



# Blast Management Plan

**Project:** Cascade Quarry

Norfolk Island Regional Council

Norfolk Island

Total Safety Management Services  
ABN 18 216 997 372

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# 1.0 PROJECT EXECUTIVE SUMMARY

Donnelly Blasting Services Pty Ltd, hereinafter known as (DBS), has been contracted to provide a Rock on Ground service to Norfolk Island Regional Council, DBS will provide this service from their Tamborine office.

The service to be provided is Small scale blast to remove hard rock from hill, that was unable to be removed by mechanical methods for Crushing for use on the Island

DBS will provide blast monitoring, with the designed low MIC (maximum instantaneous charge) the vibration predictions are expected to be well below the limits at these dwellings and also below the limits for the existing service pipes. Blast monitor locations are set out in Section 9.2 in this document.

With the distances and designs to be used, there will be no need for blast mats, as the blast will be well contained in the blasting area. To assist with this, DBS requires that NIRC supplies a body truck load of clean 7 to 10mm aggregate for stemming to assist in preventing any opportunity of a fly rock issue.

As an extra precaution, if there was to be any loading issues, the DBS shotfirer may require clean fill to be laid over the top of loaded blast holes to create a false burden (this is unlikely to happen, but it is best to make plans for any circumstance).

Due to the Remote location of the proposed works, This blast management plan may require review and updates prior to commencement of loading activities.

<b>Project</b>	<b>Name:</b>	Norfolk Island Regional Council
	<b>Address:</b>	Cascade Pier Quarry, Cascade

<b>Principal Contractor:</b>	<b>Name:</b>	Norfolk Island Regional Council
	<b>Address:</b>	Norfolk Island
	<b>Contact Person:</b>	Simon Tuituri (+6723) 22001 (ext. 143)

<b>Commencement Date:</b>	▪ TBC
<b>Completion Date</b>	▪ TBC
<b>Projected Number of Blast</b>	▪ Note Vibration and Air Blast Limits for Number of blast in Section 9.13

<b>Scope of Works:</b>	▪ Drill and Blast Operations
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<b>Hours of Work:</b>	▪ 6am to 6pm Monday to Friday
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<b>Donnelly Blasting Services Pty Ltd</b> [Redacted]	<b>Name:</b>	[Redacted]
	<b>Contact No:</b>	[Redacted]

<b>Donnelly Blasting Services Pty Ltd</b> [Redacted]	<b>Name:</b>	[Redacted]
	<b>Contact No:</b>	[Redacted]

# CONTENTS

1.0	PROJECT EXECUTIVE SUMMARY .....	2
2.0	GENERAL INFORMATION .....	5
3.0	DEFINITIONS.....	6
4.0	BLAST MANAGEMENT PLAN DISTRIBUTION.....	7
5.0	THE COMPANY.....	8
6.0	DONNELLY BLASTING SERVICES PTY LTD ORGANISATIONAL CHART .....	9
7.0	REGISTER OF MANAGEMENT .....	10
8.0	ROLES AND RESPONSIBILITIES .....	10
9.0	IMPLEMENTATION .....	13
10.0	REPORTING.....	19
11.0	RISK ASSESSMENT - Refer Below.....	19
12.0	BLASTING METHODOLOGY .....	28
13.0	BLAST MANAGEMENT FIELD PROCEDURES .....	29
14.0	POST BLAST EVALUATION .....	34

## 2.0 GENERAL INFORMATION

The Blast Management Plan is developed by Donnelly Blasting Services Pty Ltd, and is designed to provide a formal structure to manage the operational aspects and conditions for all management, workers, service providers, visitors and the general public.

The requirements defined in the Blast Management Plan are minimum standards required by Donnelly Blasting Services Pty Ltd. The contents of this plan are to be used in conjunction with, however does not overrule Australian Standards, Acts or Regulations.

The following have been listed to be of assistance, however, they may not be exhaustive for the operations being performed by workers or service providers.

- Work Health and Safety Act 2011
- Work Health and Safety Regulation 2017
- AS2187.2 – Explosives – Storage and Use – **Appendix A – Blasting Management Plan and Records.**
- AS 2187.1 Explosives – Storage, Transport and Use – Transport.
- Australian Explosives Code (AEC) (3rd Edition)

Due to the remote location of the Island and being a self-governed territory of Australia, NIRC does not have its own Use of Explosives ACT or Regulations, It would be advised to follow industry best practice on the mainland and ensure that Blasting activities would be compliant with industry best practices and explosive regulations on the mainland of Australia.

Donnelly Blasting Services Pty Ltd shall ensure they maintain awareness of any legislative changes through statutory and industry communication with a formal review of legislation and codes of practice to be undertaken on an **annual basis**.

## OBJECTIVES

The objectives of this Blast Management Plan are to:

- Minimise off-site disturbance during blasting events.
- Maintain compliance with conditions of development consents, environmental protection licences and legislation relating to air blast and ground vibration.
- Provide a protocol for the monitoring and evaluation of blast impacts on surrounding private residences, infrastructure and sensitive receivers.
- Communicate with the local community and regulators in regard to blasting activities at the worksite.

## 3.0 DEFINITIONS

The following definitions will apply in this Blast Management Plan:

Consultation:	Consultation is the act of communicating with employees and others on site to share information and to seek input into decision making.
Emergency:	A serious, unexpected, and often dangerous situation requiring immediate action.
Hazard:	A source or situation with a potential to cause harm through human injury or illness, damage to property, equipment and the environment, or which causes a combination of these.
Hazard Identification:	The process of recognising that a hazard exists and defining its characteristics.
Health and Safety Audit:	A verification activity which evaluates the degree to which design, product, process and system activities in the workplace conform to the requirements and standards described in the Blast Management Plan of Donnelly Blasting Services Pty Ltd and the client's specifications.
Induction:	Introduction of staff and others to health and safety requirements and instructions for implementation.
Health and Safety Policy:	A statement by the company of its intentions and principles in relation to its Health and Safety Policy: overall work health and safety performance which provides a framework for action and setting its work health and safety objectives and targets.
Person Conducting a Business or Undertaking (PCBU)	A person conducting a business or undertaking alone or with others, whether or not for profit or gain. A PCBU can be a sole trader (e.g. self-employed person), a partnership, company, unincorporated association or government department of public authority. Effectively all employers are PCBU.
Responsible Person:	A person nominated by Donnelly Blasting Services Pty Ltd to be accountable for a process or activity, who has delegated authority to control the process or activity and who has been trained in the requirements of their position.
Risk:	The combination of the likely frequency and probable consequences of a particular hazardous event.
Risk Assessment:	The process of estimating the magnitude of risk and prioritising risks according to their severity.
Risk Control Measures:	The methods devised and implemented to restrain, regulate and reduce exposure to danger or loss.
Safe Work Method Statements:	A tool which documents a process for identifying and controlling health and safety hazards and risks associated with a task.
Workplace:	The land and other places made available to employees / contractors by management for the purpose of carrying out work.
Service Provider/ Sub-Contractor:	Any person who supplies materials, equipment, plant or services to Donnelly Blasting Services Pty Ltd during the course of work activities.

## 4.0 BLAST MANAGEMENT PLAN DISTRIBUTION

Donnelly Blasting Services Pty Ltd shall:

- Ensure they maintain an up to date version of their Blast Management Plan at all times.
- Establish procedures for the control, approval, dissemination, withdrawal, storage and disposal of documents, data and other records. All amendments to the System are to be recorded in the Register of Amendments.
- Retain all obsolete pages of the Blast Management Plan for a period of seven (7) years to demonstrate a record of competent practices.
- Undertake reviews of the Blast Management Plan on a twelve (12) monthly basis or when deficiencies of the System are identified and require immediate rectification.

### Distribution Register

Version No.	Date of Issue	Name of Recipient	Position/Organisation
Version 4	01/2019	[REDACTED]	[REDACTED]
Version 4	01/2019	[REDACTED]	[REDACTED]

### Register of Document Amendments

Date	Page/Form No.	Version No.	Description of Amendments	Prepared by
05/2020			Updated following audit	[REDACTED]
01/2021			Change to Suit NI Legislation	[REDACTED]

## 5.0 THE COMPANY

DONNELLY BLASTING SERVICES PTY LTD	
ABN:	48 141 953 291
Company Address:	26 Tamborine Street
	Jimboomba Qld 4285
[REDACTED]:	[REDACTED]
Mobile:	[REDACTED]
Email:	[REDACTED]
[REDACTED]:	[REDACTED]
Mobile:	[REDACTED]
Email:	[REDACTED]

Donnelly Blasting Services Pty Ltd has developed this Blast Management Plan as part of their commitment to providing a safe place of work in compliance with relevant Work Health and Safety Regulations.

All activities to be undertaken by the company have been analysed, risks associated with these activities identified and control measures developed to prevent the possibility of injury or illness. The Safe Work Method Statement for operations outlined in this document is control measures needed to achieve these outcomes.

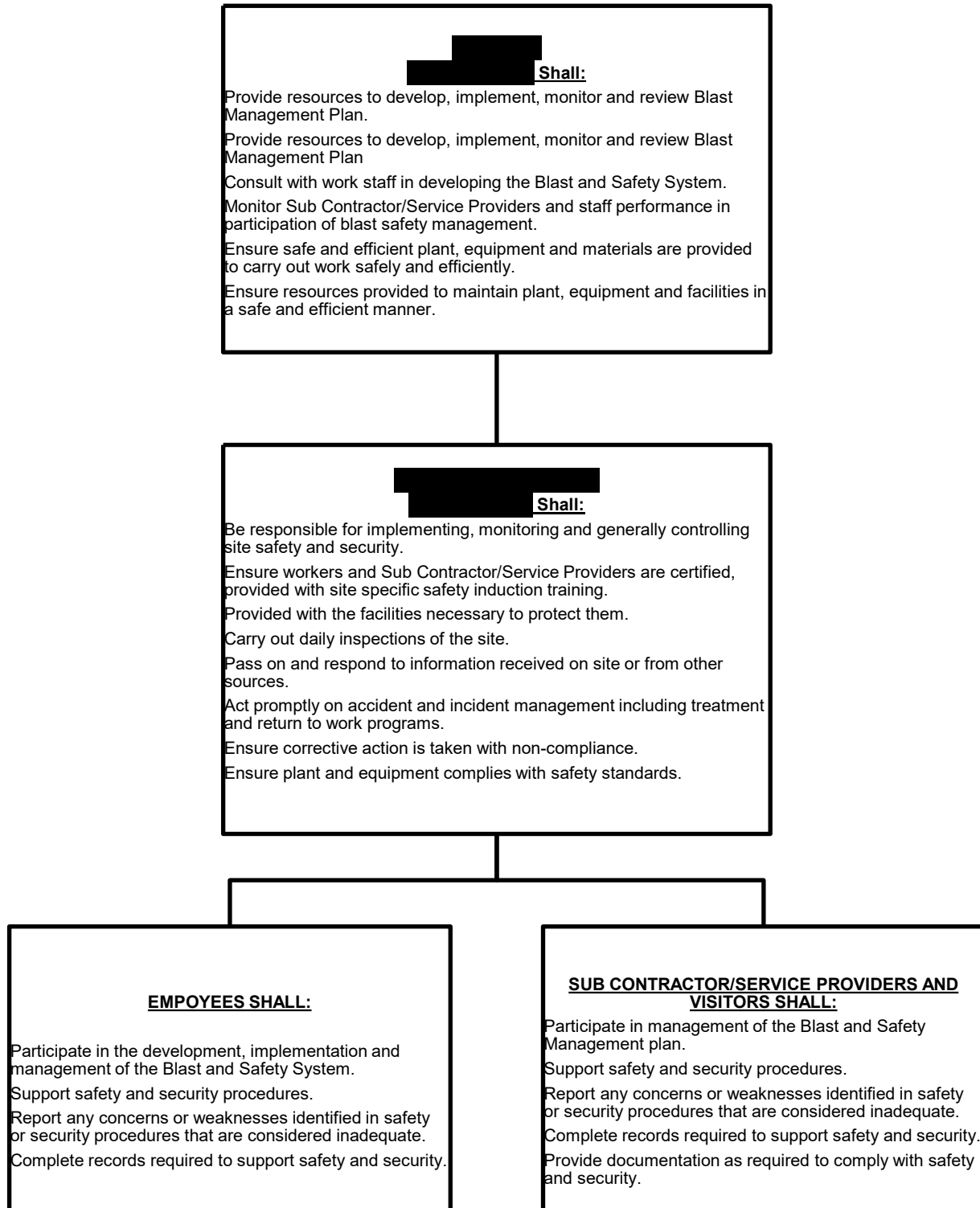
### Donnelly Blasting Services Pty Ltd

As a Service Provider, Donnelly Blasting Services Pty Ltd intends that all information contained in this document will be followed to help prevent accidents and illness, however, other information or procedures may be required for work not mentioned in this document. In this case a specific Job Hazard Analysis may be required.

If staff is found to be ignoring this information and/or not following the procedures, they could expect to be retrained, reprimanded or dismissed depending on the seriousness of the offence.



## 6.0 DONNELLY BLASTING SERVICES PTY LTD ORGANISATIONAL CHART



## 7.0 REGISTER OF MANAGEMENT

The following persons are recognised as holding positions of responsibility for the implementation and adherence of the Blast Management Plan of Donnelly Blasting Services Pty Ltd as at 1<sup>st</sup> January 2021.

### REGISTER OF MANAGEMENT

NAME	POSITION	SIGNATURE	DATE
██████████	██████		

The contents of the above table is to be updated when there is a change in Management structure

## 8.0 ROLES AND RESPONSIBILITIES

### HEALTH SAFETY AND ENVIRONMENTAL CONFORMANCE

All employers/contractors and subcontractors are now referred to as “Persons Conducting a Business or Undertaking”, or **PCBU**. A PCBU must ensure the health and safety of workers, customers and visitors by eliminating or minimising risks at the workplace. A PCBU is legally bound to actively identify hazards and risks in their workplace and to meet their **due diligence** obligations under the WHS Act 2011.

The primary “duty of care” responsibilities of Donnelly Blasting Services Pty Ltd are to:

- So far as *reasonably practicable*, ensure the health and safety of workers and others who may be affected by the carrying out of work. This includes workers that Donnelly Blasting Services Pty Ltd engages, causes to be engaged, are influenced or directed by Donnelly Blasting Services Pty Ltd, or other persons (general public, visitors, clients) who could be put at risk by what Donnelly Blasting Services Pty Ltd do.
- Ensuring the health and safety of workers (and others) so far as is *reasonably practicable* including all the common general duties such as a safe work environment, safe plant, adequate facilities, information, instruction and training.

### Responsible Shotfirers for the Project

Name	License Number	Expiry	Conditions
██████████	██████	31 Dec 2025	Nil
██████████	██████	11 Jan 2026	Nil
██████████	██████	06 July 2022	Nil
██████████	██████	04 Oct 2022	Nil

Roles	Responsibilities
<b>Principal Contractors, Operations/ Drill and Blast Engineer</b>	<ul style="list-style-type: none"> <li>▪ Is responsible for providing a safe work environment.</li> <li>▪ Ensure safe work environment for all staff and contractors</li> <li>▪ Ensure that adequate resources are available to implement the requirements of this Plan.</li> <li>▪ Ensure that Donnelly Blasting Services Blast Management Plan has specific capabilities, adequate and developed in accordance with the requirements of the relevant Government Legislations and Guidelines.</li> <li>▪ Undertake pre-and post-blast inspections to ensure blast objectives are met and blast zone is safe to conduct load and haul activities.</li> </ul>

Roles	Responsibilities
<b>Donnelly Blasting Services Pty Ltd - Management</b>	<ul style="list-style-type: none"> <li>▪ Undertake a hazard and risk assessment of drilling and blasting activities in conjunction with the Client Management.</li> <li>▪ Regularly review blast design parameters on the basis of blast monitoring records.</li> <li>▪ Design and carry out blasts to comply with the requirements of this Plan, including the identification of meteorological blasting exclusion windows.</li> <li>▪ Develop blasting practises that manage blast fumes through;               <ul style="list-style-type: none"> <li>a) Minimising sleep times for shots.</li> <li>b) Dewatering holes before loading.</li> <li>c) Choosing the correct explosive product for the conditions.</li> </ul> </li> <li>▪ Assess meteorological conditions prior to blasting to determine whether conditions are appropriate for blasting, in consultation with the Shotfirer.</li> <li>▪ Confirm that the blast monitoring network is active prior to blasting.</li> <li>▪ Advise the Shotfirer of the current blasting schedule, including changes to the schedule.</li> <li>▪ Maintain records for blasts initiated.</li> <li>▪ Assist the Shotfirer with investigations into blasting exceedances, incidents or complaints.</li> <li>▪ Ensure the work site is safe for the activities to be undertaken.</li> <li>▪ Provide appropriate and approved equipment and explosives products for personnel to safely undertake their work.</li> <li>▪ Provide competent and trained staff to undertake the work.</li> <li>▪ Provide the client with a written record of the training and competency of each contractor, employee, used on site.</li> <li>▪ Maintaining all licenses and permits, etc, for vehicles entering the site to undertake the work.</li> <li>▪ Shall ensure Donnelly Blasting Services Pty Ltd equipment is maintained and can be operated in a safe and efficient manner.</li> <li>▪ Ensure all plant and equipment is registered and licensed for the purpose it is intended.</li> </ul>

Roles	Responsibilities
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<b>Drill Rig Operator</b>	<ul style="list-style-type: none"> <li>▪ Undertake a hazard and risk assessment of drilling activities</li> <li>▪ Be responsible for ensuring the drill is operated in a safe manner</li> <li>▪ Donnelly Blasting Services Pty Ltd procedures are followed.</li> <li>▪ Be responsible for ensuring the site is safe for access of the drill rig.</li> <li>▪ Be responsible for ensuring all holes are located and drilled to the parameters on the blast hole plan.</li> <li>▪ Maintain a log of drilling conditions.</li> </ul>
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<b>Roles</b>	<b>Responsibilities</b>
<b>Shotfirer</b>	<ul style="list-style-type: none"> <li>▪ Undertake a hazard and risk assessment of drilling and blasting activities in conjunction with the Client Management.</li> <li>▪ Ensure the drill pattern is drilled in accordance with the blast design.</li> <li>▪ Ensure that the blast is loaded with the correct quantity and quality of explosive and stemmed in accordance with the blast design.</li> <li>▪ Notify the Drill and Principal Contractors Representative of any factors that may lead to non-compliance with this Plan.</li> <li>▪ Supervise the drilling.</li> <li>▪ Ensure blast site security and demarcation of work area.</li> <li>▪ Charge, stem and tie-in the blast. Fire the blast.</li> <li>▪ Carry out post blast inspection in conjunction with the Client Management.</li> <li>▪ Provide the Client management with blast reports, including copies of any risk assessments undertaken for the drilling and blasting activity.</li> <li>▪ Ensure the pre-blast checklist is strictly complied with.</li> <li>▪ Load and fire blasts in accordance with the design supplied by the Drill and Blast Engineer.</li> <li>▪ Take action if Employees and/or Sub Contractor/Service Providers are found to be noncompliant.</li> <li>▪ Ensure as a minimum requirement, retraining is performed in the event of non-conformance by Employees and/or Contractor.</li> <li>▪ Be involved in managing illness/injury and emergency procedures and the maintenance of relevant facilities on the work site.</li> <li>▪ Ensure corrective actions are developed by way of consultation and are implemented to prevent and/or minimise the recurrence of illness, injury and emergencies.</li> <li>▪ Conduct a risk assessment of high risk site-specific activities when required and develop control measures.</li> <li>▪ Identify needs to implement new procedures on-site, to accommodate new work activities or changes to existing activities that would require upgrading of SWMS.</li> </ul>

<b>Roles</b>	<b>Responsibilities</b>
<b>Other Employees and Service Providers</b>	<ul style="list-style-type: none"> <li>▪ All employees and Service Providers are required to comply with the requirements of this Plan.</li> </ul>

## 9.0 IMPLEMENTATION

### 9.1 Blasting Control Measures

Detailed design is undertaken for each blast in order to maximise the blast efficiency, minimise dust, fumes, ground vibration and air-blast and to ensure compliance with site specific blasting conditions.

In order to minimise the potential for exceedance of the relevant criteria, Donnelly Blasting Services Pty Ltd will continue to implement new and existing blast management procedures, including:

- Training of all relevant personnel on environmental obligations and safe handling of explosives.
- Designing blasts to ensure that vibration and air blast limits are met, and there is no damage to life or property from fly rock including consideration of wind speed, direction and other meteorological factors prior to blasting to minimise any impact on neighbouring structures.
- Use of adequate stemming, a delay detonation system, and careful drilling and hole loading to ensure that the required blast design is implemented.
- Assessment of wind speed and direction immediately prior to each blast to minimise the potential for dust emissions from blasting to adversely impact on neighbouring private residences.
- An appropriate minimum blasting exclusion zone will apply for persons.
- Pre-blast inspections are undertaken to ensure that no persons, property or livestock are at risk from blasting.
- Sentries are posted on all access points to ensure that there is no possible access to the blasting exclusion zone.
- Monitoring of blasts for the Principal Contractor at the closest private residences to determine whether air blast and ground vibration limits are met.

Manage misfires in a safe manner and in accordance with this Blast Management Plan.

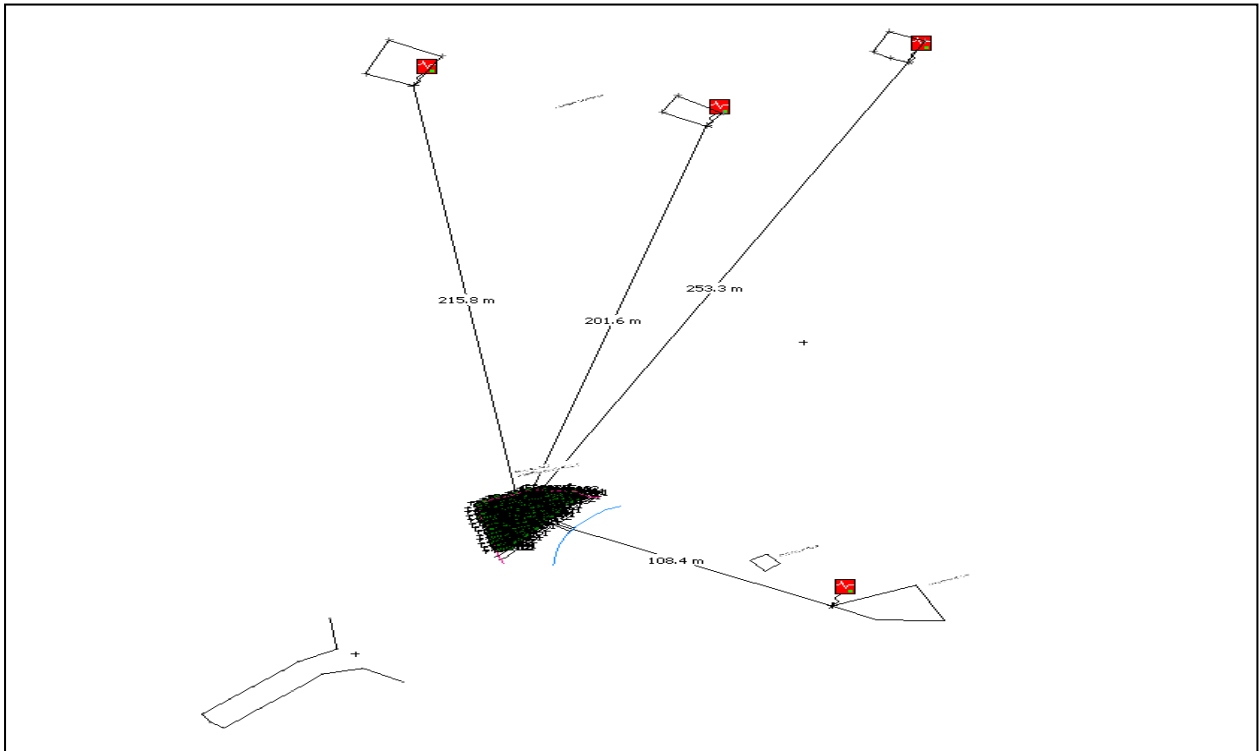
- Review of monitoring results and modification of the blast design, and ensure compliance with AS2187 Part 2 Appendix J tables J4.5 and J5.4. If blast firing program was originally intended to be completed within 20 Blasts or 12 months but this becomes not practical ensure compliance with the limits set out in AS2187 for operations lasting longer than 12 months or 20 blasts.
- Documentation of the date and time of the blast, location of blast holes and quantity of explosive used each blast.
- Periodic review of blast management practices to evaluate performance and identify corrective action, if required.

### 9.2 Blast Monitoring

Blast monitoring will be conducted at the closest to residence to both side of the blast area to ensure compliance with AS 2187 Part 2 Use of explosives. All Vibration and Air blast will be monitored with Instatel Mini Mate Blaster or Mircormate units, Each unit will have been calibrated at an approved service centre no greater than 12 months prior to the blast date.

Blast Monitor Locations

Monitor Location	Address or Coordinates	Staked or Monitoring block	Additional Notes
MP1	██████████ House Portion 5A1	Staked	
MP2	██████████ Portion 1D2	Staked	
MP3			
MP4			



## 9.3 Training

Donnelly Blasting Services Pty Ltd's training program incorporates activities including Health Safety and Environmental induction, safe work method and safe operating procedures, task training and emergency procedures in addition to any ongoing training requirements.

**All staff will read and have access to this document as part of the Workplace Induction.**

## 9.3 Consultation

Donnelly Blasting Services Pty Ltd will maintain appropriate communication processes with all relevant stakeholders during the blasting operations. The blast design must be cross checked and reviewed by others, with the level of review being commensurate with the class of blast.

Pre-Blast Tool Box Talks will be utilised to convey operational instructions to staff involved in the blast process.

Donnelly Blasting Services Pty Ltd uses an internal document system for conducting daily pre-start assessment of working conditions and on-the-spot hazard assessment.

2-Way Radio Communication will be maintained by all staff during the blasting operations.

2-Way Protocol is described for stakeholders in Company Procedures.

## 9.4 Personal Protective Equipment (PPE)

*Donnelly Blasting Services Pty Ltd will ensure personal protective equipment is worn where it has been identified as an appropriate control measure for risk – but always to be considered as the last resort.*

The preferred risk management control measures will be Elimination, Substitution, Isolation and Administration. Personal Protective Equipment will be provided to comply with the requirements identified in Material Safety Data Sheets (MSDS) for hazardous substances.

The requirements for personal protective equipment include:

- Head Protection - Hard Hats MUST be worn on sites that display the appropriate sign or where site rules dictate the need.
- Hearing protection (ear plugs or ear muffs) must be worn when performing activities that involve high noise risks.
- Safety glasses must be worn when using power tools and/or performing activities that involve flying object risks. Safety glasses or face shield may be required when using hazardous substances (refer SDS).
- Respirator protection must be worn when performing activities, including working with substances, which produce dusts, mists, fumes and/or vapours. This includes complying with the requirements of SDS.
- Hand protection (gloves) must be worn when performing activities that include risks of cuts/abrasions to hands. Hand protection may be required when using hazardous substances (refer SDS).
- Safety footwear (lace up steel cap boots) must be worn at all times. Steel capped rubber boots will be provided where necessary.
- Safety goggles, face shields – Hazards include splashes and multi-directional flying objects (grinding).
- Gauntlets – Welding and hot work hazards.

Where such equipment has been issued, it shall be listed on the *PPE Issue Register*. It is the worker's responsibility to wear, maintain, clean and store it so that it is in good condition for use. Failure to comply or refusing to wear the appropriate PPE and clothing or unless granted an exemption may result in disciplinary actions.

The wearing of PPE will be enforced, as it is not sufficient to provide the equipment, Donnelly Blasting Services Pty Ltd must also supervise the use of it.

## 9.5 Dangerous Goods

Donnelly Blasting Services Pty Ltd will be responsible for all statutory requirements regarding the storage and transport of any dangerous goods used for blasting. This includes the storage of boosters, cord and detonators in custom-made magazines, which are managed in accordance with the Donnelly Blasting Services Pty Ltd management systems.

Donnelly Blasting Services Pty Ltd will be responsible for notifying all relevant authorities regarding the status of any dangerous goods used for blasting. Due to specific circumstances, bulk explosive components may be required to be stored at the project site. Donnelly Blasting Services Pty Ltd will be responsible for the locating and management of any storage compounds in accordance with relevant legislation, for obtaining all necessary approvals and development and submission of necessary safety and security plans.

Donnelly Blasting Services Pty Ltd will maintain on site, Safety Data Sheets for all explosives and ancillary chemical items brought on site.

## 9.6 Transportation of Explosives

Donnelly Blasting Services Pty Ltd shall ensure that all transportation activities are undertaken as per their Security Plans, requirements of relevant statutory guidelines and as described in Australian Explosive Code 3<sup>rd</sup> Edition.

The person charged with the responsibility of transporting explosives shall first complete a Transport Manifest– Delivery of Explosives documentation to ensure stock control is maintained at all times.

Donnelly Blasting Services Pty Ltd shall ensure all explosives movements are undertaken in locked containers fixed to the rear of a registered road vehicle and will only be transported in approved packaging. Under no circumstances will the explosives or associated materials be left loose or unattended. Drivers must ensure that provisions are made to secure the packages against movement during transport. The vehicles utilised will be licensed and registered with the appropriate transport authorities.

While transporting the material, Donnelly Blasting Services Pty Ltd so far as is possible, shall ensure that precautions are taken to prevent the material becoming involved in a fire or an explosion. Refer to BP2 Transportation of Explosives.

## 9.7 Blasting in Close Proximity to Roads

### Temporary Road Closures

These closures are typically for a period of less than 15 minutes. Designated personnel who have received approved traffic controller training will manage traffic flow during these closures. Refer to BP4 Traffic Control Procedure.

Traffic control signs will be set up in accordance with the relevant authority guidelines. All temporary road closures will be scheduled, where practicable, for outside peak traffic flow periods. In particular, school bus times will be avoided. Roads will be closed to traffic by qualified traffic controllers approximately five minutes prior to any blast. Traffic controllers will remain in radio contact with the Project Site throughout the closure period, to enable cessation of the blast in the case of emergency.

### Notification of Road Closures



Notification of temporary road closures will be co-ordinated with the Principal Contractor's Representative, as necessary, to meet their requirements.

Notice of temporary road closures will be provided via the posting of signs, telephone communication, letter drops and door knocks.

## 9.8 Plant/Vehicle

Donnelly Blasting Services Pty Ltd proposes to bring Track Type Drill Rigs, Light Vehicle (Shot firer's Vehicle) And Heavy Rigid Mobile Manufacturing Unit to the site.

All equipment is maintained as per manufacturer's requirements.

Daily Pre-Start Inspections are undertaken on all plant/vehicles.

## 9.9 Warning Signs and Control Measures

Warning signs will be erected around the blast area as per statutory and site requirements.

## 9.10 Accidents and Incidents

All accidents and incidents are to be reported to Donnelly Blasting Services Pty Ltd and the Principal Contractor's Representative.

Refer to Section 5 Reporting.

## 9.11 Fire Protection

All vehicles and equipment are fitted with appropriate Fire Protection.

Fire extinguishers on light and heavy vehicles are checked daily as part of the Donnelly Blasting Services Pty Ltd Pre-Start checklist.

Light Vehicles are equipped with dry chemical extinguishers.

## 9.12 Permits and Licences Required

Donnelly Blasting Services Pty Ltd will ensure they obtain all required Permits highlighting permission to blast.

## 9.13 Environmental Limits

Donnelly Blasting Services Pty Ltd will ensure they adhere AS 2187-2006 Part 2 Appendix J.

The environmental impacts of blasting operations are:

- Noise from drilling
- Dust from the blasting operation
- Air-blast generated by the explosion gases venting to atmosphere
- Vibration generated by shockwaves travelling through the rock mass
- Fly rock caused by poorly designed or poorly controlled blasting operations.

AS2187-2006 Part 2 Appendix J4.5 Ground Vibration Limits

**TABLE J4.5(A)**

**GROUND VIBRATION LIMITS FOR HUMAN COMFORT CHOSEN BY SOME REGULATORY AUTHORITIES (see Note to Table J4.5(B))**

Category	Type of blasting operations	Peak component particle velocity (mm/s)
Sensitive site*	Operations lasting longer than 12 months or more than 20 blasts	5 mm/s for 95% blasts per year 10 mm/s maximum unless agreement is reached with the occupier that a higher limit may apply
Sensitive site*	Operations lasting for less than 12 months or less than 20 blasts	10 mm/s maximum unless agreement is reached with occupier that a higher limit may apply
Occupied non-sensitive sites, such as factories and commercial premises	All blasting	25 mm/s maximum unless agreement is reached with occupier that a higher limit may apply. For sites containing equipment sensitive to vibration, the vibration should be kept below manufacturer's specifications or levels that can be shown to adversely effect the equipment operation

\*A sensitive site includes houses and low rise residential buildings, theatres, schools, and other similar buildings occupied by people.

NOTE: The recommendations in Table J4.5(A) are intended to be informative and do not override statutory requirements with respect to human comfort limits set by various authorities. They should be read in conjunction with any such statutory requirements and with regard to their respective jurisdictions.

AS2187-2006 Part 2 Appendix J5.4 Air Blast Limits.

**TABLE J5.4(A)**

**AIRBLAST LIMITS FOR HUMAN COMFORT CHOSEN BY SOME REGULATORY AUTHORITIES (see Note to Table J5.4(B))**

Category	Type of blasting operations	Peak sound pressure level (dBL)
<b>Human comfort limits</b>		
Sensitive site*	Operations lasting longer than 12 months or more than 20 blasts	115 dBL for 95% blasts per year. 120 dBL maximum unless agreement is reached with occupier that a higher limit may apply
Sensitive site*	Operations lasting for less than 12 months or less than 20 blasts	120 dBL mm/s for 95% blasts. 125 dBL maximum unless agreement is reached with occupier that a higher limit may apply
Occupied non-sensitive sites, such as factories and commercial premises	All blasting	125 dBL maximum unless agreement is reached with the occupier that a higher limit may apply. For sites containing equipment sensitive to vibration, the vibration should be kept below manufacturer's specifications or levels that can be shown to adversely effect the equipment operation

\* A sensitive site includes houses and low rise residential buildings, hospitals, theatres, schools, etc., occupied by people.

## 10.0 REPORTING

### 10.1 Incidents

An incident is defined as a set of circumstances that causes or threatens to cause material harm to the environment, and/or breaches or exceeds the limits or performance measures/criteria in the Project Approval.

The reporting of incidents will be conducted in accordance with Donnelly Blasting Services Pty Ltd's procedures and the Project Approval. Donnelly Blasting Services Pty Ltd will notify all relevant authorities of any incident (e.g. Fly rock) associated with the Project as soon as practicable after Donnelly Blasting Services Pty Ltd becomes aware of the incident.

Written details of the incident are to be compiled with a written report which includes the following information:

1. The location, date, time, nature and cause of the incident/event.
2. The type, volume and concentration of every pollutant discharged as a result of the incident/event.
3. The action taken in relation to the incident including any follow up contact with any complainants.
4. Details of any control measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an incident/event.
5. Any other relevant matters.

### 10.2 Complaints

The objectives of a Complaint Response Protocol are to reply to community concerns that relate to blasting. The protocol is as follows:

- The detail of the complaint will be recorded by the Site Controller/Shotfirer.
- Preliminary investigations will commence within 24 hours of the complaint receipt to determine likely causes of the complaint using information regarding prevailing meteorological conditions, the nature of blast activities taking place and recent blast monitoring results.
- Blast control measures will be determined following an investigation into the complaint, if required. Those mitigation measures developed as a result of the assessment will be implemented by the Shotfirer/Site Controller (e.g. Blast engineer).
- Following implementation of blast control measures (if required), monitoring will assess the effectiveness of the additional blast control measures.

### 10.3 Non-Compliances with Statutory Requirements

Compliance with all approvals, plans and procedures will be the responsibility of all personnel (staff and contractors) employed on or in association with the Project.

## 11.0 RISK ASSESSMENT - Refer Below

Please read in conjunction with DBS Safe Work Method Statement 03 Loading and Blasting operations and or SWMS 04 Drill and Blast operations. All Blast superfix risks and controls will be recorded on the Safe work Method Statement, Some of the risk are but not limited too Geotechnical Hazards, Slope of work area, other traffic onsite, ECT.

# 11.0 BLAST RISK ASSESSMENT

DONNELLY BLASTING SERVICES PTY LTD  
 ABN 48 141 953 291  
 29 Kilmore Drive, Tamborine, QLD 4270

## BLAST RISK ASSESSMENT

Project:	Location/Address:	Date:
Compiled By:	Position:	Reviewed By: <span style="background-color: black; color: black;">XXXXXXXXXX</span>
		Signature:

How to use the risk assessment tool: Place a Tick (✓) in the square where you assess that these Risks/Hazards may affect your workplace.

Tick Risks/ Hazards That May Affect your Workplace	The Risk/Hazards - Things that may happen. What is it and how can it happen?	Likelihood	Consequences	Risk Rating	Risk Treatments to be Implemented	Risk Rating After Risk Treatment	Person/s responsible for implementation of Risk Treatments
<b>BLAST SET UP</b>							
<input checked="" type="checkbox"/>	1. Damage to blast location infrastructure during bump in/out. <ul style="list-style-type: none"> <li>▪ Trucks entering or exiting from a work site and movement within the worksite</li> <li>▪ Possible personal injury</li> </ul>	Moderate	Major	3	<ul style="list-style-type: none"> <li>▪ Incoming and outgoing site inspections.</li> <li>▪ Controlled with specific entry and exit locations.</li> <li>▪ Minimise damage by trucks/vehicles driven only by qualified drivers; reversed with assistant directing.</li> <li>▪ Audible alarms reversing vehicles.</li> <li>▪ Where possible trucks are small or have low axle load.</li> <li>▪ Exclusion / work zones established.</li> <li>▪ Incident reporting procedure established.</li> <li>▪ Use of Traffic Control Personnel.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff
<input checked="" type="checkbox"/>	2. Plant and Equipment <ul style="list-style-type: none"> <li>• Plant operations</li> <li>• Lifting gear failure/breakage</li> </ul>	Moderate	Catastrophic	4	<ul style="list-style-type: none"> <li>▪ Ensure all plant introduced to site is maintained to support safe use in accordance with the Plant Code of Practice.</li> <li>▪ All plant that needs to be registered is registered with the relevant state, and that all certificates of compliance are up to date.</li> <li>▪ Safe Work Method Statements, Procedures for operation of equipment in place.</li> <li>▪ Restricting access to all work areas to essential personnel only and excluding the general public.</li> <li>▪ The explosives vehicles are to be parked in secure area for constant surveillance by the shotfirer and blast crew.</li> <li>▪ Inspection and maintenance of lifting gear etc to be carried out as per legislative requirements and/or Principal Contractors site requirements.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff

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<input checked="" type="checkbox"/>	3. Blast Pre-Planning <ul style="list-style-type: none"> <li>• Exclusion Zones</li> <li>• Notifications/Permits</li> </ul>	Moderate	Major	3	<ul style="list-style-type: none"> <li>▪ Upon arriving to the shot area, cordon off drill site or area where blasting is to be done, erect warning signs – <b>(NO ADMITTANCE RESTRICTED AREA)</b> as well as blasting signs and / or other required devices.</li> <li>▪ Shot Firer to obtain Blast Permit from the Principal Contractors Representative as per Blast Plan.</li> <li>▪ Prestart Toolbox Talk to be undertaken.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff
<b>GENERAL BLAST ACTIVITIES</b>							
<input checked="" type="checkbox"/>	4. Poor Training of Staff and Contractors	Unlikely	Severe	3	<ul style="list-style-type: none"> <li>▪ Adequately trained regarding all Blast Activities.</li> <li>▪ Copies of applications, memo's and training records (including inductions) are kept.</li> </ul>	2	Donnelly Blasting Services Pty Ltd and Staff
<input checked="" type="checkbox"/>	5. General Injury to Fellow Staff and Members of the Public	Moderate	Severe	3	<ul style="list-style-type: none"> <li>▪ Barriers or taping must be erected to identify/prevent access to blast area while under construction.</li> <li>▪ Appropriate warning signage to be erected.</li> <li>▪ Consideration must be given to ensure that on the completion of the day's activities the site is left in a safe and secure state.</li> <li>▪ Daily worksite inspections to be undertaken.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff
<input checked="" type="checkbox"/>	6. Poor Communication and Lack of Information Communication System Failure	Moderate	Severe	3	<ul style="list-style-type: none"> <li>▪ Ensuring key personnel are available on site to provide effective management support.</li> <li>▪ All relevant site information to be communicated at prestart induction.</li> <li>▪ Daily Prestart Tool Box Talks to allow all Blast staff and contractors the ability to communicate directly with the stakeholders.</li> <li>▪ Effective 2-way communication systems between all staff.</li> <li>▪ Staff to be informed of Specific 2-way radio channel used on site during induction.</li> <li>▪ Multiple back up mobile phones available.</li> </ul>	1	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff

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<input checked="" type="checkbox"/>	7. Un-authorized persons entering Blast site	Moderate	Major	3	<ul style="list-style-type: none"> <li>▪ Blast Toolbox Talk to be undertaken with all involved staff.</li> <li>▪ Exclusion Zone developed.</li> <li>▪ Traffic Control Plan in place if required.</li> <li>▪ Ensure adequate notification, signage and security.</li> <li>▪ All entry points to exclusion area to be monitored by approved Sentries.</li> <li>▪ All sentries to maintain communication through 2-way radio and mobile phone back up.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff
<input checked="" type="checkbox"/>	8. Weather Conditions <ul style="list-style-type: none"> <li>• Hot weather</li> <li>• Wet weather</li> <li>• Hot ground causing premature initiation.</li> </ul>	Likely to Happen	Severe	3	<ul style="list-style-type: none"> <li>▪ Ensure weather is acceptable for task to be performed, no overcast weather and strong winds.</li> <li>▪ If adverse weather conditions are forthcoming, postpone until conditions have improved and are more suitable.</li> <li>▪ Obtain understanding of ground type in planning stage of blast.</li> <li>▪ Non-slip work platforms for wet conditions.</li> <li>▪ Water made available for excessively hot days.</li> </ul>	1	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff
<input checked="" type="checkbox"/>	9. Persons fall from Height	Moderate	Catastrophic	4	<ul style="list-style-type: none"> <li>▪ All work platforms to have secure handrails.</li> <li>▪ All ladders secured to prevent movement.</li> <li>▪ Ladders to extend at least 1m above landings, correct angles.</li> <li>▪ All faces to be fenced and sign posted during pre-blast activities.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff
<input checked="" type="checkbox"/>	10. Contact with Electricity/Portable Power Tools	Moderate	Catastrophic	4	<ul style="list-style-type: none"> <li>▪ Tools and leads inspected and tagged.</li> <li>▪ Use of portable RCD's.</li> <li>▪ RCD's wired into construction site wiring.</li> <li>▪ Residual current devices tested as per legislation.</li> <li>▪ Electrical leads kept elevated and clear of work areas or protected from damage by vehicles or pedestrian traffic.</li> <li>▪ All electric leads kept dry.</li> <li>▪ All electric leads kept insulated.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff

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<input checked="" type="checkbox"/>	11. Slips, Trips and Falls.	Moderate	Severe	3	<ul style="list-style-type: none"> <li>▪ Staff to maintain good housekeeping on blast site.</li> <li>▪ Cables or piping laid appropriately to reduce the risk of trip hazards.</li> <li>▪ All surfaces used for access kept dry and in good condition.</li> <li>▪ All equipment stacked appropriately.</li> </ul>	2	Donnelly Blasting Services Pty Ltd and Staff
<input checked="" type="checkbox"/>	12. Contact with Chemicals or other Substances.	Likely to Happen	Major	4	<ul style="list-style-type: none"> <li>▪ All staff and contractors trained in Hazards / Dangerous Goods and Environmental legal requirements.</li> <li>▪ SDS reviewed as part of risk assessment and available for inspection.</li> <li>▪ All personnel provided with appropriate PPE and its use enforced – gloves, respirators suitable to substance, protective clothing, face shields etc.</li> <li>▪ Safe Work Methods Statement developed for use, storage and disposal.</li> <li>▪ Hazardous substances and dangerous goods stored and labelled correctly.</li> <li>▪ Provision of spill kits or equipment to contain accidental spill and workers trained.</li> <li>▪ Relevant Safe work Method Statements to be read, understood and signed off by staff.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff
<input checked="" type="checkbox"/>	13. Manual Handling Injury.	Moderate	Severe	3	<ul style="list-style-type: none"> <li>▪ Work environments conform to ergonomic standards.</li> <li>▪ Provide mechanical aids where possible.</li> <li>▪ Modify task requirements.</li> <li>▪ Job rotation, task variation.</li> <li>▪ Imposed restrictions on certain activities.</li> <li>▪ Requirements for two-person lifts.</li> <li>▪ Gloves to be worn where there is potential risk of hand injuries.</li> </ul>	1	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff
<input checked="" type="checkbox"/>	14. Theft/Terrorism	Unlikely	Catastrophic	3	<ul style="list-style-type: none"> <li>▪ The explosives vehicles are to be parked in secure area for constant surveillance by Shotfirer and blast crew.</li> <li>▪ Explosives Magazine to remain locked at all times.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd

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					<ul style="list-style-type: none"> <li>▪ Inventory to be maintained as per statutory requirements.</li> <li>▪ Security plan in place.</li> <li>▪ Site Evacuation plan in place.</li> <li>▪ Site Emergency procedures in place</li> <li>▪ 24 hour security</li> <li>▪ On site first aid</li> <li>▪ Police, Ambulance, Hospital, Fire Service available.</li> </ul>		and Staff
<b>BLAST ACTIVITIES</b>							
<input checked="" type="checkbox"/>	15. Blasting Procedure	Moderate	Major	3	<ul style="list-style-type: none"> <li>▪ Blast Management Plan designed and submitted.</li> <li>▪ Qualified and experienced Shotfirer used.</li> <li>▪ All Donnelly Blasting Services Pty Ltd staff onsite appropriately trained in operational procedures.</li> <li>▪ Involvement of key personnel with appropriate competencies in the development of procedures.</li> <li>▪ Authorisation of procedures.</li> <li>▪ Blast Permit to be obtained from Principal Contractor.</li>   <li>▪ Pre-Blast Toolbox Talk to be undertaken with all involved staff.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff
<input checked="" type="checkbox"/>	16. Initiation Methods	Moderate	Major	3	<ul style="list-style-type: none"> <li>▪ Blast plan provided.</li> <li>▪ The Shotfirer is to decide which tie up is to be used.</li> <li>▪ The blast pattern should show the intended tie up sequence and what delays are to be used.</li> <li>▪ Start the tie up from the back of the blast on the rows working towards the control line – the control line is the final tie up.</li> <li>▪ When the total shot has been tied up, ensure all connections are checked.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff
<input checked="" type="checkbox"/>	17. Un-authorized persons entering Blast site.	Moderate	Major	3	<ul style="list-style-type: none"> <li>▪ Pre-Blast Toolbox Talk to be undertaken with all involved staff.</li> <li>▪ Exclusion Zone developed.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd



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					<ul style="list-style-type: none"> <li>▪ Traffic Control Plan in place if required.</li> <li>▪ Ensure adequate notification, signage and security.</li> <li>▪ All entry points to exclusion area to be monitored by approved Sentries.</li> <li>▪ All sentries to maintain communication through 2-way radio and mobile phone back up.</li> </ul>		and Staff
<input checked="" type="checkbox"/>	18. Disturbance of local residents or loss or injury to local resident's animals.	Moderate	Severe	3	<ul style="list-style-type: none"> <li>▪ Fully inform local residents of Blast prior to event.</li> <li>▪ Use of monitoring equipment and data to establish and refine predictive tools to estimate likely overpressure and vibration levels during the design process of subsequent blasts.</li> <li>▪ Abide by EPA and local laws.</li> <li>▪ Use appropriate products.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff
<input checked="" type="checkbox"/>	19. Property Damage outside of Blast area.	Rare	Severe	3	<ul style="list-style-type: none"> <li>▪ Assess wind conditions and increase safety distances if needed.</li> <li>▪ Experienced Shotfirer utilised.</li> <li>▪ Follow industry based blasting procedures.</li> <li>▪ Use of monitoring equipment and data to establish and refine predictive tools to estimate likely overpressure and vibration levels during the design process of subsequent blasts.</li> <li>▪ Emergency service attendance required.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff
<input checked="" type="checkbox"/>	20. Flyrock	Rare	Severe	4	<ul style="list-style-type: none"> <li>▪ Use only approved and tested product.</li> <li>▪ Ensure drill operator is thoroughly briefed on drilling plan and is monitored during drilling operations.</li> <li>▪ Check drill holes for diameter and depth prior to loading.</li> <li>▪ Ensure drill operator is recording true conditions of each bore hole.</li> <li>▪ Poured quantities must be checked by both measured weight and column height. This will assist in identifying</li> </ul>	2	Donnelly Blasting Services Pty Ltd and Staff

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					<p>potential problems in the hole with any voids which could result in overloaded holes.</p> <ul style="list-style-type: none"> <li>▪ Use of adequate stemming lengths to ensure maximum confinement of explosive charges minimising flyrock and overpressure.</li> <li>▪ Emergency service attendance required.</li> </ul>		
<input checked="" type="checkbox"/>	21. Misfire	Rare	Severe	4	<ul style="list-style-type: none"> <li>▪ Experienced Shotfirer takes control.</li> <li>▪ Shotfirer follows SWMS procedure.</li> <li>▪ Principal Contractor and Relevant Authorities notified.</li> </ul>	2	Donnelly Blasting Services Pty Ltd and Staff

**EMERGENCY RESPONSE**

<input checked="" type="checkbox"/>	22. Emergency Service attendance required (Police, Ambulance, Fire)	Moderate	Severe	3	<ul style="list-style-type: none"> <li>▪ Emergency service/s details available.</li> <li>▪ Site Emergency procedures in place and tested.</li> <li>▪ Multiple telephones available to contact emergency services.</li> <li>▪ Clear access routes maintained.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff
<input checked="" type="checkbox"/>	23. Fire-minor	Moderate	Severe	3	<ul style="list-style-type: none"> <li>▪ On site fire extinguishers maintained to relevant regulations and standards.</li> <li>▪ Staff aware of the use of Fire Extinguishers.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff
<input checked="" type="checkbox"/>	24. Fire-major	Moderate	Catastrophic	4	<ul style="list-style-type: none"> <li>▪ Emergency service attendance required.</li> <li>▪ Site Evacuation Plan established and practised.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff

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<input checked="" type="checkbox"/>	25. Medical care required-minor injury.	Unlikely	Minor	3	<ul style="list-style-type: none"> <li>▪ First aid kits available.</li> <li>▪ St Johns Ambulance available.</li> <li>▪ On Site Qualified Senior First Aid available.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff
<input checked="" type="checkbox"/>	26. Medical care required-major injury.	Unlikely	Major	3	<ul style="list-style-type: none"> <li>▪ Emergency Service Attendance.</li> <li>▪ Site Emergency Procedures developed and practiced.</li> </ul>	2	Principal Contractor / Donnelly Blasting Services Pty Ltd and Staff

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## 12.0 BLASTING METHODOLOGY

- Design of each blast to achieve the intended result including compliance with all environmental and safety requirements.
- Coordination of blast designs and program to ensure issues associated with materials handling, excavation, site access, haul roads, stockpiles are taken into consideration.
- Marking out of blast pattern.
- Drilling of blast holes. This will likely require 1 drill rig. Accurate drill logs will be maintained for each hole. In addition, a hole will be drilled at predetermined intervals and depth, then stemmed to the appropriate level.
- Dipping, priming and loading of blast holes with suitable primers, detonators and explosives as per the blast design.
- Stemming of blast holes. Stockpile of appropriate stemming material will be provided at each site in close proximity. A method of ensuring each blast hole is sufficiently filled with stemming shall form a hold point for each blast, i.e. an actual quantity vs design quantity check. Filling of blast holes with stemming material is to be carried out by competent workers.
- Connection of all detonators, delays etc. as required by the blast design.
- Supply and installation of blast protection measures to eliminate 'fly rock' or ejection of material from the shot area for each blast. The control measures will be reviewed and inspected prior to each blast. Existing over burden (approx. 2m) and blast mats (rubber blast mats 2.5m x 6m in size and approximate weight of 600kg each) will be used to control fly-rock if required.
- Supply of documentation from Donnelly Blasting Services Pty Ltd prior to each blast for review, including all details in accordance with specifications. The documentation shall also include safety considerations and environmental measures such as methods of monitoring vibration and locations of monitoring equipment.
- Firing of the shot. It is anticipated that the Shotfirer and Principal Contractor's Representative will be the blast controller.
- Any rectification measures required, as a result of a misfire.

### 12.1 Blast Design

The Shotfirer shall determine and document the design for each blast, prior to drilling commencing, based upon the Principal Contractor's blasting objectives, and shall provide a hard copy of the design to the Principal Contractor Management, refer to Blast Design and Evaluation Record. The Principal Contractor Management shall approve the design prior to the commencement of drilling.

### 12.2 Blasting Operations

All drilling and blasting operations will be conducted as per associated Work Procedures and Safe Work Method Statements [SWMS 06 Loading and Blasting Operations and SWMS 15 Drill and Blast Operations.](#)

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## 13.0 BLAST MANAGEMENT FIELD PROCEDURES

### 13.1 Survey and Blast Hole Layout

The Principal Contractor's Representative will liaise with Donnelly Blasting Services Pty Ltd as to the location of the blast. All Survey and blast hole layouts will be coordinated and implemented by Donnelly Blasting Services Pty Ltd and the Principal Contractor.

A plan of the blast shall be produced by Donnelly Blasting Services Pty Ltd and submitted to the Principal Contractor's Management for review, approval and retention as a record on site.

### 13.2 Blast Hole Drilling

#### Health Safety and Environmental Precautions

There are several Health Safety and Environmental precautions to be taken with respect to drilling. These are:

- All drilling to be conducted in accordance with Donnelly Blasting Services Pty Ltd's, SWMS 06 Drilling Operations and SWMS 15 Drill and Blast Operations.
- PPE is to be worn at all times during operation of the drill hammer.
- The drill rig dust collection system if fitted is to be effectively maintained and operational during drilling.
- Drilling shall be completed prior to the commencement of charging.
- Movement beepers will be required at all times.
- Caution will be taken to avoid spills during refuelling and any oil transfer.
- Where drilling must be performed during charging operations to redrill a hole or to clear a blocked hole, drilling operations must not be carried out within six (6) metres of charged blast holes.
- The Drill Operator will be briefed on the blast design and pattern requirements by the Shotfirer (or their appointed representative) prior to the commencement of drilling operations. The Drill Operator will be provided a drill pattern detailing hole diameter, hole angle and depth of each hole in the blast.
- The Drill Operator is to drill each hole to the angle and depth specified on the blast pattern at the position marked on the bench. A driller's log must be kept recording any anomalies with any of the holes (e.g. cracks, clay, broken ground etc). This log must be provided to the Shotfirer prior to any loading taking place.
- It must be noted that all face holes or holes within 6m from the face will be drilled perpendicular to the face, limiting the operator's exposure to the hazards of working at heights.

### 13.3 Blasting

#### Health Safety and Environmental Precautions

All blasting activities will be conducted to SWMS 06 Loading and Blasting Operations and SWMS 15 Drill and Blast Operations.

- All blasting to be conducted in accordance with all relevant Australian Standards, applicable guidelines, statutory rules and regulations and in conjunction with site specific blasting procedures.
- An assessment of weather conditions must be made prior to any charging taking place. If pending electrical storms or other inclement weather conditions are predicted blasting operations may need to be rescheduled.
- The Principal Contractor's Management is to notify relevant neighbours and personnel of blasting date and time on proforma supplied by Donnelly Blasting Services Pty Ltd.

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- Warning signs “BLASTING NO UNAUTHORISED ENTRY” shall be erected at the boundaries and entry road to the blast area.
  - Only persons authorised by the Shotfirer shall be permitted to enter the blast area.
  - Drilling shall be completed prior to the commencement of charging operations. If re-drilling must be carried out, drilling shall not be carried out within 6 metres of a charged blast hole and approval must be obtained from the Principal Contractor’s Representative prior to any such drilling.
  - All charging and initiation tie-up will cease upon the approach of a lightning storm and all personnel will withdraw from the blast area. Charging will not recommence until after the storm has passed and all lightning activity and thunder has ceased. Refer to BP8 Adverse Weather / Storm Procedure.
  - The blast area is to be kept free of obstructions and tripping / fall hazards at all times.
  - No smoking will be permitted within the posted blast area.
  - Stemming material will be distributed over the blast prior to any charging activities.
  - All explosives delivered to site, used on site and removed from site are to be recorded on Donnelly Blasting Services Pty Ltd documentation.

### 13.4 Priming

- Priming will be undertaken by a Shotfirer or a person under the personal supervision of a Shotfirer. Prior to the commencement of priming, all holes will be dipped to ensure holes are not blocked and are all to the correct depth.
- The primer is to be lowered into the blast hole ensuring no damage to the primer or the detonator tube.
- The tail of the detonator is to be secured at the collar of the hole to prevent the tail falling into the blast hole.

### 13.5 Blocked Holes

- If a hole is found to be blocked a weight shall be lowered on a rope and an attempt made to clear the blockage by impacting the weight against the blockage. Once the blockage is cleared the hole will be remeasured and the measured depth recorded on the Blast Plan.
- Where a hole is found blocked after charging has commenced, and there are no charged holes within 6 metres, the hole can be redrilled after obtaining approval from the Principal Contractor Management. The area around the blocked hole is to be cleared of all explosives and accessories and the Shotfirer is to guide the drill over the bench ensuring that all explosives and accessories are clear of the drill.
- If the blocked hole cannot be cleared or redrilled and it is below the stemmed portion of the blast hole, the hole is to be charged to achieve the designed stemming depth.

### 13.6 Charging

During charging the explosive column rise is to be checked at regular intervals, either by dipping the hole, through depth markings on the explosive delivery hose, or by a suitable method determined by Donnelly Blasting Services Pty Ltd and detailed in the blast charging procedures of this Blast Management Plan.

The amount of explosive being loaded into the blast hole shall be measured to confirm the correct design amount is being delivered into the hole. The measurement method is to be detailed in the charging procedures of the blast design.

If a hole is overcharged and it exceeds the allowable Maximum Instantaneous Charge (MIC), the hole will be marked and blocked to prevent stemming being placed in the blast hole.

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## 13.7 Overcharged Holes

If a hole is overcharged and exceeds the allowable Maximum Instantaneous Charge (MIC), the following procedures shall be followed;

### 13.7.1 Packaged

Plugs are to be removed using a non-ferrous rod (brass rod) hook. The hook end of the rod is lowered onto the top plug. The rod is manoeuvred to hook and remove the top plug, this process is repeated until the designed stemming or Maximum Instantaneous Charge (MIC) is achieved. The detonator tube is to be held level in the hole to avoid snagging on the hook end of the rod.

### 13.7.2 ANFO

Water will be poured into the hole dissolving the required length of ANFO.

## 13.8 Stemming

**Prior to placing any stemming into the hole, the hole must be dipped using a tamping stick, the stemming height measured and the hole checked for obstructions.**

The correct stemming material is critical in the containment of the explosive. The size of stemming to be used shall be determined by the Shotfirer and Principal Contractor's Representative.

Stemming will only be undertaken by the Shotfirer or a person under the personal supervision of the Shotfirer. Stemming shall be placed in the blast hole in a controlled manner to ensure that bridging does not occur. When placing the stemming by shovel a count of loads shall be made to ensure that the correct volume of stemming is placed in the blast hole. Alternately, stemming is to be bucketed to the blast hole and metered from the bucket into the blast hole.

If, during placement of stemming, it is found that the required volume of stemming cannot be placed in the blast hole, the procedure for Stemming Blocked Holes shall be followed.

## 13.9 Stemming Blocked Holes

Where a hole is found to be blocked during the placement of stemming and the blockage is too deep to be removed by hand, the collar of the blast hole is to be circled with survey paint.

After connection, the hole shall be covered with fine particle crushed rock material to control rifling from the blast hole collar and the associated fly. Material shall be placed to a depth of not less than 1.2 metres to a radius of 1.5 m around the blast hole. Extreme care will be necessary when placing overburden material, to ensure that damage is not caused to the down-hole detonator tubes and surface connectors. Blast mats may be utilised if deemed necessary.

Surface connectors are to be left out where necessary to allow access of a front-end loader for placement of the fine crushed material.

Care is to be taken that all detonator wires are rolled up and do not come in contact with the loader tyres or machine frame. Observers are to be positioned at the sides, front and rear of the loader to give direction and ensure that detonator tube and surface connectors are not run over by the loader.

## 13.10 Initiation Sequence Plan

The Shotfirer shall be responsible for determining the hole firing sequence for the blast, and shall have his initiation plan drawn up and completed prior to any loading taking place.

Only the Shotfirer or personnel under personal supervision of the Shotfirer shall tie-in the blast.

The Shotfirer shall inspect each hole for correct and complete "tie-in" of the initiation system.

## 13.11 Blast Initiation

### 13.11.1 Safety Precautions

Prior to firing the blast, all personnel (other than the Shotfirer) and equipment shall be removed from the blast area. Personnel removed from the blast area are to muster at the nominated muster point. A head count shall be undertaken by the Principal Contractors Representative and confirmed with the Shotfirer prior to firing.

Personnel shall remain at the muster point until given the 'all clear' by the Shotfirer to re-enter the blast area.

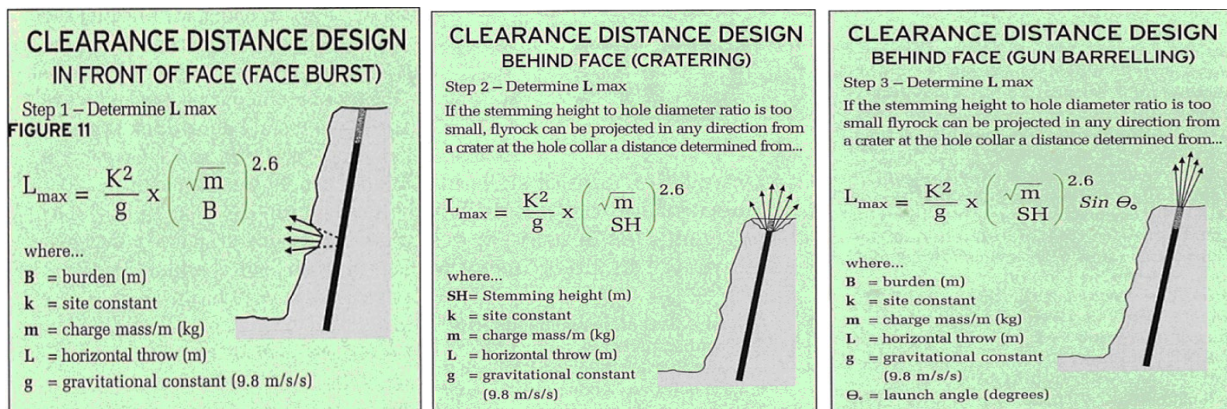
A drive-by of the entire area will be undertaken by the Shotfirer to ensure that no personnel remain in the area and that no vehicle or equipment is in the danger area around the blast site.

Sentries will be positioned with radio contact at the nominated sentry points.

All sentries will have radio contact with the Shotfirer on a nominated UHF Channel.

### 13.11.2 Exclusion Zones

There are 3 main cause that can cause Flyrock from the blast, these being a Face burst, holes cratering and holes gun barrelling. DBS conducts exclusion zone calculations for each of these know causes of Fly to establish the Exclusion Zone distances.



When Firing the blast the exclusion zone must be be clear of all personell and equipment, if equipment is to be left inside the exclusion zone it will be noted on the pre firing risk assesment and the Site Senior Exective (SSE) must sign off on the risk assesment accolegding all risk associated with leaving equipment inside exclusion zone.

The Shot firer may call on the Site Senior Exective (SSE) for asstiance in establishing the exclusion zone and accounting site personel to ensure that no personell are left inside the exclusion zone prior to firing the blast.

### 13.11.2 Firing the Shot

Please read in conjunction with BP5 Firing Procedure.

1. At 10 minutes prior to the blast, all personal and equipment involved in the project are to be re-moved from the zone of influence.
2. At 5 minutes prior to the blast the Shotfirer shall confirm by radio, that sentries/guards are in position. The Shotfirer with firing key in possession, completes the connection of firing cable and electric detonator to the non-electric initiation system and makes a final test of the electrical circuit.
3. At 2 minutes prior to blast the Shotfirer will arrange with sentries for residential streets and pedestrian access to be secured.
4. At 30 seconds prior to blast, the Shotfirer shall connect the firing cable to the exploder, engerise the exploder and sound the siren for 30 seconds.
5. The Shotfirer shall confirm that everything is secure.



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6. Shotfirer Calls “firing blast at site in 10 seconds”

7. The Shotfirer will ‘Fire the blast’ 10 seconds after call.

After the blast area has cleared of dust and fumes, the Shotfirer shall inspect the blast to determine that all charges have successfully initiated. If all charges have been successfully initiated the Shotfirer will give the all clear by sounding the blast siren three times quickly on and off and by radio to give clearance to the Principal Contractor who will then allow entry to the blast area.

If during inspection of the blast area the Shotfirer finds that all charges have not initiated the Shotfirer shall follow BP6 Misfire Procedure.

### 13.12 Misfires

Please read in conjunction with BP6 Misfire Procedure.

If during inspection of the shot after initiation the Shotfirer finds misfired charges the following procedures shall be implemented:

- The Principal Contractor’s Representative shall be informed of the misfire and entry to the blast site is to be secured with an appropriate exclusion zone until a thorough evaluation of the misfire is undertaken. Road and pedestrian blockages may be released by blast sentries after the all clear is given by the Shotfirer.
- The Shotfirer, in conjunction with the Principal Contractor’s Representative, shall determine the cause of the misfire, whether the initiation system is in a suitable condition for the misfired charges to be initiated and if burden on the charges is adequate to eliminate fly-rock.
- The options available to rectify the misfire shall be documented and a hazard and risk analysis undertaken on each option to determine the safest option for management of the misfire.
- Donnelly Blasting Services Pty Ltd shall have the misfire event reported to the designated Statutory Authority.
- The relevant authority shall be advised of the outcome of investigations and the proposed procedure for corrective action.
- In the event that the misfire cannot be safely fired without the need for further works, the blast area is to be secured and signage appropriately positioned around the blast area. No unauthorised persons shall be permitted to enter the area.
- The Shotfirer and Principal Contractor’s Representative shall determine if excavation activities can be safely recommenced whilst these corrective actions are undertaken.

All firing of misfires shall follow the BP6 Misfire Procedure.

### 13.13 Sleeping of Blasts

Occasional delays on the work site may mean that for operational reasons, a blast might need to be slept overnight and fired the next day.

Some reasons for this may include, but not be limited to the following;

- Breakdown of equipment in front of the blast face.
- Difficulty of access leading to charging delays.
- Wind or other meteorological conditions that are likely to result in undesirable environmental outcomes if the blast were to be fired.

In these circumstances ‘sleeping of the blast’ requires a guard to be posted to prevent any unauthorised access to the blast site. The engagement and briefing of a blast guard will follow documented BP7 Sleeping Shot Procedure.

## 14.0 POST BLAST EVALUATION

The Shotfirer in addition to the Principal Contractor's Representative will review the performance of each blast. The review will consider safety outcomes and assessment of blast performance to verify no misfires have occurred.

Blast design modifications (burden & spacing, hole diameter, stemming and bench height may be necessary to determine future blasts in accordance with blasting objectives and outcomes.

If Post Blast Fume Generation is present, design modifications to future blasts shall be undertaken utilising BP9 Procedure for The Mitigation of Post Blast Fume Generation.