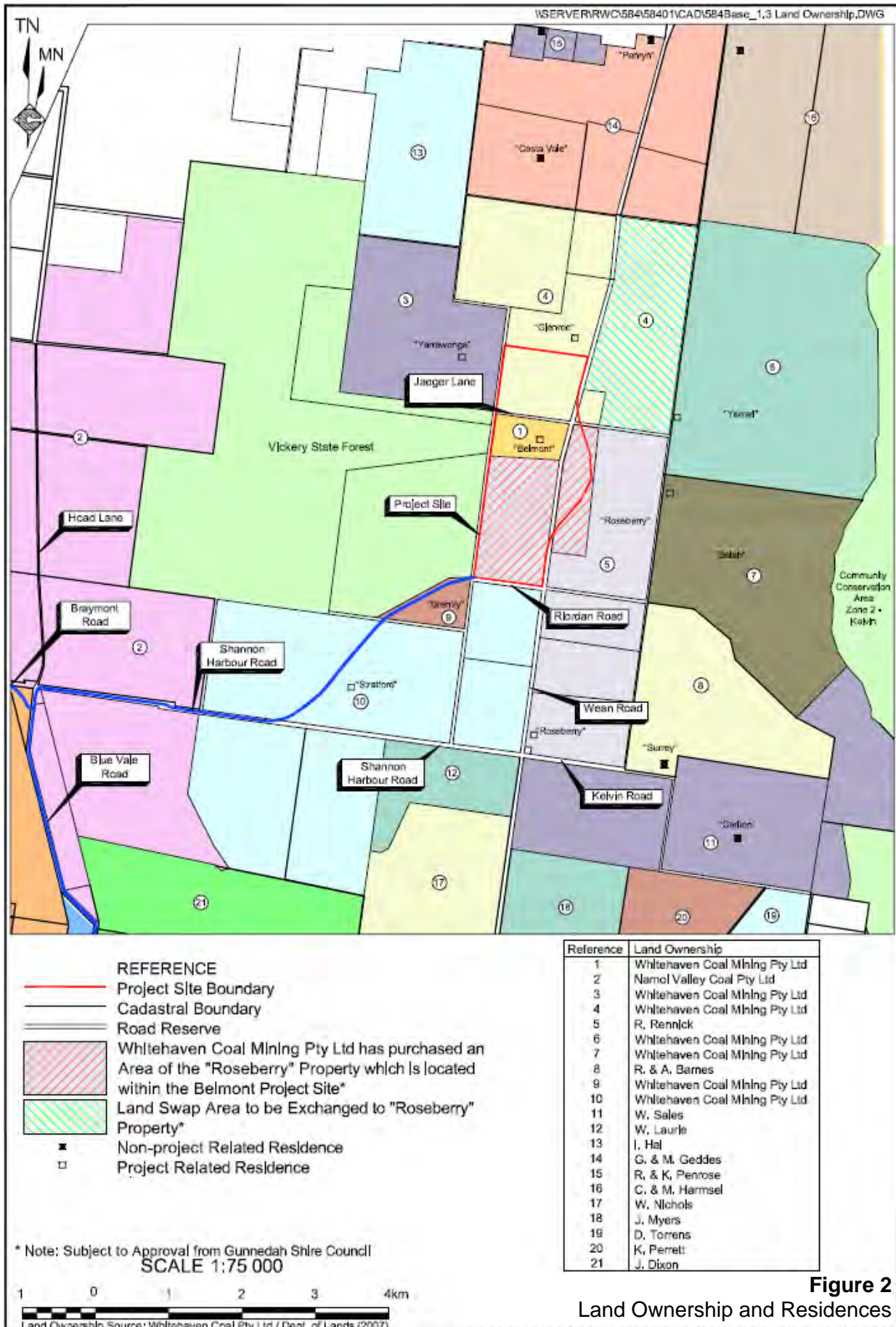


Figure 2
Land Ownership and Residences

3 PRE-BLASTING NOTIFICATION

In addition to notification to each landowner regarding their entitlement to a property inspection, WCMPL 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 WCMPL.

In addition, WCMPL 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.

WCMPL will also prepare and implement a road closure management plan to the satisfaction of Gunnedah Shire Council and the DPI for blasting activities required within 500 metres of a public road. This will ensure appropriate safeguards are in place for the control of traffic on those public roads during blasting times. A notification board will be placed on the northern and southern side of the mine site along Wean Road advising of blasting times for notification of road users. A detailed procedure for mine site staff will be included in the road closure management plan as to the activities required in relation to temporary closure of Wean Road during blasting.

4 MONITORING LOCATIONS

Figure 3 identifies the three proposed blast monitoring locations as “Costa Vale” (BB1), “Brolga”(BB2) and “Surrey”(BB3). The “Costa Vale” residence will be the closest non-project related residence to blasting activity at a distance of approximately 3 kilometres. The “Surrey” residence is approximately 3.5 kilometres south east of blasting activities, and the “Brolga” residence approximately 6.5 kilometres south of blasting activities. Monitoring at the “Brolga” residence will be undertaken initially in order to assess level of impact at that distance. In the event that monitors do not trigger, or trigger at very low levels over an extended period, WCMPL may seek removal of “Brolga” from the monitoring program.

Air-blast overpressure and ground vibration will be measured at these three locations for all blasts throughout the life of the mine by Orica as the Blasting Contractor. Results of the monitoring will be forwarded to WCMPL on the day of each blast. The three nominated blast monitoring locations (referred to as BB-1 to BB-3) are shown on **Figure 3**.

It should be noted that monitoring is not proposed for the “Roseberry” property as it is project-related. However, in the event that the occupier of the “Roseberry” property lodges a complaint in relation to blasting, or requests monitoring at the “Roseberry” property, an additional monitor will be deployed.

In addition to the nominated sites, WCMPL will also:

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

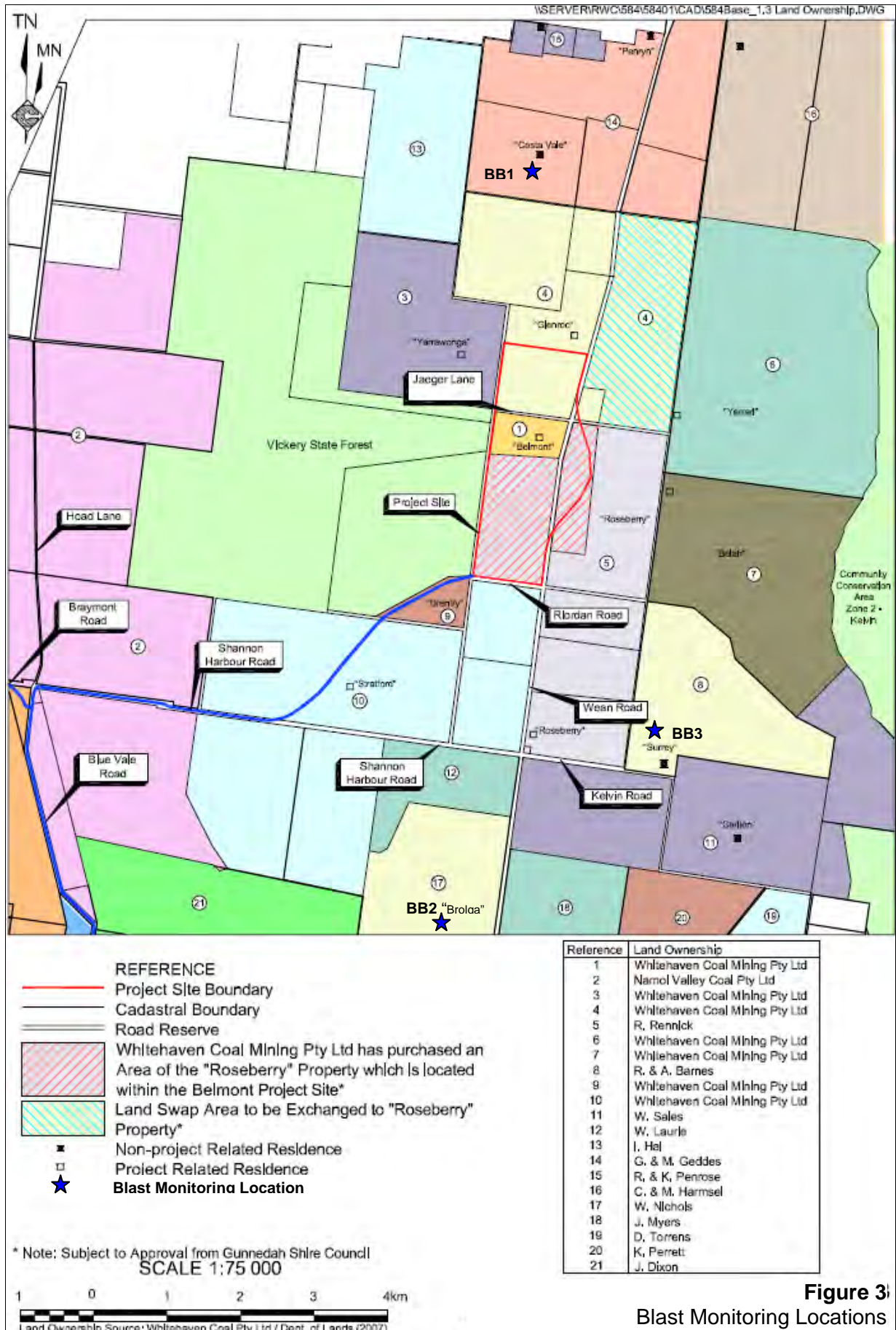


Figure 3
Blast Monitoring Locations

5 BLAST MONITORS

A combination of Texcel μ Mx and Texcel Compact Monitors will be used at Site BB-1 to BB-3 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 on site. The date of last calibration is automatically printed on each monitor print-out.

Appendix 3 shows a Blast Monitor Report print-out from Orica Explosives, typical of that produced by the Tarrawonga Coal Mine.

6 PROCEDURES

6.1 Standards

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 Rocglen Coal Mine Site Office.

6.2 Blast Impact Assessment Criteria

In accordance with *Condition 3(11)* and *3(12)* of PA 06_0198, the air-blast overpressure and ground vibration impact assessment criteria will be as presented in **Tables 1 and 2**.

Table 1
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 2
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 Rocglen 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, ie. 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 3
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 3**;

- (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 EXCEDANCE 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.

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 Rocglen Coal Project Environmental Management Strategy and summarised below.

- (i) Details of the complainant and complaint will be recorded in the complaints log.
- (ii) WCMPL 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 3(21)* of PA 06_0198, which is as follows.

SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS

BLASTING AND VIBRATION

Note: These conditions should be read in conjunction with sections 9 and 17 of the Statement of Commitments.

Property Investigations

21. If any landowner within a 2 km of proposed blasting activities, or any other landowner nominated by the Director-General, claims that any building or structure on 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 project, the Proponent shall within 3 months of receiving this request:
- (a) commission a suitably qualified 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 investigation confirms the landowner's claim, and both parties agree with these findings, then the Proponent shall repair the damages to the satisfaction of the Director-General.

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

10 APPENDIX

10.1 Appendix 1: Blasting and Vibration Consent Conditions

SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS

BLASTING AND VIBRATION

Note: These conditions should be read in conjunction with sections 9 and 17 of the Statement of Commitments.

Airblast Overpressure Impact Assessment Criteria

11. The Proponent shall ensure that the airblast overpressure level from blasting at the project does not exceed the criteria in Table 3 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 3: Airblast overpressure impact assessment criteria

Note: The overpressure values in Table 3 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

12. The Proponent shall ensure that the ground vibration level from blasting, or any other activity at the project does not exceed the criteria in Table 4 at any residence on privately-owned land.

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

Table 4: Ground vibration impact assessment criteria

Blasting Hours

13. The Proponent shall only carry out blasting on site between 9 am and 5 pm Monday to Saturday.

Blasting Frequency

14. The Proponent may carry out:
- a maximum of 2 blasts a day;
 - 5 blasts a week, averaged over a 12 month period;
- on site without the written approval of the Director-General.

Operating Conditions

15. During mining operations on site, the Proponent shall implement best blasting practice to:
- protect the safety of people, property, public infrastructure, and livestock;

- (b) minimise the dust and fume emissions from blasting at the mine site, to the satisfaction of the Director-General.
16. The Proponent shall not undertake blasting within 500 metres of any privately-owned land, unless suitable arrangements have been made with the landowner and any tenants to minimise the risk of flyrock-related impact to the property to the satisfaction of the Director-General.

Road Closure

17. Prior to blasting within 500 metres of any public road, the Proponent shall prepare and implement a Road Closure Management Plan for the project to the satisfaction of GSC and DPI.

Public Notice

18. During mining operations on site, the Proponent shall:
- (a) notify any person who registers an interest in being notified about the blasting schedule at the mine;
 - (b) 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 schedule at the project;
 - (c) advertise the blasting hotline number in a local newspaper each year;
 - (d) provide signage, with updated details of proposed blasting times, immediately to the north and south of the mine site on Wean Road; and
- to the satisfaction of the Director-General.

Property Inspections

19. Before carrying out any blasting, the Proponent shall advise the owners of "Costa Vale", "Surrey" and "Brolga", all landowners within 2 km of proposed blasting activities, and any other landowner nominated by the Director-General, that they are entitled to a property inspection.
20. If the Proponent receives a written request for a property inspection from any landowner within 2 km of proposed blasting activities, or any other landowner nominated by the Director-General, the Proponent shall within 3 months of receiving this request:
- (a) 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
 - (b) give the landowner a copy of this property inspection report.

Property Investigations

21. If any landowner within a 2 km of proposed blasting activities, or any other landowner nominated by the Director-General, claims that any building or structure on 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 project, the Proponent shall within 3 months of receiving this request:
- (a) commission a suitably qualified 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 investigation confirms the landowner's claim, and both parties agree with these findings, then the Proponent shall repair the damages to the satisfaction of the Director-General.

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

Monitoring

22. Prior to the commencement of blasting, the Proponent shall prepare and implement a detailed Blasting Monitoring Program for the project in consultation with DECC, and to the satisfaction of the Director-General.

10.2 Appendix 2: Offers of Property Inspections

10.3 Appendix 3: Typical Blast Results Sheet

