Report to

Hunter Quarries Pty Ltd

Karuah Pit Consolidation Project: Blast Impact Assessment

Karuah Hard Rock Quarry
DA 265-10-2004 MOD 2

Prepared By:

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February, 2026

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Project Details:

Project Number	:	HP2511-2
Date Completed	:	February 2026
File Name	:	Karuah Hard Rock Quarry MOD 2 Blast Impact Assessment V2
Date Saved	:	10/03/2026 8:52:00 AM

Table of Contents

1. INTROUDCTION

Hunter Quarries Pty Ltd (HQPL) owns and operates the Karuah Hard Rock Quarry (KHRQ), and together with Karuah East Quarry Pty Ltd (KEQPL) who owns and operates the Karuah East Quarry (KEQ), forms the Karuah Quarry Complex located approximately 5 kilometres (km) northeast of Karuah at Blue Rock Close / Andersite Road, Karuah.

The KHRQ and KEQ sites produce a high quality andesite resource which is supplied to construction, infrastructure, and other development projects across Greater Newcastle, the Hunter Valley and Mid-North Coast regions.

HQPL and KEQPL, who are affiliated companies, are proposing to modify the State Significant Development (SSD) approvals for the Hard Rock Quarry (DA 265-10-2004) and the Karuah East Quarry (Project Approval MP09_0175) under the provisions of Section 4.55(2) of the Environmental Planning and Assessment Act 1979 (EP&A Act). The applications are being referred to as the Karuah Pit Consolidation Project and will consist of two concurrent modification applications to the SSD approval for each quarry, that will be known as KHRQ MOD 2 and KEQ MOD 11.

HQPL has recently acquired Lot 11 DP 1024564 (Lot 11), enabling HQPL and KEQPL to control all landholdings within the Karuah Quarry Complex. This acquisition now allows HQPL and KEQPL to readily extract previously sterilised resource from the remnant dividing highwall between the KHRQ and KEQ extraction pits forming a Consolidated Extraction Area (CEA). The purpose of the modification is to primarily enable the extraction of the previously sterilised andesite resource from the remnant dividing highwall as well as within other cleared areas from the KHRQ and KEQ sites in a coordinated approach.

Heilig & Partners Pty Ltd has been engaged by HQPL to prepare a Blast Impact Assessment (BIA) for the Karuah Pit Consolidation Project, with this report considering the KHRQ (MOD 2) component of the overall project, which should be read in conjunction with the concurrent KEQ (MOD 11) BIA.

2. OBJECTIVES OF BLAST IMPACT ASSESSMENT

This BIA is prepared to provide a framework for the procedures to maintain best practice controls to manage potential environmental impacts during the drilling and blasting activities associated with the extraction of material from KHRQ, inclusive of the proposed MOD 2 development.

The objective of this document describes how HQPL will manage blasting activities and the related environmental impacts such as ground vibration, airblast overpressure and flyrock. It sets out the anticipated performance requirements and procedures to ensure that the possible environmental impacts associated with blasting activities are adequately identified and controlled for the project.

This document is applicable to all the drilling and blasting activities during the establishment phase of the proposal, as well as the ongoing production phases of the KHRQ.

This document has been prepared to address the Assessment Requirements for MOD 2 issued by the NSW Department of Planning, Housing and Infrastructure dated 1 October 2025 which requires the Modification Application to consider blasting.

This BIA will also be used to update site's Environmental Management Strategy & Monitoring Program (EMS&MP) which governs how blasting activities are undertaken to ensure compliance with DA 265-10-2004 and Environment Protection Licence (EPL 11569), as well as the site's Blast Control Plan developed to the satisfaction of the NSW Resources Regulator.

2.1. Performance Criteria

The environmental controls on blasting activity required as part of the license conditions will address:

- Minimising the impact of vibration and airblast overpressure associated with blasting activities to acceptable amenity levels.

- Preventing damage to adjacent public utilities, structures and other buildings resulting from vibration and air overpressure effects.

In addition to the above-mentioned environmental objectives and performance criteria, all drilling and blasting activities will necessarily meet the following objectives:

- Control of flyrock and safety of all personnel.

- Compliance with the requirements of the quarry and Explosives Inspectorates.

- Fragmentation and diggability requirements commensurate with excavating equipment.

The current Development Consent (DA 265-10-2004) and EPL (EPL 11569) impose blasting criteria that is reproduced in Table 1.

Table 1 – Environmental criteria relevant to blasting activities, as per DA 265-10-2004 and EPL11569.

	Ground vibration and air overpressure measured at a sensitive place	
	Monday to Friday 9am to 3pm	Other times and public holidays
Ground Vibration (peak particle velocity)	Exceed 5 mm/s for more than 5% of the total number blasts during the reporting period No blasting > 10mm/s	No blasting to occur, unless special approvals sought.
Airblast overpressure level (dB linear peak)	Exceed 115 dBL for more than 5% of the total number of blasts during the reporting period No blasting > 120dBL	No blasting to occur, unless special approvals sought.

The permissible limits given in Table 1 are generally consistent with those of other recently reviewed quarry approval and other license conditions. The noted variations however relate to the percentile compliance conditions of 95% of blasts over a 12-month period.

These Table 1 criteria are protective of personal amenity and quality of life for existing residents around the KHRQ as well as necessarily ensuring that the integrity of infrastructure, including houses, sheds, water tanks, pools, and in-ground services, are not impacted upon by the quarry blasting.

There is no indication that more restrictive criteria than those given in Table 1 are required to be applied to any the current or proposed MOD 2 activities at the KHRQ.

3. KARUAH EAST QUARRY DESCRIPTION

The operation of KHRQ (and KEQ) contribute towards satisfying significant and ongoing market demand associated with various State Significant Infrastructure (SSI) projects in the Newcastle, Hunter Valley and Mid-North Coast regions. These projects are critical to deliver improved connectivity of the Mid North Coast to Newcastle, the Hunter Valley and Sydney and include the Newcastle Inner-city Bypass (SSI-6888), Pacific Highway widening at Hexham Straight, Singleton Bypass, and the M1 Pacific Motorway extension to Raymond Terrace (SSI-7319).

HQPL supplies high quality quarry products to a large and rapidly emerging customer base that includes Transport for NSW, a number of local Councils, the Port of Newcastle, Ausgrid, Newcastle Airport, Tier 1 infrastructure providers as well as the general construction, development and infrastructure industries within greater Newcastle, Hunter Valley and the Mid North Coast Regions. HQPL also supplies and supports downstream businesses, including the Tea Gardens Hunter Ready mix Concrete Plant, which in turn contributes to the local construction industry.

Development Consent DA 265-10-2004 was granted for the KHRQ as a State Significant Development under the provisions of Section 76A(7) of the EP&A Act 1979 on 3 June 2005.

Prior to this consent, KHRQ was located wholly within Lot 21 DP 1024341 (Lot 21) and operated under a Development Consent granted by the Great Lakes Council (now MidCoast Council) in 1997, and continuing use rights for the former Karuah Red Quarry which began operations before the commencement of the EP&A Act 1979.

At this time, the quarry contained:

- An open cut quarry pit;
- A processing and handling area, which included a crusher and several stockpiles;
- An internal haul road network that joined The Branch Lane;
- An office and weighbridge; and
- A water management system that used the former Karuah Red Quarry for dirty water storage.

DA 265-10-2004 provided approval for the KHRQ to extract the remainder of the resource approved for extraction and expand into adjoining Lot 11. The key features of the approval include:

- Implementing the remainder of the approved Stage 1 quarry operation and the Stage 2 extension of the quarry pit onto adjoining land of Lot 11;
- Upgrading and using the existing infrastructure at KHRQ to accommodate the extension;
- The extraction of up to 500,000 tonnes of material per annum;
- Quarrying operation permitted for 22 years after the commencement of the consent (current lapse date 3 June 2027);
- A total extraction limit of 11.2 million tonnes of andesite material over the period of the consent;
- The progressive rehabilitation of the quarry;
- The establishment of a Conservation Offset Area (COA) on the southern portion of Lot 12; and
- Surrender of any existing development consents and existing use rights associated with the site.
- Approved operating hours for the KHRQ are as follows:
    - 7.00am to 6.00pm, Monday to Friday and 7am to 1pm Saturday.
    - No quarrying operations on Sundays or Public Holidays.
- Approved blasting hours are as follows:
    - 9.00am to 3.00pm, Monday to Friday.
    - No blasting Saturdays, Sunday and Public Holidays.
- One (1) blast can be carried out per week.

4. PROPOSED MOD 2 DEVELOPMENT

The proposal seeks to enable the extraction of previously sterilised andesite resource from the remnant dividing highwall and all disturbed areas at the KHRQ (MOD 2 to DA 265-10-2004) and KEQ (MOD 11 to MP 09_0175) in a coordinated approach. The proposal does not seek to increase the approved annual throughputs at either quarry (500,000 tpa at KHRQ and 1.5 mtpa at KEQ). There will be no intensification of annual quarry operations.

Details of the proposed KHRQ MOD 2 development are provided below, and the proposed KHRQ site plan is provided in **Appendix 1:**

- Concurrently modify both the KHRQ and KEQ consents to extract the known resource contained within already disturbed areas of Lot 12, Lot 13 and Lot 11 including the dividing highwall, within the currently approved excavation depths of RL65 at KHRQ and RL45 at KEQ.

- Minor extension and overlap of extraction boundary of both KHRQ (into Lot 12) and KEQ (into Lot 11) extraction areas to holistically encompass the highwall structure, inclusive of appropriate safety offsets.

- Material sourced from the overlapping area of the combined extraction area (CEA) will be transported by internal haul road to either the KHRQ or KEQ for processing, stockpiling, sale and transport to market within currently approved throughput rates.

- An extension of the life of quarrying operations from 3 June 2027 to 31 December 2034 to align with the approved operational timeframe of the KEQ.

- Increase in approved total resource volume from 11.20 Mt to 13.20 Mt (18% increase).

- Extended operating hours to match the approved hours of operation of the KEQ as follows:

    - Quarrying Operations:
        - 7.00 am to 9.00 pm, Monday to Friday.
        - 7.00 am to 10.00 pm, Monday to Friday on 50 calendar days per year.
        - 7.00 am to 6.00pm Saturday.
        - No drilling 6.00 pm to 10.00 pm Monday to Friday or 1.00 pm to 6.00 pm Saturday.
        - No quarrying operations on Sundays or Public Holidays.

    - Product Loading and Dispatch:
        - 5.00 am to 9.00 pm, Monday to Friday.
        - 5.00 am to 10.00 pm, Monday to Friday on 50 calendar days per year.
        - 6.00 am to 6.00pm Saturday.
        - No quarrying operations on Sundays or Public Holidays.

    - Construction Activities:
        - 7.00 am to 6.00 pm, Monday to Friday; and 8.00 am to 1.00 pm Saturdays unless noise from construction activities does not exceed 40 dB(A) $L_{Aeq(15\ min)}$ at any privately-owned residence.

- Maintenance Activities:
  - 24 hours a day, 7 days per week, providing maintenance activities are inaudible at any privately-owned residence.

- Changes to approved blasting activities as follows:

  - Change in blasting frequency from one (1) blast per week at KHRQ to a combined two (2) blasts per week in total between KHRQ and KEQ. This will result in a cumulative reduction of blasting activities between KHRQ (one blast per week currently approved) and KEQ (2 blasts per week currently approved) from a total of three (3) blasts per week to two (2) blasts per week.

- Approved blasting hours are proposed to be extended by 2 hours to occur between 9am and 5pm (Monday to Friday) to provide improved flexibility during blasting of the dividing highwall and align with proposed arrangements at KEQ.

- Revised final landform resulting in a free-draining landscape of the current extraction area, resulting in reduced geotechnical risks over the long-term and a landform with greater consistency with the existing surrounding environment.

- Reviewing and modernising established Management Plans as required.

- Environmental safeguards incorporated into Management Plans that are in place for the KHRQ operation will be reviewed and updated (where required) to accommodate the proposal.

No change is necessary to the Development Consent as it relates to annual extraction, processing and transport rates (capped at 500,000 tpa).

The following coordinated extraction sequence between the KHRQ and KEQ will be generally undertaken to complete the Karuah Pit Consolidation Project (inclusive of remnant highwall removal):

- Stage 1: Extract the current top benches of the remnant highwall (RL135 m) down to RL90 m (currently lowest KEQ bench at the time of writing (February 2025)), forming a single extraction level/area on Lot 12. This approach is needed to safely remove peak of the dividing highwall and make the extraction area level with the current KEQ extraction area.

- Stage 2: Extract Lot 12 from RL90 m (currently lowest KEQ bench at the time of writing (February 2025)), down to RL65 m in line with KHRQ pit floor and KEQ boot-bin levels, forming a single extraction level/area over the entire Consolidated Extraction Area.

- Stage 3: Extract final benches at KEQ (Lots 12 & 13) from RL65 m down to RL45 m. The KHRQ pit floor is to remain at RL65 m.

5. KARUAH HARD ROCK QUARRY LOCATION

The KHRQ extents are bounded by bushland to the north and west, the KEQ to the east (and bushland further east) and the Pacific Highway to the south. Bushland dominates the areas surrounding the quarry with the closest residential property approximately 550 metres from the south-western bounds of the KHRQ extraction area.

In general, the area is very low density with not more than 10 properties within a 1000-metre radius around the pit footprint. A separation distance of approximately 420 metres exists between the KHRQ extraction area and the Pacific Highway which links Brisbane and Sydney. The location of the KHRQ pit and the nearby sensitive receivers are shown in Figure 1 and Table 2 shows the title details of each identified receiver.

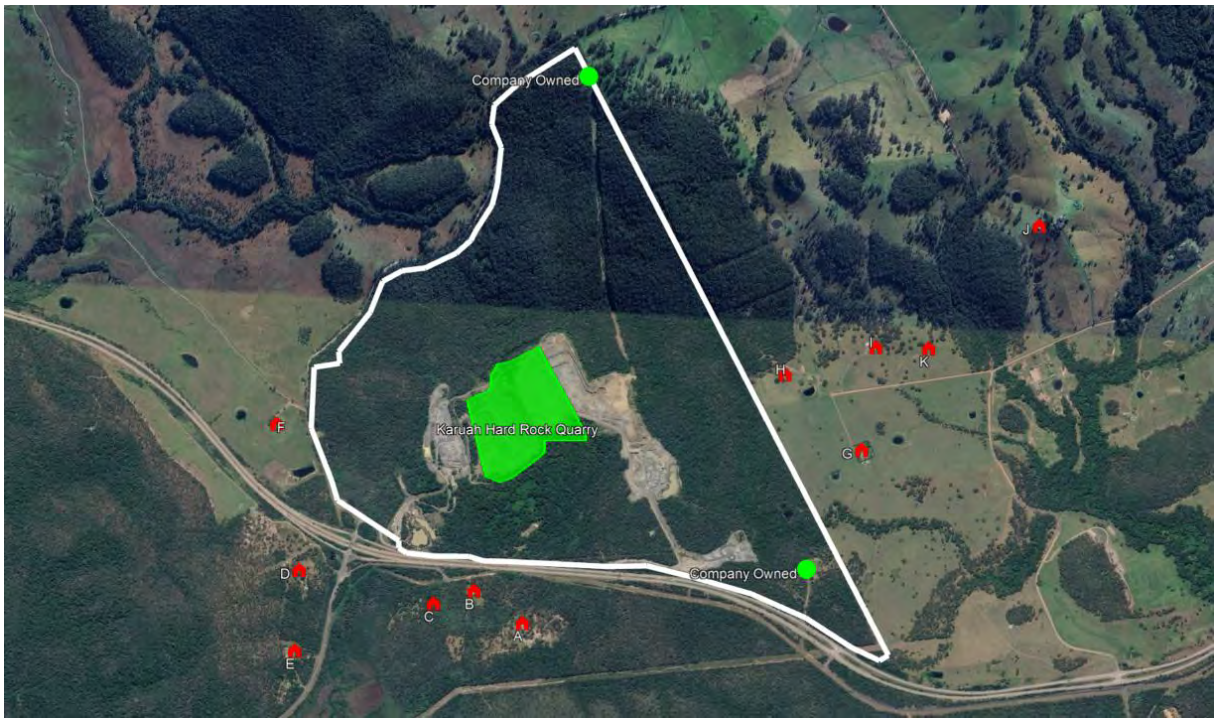


Figure 1 – Plan of the area (Google Earth) showing the maximum extents of the Karuah Hard Rock Quarry Pit area as a green shaded zone. Adjacent rural residential properties are also shown.

Table 2 – Nearby sensitive receiver ID and property ID

Receiver ID	Property ID
A	Lot 100 DP785172
B	Lot 3 DP785172
C	Lot 2 DP785172
D	Lot 22 DP1024341
E	Lot 250 DP1092111
F	Lot 50 DP1036893
G	Lot 1 DP1032636
H	Lot 10 DP1032636
I	Lot 11 DP1032636
J	Lot 13 DP1032636
K	Lot 12 DP1032636

The potential effect of blasting is assessed based on the assumption that blast activities are undertaken at the perimeter of the proposed extraction footprint in order to test conservative minimum separation distances to sensitive receivers. This necessarily produces an assessment skewed to the conservative evaluation; however, it ensures that the assessment remains valid should there be any changes to the overall quarry and pit benching design.

6. EXISTING CONDITIONS

The existing conditions in the area of the KHRQ are typical of a semi-rural area with minimal sources of external ground vibration, beyond heavy vehicles.

Any instances of perceptible vibration would result only from a combination of heavy vehicle movement coupled with uneven road pavement surfaces. Only under these combined conditions would measurable vibration occur. Even then, it would however be limited to areas immediately around the road and not measurable at the property given the setback distance of the property to the road. A review of the Pacific Highway shows the surface pavement is generally in good condition; however, it is frequently used by heavy transport.

Although no long-term background measurements of vibration were collected as part of this BIA, some short interval vibration measurements at other locations where there is heavy transport showed levels of vibration less than 0.1mm/s at distances of within 10 metres from the road. These distances are significantly less than the minimum distance between the road and the dwelling.

There are no identified locations around the KHRQ where elevated vibration levels already occur.

7. ADJACENT PROPERTIES

A review of the neighbouring properties to the KHRQ extraction area, identifies a small number of various types of dwellings and sheds within approximately 550 to 1500 meters.

Most of these properties are timber or brick-veneer construction style dwellings, with no instances of blast induced vibration damages being reported to HQPL due to operations to-date.

It should be noted that the setback of properties along Mill Hill Close make it difficult to identify the type and age of the property with accuracy, but it would be assumed that these fit with the described above.

There is no indication that they would require a vibration criterion that is more stringent than that commonly applied for standard residential properties.

It is noted that around the planned blast area:

- The nearest residential property is located towards the south and is approximately 550 metres from the closest location of possible blasting in the quarry, but more than 650 metres from much of the blasting after it moves toward the north-east and away from the southern extraction limit boundary to extract the remnant dividing highwall.
- Towards the south-west there are several properties along Mill Hill Close and Tarean Road with the closest being approximately 550 metres from the closest point of blasting.
- There are no residential properties to the directly east of the quarry.
- The property density in the area is low with less than 10 individual buildings/sheds within 1500 metres of the consolidated quarry crest.

Examples of the building types adjacent to the proposed quarry are shown in Figure 2. Infrastructure is generalised according to residential and industrial sheds. No other significant infrastructure has been identified in the general vicinity of the quarry. Building specific vibration criteria is not proposed nor considered relevant. There are no buildings that would preclude the generic building categories and associated vibration criterion given in Table 1.

827 Tarean Road, Karuah

2 Halloran Road, North Arm Cove

Figure 2 – Typical example of properties that exist around the KHRQ along Halloran Road, North Arm Cove (east of site) and Tarean Road, Karuah (south of site).

8. OTHER PROPOSED QUARRY OPERATIONS

The proposed Karuah South Quarry (KSQ) (State Significant Development (SSD) SSD-8795) application at Lot 11 DP 1024564 is located to the west of KEQ and the south of the existing KHRQ extraction area. The KSQ proposal seeks to extract the remaining resource south (of KHRQ) and west (of KEQ) of the existing quarry's limit of extraction. The quarry is proposed to be a conventional drill and blast operation with rock collected and processed onsite. Processed product is proposed to be stockpiled onsite with a loader used to load trucks for transport off-site when required. The proposed hours of operation are 5:00 am to 6:00 pm Monday to Friday and 5:00 am to 1:00 pm Saturday with only product loading and transport activity to occur between 5:00 am and 7:00 am. The proposed annual production limit is 600,000 tonnes.

Following acquisition of Lot 11 DP 1024564, HQPL is also the proponent for the proposed KSQ. In relation to the consideration of cumulative impacts, the following is noted:

- If approved, KSQ will not commence operations until after operations at KHRQ have ceased;
- The applicant is currently reviewing the business case for the proposed KSQ; and
- Any future revision or amendment to the proposed KSQ project will be supported by an updated BIA that accounts for the proposed Karuah Pit Consolidation Project.

9. DRILLING AND BLASTING METHOD

Extraction within the KHRQ will continue using a combination of drilling and blasting techniques, together with a small amount of free digging and hydraulic hammering where any oversize material is encountered, which is consistent with current operations. Some near-surface weathered material may be removed using medium size excavators without any requirement for blasting.

Previous blasting on site has identified the required powder factor to achieve appropriate breakage and diggability as around 0.75 kg/m^3 (Precision Drill & Blast, 2026). No information is available on the quantity of oversize that is likely; however, it is expected to be minimal, possibly around a few percent. It is also expected that the explosives supply and delivery will be sub-contracted to a specialised blasting supplier. The same level of quality assurance that has been applied to all previous aspects of the blasting processes will continue.

The scale of blasting will be controlled by the benching strategy for the site rather than a restricted scale of blasting as a requirement to comply with both vibration and air overpressure levels. The blast design is therefore based upon:

- A blasthole diameter of between 89 and 102mm, drilled using conventional and modern hydraulic drilling rig equipment.
- A nominal bench height up to 15 metres depending upon the geometry of the benches. Shorter bench heights may be initially required to establish the benching plan. Once established, any bench face exceeding 15 metres would be unlikely. The proposed pit geometry is based around 15 metre benches.
- A nominal blasthole pattern with a burden and spacing of around 2.5 and 2.8 metres respectively depending upon the competency of the rock mass (and the blasthole diameter)
- A single explosive charge per blasthole, independently sequenced to restrict the maximum explosive quantity per delay to a value permitting compliance at the nearest property.
- The powder factor is expected to vary to provide fragmentation and diggability commensurate with the excavation techniques with very limited use of hydraulic hammers. Advice from HQPL's blasting contractor provides that the current power factor lies in the current region of 0.6 to 0.75 kg/m^3 (Precision Drill & Blast, 2026).

Once the consolidated extraction area has been established, blasting is planned to continue with the 15 metre bench heights. The shallower bench heights will only be used during the initial phase of establishing the bench faces.

The KHRQ site plan shows a bench height of 15 metres with multiple benches planned. Based upon a 15 metres bench height, the explosive weight will vary to around 100 kilograms per blasthole for an 89mm diameter blasthole loaded with an emulsion explosive type explosive. Lesser explosive weights may be used during the development of the quarry in the initial stages until regular bench heights are established.

10. DRILLING AND BLASTING IMPACTS

The effects associated with blasting activities will be controlled to ensure safe working procedures for all personnel, safety of adjacent equipment and infrastructure (including houses and public utilities) and a minimum disturbance to persons located around the quarry area.

The environmental impacts from blasting will be controlled to the established performance criteria provided in in Section 1 of this BIA.

As noted in Section 4, blasting hours are proposed to be extended to align with standard quarry hours of 9.00am to 5.00pm Monday to Friday, excluding public holidays. In the event that additional blasting is required beyond the proposed blasting hours, written approval from both the NSW EPA and the NSW Planning Secretary would be sought in the first instance.

As also noted in Section 4, blasting frequency will be cumulatively reduced from an approved three blasts per week (two blasts at KEQ and one blast at KHRQ) to a cumulative two blasts per week.

Blasting is typically undertaken during the middle of the day and only when fine weather conditions prevail. Blasting outside these hours will only be undertaken in unforeseen circumstances (e.g. safety issue with explosives) or the event of an emergency.

The tonnage yield per blasthole will vary according to the available quarry area, product forecast and blast design, including the bench height, drill pattern dimensions, and the number of blastholes. A typical blast yields up to approximately 60,000 tonnes although blasts of more than 60,00 tonnes are completed from time to time.

10.1. Drill and Blast Vibration

Production blasting has been undertaken on site as part of the current KHRQ. A site specific relationship has been developed between vibration level, distance and explosive quantity using measured vibration data from previous production blasting.

The primary factors known to influence the level of ground vibration from blasting include:

a) The weight of explosive per delay;
b) The distance between the blastholes and the point of measurement; and
c) The local geological conditions and the influence of geology and topography on vibration attenuation.

Consistent with the recommendations of the Australian Standard[1], the most common form of the vibration equation to predict the amplitude of ground vibration from blasting at any distance from the blasthole and is given as:

$$PPV = K\left(\frac{d}{\sqrt{w}}\right)^{-\beta}$$

where d is the distance between the blastholes and the point of measurement;
w is the maximum instantaneous charge weight per delay;
K and β are site specific constants.

Based on the above equation, the expected level of ground vibration can be determined for a given distance and maximum charge weight.

A relationship between the level of vibration, the quantity of explosive and the distance from the blast has been derived vibration measurements from a regression of the vibration recorded from the existing blasting activities at the same site. An equation consistent with the format described above has been developed from these data. and used to estimate the level of ground vibration.

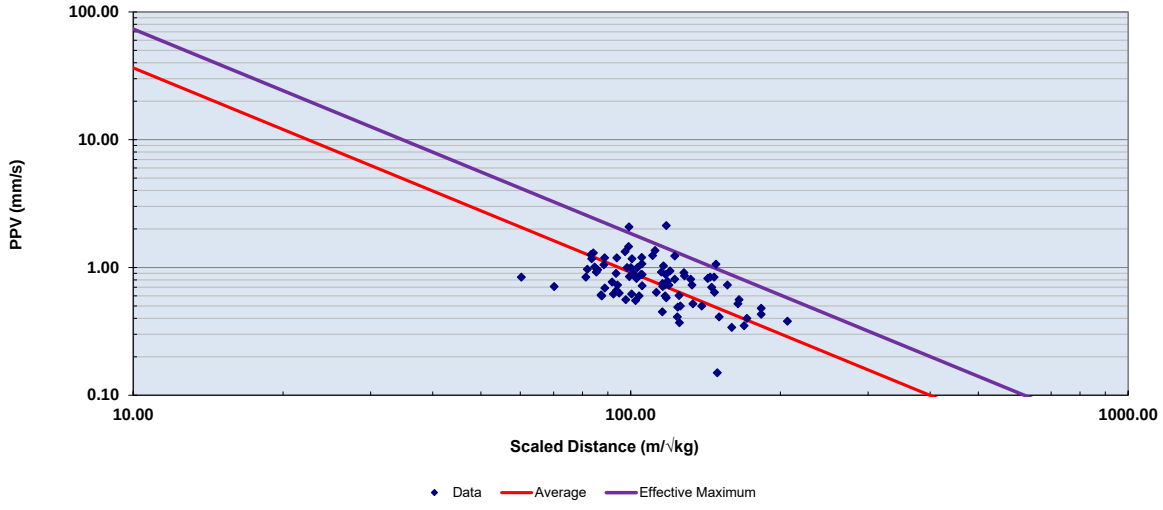


Figure 3: Regressed vibration data measured from the current blasting activities at the Karuah Hard Rock Quarry and the Karuah East Quarry

To account for the variability in explosive performance and ground characteristics, it is accepted industry practice to design blast patterns using an equation that predicts the 95-percentile level (i.e. a level which

[1] AS2187.2-2006, "*Explosives – Storage, transport and use Part 2: Use of explosives*"

will exceed 95% of all measured values) and continually update and review practices according to the measured levels. If measured levels routinely exceed, or fall below, the predicted value, the equation is adjusted to reflect the different site conditions. The vibration relationship for the 95th percentile that has been regressed from the existing Karuah Quarry is as follows:

$$PPV = 2780\left(\frac{d}{\sqrt{w}}\right)^{-1.60}$$

Figure 3 shows vibration level as a function of distance from the blasthole for varying quantities of explosive. Because of the sufficient separation distance between the proposed extraction areas of KHRQ and the nearest properties, the explosive quantities per blasthole will be generally consistent with that used at conventional medium to large scale quarrying operations.

Figure 4 shows the explosive quantities per blasthole ranging up to 130 kilograms. As a function of distance for compliance with a 5mm/s criterion. Explosive weights per blasthole will necessarily vary according to the blasthole depth with greater variation in explosive quantities expected during the initial stages of the quarry development phases until consistent bench heights have been established.

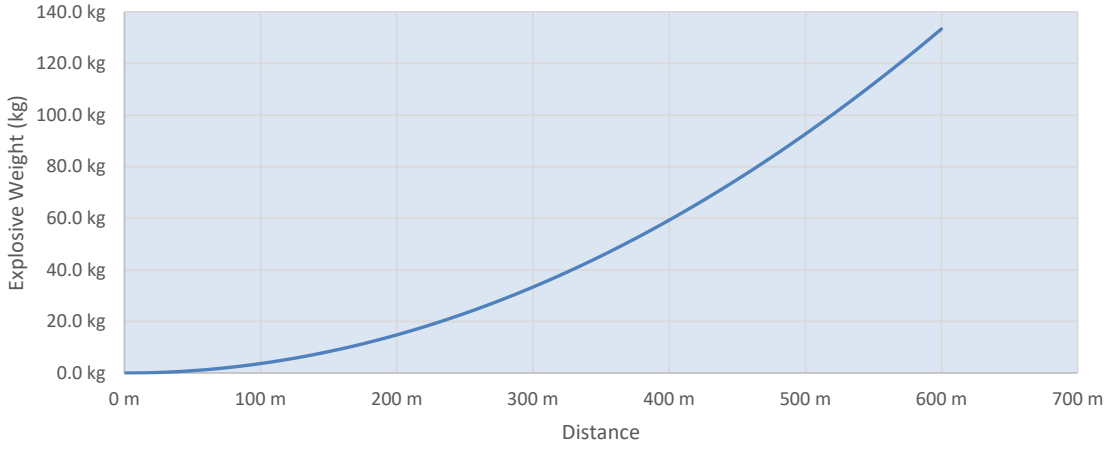


Figure 4: Vibration level as a function of distance from varying explosive quantities per delay for compliance with 5mm/s

10.2. Air Overpressure

Like the vibration analyses, site data has been collected by HQPL and KEPQL from all recent blasting operations to determine the overpressure level as a function of distance and explosive weight. The assessment is therefore based upon information presented in the peer reviewed international literature.

The United States Bureau of Mines (USBM)[2] have undertaken perhaps the most extensive review of overpressure and its effects and have proposed the form of the relationship showing the expected level of overpressure as a function of distance and explosive quantity. Using this form of this equation, a reference equation for estimating the overpressure is shown below:

$$dBL = 164 - 24 \times Log\left(\frac{d}{\sqrt[3]{w}}\right)$$

where dBL is the level of overpressure and d and w are as per the vibration relationship.

Unlike ground vibration, geology has a negligible impact on the levels of air overpressure. The

[2] Siskind, D.E., Stachura, V.J., and Stagg, M.S., 1980. "*Structure Response and Damage Produced by Airblast from Surface Mining*", United States Bureau of Mines, Report of Investigations No 8485.

overpressure level is affected by blast design, in particular the proximity of the explosive charges to the free surface. Also, unlike ground vibration, overpressure level is significantly affected by local conditions including:

- Topography and vegetation with treed areas or other elevated features aiding in affecting the measured level of overpressure. Properties on the leeward side of the hill will commonly measure overpressure up to 5dBL less than those of the windward side.

- Atmospheric conditions with wind direction, humidity and temperature inversions combining to affect overpressure levels by as much as 10dBL for upwind versus downwind areas of the blast.

- Orientation of blast with measurements point in front of the blast receiving levels up to 5dBL greater than those points directly behind the blast.

10.3. Blast Modelling of Explosive Quantities

The regressed vibration and air overpressure relationships can be used to assess the effects of the planned scale of blasting for the KHRQ and confirm any restrictions that may be necessary to ensure compliance with the existing environmental performance criteria summarised by Table 1 at the existing properties.

It should be noted that the maximum permissible explosive weights used by HQPL will be maintained and only increased in the event that the closest sensitive receivers where either acquired or detailed in an agreement with the current property owner to exceed the environmental performance criteria.

The analyses given in Plate A shows the expected explosive quantities that can be used in the total footprint of the quarry consolidation based upon compliance with 5 mm/s at the nearest properties. The entire footprint of the consolidated extraction area has been considered in the analyses to ensure flexibility of the design. The scale of blasting material and corresponding bench heights are therefore modelled to be based upon the predicted quantities in Plate A and the permissible explosive quantities referenced to Figure 4.

Plate A also shows the expected location of vibration contours for blasting with explosive quantities modelled to comply at the nearest sensitive receivers with a 5 mm/s vibration limit. Those locations lying nearer to the blast than say the 2 mm/s contour will on occasions receive vibration levels exceeding 2mm/s, but predicted to be not more than 5 mm/s. Those further from blast than the same 2 mm/s contour are predicted to receive vibration less than 2 mm/s. The contours show the maximum extent of the vibration and not that which would be produced from all blasts. When blasting in any area of the KHRQ, the level of vibration at properties on the eastern sides of the quarry near to Halloran Road will fall to low and probably immeasurable vibration values. Plate A also indicates:

- The scale of blasting in the KHRQ will be consistent with the current 15 metres benches over the majority of the quarry. There are no areas of the KHRQ extraction area where the explosive weight needs to be reduced in order to comply at the closest properties along Halloran Road or Mill Hill Close.

- The residential properties along Halloran Road, Mill Hill Close or Tarean Road do not affect the scale of blasting although may receive perceptible levels of vibration at some stages when blasting occurs at the nearer extents of the consolidated quarry footprint.

- The entirety of the KHRQ extraction area will not require any adjustment to the scale of blasting. Explosive quantities per blasthole of 130 kilograms are considered feasible. The current benching design for the quarry plan indicates that explosive quantities will be around 130 kilograms per blasthole.

Plate C shows the modelled location of the varying air overpressure contours based upon compliance with 115 dBL at the adjacent properties. The information shown on Plate C indicates that the blast

design with the maximum explosive weight will comply with the 115 dBL limit and like the ground vibration impacts will require no adjustment to achieve compliance with the environmental performance criteria.

Plate C indicates:

- Similar to vibration, there is no adjustment to the scale of blasting required to comply with the 115 dBL criterion at the adjacent residential properties along Halloran Road, Mill Hill Close or Tarean Road.
- Explosive quantities per blasthole of 130 kilograms are considered feasible to achieve compliance with the existing environmental performance criteria.
- The KHRQ can be blasted with the maximum 15 metre bench height and achieve compliance with the existing environmental performance criteria.

11. FLYROCK MODELLING

There are two potential sources of flyrock from blasthole patterns:

- Vertical face; and
- Horizontal surface.

High velocity rock movement from the vertical face can occur if blastholes are drilled too close to the vertical face, enabling the high-pressure gases to easily burst free. Best practices suggest that orientation of the vertical face and the blasthole orientation should be reviewed prior to the blast to identify any instances where the distance to a free face may be insufficient to prevent flyrock. Where possible, the preferred direction of any movement of blasted material should also be towards the center of the pit and away from sensitive receivers. The planned pit arrangement for the proposal complies with this objective.

11.1. Flyrock Modelling

An engineered flyrock model combining all the relevant aspects of projectile motion based upon rock ejection velocities has been developed and applied to the KHRQ. The model incorporates the results of more than ten different documented research projects specifically aimed at estimating flyrock ejection velocities, flyrock ranges and/or safety exclusion zones. These models account for both blast designs, in particular the proximity of the explosive column to the free face, and fluid dynamics code addressing projectile motion and air resistance (drag) of the ejected blast fragments. The models incorporate specific derived code to best estimate flyrock ranges and corresponding safe exclusion zones. The presented results are based on probabilistic analyses and estimate the likely landing position of possible ejected rock fragments based upon their equivalent diameter.

The uncontrolled movement of rock from the horizontal surface (i.e. ejection of rock around the collar) and vertical free face represent the possible sources of flyrock. Confined blasting (i.e. without a free face) virtually eliminates the possibility of flyrock from the vertical face, although the propensity for flyrock from the collar region increases and necessitates an increased uncharged collar to better control rock movement from around the collar. There is no intent to undertake routine confined blasting as part of the current or proposed blasting activities.

Blasting in built up areas where control of flyrock is critical commonly employs an uncharged collar length equivalent to between 25 and 30 times the blasthole diameter, or for an 89mm diameter blasthole, 2.3 to 2.7 metres. These ratios are as per the Australian Standard AS2187.2 for the control of flyrock from blasting.

Figure 5 shows the results of the flyrock outcomes for a 15-metre bench height blasthole loaded with approximately 130 kilograms of explosive. The modeled landing positions for flyrock are based upon the

calculated trajectories and a probabilistic component accounting for the fragment size, direction and velocity. The probabilistic component of the model estimates flyrock ranges based upon a combination of operating conditions and therefore predicts the outermost envelope of flyrock landing points.

Figure 5 – Predicted flyrock locations from blasting with a 102mm diameter blast-hole and 15 metre bench. The predicted locations are shown as the yellow markers.

The representative locations correspond to the closest point that blasting with a 15-metre bench could occur to Mill Hill Close. The modeling predicts that any blast generated flyrock is constrained to within a zone of approximately 50 metres around the perimeter of the blast zone, compared to the 500 metres at Mill Hill Close, and approximately 370 metres to the Pacific Highway.

The flyrock modeling indicates that for a 15-metre bench with an uncharged collar of 2.5 metres and an explosive weight per blasthole of approximately 130 kilograms, flyrock is controlled to within approximately 80 metres of the blasthole collar. For other bench heights and with a corresponding increase in the weight of the explosive to around 125 kilograms, the extent of flyrock increases slightly because of the increased explosive weight.

The predicted flyrock ranges are based upon a detailed flyrock model that considers flyrock distances based upon ejection velocities, particle size and sphericity and whether collar or front row origin. Whilst best engineering procedures would clearly dictate that site data should continue to be used to supplement the model and verify the predicted results, the model is considered to produce appropriate preliminary expectations of flyrock ranges for varying particle sizes. The probabilistic component of the model estimates flyrock ranges based upon a combination of operating conditions and therefore predicts the outermost envelope of flyrock landing points.

The modelling predicts that flyrock related issues are extremely unlikely for the proposed expansion of blasting areas within the KEQ, particularly given the very controlled nature of the blasting activities in the existing quarry area.

12. ENVIRONMENTAL MITIGATION MEASURES

Environmental mitigation measures will be incorporated into each blast to minimise the impact of the following effects:

- Vibration,

- Airblast overpressure, and
- Flyrock.

12.1. Vibration

Mitigation measures to reduce vibration effects during blast activities are not required based upon the modelling results and the large separation distances from any sensitive receivers. If circumstances change and control measures are required, they could include:

- Ensuring all relevant areas associated with blast activities have been properly analysed to determine scale of blasting required.
- Ensuring only exact quantity of explosives is used for each hole.
- Condition surveys by HQPL for adjacent structures whose risk assessment has highlighted that vibration from blasting may be elevated or where the owner has expressed concern in relation to the possibility of damage, will be undertaken.
- Regular vibration monitoring to confirm that vibrations being induced by the blasting activities are at or below the established environmental performance criteria specified in Section 1.

12.2. Airblast Overpressure

Mitigation measures to reduce overpressure effects during blast activities are not required based upon the modelling results and the large separation distances from any sensitive receivers. If circumstances change and control measures are required, they could include:

- Ensure all relevant areas associated with blast activities have been properly analysed to determine scale of blasting required.
- Engagement with the nearest residents (as identified in Figure 1) as to the effect of the blasting activities.
- Ensure only exact quantity of explosives is used for each hole.
- Regular airblast overpressure monitoring to confirm that vibrations being induced by the blasting activities are at or below the established environmental performance criteria specified in Section 1.
- All blasts designed with a minimum uncharged collar length.
- Where uneven or irregular vertical faces are encountered, ensure that a minimum front row burden is maintained by undertaking face profiling and borehole tracking.

12.3. Flyrock

Mitigation measures to reduce flyrock during blast activities are not required based upon the modelling results and the large separation distances from any sensitive receivers. If circumstances change and control measures are required, they could include:

- An increased minimum uncharged collar lengths (beyond that recommended in the Australian Standard AS2187.2) is applied to all blastholes.
- Ensuring that all design criteria are very accurately measured, documented and adhered to prior to any blasting activity proceeding.

Controlling flyrock is paramount to the design. It is recommended that all blast patterns are recorded by video (drone footage) to determine the appropriateness of the uncharged collar lengths and overall blast

design parameters. Where stemming ejection occurs, or face bursting is observed, the blast design should be reviewed as part of best practices.

13. PERCEPTIBILITY

The following table shows the human perception as a function of vibration levels, as given in the International literature linking human response and vibration.

Table 3 –perceptibility of vibration (Wiss, 1984)

Perceptible Effects	Vibration Range	
	Lower Bound	Upper Bound
Imperceptible	-	0.4mm/s
Slightly Perceptible	0.4 mm/s	1 mm/s
Distinctly Perceptible	1 mm/s	2.5 mm/s
Strongly Perceptible	2.5 mm/s	10 mm/s
Disturbing	10 mm/s	-

The performance criteria specified in Section 1 of this plan limit vibration levels at some properties to those classed as “strongly perceptible”, however given the larger separation distance, the vibration is significantly lower and would more likely “slightly perceptible”.

14. BLASTING MANAGEMENT

As per the Australian Standard AS2187.2 recommendations, all blasts will be planned and designed to achieve the required outcome with minimum impact on the surrounding environment, below, on or above the soil or water surface. Records that detail the results of each blasting operation will be taken and maintained. This information assists in the planning and implementation of further blasts and provides documentation in case of incident or complaint.

For the KHRQ, blast management documentation is divided between the Environmental Management Strategy & Monitoring Program (EMS&MP) (latest version 7B, October 2025) which was established in consultation with the EPA and is approved by the NSW Planning Secretary; and the Blast Control Plan that is developed and implemented to the satisfaction of the NSW Resources Regulator.

The EMS&MP governs how blasting activities will be undertaken to ensure compliance with environmental performance criteria, other management obligations provided by the Development Consent (DA 265-10-2004) and EPL (20611), and any potential impacts to external stakeholders.

The Blast Control Plan governs how blasting activities will be undertaken to ensure compliance with relevant Australian Standards and industry best practices, and any potential impacts to internal stakeholders.

Both documents will be reviewed and updated as necessary prior to commencing blasting activities associated with the MOD 2 development.

14.1. Blast Management Plan Contents

The established EMS&MP (latest version 7B, October 2025) includes the following details to ensure compliance with the Development Consent (DA 265-10-2004) and EPL (EPL 11569):

- Regulatory requirements.
- Roles and responsibilities.
- Blasting monitoring program.
- Community Consultation, including Landholder Blasting Notifications.
- Agency and Public Reporting.
- Complaints Handling.
- Dispute Resolution.

- Non-Compliance, Incident and Emergency Response.

This document will be reviewed as necessary to include the MOD 2 proposal.

14.2. Blast Control Plan Contents

The Blast Control Plan will include the following elements in accordance with Australian Standard AS2187.2:

- Location of the proposed blasting.
- Description of the proposed blasting.
- Permits/licences required for the project.
- Identification and position of the person responsible for the project including project safety and security.
- Identification and position of person who has given approval to use explosives on the project.
- Key appointments and responsibilities.
- Shotfirer's details.
- Details of the risk management assessment.
- Details of adjacent structures or services that influence the blast design.
- Details of reports, drawings and records consulted.
- Layout plan of the blast including drilling pattern and hole depths.
- Detonation sequence/effective charge mass per delay (MIC)/powder factor.
- Type of explosive to be used and quantity required.
- Method of initiation.
- Type of firing equipment and procedures.
- Drilling procedures.
- Explosive loading and charging procedures.
- Explosive storage and handling procedures.
- Security procedures for the site and the blast, including explosives.
- Environmental considerations for airblast overpressure, ground vibration
- Details of communication systems.
- Warning procedures.
- Traffic management plan.
- Proposed dates and times of blasting.
- Details of the exclusion zone.
- Method of notification to owners and occupiers of structures, and providers of services adjacent to the blast.
- Influence of weather.
- Loading in poor light conditions or reduced visibility.
- Cessation of explosive-related activities during electrical storms.
- Misfire management system.
- Post blast assessment and inspection procedures.
- Provision for post-blast comments.
- Signature spaces for the plan author, shotfirer and person who approves the plan.

14.3. Records

Details of the blast will be taken and maintained, including:

- Environmental conditions at the time of the blast.
- Monitoring equipment including type, serial number and location.
- Details of measurements recorded during the blast.
- Details of flyrock or fly.
- Details of incidents and complaints.
- Comment on the results of the blast.
- Proposed modification to the blast plan for future shots.

14.4. Community Consultation

HQPL has a well-established community engagement process in place, as is outlined within the established EMS&MP (latest version 7B, October 2025) which will continue as part of the proposed MOD 2 development including prior to the commencement of blasting in any new areas within the KHRQ. The following is noted:

- A Blast Notification Register is established. Information describing the nature and likely timing of a scheduled blast is conveyed to those on the established Blast Notification Register (which includes all residences identified within Figure 1).
- HQPL has an established Community Call Line for any enquiries or complaints and procedures to respond to any enquiries or complaints in line with the EMS&MP.
- The KHRQ project has recently joined the well established KEQ Community Consultative Committee (CCC). Results of environmental performance (including compliance with blasting criteria) is reported to the CCC.
- Monthly environmental monitoring results (including compliance with blasting criteria) is published on HQPL website.

14.5. Reconciliations and Reporting

For each blast, the following records are maintained:

- A pre-blast sheet confirming that the expected level of vibration at each of the nearest sensitive receivers complies with the vibration limits.
- A completed drilling sheet prepared by the shotfirer showing the measured depth of each blasthole. The sheet will identify and clearly mark any “short” blastholes.
- A blast loading plan showing the depth of each blasthole, quantity of explosive in each blasthole and the uncharged stemming length. The initiation sequence will also be shown. Reconciled explosive quantities used versus the designed quantity will also be shown and any variations accounted for.
- A signed blast summary sheet showing that each of these forms been received and no variations between the intended and implemented design exist.

These requests are in accordance with the specifications listed in the Australian Standards AS2187.2 document.

15. MONITORING OF BLASTING ACTIVITIES

A monitoring program for both vibration and air overpressure levels is established within the EMS&MP (latest version 7B, October 2025) and will be continued for the MOD 2 proposal.

The Monitoring Program has been developed with reference to the procedures described in AS 2187.2-2006, “Explosives - Storage, Transport and Use” and with reference to the ANZECC’s “Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration”, September 1990.

A monitoring site has been established and is representative of the nearest privately owned residential dwellings and other sensitive infrastructure as illustrated by Figure 6 below and monitors air blast overpressure and ground vibration for all blasts.

Figure 6 – Location of Air Blast Monitor

This location is sufficient to accommodate the proposed MOD 2 development, and the establishment of new locations is not necessary.

In the event that community feedback is received that warrants investigation at an additional location surrounding the KHRQ, monitoring will be undertaken and continue until such time that sufficient data is available to allow a satisfactory assessment of both vibration and overpressure values from the blast design. If deemed necessary, amended blast design would be considered to ensure compliance with blasting criteria is achieved.

The vibration monitoring system will consist of an individual vibration and air blast monitor which will be positioned at EPL 11569 Monitoring Point 11 on Mill Hill Close. The vibration monitor will have four recording channels. An external geophone (transducer) will monitor ground vibration in three directions (transverse, vertical and longitudinal particle velocities) and report the level in mm/s. An external microphone will measure the level of overpressure, reporting the data in units of dBL. The monitor will be configured with a vibration threshold trigger to record blast events which exceed a minimum value, typically around 0.5mm/s. The recording duration will be set to exceed the duration of the blast.
Vibration and air overpressure monitoring will be undertaken by persons with appropriate experience. Monitoring equipment will meet the specifications of the Australian Standards AS2187.2. Section J.

The existing monitoring systems that have been established for assessing the current KHRQ blasting activities meet these recommended requirements and no adjustments are necessary.

16. CONCLUSION

This BIA provides an assessment of how HQPL will manage blasting activities for the proposed Karuah Pit Consolidation Project, which primarily seeks to enable the extraction of the previously sterilised andesite resource from the remnant dividing highwall as well as within other cleared areas from the KHRQ and KEQ sites in a coordinated approach. This report has been prepared to specifically accompany the MOD 2 application to the KHRQ (DA 265-10-2004).

This BIA has provided a framework for the KHRQ to maintain best practice controls to manage potential environmental impacts during the drilling and blasting activities associated with the extraction of material from KHRQ associated with the proposed Karuah Pit Consolidation Project.

This BIA describes how HQPL will manage blasting activities and the related environmental impacts such as ground vibration, airblast overpressure and flyrock and has sets out the performance requirements and procedures to ensure that the possible environmental impacts associated with blasting activities are adequately identified and controlled for the project.

The following conclusions are made:

- Based on modelling completed, compliance with established blasting criteria (airblast overpressure and vibration) within DA 265-10-2004 and EPL 11569 will continue to be achieved. No amendments to established criteria are necessary.

- No additional mitigation measures (to those already incorporated into the Environmental Management Strategy & Monitoring Program and Blast Control Plan) to reduce vibration, overpressure effects and flyrock during blast activities are required based upon the modelling results and the large separation distances from any sensitive receivers.

- The proposed blasting arrangements including extension of hours from 9.00am to 5.00pm (weekdays and excluding public holidays) as well as the reduction of cumulative blasts between the KHRQ and adjoining KEQ from 3 per week to two per week is acceptable.

- Modelling completed predicts that flyrock related issues are extremely unlikely for the proposed development and there will be no impact on the closest sensitive receivers and public roads.

- The established blast management practices within the Environmental Management Strategy & Monitoring Program (latest version 7B, October 2025) and Blast Control Plan can be readily updated to include the proposed MOD 2 development.

- The established monitoring program for both vibration and air overpressure levels is satisfactory to accommodate the proposed MOD 2 development.

- Established community engagement and reporting processes are satisfactory to accommodate the proposed development.

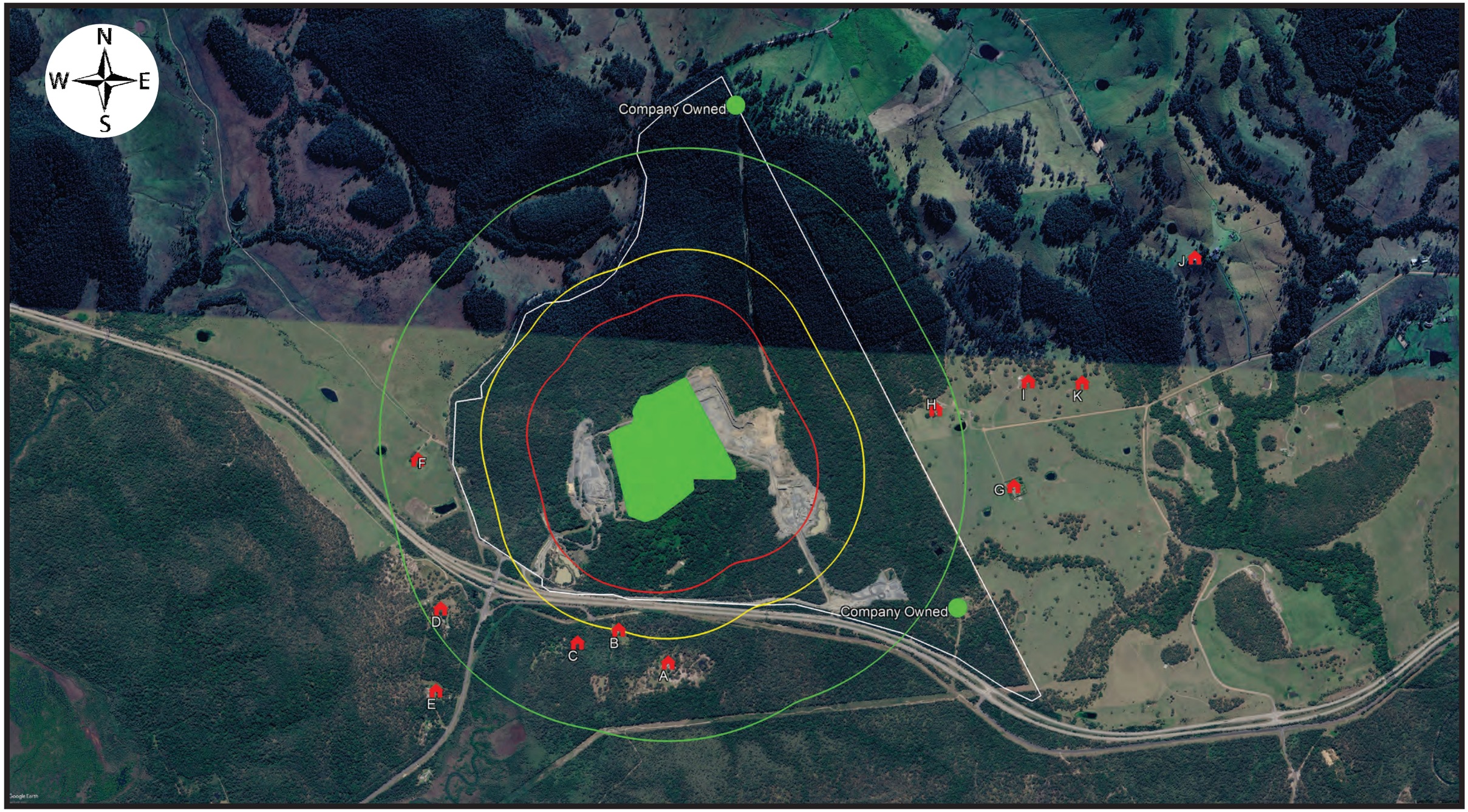
The proposed development is acceptable in terms of blasting considerations and can be supported.

17. STATEMENT

The above BIA has been prepared by John Heilig (RPEQ 6304) of Heilig & Partners consulting engineers. In preparing this assessment, Heilig & Partners have made certain assumptions. We have assumed that all information and documents provided to us by HQPL or because of a specific request were complete, accurate and up to date. Where we have obtained information from a Government register or database, we have assumed that the information is accurate. Where an assumption has been made, we have not made any independent investigations with respect to the matters the subject of that assumption. We are not aware why any of the assumptions are incorrect.

John Heilig (RPEQ6304)

18. MODELLING RESULTS



Created using TunnelTRAP Software

Karuah Quarry Complex

SCALE

0 200 400 600 800 1000m

Surface Vibration Levels

- 2 mm/s Vibration Contour
- 5 mm/s Vibration Contour
- 10 mm/s Vibration Contour

Explosive Quantities

- More than 90 kilograms
- Between 76 and 90 kilograms
- Between 62 and 76 kilograms
- Between 48 and 62 kilograms
- Between 34 and 48 kilograms
- Less than 34 kilograms

PROJECT DESCRIPTION Hunter Quarries - Karuah Hard Rock Quarry - Back calculated explosive weights and associated vibration contours from blasting to comply with a vibration criterion of 5mm/s at the adjacent residential receivers. Vibration contours are shown at surface level and represent maximum expected values from blasting.

HEILIG & PARTNERS Engineered Excellence

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P.O. Box 1176
Mt.Ommaney
QLD. 4074. Australia

HUNTER QUARRIES

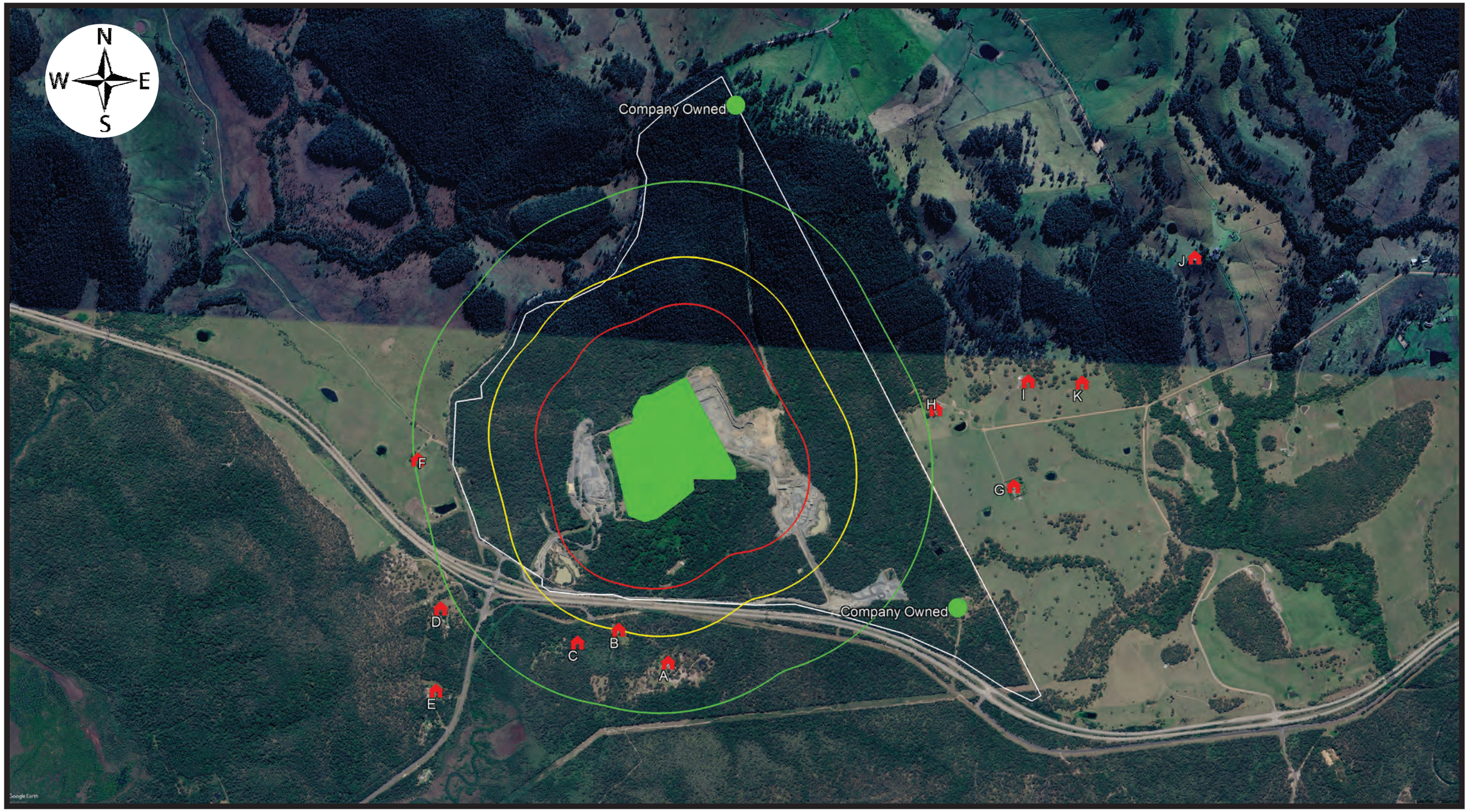
Plate No. A

Revision History
R1: Original

Date Drawn: 9 March 2026

Ref No: Pit Consolidation Project Karuah Hard Rock Quarry

Job No: HP2511-2



Created using TunnelTRAP Software

Karuah Quarry Complex

SCALE

0 200 400 600 800 1000m

Overpressure Levels

- 110dBL Overpressure Contour
- 115dBL Overpressure Contour
- 120dBL Overpressure Contour

Explosive Quantities

- More than 90 kilograms
- Between 76 and 90 kilograms
- Between 62 and 76 kilograms
- Between 48 and 62 kilograms
- Between 34 and 48 kilograms
- Less than 34 kilograms

PROJECT DESCRIPTION Hunter Quarries - Karuah Hard Rock Quarry - Back calculated explosive weights and associated overpressure contours from blasting to comply with an overpressure criterion of 115dBL at the adjacent residential receivers. Overpressure contours represent maximum expected values from blasting.

HEILIG & PARTNERS Engineered Excellence

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HUNTER QUARRIES

Plate No. B

Date Drawn: 9 March 2026

Revision History

R1: Original

Ref No: Pit Consolidation Project Karuah Hard Rock Quarry

Job No: HP2511-2

In preparing this drawing, HP have made certain assumptions. We have assumed that all information and documents provided to us by the Client or as a result of a specific request were complete, accurate and up to date. Where we have obtained information from a Government register or database, we have assumed that the information is accurate. Where an assumption has been made, we have not made any independent investigations with respect to the matters the subject of that assumption. We are not aware why any of the assumptions are incorrect.

19. APPENDIX 1

PROPOSED SITE PLAN OF KARUAH PIT CONSOLIDATION PROJECT Location: Andersite Road & Blue Rock Close Karuah

KARUAH QUARRY & KARUAH EAST QUARRY
LOTS 11, 12 & 13 D.P.1024564
ANDERSITE ROAD & BLUE ROCK CLOSE, KARUAH

Council: Mid Coast

Datum:	A.H.D.	Create Date:	16th June 2022
Origin:	Lidar Data	Sheet:	1 of 1
Projection:	M.G.A.	Plan By:	ZJ
Origin:		Project Manager:	MR
North Direction:	Grid	Office:	Hunter
Contour Interval:	2.0m	Plan Purpose:	Scoping

Version:	G (05/08/2025)
Client:	Hunter Quarries Pty Ltd
Survey:	N/A
AutoCAD:	Dwg\11819-SITE-011-G
Our Ref:	11819

N

adw johnson

LEGEND

- KARUAH QUARRY ACCESS ROAD (ANDERSITE ROAD)
- KARUAH EAST QUARRY ACCESS ROAD (BLUE ROCK CLOSE)
- EXISTING PRIVATE ACCESS ROAD WITHIN LOT 12
- SUBJECT SITE BOUNDARIES
- ADJACENT BOUNDARIES
- APPROVED CONSERVATION OFFSET FOR DA 265-10-2004 (PART LOT 12)
- APPROVED BIODIVERSITY OFFSET FOR MP 09_0175 (PART LOT 13, LOT 14 & LOT 5)
- PROPOSED HIGHWALL EXTRACTION AREA
- KARUAH QUARRY (DA 265-10-2004)
- KARUAH EAST QUARRY (MP 09_0175) 40.18Ha
- APPROVED KARUAH EAST QUARRY EXTRACTION AREA
- PROPOSED KARUAH EAST QUARRY EXTRACTION AREA
- PROPOSED CONSOLIDATED EXTRACTION AREA
- PROPOSED ADDITIONAL DISTURBANCE AREA 4690m²
- PROPOSED KARUAH EAST QUARRY TOTAL DISTURBANCE AREA 40.65Ha

BRANCH LANE

4 D.P.838128
5 D.P.838128
10 D.P.1032636
11 D.P.1032636
1 D.P.1032636
2 D.P.1032636
14 D.P.1024564
201 D.P.1042537
202 D.P.1042537
21 D.P.1024341
26 D.P.1024341
27 D.P.1024341
7 D.P.749493
16 D.P.1024564
17 D.P.1024564
11 D.P.1024564
12 D.P.1024564
13 D.P.1024564

KARUAH EAST QUARRY MP 09_0175
KARUAH QUARRY DA 265-10-2004
SAFETY OFFSET
PROPOSED ADDITIONAL DISTURBANCE (4690m²)
PROPOSED EXTENDED EXTRACTION AREA
CRUSHING PLANT, PROCESSING & STOCKPILE AREA
DAM 1
OFFICE, CARPARK & WEIGHBRIDGE AREA
SEDIMENT DAM
APPROVED RELOCATED & RESIZED DAM 2
EXISTING DAM 2 TO BE FILLED & STABILISED
APPROVED STOCKPILE AREA
APPROVED RESIZED DAM 3
STOCKPILE AREA
APPROVED HEAVY VEHICLE PARKING
OFFICE, CARPARK & WEIGHBRIDGE AREA (INCLUDING 2 APPROVED WEIGHBRIDGES & WB OFFICE)
APPROVED 2 STOREY ADMIN BUILDING & VISITOR CARPARK
PACIFIC HIGHWAY

(S) EASEMENT FOR OVERHEAD POWER RETICULATION 10 WIDE (DP.838128)

0 100 200 300 400 600

Bar Scale 1: 6000 (A1), 1: 12000 (A3)

Ver.	Date	Comment
G	05/08/2025	UPDATED FOR CLIENT COMMENTS
F	04/08/2025	UPDATED FOR CLIENT COMMENTS
E	29/07/2025	UPDATE HIGHWALL EXTRACTION AREA
D	22/07/2025	UPDATE HIGHWALL EXTRACTION AREA

N

KARUAH QUARRY DA 265-10-2004
KARUAH EAST QUARRY MP 09_0175
SAFETY OFFSET
PROPOSED ADDITIONAL DISTURBANCE (4690m²)
PROPOSED EXTENDED EXTRACTION AREA
11 D.P.1024564
12 D.P.1024564
13 D.P.1024564

INSERT: PROPOSED CONSOLIDATED EXTRACTION AREA

0 10 20 50 100 200 300

Bar Scale 1: 2500 (A1), 1: 5000 (A3)

adw johnson pty. ltd. unit 7, building 2, 335 hillsborough road, warners bay 2282 ph: (02) 49785100 fax: (02) 49785199 hunter@adwjohnson.com.au abn 62 129 445 398

Plotted By: anthonym Plot Date: 16/02/26 - 09:26 Cad File: N:\11819\Dwg\11819-SITE-011-G.dwg

PROPOSED SITE PLAN

KARUAH QUARRY
LOTS 11 & 12 D.P.1024564 & LOT 21 D.P.1024341
ANDERSITE ROAD & BLUE ROCK CLOSE, KARUAH

Location: Andersite Road & Blue Rock Close Karuah

Council: Mid Coast

Datum:	A.H.D.	Create Date:	23rd July 2025
Origin:	Lidar Data	Sheet:	1 of 1
Projection:	M.G.A.	Plan By:	ZJ
Origin:		Project Manager:	MR
North Direction:	Grid	Office:	Hunter
Contour Interval:	2.0m	Plan Purpose:	Scoping

Version:	E (05/02/2026)
Client:	Hunter Quarries Pty Ltd
Survey:	N/A
AutoCAD:	Dwg\11819-SITE-019-E
Our Ref:	11819

N

adw johnson

LEGEND

- KARUAH QUARRY ACCESS ROAD (ANDERSITE ROAD)
- KARUAH EAST QUARRY ACCESS ROAD (BLUE ROCK CLOSE)
- EXISTING PRIVATE ACCESS ROAD WITHIN LOT 12
- SUBJECT SITE BOUNDARIES
- ADJACENT BOUNDARIES
- APPROVED CONSERVATION OFFSET FOR DA 265-10-2004 (PART LOT 12)
- KARUAH QUARRY (DA 265-10-2004)
- KARUAH EAST QUARRY (MP 09_0175)
- KARUAH QUARRY EXTRACTION AREA
- PROPOSED KARUAH QUARRY EXTRACTION AREA
- PROPOSED CONSOLIDATED EXTRACTION AREA

BRANCH LANE

4 D.P.838128

5 D.P.838128

10 D.P.1032636

11 D.P.1032636

201 D.P.1042537

KARUAH EAST QUARRY MP 09_0175

PROPOSED EXTENDED EXTRACTION AREA

KARUAH QUARRY DA 265-10-2004

21 D.P.1024341

CRUSHING PLANT, PROCESSING & STOCKPILE AREA

11 D.P.1024564

12 D.P.1024564

13 D.P.1024564

14 D.P.1024564

1 D.P.1032636

2 D.P.1032636

OFFICE, CARPARK & WEIGHBRIDGE AREA

202 D.P.1042537

26 D.P.1024341

SEDIMENT DAM

1 D.P.719493

27 D.P.1024341

16 D.P.1024564

17 D.P.1024564

PACIFIC HIGHWAY

(S) EASEMENT FOR OVERHEAD POWER RETICULATION 10 WIDE (DP.838128)

0 100 200 300 400 600

Bar Scale 1: 6000 (A1), 1: 12000 (A3)

Ver.	Date	Comment
E	05/02/2026	UPDATED V4 BENCH LAYOUT
D	05/08/2025	UPDATED FOR CLIENT COMMENTS
C	04/08/2025	UPDATED FOR CLIENT COMMENTS
B	29/07/2025	UPDATE HIGHWALL EXTRACTION AREA

N

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KARUAH QUARRY DA 265-10-2004

KARUAH EAST QUARRY MP 09_0175

PROPOSED EXTENDED EXTRACTION AREA

11 D.P.1024564

12 D.P.1024564

INSERT: PROPOSED EXTENDED EXTRACTION AREA

0 10 20 40 50 100 200 300

Bar Scale 1: 2500 (A1), 1: 5000 (A3)

adw johnson pty. ltd. unit 7, building 2, 335 hillsborough road, warners bay 2282 ph: (02) 49785100 fax: (02) 49785199 hunter@adwjohnson.com.au abn 62 129 445 398

Plotted By: anthonym Plot Date: 13/02/26 - 13:32 Cad File: N:\11819\Dwg\11819-SITE-019-E.dwg