

Blast Management Plan

for the

Possum Brush Quarry

DA 283/97

Prepared in conjunction with:



R.W. CORKERY & CO. PTY. LIMITED

December 2019

This Copyright is included for the protection of this document

COPYRIGHT

© Pacific Blue Metal Pty Ltd 2016

and

© R.W. Corkery & Co. Pty Limited 2016

All intellectual property and copyright reserved.

Apart from any fair dealing for the purpose of private study, research, criticism or review, as permitted under the Copyright Act, 1968, no part of this report may be reproduced, transmitted, stored in a retrieval system or adapted in any form or by any means (electronic, mechanical, photocopying, recording or otherwise) without written permission. Enquiries should be addressed to R.W. Corkery & Co. Pty Limited.



Blast Management Plan

for the

Possum Brush Quarry

DA 283/97

Prepared by:

Pacific Blue Metal Pty Ltd
ABN: 45 050 224 250
PO Box 6
NABIAC NSW 2312

Telephone: (02) 6554 3206
Facsimile: (02) 6554 3250
Email: charlie@pacificbluemetal.com.au

In conjunction with:

R.W. Corkery & Co. Pty. Limited
Geological & Environmental Consultants
ABN: 31 002 033 712

Brooklyn Office:

1st Floor, 12 Dangar Road
PO Box 239
BROOKLYN NSW 2083

Telephone: (02) 9985 8511
Facsimile: (02) 6361 3622
Email: brooklyn@rwcorkery.com

Orange Office:

62 Hill Street
ORANGE NSW 2800

Telephone: (02) 6362 5411
Facsimile: (02) 6361 3622
Email: orange@rwcorkery.com

Brisbane Office:

Suite 5, Building 3
Pine Rivers Office Park
205 Leitchs Road
BRENDALD QLD 4500

Telephone: (07) 3205 5400
Facsimile: (02) 6361 3622
Email: brisbane@rwcorkery.com

Ref No. 484/28

December 2019



R.W. CORKERY & CO. PTY. LIMITED

Document Control

Document Title	Blast Management Plan
Document Nbr.	484/28

Draft					
Version	Date	Distributed to	Comments Rec'd from – Date		
0.00	n/a				
Final					
Version	Date	Approved By	Reviewed By	Section	Description
1.00	25/07/16	Charlie Kennett General Manager	Stacey Tyack QSE Manager	All	Plan approved for submission to DPE
1.01	04/10/16	Charlie Kennett General Manager	Stacey Tyack QSE Manager	All	Plan amended to address DPE comments received 12/09/16.
1.02	13/03/17	Charlie Kennett General Manager	Stacey Tyack QSE Manager	All	Minor corrective editing including pages numbers and labels.
2.00	03/01/18	Charlie Kennett General Manager	Stacey Tyack QSE Manager	All	Full review triggered by DA Condition 5(4).
3.00	10/12/19	Charlie Kennett General Manager	Stacey Tyack QSE Manager	All Table 1 Section 4.2 Section 5.3.1 Section 8	Removed all or parts of Sections 1,2,3,10-17 to EMS (generic information to all MP's). Altered order of contents. General editing. Updated internal references Added results to June 2019 Amended blast notification scheme. Added new section.
3.01	12/06/20	Charlie Kennett General Manager	Stacey Tyack QSE Manager	Section 7	Included comparison of monitoring results to blasting criteria (as per DPIE email dated 03/06/20).

CONTENTS

	Page
LIST OF ACRONYMS.....	V
1. INTRODUCTION.....	1
2. LEGAL AND OTHER REQUIREMENTS.....	3
2.1 DEVELOPMENT CONSENT	3
2.2 ENVIRONMENT PROTECTION LICENCE	5
3. OBJECTIVES AND OUTCOMES.....	6
4. BASELINE DATA	7
4.1 WIND ENVIRONMENT	7
4.2 HISTORICAL BLAST DATA	7
4.3 SURROUNDING RESIDENCES	8
5. BLAST MANAGEMENT SYSTEM	10
5.1 INTRODUCTION	10
5.2 POTENTIAL BLAST IMPACTS.....	10
5.3 BLAST MANAGEMENT	10
5.3.1 Blasting Schedule Notification.....	10
5.3.2 Meteorological Forecasting	10
5.3.3 Proactive Mitigation Measures	11
5.3.4 Request for an Inspection	12
6. MONITORING.....	13
6.1 BLASTING CRITERIA AND LIMITS	13
6.1.1 Blasting Criteria	13
6.1.2 Blasting Hours of Operation	13
6.1.3 Blasting Frequency.....	13
6.2 METEOROLOGICAL MONITORING.....	13
6.3 BLAST MONITORING	14
6.4 BLAST MONITORING LOCATIONS	14
7. EVALUATION OF COMPLIANCE.....	15
8. CORRECTIVE AND PREVENTATIVE ACTION	15
9. COMPLAINTS HANDLING	15
10. INCIDENT MANAGEMENT, NOTIFICATION AND REPORTING	16
11. PUBLICATION OF MONITORING INFORMATION.....	16
12. PLAN REVIEW.....	16

CONTENTS

Page

FIGURES

Figure 1	Locality Plan	2
Figure 2	Land Ownership and Residences	9
Figure 3	Blast Monitoring Locations	15

TABLES

Table 1	Development Consent Requirements Relating to Blasting	3
Table 2	Objectives and Key Performance Outcomes	6
Table 3	Blasting Criteria	13
Table 4	Meteorological Monitoring	14

LIST OF ACRONYMS

AHD	Australian Height Datum
AS	Australian Standard
BoM	Bureau of Meteorology
CCC	Community Consultation Committee
DA	Development Application
DPE	Department of Planning and Environment
DPIE	Department of Planning, Industry & Environment (formally DPE)
Department	Department of Planning, Industry & Environment (formally DPE)
EA	Environmental Assessment
EP&A Act	Environmental Planning and Assessment Act 1979
EPA	Environment Protection Authority
EPL	Environment Protection Licence
ERM	Environmental Resource Management Pty Ltd
GTCC	Greater Taree City Council (MidCoast Council as of 1 July 2016)
LEP	Local Environmental Plan
MCC	MidCoast Council
PBM	Pacific Blue Metal Pty Ltd
POEO Act	Protection of the Environment Operations Act 1997
PPV	Peak Particle Velocity
RPM	Runge Pincock Minarco Ltd
Secretary	Secretary of the Department, or nominee
SSD	State Significant Development

This page has intentionally been left blank

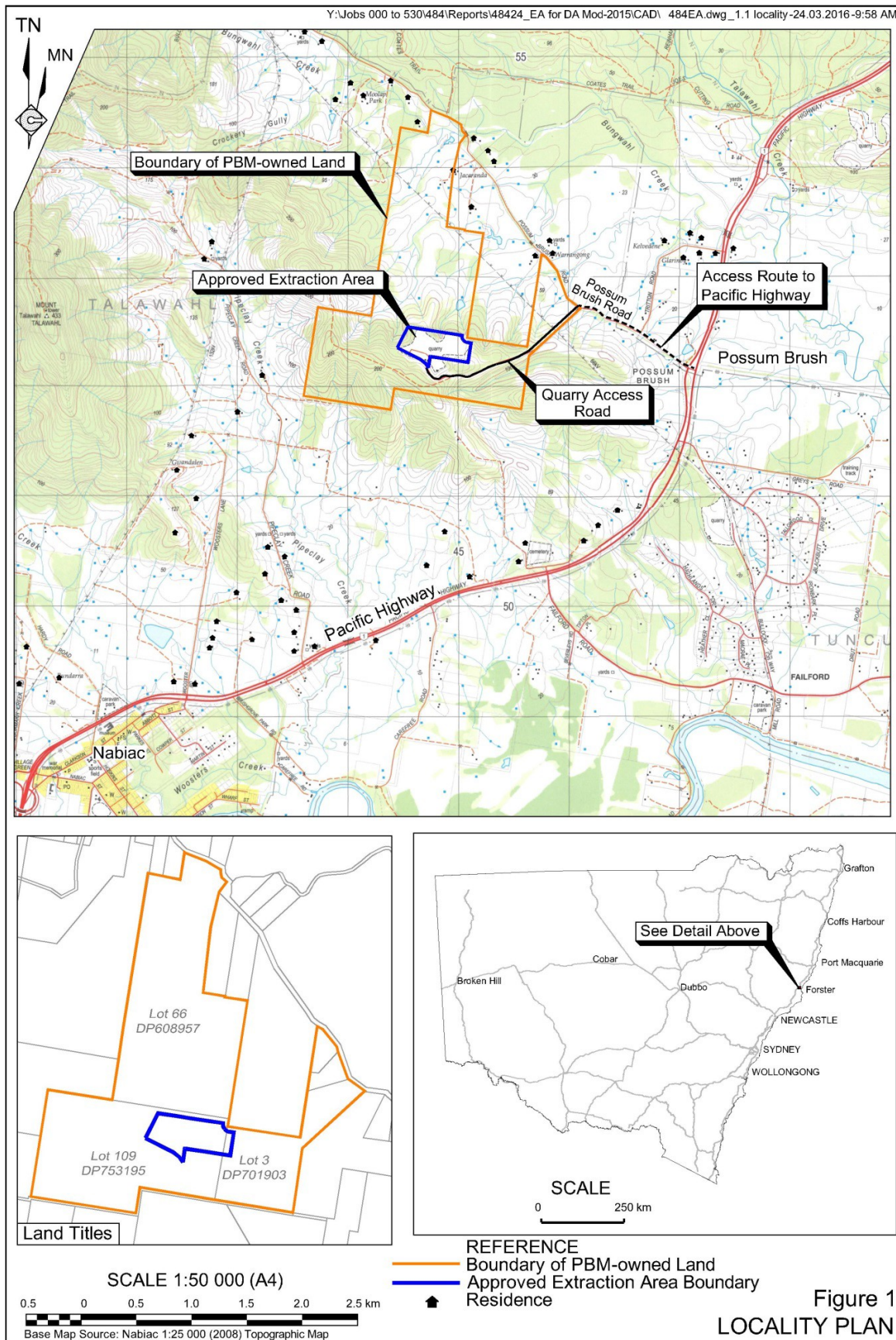
1. INTRODUCTION

This *Blast Management Plan* (the Plan) has been prepared by Pacific Blue Metal Pty Ltd (PBM) in conjunction with R.W. Corkery & Co. Pty Limited for the Possum Brush Quarry (the Quarry). The Quarry is located approximately 2km west of the Pacific Highway at Possum Brush, 4km northwest of Failford and 5km northeast of Nabitac (**Figure 1**).

This Plan has been prepared in satisfaction of *DA Conditions 3(8) and 5(2)* of Development Consent (DA) 283/97¹. This Plan is one of six (6) supporting documents for the Environment Management Strategy. These six (6) supporting documents being:

- Air Quality Management Plan
- Blast Management Plan
- Landscape and Rehabilitation Plan
- Noise Management Plan
- Transport Management Plan
- Water Management Plan

¹ All conditions in Development Consent DA 283/97 are referred to as *DA Condition ...*



2. LEGAL AND OTHER REQUIREMENTS

2.1 DEVELOPMENT CONSENT

DA 283/97 was formally modified as Mod 4 by the Executive Director, Resource Assessments and Compliance as a delegate of the Minister of Planning on 1 April 2016 pursuant to Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Relevant blast-related conditions in DA 283/97 are reproduced in **Table 1** together with a reference to the sections of the Plan where each condition is addressed.

Table 1
Development Consent Requirements Relating to Blasting

Schedule (Cond. No.)	Condition Requirement	Plan Section											
3(4)	<p>Blasting Impact Assessment Criteria</p> <p>The Applicant shall ensure that blasting on site does not cause any exceedance of the criteria in Table 3.</p> <p>Table 3: Blasting criteria</p> <table><tr><th>Location</th><th>Airblast overpressure (dB(Lin Peak))</th><th>Ground vibration (mm/s)</th><th>Allowable exceedance</th></tr><tr><td rowspan="2">Any residence on privately owned land</td><td>120</td><td>10</td><td>0%</td></tr><tr><td>115</td><td>5</td><td>5% of the total number of blasts over a period of 12 months</td></tr></table> <p>However, these criteria do not apply if the Applicant has a written agreement with the relevant owner to exceed the limits in Table 3, and the Applicant has advised the Department in writing of the terms of this agreement.</p>	Location	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance	Any residence on privately owned land	120	10	0%	115	5	5% of the total number of blasts over a period of 12 months	6.1.1
Location	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance										
Any residence on privately owned land	120	10	0%										
	115	5	5% of the total number of blasts over a period of 12 months										
3(5)	<p>Blasting Frequency</p> <p>The Applicant may carry out a maximum of 2 blasts per calendar month, unless an additional blast is required following a blast misfire. This condition does not apply to blasts required to ensure the safety of the quarry or workers on site.</p> <p>Note: For the purposes of this condition a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the quarry.</p>	6.1.3											
3(6)	<p>Operating Conditions</p> <p>During blasting operations, the Applicant shall:</p> <p>a) implement best management practice to:</p> <ul style="list-style-type: none">– protect the safety of people and livestock in the areas surrounding blasting operations;– protect public or private infrastructure/property in the surrounding area from damage from blasting operations; and– minimise the dust and fume emissions of blasting; <p>b) operate a suitable system to enable the local community to get up-to-date information on the proposed blasting schedule on site; and</p> <p>c) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent,</p> <p>to the satisfaction of the Secretary.</p>	<p>5</p> <p>5.3.1</p> <p>6</p>											

Table 1 (Cont'd)
Development Consent Requirements Relating to Blasting

Schedule (Cond. No.)	Condition Requirement	Plan Section
3(7)	<p>Upon written request of the owner of any existing dwelling house located within 1.25 kilometres of the development, the Applicant shall arrange at its own costs, for the inspection by a technically qualified person agreed to by both parties, to record the material condition of any existing dwelling house. The Applicant shall supply a copy of any inspection report, certified by the person who undertook the inspection, to the relevant property owner within fourteen days of receipt of the report.</p> <p>Should the inspection report find that structural damage to the dwelling house has occurred as a result of blasting at the quarry, the owner of that dwelling house may request the Applicant to carry out works to remedy or mitigate that damage. Such works shall be carried out at the Applicant's expense and shall be agreed to by the owner of the dwelling house.</p> <p>the requirements of this condition, the Applicant shall refer the matter for the consideration and decision of the Secretary.</p>	5.3.4
3(8)	<p>Blast Management Plan</p> <p>The Applicant shall prepare a Blast Management Plan for the development to the satisfaction of the Secretary. In addition to the standard requirements for management plans (see Condition 2 of Schedule 5) this plan must:</p>	This document
	a) be submitted to the Secretary for approval within three months of the date of approval of Modification 4, unless otherwise agreed by the Secretary;	n/a
	b) describe the measures that would be implemented to ensure compliance with the blast criteria and operating conditions of this consent;	5
	c) include a monitoring program for evaluating and reporting on compliance with the blasting criteria in this consent;	6
	d) include community notification procedures for the blasting schedule; and	5.3.1
	e) include a protocol for investigating and responding to complaints. The Applicant shall implement the management plan as approved from time to time by the Secretary.	9
5(2)	The Applicant shall ensure that the Management Plans required under this approval are prepared in accordance with any relevant guidelines, and include:	
	a) detailed baseline data;	4
	b) a description of:	
	– the relevant statutory requirements (including any relevant approval, licence or lease conditions);	2
	– any relevant limits or performance measures/criteria; and	2
	– the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;	3
	c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	2, 5
	d) a program to monitor and report on the:	
	– impacts and environmental performance of the project; and	6
	– effectiveness of any management measures (see (c) above);	

Table 1 (Cont'd)
Development Consent Requirements Relating to Blasting

Schedule (Cond. No.)	Condition Requirement	Plan Section
5(2) (Cont'd)	e) a contingency plan to manage any unpredicted impacts and their consequences;	10
	f) a program to investigate and implement ways to improve the environmental performance of the project over time;	7
	g) a protocol for managing and reporting any: <ul style="list-style-type: none"> – incidents; – complaints; – non-compliances with statutory requirements; and – exceedances of the impact assessment criteria and/or – performance criteria; and 	6, 10
	h) a protocol for periodic review of the plan. Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.	12
5(7)	The Applicant shall notify, at the earliest opportunity, the Secretary and any other relevant agencies of any incident that has caused, or threatens to cause, material harm to the environment. For any other incident associated with the project, the Applicant shall notify the Secretary and any other relevant agencies as soon as practicable after the Applicant becomes aware of the incident. Within 7 days of the date of the incident, the Applicant shall provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.	10
5(8)	The Applicant shall provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval.	11
2(11)	Blasting 9am and 3pm Monday to Friday. No blasting is allowed on Saturdays, Sundays or public holidays, or at any other time without the written approval of the Secretary.	6.1.1

2.2 ENVIRONMENT PROTECTION LICENCE

It is noted that the blast limits in *DA Condition 3(4)* within DA 283/97 are consistent with those set out in *Conditions L5.1 to L5.4.* of EPL 3393. Blasting criteria are discussed in Section 6.

3. OBJECTIVES AND OUTCOMES

The primary objectives of blast management at the Quarry are to ensure that blasting activities are undertaken in a manner that minimises annoyance, amenity and any adverse impacts resulting from the impact of airblast overpressure and ground-borne vibration at surrounding rural residences or buildings. **Table 2** details the objectives and outcomes with respect to blast management of the Quarry Site.

Table 2
Objectives and Key Performance Outcomes

Objectives	Key Performance Outcomes
a) To ensure compliance with the criteria of DA 283/97, EPL 3393 and reasonable community expectations.	i) Compliance with all relevant criteria and reasonable community expectations, as determined in consultation with the relevant government agencies.
b) To implement blast management and mitigation measures during all stages of Quarry operation.	ii) All identified blast management and mitigation measures implemented.
c) To implement a blast monitoring program to establish compliance or otherwise with relevant criteria during all stages of Quarry operation.	iii) All identified monitoring undertaken in accordance with the Plan.
d) To implement a complaints handling and response protocol.	iv) Complaints (if any) are handled and responded to in a timely manner. v) All complaints are recorded and reported in accordance with annual reporting requirements.
e) To implement corrective and preventative actions, if required.	vi) Corrective and preventative actions implemented, if required.
f) To implement an incident reporting program, if required.	vii) Incidents (if any) reported and recorded.

4. BASELINE DATA

4.1 WIND ENVIRONMENT

The climatic conditions in the vicinity of the Quarry are presented in *Section 5.4.2.4* of the *Environmental Assessment*. Wind may affect the transmission of noise and dust from a blast to surrounding receivers.

On an annual basis, prevailing winds within the Quarry Site are from the northwest and west with significant winds also experienced from the north east and east-north east, especially during summer. Calm conditions (<0.5m/s) are experienced approximately 6% of the time and the average wind speed is 2m/s. (**Figure 2** Air Quality Management Plan).

4.2 HISTORICAL BLAST DATA

Noise and vibration levels from blasting are assessable against criteria proposed by the Australian and New Zealand Environment and Conservation Council (ANZECC) in their publication “*Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration – September 1990*”. These criteria are summarised as follows:

- The recommended maximum overpressure level for blasting is 115 dB(Linear) or dB(L).
- The level of 115 dB(L) may be exceeded for up to 5% of the total number of blasts over a 12-month period, but should not exceed 120 dB(L) at any time.
- The recommended maximum vibration velocity for blasting is 5 mm/s Peak Vector Sum (PVS).
- The PVS level of 5 mm/s may be exceeded for up to 5% of the total number of blasts over a 12-month period, but should not exceed 10 mm/s at any time.
- Blasting should generally only be permitted during the hours of 9 am to 3 pm Monday to Friday, and should not take place on Sundays or Public Holidays.
- Blasting should generally take place no more than once per day.

The nearest residences to the extraction area where blasting is conducted are approximately 700m to the south and 1 000m to the north (**Figure 2**).

Blasting at the quarry has been monitored since 1998. The majority of the early blast monitoring was undertaken at a location within the quarry boundary. This is closer to the blasts than any residence.

An analysis of the results of monitoring of 123 blasts between 1998 and 2012 showed the ground vibration exceedance was not exceeded at any time (worst case being 2.63mm/s). The airblast 95 percentile overpressure criterion was marginally exceeded on only one occasion in 1998-1999, at a level of 116.1dB(L). The 115dB(L) limit may be exceeded for 5% of the blasts in any 12 month period. As described, this was measured at the quarry boundary and not at a residence. The 120dB(L) was not exceeded at any time.

Between July 2013 and June 2019, 31 blasts were monitored at both 5 St. Peters Close and 175 Possum Brush Road. Neither the airblast overpressure or ground vibration criteria were exceeded for any of these blasts.

4.3 SURROUNDING RESIDENCES

Figure 2 displays the locations of residences surrounding the Quarry Site. It is noted that a total of seven (7) non-Quarry-related residences are located within 1.25km of the closest point of the approved extraction area. This distance is relevant to *Condition 3(7)* – see **Table 1**.

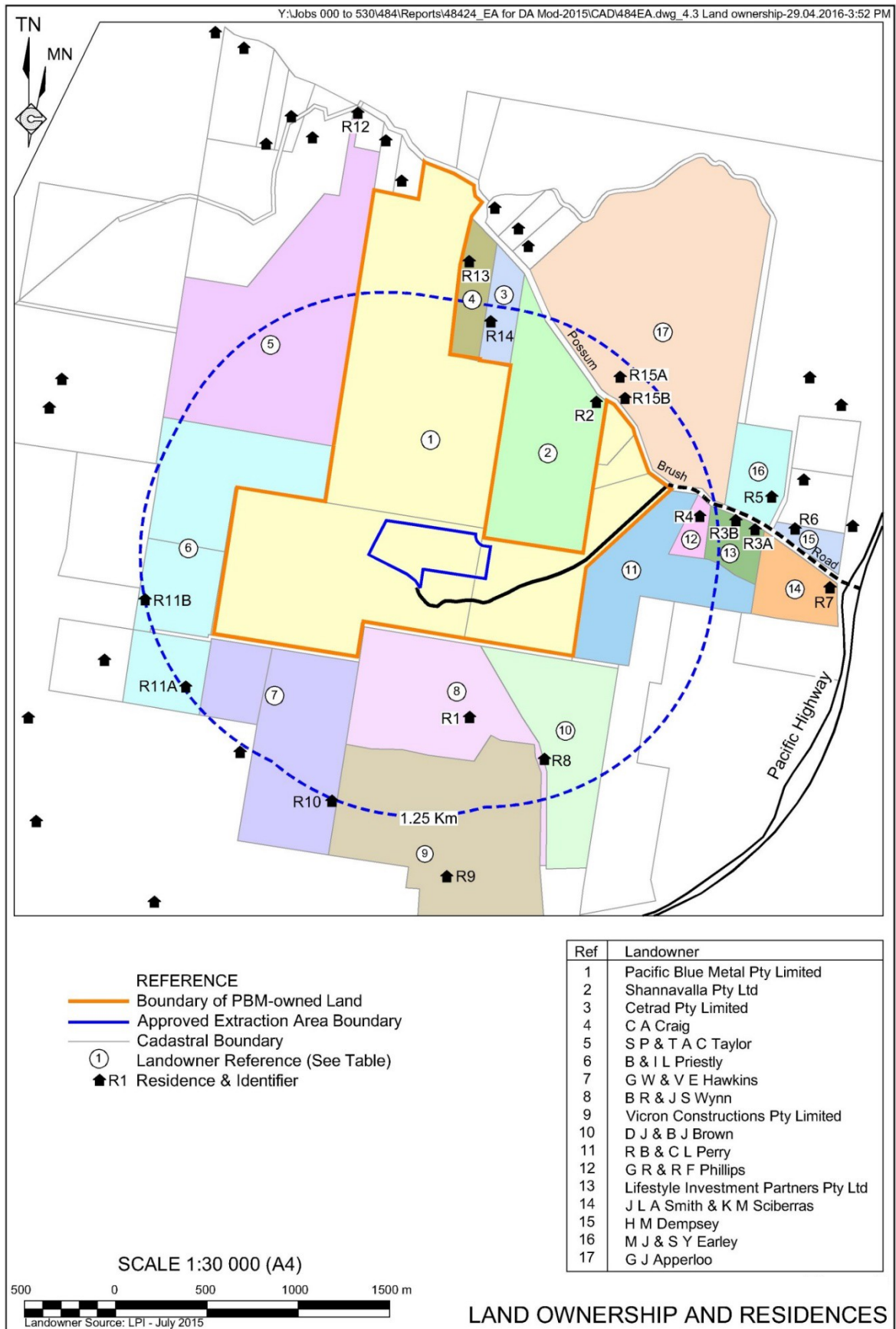


Figure 2 Land Ownership and Residences

5. BLAST MANAGEMENT SYSTEM

5.1 INTRODUCTION

The Blast Management System is designed to ensure that blast emissions generated by the Quarry do not cause exceedances of the blast criteria of DA *Condition 3(1)* and EPL *Condition L4.1* at any residence on privately-owned land. **Figure 2** displays the location of residences surrounding the Quarry.

5.2 POTENTIAL BLAST IMPACTS

Potential blasting impacts include the following.

- Air blast overpressure affecting nearby residents or livestock.
- Excessive ground vibration resulting in structural damage to nearby residences or infrastructure or that affects livestock.
- Dust impact on nearby residents and livestock.
- Fume impact on nearby residents and livestock.
- Fly rock received at nearby residences, public roads or affecting livestock.

PBM's experience over the past 25 years and its knowledge of potential risks provides a high degree of comfort that the above impacts and risks would not eventuate.

5.3 BLAST MANAGEMENT

5.3.1 Blasting Schedule Notification

All site personnel will be informed of blast activity on site, at daily Toolbox Safety Meetings. Blast notifications include blast time, location and contact information and will be the responsibility of the Quarry Manager/ Site Supervisor and/or QSE Manager.

PBM operates a direct blast notification scheme for local residents. Regular letter box drops to surrounding residents are conducted to invite residents to opt in or out of the blast notification scheme. Residents who have elected to join are directly notified of upcoming blasts by their preferred method of notification, i.e. email, phone, letter.

Unless required for safety management reasons, blast notifications will be issued at least 24 hours prior to any blast.

5.3.2 Meteorological Forecasting

Regional weather forecasts are available from the Bureau of Meteorology (BoM). These data will be reviewed by the Quarry Manager and/or blasting contractor who will check weather conditions for coming blast events and plan accordingly for adverse weather.

Adverse weather in terms of blasting impacts relates to either:

- strong winds in the direction of the closest sensitive receivers, i.e. from the northwest to southwest quadrants; or
- conditions likely to be indicative of temperature inversion, i.e. fog or frost conditions.

Seasonal conditions will be reviewed annually with a view to modifying long-term forecasting and planning of blasts on the Quarry Site.

5.3.3 Proactive Mitigation Measures

PBM will implement the following additional blast impact mitigation measures to ensure the safety of people, equipment, vehicles and livestock in the surrounding areas.

- Long-term (annual) scheduling of activities to limit blasting activities during the daily periods when adverse conditions are most likely to occur for example in fog/frost in the morning or when significant North-Westers are common.
- Short-term modification of blasting activities in response to forecasting of adverse conditions in the short-term.
- Blast contractors, in conjunction with the Quarry Manager, will review existing and previous blast monitoring records to enable continuous improvement and quality control, resulting in continual development of optimum blast parameters.
- Quality control practices are to be implemented on the ground to ensure blasts are kept within design tolerances.
- Adequate burden is to be maintained on all faces to prevent blowouts and blast anomalies.
- Blast energies are to be minimised as far as possible.
- Adequate exclusion / clearance zones are to be maintained to ensure people, equipment, vehicles or livestock on nearby land will not be affected by blasting.
- Best practice methodology is used to ensure fly-rock and fumes are kept as low as reasonably practicable levels.
- Blasts are only fired in favourable weather conditions. In the event that unfavourable meteorological conditions are identified, the shot-firer will liaise with the Quarry Manager to determine whether to postpone a blast.
- Each blast will be monitored to confirm compliance with air blast overpressure and ground vibration criteria.
- Training will be provided to all relevant personnel on environmental obligations in relation to blasting controls.

PBM will implement the following quality control measures to minimise the dust emissions during blasting.

- Monitoring of blast performance with improvements to be made in response to elevated ground vibration or air blast overpressure.

- Restricting blast firing to times of favourable weather conditions.

PBM blasting contractors will implement the following measures to minimise dust and or fume emissions generated from blasting.

- Use of high quality stemming products (dust).
- Minimising blast energies (dust).
- Monitoring and calibration of the explosive manufacturing unit to ensure explosive mixing is in the correct proportions. This will ensure that noxious fuming is kept to a minimum (fumes).
- Use of emulsion based explosive products, when necessary, thereby minimising the effects of wet holes on ammonium nitrate and thus reducing the potential for fuming (fumes).

5.3.4 Request for an Inspection

Condition 3(7) provides for the owner of any residence within 1.25km of the approved extraction area (see Section 5.2) to request PBM to arrange an independent inspection of their residence to record the structural condition of their residence. In the event, the independent inspection determines that any structural damage is present, and that damage has occurred as a result of blasting at the Quarry, PBM would arrange (at its expense) for works / repairs to be carried out to remedy or mitigate that damage.

6. MONITORING

6.1 BLASTING CRITERIA AND LIMITS

6.1.1 Blasting Criteria

The criteria for all on-site blasting activities are presented in **Table 3**.

Table 3
Blasting Criteria

Location	Air Blast Overpressure (dB(Lin Peak))	Ground Vibration (mm/s)	Allowable Exceedance
Any residence on privately owned land	120	10	0%
	115	5	5% of the total number of blasts over a period of 12 months
Source: DA Condition 3(4) – Table 3			

In accordance with *Condition 4* of Schedule 3 of DA 283/97, the criteria of **Table 3** also do not apply if PBM has a written agreement with the owner of a residence to exceed the criteria in **Table 3**. Currently, no such agreements are held by PBM. If, however, any agreement is reached, the Department will be informed in writing of the terms of any such agreement.

6.1.2 Blasting Hours of Operation

Operational hours for blasting will be limited to 9:00am to 3:00pm Monday to Friday (excluding public holidays). Blasting outside these hours may be undertaken with the written approval of the Secretary.

6.1.3 Blasting Frequency

Blasting frequency will be limited to a maximum of two blast per calendar month, unless an additional blast is required following a misfire.

The nominated frequency limits do not apply to blasts required to ensure the safety of the Quarry or Quarry personnel and visitors.

6.2 METEOROLOGICAL MONITORING

Condition 13 of Schedule 3 of DA 283/97 requires that a suitable meteorological station be operating in the vicinity of the Quarry Site in accordance with the requirements described in the *Approved Methods for Sampling of Air Pollutants in New South Wales*. A meteorological station has been established outside the PBM Main office and has been operational since 19 January 2017. *Condition M4.2* of EPL 3393 requires monitoring of the parameters, units of measure, averaging period and frequency specified in **Table 4**.

Table 4
Meteorological Monitoring

Parameter	Units of Measure	Frequency	Averaging Period
Rainfall	mm	Continuous	1 hour
Sigma theta		Continuous	15 minute
Air Temperature @ 2m and 10m	°C	Continuous	15 minute
Wind Direction @ 10m	degrees	Continuous	15 minute
Wind Speed @ 10m	m/s	Continuous	15 minute

Meteorological monitoring will enable a quantitative record of weather conditions during the period before and after a blast together with a qualitative description of weather conditions, including cloud cover, fog, etc. This data will be used to record relevant environmental conditions during blasting events and derive any relevant relationship between air blast overpressure and ground vibration monitoring records.

6.3 BLAST MONITORING

Monitoring will be used to capture and record all blast events. Permanent blast monitoring locations have been established at each of the blast monitoring residences (**Figure 3**). The following information will be recorded as part of the monitoring procedure.

- Blast noise overpressure (dBL_{peak}) and peak particle velocity (ppv) (mm/s) in a radial, vertical and transverse direction.
- The time and duration of monitoring for each location.
- Licence limits.
- Wind speed and direction, cloud cover and fog etc.
- The type of monitoring being undertaken.
- The monitoring location.
- Monitoring equipment type.
- Photographic evidence of the blast monitor in place

Blast monitoring will be undertaken by the blasting contractor. All monitoring instrumentation, calibration and procedures, will be undertaken in accordance with AS 2187.2-2006 *Explosive – Storage and use Part 2: Use of Explosives*. Microphones used for airblast overpressure monitoring have a lower cut-off frequency of 2Hz or less.

The results of all blasts will be documented by the blasting contractor and records maintained by the Quarry Manager.

6.4 BLAST MONITORING LOCATIONS

Blast monitoring will continue to be undertaken at the two locations displayed on **Figure 3**.

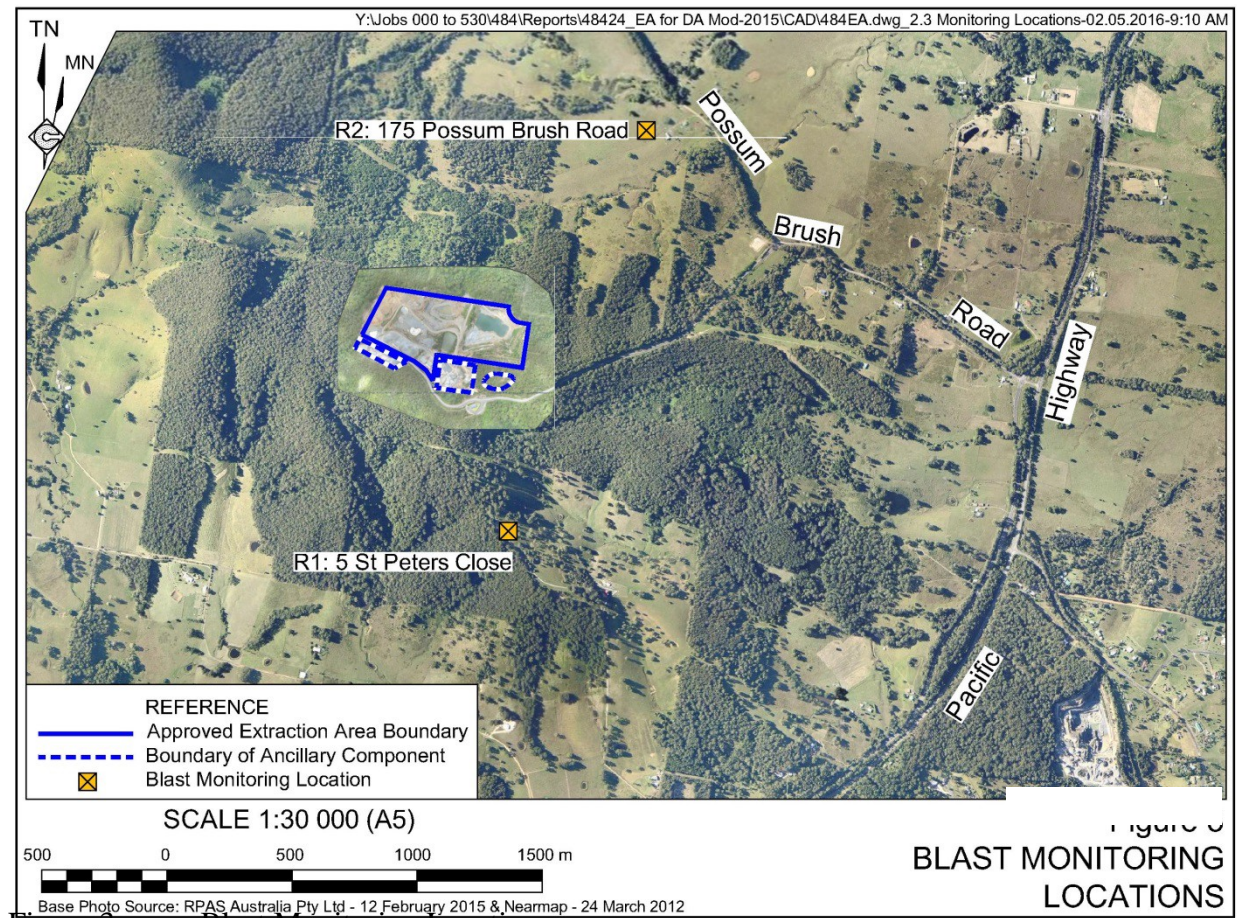


Figure 3 Blast Monitoring Locations

7. EVALUATION OF COMPLIANCE

PBM will evaluate compliance in accordance with the procedures detailed in Section 7 of the Environmental Management Strategy. All blast monitoring results will be compared to blasting criteria as stipulated in *DA Condition 2(4)* to determine compliance

8. CORRECTIVE AND PREVENTATIVE ACTION

Section 8 of the EMS details the corrective and preventative actions to be taken in the event an exceedance of any relevant criteria or breach of condition(s) is identified.

9. COMPLAINTS HANDLING

Section 9 of the Environmental Management Strategy outlines PBM's complaints management procedure, including dispute resolution.

10. INCIDENT MANAGEMENT, NOTIFICATION AND REPORTING

As per Environmental Management Strategy Section 10.

11. PUBLICATION OF MONITORING INFORMATION

As per Environmental Management Strategy Section 11.

12. PLAN REVIEW

As per Environmental Management Strategy Section 12.