



BLAST
MANAGEMENT
PLAN

BLAST MANAGEMENT PLAN

PURPOSE

This Blast Management Plan has been developed to ensure Griffith City Council meets its duty of care and obligations to the community, contractors and employee during the operation of the mine.

1. SCOPE

This plan is applicable to all drilling and blasting operations carried out at Tharbogang Quarry. Any Contractor who operate drills and carries our blasting duties on behalf of Griffith City Council shall comply with this procedure.

Quarry Operation

It is Griffith City Councils intention to nominate in accordance with part 5, Division 1 Section 22 of the Mine Health and Safety Act 2004 the successful tenderer as the operator of the mine.

2. REFERENCES

Guidelines for safe mining
Australian Standards AS2187.2
Mine Health and Safety Act 2004
Mine Health and Safety Regulation 2007

3. DEFINITIONS

Nonel shock tube donator designed to initiate explosions;
Goldet type of detonator
MIC maximum instantaneous charge
ANFO bulk industrial mixture comprising of ammonium nitrate and fuel oil.

4. PROCEDURES

4.1 Working near Quarry Benches

When working the following points have to be adhered to:

- Ensure all employees and contractors who perform tasks on site are trained in and understand and use risk assessments and safe work method statements (SWMS) prior to conducting hazardous or new tasks.
- Ensure barriers, fall arrest systems or identifying markers restricting access into 'No go' areas are used or placed along all exposed edges where work is being undertaken.
- Non-active benches or exposed edges should have appropriate berms in place to restrict access to the face.
- Ensure there are appropriate levels of supervision for all employees and contractors who perform work activities on site.

4.2 Drilling

Drilling techniques and blast design will be based upon achieving effective results whilst minimising the impact on local surrounds and landholders.

Drill Patterns

Attention must be paid during drilling to the location of butt holes and craters.

The only equipment allowed to travel over drill patterns are:

- Vehicles carrying explosives
- Vehicles carrying stemming
- Drill Rigs
- Vehicles approved and required by the Shotfirer

Whenever such equipment is entering or moving in the blast area the movement will be under the direct supervision of the Shotfirer.

Presplit Drill and Blast

Presplit drill and blast design for batters will be based upon achieving effective results with minimum impact upon the local community.

Presplit design will be based around;

- 76 diameter holes
- Use of a small diameter continuous presplit product
- Stemming the collar of the hole to minimise noise
- Use of angle indication devices to control drill accuracy.

Trench Drill and Blast

- Small diameter holes 89mm or 76mm
- Use of nonel or goldets
- Use of electrical initiation for the blast
- Use of appropriate stemming material for each hole
- Use of blasting mats if required

Noise and Vibration Levels

- Through efficient blasting practices much of the potential noise and vibration problems are overcome. The use of appropriate stemming material and minimum stem heights will also significantly assist in reducing surface noise and flyrock.
- Dust control will be achieved through the use of a cyclone and automatic dust collector on the drill rigs used.

Safety Procedures and Traffic Management Plan

- Site specific drill and blast safety procedures will be established prior to the commencement of any blasting, with utmost importance being placed on securing the immediate area and protecting all personal and property.
- Blast design will take into account the proximity of any traffic. If there are concerns with the impact of blasting, traffic will be stopped at a safe distance from the site and a blasting sign shall be erected at all approaches in accordance with AS 1742.3. A person shall be stationed at each sign to ensure that traffic is stopped and a warning shall be sounded prior to firing.

- Control of MIC per delay together with minimum stem heights and adequate stemming material will ensure that flyrock is minimised and managed ensuring public safety.

Design and Set Out of Blast Patterns

- The preliminary design will be agreed between the Quarry Manager and the Shotfirer including the location of the blast and proposed parameters. (eg. Hole diameter, pattern size, charge).
- The Project Supervisor shall ensure that the blast area is clear and clean.
- The Shotfirer will mark out holes in accordance with the preliminary design.
- Any proposed changes shall be discussed and agreement reached between the Quarry Manager and Shotfirer prior to drilling, then recorded on the blast report and shot plan.

Drilling

- The Shotfirer shall place cones 6 metres outside the drilling area at maximum 10 metre spacing to restrict access to the area.
- These cones shall be maintained during the drilling, loading and tie in process by the Shotfirer to ensure safety and minimise risk of hole damage.
- Before drilling the Shotfirer shall check stability of the ground and the drilling rig.
- The Shotfirer shall ensure the drill is at the correct angle using a manual or electronic angle indicator, and check that the depth of each hole is within +/- 0.3 metres.
- Any butt holes from a previous blast shall be inspected for explosives and if there is any doubt the new holes shall be drilled at least 1 metre from butt holes.
- The dust suppression system shall keep the dust level to a minimum. The Shotfirer shall notify the Quarry Manager immediately if this is not achievable.
- When drilling presplits or stab holes the Shotfirer shall pay particular attention to batter stability. If there are signs of instability the Shotfirer shall immediately:-
 - Cease drilling.
 - Report the instability to the Quarry Manager
 - Evacuate to a safe location.
- Appropriate mechanical guards shall be installed on the drilling rig and limbs shall be kept clear of moving parts.

Personnel Access

No person shall approach within six (6) metres of an operating drill rig until:

- Shotfirer has been notified by visual contact or mobile phone
- The drill rig has ceased, and
- The Shotfirer has indicated that it is safe to approach.

Personnel Access to Charged/Tied-in Blast Pattern

Before approaching the charged/tied-in blast pattern permission must be granted from either, Shotfirer and Quarry Manager.

Vehicle Access

- The Shotfirer has been notified by visual contact or mobile phone.
- The Shotfirer has acknowledged the intention and indicated that it is safe to approach.
- This procedure applies to all vehicles travelling along a designated haul route beside a drill pattern.

Vehicle Parking

No vehicle shall enter the drilling area unless;

- Permission shall be gained from the Shotfirer or Project Supervisor in order to move a light vehicle closer
- If the Shotfirer has doubts when moving a drill rig in close proximity to light vehicles he shall contact the Quarry Manager who will have the vehicle removed.
- Personnel who require access to the drill bench shall assess the situation and if a drill rig is operating in the area, the vehicle shall be parked at least twenty (20) metres from the rig and personnel access shall be in accordance with the Personal Access procedure set out above.
- Any damage or near misses are to be reported to the Quarry Manager immediately before continuing.

Personal Protective Equipment

Personal protective equipment shall be worn where indicated or required by the mine or quarry site.

As an absolute minimum you must wear a hard hat, safety boots and safety glasses with side shields when working on a mine or quarry bench.

If you are exposed to drill dust or an uncomfortable level of dust you must wear a dust mask.

If you have difficulty hearing someone speaking in a normal voice 1 metre away from you then you must wear hearing protection.

Chemically impervious gloves and sunscreen must also be worn if you are handling chemicals or are in the sun.

4.3 Notification of Neighbouring Residential Properties

The below table shows the properties that will be notified before a blast occurs;

Table 1 The contact information of the Neighbouring Residential Properties.

Property Identification Number	Owners Name	Properties Address	Contract Phone Number
1	Mr A Bergamin	Farm 1765 Slopes Rd	(02) 69 636 273 (h) 0427 771 765 (mob)
2	Mr D & S Sergi	Farm 1743 Slopes Rd	(02) 69636313 0412 696 313
3	Mr F & Mrs E Barbaro	Farm 1760 Slopes Rd	
4	Mr P J Sergi	Farm 1757 Slopes Rd	(02) 69 636 336 (h)
5	Mr G and Mrs G Sergi	250 Slopes Rd	(02) 69 636 230 (shed) (02) 69 636 362 (h)

For a locality map of the above properties see Appendix A figure 1.

Notification Procedures

- Blasting notification boards are located at site offices
- Blasting times shall be subject to approval from the Quarry Manager
- A minimum of 24 hour notification notice given to the Mine Superintendent prior to blasting at the Tharbogang quarry.
- The *Neighbouring Residential Properties* in the above table will be notified of a blast event no later than 1 week out from the blast event.
- If the resident is unable to be contacted by phone, a visit to the property will be required to notify the resident.
- If the resident is not home at the time of the visit, a notification letter will be left at the residence in a prominent location.
- As a record that the resident of the property was notified a Blast Notice Registration Form will be fill out. The Blast Notice Registration Form will be made available to Quarry Superintendent upon request.

For the Blast Notice Registration Form see Appendix A table 1.

4.4 Blasting

MATERIALS

The main materials used in blasting are:

- Class 5.1 Oxidising agents, eg: Ammonium Nitrate, Ammonium Nitrate Emulsions
- Distillate
- Class 1.5 explosives

All transport and use of hazardous substances of any quantity will be in accordance with the Materials Safety Data Sheet (MSDS) and all relevant law. Hazardous substances of any quantity shall not be stored in crib rooms or offices. All hazardous substances will be stored in their original containers with the label intact at all times. Prior to using the hazardous substances all workers involved in its use will be provided with information and training to allow safe completion of the task.

STORAGE OF EXPLOSIVES

Checks will ensure that:

- The magazines are constructed, located and maintained in accordance with Australian Standards and all relevant law for the storage of explosives.
- Fire Protection requirements include no smoking and established fire breaks. The site around the magazine needs to be cleared and maintained in accordance with Australian Standards.
- A magazine keeper will be appointed. The magazine keys will stay in possession of the magazine keeper.
- The quantity of explosives stored is within the limits stated on the licence and that detonators are stored in a separate magazine from explosives.
- Each magazine has a stock record book that must be filled in every time there is a stock movement. The stock in the magazine and the record book must reconcile at all times. If the stock does not reconcile with the records, then this is to be investigated and reported to the Site Manager. Stocks should be audited on a monthly basis.
- The floor of the magazine is kept clean at all times, with no rubbish, empty boxes or equipment stored.
- Empty containers are not left in the magazine but are removed and destroyed.
- The explosives are stored so that the date of manufacture is visible and are used strictly in order of their age, oldest stock to be used first.
- The correct tools for opening cases or cartons are kept in the magazine and are used.
- Any signs of leakage or staining on the cases or cartons of explosives stored in the magazine are to be reported to the Magazine Keeper.
- Explosives showing any signs of deterioration are reported to the Magazine Keeper.
- The magazine is closed and the area vacated during electrical storms.

TRANSPORT

All blasting materials will be transported to site on the day of the blast via vehicles which have appropriate Dangerous Goods Licences and licences to manufacture explosives.

Checks will ensure that:

- Transport of explosives and detonators by road to the site is in accordance with the requirements of the appropriate statutory authority.
- A general shipping document in the form of a cargo manifest is required for each delivery.

- Detonators are not transported with explosives unless:-
- Quantity of explosive less than 250kg
- Quantity of detonators less than 5000 units
- Explosives are carried in the rear and detonators are carried in the front of a light vehicle
- An approved blast barrier separates explosives and detonator compartments
- The vehicle should carry Emergency Procedure Guides for the products in the marked holder securely attached to the driver's side door.
- The necessary warning signs are attached to the vehicle. As per the Australian Explosive Code, the type of placarding is dependent on the quantity of explosives carried.
- Loose explosives and detonators are carried around the site in the proper containers.
- Heavy metal objects are not carried with explosives on a vehicle.
- Passengers or unauthorised persons are not transported in a vehicle carrying explosives.
- Smoking is not allowed when handling or transporting explosives.
- The speed restrictions relative to the transport of explosives are obeyed.
- Each vehicle carries an approved fire extinguisher, fully charged and in sound working condition.
- At no time is the loaded vehicle left unattended.

The following are considered to be the main environmental consequences or high risk events of blasting: -

Consequence	Safeguards
Noise	<ul style="list-style-type: none"> • Front row charges having adequate burdens • Stemming columns are of sufficient length and appropriate stemming material is used (aggregate) • Orientation of blasts away from residences • Using previous blasts results from site blast records • Covering all exposed detonating cord • No blasting in adverse weather conditions
Vibration	<ul style="list-style-type: none"> • Single hole per delay • No excessive sub-drill • Using previous blast results • Ensuring blastholes are properly relieved • Establishing and using a vibration site-law • Controlling the number of pre-split holes that fire together

	<ul style="list-style-type: none"> • Measuring vibration levels at designated points
Dust	<ul style="list-style-type: none"> • No blasting in adverse weather conditions • Wetting down the blast area
Fume	<ul style="list-style-type: none"> • Ensure fume has dissipated before people re enter blast area
Fly rock	<ul style="list-style-type: none"> • Containment of explosives • Appropriate stemming material • Appropriate stemming length • Appropriate front row burden (use of face surveying) • Designate appropriate blast area
People entering blast area	<ul style="list-style-type: none"> • Guard all entrances with trained personnel • Use recognised blast sirens and sequence • Use systematic approach to evacuate blast area

Use of Explosives

The use of explosives shall be in accordance with AS 2187.2.

- No personnel shall handle any explosives unless they hold an unsupervised handling ticket.
- It is the responsibility of all personnel handling explosives to know and follow all approved safety procedures.

The Shotfirer

The Shotfirer shall hold a current blasters license and shall be responsible for supervision of all drilling and blasting.

This includes the transport and use of explosives, and hazard identification and risk control.

Times of Use

Blasting will occur between the hours of 9am and 3pm Monday and Fridays, with one blast a week. There will be no blasting on public holidays.

Detonators

Detonators shall be transported in an approved container.

Atmospheric Electrical Activity

If there is evidence of any form of atmospheric electrical activity or disturbance, all blasting operations shall be suspended until the electrical disturbance has passed to the satisfaction of the Shotfirer and Quarry Manager. Other inclement weather situations such as dust storms may also require similar action.

Charging Holes

Cones shall be maintained by the Shotfirer 6 metres outside the blasting area at maximum 10 metre spacing to restrict access to the area, ensure safety and minimise risk of damage.

- Appropriate signage shall be installed by the Quarry Manager.
- All tools, equipment and personnel not required by the Shotfirer must be removed from the blast area before charging operations begin.
- When the site has been prepared the explosives may be taken close to the holes but staked at a distance sufficient to prevent accidental detonation should a charged hold explode prematurely. Once charging operations have started clearances to the charge holes shall be maintained.
- No work, other than that associated with the charging operation, shall be performed within 6 metres of the blast hole without prior approval of the Shotfirer.
- There shall be no smoking, naked lights, or machinery likely to generate heat or sparks within 6 metres of holes being charged. Machinery that is likely to generate heat or sparks shall be approved by the Shotfirer and Quarry Manager before it is to be used within this safety distance.
- Charging shall not begin unless it is practicable to complete the charging and firing operation on the same day, and in no circumstances shall charged holes be left unattended.
- All holes that are not charged immediately should be plugged to prevent rubble from entering.
- Undue force must never be used in charging a hole. The diameter of the cartridge ideally should be 12.5% to 25% smaller than the drill hole and care must be taken to avoid the introduction of loose earth when inserting the cartridges.

Preparing and Loading a Primer

Primers shall be prepared immediately prior to charging. A primer is a cartridge of explosive which has been fitted with a detonating device, and is used to detonate the remainder of a charge which does not contain any detonation device. A primer shall be initiated with a non-electric detonator which detonates the main ANFO charge.

When firing with instantaneous detonators the primer may be positioned either top or bottom but in each case the base of the detonator shall face the rest of the charge. With delay nonel detonators the primer shall be placed first in the hole with the base of the detonator facing the rest of the charge.

Obstruction within the Hole

In the event of an obstruction being encountered within the hole after charging has begun, no attempt shall be made to remove the obstruction. Instead, charging shall be continued above the obstruction using a top primer which shall be fired simultaneously with any other primer inserted before the obstruction occurred.

Stemming

The length of stemming depends on the type of blast and the quantity of explosives used but generally it should not be less than one-third of the depth of the hole and should be at least equal to the length of the face burden. Good stemming is important and should aim at making the hole almost as strong as the surrounding rock in order to obtain maximum effect from the blast.

Screened aggregate with a size approximately 10% of the hole diameter is recommended.

When the stemming of a hole is completed, there will be a length of nonel tube protruding from the top which should be coiled ready for tying in.

Firing Preparation

On completion of all charging operations the Shotfirer shall ensure that he has written record of the essential features of the blast program which will be recorded on the blast report. The surplus explosives and all ancillary equipment shall be moved from the firing area.

Nonel Tie-in

- Nonel tube and surface delays are inserted in accordance with the shot plan to ensure a maximum instantaneous charge and minimum impact on noise and vibration.
- Tie in the initiation point shall be carried out by the Shotfirer in accordance with the shot plan.
- The Shotfirer shall confirm that the blast is tied in and ready to fire, then the area shall then be cleared by the Quarry Manager prior to initiation.

Electrical Initiation

- The Shotfirer shall install a pre-tested electrical detonator at the initiation point and connect a length of approved firing cable from the detonator to a safe location from the blast. The firing circuit shall be tested before connecting to the exploder and shall not exceed the rated capacity of the exploder.

Restricted Area

- The blasting areas, Authorisation to enter blasting areas shall be obtained from the Quarry Manager by all personnel. This authorisation shall only be given when appropriate induction requirements have been completed.
- All personnel not directly involved with the blast shall clear the blast area no later than 15 minutes prior to the posted blasting time.

Monitoring of Blasts

The Blast at Tharbogang Quarries will be;

- Monitored on site and Copies of all blast monitoring results shall be forwarded to the Mine Superintendent.
- The property labelled number *5 in table 1* will be monitored at each blast.
- The location of monitoring equipment will be as close to the property as possible. Photograph of the monitoring equipment location with respect to the house will be included with the blast monitoring results.

The results of blast monitoring at Tharbogang Quarry will comply with the following protocols.

Air Blast

The air blast overpressure level from blasting operations in or on the premises must not exceed:

- a) 115 dB (Lin Peak) for more the 5% of the total number of blast during each reporting period;

And

- b) 120dB (Lin Peak) at any time.

At any point within 1 metre of any affected residential boundary or other noise sensitive location such as a school or hospital

Vibration

The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed:

- a) 5mm/s for more the 5% of the total number of blasts carried out on the premises during each reporting period; and

- b) 10mm/s at any time.

At any point within 1 metre of any affected residential boundary or other noise sensitive such as a school or hospital.

To determine compliance with conditions(s) L6.2 and L6.3:

- a) Air blast overpressure and ground vibration levels must be measured at any point within 1 metre of any affected residential boundary or other noise sensitive location such as a school or hospital – for all blasts carried out in or on the premises; and
- b) Instrumentation used to measure the air blast overpressure and ground vibration levels must meet the requirements of the Australian Standards 2187.2 of 1993.

Road Blocks and Guards

- Road blocks shall be located with appropriate signage and manned to restrict access to the blast area
- As a minimum requirement, road blocks shall be established on the haul road at least 100 metres from each end of the blast area.
- Blast guards shall also be located as required at other appropriate locations to prevent the public unauthorised personnel entering the blast area.
- Road block controllers and blast guards shall be in constant radio contact with the Shotfirer.

Blast Area Clearance

- The Quarry Manager shall be responsible for clearing the blast area after the Shotfirer confirms that a blast is tied in and ready to fire. The Quarry Manager shall activate a siren on his vehicle and drive around the blast area with a flashing light to clear the area.
- The Quarry Manager shall check with the road block controllers and blast guards via radio to ensure that all areas are cleared.

- The Project Supervisor will contact the Shotfirer by sight or radio to activate the blast and radio procedure must be observed by all personnel.
- After the blast detonates and on appropriate amount of time has elapsed, the Shotfirer and Quarry Manager shall investigate the blast for hazards or misfires.
- The siren shall be left on until the blast has been fired and cleared.
- The Shotfirer shall give the all clear signal on the siren with 3 short blasts and also on the radio.
- Road block controllers and blast guards shall not allow access to the blasting area until the all clear has been received.

Misfires

In the event of a misfire the following precautions are to be adopted:-

- No person enters the danger area until the prescribed time has elapsed.
- Only the shotfirer and assistant to re-enter the blast area. Identify the misfire and re-fire blast holes if safe to do so.
- Sentry guards will be advised to remain at their positions and keep area secure due to misfire.
- Notify the Quarry Manager of any misfire, as the event is a reportable incident. (Mine Safety Officer-DII) within 24 hours)

Where it is unsafe to re-fire the misfired shot, the explosives will be disposed of by clearing and removal.

Cancelled Blasts

- If a scheduled blast is cancelled and has already been tied in, the shot will be untied and a guard posted to ensure the area is safe. The blasting signs will be taken down and the Project Supervisor will notify other personnel as soon as possible.
- This also applies to misfires which cannot be recharged and blasted on the same day.
- Properties in *table 1* will be notified if a blast is cancelled and event notification form will be filled out.

Appendix A

Figures and Tables

Figure 1 Neighbouring Residential Properties



