Albion Park Quarry

Blast Management Plan

SSD 10369

Version 1 | Revision 3

Issued – March 2024

CLEARY BROS

ACKNOWLEDGEMENT

Cleary Bros acknowledge and pay our respects to the Traditional Custodians of the lands in NSW and Australia on which our projects are located. We value the knowledge, advice and involvement of the Elders and extended Aboriginal community that contribute to our Projects and extend our respect to all Aboriginal and Torres Strait Islander peoples.

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Document Control

Version	Date	Reason	Prepared by	Approved
V1 r1	23/1/24	New plan prepared for Stage 7 approval (SSD 10369) for stakeholder consultation	D Godson (VMS) M Hammond	
V1r2	28/2/24	Updated following stakeholder consultation. Submission to DPE for approval	M Hammond	
V1r3	11/3/24	Updated following DPE review	M Hammond	DPE

1. Introduction

1.1 Scope

Cleary Bros (Bombo) Pty Ltd (Cleary Bros) received State Significant Development consent (SSD) 10369 on 29 September 2023 to extend the current hard rock extraction area within the Albion Park Quarry (the Quarry). The Quarry is located in the local suburb of Croom, approximately 20km south-southwest of Wollongong and approximately 4km west of Shellharbour (Figure 1). Three other operational quarries are present in this area, as shown in Figure 1.

The Quarry involves extraction of latite and agglomerate for the production of a range of high quality aggregates, armour rock, and pavement products for use in the Illawarra-Shoalhaven and Greater Sydney Regions. The approved Quarry operations are fully described in the publicly available documents on Cleary Bros website (www.clearybros.com.au/albion-park*)*.

This *Blast Management Plan* (the Plan) has been prepared by VMS Australia Pty Ltd (VMS), with assistance from, on behalf of Cleary Bros in satisfaction of Condition B18 of SSD 10369. This Plan describes the following, where relevant.

- Objectives and outcomes related to blasting activities on Cleary Bros land surrounding the Extraction Area,
- Consultation undertaken during preparation of this Plan.
- Training requirements and roles and responsibilities of key Cleary Bros personnel.
- Legal and other statutory requirements and commitments that apply to the Quarry.
- A description of the activities approved under SSD 10369.
- Potential blasting impacts and risks to the community.
- Performance indicators and criteria related to blasting activities.
- Key management measures related to blasting activities.
- Blast monitoring and contingency measures.

This Plan does not address the following aspects of the Quarry.

- Aspects not relevant to management of blasting activities
- Management of Workplace Health and Safety risks associated with blasting activities.

Blasting activities will not commence until this Plan has been submitted to and approved by the Planning Secretary, and the Plan will subsequently be implemented as approved.

Figure 2 illustrates the strategic relationship, and inter-relationship, of this Plan to the Environmental Management Strategy (EMS) and other key environmental management documents.

Figure 1 - Locality Plan

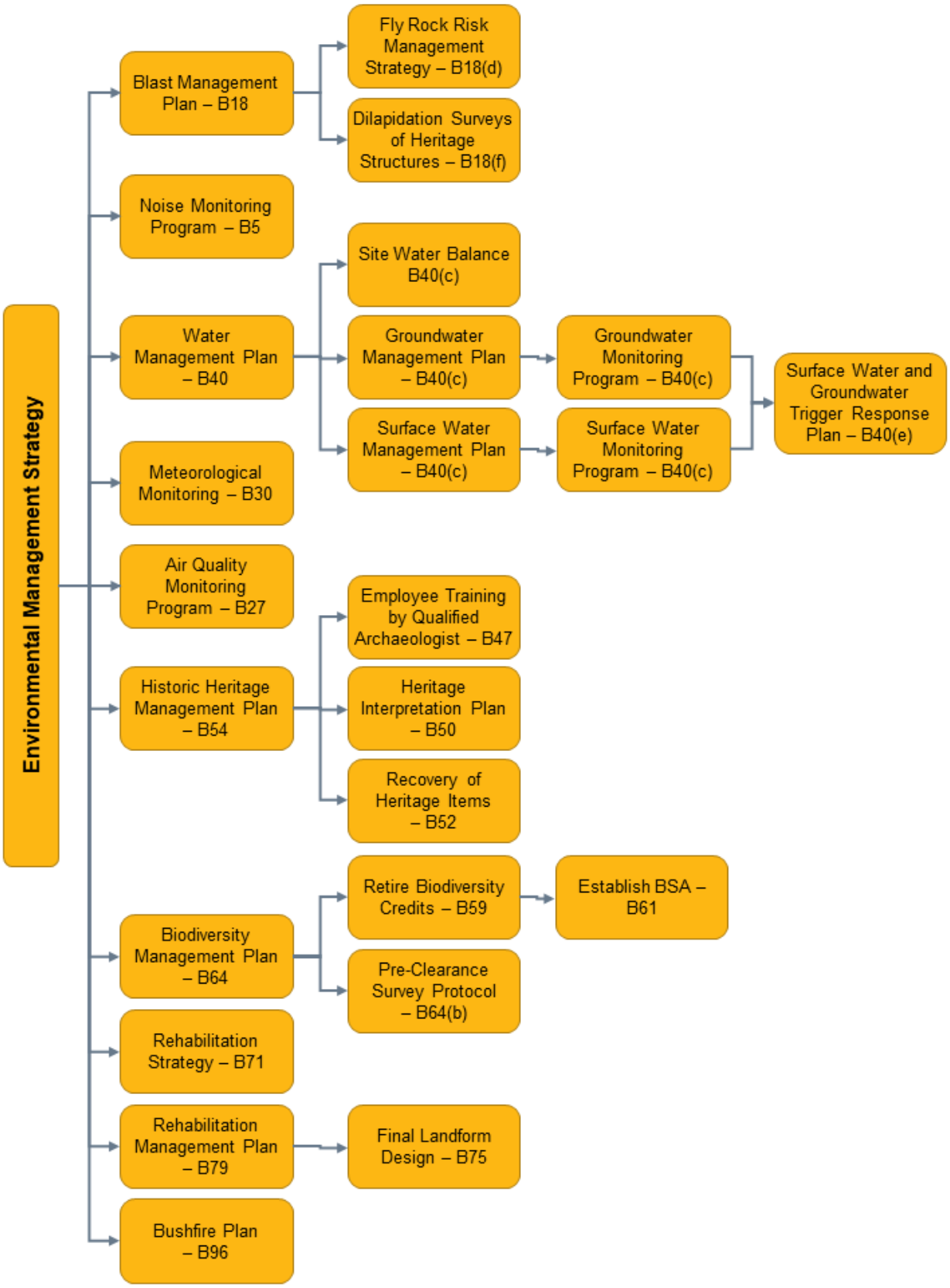


Figure 2 - Key Environmental Management Documents

1.2 Objectives and Outcomes

Table 1 presents the objectives and key performance outcomes for blasting at the Quarry.

Table 1 - Objectives and Key Performance Outcomes

Objectives	Key Performance Outcomes
To ensure compliance with all relevant conditions of SSD 10369 and EPL299, stated commitments related to blast management and reasonable community expectations.	(i) Implementation of this Plan. (ii) No reasonable community complaints or reportable incidents.
To implement appropriate blast management and mitigation measures throughout the life of the Quarry to ensure negligible harm to the built environment and heritage structures, and to minimise impacts to the amenity of surrounding residents.	(i) Implementation of this Plan. (ii) No exceedance of blasting criteria at any non-Project related residence. (iii) No reportable incidents related to blasting activities. (iv) Effective complaints process in place to record and address any genuine community complaints.
o implement an appropriate monitoring program which reviews compliance with the blasting criteria throughout the life of the Quarry.	(i) Vibration and airblast overpressure is monitored for each blast at the nearest non-Project related residence. All other monitoring is undertaken in accordance with the relevant conditional requirements and procedures and at the relevant intervals. (ii) Monitoring results are published and reported on Cleary Bros' website and in the Annual Review.
To implement an effective notification process, which ensures that stakeholders who wish to be advised of upcoming blasts are notified in a timely fashion.	(i) Implementation of an effective notification process in line with stakeholder preferences.
To investigate, implement and report on reasonable and feasible measures for continual improvement to blasting practices.	(i) Regular review of this Plan, including updating as required.
To implement an incident reporting program, if required.	(i) Incidents (if any) are reported in an appropriate manner in accordance with this Plan.

Further to the general objectives of the Blast Management Plan, the Plan has been specifically designed to monitor, assess, mitigate, and manage the effects of blasting on The Hill Complex.

1.3 Environmental Management Training and Responsibilities

All Cleary Bros personnel and contractors and their employees will undergo environmental training as part of the site induction and re-induction program.

Table 2 presents the roles and responsibilities of personnel with reference to biodiversity management.

Table 2 - Roles and Responsibilities

Roles	Responsibilities
Chief Executive Officer	Provide strategic direction regarding environmental policy Independently review indicators of environmental performance, review compliance with environmental objectives and approvals.
General Manager Quarries	Accountable for the overall environmental performance of the Quarry, including the outcomes of the Plan. Independently review indicators of environmental performance, confirm compliance with environmental objectives and approvals. Ensure adequate resources are available to enable implementation of the Plan.

Roles	Responsibilities
	Provide adequate resources for implementation of this Plan. Ensure employees are competent through training and awareness programs.
Environmental Officer	Ensure the implementation of this Plan, including reporting of non-compliances with the trigger values, and subsequent implementation of the relevant action plan. Ensure monitoring is undertaken in accordance with the Plan. Ensure all internal and external reporting requirements are met. Respond to all incidents and complaints. Update the Plan as required. Undertake/organise, review and analyse all monitoring data.
Operational Staff and Contractors	Undertake all environmental training and awareness induction as directed. Follow directions provided by the Environmental Officer, Supervisors and Quarry management. Show due care not to cause environmental harm. Notify Supervisor of any environmental non-compliance.
Blast Shotfirer	Design all blasting plans in accordance with the criteria in the Blast Management Plan. Implement the blast design for each blast. Provide guidance to the General Manager Quarries of opportunities to improve blast management practices.
Blasting Engineer	Review the blast design prior to each blast. Provide guidance to the Shotfirer and General Manager Quarries on blast management practices.

1.4 Document Preparation

This Plan has been prepared by Mr Richard Godson (BSc (Civ. Eng.), MSc (Excav. Eng.)), Technical Director of VMS Australia Pty Ltd (VMS). Mr Godson's appointment as principal author of this document was endorsed by the Planning Secretary on 14 November 2023.

Mr Mark Hammond (BEnvSc (hons)), Quality and Environment Manager with Cleary Bros, provided a range of information presented in this document, as well as reviewing the draft and approving the final version for release.

2. Legal and Other Requirements

2.1 Development Consent SSD 10369

Table 3 identifies the conditional requirements of SSD 10369 relevant to this Plan and where they are addressed.

Table 3 - Development Consent Conditions (SSD 10369) – Blasting

<table>
<tr><th>Cond No.</th><th>Requirement</th><th>Plan Section</th></tr>
<tr><td colspan="3">Hours of Operation</td></tr>
<tr><td>A11</td><td>The Applicant must comply with the operating hours set out in Table 1.
Table 1: Operating hours (extract)
<table>
<tr><th>Activity</th><th>Permissible Operating hours</th></tr>
<tr><td>Blasting</td><td>9 am to 5 pm Monday to Friday
At no time on Saturdays, Sundays, or public holidays</td></tr>
</table></td><td>Section 3.1</td></tr>
<tr><td colspan="3">Blasting Criteria</td></tr>
<tr><td>B7</td><td>The Applicant must ensure that blasting on the site does not cause exceedances of the criteria at the locations in Table 3.
Table 3: Blasting criteria
<table>
<tr><th>Location</th><th>Airblast Overpressure (dB(Lin Peak))</th><th>Ground vibration (mm/s)</th><th>Allowable exceedance</th></tr>
<tr><td rowspan="2">Residence on privately-owned land (or other sensitive receiver location (e.g. a school or hospital))</td><td>120</td><td>10</td><td>0%</td></tr>
<tr><td>115</td><td>5</td><td>5% of the total number of blasts over a financial year</td></tr>
<tr><td>All public infrastructure</td><td>-</td><td>50</td><td>-</td></tr>
</table></td><td>Section 5.1</td></tr>
<tr><td>B8</td><td>The blasting criteria in Table 3 do not apply if the Applicant has an agreement with the owner/s of the relevant residence or infrastructure to exceed the blasting criteria, and the Applicant has advised the Department in writing of the terms of this agreement.</td><td>Section 5.1</td></tr>
<tr><td>B9</td><td>The Applicant must ensure that blasting on the site does not cause exceedances of the criteria at the locations in Table 4.
Table 4: Blasting criteria – heritage items
<table>
<tr><th>Location</th><th>Airblast Overpressure (dB(Lin Peak))</th><th>Ground vibration (mm/s)</th><th>Allowable exceedance</th></tr>
<tr><td rowspan="2">Heritage items listed in Appendix 5</td><td>120</td><td>10</td><td>0%</td></tr>
<tr><td>115</td><td>5</td><td>5% of the total number of blasts over a financial year</td></tr>
</table></td><td>Section 6.1</td></tr>
<tr><td colspan="3">Blasting Frequency</td></tr>
<tr><td>B10</td><td>The Applicant may carry out a maximum of 1 single blast event per week.</td><td>Section 3.2</td></tr>
<tr><td>B11</td><td>Condition B10 does not apply to blasts that generate ground vibration of 0.5 mm/s or less at any residence on privately-owned land, or to blast misfires or blasts required to ensure the safety of the mine, its workers or the general public.</td><td>Section 3.2</td></tr>
</table>

Cond No.	Requirement	Plan Section
Property Inspections		
B12	If the Applicant receives a written request from the owner of any privately-owned land within 1.3 kilometres of the approved disturbance area for a property inspection to establish the baseline condition of any buildings and structures on their land, or to have a previous property inspection updated, then within 2 months of receiving this request the Applicant must: (a) commission a suitably qualified, experienced, and independent person, whose appointment is acceptable to both parties to: (i) establish the baseline condition of any buildings and other structures on the land, or update the previous property inspection report; and (ii) identify measures that should be implemented to minimise the potential blasting impacts of the development on these buildings and structures; and (b) give the landowner a copy of the new or updated property inspection report.	Section 8.6
B13	If there is a dispute over the selection of the suitably qualified, experienced, and independent person, or the Applicant or the landowner disagrees with the findings of the property inspection report, either party may refer the matter to the Planning Secretary for resolution.	Section 8.6
Property Investigations		
B14	If the owner of any privately-owned land within 1.3 kilometre of the approved disturbance area or any other landowner where the Planning Secretary is satisfied an investigation is warranted, claims in writing that buildings or structures on their land have been damaged as a result of blasting on the site, then within 2 months of receiving this written claim the Applicant must: (a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to investigate the claim; and (b) give the landowner a copy of the property investigation report	Section 10.3
B15	If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Applicant must repair the damage to the satisfaction of the Planning Secretary.	Section 10.3
B16	If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Applicant or the landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Planning Secretary for resolution.	Section 10.3
Blast Operating Conditions		
B17	The Applicant must: (a) implement all reasonable and feasible mitigation and management measures to: (i) ensure the safety of people and livestock from blasting impacts of the development; (ii) protect public and private infrastructure and property in the vicinity of the site from blasting damage associated with the development; and (iii) minimise blast-related dust and fume emissions; (b) ensure that blasting on the site does not impact the heritage values of The Hill Complex; (c) operate a comprehensive blast management system that uses a combination of meteorological forecasts and predictive blast modelling to guide the planning of blasts to minimise blasting impacts; (d) operate a suitable system to enable interested members of the public to get up-to-date information on the proposed blasting schedule on the site and any associated	Section 5.2 Sections 5.1 & 8.6 Section 6.1 Section 6.2

Cond No.	Requirement	Plan Section
	road closures, including notification via SMS message (or other method as agreed by the Planning Secretary) of the blasting schedule and associated road closures for that day and any variations to that schedule and closures; (e) co-ordinate the timing of blasting at the site with any nearby quarries to minimise cumulative blasting impacts, unless otherwise agreed by the Planning Secretary; and (f) monitor each blast undertaken for the development to determine whether the development is complying with the relevant conditions of this consent.	Section 6.2 Section 0
B18	The Applicant must prepare a Blast Management Plan for the development. The plan must: (a) be prepared by a suitably qualified and experienced person/s whose appointment has been endorsed by the Planning Secretary; (b) describe the blast management system and the measures that will be implemented to ensure compliance with the blasting criteria and operating conditions of this consent; (c) include a blast fume management strategy for minimising blast fume events, rating and recording blast fume events and reporting significant blast fume events to the Department and the EPA: (d) include a fly rock risk management strategy. The strategy must: (i) be prepared in consultation with the owner of any public or private land located within 250 m of a blast, unless the blast generates a vibration of 0.5 mm/s or less on the landowner's land; (ii) include procedures to prevent access to the Dunsters Lane road reserve to ensure the safety of the public; (iii) include procedures to ensure the safety of people and livestock on private land; and (iv) include an adaptive management protocol if the procedures to manage the safety of people and livestock cannot be implemented; (e) include a strategy to manage potential blast interactions with nearby quarries; (f) include a strategy to monitor, assess, mitigate, and manage the effects of blasting on The Hill Complex, incorporating baseline a dilapidation survey and five yearly dilapidation surveys of structures identified by the heritage listing (refer to Appendix 5) (subject to landowner access arrangements); (g) include a monitoring program for evaluating and reporting on compliance with the relevant conditions of this consent; (h) include a protocol for identifying any blast-related exceedance, incident, or non-compliance and for notifying the Department, the EPA and relevant stakeholders of these events; and (i) include public notification procedures to enable members of the public, particularly surrounding residents, to get up-to-date information on the proposed blasting schedule.	Section 1.4 Section 6 Section 6.5 Section 7 Section 6.2 Sections 6 and 8.6 Section 0 Section 9 Section 6.2
B19	Prior to the commencement of blasting within the Stage 7 extraction area, the Applicant must submit the Blast Management Plan to the Planning Secretary for approval.	Section 1.1
B20	The Applicant must not undertake any blasting within the Stage 7 extraction area until the Blast Management Plan is approved by the Planning Secretary.	Section 1.1
B21	The Applicant must implement the Blast Management Plan as approved by the Planning Secretary.	Section 1.1
Revision of Strategies, Plans and Programs		

Cond No.	Requirement	Plan Section
D6	Within three months of: (a) the submission of an incident report under condition D8 or D9; (b) the submission of an Annual Review under condition D10; (c) the submission of an Independent Environmental Audit under condition D11; (d) the approval of any modification of the conditions of this consent (unless the conditions require otherwise); or (e) notification of a change in development phase under condition A13. the suitability of existing strategies, plans and programs required under this consent must be reviewed by the Applicant.	Section 11.2
Incident Notification		
D8	The Applicant must notify the Department and any other relevant agencies immediately after it becomes aware of an incident. The notification must be in writing via the Department's Major Projects Website (or other method prescribed by the Planning Secretary) and identify the development (including the development application number and name), set out the location, and nature of the incident.	Section 10.4
Non-Compliance Notification		
D9	Within seven days of becoming aware of a non-compliance, the Applicant must notify the Department of the non-compliance. The notification must be in writing via the Department's Major Projects Website and identify the development (including the development application number and name), set out the condition of this consent that the development is non-compliant with, why it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance. ***Note:*** *A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.*	Section 10.4
Annual Review		

Cond No.	Requirement	Plan Section
D10	By the end of September in each year after the commencement of quarrying operations in the Stage 7 extraction area, or other timeframe agreed by the Planning Secretary, a report must be submitted to the Department reviewing the environmental performance of the development, to the satisfaction of the Planning Secretary. This review must: (a) describe the development (including any rehabilitation) that was carried out in the previous financial year, and the development that is proposed to be carried out over the current financial year; (b) include a comprehensive review of the monitoring results and complaints records of the development over the previous financial year, including a comparison of these results against the: (i) relevant statutory requirements, limits, or performance measures/criteria; (ii) the environmental risk assessment prepared as part of the environmental management strategy required by condition D1; (iii) requirements of any plan or program required under this consent; (iv) monitoring results of previous years; and (v) relevant predictions in the documents listed condition A2(c). (c) (c) identify any non-compliance or incident which occurred in the previous financial year, and describe what actions were (or are being) taken to rectify the non-compliance and avoid reoccurrence; (d) evaluate and report on: (i) the effectiveness of the noise and air quality management systems; and (ii) compliance with the performance measures, criteria, and operating conditions of this consent; (e) identify any trends in the monitoring data over the life of the development; (f) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and (g) describe what measures will be implemented over the next financial year to improve the environmental performance of the development.	Section 10.1
Independent Environmental Audit		
D11	Within one year of commencement of quarrying operations within the Stage 7 extraction area, and every three years after, unless the Planning Secretary directs otherwise, the Applicant must commission and pay the full cost of an Independent Environmental Audit of the development. The audit must: (a) be prepared in accordance with the *Independent Audit Post Approval Requirements* (NSW Government 2020); and (b) be submitted, to the satisfaction of the Planning Secretary, within two months of undertaking the independent audit site inspection, unless otherwise agreed by the Planning Secretary.	Section 11.1

Cond No.	Requirement	Plan Section
D12	In accordance with the specific requirements of the *Independent Audit Post Approval Requirements* (NSW Government 2020), the Applicant must: (a) review and respond to each Independent Audit Report prepared under Condition D11 of this consent; (b) submit a response to the Planning Secretary and any other NSW agency that requests it, together with a timetable for the implementation of the recommendations of the Independent Audit Report; (c) implement the recommendations to the satisfaction of the Planning Secretary; and (d) make each Independent Audit Report and response to it publicly available no later than 60 days after submission to the Planning Secretary. (e) be led by a suitably qualified, experienced, and independent auditor whose appointment has been endorsed by the Planning Secretary;	Section 11.1
Access to Information		
D15	Prior to the commencement of quarrying operations in the Stage 7 extraction area until the completion of all rehabilitation required under this consent, the Applicant must: (a) make the following information and documents (as they are obtained, approved, or as otherwise stipulated within the conditions of this consent) publicly available on its website: (i) the document/s listed in condition A2(c) of this consent; (ii) all current statutory approvals for the development; (iii) all strategies, plans and programs required under the conditions of this consent; (iv) any strategy, plan, or program developed in accordance with the documents listed in condition A2(c) or the conditions of this consent; (v) the proposed staging plans for the development; (vi) minutes of CCC meetings; (vii) regular reporting on the environmental performance of the development in accordance with the reporting requirements in any plans or programs required by the conditions of this consent; (viii) a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any strategies, plans and programs; (ix) a summary of the current phase and progress of the development; (x) contact details to enquire about the development or to make a complaint; (xi) a complaints register, updated monthly; (xii) the Annual Reviews of the development; (xiii) audit reports prepared as part of any Independent Environmental Audit of the development and the Applicant's response to the recommendations in any audit report; (xiv) any other matter required by the Planning Secretary; and (b) keep such information up to date, to the satisfaction of the Planning Secretary.	Section 10.1

2.2 Environment Protection Licence 299

Table 4 identifies the conditional requirements of Environment Protection Licence 299 (EPL 299) relevant to this Plan and where they are addressed.

Table 4 – EPL 299 Requirements Relating to Blasting

Cond. No.	Requirement	Plan Section
L3.1	The airblast overpressure level from blasting operations in or on the premises must not exceed:	Section 5.1

Cond. No.	Requirement	Plan Section
	a) 115 dB (Lin Peak) for more than 5% of the total number of blasts during each reporting period; and b) 120 dB (Lin Peak) at any time. At any point that is located at least 3.5m from any residence or other sensitive receiver on privately-owned land.	
L3.2	The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed: a) 5mm/s for more than 5% of the total number of blasts during each reporting period; and b) 10mm/s at any time. At any point that is located at least 3.5m from any residence or other sensitive receiver on privately-owned land.	Section 5.1
L3.3	Blasting must be limited to one blast each day. Where compelling safety reasons exist, the Authority may permit additional blasts to occur where prior written (or facsimile) notification of any additional blasts are made to the Authority.	Section 3.2
L3.4	Blasting operations at the premises may only take place between 9:00am – 5:00pm Monday to Friday. Where compelling safety reasons exist, the Authority may permit a blast to occur outside the abovementioned hours. Prior written (or facsimile) notification of any such blast must be made to the Authority	Section 3.1
M7.1	Each production blast must be monitored and recorded at the permanent station established near the Dunster residence.	Section 8.4.2
M7.2	To determine compliance with the blasting limits contained in this licence: a) Airblast overpressure and ground vibration levels must be measured for all production blasts carried out in or on the premises; and b) The written record must include: i. the time and date of each blast; ii. the station(s) at which the noise was measured; iii. the ground vibration for each blast; iv. the airblast overpressure for each blast; v. evidence that during the past 12 month period, a calibration check had been carried out on each blast monitor to ensure accuracy of the reported data; and vi. the waveform for the ground vibration and overpressure for each blast that exceeds a ground vibration of 5mm/sec (peak particle velocity) or an airblast overpressure of 115dB(L). c) Instrumentation used to measure the airblast overpressure and ground vibration levels must meet the requirements of Australian Standard 2187.2 of 1993 or as updated	Section 8.5

2.3 Statement of Commitments

Table 5 identifies Cleary Bros commitments relevant to this Plan and where they are addressed. In accordance with Condition A4 of SSD 10369, the conditions of the consent prevail over Cleary Bros' prior commitments.

Table 5 – Statement of Commitments – Blasting

Desired Outcome	Measure	Timing	Document Reference
Effective Blast Design to minimise blast emissions	2.3 Ground vibration and airblast site laws would be updated on a regular basis to reflect the blast results obtained. This will ensure that future blast design is optimised to minimise blast impacts upon the nearest sensitive receivers.	Site laws reviewed every 5 years	Section 11
	2.5 Deck charging of blastholes would continue to be used to limit blast emissions and ensure compliance with airblast overpressure and ground vibration limits.	Ongoing	Section 6.1.1
	2.6 Front row boreholes would be surveyed to identify areas of sub optimal burden where additional inert material would be placed to prevent flyrock ejection from the blast face. Aggregate would be used as stemming material to limit flyrock ejection from the borehole collar.	Ongoing	Section 6.1.1
Suitable blasting processes to minimise disturbance	2.4 Blasting would be avoided, where possible, under unfavourable meteorological conditions.	Ongoing	Section 6.1.3
	2.7 Where requested, stakeholders would be notified by telephone on the morning of each blast and advised of the expected time of firing.	Ongoing	Section 6.2
	2.8 Undertake blasts no more than once per week.	Ongoing	Section 3.2
	2.9 Measures would be undertaken to ensure that blasts in the neighbouring quarry are separated in time from blasts within the Amended Project Area.	Ongoing	Section 6.2
Monitoring of every blast	2.10 Monitor blast emissions at the closest residence on "Figtree Hill", as well as to the east of the Amended Project Area on Cleary Bros' property.	Ongoing	Section 0
Source: RWC (2023) – modified after Table A3.1			

2.4 Existing Environment Climatic Conditions

In order to determine the occurrence of blast emissions enhancing weather conditions, an analysis of meteorological data collected at the Bureau of Meteorology weather station at Albion Park (site # 68241) between 2016 and 2020 has been undertaken utilising the NSW EPA Noise enhancing wind analysis program (NEWA).

The weather analysis shows that airblast overpressure enhancing winds (0.5-3m/s) are not a significant feature (>30% occurrence) of the Project Area during the daytime period when extraction (including blasting) operations occur.

2.5 Sensitive Receivers

The Quarry location and surrounding residences are shown in Figure 3. The closest non-Project related structures to the extraction area are the residences and associated structures on the Fig Tree Hill property to the north. At its closest point, the extraction area (and associated blasting activities) will be approximately 280 metres away from the closest structure on the Fig Tree Hill property. The structures on the Fig Tree Hill property are included in the locally listed heritage item "The Hill Complex". The Blast Management Plan has

predominantly been prepared to ensure the blast emissions associated with the Project comply with the blasting criteria at these structures, such that there is negligible impact to these structures associated with blasting activities. In relation to The Hill Complex, dilapidation surveys will be conducted prior to the first blast in Stage 7 and then every 2 years (subject to permission being granted by the landowner).

Other non-Project related structures in the general vicinity include the residences on the rural properties to the east of the Project, which are located a minimum distance of 722 metres from the Project Area. The Cottage residence on the Fig Tree Hill property will be the closest non-Project related structure to all blasts within then Project Area, with the exception of a small area within Stage 7b where The Cottage is of similar distance to the residence on the adjoining property to the east. As such, measures to minimise blast emissions and comply with the blasting criteria have been focused on the Fig Tree Hill residences, as the most impacted under almost all blasting scenarios.

Beyond the rural residential properties to the east of the Project Area, the suburban areas of Albion Park Rail, Flinders, Dunmore, and Shell Cove are located to the north and east of the Princes Motorway. With the exception of a small area along Whittaker St, Flinders and some adjoining side streets, all of these suburban areas are located at least 1.3km from the nearest point of the Project Area.

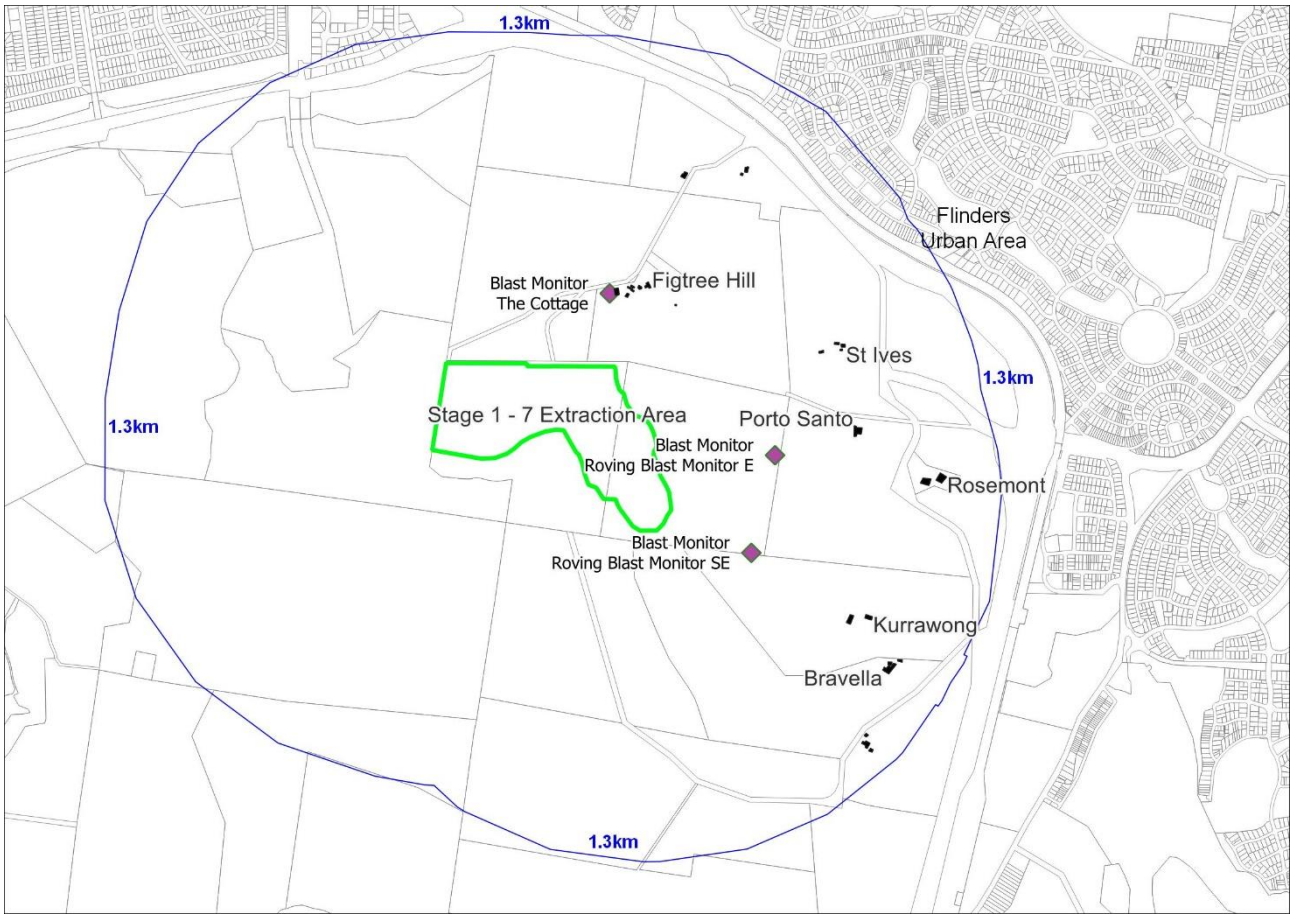


Figure 3 – Sensitive Receivers

2.6 Blasting History

Cleary Bros has typically blasted between 12 and 35 times each year fragmenting between approximately 10,000 tonnes and 100,000 tonnes during each blast.

A detailed review of the historic blast designs and corresponding blast emissions (ground vibration and airblast overpressure) monitoring data was conducted for blasting in Stages 1 to 4 of the current extraction area in order to complement earlier blast monitoring data. In addition to this combined data set, the blast

monitoring results from Blast 10/17 to Blast 22/20 were added to the data and the blast emissions site law (ground vibration and airblast overpressure) have been updated accordingly.

A statistical summary of all monitoring results from blasting in Stages 1 to 6 between 2009 and March 2021 is provided in Table 6. During this time, 266 blasts were recorded at the permanent monitoring site adjacent to Residence R1, with the allowable MIC for each blast determined by the site laws current at the time of blast. This practice has been successful to date, with no exceedances of the performance criteria. The low proportion of blasts recorded above the 95th percentile criterion (0.4%) for both vibration and airblast indicates that either the site laws are conservative and/or that the MIC adopted at the time of the blast was below the allowable maximum.

Table 6 – Historical Blast Monitoring Statistics for Stages 1 – 6 at Residence R1 (2009 – 2021)

Statistic	Ground Vibration (mm/s)	Airblast (dB Linear)
95th percentile limit	5	115
100th percentile limit	10	120
Number of monitoring records	266	266
Average result	1.69	103.9
Median result	1.43	104.9
95th percentile of monitoring records	3.68	111.8
Maximum result	7.39	115.6
Number of blasts over 95th percentile limit	1	1
Proportion of blasts over 95th percentile limit	0.4%	0.4%
Number of blasts over 100th percentile limit	0	0

3. Approved Activities

The approved activities include the following (Figure 4).

- Extension of the current Stage 1 to 6 Extraction Area to include the Stage 7 Extraction Area.
- Continued staged extraction of latite, agglomerate and overburden material using free dig and drill and blast extraction methods at a maximum rate of 900,000 tonnes per annum (tpa) of material exported from the Project Area. A total of 21.5Mt of hard rock resource will be extracted over the life of the Quarry.
- Continued primary, and on occasion secondary, processing operations within the Project Area.
- Continued transportation of extracted and processed material to Cleary Bros fixed processing plant for further processing.
- Continued operation of the Quarry between:
  - 7:00am and 6:00pm Monday to Friday:
  - 7:00am to 1:00pm on Saturdays (to a maximum of 16 Saturdays per calendar year within Stage 7); and
  - at no time on Sundays or Public Holidays.
- Operation of the Quarry until 2053.
- Rehabilitation of the final landform suitable for agriculture and nature conservation, including establishment and revegetation of:
  - Quarry extraction benches, including reduced height (7m high) faces on the upper western and northern highwalls of the Stage 7 Extraction Area;
  - the floor of the Extraction Area; and
  - two quarry sumps, including a pipeline to ensure the Southern Sump is free draining.

3.1 Hours of Operation

Activities in the extraction area will be limited to the following operating times.

Activity	Permissible Operating Hours
Quarrying Operations	7 am to 6 pm Monday to Friday. 7 am to 1 pm Saturdays within Stages 1 to 6 as shown on the development layout. 7 am to 1 pm on a maximum of 16 Saturdays per calendar year within Stage 7 as shown on the development layout. At no time on Sundays or public holidays.
Blasting	9 am to 5 pm Monday to Friday. At no time on Saturdays, Sundays, or public holidays.

3.2 Blasting Frequency

Blasting will be limited to no more than one blast per week, except where blasts generate ground vibration of 0.5mm/s or less at any residence on privately-owned land, where a blast has misfired, or where blasting is required to ensure the safety of the quarry, its workers, or the general public. In the event of a misfire or an additional blast for safety reasons, the notification process outlined in Section 6.2 will be followed.

3.3 Location of Blasting

Blasting will be restricted to the areas shown as Stages 1 to 6 Extraction Area and Stage 7 Extraction Area in Figure 4.

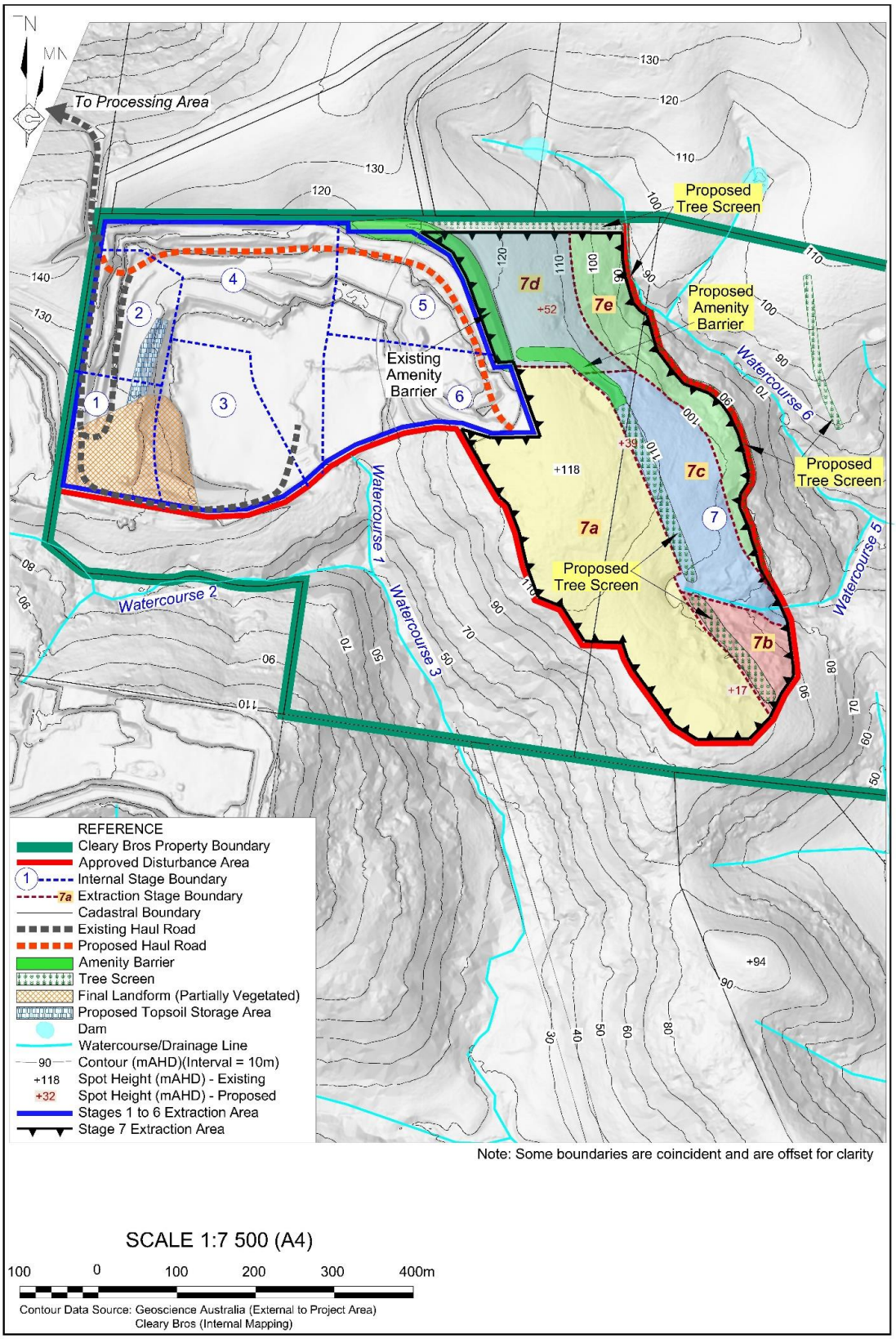


Figure 4 – Approved Quarry Site Layout

4. Potential Impacts and Risks

Table 7 presents an extract of the Environmental Risk Register from the Environmental Management Strategy, with risks related to blasting.

Table 7 – Blasting Risk Assessment

Risk Issue	Cause	Impact(s)	Existing Controls	Severity	Likelihood	Risk Rating	Additional Controls	Plan reference
Elevated ground vibration or air overpressure at sensitive receivers during blasting activities	Inadequate design Noise enhancing weather	Blast emissions disturb amenity of surrounding residents	Maximum MIC calculated for each blast based on current site laws Blast design aligned to Blast Management Plan Blasting scheduled to avoid temperature inversions Holcim contacted prior to blasting to ensure no overlap Blast dates and results displayed on CB website Interested parties notified in advance of blasts	2 Minor	4 Likely	12 Moderate	N/A	Section 6.1
Elevated ground vibration or air overpressure at sensitive receivers during blasting activities	Inadequate design Noise enhancing weather	Blasting emissions damage structures or stock on surrounding properties	Maximum MIC calculated for each blast based on current site laws for nearest structures and boundary Blast design aligned to Blast Management Plan Blasting scheduled to avoid temperature inversions Holcim contacted prior to blasting to ensure no overlap Dilapidation surveys undertaken on Figtree Hill residences	2 Minor	2 Unlikely	5 Low	N/A	Section 6.1
Escape of Blast Fume gases during blasting activities	Poor blast design and management practices	Blast fume impacts health of adjoining residents	Blast design aligned to Blast Management Plan Load and fire on the same day	2 Minor	1 Rare	3 Low	N/A	Section 6.5

Risk Issue	Cause	Impact(s)	Existing Controls	Severity	Likelihood	Risk Rating	Additional Controls	Plan reference
			Use of emulsion gel explosives Blasting scheduled to avoid temperature inversions Video recording of blasts to detect any blast fumes to allow refinement and management of fume controls					
Flyrock ejected outside of property boundary during blasting activities	Inadequate design Poor control of blast	Damage to privately owned residences, buildings, infrastructure or stock	Property/equipment/stock exclusion area to be 2 times flyrock envelope modelled using flyrock model (excluding fencing) Blast design to be modified if required to ensure exclusion area can be achieved. Exclusion area checked and sentries posted prior to blasting Blast design aligned to Blast Management Plan Any damage to structures including fencing to be repaired by CB in consultation with owner	2 Minor	2 Unlikely	5 Low	N/A	Section 7
Flyrock ejected outside of property boundary during blasting activities	Inadequate design Poor control of blast	Personal Injury	Personnel exclusion area to be 4 times flyrock envelope modelled using flyrock model. Blast design to be modified if required to ensure exclusion area can be achieved. Exclusion area checked and sentries posted prior to blasting Blast design aligned to Blast Management Plan	4 Significant	1 Rare	10 Moderate	N/A	Section 7

5. Performance Indicators and Criteria

5.1 Approved Blasting Criteria

Blast emission data from every blast will be used (via the blast emissions site laws developed from the results of the quarry extension blast monitoring to date) to refine subsequent blast designs in order to control blast emission (ground vibration and airblast overpressure) levels using the near-field site laws, particularly for later blasting in the Stage 7 Extension area when operating closer to residences.

The ground vibration and airblast overpressure criteria for residential receivers nominated in the DC cater for the inherent variation in emission levels from a given blast design by allowing a five percent exceedance of a general criterion up to a (never to be exceeded) maximum. Correspondingly, the "5% exceedance" prediction formulae were generated in the blast emissions site laws. The site laws relating to minimising impacts at receivers are based on providing a statistical 95% confidence that the lower of the levels in the DC will not be exceeded (115dB Linear of airblast and 5mm/s for vibration).

The criteria presented in Table 8, from Part A, Table 3 of SSD10369 do not apply where Cleary Bros has an agreement with the owner(s) of the relevant residence or infrastructure to exceed the blasting criteria, and Cleary Bros has advised the Department in writing of the terms of this agreement. There are currently no agreements with third parties to exceed the blasting criteria, however in the event such an agreement is made, Cleary Bros will notify the Department by writing within 30 days of finalising the agreement.

Table 8 – Blasting Criteria

Location	Airblast Overpressure (dB(Lin Peak))	Ground Vibration (mm/s)	Allowable Exceedance
Residence on privately-owned land (or other sensitive receiver location (e.g. a school or hospital))	120	10	0%
Heritage Item listed in Appendix 5 of the SSD 10369 Development Consent	115	5	5% over the total number of blasts over a financial year
All public infrastructure	-	50 (or a limit determined to the satisfaction of the Planning Secretary by the structural design methodology in AS2187.2-2006, or its latest version)	0%

5.2 Other Blasting Objectives

For the protection of people and livestock from any blast emissions, blasts will be designed to ensure that the peak particle component velocity levels for blasting do not exceed 200mm/s at any point on the external property boundary. This limit was established following a study of vibration impacts on dairy cattle which demonstrated that there were no adverse impacts on the cattle's health (including stress and contentment) in response to vibration velocities of up to 223mm/s ("Report on Vibration Effects in Transported Cattle", Heggies Australia Pty Ltd dated 15 November 2005). Furthermore, observations made by quarry personnel of cattle behaviour in adjacent paddocks when blasting in recent years in Stages 1 to 6 showed no observable change in cattle movement or response throughout the blasting sequence.

Similarly, blasts will be designed so that the airblast overpressure levels do not exceed 135dB Linear at any point on the external property boundary. The 135dB Linear limit has been adopted to limit potential health impacts to persons and was determined via reference to Regulation 49 of the OH&S Regulations 2001 (which defines the noise limits that are applicable in NSW) as well as Clause 2.1.3 of the ANZEC's Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration, September 1990.

A summary of the near-field and other objectives associated with blasting are included in Table 9.

Table 9 – Other Blasting Objectives

Aspect	Objective	Exceedances
Maximum vibration at property boundary (PVS)	200 mm/s	Nil
Maximum air overpressure at property boundary	135 dBL	Nil
Dust emissions	No visible dust travels beyond CB property boundary	Nil
Blast Fume	No visible blast fume travels beyond CB property boundary	Nil
Impacts to non-Project related structures	No damage to non-Project related structures as a result of blasting activities	Nil
Flyrock	No flyrock outside of area predicted by Flyrock Model	Nil

6. Management Measures

6.1 Blast Planning Procedures

6.1.1 Blast Design

Cleary Bros engages a specialist Blasting Contractor to drill, load and fire blasts at the quarry. Each blast design prepared by the Blasting Contractor is reviewed by a specialist Blasting Engineer to ensure consistency with the requirements of the Plan.

The following blast design parameters will be implemented for all blasts:

- Direction of detonator initiation is away from the closest residence, where possible.
- All blast faces to face generally away from the closest residence where possible.
- Use of solid decking in the blastholes, where required (solid decking is an inert material used in deck charging, usually stemming material).
- Two (or more) columns of explosives of approximately equal length per blasthole, where decked holes are required.
- Two (or more) detonators per blasthole, where decked blastholes are required.
- Use of 89mm diameter blastholes, unless otherwise authorised.
- Stemming depth 3.0m (nominal).
- Subdrill of 1.0m (nominal) for both production and overburden blasts.
- Bench height up to 14m, unless blastholes are decked.
- Front row burden 4.0m (nominal).
- Subsequent burden 2.5m (nominal)
- Spacing 3.5m (nominal).

6.1.2 Predicted Blast Emission Levels

Blast emission data from every blast will be used (via the blast emissions site laws developed from the results of the quarry extension blast monitoring to date) to refine subsequent blast designs in order to control blast emission (ground vibration and airblast overpressure) levels using the site laws, particularly for later blasting in the Stage 7 Extension area when operating closer to residences.

The ground vibration and airblast overpressure criteria for residential receivers nominated in the Consent cater for the inherent variation in emission levels from a given blast design by allowing a five percent exceedance of a general criterion up to a (never to be exceeded) maximum. Correspondingly, the “5% exceedance” prediction formulae were generated in the blast emissions site laws. The site laws relating to minimising impacts at receivers are based on providing a statistical 95% confidence that the lower of the levels in the Consent will not be exceeded (115dB Linear of airblast and 5mm/s for vibration).

Prior to implementing any revisions to the site laws for the Stage 7 extraction area, Cleary Bros will consult with the “Fig Tree Hill” representatives on the changes.

6.1.2.1 Managing Near Field Blast Effects

A near-field ground vibration site law has been specifically developed for the current extraction area to assist in designing the blasts so that the peak particle component velocity levels for blasting at the development do not exceed 200mm/s at any point on the boundary of Cleary Bros property.

The near-field vibration site law was developed by monitoring blast emissions at offset distances of between 21m and 151m from the blast and is presented in Appendix A.

Similarly, a near-field airblast overpressure site law has been developed to assist in designing the blasts so that the airblast overpressure levels for blasting at the development do not exceed 135dB Linear at any point on the boundary of the Cleary Bros property.

The near-field airblast overpressure site law is also presented in Appendix A. For the near-field site laws, the 1% exceedance confidence interval will be applied (compared to the 5% exceedance interval applied for blasting emissions at residences) in order to reduce the risk of any exceedance of these near-field limits.

These near-field site laws will be applied for all external property boundaries when blasting in the Stage 7 area, unless an agreement exists with the landowner to permit an exclusion zone that extends on to their property. The continued implementation of these near-field site laws at the property boundary, including a maximum vibration of 200mm/s and airblast overpressure of 135dB Linear, will protect the health of stock and people respectively on neighbouring properties.

6.1.2.2 Managing Airblast

The Maximum Instantaneous Charge (MIC-kg) for blasts will not exceed the mass of explosives given by the then current airblast overpressure site law. The following formula is based on the current 5% exceedance combined airblast overpressure site law, where the blast design is controlled by blast emissions at the closest sensitive receiver:

$$\text{MIC (kg)} = [(\text{Distance to nearest Receiver (m)}) / 101.2]^3$$

Where the blast design is controlled by blast emissions at the closest external property boundary, the MIC for the blast will not exceed the mass of explosives given by the then current near-field site law. The following formula is based on the current 1% exceedance near-field site law:

$$\text{MIC (kg)} = [(\text{Distance to nearest property boundary (m)}) / 5.337]^3$$

Blast design procedures will continue to be implemented with the objective of maintaining the levels of airblast overpressure at the closest residences to below 115dB Linear and protecting people and cattle at all external property boundaries.

By incorporating, when required (i.e. when a single explosive column weight exceeds the then allowable MIC), deck charging (a method of loading blastholes in which the explosive charges in the same blasthole are separated by an inert material) of (at least) the front row of blastholes in each blast and generally initiating the blast in the direction away from the closest receiver location, it is predicted that emissions from blasting in the Quarry, using an MIC in accordance with the then current combined airblast overpressure site law established for the extraction area, will result in compliance with the 115dB Linear airblast overpressure limit.

In relation to the protection of people and stock potentially located on external property boundaries during blasting, as an example, for an MIC of 80kg, the current 1% exceedance near-field site law predicts that an airblast level of 135dB Linear would occur at a distance of approximately 23m from the blast. As a precaution, when blasting within about 50m of the property boundary, the MIC for each blast may need to be restricted to below 80kg. However, this would be based on the then current near-field airblast overpressure site law.

Non-explosive rock fracturing techniques may need to be used to allow extraction of the hard rock resource in closer proximity to external property boundaries if the then current near-field site laws restrict productive explosive blasting techniques.

6.1.2.3 Managing Vibration

The MIC (kg) of blasts in Stage 7 will not exceed the mass of explosives given by the then current combined ground vibration site law. The following formula is based on the current 5% exceedances site law, where the blast design is controlled by blast emissions at the closest sensitive receiver:

$$\text{MIC (kg)} = (\text{Distance to nearest Receiver (m)})^2 / 2{,}620.3$$

Where the blast design is controlled by blast emissions at the closest external property boundary, the MIC for the blast will not exceed the mass of explosives given by the then current near-field site law. The following formula is based on the current 1% exceedance near-field site law.

$$\text{MIC (kg)} = (\text{Distance to nearest property boundary (m)})^2 / 9.158$$

Blast design procedures will be implemented with the objective of maintaining the levels of ground vibration at the closest residences below 5mm/s.

By incorporating, when required (i.e. when a single explosive column weight exceeds the then allowable MIC), deck charging of the blastholes for each blast and generally initiating the blast in the direction away from the closest receiver location, it is predicted that emissions from blasting in the proposed Stage 7 extension, using an MIC in accordance with the then combined ground vibration site law, will result in compliance with the 5mm/s ground vibration limit.

The impacts of vibration from blasting at the closest residential receivers and close to external property boundaries will be mitigated in line with the control of the MIC associated with the control of airblast overpressure levels, based on the then current combined and near-field vibration site laws for the Quarry.

Further, as discussed, non-explosive rock fracturing techniques may need to be used in order to allow extraction of the hard rock resource in closer proximity to external property boundaries if the then current near-field site laws preclude the use of conventional explosive blasting techniques.

6.1.3 Meteorological Considerations

Due to the relatively close proximity of the nearest sensitive receivers to the extraction area, relatively low MIC's are used on all blasts at the Albion Park Quarry. With this close proximity, weather conditions generally have a reduced influence on air overpressure levels at these close receivers, which are strongly dictated by the MIC and blast design. Nevertheless, blasting will be avoided during weather conditions that may significantly increase blast emissions, such as temperature inversion conditions and noise enhancing wind. The Quarry Manager will maintain sufficient inventories of blasted rock, such that blasting can be delayed by one or more days without adversely affecting production from the site. This allows blasting to be scheduled to target weather conditions that are unlikely to increase emissions at sensitive receivers, such that standardised blast design processes can be used without further consideration of meteorological impacts.

When scheduling the firing of each blast, the Quarry Manager will review the weather forecast and select a day when suitable weather is forecast. Advance weather forecasts deemed unsuitable include periods of extended rainfall. Two days prior to each scheduled blast, the Quarry Manager will review the weather forecast for the day and make any necessary adjustments to the blast schedule. Conditions that may require adjustment to be made to the timing of the blast include:

- Temperature inversions
- Strong wind, particularly from the west or south.
- Heavy cloud cover

Meteorological data from the on-site meteorological station will be evaluated by the Blast Controller immediately prior to blasting. The weather conditions and their effect on the airblast overpressure (and dust) generated by the blasting will be considered and the blast delayed if required.

6.1.4 Blast Design Review

Prediction of the far and near-field ground vibration and airblast overpressure levels will be conducted prior to each blast by the Blasting Engineer in order to determine the potential impacts at the closest receiver location. The ground vibration and airblast overpressure site laws will be updated on a regular basis to reflect the blast results obtained.

6.2 Blast Notification Systems

Prior to the commencement of blasting activities in the Stage 7 area, Cleary Bros will contact the occupiers of all adjacent properties to inquire whether they wish to be notified in advance of proposed quarry blasts, and their preferred format for notification such as via phone call, email, or a Short Message Service (SMS).

All parties who have expressed an interest in being notified of blasts will be contacted on the morning of each blast via their preferred method indicating the expected time of firing and any information relevant to their property. The planned day of the next blast will also be available on the Cleary Bros website, at least 24 hours prior to the blast being initiated.

If, when notifying Holcim, it is found that a blast is planned for the same day, measures will be taken to ensure the blasts are separated by a minimum of 10 minutes to prevent an unplanned increase in blast emissions.

In the event a second blast is required in any week, due to a misfire or to ensure the safety of the quarry, its workers, or the general public, the stakeholders above will be notified of the requirement for a subsequent blast and the expected time of firing. The EPA and Planning Secretary will also be notified of the requirement for the subsequent blast prior to the blast, or otherwise as soon as reasonably practicable after the subsequent blast.

6.3 Blast Area Security

The **Drill and Blast Design HSEQ Form** is completed for each blast. It includes a Blast Exclusion Plan showing the areas to be cleared of people and equipment, as well as the following checks completed as part of the firing sequence, that are initialled by the Shotfirer as the blast proceeds. The exclusion zone is swept by the shotfirer after the Blast Guards have secured their zone and prior to firing, with the Blast guards remaining in position until the blast has been cleared by the Shotfirer. An extract of the HSEQ Form is included below, which is subject to change in line with the continuous improvement of blasting processes.

FIRING SEQUENCE

PART L – SHOT FIRER'S SEQUENCE				**(Completed by Shot Firer)**
The Shot Firer shall confirm that the following actions have been completed before commencing the sequence for firing the shot.				**Action Completed**
1.	Confirm Blast Guards are positioned & all clear			
2.	Evacuation siren commenced			
3.	Warning signs are in place as appropriate			
4.	Shot Firer to clear the Blast Exclusion Zone to their satisfaction			
5.	Connect initiating detonator			
6.	Blast supervisor to stay with the Shot Firer or leave the Exclusion Zone.			
7.	5 Minute Radio call			
8.	Move to a safe position			
9.	Check guard positions			
10.	1 minute call/Siren			
11.	30 second call/Siren			
12.	10 second call/Siren			
13.	Fire Shot	Record actual firing time:		

14.	Radio call to hold guards	
15.	Inspect for misfires	
16.	If no misfires, release guards	

6.4 Dust Emissions

An experienced Blasting Contractor is engaged to survey the blast area, design the blast and conduct the blast. Blasting will only occur following an appropriate assessment of the weather conditions by the Quarry Manager to ensure that the wind speed and direction will not result in excessive dust emissions from the Project Area in the direction of the sensitive receptor location. This measure will be effective in controlling off-site impacts due to dust released during blasting operations.

Additionally, the design for each blast will aim to maximise the blast efficiency and to minimise the emission of dust in order to ensure compliance with site specific blast emissions criteria.

Meteorological data from the on-site meteorological station will be evaluated by the Blast Controller immediately prior to blasting. The weather conditions and their effect on the dust generated by the blasting will be considered and the blast delayed if required. Meteorological conditions that will be considered are:

- Prevailing winds including their direction and velocity.
- Temperature inversions.
- Time of day.
- Seasonal effects on weather patterns; and
- Cloud cover.

Blasting will be avoided, whenever possible, when winds are blowing from the blast site towards the nearest receiver at a strength likely to enhance blast dust impacts.

6.5 Blast Fume Emissions

6.5.1 Mitigation of Fume Emissions

Fumes can be generated by the mechanisms as outlined in Table 10. Potential indicative control measures are also presented in Table 10. It is noted that wet product is used in both wet and dry blastholes in order to minimise blast fume generation.

Table 10 – Possible Causes and Controls for Blast Fume Generation

Possible Cause	Potential Control Measures
Explosive Formulation	
Explosive incorrectly formulated or not manufactured to specification	• Track explosive mix back with supplier • Perform visual check at discharge point • Use supplier who operates under an externally accredited quality system
Improper mixing of raw materials/incorrect metering	• Perform visual check at discharge point • Ensure Mobile Manufacturing Unit (MMU) calibrated every 6 months
Blast Design	
Inappropriate priming and/or placement	• Follow manufacturer's recommendation on placement on initiating explosives

Mitigation measures for fume control during blasting include:

- Fine material collected during drilling will not be used for blasthole stemming.
- All blastholes will be stemmed with 3m of aggregate typically 10-14mm in size.
- Emulsion gel explosives will be used to minimise interaction with water. If there is the possibility of significant water accumulating in the blastholes due to the presence of a fracture or spring in the highwall or recent rainfall, holes will be dipped prior to loading, and if excessive water identified packaged explosion products will be used.
- Blasting will only occur between the hours 9.00 am and 5.00 pm, Monday to Friday, or as otherwise approved by the EPA as per the EPL conditions.

An experienced Blasting Contractor is engaged to survey the blast area, design the blast and conduct the blast. Blasting will only occur following an appropriate assessment of the weather conditions by the Quarry Manager to ensure that the wind speed and direction will not result in excessive fume (or dust) emissions from the Project Area in the direction of the sensitive receptor locations. This measure will be effective in controlling off-site impacts due to fumes released during blasting operations.

Additionally, the design for each blast will aim to maximise the blast efficiency and to minimise the emission of fumes (as well as dust and odour) in order to ensure compliance with site specific blast emissions criteria.

The blasting schedule for each blast will also be made available to the public via the Quarry website. Typically three days prior to a blast being initiated.

6.5.2 Monitoring Program for Fume Emissions

The blast fume emissions will be monitored by a visual assessment being conducted by Cleary Bros Quarry Manager or their delegate immediately after each blast. Each blast would be recorded on video and could be relied upon to review blast fume emissions.

A visual rating of blast fume emissions is approximate at best but gives some indication of the severity of the event, however, it is worth recording.

The following factors (taken from the Code of Good Practice: Prevention and Management of Blast Generated NOx Gases in Surface Blasting issued by the Australia Explosives Industry and Safety Group Inc.) would be considered for inclusion in a post-blast report, in the event that any blast fume is detected:

- Date and time of blast.
- Presence of noticeable post-blast Nox gases.
- Post-blast Nox gas rating, e.g. 0-5 (refer Appendix B).
- Extent of post-blast Nox gas event, e.g. A, B or C (refer Appendix B).
- Duration of any post-blast Nox gas event (measure of time to disperse).
- Direction of movement of any post-blast Nox plume.
- Movement of any post-blast Nox gas plume relative to the established exclusion zone and any establishment management zone (i.e. maintained within or exceeded).
- Climate conditions, including temperature, humidity, wind speed and direction, cloud cover, rain.
- Video results of blast, where relevant.

7. Flyrock Risk Management Strategy

Flyrock is the undesirable throw of rock debris from a blast, however doesn't include airborne dust emitted during a blast which doesn't pose a risk to persons from impact.

7.1 Consultation

Table 11 lists the owners of public and private land within 250 metres of the Stage 7 area who will be consulted with as part of the preparation of this Strategy, and how their feedback has been addressed as part of the preparation of this Plan.

Table 11 - Summary of Consultation – Flyrock Risk Management Strategy

Stakeholder	Date	Comments	Where Addressed in this Strategy
Shellharbour City Council	25/1/24	Provided a copy of the draft Strategy. No comments received.	No changes required
Figtree Hill Pty Ltd	25/1/24 15/2/24	Provided a copy of the draft Strategy. Phone call on 15/2/24 advised no feedback on the draft Strategy.	No changes required
Holcim (Australia) Pty Ltd	25/1/24	Provided a copy of the draft Strategy. Responded advising no feedback on draft Strategy.	No changes required
Owner of 126 James Rd, Croom	25/1/24 25/2/24	Provided a copy of the draft Strategy. The owner mostly provided feedback on the Project in general and unrelated to flyrock. The feedback relevant to flyrock questioned how the exclusion zone was calculated and challenged the basis of the exclusion zone calculation.	Additional information on the technical experts involved in designing the flyrock risk model has been included in s7.4.
Owner of 144 James Rd, Croom	25/1/24	Provided a copy of the draft Strategy. Responded on 13/2/24 requesting further information, which was provided on 19/2/24. No further comment received.	No changes required

7.2 Flyrock Risk

There are generally two main areas within the blast from which flyrock has the potential to be produced. These are at the blasthole collar (where the stemming length has not been optimised and the explosive column is too close to the upper surface of the rock mass creating crater effects – rifling) and at the face of the blast (where there could be less than optimum burden on a blasthole whereby the explosives gases are able to vent to atmosphere – blowouts, producing flyrock).

In relation to the impacts of flyrock, the Blasting Contractor has indicated that historically blasted rock generally falls within an envelope with dimensions:

- 50m in front of the blast face;
- 20m on either side of the face; and
- 10m behind the face

and that such dimensions are consistent with industry best practice.

Table 12 lists the approximate distance of each external property to the nearest blasthole within the Project Area. This has been calculated by allowing a 3 metre offset from the Project boundary to allow for benching and overburden extraction without blasting.

Table 12 – Approximate distance of each property to nearest blast

Stakeholder	Approximate distance to closest blast hole (m)
Dunsters Lane road reserve	23
Figtree Hill Pty Ltd	23
Holcim (Australia) Pty Ltd	53
Owner of 126 James Rd, Croom	115
Owner of 144 James Rd, Croom	48

7.3 Flyrock Management Measures

Due to the nature of the extraction process, blasting will generally be undertaken such that the nearest external property will be either behind the face or to the side of the face. When blasting along the northern and southern extents of the Project Area, where it is closest to the external properties, the blast will be orientated such that the external property is behind the face, where flyrock throw has typically been minimal.

For the blasting undertaken within the Project Area, the front row blastholes will continue to be "Boretracked" in order to identify any areas of less than optimum burden in order that, if required, inert material (rather than explosives) can be placed at this location in the blasthole. Consequently, in relation to flyrock ejection, the latter situation will not occur.

In terms of collar ejection, the nominal minimum stemming length of 3.0m and stemming material, comprising aggregate typically 10-14mm in size will continue to be used as the stemming material (rather than drill cuttings or other materials) again in order to contain the explosives within each blasthole. Aggregate is used as stemming material as it "locks" at the collar of the blasthole upon initiation of the blast enabling the explosives gases to be used in fracturing and moving the rock instead of being ejected from the blasthole ("rifling").

The blast design procedures for blasting near external property boundaries will be determined through reference to the then current near-field blast emissions site laws (refer to Sections 6.1.2.1 and 6.1.2.3). As stated, the site specific Stage 7 Extension and near-field site laws (for ground vibration and airblast overpressure) will be regularly updated and used to design subsequent blasts. Consequently, the allowable MICs to comply with the nominated ground vibration and airblast overpressure safety limits at external property boundaries will progressively reduce as blasting approaches closer to the boundary, thereby further reducing the likelihood of flyrock.

The Shotfirer will control access to the Blast Exclusion Zone as described in Section 6.3, to prevent unauthorised access to the blast area.

7.4 Flyrock Model

While the blast design parameters described above are intended to reduce the extent of flyrock, a Flyrock Model will be used to calculate the maximum predicted envelope of flyrock throw, and apply appropriate safety factors to ensure the safety of people and infrastructure. Flyrock models are used widely in Australian mines and quarries and predict flyrock distances based on:

- Free face burden;
- Stemming height;
- Charge mass per metre of blasthole; and
- Blast hole angle.

The Flyrock Model was developed by Terrock Consulting Engineers, who examined flyrock generation from quarry blasting over more than 15 years to model the maximum extent of flyrock throw, and who have been recognised by the Department of Planning and Environment as experts in this field.

The Flyrock Model is then used to calculate the horizontal flyrock distances that will result due to ejection of rock from the free face and from the stemming zone. The maximum flyrock throw from the free face will be calculated for each blast using the following formula:

$$L_{max} = \frac{k^2}{g} \times \left(\frac{\sqrt{m}}{B}\right)^{2.6}$$

Where:

L_{max}	= Flyrock throw, horizontal (m)
k	= Site constant (initially '27' but may be refined as per Section 7.5)
g	= Acceleration due to gravity (9.8 m/s^2)
m	= Charge mass per metre of blasthole (kg/m; from blast design)
B	= Free face burden (m; from blast design – typically 4.0m)

The maximum flyrock throw from the stemming zone will be calculated for each blast using the following formula:

$$L_{max} = \frac{k^2}{g} \times \left(\frac{\sqrt{m}}{SH}\right)^{2.6} \times \sin 2\theta$$

Where:

SH	= Stemming height (m; from blast design – typically 3.0m)
Θ	= Launch angle (°) = 90° – (blasthole angle from vertical) – (dispersal angle (assumed 5°))

Cleary Bros will adopt a Safety Factor of 2x for all plant and equipment (equipment exclusion zone), and a Safety Factor of 4x for all personnel (personnel exclusion zone). Cleary Bros will not undertake a blast where the personnel exclusion zone calculated using the Flyrock Model extends beyond Cleary Bros property boundary, unless the affected property owner has agreed in writing to exclude all persons from the personnel exclusion zone for the blast.

The personal exclusion zone will be included in its entirety within the Blast Exclusion Zone prepared for each blast (refer Section 6.3). This will include the establishment of a sentry on the Dunsters Lane road reserve where the Blast Exclusion Zone encroaches into the road reserve.

7.5 Adaptive Management Protocol

Increasing confidence in flyrock predictions will be achieved by conducting a review of blast videos to determine the range of maximum rock throw around each blast (in front, to the side and behind the blast). The site constant will be revised if required to ensure the observed extent of flyrock is within the zone calculated by the model. The site constant may be increased by the Quarry Manager without further consultation, however will not be reduced unless endorsed by a suitably qualified blast engineer.

In the event that the procedures cause the personnel exclusion zone of the Flyrock Model to extend outside of Cleary Bros property boundary, and there is no current agreement to extend the exclusion envelope on to the affected private property, Cleary Bros will consider in the following order strategies to reduce the personnel exclusion zone to within the CB property boundary:

1. Utilise vertical blastholes instead of angled holes.
2. Increase stemming depth of blastholes (to 3.5 metres or 4.0 metres).

3. Seek agreement from the landowner for a once-off exclusion area extending on to their property.

In any such instance, the safety of the people and then property will be prioritised, and blasting will not be undertaken where there is uncontrolled risk of flyrock outside of Cleary Bros property boundary.

8. Monitoring

8.1 Blast Monitoring Plan Requirements

Condition B18, Part B of SSD 10369, that the Blast Management Plan must:

(g) include a monitoring program for evaluating and reporting on compliance with the relevant conditions of this consent.

8.2 General Procedure

The Monitoring Program has been reviewed with reference to the procedures described in AS 2187.2-1993, "Explosives – Storage, Transport and Use" and with reference to the ANZEC's "Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration", September 1990.

The blast emissions will be quantified for all blast events conducted within the Project Area. Monitoring of potential blast fume emissions is described in Section 6.5.

8.3 Monitoring Locations

A permanent blast emissions monitor (ground vibration and airblast overpressure) has been located at the closest inhabited residence to the Project Area, namely the "Figtree Hill" (Residence R1 "The Cottage") residence, as shown in Figure 3.

A portable blast emissions monitor (to measure ground vibration and airblast overpressure) will be positioned at the nearest potentially affected residence to the east of the Project as shown by the "Roving Blast Monitor" in Figure 3.

8.4 Instrumentation Requirements

8.4.1 Blast Emissions Monitors

Blast monitoring instrumentation will be employed to meet the measuring equipment specifications presented in Appendix J, Section J3.2.1 (for ground vibration) and Section J3.3.1 (for airblast overpressure) of AS 2187.2-2006 "Explosives – Storage and Use. Part 2: Use of Explosives". The instrumentation will be installed, operated and maintained by suitably qualified or trained personnel. The instruments will be calibrated annually throughout the life of the Project.

8.4.2 Permanent Monitor Installation

A permanent blast monitor will be maintained at "Figtree Hill" (Residence R1 "The Cottage") throughout all blasting operations.

8.4.3 Portable Monitor Installation

A portable blast monitor will be operated manually for each blast at the relevant Roving Blast Monitor location.

Vibration velocity geophones will be coupled to the ground via a "star stake" or concrete plinth embedded in the consolidated surface within 50 m of the Cleary Bros property boundary, with the associated microphone positioned in the free-field.

8.4.4 Weather Monitoring Equipment

The automatic weather station is to be relocated to the southern end of the Stage 7 area and is considered representative of wind propagation conditions in relation to blast emissions throughout the blast monitoring

program. The weather station will be sited and installed generally in accordance with the EPA's "*Approved Methods of the Modelling and Assessment of Air Pollutants in NSW*".

The automatic weather station will be programmed, as a minimum, to continuously record the meteorological parameters shown in **Table 13**.

Table 13 – Meteorological Measurement Parameters

Measured Parameter	Unit	Sample Interval
Mean wind speed	km/h (or m/s)	15 minute
Mean wind direction	Degrees	15 minute
Sigma-theta	-	15 minute
Aggregate rainfall	mm	15 minute
Mean air temperature	°C	15 minute
Mean relative humidity	%RH	15 minute

8.5 Blast Records

Blast design records will be maintained for all individual blast events. The purpose of the records is to assist in the design and optimisation of future events, the planning and control of blast emissions and to provide a traceable system of documentation in case of accident or complaint.

The Blasting Contractor will provide a description of the blast parameters prior to each blast event and include the location co-ordinates (East, North, elevation (mAHD)) of the blast site (or the distance from the blast site to the blast monitor(s)) and the maximum explosive mass (MIC) to be detonated in any 8ms interval.

Section 6.1.2 presents the MIC limiting equations based on the current combined and near-field blast emission site laws for ground vibration and airblast from the results of blasting in Stages 1 to 6 of the existing extraction area. The current combined blast emissions site laws, in the standard form, are presented below.

In order to maximise the benefits of the blast monitoring process, the significant design parameters, emission levels and meteorological data will be collated and maintained for each blast event.

8.6 Property Inspections

Subject to permission being granted by the landowner, Cleary Bros will conduct a dilapidation survey of the built structures on the Fig Tree Hill property prior to the first blast in the Stage 7 area, and then every 2 years thereafter. The dilapidation surveys are intended to record the condition of each of the structures on the property, and identify any structural or cosmetic defects present in the structures at the time of the survey. The dilapidation survey of the Fig Tree Hill property will include the following structures (subject to landowner consent):

- The Hill Residence
- The Cottage Residence
- Workers Cottage
- Milking Room
- Outbuildings
- Barn

In addition, where the owner of any privately-owned property within 1.3km of the approved disturbance area of the Stage 7 Project (refer Figure 3) provides a written request for a property inspection to establish the baseline condition of any buildings or structures on their property.

Written requests for property inspections should be addressed to:

Environmental Officer

Cleary Bros (Bombo) Pty Ltd

PO Box 210

Port Kembla NSW 2505

Or via email to environment@clearybros.com.au, with attention to the 'Environmental Officer'.

On receipt of a request for a property inspection, Cleary Bros will undertake the following actions within 2 months of the request:

1. Provide the property owner with the name and experience of the person proposed to undertake the property inspection (*building inspector*) and the person proposed to provide specific advice in relation to blasting-related impacts (*blasting expert*), and request the property owner's acceptance of the nominations for the suitably qualified persons.
2. Following acceptance of the nominated persons, commission the approved building inspector to establish the present condition of any structures on the property (in line with the property owners request) at a mutually agreeable time, and prepare a property inspection report.
3. Commission the approved blasting expert to review the property inspection report and Blast Management Plan, and provide a brief blast expert report identifying any measures that should be implemented to minimise the potential blasting-related impacts of the Quarry on the nominated structures.
4. Provide the property inspection report and blast expert report to the property owner.

Where the property owner disagrees with the findings of the report, rejects the suitability of Cleary Bros' nominated building inspector, or a mutually agreeable time for the property inspection cannot be reached, then Cleary Bros will refer the matter to the Planning Secretary for resolution.

All property inspections and dilapidation surveys will be undertaken by an independent, qualified person with experience preparing building inspection reports. The blast expert will be an independent, experienced engineer, specialising in blasting.

9. Adaptive Management

9.1 Emergency Response

Emergency management at the Quarry is managed in accordance with the Pollution Incident Response Management Plan and Emergency Management Plan. All employees, contractors and visitors receive training in these plans commensurate with their level of responsibility.

During emergencies, including emergencies related to blasting activities, the Site Emergency Controller will determine the level of response (i.e internally manageable or requiring external resources). All personnel and contractors will be required to assist emergency services if, and when, directed. Cleary Bros will also provide appropriately trained personnel as requested and required, including those trained to act as first responders. In the event of an emergency requiring external resources, emergency vehicles will be met at the gates and escorted to the emergency.

9.2 Triggers

Table 14 identifies the key risks to successful achievement of the blasting criteria and outlines the approach to contingency management in the form of a Trigger Action Response Plan (TARP).

Table 14 – Trigger Action Response Plan

TARP No.	Parameter	Trigger	Action and Response
1	Near exceedance	Single occasion of vibration or airblast overpressure exceeding 95% criteria in Table 8	Review site laws and update as required.
2	Exceedance of blasting criteria	Vibration or airblast overpressure exceeds criteria in Table 8	Implement Incident Response procedure (Section 10.4). Review the blast design and weather conditions. Introduce changes to the blast design if required. Environmental Officer to inspect all heritage listed structures where there may have been an exceedance, with reference to any recent dilapidation report.
3	Blast Fume	Blast Fume of Level 3 or above detected during blast, or visible blast fume leaves property boundary	Implement Incident Response procedure (Section 10.4). Review the blast video and prepare a post-blast report noting particularly the movement of any NOx gas plume and determine any mitigation required for future blasts.
4	Dust Emissions	Visible dust leaves property boundary	Implement Incident Response procedure (Section 10.4). Review the blast design and weather conditions. Introduce changes to the blasting protocols to prevent recurrence.
5	Flyrock	Flyrock travels outside of modelled flyrock envelope	Implement Incident Response procedure (Section 10.4). Review the blast design and ensure adequate. Assess the implemented blast control measure and change design if required. Update Flyrock Model.
6	Community Complaint	Community member claims blasting has damaged buildings or structures	Investigate the complaint following the process described in Section 10.2.

10. Management of Compliance

10.1 Reporting and Publishing

An *Annual Review* must be prepared and submitted to the Department by 30 September each year addressing the matters identified in Condition D10 of SSD10369. The *Annual Review* will include all blasting-related monitoring and other relevant matters for the 12-month period to the preceding 30 June, as well as measures to be implemented for the following 12-month period.

The Annual Review will include information relevant to:

- Activities undertaken during the year, and activities planned to be carried out over the next year.
- A review of all monitoring results associated with this plan, including how they compare to the limits and performance criteria identified in this plan, the risk assessment in Section 4, previous years monitoring results, the predictions from the EIS, and any trends observed.
- Details of compliance and any non-compliance with the conditions and the plans, and any incidents.
- Details of any complaints received, and how Cleary Bros has responded to them.
- Any discrepancies between the observed impacts of the Quarry and that predicted by the EIS.
- Any measures that will be implemented in the next year to improve the environmental outcomes of the Quarry.

The Annual Review will be uploaded to the Planning Portal or otherwise submitted to the Planning Secretary in line with the current submission process.

In addition, an Annual Return for EPL299 will be prepared annually in line with the requirements of the licence. This report will not be made available on the Cleary Bros website, however, information contained within the report will be presented in the *Annual Review*.

In accordance with condition D15 of SSD 10369, Cleary Bros will make the following information and documents publicly available on their website:

- the EIS;
- all current statutory approvals for the Quarry;
- all strategies, plans and programs required under the conditions SSD 10369;
- any strategy, plan, or program developed in accordance with the EIS or the conditions of this SSD 10369.
- the proposed staging plans for the Quarry;
- minutes of CCC meetings;
- regular reporting on the environmental performance of the Quarry in accordance with the reporting requirements in any plans or programs required by the conditions SSD 10369;
- a comprehensive summary of the monitoring results of the Quarry, reported in accordance with the specifications in any conditions of SSD 10369, or any strategies, plans and programs;
- a summary of the current phase and progress of the Quarry;
- contact details to enquire about the Quarry or to make a complaint;
- a complaints register, updated monthly;

- the Annual Reviews of the Quarry;
- audit reports prepared as part of any Independent Environmental Audit of the Quarry and the Cleary Bros' response to the recommendations in any audit report; and
- any other matter required by the Planning Secretary.

All information will be regularly updated.

A summary of the vibration and air overpressure for each blast will be included on Cleary Bros website within 14 days of the blast.

10.2 Community Complaints

Community complaints can be made via any of the following methods:

- Phone: 02 4275 1000
- Email: environment@clearybros.com.au
- Mail: Albion Park Quarry Complaints
  Cleary Bros (Bombo) Pty Ltd
  PO Box 210
  Port Kembla NSW 2505

When a complaint is received by Cleary Bros, it will be recorded using the Community Complaints Form and listed in the Albion Park Quarry Complaints Register. Cleary Bros will seek further details from the complainant where required and possible to better ascertain the nature of the complaint, including potential contributor(s). Cleary Bros will also advise the complainant of the process to be followed for investigating the complaint. Cleary Bros investigate the complaint, and provide the complainant with a response within 7 days of the complaint being raised, or where the investigation is ongoing, provide an update and an anticipated date for completion of the investigation.

The investigation will be summarised using the Community Complaints Form, which will include:

- time and date of the complaint;
- nature of the complaint;
- name and address of complainant (if provided);
- name of the person conducting the investigation;
- quarrying activities at the time of the complaint;
- environmental factors which may have contributed to the complaint;
- any observations as to the possible contributing factors leading to the complaint;
- any proposed corrective actions identified for implementation as part of the investigation;
- summary of information provided to complainant following the investigation; and
- perceived response of complainant to investigation.

The Albion Park Quarry Complaints Register will contain a brief, anonymised summary of each complaint, and a copy of the Register maintained on Cleary Bros' website.

10.3 Property Investigations

Where the owner of any privately-owned property within 1.3km of the approved disturbance area of the Stage 7 Project (refer Figure 3) claims in writing that buildings or structures on their property have been damaged as a result of blasting activities at the Quarry, Cleary Bros will undertake a property investigation as described in this section. A property investigation will also be undertaken at the request of the Planning Secretary for a property greater than 1.3km from the Project Area. The property inspection will form part of the complaints investigation process described in Section 10.2.

On receipt of a claim of property damage associated with blasting activities, Cleary Bros will undertake the following actions within 2 months of the claim:

1. Provide the property owner with the name and experience of the person proposed to investigate the claim (the *expert*), and request the property owner's acceptance of the nomination.
2. Following acceptance of the expert, commission them to investigate the claim including any likely connection to blasting activities on the Project, and provide a report with their findings. In the event an inspection of the property is required, this will be undertaken at a mutually agreeable time.
3. Provide the investigation report to the property owner.

Where the property owner of Cleary Bros disagrees with the findings of the report, the property owner rejects the suitability of Cleary Bros' nominated expert, or a mutually agreeable time for a property inspection cannot be reached, then Cleary Bros will refer the matter to the Planning Secretary for resolution.

Where Cleary Bros and the property owner agree on the findings of the investigation report, and the investigation report concludes that blasting activities associated with the Project have caused damage to the property owners structures, Cleary Bros will repair any damage attributable to the Project, to the satisfaction of the Planning Secretary and in consultation with the property owner.

All property investigations will be led by an independent, experienced engineer, specialising in blasting, and may involve other specialists on a case by case basis.

10.4 Incident and Non-compliance Identification and Management

Conditions D8 and D9 of SSD10369 require Cleary Bros to notify the Department of Planning and Environment and any other relevant government agency of incidents or non-compliances with the conditions of the consent. Similar conditions are included in EPL299 held for the Quarry.

For the purposes of this Plan, an incident or non-compliance is as follows.

- Incident - An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance. Material harm is defined as

  "harm to the environment that:

  - involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial; or
  - results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000, (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment)

  Material harm does not include "harm" that is authorised under SSD10369 or any other statutory approval.
- Non-compliance - An occurrence, set of circumstances or development that is a breach of this consent.

In relation to blasting activities, an incident may include any of the following:

- Member(s) of the public identified to be within the personnel exclusion zone for initiated blast.
- Flyrock observed to breach the calculated equipment exclusion zone for any blast.
- Blast fume event of Level 3 or above.

- Blast fume cloud or blast dust cloud travels beyond Cleary Bros property boundary.
- Damage to public or private infrastructure due to blasting activities.

A non-compliance may include the exceedance of the blasting criteria (refer Table 8 and Table 9) with no impact to persons or property.

The *Environmental Management Strategy* sets out the procedures to be implemented in the event of an incident or non-compliance.

11. Plan Review and Continual Improvement

11.1 Independent Environmental Audit

In accordance with Condition D11 of SSD 10369, Cleary Bros will engage a third party to undertake an independent environmental audit of the conditions of these approvals and the implementation of the Blast Management Plan. The first audit will be undertaken within 12 months of commencement of quarrying activities under SSD 10369, and will be undertaken every three years thereafter. The Independent environmental audit will be undertaken as per the process described in the Environmental Management Strategy.

In accordance with D12 of SSD 10369, Cleary Bros will review each Independent Environmental Audit and submit a response to the Planning Secretary and any other relevant agencies. The response will include a timetable for the implementation of the recommendations of the Independent Environmental Audit. The Independent Audit Report and Response will be made available on the Cleary Bros' website within 60 days following submission to the Planning Secretary.

11.2 Plan Review

In accordance with Condition D6 of SSD-10369, this Management Plan will be reviewed and, if required, revised within 3 months of any of:

- the submission of an incident report related to blasting activities under Condition D8 or D9;
- the submission of an *Annual Review*;
- the submission of an Independent Environmental Audit;
- the approval of any modification of the conditions of SSD10369; or
- commencement of each Stage of the Quarry.

The blast emissions site laws will be reviewed every five years, and updated unless the review determines that the current site laws are still appropriate for managing blast emissions on the Project.

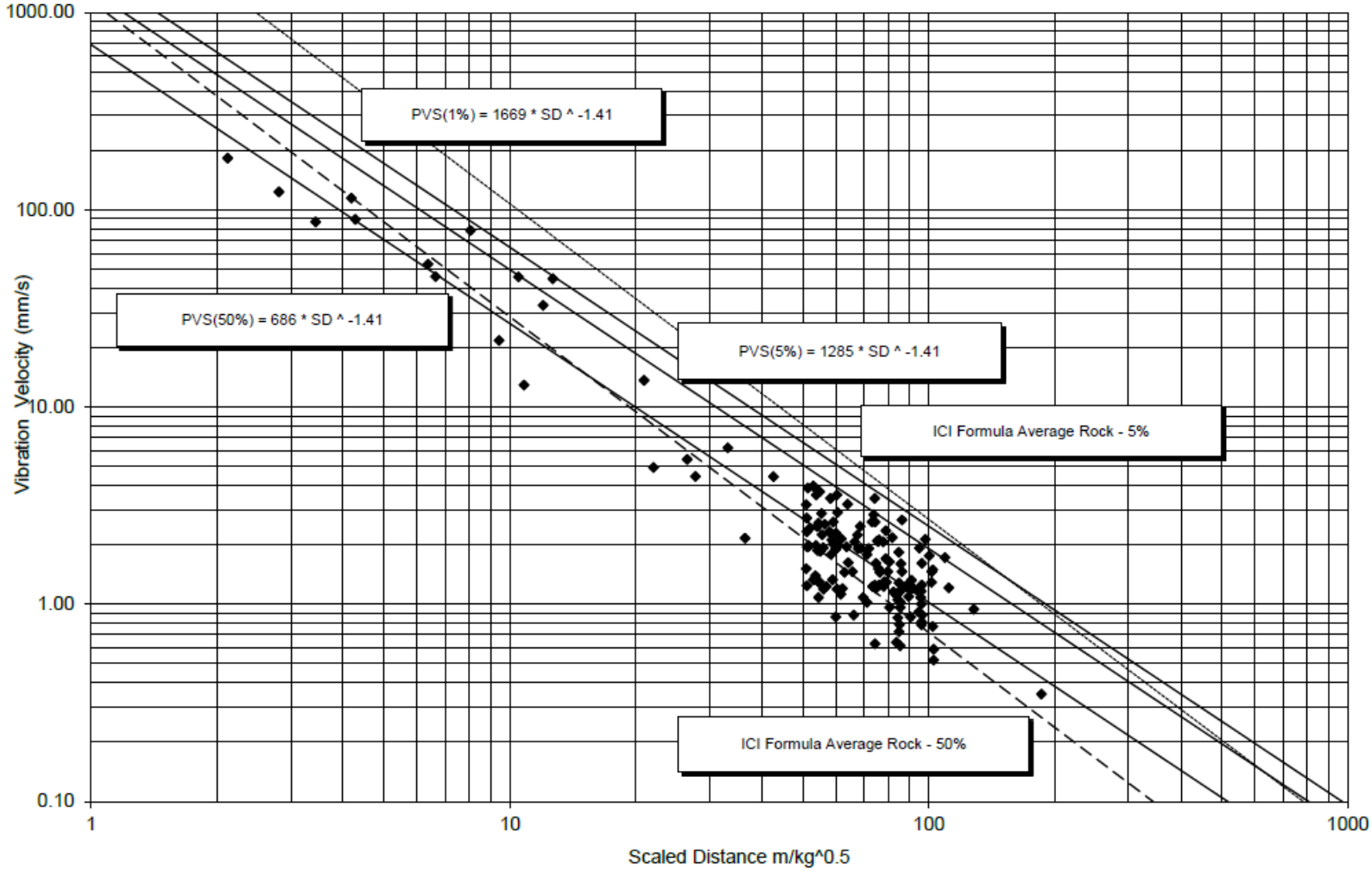
12. References

RW Corkery & Co Pty Limited (RWC) (2023). *Amendment Report for the Albion Park Quarry Extraction Area Stage 7 Extension*. Prepared on behalf of Cleary Bros (Bombo) Pty Ltd. Dated May 2023.

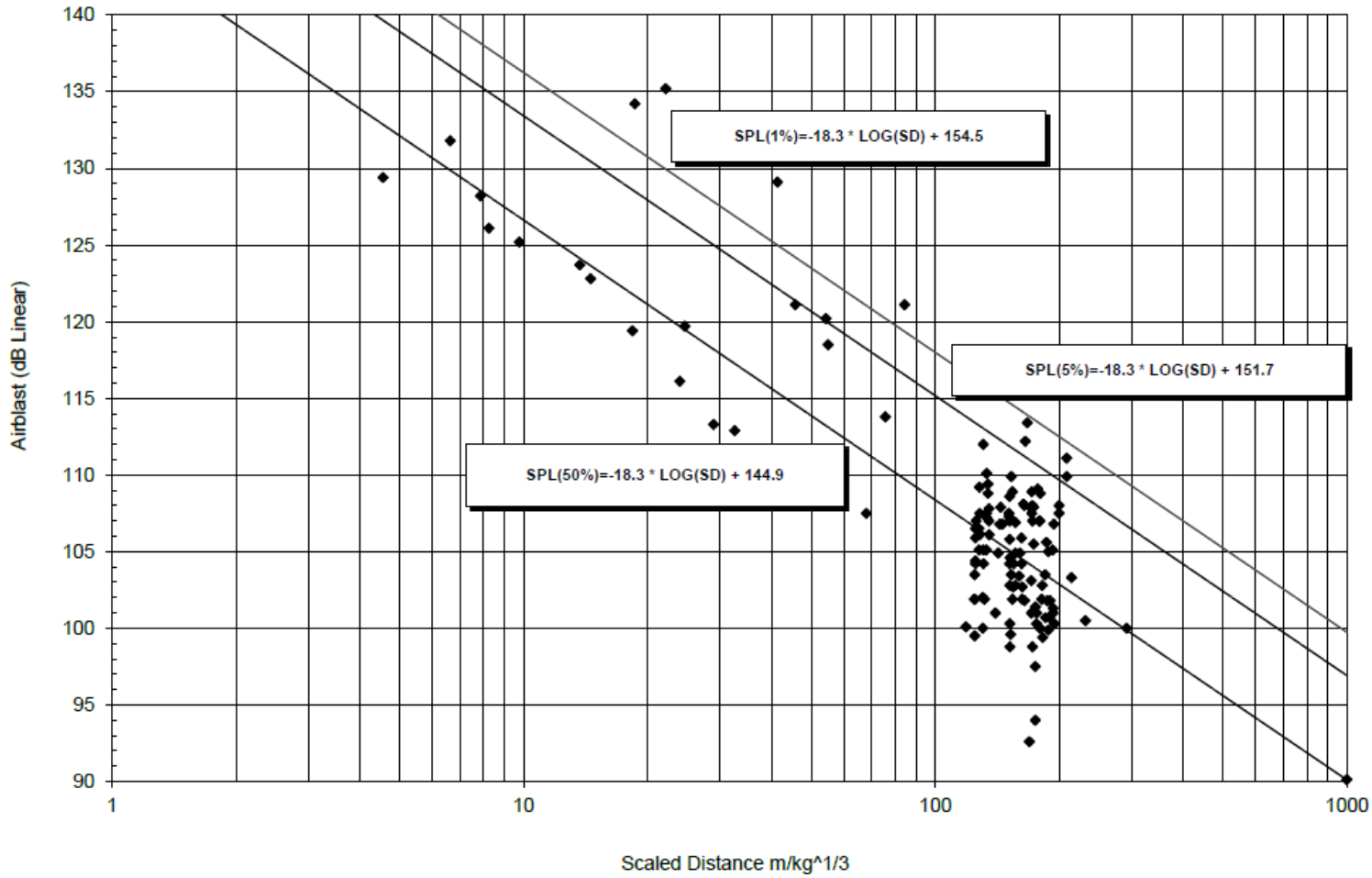
Heggies Australia Pty Ltd (Heggies) (2005). *Report on Vibration Effects in Transported Cattle.* Dated 15 November 2005).

Appendix A – Albion Park Quarry Blast Site Laws

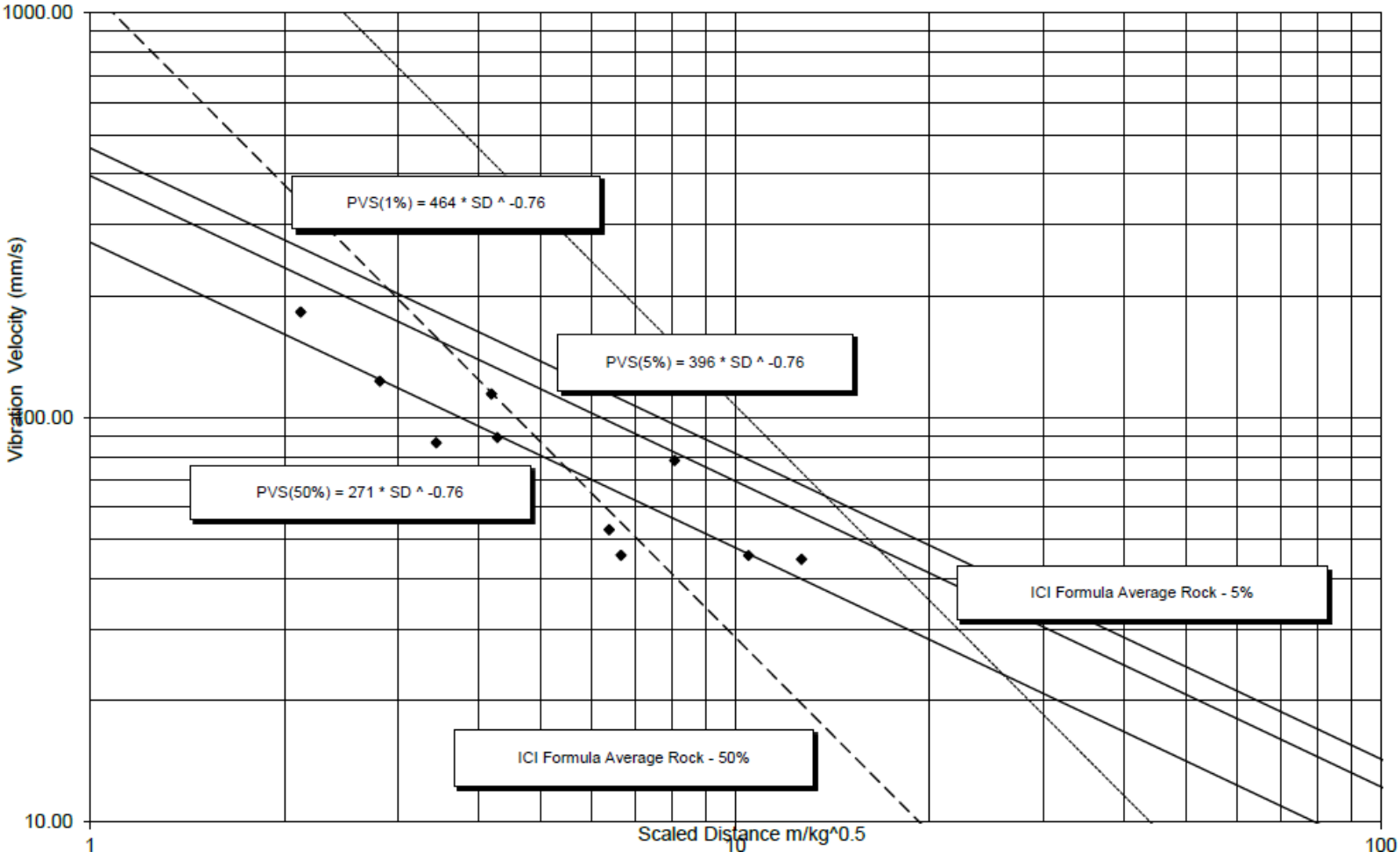
Albion Park Quarry
PVS Ground Vibration Velocity Site Law - 200 Data Points
From 20/2/2013 to Blast #22/20 - Near and Far Field Data



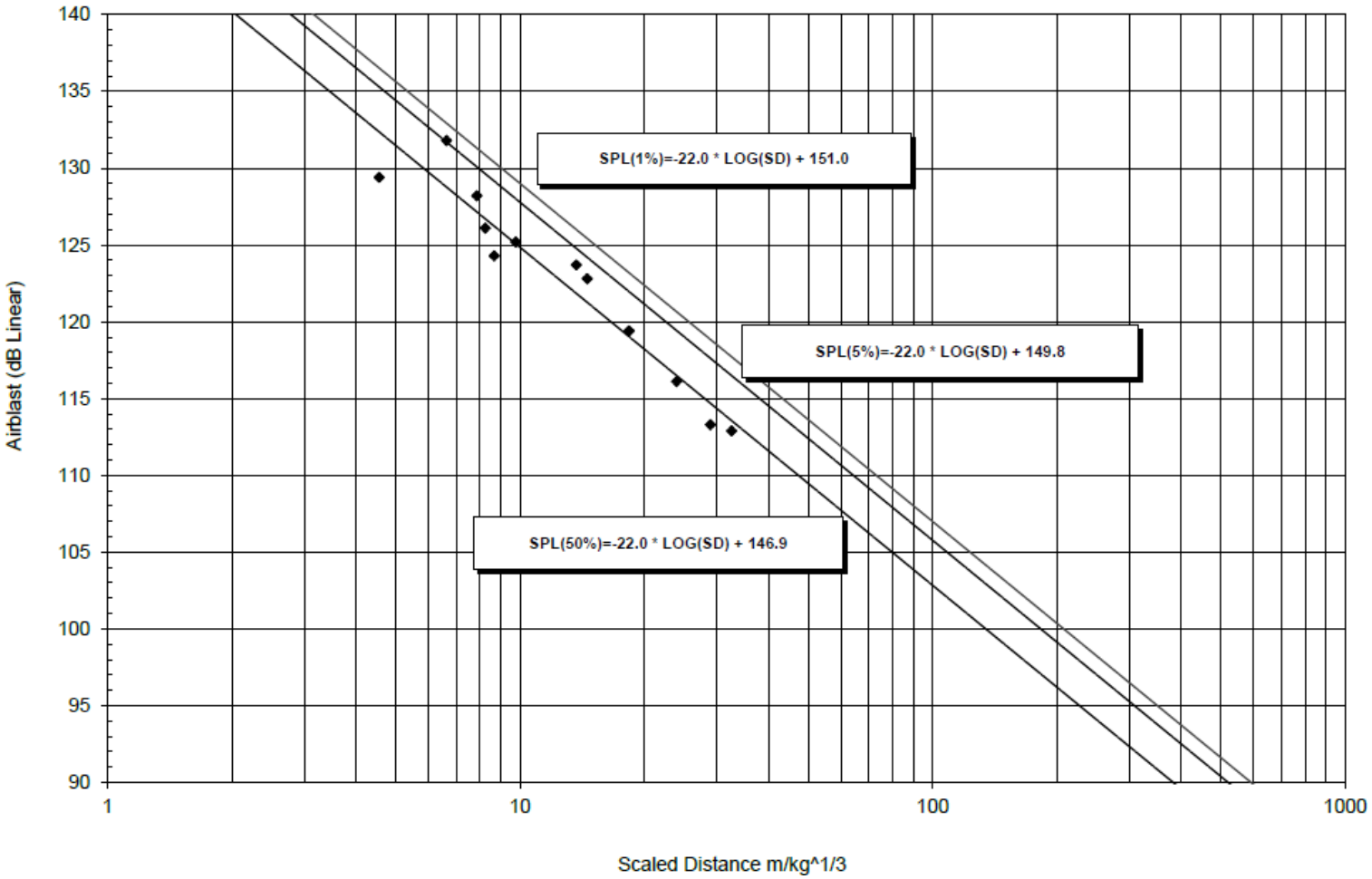
Albion Park Quarry
Peak Linear Airblast Site Law - 206 Data Points
From 20/2/2013 to Blast #22/20 - Near and Far Field Data



Albion Park Quarry
PVS Ground Vibration Velocity Site Law - 10 Data Points
Blast #03, 04, 08, 09/17 and 10/18 - Near Field Data



Albion Park Quarry
Peak Linear Airblast Site Law - 12 Data Points
Blasts #03, 04, 08, 09/17 and 10/18 - Near Field Data



Appendix B – Blast Fume Rating Scale and Field Colour Chart

Appendix B

Visual Nox Fume Rating Scale and Field Colour Chart

23162.1.3

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APPENDIX 2 - VISUAL NOX FUME RATING SCALE

The following table, together with the Field Colour Chart in Appendix 3, details how NOx gases from a surface blast can be assessed.

Level	Typical Appearance
Level 0 No NOx gas	
Level 1 Slight NOx gas 1A Localised 1B Medium 1C Extensive	
Level 2 Minor yellow/orange gas 2A Localised 2B Medium 2C Extensive	
Level 3 Orange gas 3A Localised 3B Medium 3C Extensive	
Level 4 Orange/red gas 4A Localised 4B Medium 4C Extensive	
Level 5 Red/purple gas 5A Localised 5B Medium 5C Extensive	

Assessing the amount of NOx gases produced from a blast will depend on the distance the observer is from the blast and the prevailing weather conditions. The intensity of the fume produced in a blast should be measured on a simple scale from 0 to 5 based on the table above. The extent of the fume also needs to be assessed and this should be done on a simple scale from A to C where:-

A = Localised (ie Fume localised across only a few blast holes)

B = Medium (ie Fume from up to 50% of blast holes in the shot)

C = Extensive (ie Extensive generation of fume across the whole blast)