



NAMOI MINING PTY. LTD.

A.C.N. 071 158 373, A.B.N. 24 071 158 373

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Blast Monitoring Program
for the
Sunnyside Coal Mine



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ACRONYMS USED THROUGHOUT THIS PROGRAM

AEMR	-	Annual Environmental Management Report
AS	-	Australian Standard
BMP	-	Blast Monitoring Program
CCC	-	Community Consultative Committee
DECC	-	Department of Environment and Climate Change (now DECCW)
DECCW	-	Department of Environment, Climate Change and Water
DoP	-	Department of Planning
EPL	-	Environment Protection Licence
ML	-	Mining Lease
NMPL	-	Namoi Mining Pty Ltd
PA	-	Project Approval

1 INTRODUCTION

The Sunnyside Coal Mine is located approximately 15km west of Gunnedah and 2km north of Oxley Highway (see **Figure 1**). The mine site is approximately 234 ha and is located entirely within the property known as “Sunnyside”. The mine is being developed by Namoi Mining Pty Ltd (NMPL) as an open cut mining operation. NMPL is a 100% subsidiary company of Whitehaven Coal Ltd.

The mine site is located within the area covered by Mining Lease (ML 1624), granted by the Minister on the 5th November 2008.

A Final Statement of Commitments was compiled in Response to Submissions received during the exhibition of the Environmental Assessment for the project. These commitments are designed to effectively manage, mitigate, guide and monitor the mine from initial construction through to full production and eventually rehabilitation of the mine site. The Blast Monitoring Program (BMP) reflects commitments made in relation to blast monitoring.

This BMP has been prepared to ensure that the blasting associated with the Mine’s operations are in compliance with the required air overpressure and ground vibration criteria. To ensure this, the BMP for the Sunnyside Coal Mine has been prepared in accordance with the Blasting and Vibration section of the Development Consent specifically *Conditions 10 to 17* of Schedule 3 of PA 06_0308 and relevant conditions from Environment Protection Licence (EPL) 12957. 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 BMP 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 10am to 5pm Monday to Friday and 10am to 2pm on Saturdays (excepting Public Holidays);
- A maximum of 2 blasts per day; and
- A maximum of 5 blasts per week, averaged over a 12 month period.

In order to minimise airblast overpressure impacts blasting will utilise appropriate stemming material (eg 20mm aggregate) and will be conducted before the establishment and after break up of low level atmospheric temperature inversions, where practicable. Ground vibration will be controlled by ensuring the minimum practicable weight of explosive detonates in an instant and by ensuring that burden distance and effective sub-drilling are not too large.

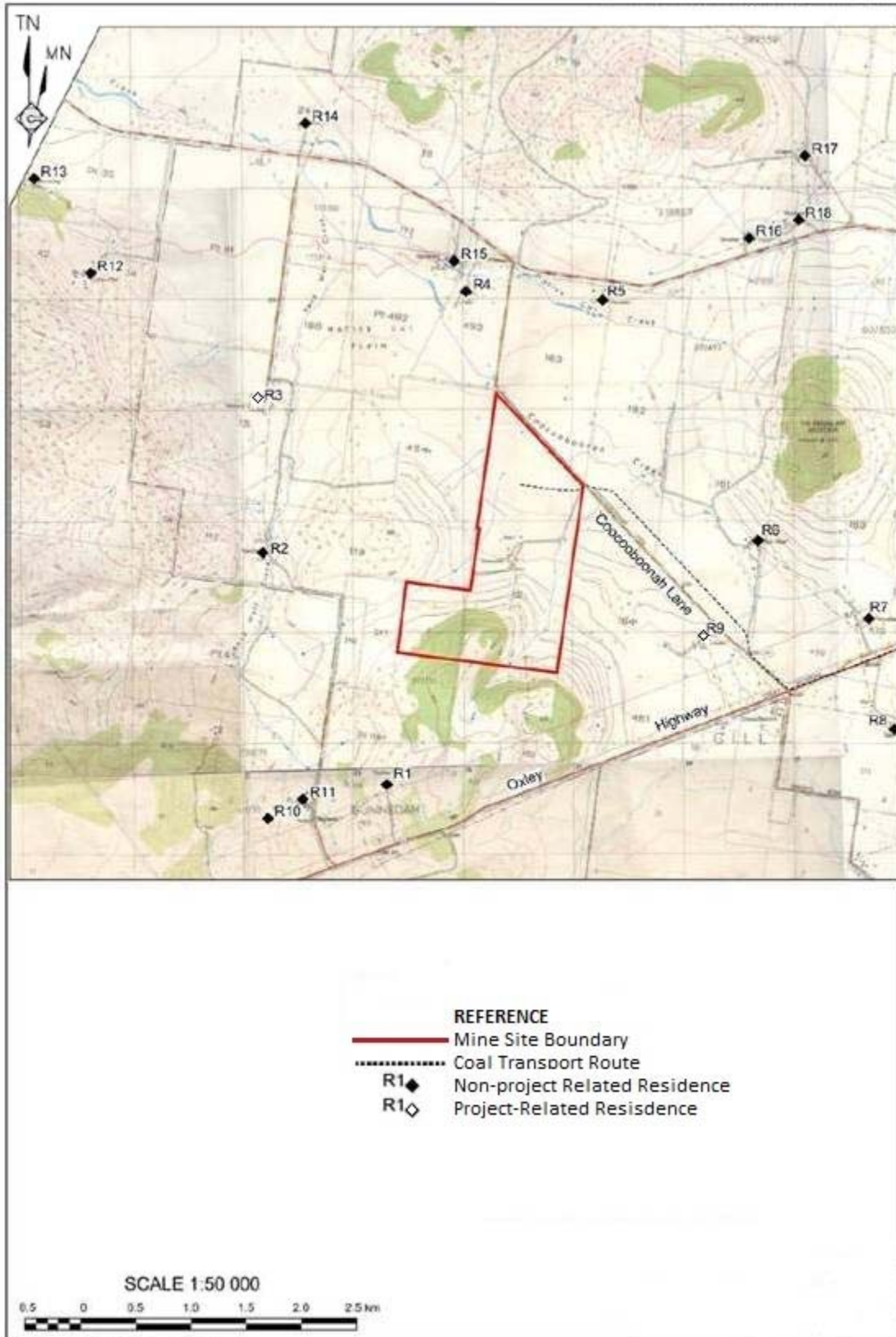


Figure 1 - Mine Site and Receiver Locations

2 PRE-BLASTING PROPERTY INSPECTIONS

As a requirement of *Conditions 14 and 15* of PA 06_0308, the owners of all landowner residences within a 2km radius of the planned blasting activity, and any other landowner nominated by the Director-General, (other than those owned by NMPL) were advised of their entitlement to a property inspection prior to the commencement of blasting activities. The list of property names for the receivers is provided in **Table 1** and shown in **Figure 1**. Properties in red are within 2km of the mine site boundary and were offered a pre-blast property inspection.

Table 1 - Residential Receivers near the Mine Site

R1 "Flodden" (now "Innisvale")	R7 "Woodlawn"	R13 "Merralong"
R2 "Ivanhoe"	R8 "Sugarloaf"	R14 "Skipton"
R3 "Werona" ¹	R9 "Lilydale" ¹	R15 "Glendower"
R4 "Illili"	R10 "Mulwalla" (1)	R16 "Carramar"
R5 "Ferndale"	R11 "Mulwalla" (2)	R17 "Crendon"
R6 "Plain View"	R12 "Lyndon Park"	R18 "Glenfenzie"

¹ Mine related

Figure 2 depicts land ownership and residences around the mine site. Properties R3 "Werona" and R9 "Lilydale" (as shown in **Figure 1**) are now mine related and not included in this Blast Monitoring Program. Sites that were provided with an offer of property inspection are provided in **Appendix 2**. Copies of all letters are filed on site.

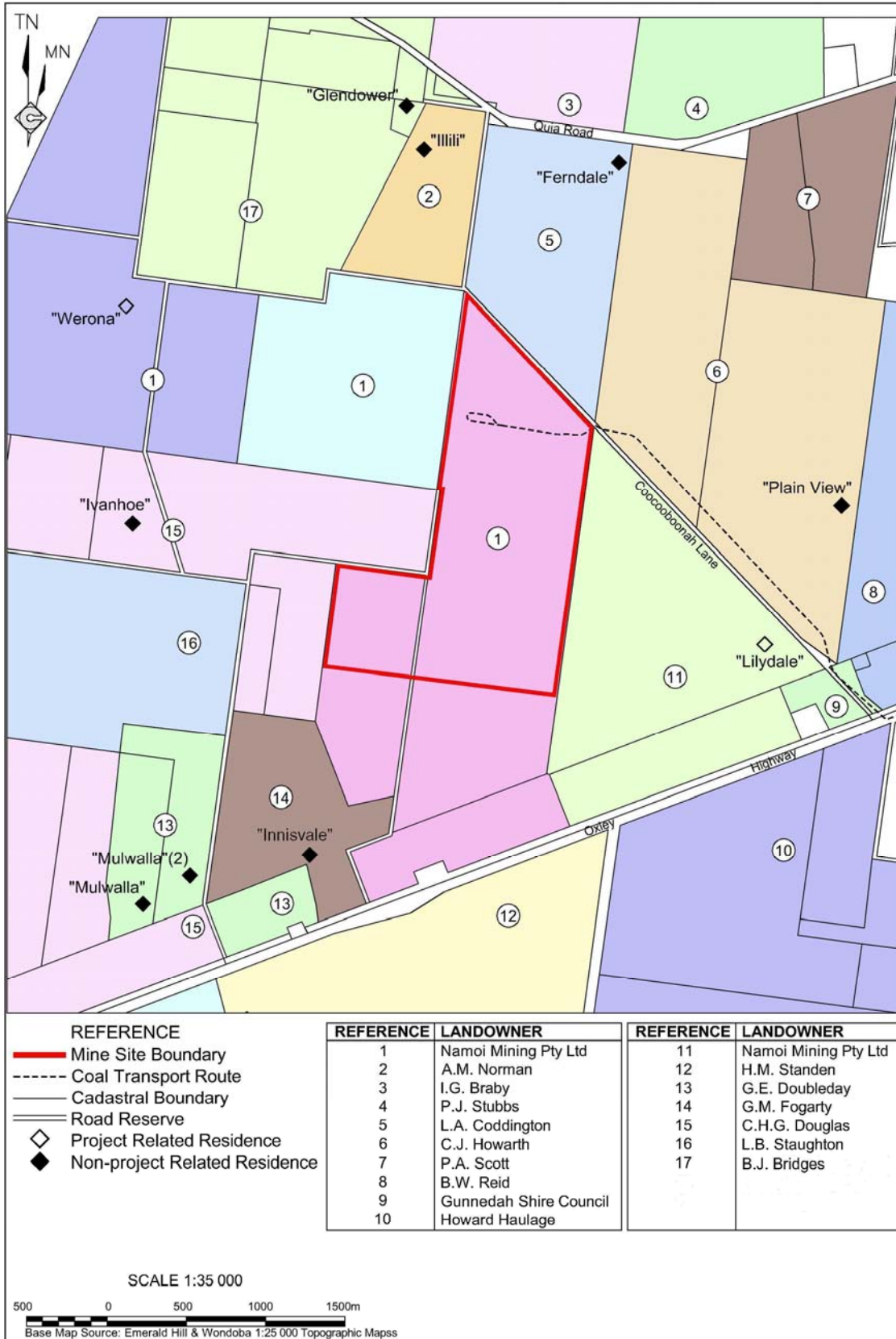


Figure 2 - Surrounding Land Ownership

3 PRE-BLASTING NOTIFICATION

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

In addition, NMPL provides specific notification of individual blasts to any landowner, who registers an interest in being notified about the blasting schedule at the mine. Notification involves:

- A letter nominating a planned blast date and an indicative time for the blast. The letter is delivered by hand at least 24 hours before the scheduled blast; and
- A telephone call during the morning of the blast to confirm the blast will proceed at the nominated (or varied) time.

A blast notification board, detailing the date and time of the next blast has been installed at the mine entrance on Coocooboonah Lane and is updated at least 24 hours before each blast.

As all blasting will be greater than 500m from any public road, road closures will not be required.

4 MONITORING LOCATIONS

All properties within a 2km radius from the blast may be used to monitor blasting activity. Monitoring sites may be modified if access is not granted by the resident, properties are acquired by NMPL or additional sites are required for impact assessment.

Blasting monitoring locations which require ongoing monitoring for blasting within the 2km radius of blasting activity are at the following receiver locations, as specified in EPL 12957 and shown in **Figure 1**:

- R1 "Innisvale";
- R2 "Ivanhoe";
- R4 "Illili";
- R6 "Plain View";

Air-blast overpressure and ground vibration will be measured for all blasts throughout the life of the mine. In addition to the nominated sites, NMPL will also observe flyrock/blast rock distribution for each blast.

5 BLAST MONITORS

A combination of Texcel μ Mx and Texcel Compact Monitors or equivalent will be used 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.

Appendix 3 shows an example of a typical Blast Monitor Report print-out from a μ Mx monitor.

6 PROCEDURES

6.1 Standards

All aspects of blast monitoring will be undertaken in accordance with AS 2187.2-2006 - Storage and Use – Use of Explosives, a copy of which will be retained at the site office.

6.2 Blast Impact Assessment Criteria

In accordance with *Condition 10* and *11* of PA 06_0308, 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

The μ Mx blast monitors require a trigger level to initiate a monitored blast event. 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 to 111.9dB (for air-blast overpressure) have been adopted for the Sunnyside Coal Mine.

6.4 Pre-Check

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

1. Battery is charged (note: batteries will be placed on charge immediately following data downloading from each blast).
2. Date and time are correct.
3. Location (Site) for each monitor is marked on the carry case.
4. 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.

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 current monitoring locations will require the instrument to be set on the “Far Field” setting.

Table 4 - Monitor Settings and Air-blast Overpressure 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.

5. Instrument trigger levels are set to minimise 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 115dBL 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 111.9dBL.
6. Setting adjustment as necessary.
7. Print off a confirmation of settings from the logger.

6.5 Field Setup

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.

1. Insert the soil spike into the ground and level the geophone.
2. Set up microphone.
3. Connect microphone and geophone to the monitor.
4. Turn power on. Powering up the monitor initiates a self check culminating in a display advice that the instrument is functioning properly.
5. Press "start". Following a countdown sequence, the monitor moves into a "standby mode" awaiting triggering.

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.

1. Press "stop" button.
2. Turn power off.
3. Disconnect microphone and geophone
4. Remove soil spike.
5. Pack instrument up.

6.7 Post Blast (in the office)

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

1. Retrieve/download the data to the office computer;
2. Review the data and delete any data pertaining to false triggers, ie. triggers before the blast initiation time;
3. 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 is attached as **Appendix 3**;
4. Supply copies of relevant documents (eg. printouts, drill logs and tie-in patterns) to be retained at the Sunnyside site office; and
5. Place monitor battery on charge to await the next blast.

NMPL staff will:

1. Assess the blast results for any exceedances or issues;
2. Print off and distribute the results to landholders, if requested;
3. Transfer the data for the blast to an Excel spreadsheet; and
4. In the event of an exceedance of blast criteria, or if a complaint is received, implement the procedures detailed in Section 8 and Section 9.

7 FLYROCK MONITORING AND ARCHAEOLOGICAL IMPACTS FROM BLASTING

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.

When blasting within 500m of the axe grinding groove site (refer to the Sunnyside Aboriginal Cultural Heritage Management Plan) the site will be covered with straw bales to prevent any possible flyrock damage. Additionally, when within 150 to 210m of the axe grinding groove site the Maximum Instantaneous Charge of the blast will not exceed 960kg.

8 BLAST CRITERIA EXCEEDANCE MANAGEMENT AND REPORTING

Blast impact assessment criteria are detailed in Section 6.2. In the event that the criteria are exceeded NMPL, as the holder of EPL 12957 under the *Protection of the Environment Operations Act 1997*, will report the incident to the Department of Environment, Climate Change and Water (DECCW) – EPA, Armidale (02 6773 7000) and initiate investigations as to the cause.

In accordance with the PA 06_0308, *Schedule 5, Conditions 3, 4 and 5*, any exceedance in blast criteria will also result in notification to the Department of Planning (DoP) and DECCW within 24 hours of the occurrence of the exceedance. Additionally, within 6 days of the notification, NMPL will provide a written report to both DoP and DECCW 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.

In the event that the criteria for a 12 month period are exceeded, the DECCW and DoP will similarly be notified in accordance with the requirements identified above.

NMPL will also report any exceedance in blasting criteria in the Annual Environmental Management Report (AEMR). Additionally, blast monitoring results are provided via a monitoring report presented at quarterly Community Consultative Committee (CCC) meetings.

9 BLAST COMPLIANT 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 Sunnyside Coal Mine Environmental Management Strategy and summarised below.

1. Details of the complainant and complaint will be recorded in the complaints register.
2. NMPL 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.
3. Investigations will be initiated to verify or otherwise the basis for the complaint.
4. 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.

NMPL will also, in consultation with the complainant, consider temporary blast monitoring at the location of the complaint if it is not already included as a blast monitoring location. Such action will provide relevant information pertaining to overpressure and ground vibration levels at the location to assist in identification of ameliorative measures if required.

Complaints pertaining to blast-related damage will be managed in accordance with *Condition 16* of Schedule 3 of PA 06_0308 (**Appendix 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 section 8 of the Statement of Commitments.

Airblast Overpressure Limits

10. The Proponent shall ensure that the airblast overpressure level from blasting at the project does not exceed the criteria in Table 5 at any residence on privately-owned land.

Table 5: Airblast overpressure impact assessment criteria

Airblast 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.

Ground Vibration Impact Assessment Criteria

11. 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 6 at any residence on privately-owned land.

Table 6 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%

Blasting Hours

12. The Proponent shall carry out blasting on site only between 10 am and 5 pm Monday to Friday and 10 am and 2 pm on Saturdays (excepting Public Holidays).

Blasting Frequency

13. The Proponent shall not carry out more than:
- 2 blasts a day; and
 - 5 blasts a week, averaged over a 12 month period; on site.

Property Inspections

14. At least 2 months before carrying out any blasting on the site, the Proponent shall advise 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 to establish the baseline condition of the property.
15. If the Proponent receives a written request for a property inspection from any such landowner, the Proponent shall:
 - (a) commission a suitably qualified person, whose appointment has been approved by the Director-General, to inspect and report on 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

16. If any landowner within 2 km of proposed blasting activities, 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 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 prepare a property inspection report; and
 - (b) give the landowner a copy of the 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

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

Appendix 2 – Offers of Property Inspections

The following properties received a property inspection at the property owners request prior to any site blasting operation.

R1 “Flodden” (now “Innisvale”)
R2 “Ivanhoe”
R4 “Illili”
R5 “Ferndale”
R6 “Plain View”
R15 “Glendower”

In addition to the above properties, the following properties located beyond the receiver locations identified on **Figure 1** also received pre-blast property inspections:-

- “Kammen Park”
- “Ridgelands”
- “Eulalie”
- “Dondee”

Appendix 3 - Typical Blast Monitoring Results Sheet

Sunnyside

Time: 1:44:48 Monitor Location: Ivanhoe Station
 Date: 18 Nov 2008 Blast No/Id: .

RADIAL

Velocity [mm/s]

Time [seconds]

PPV 0.51 mm/s

TRANSVERSE

Velocity [mm/s]

Time [seconds]

PPV 0.48 mm/s

VERTICAL

Velocity [mm/s]

Time [seconds]

PPV 0.91 mm/s

MICROPHONE

Pressure [dBL]

Time [seconds]

BLAST SUMMARY

Pattern Type : .	Max. Inst. Charge : .
Pattern Size (m) : .	Explosive (Type & Weight)
Designed Tonnage : .	a) .
Bench Height (m) : .	b) .
Number of Rows : .	c) .
Number of Holes : .	Delay Type - .
Blasthole Dia. (mm) : .	- Average Interval (ms): .
Stemming (m) : .	- Duration (ms) : .
Sub Drill : .	

Peak Vector Sum Velocity : 0.91 mm/s

Peak Overpressure : 110.7 dBL

Comments & Observations
 .
 .
 .

Monitoring conducted by:
 (Orica Limited:Orica Limited)

Checked by:

TM Serial Number: 3095

Last Calibration: 19 Jul 2007

EL:4.0 Templates\ANZECC Standard.rtt Sunnyside\Ivanhoe Station\A3095 - 2008-11-18 12.44.48 - 1.twf