BLASTING NOISE AND VIBRATION MANAGEMENT PLAN

Date xx June 2026

Text in blue italics flags content that must be completed or confirmed with site-specific information (consent conditions, monitoring locations, site constants and project descriptions) before issue.

CONTENTS

1.0 PLAN OBJECTIVE

The objectives of this Blasting and Vibration Management Plan (BVMP) are to detail the methods the Operator will use to:

- comply with the blasting vibration and air-blast overpressure conditions of the relevant resource consents and any applicable district plan standards
- avoid or mitigate unreasonable blasting vibration effects on people, buildings and structures, including heritage structures
- design, monitor and report blasting in a consistent and auditable way
- liaise with the consent authority and the community, and respond to complaints and concerns as they arise

Insert the specific consent references, conditions and any corporate environmental standards that apply to the project.

2.0 SCOPE AND APPLICATION

This plan applies to all blasting undertaken for the project, including during construction, open pit, underground development, underground production, tunnelling and any maintenance or safety blasts. It covers ground vibration and air-blast overpressure.

This plan does not replace the Operator's health and safety procedures for explosives storage, charging, firing and the control of blast fume and fly-rock as they affect off-site receivers.

This plan should be reviewed at least annually, following any vibration exceedance or relevant investigation, and when consent conditions or blasting methods change. Material amendments should be submitted to the consent authority for certification before implementation.

3.0 DEFINITIONS

Term	Definition
Blast event	An individual blast or a number of linked individual blasts fired within the duration limits set by consent
MIC	Maximum Instantaneous Charge: the maximum explosive weight detonated per delay (kg)
PPV	Peak Particle Velocity: the maximum vibration velocity, reported as the vector sum of the three orthogonal components (mm/s) unless the applicable criterion specifies peak component values
Scaled distance	The distance between the blast and the receiver divided by the square root of the MIC (d/√w)
Overpressure	The momentary air pressure above atmospheric pressure generated by a blast, measured unweighted in dBL (cf. dB A-weighted for noise)
Sensitive receiver	Any dwelling, building or site identified in the consent conditions at which vibration or overpressure limits apply, typically assessed at the notional boundary
Heritage structure	Any built structure or archaeological feature identified under Section 8.0 of this plan as having heritage value and potential sensitivity to vibration

4.0 CONSENT CONDITIONS RELATING TO BLASTING

The relevant consent conditions will be inserted here:
[PLACEHOLDER]

5.0 BLAST SCHEDULING AND NOTIFICATION

Predictability of blasting times is recognised as an effective means of reducing and mitigating blast vibration effects on people. Where practicable, the Operator should:

- restrict blasting to defined daily windows agreed with the consent authority, and keep each firing close to a similar time each day
- provide prior and timely notification of the proposed blast schedule via the operators website, SMS/email notification or other agreed method.

6.0 MANAGEMENT OF EFFECTS

6.1 Mine planning and mining methods

Management of blasting effects starts with mine planning and design. Vibration levels should be predicted using the scaled-distance relationship recommended in AS 2187-2, Appendix J.

AS 2187-2 recognises that predicting blast vibration is complex due to the non-linear nature of blasting and variable local rock conditions. It is standard industry practice to conduct monitored trial blasts to establish site-specific ground response and confirm the design constants before full-scale blasting.

Insert the site constants once trial blast data are available. Until then, adopt conservative published values for comparable geology and design to a 95% confidence relationship.

The blast design procedure should be:

1. Use the predictive relationship as the starting point for the initial blasts in any new area, charging conservatively until sufficient data confirm or refine the relationship.
2. Apply the previous blast design once it demonstrates compliance, adjusting where recorded vibrations dictate.
3. Update the design relationship by statistical analysis of recorded blast data.
4. Adopt conservative charge weights for the first long-hole production blasts until enough data exist to refine the relationship.
5. Apply the maximum calculated charge weight only once compliance is demonstrated.
6. Repeat the above steps when blasting moves to a new area, or where compliance has proven difficult.
7. Where compliance is difficult, interrogate the design further using data from previous blasting at or near that location.

All blasts should be designed by suitably qualified engineers and independently reviewed before firing. The review should check the MIC, timing and sequencing against the results of previous firings in the same area. Blast designs that depart from standard practice should be referred to a specialist blasting consultant for review.

7.0 MONITORING

At least one spare monitoring unit should be held for use as a roving monitor. The objectives of roving monitoring may include:

1. assess and confirm compliance with vibration and duration limits
2. Investigation of complaints
3. check for anomalous vibration behaviour
4. address residents' concerns and help them understand what they are experiencing
5. provide additional detail on blast design and behaviour
6. identify the need for, and location of, new or relocated fixed monitors

7.1 Calibration

Seismographs, geophones and microphones should be calibrated as required by the measurement standards or the equipment manufacturer. Calibration certificates should record the instrument make, model and serial numbers, calibration date and method reference (ISO/IEC 17025), and be retained with the monitoring records.

8.0 HERITAGE STRUCTURES

8.1 Overview

Blasting is the mining activity most likely to generate ground vibration levels that could affect nearby heritage structures. Blasting can generally proceed across most of a project area while complying with recognised damage-avoidance criteria. However, where blasting occurs close to vibration-sensitive heritage structures, particularly unreinforced masonry, the blasting methodology must be adapted to minimise the risk of superficial (cosmetic) damage. This is best managed through the process set out in this section, which uses real site-specific vibration measurements to guide safe blasting practice.

8.2 Identifying heritage structures

Heritage structures and features within a nominal radius of blasting activities (e.g. 500 m, refined by vibration prediction) should be identified before blasting begins.

Identification protocols and other appropriate considerations will require the input of heritage and engineering professionals.

While the DIN 4150-3 criteria will apply as a default, not all identified heritage items are equally sensitive to vibration. Sites within a heritage area can range from robust concrete machine foundations to fragile dry-stone or revetted masonry. Each structure should therefore be classified by construction type and condition, because this determines which vibration criterion applies (Section 8.3). These classifications should be confirmed through the dilapidation surveys described in Section 8.4.

8.3 Vibration criteria for heritage structures

The DIN 4150-3 Line 3 Criteria in Table 1 are the default to be applied to all heritage structures in accordance with the consent conditions. Alternative vibration criteria from AS 2187-2 may be assigned following agreement from a suitably qualified expert for CODC, For example, this could occur following the initial dilapidation review, or the installation of mitigation such as sandbagging or plywood shoring.

Damage protection criteria should be established with reference to AS 2187-2:2006 and DIN 4150-3:2016 *Vibrations in buildings — Part 3: Effects on structures*. AS 2187-2 provides guidance for structures with typical levels of vibration sensitivity which does not include specific criteria for heritage structures, so additional guidance is taken from DIN 4150-3, which provides limits for structures that, because of their particular sensitivity to vibration, cannot be classified as commercial or residential buildings and are of great intrinsic value (e.g. listed buildings):

Table 1: DIN 4150-3:2016 guideline values for evaluating the effects of short-term vibration on vibration-sensitive structures of intrinsic value

Line	1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz
3	3 mm/s	3 mm/s increasing to 8 mm/s	8 mm/s increasing to 10 mm/s

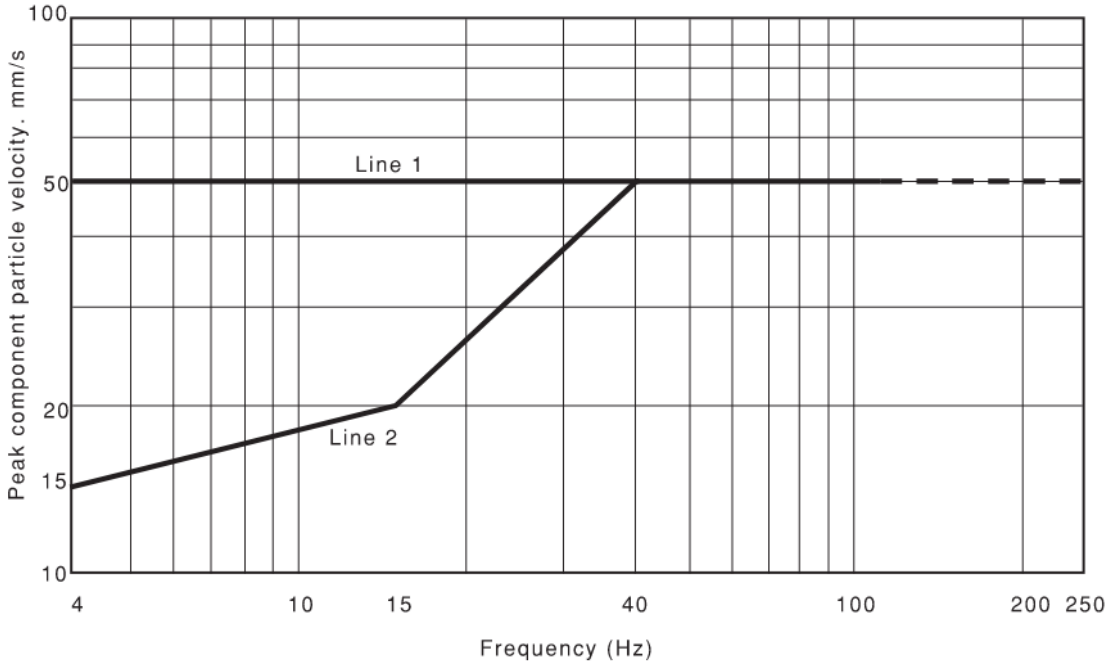
The DIN 4150-3 values are peak particle velocities measured at the foundation, in any direction. They are conservative guideline values below which cosmetic damage is very unlikely; exceeding them does not necessarily mean damage will occur.

The applicable vibration criteria to avoid damage to structures such are set out in Table J4.4.2.1 and Figure J4.4.2.1 of AS 2187-2:2006 and are repeated in Table 2 and Figure 1 respectively.

Table 2: J4.4.2.1 Transient vibration guide values for cosmetic damage

Line	Type of Building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structure. Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Figure 1: J4.4.2.1 Transient vibration guide values for cosmetic damage (BS 7385-2)



8.4 Dilapidation surveys

Before blasting within the nominal radius, dilapidation surveys should be completed by a suitably qualified and experienced structural engineer, with input from the heritage specialist where required. The surveys should:

- document the existing condition of each heritage structure using written descriptions and imagery
- assign a vibration-sensitivity category and corresponding vibration limit to each structure
- identify whether any structure would benefit from temporary shoring or protection to reduce its vibration sensitivity
- establish the baseline against which any alleged blast-related change can be objectively assessed

Surveys should be repeated periodically while blasting continues nearby, and following any monitored exceedance of the assigned limit at that structure.

8.5 Trial blasting and blast design near heritage structures

Reduced-scale trial blasts should be conducted and monitored to determine how vibration propagates through the site-specific geology and to establish safe buffer distances and charge weights for each heritage structure.

Where the assigned criterion could be exceeded, blast engineers should implement a 'proximity' blast design, typically including:

- reduced charge weights per delay, smaller blasthole diameters and shorter advances or lifts
- timing and sequencing selected to avoid reinforcement and to direct the firing progression away from the structure
- temporary shoring of structures identified in the dilapidation survey as benefiting from support

10.0 ROLES AND RESPONSIBILITIES

Amend role titles to match the project organisation and name the appointed specialists.

Role	Responsibility
Site Manager	Review and resourcing of this plan; reporting high-level blast results to the consent authority
Environmental Manager	Monitoring and reporting of blast vibration results; maintaining the monitoring network; review of this plan; environmental awareness and training
Blasting / Mining Specialist	Designing blasts to meet the vibration criteria; investigating high-level results and implementing mitigation; timely provision of blast data Statistical analysis of vibration data; review of design relationships and non-standard blast designs; advice on mitigation
Heritage Specialist	Identification and classification of heritage features; advice on protection measures; accidental discovery response
All site personnel	Be aware of and comply with the procedures in this plan

11.0 RECORDS AND REPORTING

Blast event recording and reporting is a requirement of consent conditions 19 to 23.

Records of all blasts and any monitoring, should be maintained and made available to the consent authority in line with the requirements of the conditions.

12.0 COMMUNITY LIAISON AND COMPLAINTS

The complaints procedure should be updated to reflect the conditions of consent including response timeframes and notification processes. Sample text is provided below.

A nominated liaison officer with delegated authority should be available to receive and investigate complaints as soon as possible after receipt, with contact details available to the local community.

The following procedure shall be followed for all noise complaints:

1. All noise and vibration complaints should be immediately directed to Site Manager.
2. As soon as the complaint is received it will be recorded on the complaints register.

3. An initial response will be made and recorded. Useful responses include reviewing blast records against the complaint, deploying the roving monitor (Section 7.3), and adjusting notification or blast timing.
4. All actions will be recorded on the complaints register and the complaint will then be closed

13.0 TRAINING

All management, staff and contractors should complete induction training before starting work, covering individual responsibilities for managing and reporting environmental and community effects, including blasting effects. Personnel undertaking vibration monitoring should be suitably trained, with specialist support and guidance available, and use equipment compliant with the current standards.

15.0 AUDIT AND REVIEW

This plan should be reviewed at least annually, and following:

- any event or investigation that affects the plan
- relevant amendments to the site risk register or legislation
- changes to mining methods, project staging or consent conditions

16.0 REFERENCES

- AS 2187-2:2006 Explosives — Storage and use, Part 2: Use of explosives (Appendix J)
- BS 7385-2:1993 Evaluation and measurement for vibration in buildings — Guide to damage levels from groundborne vibration
- DIN 4150-3:2016 Vibrations in buildings — Part 3: Effects on structures