

# BLASTING - INFORMATION SHEET

## WHAT IS BLASTING

Blasting or firing is a common process in mining across Australia. It involves using explosives, carefully designed and calculated, to cause a controlled removal of ore or barren rock from underground areas. Vertex uses an explosive material called ANFO, which is harmless until mixed with an accelerant.

Each blast generates Overpressure (measured in dB) and Vibration (peak particle velocity, measure in mm/s). Overpressure is a short spike in air pressure above normal atmospheric pressure created by the blast's shock wave. The rapid pressure rise (and subsequent drop) can cause damage to buildings or people. Thankfully due to being underground, Vertex's operations at the Reward Gold Mine are unlikely to have any overpressure effects on the surface.

Vibration is the ground movement produced by seismic waves traveling through rock after explosive detonation. These vibrations can cause structural damage, cracking, or cosmetic effects in nearby buildings if they exceed safe limits.

## BLASTING AT VERTEX

There are two main types of blasts that occur at the Reward Gold Mine. Development blasts (fairly small and frequent) will generally occur at shift change over to ensure optimal efficiency between shifts. Stope blasts (larger and less frequent) shall generally be fired between 12pm and 1pm, to avoid community disturbance as much as possible.

## LIMITS VERTEX MUST ABIDE BY

Within Vertex's Environmental Protection Licence, limits for both vibration and overpressure to ensure the comfort of communities and prevent any damage occurring.

These EPL limits are:

Air blast overpressure level from blasting operations at the premises must not exceed 115dB at any noise sensitive location for more than 5% of the total number of blasts over each reporting period, and none over 120dB.

Ground vibration peak particle velocity from blasting operations at the premises must not exceed 5 mm/s at any noise sensitive location for more than 5% of the total number of blasts over each reporting period, and none over 10 mm/s.

## PROPAGATION OF VIBRATIONS

Propagation of vibrations (or how vibrations move through the ground) depends on many factors. Vibrations from a blast propagate through the ground as seismic waves that travel outward in all directions. The speed and intensity of these vibrations depend on factors such as the type and density of the soil or rock, voids in the ground, moisture content, and distance from the source.

## BLAST MONITORING

To ensure that Vertex's blasting operations remain within the EPL limits for vibration and overpressure, we have set up two semi-portable blast monitoring units. These units are ready to record both vibration and overpressure data 24/7, with live transmission to an online data viewing platform accessible to Vertex employees. The location of these monitors can be seen on the map below.

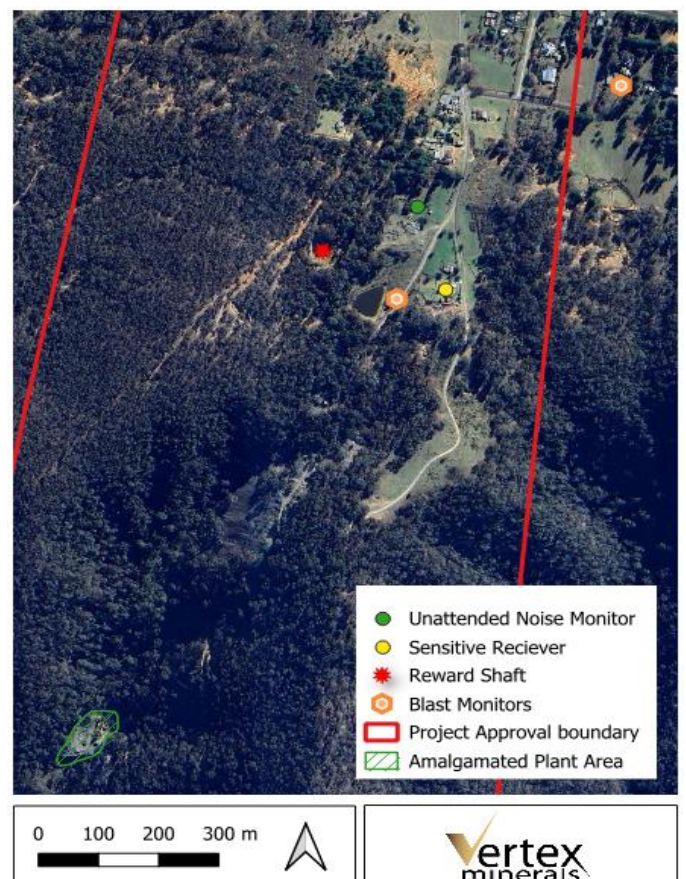


Figure 1: Monitoring Map



Figure 2: Blast monitor unit in situ

following table shows the range of vibrations for cosmetic damage to begin:

Table 2: Vibration thresholds for cosmetic damage (AS2187.2-2006)

| Building Type                             | Vibration Range                     |
|---|-------------------------------------|
| Reinforced or framed structures           | 50 mm/s at 4Hz and above            |
| Residential or light commercial buildings | 15 mm/s at 4Hz and 20 mm/s at 15Hz. |
| Historic or very sensitive structures     | Over 5 mm/s (general damage)        |

An increase from 5 mm/s to 10 mm/s doesn't just mean the vibration is twice as strong, this actually requires a much larger increase in energy.

## COMMUNITY CONCERNS

If any members of the community have concerns about blasting, feedback from any blasting events, or complaints, feel free to reach out to us:

**P:** +61 2 7229 4849

**E:** [info@vertexminerals.com.au](mailto:info@vertexminerals.com.au)

**A:** 6 Bowen Street, Hill End NSW 2850

## COMPARISONS OF VIBRATION

Some everyday events can cause vibration levels above the limits imposed by the EPL, shown below:

Walking, measured on wooden floor: 1.0-2.5 mm/s

Slamming a door, measured on wooden floor: 2.0-5.0 mm/s

Stomping, measured on wooden floor: 5.0-50.0 mm/s

## VIBRATION RANGES AND THEIR EFFECTS

The table below shows a range of peak particle velocities and the Human Response to each range:

Table 1: Human responses to vibration ranges (Playle, R. 2009)

| Vibration (mm/s) | Human Response |
|------------------|----------------|
| 2.0 – 5.0        | Perceptible    |
| 5.0 – 9.5        | Noticeable     |
| 9.5 – 20.0       | Unpleasant     |
| 20.0 – 32.5      | Disturbing     |

Vertex appreciates that the local community may also have concerns regarding structural integrity of homes and historical buildings around Hill End. The