Appendix 8

Blasting Impact Assessment

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Northparkes Mines Step Change Project

Blasting Impact Assessment

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Northparkes Mines Step Change Project

Blasting Impact Assessment

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DOCUMENT CONTROL

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1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Umwelt (Australia) Pty Limited (Umwelt) on behalf of North Mining Limited (NML) to undertake a blasting impact assessment for the proposed Northparkes Mines (NPM) Step Change Project (the Project). The Project would involve the continuation of underground block cave mining in two existing ore bodies, the development of underground block cave mining in the E22 resource, additional campaign open cut mining located in existing mining leases and an extended mine life of 7 years until 2032.

2 PROJECT SETTING AND OVERVIEW

2.1 Project Setting

NPM is an existing copper-gold mine that has been in operation since 1993 and is located approximately 27 kilometres northwest of Parkes in central west NSW (refer to **Figure 1**). The NPM landholdings comprise the existing NPM site as well as agricultural landholdings within the surrounding area. NPM is a joint venture between Rio Tinto, Sumitomo Metal Mining Oceania Pty Ltd and Sumitomo Corporation.

NPM was granted Project Approval (PA06_0026) on 28 February 2007 by the Minister for Planning for the *Northparkes Mines - Continuation and Underground E48 Expansion* (2007 Project Approval).

2.2 Land Ownership

The nearest potentially affected residences beyond the Project area are presented in **Table 1**Error! Reference source not found.. It should be noted that “Avondale” is subject to an existing commercial agreement with NPM.

Table 1 Nearest Potentially Affected Residences

Residence Reference	Location	Land Owner	Coordinates (AMG55)	
			Easting	Northing
A	“Hubberstone”	A.R. Kingsmill	600623	6360760
B	“Avondale”	D.B. Bicket	602100	6357125
C	“Milpose”	I.D. Hoy	594630	6352650
D	“Lone Pine”	W.H. Tanswell	593530	6358830

Figure 3 presents the location of the four nearest residences in relation to the Project area.

Figure 1 Locality Map

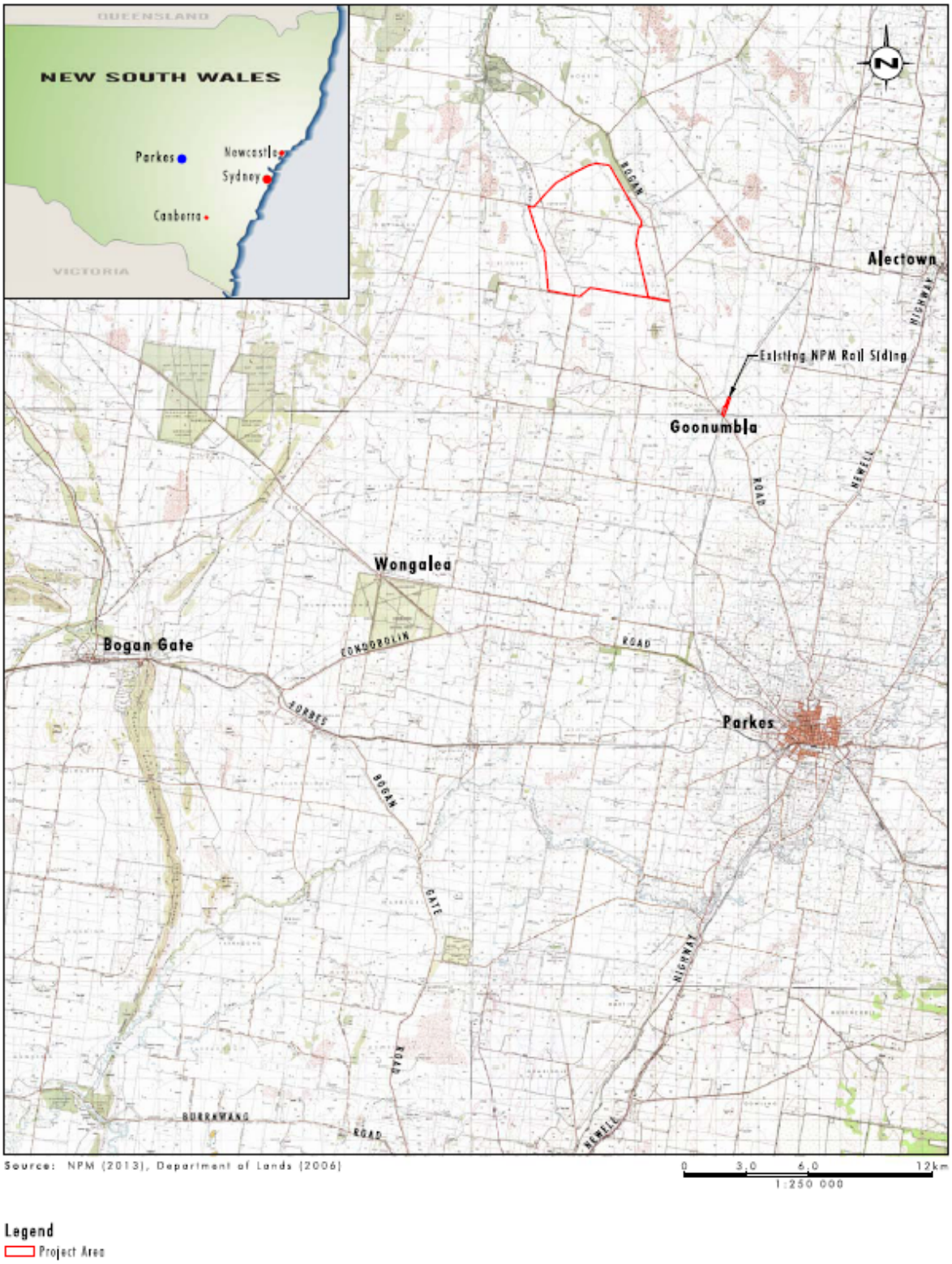


Figure 2 Northparkes Mines Step Change Project

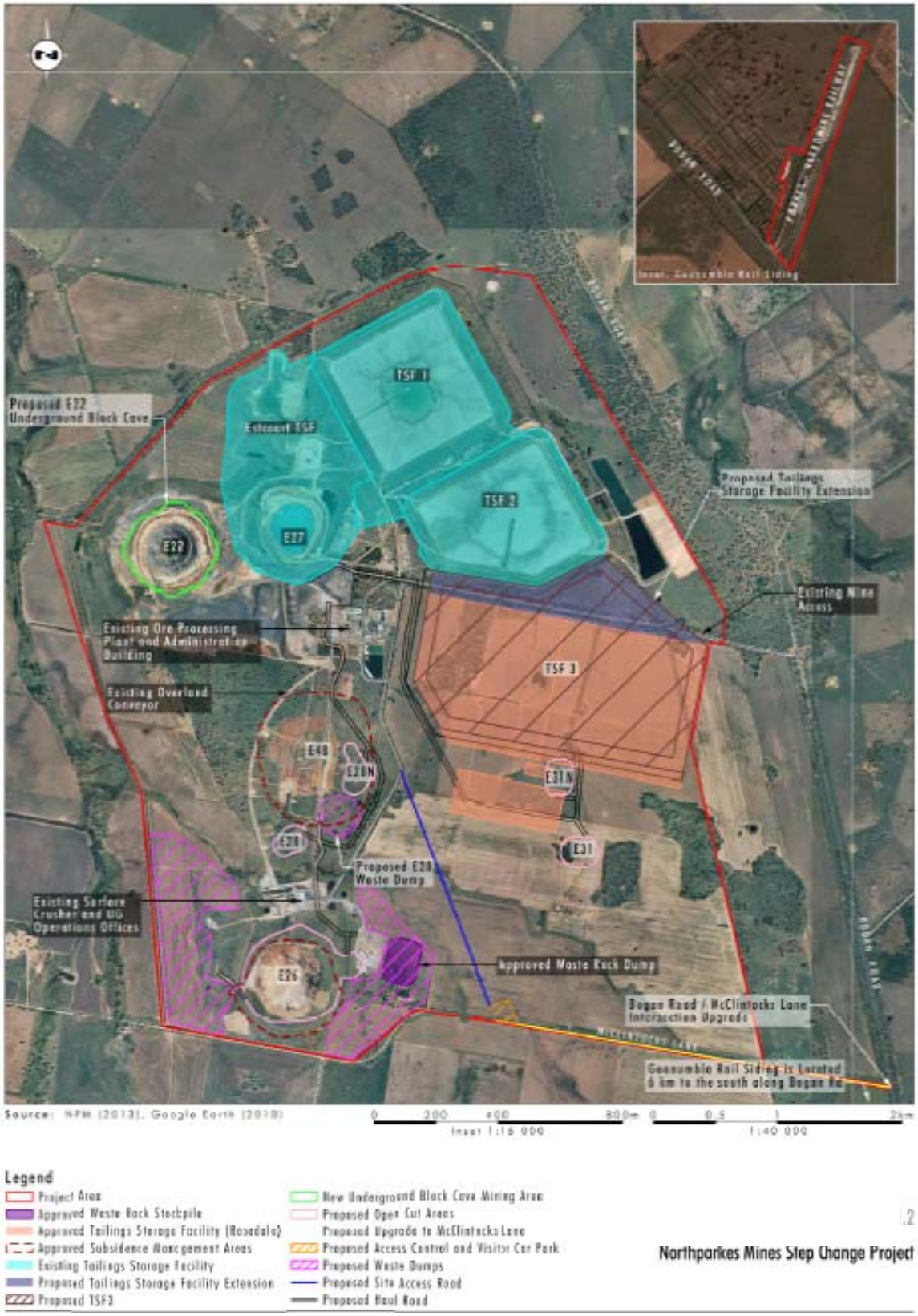
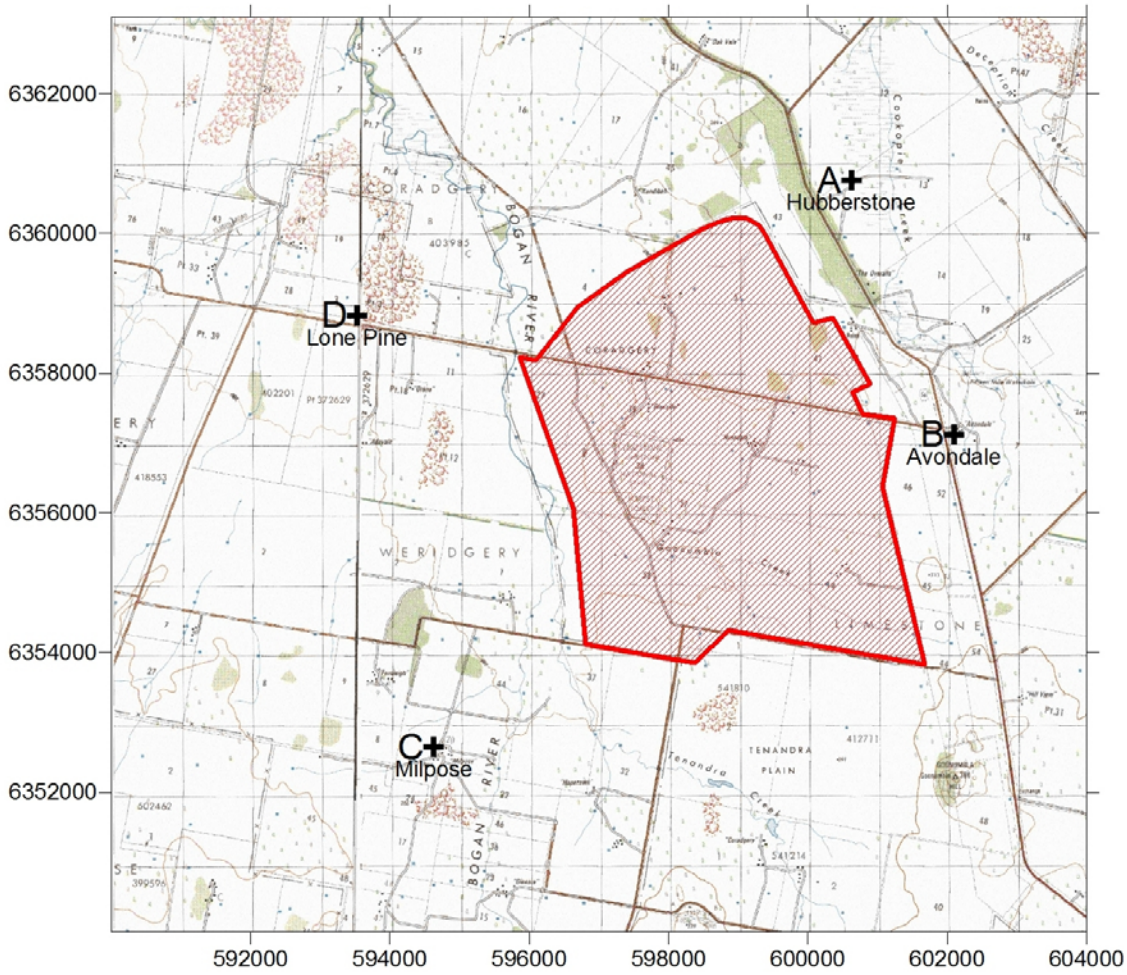


Figure 3 Project Area and Nearest Residences



2.3 Existing Approvals

NPM proposes to extend the existing E22 open-cut mine to the development of an underground block cave mine and commence open-cut mining operations in four small open-cut pits corresponding to E31, E31N, E28 and E28NE and one larger open-cut within the E26 subsidence zone. The locations of the various components of the Project are displayed on **Figure 2**.

The existing NPM operation has consent to operate (with respect to noise and blast emissions) in accordance with the following approvals issued by the:

- Former Department of Planning (now Department of Planning and Infrastructure) Project Approval 06-0026 dated 28 February 2007 (PA06-0026);
- Environment Protection Licence (EPL) 004784 - Anniversary date 30 May;
- Department of Mineral Resources (DMR) Mining Lease 1247 dated 27 November 1991;
- Department of Mineral Resources (DMR) Mining Lease 1367 dated 21 March 1995;
- Parkes Shire Council Development Consent DA504/90 dated 7 August 1991; and
- Parkes Shire Council Development Consent DA836/95 dated 21 March 1995.

2.4 NPM Blasting Compliance Summary

Blast monitoring is conducted at the NPM in accordance with the NPM Noise and Vibration Management Plan. In May 2009, a remote blast monitoring station was installed at 'Hubberstone' to assess for compliance against the blast emission limits in PA06_0026. The remote blast monitoring equipment was decommissioned in 2010 due to surface mining in E22 open cut ceasing in October 2010.

A summary of the findings of the blast compliance monitoring undertaken since commencement of blasting monitoring under PA06_0026 is provided in **Table 2**.

Table 2 Summary of Blast Compliance Monitoring

Year	Number of Blasts	Number of Blasts above 5 mm/s	Number of Blasts above 5 mm/s	Number of Blasts above 115 dBL	Number of Blasts above 120 dBL	Blast Compliance Statement
2008	151	Nil	Nil	1 (0.7%)	Nil	Compliant
2009	230	Nil	Nil	1 (0.4%)	Nil	Compliant
2010	134	Nil	Nil	Nil	Nil	Compliant
2011	Nil	Nil	Nil	Nil	Nil	Compliant
2012	Nil	Nil	Nil	Nil	Nil	Compliant

No airblast results exceeding 120 dBL were recorded at any privately owned properties during the period 2008 to 2012. Two blasts were above 115 dBL at 'Hubberstone', equivalent to 0.4 percent (%) (2 of 515 blasts) of blasts exceeding 115 dBL for the period 2008 to 2012.

All vibration results were less than 5 mm/s, therefore conforming to limits specified in PA06_0026.

Accordingly, airblast and ground vibration monitoring has demonstrated that the NPM blasting and vibration management is compliant with the regulatory criteria at the monitored site.

2.5 Project Overview

The proposed Project maintains the approved ore processing plant/rate of up to 8.5 million tonnes per annum (Mtpa) and includes the continuation of underground block cave mining in two established ore bodies (E26 and E48) in accordance with existing approvals. The proposed Project is depicted on **Figure 2** and includes:

- Continuation of approved underground block cave mining in the E48 and E26 ore bodies, and associated underground infrastructure;
- Development of underground block caving in the E22 resource beneath the E22 open cut void;
- Campaign open cut mining through development of five open cut resources including:
  - Development of four small open cut pits E31, E31N, E28, E28N; and
  - Proposed E26 open cut which is located in an area of previous underground block cave subsidence (existing vertical extent of subsidence void is approximately 200 metres);
- Amendments to the configuration of tailings storage facilities (TSFs) including:
  - Continuation of tailings disposal to the existing and approved TSFs (TSF 1 and 2, infill between TSF 1 and 2, and Estcourt) to an approved height of 28 metres;
  - Provision for additional raises on Estcourt TSF to provide for an increased height from the approved 25 metres to up to approximately 28 metres above ground surface; and

  - Development of a new TSF 3, which will extend to the south and from the southern embankment of TSF 2 to a height of approximately 28 metres above ground surface, which incorporates the approved Rosedale TSF.

- Development of new waste dumps for the management of E28/E28N and E26 open cut waste rock. Waste rock from open cut mining areas can be utilised in the development of TSF 3;
- Continuation of approved ore processing infrastructure up to 8.5 Mtpa capacity, and road haulage of copper concentrate to the existing Goonumbla rail siding;
- Continued use of existing site infrastructure including administration buildings, workshop, internal access roads and service infrastructure;
- Continued use of surface mining infrastructure including ventilation shafts, hoisting shaft and ore conveyors;
- Continuation of existing approved water supply and management processes;
- Development of an amended access road to service all mine related traffic entering the site;
- Establishment of new visitor car parking facilities and access control to support the amended mine site access;
- Continuation of approved mining operations for an extended life of an additional seven years until end of 2032; and
- Rehabilitation and closure of the mine site will be carried out after the end of the operational life of the Project in accordance with relevant approvals.

All components of the Project are located within land which is subject to both the existing Project Approval (PA06_0026) Area and established mining leases (ML1247, ML1367 and ML641).

2.6 Assessment Areas

The major sources of blast emissions from the Project have been identified as emanating from the E26 open-cut operations, however, smaller scale campaign blasts would also be undertaken in the four smaller open-cut operations E31, E31N, E28 and E28N. The potential blast emissions from blasting operations in all five proposed open-cuts have been assessed for the purposes of this blasting impact assessment.

2.7 Hours of Operation

The on-site activities would occur during the periods shown in **Table 3**.

Table 3 Hours of Operation

Activity	Hours of Operation	Shift Roster
Mine Development	24 hours per day, 7days per week	12 hour shifts
Blasting Operations	9 am to 5 pm, Monday to Saturday	12 hour shift
Underground Mining	24 hours per day, 7 days per week	12 hour shifts
Open-cut Mining	24 hours per day, 7 days per week	12 hour shifts
Tailings Storage Facility Construction	24 hours per day, 7 days per week	12 hour shifts
Maintenance	24 hours per day, 7 days per week	12 hour shifts
Processing	24 hours per day, 7 days per week	12 hour shifts
Product Transport - Trucks - Trains	Trucks: 24 hours per day, 7 days per week; but timed to avoid school buses Trains: 24 hours per day, 7 days per week	12 hour shifts

3 BLASTING IMPACT ASSESSMENT

3.1 Assessment Criteria

Airblast and ground vibration criteria are nominated in Condition 21 and Condition 22 of Schedule 3 of PA06_0026, respectively and are reproduced below. These criteria are based on accepted and commonly used criteria and would be expected to be continued on any new project approval issued for NPM operations.

Airblast Overpressure Criteria

21. The Proponent shall ensure that the airblast overpressure level from blasting at the Project does not exceed the criteria in Table 1 at any residence on privately-owned land.

Table 1: Airblast overpressure impact assessment criteria

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

Ground Vibration Impact Assessment Criteria

22. The Proponent shall ensure that the ground vibration level from blasting at the Project does not exceed the criteria in Table 2 at any residence on privately-owned land

Table 2: Ground vibration impact assessment criteria

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

3.2 Open-cut Blasting

3.2.1 Blasting Practices

Blasting practices for the Project would be the same as the existing E22 open-cut mining operations. Typically one blast would be fired per day, 6 days per week. The indicative blast design parameters are presented in **Table 4**.

Table 4 Indicative Blast Design Parameters

Parameter	Open-cut Blasting
Blast hole diameter	89 mm
Blasthole depth	7 m to 8 m
Blasthole/Burden	3.5 m x 4 m
Depth of Stemming	2.5 m
Area of Blast	2500 m^2
Size of Blast	20,000 m^3
Number of Holes	200
Bulk Explosive Type	ANFO (Emulsion if wet blastholes)
Power Factor	0.5 kg/BCM
Maximum Instantaneous Charge (MIC)	Up to 50 kg
Initiation System	Nonel

Note: BCM - bank cubic metre
Source: Umwelt

3.2.2 Predicted Blast Emission Levels

The ground vibration and airblast blast emission site laws for the NPM was prepared and presented in SLR (then, Heggies Australia Pty Ltd) Report 651/02 "*Northparkes Mines - E48 Project Noise and Blasting Assessment"* dated August 2006.

All available blast monitoring data between March 2008 and October 2010 was reviewed and the validated emission recordings used to update the NMP blast site laws.

The resulting 5% exceedance Project site laws for ground vibration and airblast are as follows:

Peak Vector Sum (PVS) Vibration Velocity (mm/s)
$PVS\ (5\%) = 465 \times (SD_1)^{-1.14}$

Peak Airblast Linear Sound Pressure Level (dB re 20 µPa)
$SPL\ (5\%) = 171 - 17.3 \log (SD_2)$

Where SD_1 and SD_2 are the ground vibration and airblast scaled distances, where:

$$SD_1 = \frac{\text{Distance}}{\sqrt{MIC}}\ (m\ kg^{-0.5}) \qquad SD_2 = \frac{\text{Distance}}{\sqrt[3]{MIC}}\ (m\ kg^{-0.33})$$

The Project ground vibration site law and airblast site law are presented graphically in **Figure 4** and **Figure 5**, respectively.

Figure 4 Project Blast Ground Vibration Site Law

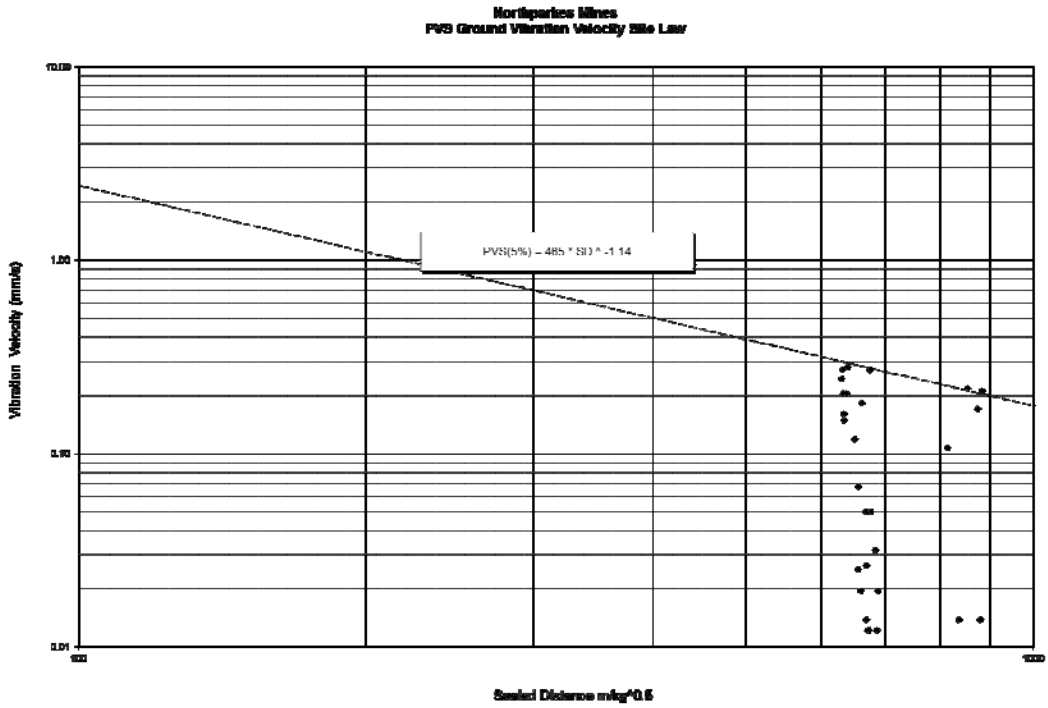
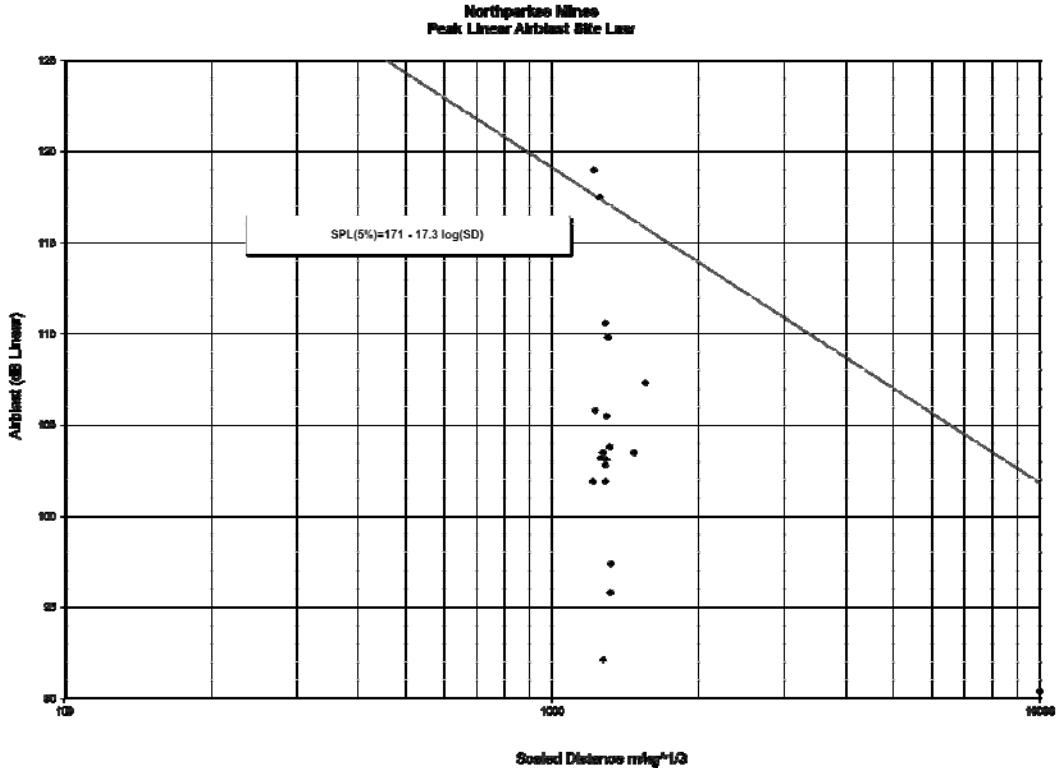


Figure 5 Project Airblast Site Law



The blast emissions prediction formulae have been used to predict the levels of ground vibration and airblast at the nearest potentially affected residential dwellings as presented in **Table 5**.

Table 5 Predicted 5% Exceedance Blast Emissions (50 kg)

Residence Reference/Location	Nearpoint		Predicted Blast Emission Level[1]	
	Blast Site	Distance	PVS Vibration Velocity	Peak Linear Airblast
			50 kg	50 kg
A - "Hubberstone"	E31N	4,570 m	0.3 mm/s	117.5 dBL
B - "Avondale"	E31N	2,200 m	0.7 mm/s	123.0 dBL
C - "Milpose"	E26	3,430 m	0.4 mm/s	119.6 dBL
D - "Lone Pine"	E28	5,220 m	0.2 mm/s	116.5 dBL

3.2.3 Blast Emissions Assessment and Recommendations

The following assessments are derived from the predicted levels of blast emissions given in **Table 5** and the blasting assessment criteria presented in **Section 3.1**.

Residential Human Comfort Vibration Criteria

- The 5% exceedance Peak Vector Sum (PVS) vibration velocity is below the criterion of 5 mm/s at all residences.

Residential Human Comfort Airblast Criteria

- The 5% exceedance Peak Airblast Level is above the criterion of 115 dBL at each of the four nearest identified receivers but below the maximum allowable level of 120 dBL, except at "Avondale" which is subject to an existing commercial agreement with NPM.
- In order to meet the 115 dBL 5% exceedance Peak Airblast Level, the MIC would have to be reduced to 18.6 kg, 2.1 kg, 7.9 kg and 27.7 kg when blasting at the nearpoint to "Hubblerstone", "Avondale", "Milpose" and "Lone Pine", respectively.

Monitoring

A review of the 515 blast emissions (vibration and airblast) monitoring records for the period May 2008 and November 2010 reveals that the vibration levels ranged from <0.1 mm/s to 0.3 mm/s. The corresponding range of airblast levels was <90 dBL to 119 dBL, with only 2 blasts above 115 dBL (ie only 0.4% of all blasts).

In light of these measurements and based on the predictions in **Table 5**, proposed blasting operations within each of the five open cut operations can be managed so as not to cause any adverse blasting-related impacts. However, it is recommended that the NPM Noise and Vibration Management Plan and previous monitoring program employed during the E22 open cut operations be resumed during the periods of mining in the E26, E31, E31N, E28 and E28N open cut operations.

Can a statement of the management of blasts within 500m of McClintocks Lane (whilst blasting in E26) be included as a recommendation here.

3.3 Blasting Adjacent To Roads

Blasting operations within the E26 open-cut would be undertaken within 200 m of McClintocks Lane. Where blasting operations are undertaken within 500 m of McClintocks Lane, the blast management practices presented below would be implemented.

3.3.1 Temporary Road Closures

Prior to any blasting within 500 m of a public road, agreement would be reached with the Parkes Shire Council (PSC). McClintocks Lane would be temporarily closed whenever blasting is carried out within 500 m of the road as a precautionary measure to ensure public safety. These closures would typically be for a period of less than 15 minutes. Designated mine personnel who have received RTA approved traffic controller training would manage traffic flow during these closures.

Traffic control signs would be set up in accordance with the RTA / PSC guidelines. Adequate training would also be provided on “Introduction to Traffic Control at Roadworks” for the purpose of setting up and removing traffic control and controlling any on-site hazards. All temporary road closures would be scheduled, where practicable, for outside peak traffic flow periods. In particular, school bus times would be avoided. Roads would be closed to traffic by qualified traffic controllers approximately 5 minutes prior to any blast. Traffic controllers would remain in radio contact with the mine throughout the closure period, to enable cessation of the blast in the case of emergency.

3.3.2 Notification of Road Closures

Notification of temporary road closures would be co-ordinated with local PSC, as necessary, to meet their requirements. Notice of temporary road closures would be provided via the posting of signs on the relevant roads at least 3 days prior to blasting. It is not practical to notify all relevant emergency services of temporary road closures well in advance of scheduled blasts as it is necessary to consider weather conditions when determining when to blast. All relevant emergency services would be contacted by telephone and informed of the Project’s temporary road closure procedures. They would be advised that, if requested, they can be notified by telephone or email within two hours of a planned blast time. Advice of road closures would also be provided on the NPM hotline.

3.3.3 Flyrock Removal and Road Maintenance

All blasts would be visually inspected and monitored to determine whether any flyrock is generated. If it appears possible that flyrock may have landed on the road after a blast event, then prior to reopening roads, the traffic controllers would undertake a visual inspection of the roads to ensure that it is safe for traffic to proceed. In the event that flyrock has impacted upon public roads, traffic controllers would immediately notify the Mine Manager who would initiate a clean-up and repair response with hand removal of any rock. Traffic controllers would continue to keep roads closed and monitor road traffic until authorised to reopen the road by the Mine Manager. In addition, NPM would engage a suitably qualified contractor approved by PSC to undertake any road repair works, resulting from blast related activities, if required.