

Dunmore Quarry

Blast Management Plan



Document Control

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1	Rod Wallace (E & C Advisor Quarries NSW)	21/01/2008	Greg Price (GM Quarries & Recycling NSW)	Initial Document	-
2.	N. Constantine (OHS Advisor)	07/02/2013	Todd Kalajzich (Quarry Manager)	<ul style="list-style-type: none"> - Internal Edits - Meet Australian Standards - Integrate with Boral Standard Operating Procedure 	-
3.	R. Lawton (Env. Coordinator)	26/08/2016	B. Bolton (Quarry Production Manager)	<ul style="list-style-type: none"> - >3 years since last review - Contacts updates - Internal edits 	September 2017
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1. Introduction

This Blast Management Plan (BMP) covers aspects of blast management for the Boral Dunmore Quarry (DQ). The BMP was originally developed in January 2008 and the Department of Planning and Environment (DP&E) Secretary (formerly Director General) approved the plan in March 2008. The BMP has been prepared to address matters relevant to the management of blasts for the operation to avoid or minimise potential effects of the McParland property, which is now owned by Boral.

1.1. Scope

The scope of the BMP applies to all existing and future activities undertaken by Boral within the DQ site and adjacent land owned or under control of Boral.

1.2. Requirements for Blast Management

It is recognised that blast operations of Dunmore Quarry have the potential to impact beyond the boundaries of the site. The quarry operates under a Ministerial consent granted in November 2004, issued for the Development Application DA 470-11-2003. Table 1 includes the relevant conditions considered in the development of this plan.

Table 1 - Conditions of Approval

Condition of Approval	Condition Requirement
4 (16)	The Applicant shall ensure that the airblast overpressure level from blasting at the development does not exceed the criteria in Table 4 of the consent at any residence or sensitive receiver on privately-owned land.
4 (17)	The Applicant shall ensure that the peak particle velocity from blasting at the development does not exceed the criteria in Table 5 of the consent at any residence or sensitive receiver on privately – owned land.
4 (18)	Blasting operations at the site may only take place: a) between 9am and 5pm Monday to Saturday inclusive; b) are limited to 2 blasts each day; and c) at such other times as may be approved by EPA.
4 (19)	During the life of the development, the Applicant shall: (a) operate a blasting hotline, or alternative system agreed to by the Secretary, to enable the public to get up-to-date information on blasting operations at the development; and (b) notify landowners and other interested persons about this hotline or system by placing annual notices in a local newspaper.
4 (20)*	Before carrying out any development within 250 metres of Lot 10 DP977931 (see Figure 4.4 of the EIS), the Applicant shall prepare, and subsequently implement, a Blast Management Plan for the development in consultation with the landowner(s), and to the satisfaction of the Secretary . This plan must describe the measures that would be implemented to: (a) avoid and/or minimize any blasting impacts of the development on either the property, or use of the property; (b) monitor the blasting impacts of the development on the property; (c) mitigate, remediate or compensate for any blasting impacts of the development on either the property, or the use of the property.
4 (21)	The Applicant shall monitor the airblast overpressure and peak particle velocity impacts of the development at the permanent monitoring station at Croome Farm, or any alternative location approved by the EPA, to the satisfaction of the EPA and Secretary, using the specified units of measure, frequency, sampling method, and location in Table 6.

* Note that as the McParland Property has now been acquired, this condition will no longer be relevant and a Modification has requested that this condition be removed.

This plan has been developed to outline how DQ will satisfy the requirements of the above conditions.

2. Site Locality

2.1. Land Ownership

Figure 1 illustrates the site locality and land ownership of Boral and neighbouring properties. Lot 10, DP 977931 (McParland property) was previously owned by Tom and Dot McParland and is now part of Boral's land immediately to the south of the Croome Farm extraction area in the western section of Dunmore Quarry. The lot referred in condition 4(20) (lot 10 DP 977931) is now known as Lot 10 DP 1125853. Boral formally acquired the McParland property on 8 July 2016. The main residence on the property is approximately 500 metres to the south west of the Croome Farm extraction area and is the closest residence impacted by blasting.

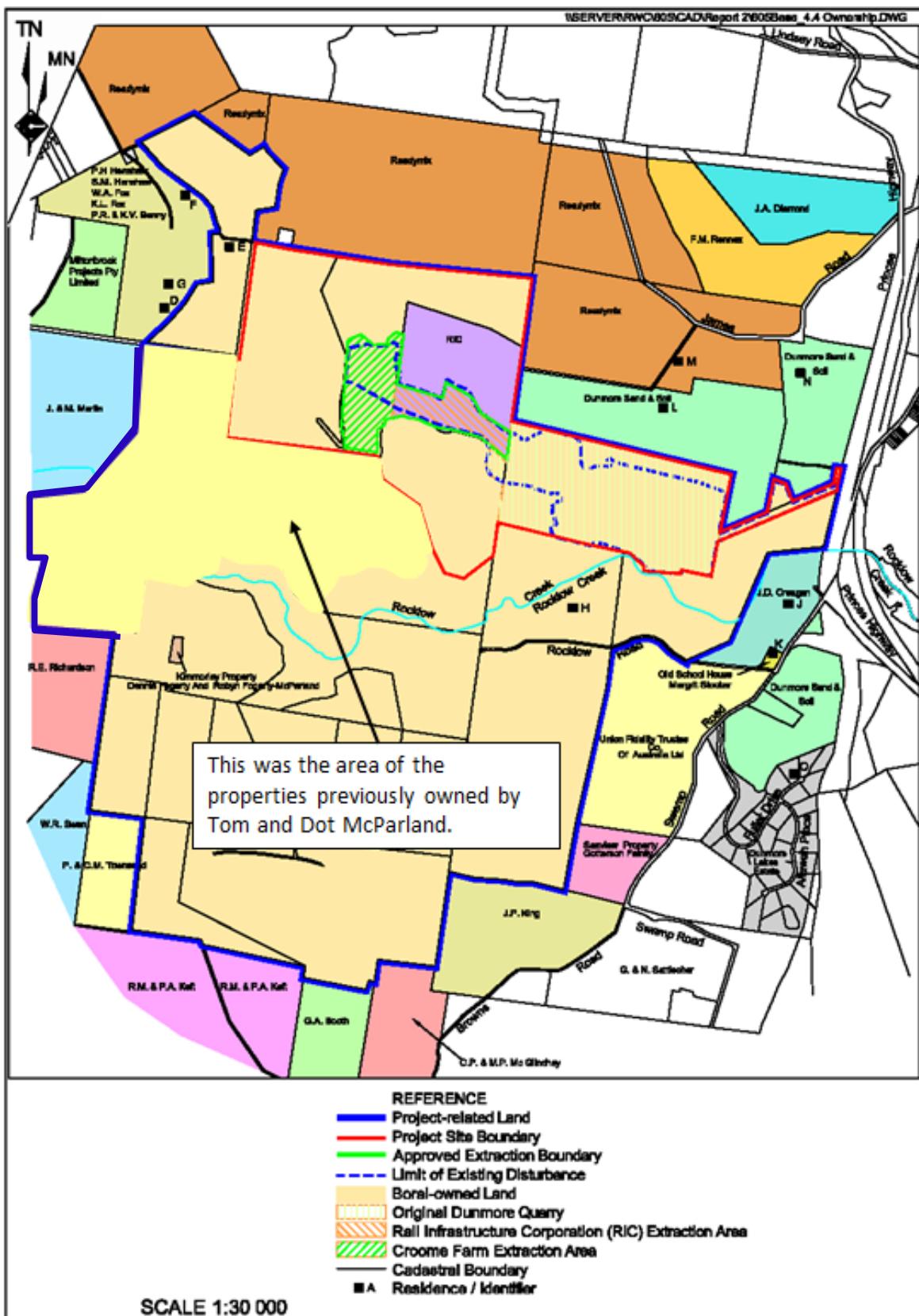


Figure 1: Land Ownership

3. McParland Property

3.1. Consultation

Boral Quarries has an ongoing relationship with the occupants of the McParland property as long term neighbours, through access for noise and blast monitoring, and involvement in the Dunmore Quarry Community Consultative Committee. Preliminary discussions were held with the occupants of the property, Dennis Fogarty and Robin Fogarty-McParland (son in law and daughter of Tom and Dot McParland) on 12 October 2006 to understand the potentially affected items of value on the property and broadly discuss the nature and form of this plan. The initial BMP has been reviewed by Dennis and Robyn, with their comments being discussed at another meeting with Rod Wallace of Boral on 14 January 2008. These comments have been incorporated into the BMP.

3.2. Items of Significance

Through consultation with the previous owner of the McParland property, a number of features were identified as having significance to be incorporated into this plan. These items were:

- Primary Residence – the original house was constructed in 1923, with additions and alterations made by Dennis and Robyn in recent years. Immediately to the south is a small detached cottage (circa 1890's) which is connected to the primary residence via a covered walkway;
- Flour Mill – a Georgian style stone building constructed circa 1830's with Latite field stones and mortar which was made using material from Aboriginal Middens;
- Butter Mill – the age, style and construction the same as the Flour Mill; and
- Hay shed – a timber framed structure with a tin roof built circa 1830's. The timber used was locally sourced and unmilled. An awning was later added to the structure around all sides.

Within the next 6 months an investigation considering whether items, on Lot 12 DP 977931, with heritage values require further management and monitoring to avoid impacts will be completed.

4. Blasting Details

4.1. Blasting Arrangements

Blasting at Dunmore Quarry is undertaken by Boral's Drill and Blast Team, who manage the blasting for all of the hard rock quarries within Boral Quarries NSW. They are assisted by Orica Quarry Services who supply explosives and provide advice on blasting techniques. The standard blasting parameters

for the site have been determined based on geotechnical investigation and site blasting risk assessment in accordance with the Drilling and Blasting Standard Operating Procedure (SOP) and Drilling and Blasting Standard HSEQ-6-09. The Dunmore Quarry standard blasting parameters are available in Appendix A. Boral's strategy to avoid and minimise blasting impacts on the McParland property focuses on the two aspects of the property that are affected, the McParland's use of the property, and the property itself i.e. buildings, structures. Appendix B outlines the blasting protocol for the site.

4.2. Blast Timing and Frequency

In accordance with the development consent and environmental protection licence, blasting occurs between 9:00 am and 5:00 pm Monday to Saturday, and no more than 2 times per day. On average, blasts occur 36 times per annum, increasing to 72 times per annum at full production.

4.3. Notification Protocol

Through ongoing consultation a notification protocol was developed. The protocol has been amended a number of times to meet the needs of both parties and will continue to be reviewed as needs arise. The notification protocol is as follows:

1. When Orica Quarry Services is booked to supply explosives for a particular blast (typically 1 week prior), the Drill and Blast Supervisor sends an email to the owner of the McParland property letting them know the date and approximate time of the blast.
2. On the morning of the blast, a member of the Drill and Blast Team makes a phone call to Robyn and Dennis Fogarty, the Dunster residence, and sends a text message to Cole Harris, to inform them of the blast, and a more definite time. If the phone is not answered, a message is left on the answering machine.
3. Before the blast occurs, and whilst the blast monitors are being setup, a flashing light on the shared boundary is started, to alert anyone who may be in the adjoining paddocks that a blast is about to occur. This is approximately 30 minutes before the blast occurs.
4. Approximately 60 seconds before the blast an audible alarm is activated as a final warning of the pending blast

4.4. Continuous Improvement Blast Design

As extraction has moved within 250 metres of the boundary of the McParland property, Boral's strategy, to avoid and/or minimise blasting impacts on items of significance on the property, will

continue to focus on continuous improvement of blast design. Blasts will be specifically designed and laid out to minimise the effects of ground vibration and airblast at the McParland property and continue to keep levels below the impact assessment criteria.

The Noise and Blasting Specialist Consultants Study prepared by Richard Heggie Associates for the EIS made predictions on the impacts of blasts as extraction moved closer to the McParland property. These predictive site laws were based on statistical analysis of previous blast results, the monitors distance from the blast and the Maximum Instantaneous Charge (MIC). The ground vibration and airblast levels and corresponding MIC determined using the predictive site laws are presented in **Table 2**.

Table 2 - McParland Residence Predicted Blasting Levels

Blast Location	MIC (kg)	Predicted Quarry Blasting Level	
		Airblast (dB Linear)	Ground Vibration (mm/s)
Croome Farm Extraction Area	100	115	4.2
Croome Farm - south western extremity	30	115	3.5

Blasts within 250 metres of the boundary of the McParland property will initially be designed based on these predetermined sites laws or further revised based on more recent blast results. The ground vibration and airblast results along with the blast distance and MIC from each blast will be used to further refine the predictive site laws to determine the most appropriate MIC of future blasts to reduce ground vibration and airblast impacts. The predictive site laws will be revised based on learning from monitoring results unless:

- an exceedance of the 95th percentile impact assessment criteria is recorded (i.e. ground vibration 5mm/s, airblast overpressure 115 dBL); or
- a complaint is lodged from the McParland property.

Under either of these circumstances, the predictive site laws will be revised before the next blast to minimise impacts and reduce the likelihood of a future exceedance.

5. Blasting and Vibration Criteria

5.1. Criteria

Blasting and vibration compliance criteria for the DQ operations are outlined in condition 4(16) and 4(17) of the development consent and conditions L6.3 and L6.4 of EPL77. DQ will ensure the blasting activities of the operation do not exceed these criteria, as reproduced in Table 3 and Table 4.

Table 3 – Airblast Overpressure 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%

Table 4 – Ground Vibration 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%

6. Monitoring and Reporting

6.1. Monitoring Program

DQ will undertake monitoring of blasts to ensure that the operational and design controls on blasting activities are effective. Criteria for compliance were identified in Section 5.1. **Table 5** tabulates all relevant information for the blast monitoring program.

Table 5 – Blast Monitoring Program

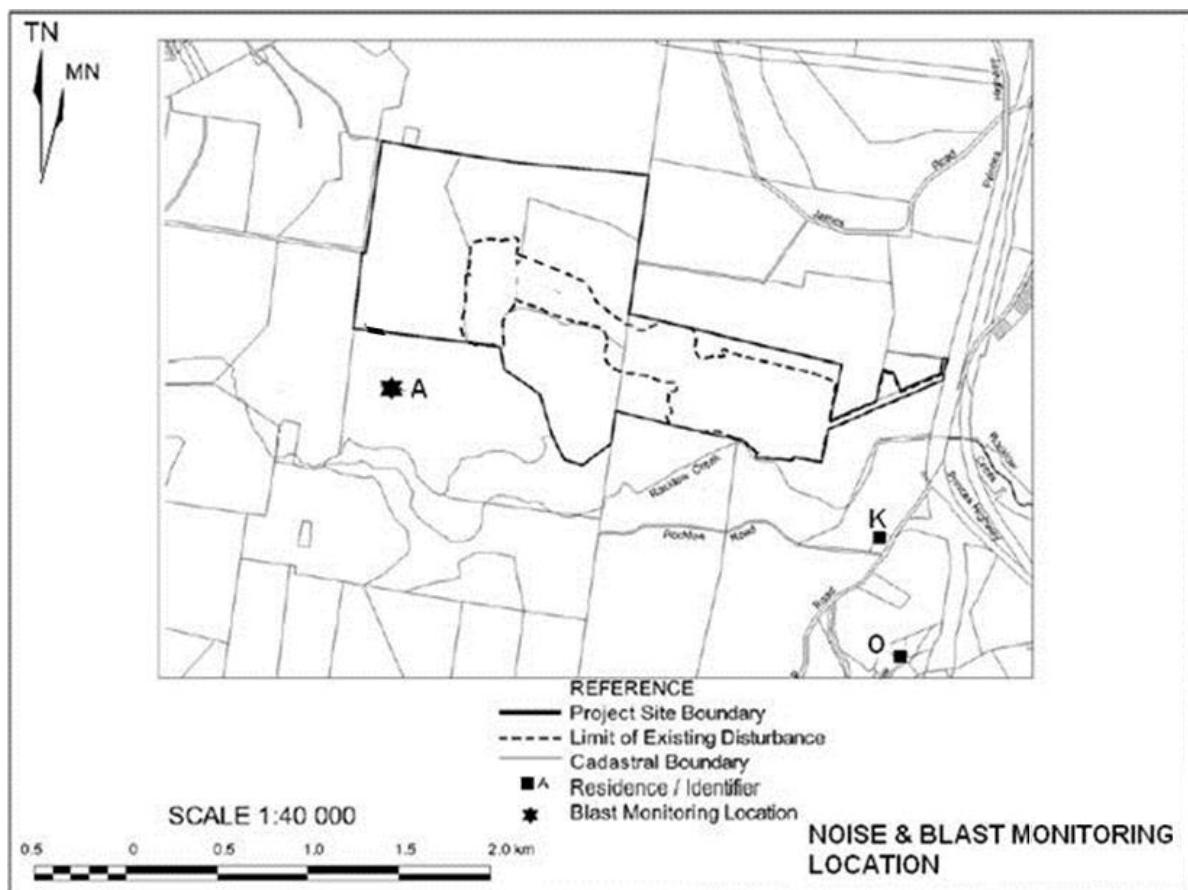
Parameter	Airblast overpressure level	Peak particle velocity	Allowable exceedance
Criteria	115 dB(Lin Peak)	5 (mm/s)	5% of the total number of blasts over a period of 12 months
	120 dB(Lin Peak)	10 (mm/s)	0%
Frequency	During every blast	During every blast	-
Sampling method	AS2187.2-1993	AS2187.2-1993	-

Source: DA 470-11-2003, Tables 4, 5 and 6. EPL 77 Conditions L6.3 and L6.4

6.2. Monitoring Location

Figure 1 provides the location of the blast monitor for the DQ operation.

Figure 1 - Noise & Blast Monitoring Location



6.3. Data Recording

The following information of each blast will be recorded and filed electronically.

- Time and date of each blast
- Ground vibration of each blast
- Airblast overpressure of each blast
- Evidence that during each 12 month period a calibration check had been carried out on each blast monitor to ensure accuracy of the reported data (Australian Standard 2187.2-2006)
- Waveform for the ground vibration and overpressure for each blast that exceeds a ground vibration of 5mm/sec (peak particle velocity) or an airblast overpressure of 115bB(L)
- Maximum instantaneous charge

6.4. Data Review

The monitoring program will be reviewed after one of the following triggers

- the 100 percentile impact assessment criteria are exceeded (i.e. ground vibration 10 mm/s or airblast 120 dBL); or
- a complaint is received from the owners of any privately owned property which adjoins Boral owned property regarding physical damage.

The details of any review will be reported in the Annual Review.

6.5. Data Reporting and Incident Reporting

The results of each blast will be reported in the Annual Review and Annual Return. If any monitoring event records an exceedance of blasting criteria, it will be immediately reported to the EPA and Secretary of the DP&E by either the Site/Operations Manager, or Environment Representative. Further, a detailed report of the exceedance will be completed and provided to the EPA and Secretary of the DP&E within 7 days in accordance with EPL Conditions R1.14 and R4, and condition 5(10) of the development consent.

7. Mitigation, Remediation & Compensation

7.1. Mitigation

The impacts of blasting on the “McParland” property (now owned by Boral) will be mitigated through the implementation of the blast notification protocol outlined in section 4.3 of this plan. This will provide the residents with the information necessary to adjust or manage their activities on the property according to the timing of any blasts.

7.2. Remediation and Compensation

This section of the plan is no longer relevant as the “McParland” property residence is now owned by Boral.

8. Complaints and Dispute Resolution

All complaints from the McParland residence in regard to blasting activities will be recorded in the complaints register taking note of the following:

- the date and time of the complaint;
- the method by which the complaint was made;
- any personal details of the complainant (if provided) or,
- if no such details were provided, a note to that effect;
- the nature of the complaint;
- the action taken by Boral in relation to the complaint, including any follow-up contact with the complainant; and
- if no action was taken by Boral, the reasons why no action was taken.

Each complaint will be followed up as soon as practically possible of the complaint being made, and if necessary, a site visit will be organised to better understand the issues involved. As previously mentioned, complaints from the McParland residents will trigger a review of the blast monitoring program, and a review of the blast design predictive site laws.

All complaints, including those regarding blasting will be reported in the Annual Review.

APPENDIX A

Standard Blasting Parameters

Standard Blasting Parameters		
	Lower Limit	Upper Limit
MIC Limits	N/A	To be calculated so that the ppv at McParland residence is 95% below 5mm/s
Standard Powder Factors	0.45	0.55
Standard Front Burdens	3.5m	4.2m
Site Guidance Information		
(For Guidance Only)		
Standard Spacing	4.0m	
Subdrill	1.0m	
Drill Angle	10 degrees or as design	
Stemming Length	2.7m	
Selection of Explosives	Emulsion	
Conditions where double priming is required	Front holes greater than 15m	
Minimum distance to plant in relation to blast prior to authorisation being required	300m	
Exclusion zones	<p>See Section 1.8 of this Plan for map detailing exclusion zones.</p> <p>As a minimum the following exclusion zone distances apply:</p> <ul style="list-style-type: none"> * Blast personnel minimum 400m from side or rear of blast * Minimum of 400m from front of blast and must have suitable protective structure to retreat to if necessary * All other non blasting personnel minimum 800m when firing 	
Hole Diameter	102mm (average)	
Pattern	Staggered	
Bench Height	10m – 20m (average)	

APPENDIX B

Blasting Protocol

1.1 Personnel Requirements

Purpose	To identify persons responsible and key appointment responsibilities
Responsibility	Mine Manager
Framework	Guiding Regulations, AS 2187, Boral SOP 34 Drilling & Blasting, HSEQ-6-09
General information	<p>Collect information on:</p> <p>Identification and position of the person responsible for the project including project safety and security.</p> <p>Identification and position of person who has given approval to use explosives on the project.</p> <p>Key appointments and responsibilities.</p> <p>Shotfirer's details</p>
Implementation	<p>Outline roles and responsibilities (in the tables throughout this document.)</p> <p>Identify persons who will be authorised to perform roles stipulated in this document</p> <p>Complete Authorised Persons Table in this document</p> <p>Obtain copies of certificates, licences and evidence of experience and file on site</p>
Procedures & SWMS	No SWMS required for collation of this documentation
Forms	Personnel Requirements Table (in this BMP)
Monitoring & Measurement	Licences shall be reviewed prior to commencement of work on each Blast and must be available at all times while work is being conducted, for review.
Reporting	Report any certificates/licences out of date or close to expiry date.

1.2 Personnel Requirements Table

Role	Selection Criteria
Mine Manager	<ul style="list-style-type: none"> • All Mine Managers shall have control and management of the work that necessitates the use of the explosive; • All Mine Managers shall have the control and management of the place where the explosive is used • All Mine Managers who oversee blasting activities shall hold a Shotfirer's Certificate of Competency issued by the statutory body (where they are required to do so). • To maintain competency, Mine Managers who are expected to oversee blasting activities need to conduct a minimum of one blast per year (at any site). At a minimum, this shall include carrying out the blast design and supervising the loading and firing of the shot. • An experienced Shotfirer shall oversee this process and sign off before the Mine Manager is permitted to oversee any further drill and blast operations. • In the event that the Mine Manager has not achieved or maintained Boral's minimum competencies to supervise a drill and blast operation, the Mine Manager shall appoint a Blast Supervisor in addition to the Shotfirer appointed to perform the shot, who has been deemed competent to supervise blasting at that site in conjunction with the Mine Manager.
Blast Supervisor (only where the Mine Manager does not perform the role themselves)	<ul style="list-style-type: none"> • The Blast Supervisor shall be authorised by the Regional Manager to perform the role • The Blast Supervisor shall be appointed by the Mine Manager in writing to perform the role for each blast • The Blast Supervisor shall hold a Shotfirer's Certificate of Competency issued by the statutory body (where they are required to do so). • The Blast Supervisor shall conduct a minimum of one blast per year (at any site). At a minimum, this shall include carrying out the blast design and supervising the loading and firing of the shot. • An experienced Shotfirer shall oversee this process and sign off before the Blast Supervisor is permitted to oversee any further drill and blast operations.
Driller	<ul style="list-style-type: none"> • A Driller shall hold the national competency (MNQOPS312A: Conduct Blast Hole Drilling Operations), at a minimum.
Shotfirer	<ul style="list-style-type: none"> • A Shotfirer shall hold the national competency, a state explosive licence and a relevant statutory permit (this will need to include the type of endorsement for the blast that they are going to conduct). • Once licensed by the statutory authority, they are not permitted to act in their own capacity until they have performed 12 blasts under the supervision of an experienced

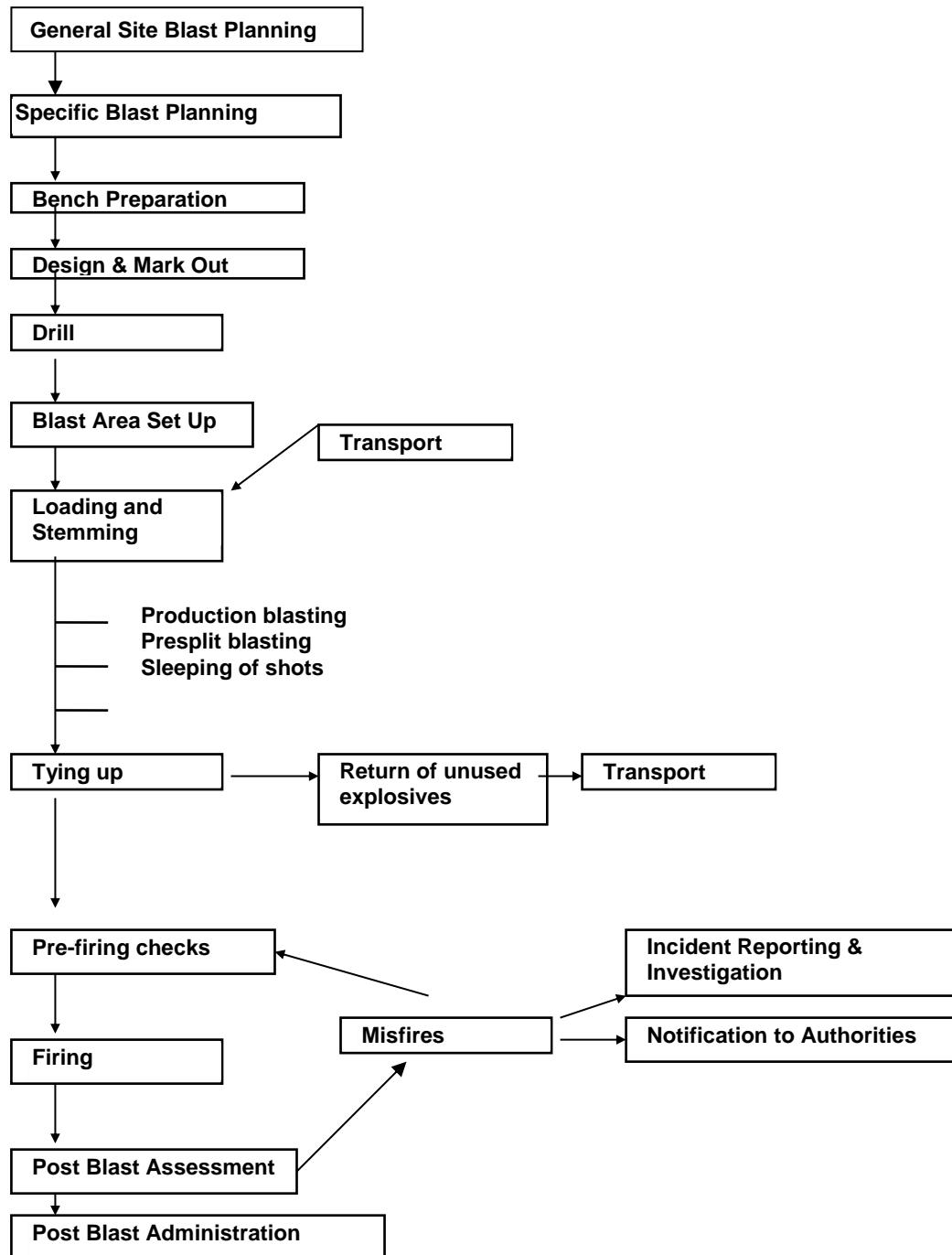
Role	Selection Criteria
	<p>Shotfirer.</p> <ul style="list-style-type: none"> • On obtaining the status of experienced Shotfirer, they shall perform their full duties at least once every year. • If they have not performed a blast for more than 12 months, another experienced Shotfirer will need to supervise and confirm that they are still competent.
Trainee Shotfirer	<ul style="list-style-type: none"> • Shall have attended the Blasting training course and be in the process of collecting their 12 blasts.
Blast Guards	<ul style="list-style-type: none"> • Blast Guards shall be appointed by the Blast Supervisor in writing on the day of the blast. • Blast Guards shall have adequate knowledge of the site to locate the designated guard location and communicate effectively with the Shotfirer and Blast Supervisor
Competent persons to handle explosives.	<ul style="list-style-type: none"> • Persons required to handle explosives shall possess the relevant licence/qualifications in accordance with the legislation
Magazine Keeper	<ul style="list-style-type: none"> • The Magazine keeper shall be at least 18 years of age • The Magazine Keeper shall be appointed by the Mine Manager in writing and approved by the Regional Manager • The Magazine Keeper must have adequate training to perform the duties specified in AS 2187.1-1998 Explosives Storage, Transport and Use- Storage, Clause 4.2.2 and <i>Explosive Storage Security Plan 34-F12</i>

1.3 Table of Authorities

The below Table lists all persons approved to undertake the following Roles at Dunmore Quarry. If the site is unable to use one of the persons listed, appropriate replacements for Mine Manager and Blast Supervisor require authorisation by the Regional Manager.

Role	Name	Position	Date Approved	Approved By
Mine Manager	Todd Kalajzich	Quarry Manager		
Blast Supervisor	Todd Kalajzich	Quarry Manager		
	Brodie Bolton	Production manager		
	Alex Nicetin	Drill & Blast Manager		
	Brad Subotic	DSS Quarry manager		
Shotfirer (where known)	Johno Keller	Orica		
Trainee Shotfirer (where known)				
Driller (where known)	Tony Falconer	Premier D&B		
Blast Guard	Todd Kalajzich	Quarry Manager		
	Stuart McLean	Quarry Supervisor		
	Alex Nicetin	Drill & Blast Manager		
	Brodie Bolton	Production manager		

Flowchart



1.5 Development of Blast Management Plan

An overall Risk Assessment for blasting at Dunmore Quarry has been undertaken in accordance with **AS 2187.2 Section 4.**

This Risk Assessment will form the basis of this BMP, along with the minimums prescribed by this BMP.

Purpose	Development of Specific Site Blasting Parameters and Blast Management Plan including controls determined through Geotechnical planning and Site Blasting Risk Assessment.
Responsibility	Mine Manager, Shotfirer, geotechnician
Framework	<ul style="list-style-type: none"> • Guiding Regulations • AS 2187 • Boral Drilling & Blasting SOP • HSEQ-6-09
General information	Collect information on site hazards and controls specific to the blasting process
Implementation	<ol style="list-style-type: none"> 1. Complete a Geotechnical Plan with assistance from a geotechnician 2. Perform the Site Blasting Risk Assessment 3. Use the Site Blasting Risk Assessment to assist with blasting hazards to focus on. 4. Determine exclusion zones and Specific blasting Parameters through Site Blasting Risk Assessment or Modelling.. 5. Insert the information from Geotechnical plan and Site Blasting Risk assessment into the BMP.
Procedures or SWMS	<ol style="list-style-type: none"> 1. Use the Boral SOP to perform the risk assessment. 2. Dunmore Quarry blasting risk assessment
Forms	<ul style="list-style-type: none"> • Geotechnical Plan • Site Blasting Risk Assessment 34-F10
Monitoring & measurement	Nil
Reporting	Nil
Review – opportunities for improvement	Nil

**ZERO HARM
TODAY**



Section 2 Blasting

2.1 Specific Blast Planning: Blast Site Information

Purpose	To have a clear blast plan proposal
Responsibility	Mine Manager & Shotfirer
Framework	Guiding Regulations, AS 2187, Boral SOP 34 Drilling & Blasting Dunmore Site information sheet designed in conjunction with ORICA HSEQ-6-09-F03
General information	<p>Collect information on:</p> <ul style="list-style-type: none"> • Blast type, yield, location and date of the proposed blasting • Previous blasting design and performance • Extra permits/licences required for this project.
Implementation	<ol style="list-style-type: none"> 1. Mine Manager requests blast using Drill & Blast Design 34-F02 form 2. Shotfirer designs proposed blast based on licence conditions, previous blasting design and performance, Standard Blast Parameters and laser profiling 3. Mine Manager authorises blast proposal
Procedures & SWMS	a) No SWMS required for collation of this documentation.
Forms	<ul style="list-style-type: none"> • Drill & Blast Design HSEQ-6-09-F03
Monitoring & measurement	Nil
Reporting	Nil
Review – opportunities for improvement	Nil

**ZERO HARM
TODAY**



2.2 Bench Preparation

Purpose	To prepare the bench (to be blasted) for drilling
Responsibility	Mine Manager
Framework	Guiding Regulations, AS 2187, Boral SOP 34 Drilling & Blasting GRP-HSEQ-6-09
General information	The blast area and access shall be prepared so that it is safe and suitable for its intended purpose.
Implementation	<ol style="list-style-type: none"> 1. Site ground condition inspection is conducted by Site Supervisor 2. Conduct SWMS for preparing bench 3. Prepare the blast area for mark out and drilling, by clearing the site, securing boundary, erecting edge protection and implementing controls identified during inspection 4. Shotfirer confirms that bench area is ready for work to commence
Procedures & SWMS	<ol style="list-style-type: none"> a) Use the Boral SOP to perform the SWMS b) SWMS- Bench Preparation
Forms	<ul style="list-style-type: none"> • Blast Preparation Site Inspection 34-F01 • SWMS
Monitoring & measurement	Nil
Reporting	Nil
Review – Opportunities for Improvement	Nil

2.3 Design & Mark Out

Purpose	To survey the shot, undertake markout and develop the drill plan
Responsibility	Mine Manager & Shotfirer
Framework	Guiding Regulations, AS 2187, Boral SOP 34 Drilling & Blasting HSEQ-6-09-F03 Drill and blast design
General Information	Intended blast holes should be marked out prior to drilling in accordance with the shot design.
Implementation	<ol style="list-style-type: none"> 1. Undertake SWMS for safe blast hole mark out 2. Laser profile shot 3. Design front row and remainder of pattern 4. Mark out the locations of the holes, according to the plan 5. Design the drill plan 6. Obtain authorisation for drill plan from Mine Manager.
Procedures & SWMS	Use the Boral SOP to perform the SWMS SWMS – Safe Blast Hole Mark Out.
Forms	SWMS HSEQ-6-09-F03 Drill and blast design
Monitoring & Measurement	Nil
Reporting	Nil
Review – Opportunities for Improvement	Nil

2.4 Drilling

Purpose	To safely drill the blast holes into bench according to the plan
Responsibility	Drillers
Framework	Guiding Regulations, AS 2187, Boral SOP 34 Drilling & Blasting HSEQ -6-09F04 Driller's log
General Information	<p>Drilling of blast holes into bench should be conducted according to the drilling plan.</p> <p>The driller shall record and report any unusual events during the drilling, e.g., cavities, soft rock, an inability to drill holes in accordance with the blast plan.</p>
Implementation	<ol style="list-style-type: none"> 1. Supply driller with drill plan 2. Inspect the immediate area to be drilled and compare markout with drill plan 3. Drill the holes 4. Maintain the Drillers Log for each hole 5. Undertake Bore tracking 6. Review Bore track results compared to design 7. Redrill holes if required and possible 8. Deliver and place out stemming materials
Procedures & SWMS	<p>Use the Boral SOP to perform the SWMS</p> <p>SWMS – Drilling Operations.</p> <p>HSEQ -6-09F04 Driller's log</p>
Forms	<p>HSEQ -6-09F04 Driller's log</p> <p>SWMS</p>
Monitoring & measurement	Nil
Reporting	Nil
Review – Opportunities for Improvement	Nil

2.5 Loading and Initiation/Tie Up Planning

Purpose	To develop loading and initiation plan/tie up plan
Responsibility	Mine Manager & Shotfirer
Framework	Guiding Regulations, AS 2187, Boral SOP 34 Drilling & Blasting HSEQ-6-09-F05 Loading and firing the shot
General information	Develop Loading Plan and Tie-Up Initiation Plans
Implementation	<ol style="list-style-type: none"> 1. Develop Loading Plan 2. Develop Initiation Plan/Tie Up Plan 3. Obtain Mine Manager approval for plans 4. Confirm quantities and date of delivery for initiation and bulk explosives
Procedures & SWMS	No SWMS required for collation of this documentation.
Forms	HSEQ-6-09-F05 Loading and firing the shot
Monitoring & measurement	Nil
Reporting	Nil
Review – opportunities for improvement	Nil

2.6 Blast Area Set Up

Purpose	To manage personnel & traffic around the blast area
Responsibility	Mine Manager & Shotfirer
Framework	Guiding Regulations, AS 2187, Boral SOP 34 Drilling & Blasting HSEQ-6-09
General information	<p>Before charging commences, unauthorised personnel and machinery not involved with the blasting operations shall be removed from the area.</p> <p>Warning signs shall be displayed advising that blasting operations are in progress.</p> <p>NOTE: Information for signs used on public roads is provided in AS 1742.3 and AS 1743.</p>
Implementation	<ol style="list-style-type: none"> 1. Undertake risk assessment to determine whether it is safe for shot to go ahead as planned 2. Perform Environmental & Weather Forecast Check 3. Notify owners and occupiers of structures, and providers of services adjacent to the blast 4. Conduct pre-loading meeting including Shotfirer, Blast Supervisor and other parties to establish work area safety controls are in place 5. Implement physical elements of the Blast Zone Traffic Management Plan including exclusion zones and access to the shot 6. Test Communications Systems
Procedures & SWMS	<p>Use the Boral SOP to perform the SWMS</p> <p>SWMS – Blast Zone Personnel & Traffic Movement.</p>
Forms	SWMS
Monitoring & measurement	Environmental & Weather Forecast Check – Download & print information on weather forecasts, include in BMP records.
Reporting	Nil
Review – Opportunities for Improvement	Nil

2.7 Loading & Stemming

Purpose	To load & stem all the holes
Responsibility	Mine Manager & Shotfirer
Framework	Guiding Regulations, AS 2187, Boral SOP 34 Drilling & Blasting HSEQ-6-09-F05 Loading and firing the shot
General information	Loading and stemming shall be conducted in accordance with the Loading Plan A wide variety of material may be used as stemming material, and the requirements vary with the size of the blasthole and the site conditions.
Implementation	<ol style="list-style-type: none"> 1. Inspect all components of the charge 2. Inspect the blast hole cleanliness 3. Review the Loading Plan 4. Insert charge and primer 5. Complete the loading report including notable variations 6. Document and report to Mine Manager any significant variations before stemming 7. Stem holes
Procedures & SWMS	Use the Boral SOP to perform the SWMS SWMS – Charge Component Inspection SWMS – Inspecting blast hole cleanliness SWMS – Inserting charge, primer and stemming
Forms	SWMS
Monitoring & measurement	Nil
Reporting	Significant variations with loading report should be reported to the Mine Manager prior to stemming
Review – Opportunities for Improvement	Nil

**ZERO HARM
TODAY**



2.8 Tying Up

Purpose	To connect all the charges and run off the firing line
Responsibility	Mine Manager & Shotfirer
Framework	Guiding Regulations, AS 2187, Boral SOP 34 Drilling & Blasting HSEQ-6-09-F05 Loading and firing the shot
General information	<p>A documented initiation plan/tie up plan should be in use which should include the following information:</p> <ul style="list-style-type: none"> a) Identification of the initiation point. b) Identification of the control row. c) The delay times to be used within the blast, and their location. d) Method of initiation. e) Final inspection.
Implementation	<ol style="list-style-type: none"> 1. Remove edge protection fencing (where applicable) 2. Tie up shot in accordance with Tie Up Plan and document any adjustments to timing 3. Collect stock usage delivery dockets and reconcile usage 4. Report variations to Mine Manager for investigation 5. Shot firer and Blast Supervisor walk the shot, check tie-up and complete Tie-Up Plan Sign Off 34-F04
Procedures & SWMS	<ul style="list-style-type: none"> a) Use the Boral SOP to perform the SWMS b) SWMS – Tying Up. c) HSEQ-6-09-F05 Loading and firing the shot
Forms	HSEQ-6-09-F05 Loading and firing the shot
Monitoring & measurement	Nil
Reporting	Variations in explosive stock usage shall be reported to the Mine Manager
Review – Opportunities for Improvement	Nil

2.9 Pre Firing Checks

Purpose	To ensure the area is managed, process has been followed and all persons on site are aware of a blast about to occur.
Responsibility	Mine Manager & Shotfirer
Framework	Guiding Regulations, AS 2187, Boral SOP 34 Drilling & Blasting HSEQ-6-09-F05 Loading and firing the shot
General Information	Precautions need to be taken prior to firing to ensure the safety of persons and property including the completion of several process checks.
Implementation	<ol style="list-style-type: none"> 1. Conduct Pre-Blast Meeting 2. Perform final Environmental & Weather Forecast Check 3. Confirm notifications have taken place 4. Determine location and set up vibration monitors and cameras 5. Clear exclusion zones 6. Locate sentries in position 7. Blast Supervisor conducts clearance and completes Firing of Shots form 8. Blast Zones handed over to Shotfirer 9. Shotfirer conducts own clearance
Procedures & SWMS	<ul style="list-style-type: none"> • SMWS – Clearing Blast Exclusion Zones
Forms	HSEQ-6-09-F05 Loading and firing the shot
Monitoring & Measurement	Vibration monitors and cameras shall be set up in accordance with site requirements and licence conditions.
Reporting	Nil
Review – Opportunities for Improvement	Nil

2.10 Firing

Purpose	To fire a shot
Responsibility	Mine Manager & Shotfirer
Framework	Guiding Regulations, AS 2187, Boral SOP 34 Drilling & Blasting HSEQ-6-09-F05 Loading and firing the shot
General information	<p>Precautions need to be taken during firing to ensure the safety of persons and property including establishing a safe place for the Shotfirer to initiate the shot.</p> <p>NOTE: Where an audible warning device is used, it should produce a sound that is recognizable and clearly different from any other sound that might be used for warning or other operational signals on the work site and sufficiently loud to give adequate warning to those likely to be affected by the blast. A modulated frequency siren is normally suitable.</p>
Implementation	<ol style="list-style-type: none"> 1. Warning Sirens 2. Connection of Initiation Device 3. Complete Shotfirer's Checklist 4. Conduct siren sequence and countdown 5. Firing of blast
Procedures & SWMS	SWMS – Firing
Forms	HSEQ-6-09-F05 Loading and firing the shot SWMS
Monitoring & measurement	Nil
Reporting	All incidents shall be reported in accordance with Licence conditions and site Incident Reporting procedures.
Review – Opportunities for Improvement	Nil

2.11 Post Blast Assessment

Purpose	To assess that the site is safe after the blast.
Responsibility	Shotfirer
Framework	Guiding Regulations, AS 2187, Boral SOP 34 Drilling & Blasting HSEQ-6-09-F05 Loading and firing the shot
General Information	The Shotfirer shall ensure that the site is left in a safe condition after every blast.
Implementation	<ol style="list-style-type: none"> 1. Shotfirer Post Blast Inspection. (Must wait 5 mins after blast before inspecting) 2. Shotfirer Assessment of the Shot <ul style="list-style-type: none"> b) Issues – Exclusion Zones remain in place. Issues dealt with. 3. Shotfirer's assessment allows ALL CLEAR to be given 4. Site housekeeping and safe conditions put in place
Procedures & SWMS	<ol style="list-style-type: none"> a) SMWS – Post Blast Inspection & Assessment b) SWMS – Misfire management c) SWMS – Post Blast Housekeeping
Forms	SWMS HSEQ-6-09-F05 Loading and firing the shot
Monitoring & Measurement	Nil
Reporting	Where the All Clear cannot be given, a report shall be made to the Mine Manager.
Review – Opportunities for Improvement	Nil

2.12 Post Blast Administration

Purpose	To compile the blast documentation in an orderly fashion, with all information available for future reference.
Responsibility	Shotfirer
Framework	Guiding Regulations, AS 2187, Boral SOP 34 Drilling & Blasting HSEQ-6-09-F05 Loading and firing the shot
General Information	Records of the blast should be taken and maintained.
Implementation	<ol style="list-style-type: none"> 1. Collate monitoring results 2. Report and investigate abnormalities 3. Compile Blast Records in order of Blast Management Plan Cover Sheet 4. Complete the Blast Records Register 5. Provide records to Mine Manager and obtain sign-off
Procedures	Nil
Forms	<i>Blast Record Register 34-F08</i> HSEQ-6-09-F05 Loading and firing the shot
Monitoring & measurement	Monitoring results shall be included within Blast Records.
Reporting	All incidents shall be reported in accordance with Licence conditions and site Incident Reporting procedures.
Review – Opportunities for Improvement	Nil