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# Bass Point Quarry Project Noise and Blast Management Plans

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# Bass Point Quarry Project

## Noise and Blast Management Plans

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### DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
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## 1 INTRODUCTION

The Minister for Planning and Infrastructure has conditionally approved the continued operation of Bass Point Quarry (BPQ), NSW until 31 January 2044.

The associated Project Approval was issued on 28 January 2014 and is attached as **Appendix A**.

The following report contains the Noise Management Plan (NMP) and Blast Management Plan (BMP) for BPQ, prepared in consultation with the EPA, detailing monitoring locations, methods of monitoring noise and blasting as well as the correct compliance checking procedures for the subsequent reporting in accordance with the Department of Planning and Environment (DP&E) and the Environment Protection Authority (EPA) requirements.

The NMP and BMP have, in turn, been prepared for inclusion in the Environmental Management Strategy in order to satisfy Condition 1, Schedule 5 of the Project Approval. The relevant sections of Condition 1 state:

1. *The Proponent shall prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Director-General. This strategy must:*
  - ....;
  - (b) provide the strategic framework for environmental management of the project;*
  - ....; and
  - (f) include:*
    - *copies of any strategies, plans and programs approved under the conditions of this approval; and*
    - *a clear plan depicting all the monitoring required to be carried out under the conditions of this approval.*

Condition 3, Schedule 5 of the Project Approval (hereafter the "Approval") contains the requirements for the BPQ Management Plans and states that:

### **Management Plan Requirements**

3. *The proponent shall ensure that the Management Plans required under this approval are prepared in accordance with any relevant guidelines, and include:*
  - (a) detailed baseline data;*
  - (b) a description of:*
    - *the relevant statutory requirements (including any relevant approval, licence or lease conditions);*
    - *any relevant limits or performance measures/criteria; and*
    - *the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;*
  - (c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;*
  - (d) a program to monitor and report on the:*
    - *impacts and environmental performance of the project; and*
    - *effectiveness of any management measures (see (c) above);*

**Table 1** provides a summary of the planned noise and blast monitoring programs and identifies the relevant sections in the NMP and BMP that contain the detailed program description.

**Table 1 Summary of Planned Noise and Blast Monitoring Program**

<b>Monitoring Timing</b>	<b>Activity Monitored</b>	<b>Requirements and Program Reference</b>
1. Undertaken when operational equipment commences work on site	Noise emission level	Criteria and Program <b>Sections 2.1</b> and <b>4</b> respectively
2. Undertaken quarterly after all components of the project are operating	Quantification of intrusive noise emissions	Program <b>Section 4.2</b> for on-site monitoring and <b>Section 4.3</b> for community monitoring
3. Undertaken when a non-compliance is identified in Item 2 above	Actions to be determined at the time of non-compliance and would be specific to the individual situation May require unattended continuous noise logging	<b>Section 4.3</b>
4. Undertaken for every blast	Airblast and ground vibration	Criteria - <b>Section 2.2</b> Program - <b>Section 7</b> Check lists - <b>Section 7.6</b>

## **2 PROJECT NOISE AND BLAST MANAGEMENT PLANS/EMISSION LIMITS**

### **2.1 Noise**

Condition 6, Schedule 3 of the Approval states that:

#### **3. Noise Management Plan**

6. *The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:*
- (a) *be prepared in consultation with the EPA, and submitted to the Director-General for approval by 31 May 2014;*
  - (b) *describe the measures that would be implemented to ensure:*
    - *best management practice is being employed to minimise the construction, operational and transport noise of the project;*
    - *the noise impacts of the project are minimised during any meteorological conditions when the noise limits in this approval do not apply; and*
    - *compliance with the relevant conditions of this approval;*
  - (c) *describe the proposed noise management system in detail; and*
  - (d) *include a monitoring program that:*
    - *is capable of regularly evaluating the performance of the project, including noisy individual items of plant, such as haulage trucks, crushers and bulldozers;*
    - *includes a protocol for determining any exceedances of the relevant conditions in this approval at locations listed in Table 2; and*
    - *evaluates and reports on the effectiveness of the noise management system on site.*

Table 2 of the Approval and the associated notes and references are as follows:

*Table 2: Noise criteria dB(A)*

Location	Day/Evening	Night	
	<i>L</i> <sub>Aeq</sub> (15 min)	<i>L</i> <sub>Aeq</sub> (15 min)	<i>L</i> <sub>A1</sub> (1 min)
R4	44	44	54
R5	45	45	55
R6	42	42	52
R7	41	41	51
R8	35	35	45
R9	35	35	45
R11	45	45	55
R12	45	45	55
Any residential property within the Shell Harbour Marina Precinct	48	48	58
Shell Cove Primary School (when in use)	<i>L</i> <sub>Aeq</sub> (1 hour) 40 (internal)	Not applicable	

Notes:

- Receiver locations are shown in Figure 2 in Appendix 2.
- After the first review on any EPL granted for this development under Section 78 of the POEO Act, nothing in this approval prevents the EPA from imposing stricter noise limits on the quarrying operations on site under the EPL.

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 6 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

In turn, Appendix 6 of the Approval, Noise Compliance Assessment, contains the following:

1. The noise criteria in Table 1 of the conditions are to apply under all meteorological conditions except the following:
  - (a) during periods of rain or hail;
  - (b) average wind speed at microphone height exceeds 5m/s;
  - (c) wind speeds greater than 3 m/s measured at 10 m above ground level; or
  - (d) temperature inversion conditions greater than 3°C/100 m.

**Determination of Meteorological Conditions**

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the meteorological station on or in the vicinity of the site.

**Compliance Monitoring**

3. Deleted (MOD 1)
4. Unless otherwise agreed with the Secretary, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW Industrial Noise Policy (as amended from time to time), in particular the requirements relating to:
  - (a) monitoring locations for the collection of representative noise data;

- (b) meteorological conditions during which collection of noise data is not appropriate;
- (c) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
- (d) modifications to noise data collected including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

## 2.2 Blasting

Condition 13, Schedule 3 of the Approval states that:

### **Blast Management Plan**

13. The Proponent shall prepare and implement a Blast Management Plan for the project to the satisfaction of the Director-General. This plan must:

- (a) be prepared in consultation with the EPA, and be submitted to the Director-General for approval by 31 May 2014;
- (b) describe the measures that would be implemented to ensure:
  - best management practice is being employed; and
  - compliance with the relevant conditions of this approval;
- (c) include a specific blast fume management protocol to demonstrate how emissions will be minimised, including risk management strategies if blast fumes are generated; and
- (d) include a monitoring program for evaluating the performance of the project including:
  - compliance with the applicable criteria; and
  - minimising fume emissions from the site.

In turn, Condition 7, Schedule 3 of the Approval states that:

- 7. The Proponent shall ensure that blasting on the site does not cause exceedances of the criteria in Table 3.

Table 3: Blasting criteria

Location	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance
	120	10	0%
Any residence on privately owned land	115	5	5% of the total number of blasts over a period of 12 months

However, these criteria do not apply if the Proponent has a written agreement with the relevant residential owner or infrastructure provider/owner, and the Proponent has advised the Department in writing of the terms of this agreement.

The EPA's response to a review of the NMP and the BMP is attached as **Appendix B**.

### 3 NOISE MANAGEMENT MEASURES

#### 3.1 Noise Minimisation

Condition 6b, Schedule 3 of the Approval states that:

- (b) describe the measures that would be implemented to ensure:
- best management practice is being employed to minimise the construction, operational and transport noise of the project;
  - the noise impacts of the project are minimised during any meteorological conditions when the noise limits in this approval do not apply; and
  - compliance with the relevant conditions of this approval;

As demonstrated in Section 9, Noise Impact Assessment, of the Noise and Blasting Impact Assessment (NBIA) prepared by Heggies Pty Ltd (now SLR Consulting Australia Pty Ltd), dated 24 May 2010, the results of the construction, operational and transport noise modelling predictions "indicate that the proposed operations will comply with the noise criteria during each assessment period at all surrounding receiver locations."

Further, the results of the noise modelling, under a prevailing 3 m/s wind in all directions, presented in Table 2 of the document entitled "Bass Point Quarry Environmental Assessment, Response to Submission from OEH", prepared by SLR Consulting Australia Pty Ltd dated 20 October 2011, indicate compliance with the Project Approval Noise Criteria (Schedule 3, Condition 3 dated 28 January 2014).

These two sets of results are in turn based upon "All fixed and mobile plant being selected to have a sound power level (SWL) not exceeding those outlined in Table 28," of the NBIA.

Table 28 is reproduced below.

Table 28 SWL of Plant for Base Point Quarry

<b>Plant Items</b>	<b>SWL LAeq (dBA)</b>
Blasthole Drills	121 dBA
Cat 988 FEL	114 dBA
Komatsu 456 Quarry Truck	113 dBA
Cat 777C Quarry Truck	119 dBA
Cat 990 FEL	115 dBA
Cat 773 Watercart	117 dBA
Road Trucks	110 dBA
Bobcat	113 dBA
Grader	107 dBA
Conveyor Belt to Ships	113 dBA
Primary Gyratory Crusher	118 dBA
Primary Screen	117 dBA
Secondary Cone Crusher	113 dBA
Secondary Screen	118 dBA
Tertiary Cone Crusher 1	113 dBA
Tertiary Cone Crusher 2	119 dBA
Tertiary Cone Crusher 3	113 dBA
Tertiary Cone Crusher 4	113 dBA
Surge Bin for Tertiary Crusher 1	107 dBA
Surge Bin for Tertiary Crusher 2	113 dBA
Surge Bin for Tertiary Crusher 3	107 dBA
Surge Bin for Tertiary Crusher 4	107 dBA
Product Screen	117 dBA

In order to monitor the SWLs of the fixed and mobile plant, a noise monitoring program will be implemented where the plant items are measured once the project is fully operational and subsequently at 12 monthly intervals, if operational practices vary significantly. Any additional plant items will be included in the subsequent annual SWL surveys. In this way, any deterioration in the condition or performance of the plant items can be monitored and action taken to reduce noise levels.

Further to the SWL noise surveys of the plant and equipment, Hanson will implement operational management and control measures to manage and reduce the noise impacts and to ensure that the noise from the BPQ is managed to acceptable levels, through a combination of the following:

- Ensuring best management practices are implemented onsite by all staff and contractors;
- Implementing noise controls to reduce noise from the source and attenuate noise transmission;
- Implementing a Noise Monitoring Program; and
- Additional mitigation measures:
  - maintaining community engagement via establishing a complaints register and conducting community consultation; and
  - Other measures and plans such as internal auditing and contingency measures.

The effectiveness of the noise management measures at the BPQ will be assessed through attended noise monitoring (refer to **Section 4**).

### **3.2 Best Management Practices and Best Available Technology Economically Achievable**

The following best practice construction, operational and transport noise management measures will be implemented at BPQ:

#### **Site Procedures:**

- Optimise the site design and layout eg use of acoustic bunds.
- During extreme weather conditions ie strong winds, the quarry manager will relocate and operate major noise emitting mobile plant items away from areas where any adverse prevailing wind conditions would normally enhance noise emissions in the nearby residential areas in order to reduce noise levels, where reasonable and feasible.
- Raise the awareness and understanding of noise issues and the use of quiet work practices via site inductions for all staff, contractors and visitors to the BPQ;
- Avoid the simultaneous use of significant noise generating equipment wherever possible. The least amount of equipment as possible will be used for each project operation;
- Where practicable, schedule the use of any noisy equipment to the daytime only; and
- Where practical, site noisy equipment behind structures that act as barriers, or at the greatest distance from the noise-sensitive area, or orienting the equipment so that noise emissions are directed away from any sensitive areas in order to achieve the maximum attenuation of noise.

#### **Plant Equipment:**

- All machinery and plant used on site will be regularly maintained in order to minimise excessive noise generation;
- Where applicable, maintain the effectiveness of any noise suppression equipment (eg acoustic attenuator) on plant and ensure that defective plant is not operationed until repaired;
- The least intrusive types of reversing alarms will be used; and
- Specify maximum noise/sound levels when purchasing equipment (refer to **Section 3.1**).

## Source and Transmission Noise Controls

Source and transmission noise controls include:

- Enclosure of specific fixed plant and noise intensive area such as hopper bins and loading bay - where equipment is enclosed ensure that they are well maintained and, if openable, kept closed when not in use; and
- Where applicable, mobile equipment such as front end loaders should be fitted with "noise suppressors".

## 4 NOISE MANAGEMENT/MONITORING PROGRAM

As discussed, Condition 6d, Schedule 3 of the Approval states that:

- (d) *include a monitoring program that:*
- *is capable of regularly evaluating the performance of the project, including noisy individual items of plant, such as haulage trucks, crushers and bulldozers;*
  - *includes a protocol for determining any exceedances of the relevant conditions in this approval at locations listed in Table 2; and*
  - *evaluates and reports on the effectiveness of the noise management system on site.*

### 4.1 General Requirements

The noise measurement procedures employed throughout the monitoring program will be in accordance with the requirements of AS 1055 1997 "Acoustics - Description and Measurement of Environmental Noise" and the NSW EPA's Industrial Noise Policy, 2000 (INP).

### 4.2 Operator Attended Noise Surveys

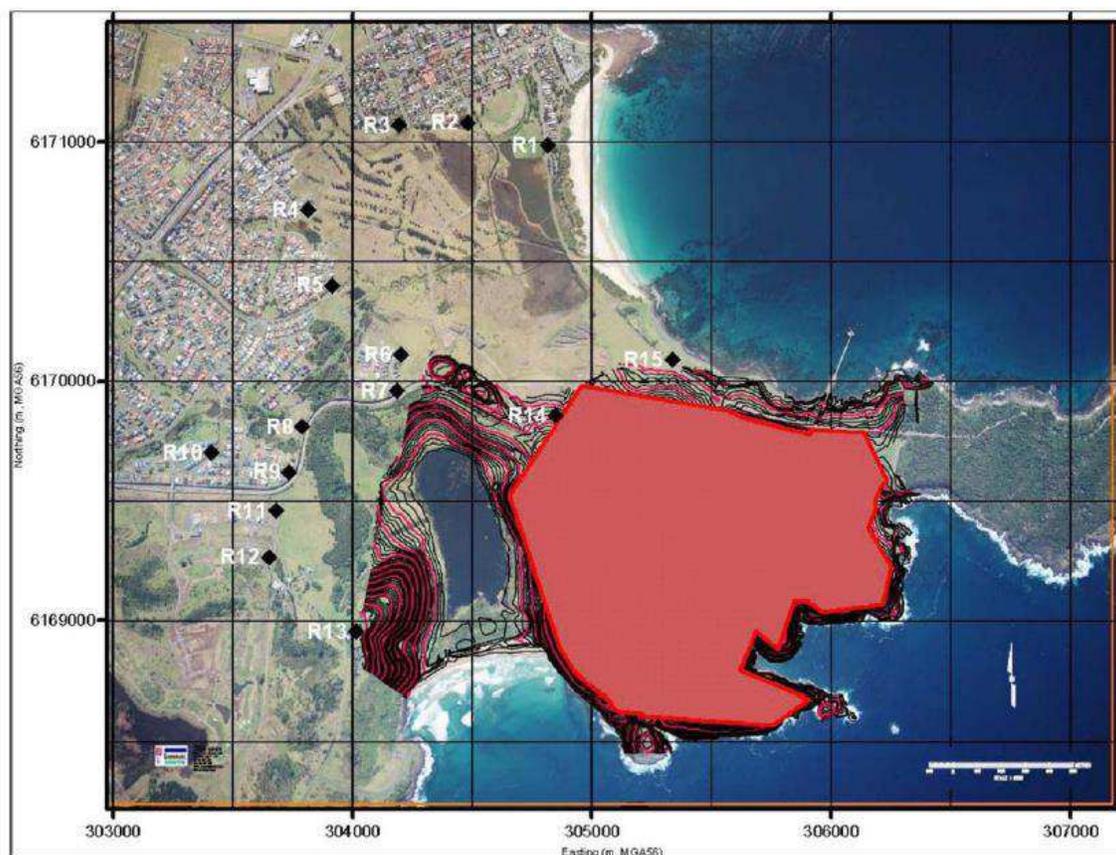
Operator attended noise measurements and recordings will be conducted to quantify the intrusive noise emissions from quarrying and processing operations as well as the overall level of ambient noise.

The operator will quantify and characterise the maximum ( $L_{Amax}$ ) and the average ( $L_{Aeq(15minute)}$ ) intrusive noise level from quarrying and processing operations over a 15 minute measurement period. In addition, the operator shall quantify and characterise the overall levels of ambient noise (ie  $L_{Amax}$ ,  $LA1$ ,  $LA10$ ,  $LA50$ ,  $LA90$ ,  $LA99$ ,  $L_{Amin}$ ) over the 15 minute measurement interval.

### 4.3 Monitoring Locations and Intervals

In order to check compliance, noise measurements will be carried out at the closest monitoring locations (R6, R7, R8, R9, R11 and R12) identified in Table 2, Schedule 3 of the Approval. **Figure 1** (Appendix 2 of the Approval) shows the location of the closest adjoining residences identified in Table 2 of the Approval.

**Figure 1 Location of the Closest Receivers to the Quarry**



Noise measurements will be conducted quarterly (and in the event of a complaint) after all components of the project are operating in accordance with the DP&E correspondence following review of the Noise and Blast Management Plans dated 17 December 2015.

If non-compliance is identified, it will be addressed appropriately. This may require unattended continuous noise logging in order to quantify the overall ambient noise levels resulting from quarrying and processing operations as well as from other environmental noise sources.

Noise emissions from BPQ to the closest adjoining residences is expected to decrease over the life of the quarry due to increasing topographic shielding as a result of the lowering of the quarry floor over the life of the quarry. If in the future, the quarry is seeking to reduce monitoring frequency (due to continual compliance with nominated criteria); approval must be sought from The Department of Planning and Environment.

## 5 INSTRUMENTATION AND MEASUREMENT PARAMETERS

### 5.1 Operator-Attended Surveys

All acoustic instrumentation employed throughout the monitoring program will be designed to comply with the requirements of AS 1259.2-1990, "Sound Level Meters" and carry current NATA or manufacturer calibration certificates.

All instrumentation will be programmed to record continuously statistical noise level indices in 15 minute intervals which may include the LAmax, LA1, LA50, LA10, LA50, LA90, LA99, LAmin and the LAeq.

Instrument calibration will be checked before and after each measurement survey, with the variation in calibrated levels not to exceed  $\pm 0.5$  dBA.

### 5.2 Weather Monitoring Instrumentation

All noise measurements will be accompanied by both a qualitative description (including cloud cover) and quantitative measurements of the prevailing local weather conditions throughout the survey period.

Meteorological measurements will be guided by the requirements of AS 2923 1987 "Ambient Air-Guide for Measurements of Horizontal Wind for Air Quality Applications". A regional automatic weather station will be used to access the meteorological parameters shown in **Table 2**.

**Table 2 Meteorological Measurement Parameters**

Measured Parameter	Unit	Sample Interval
Mean wind speed	km/hr (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

### 5.3 Plant and Equipment Observations and Log

During the attended noise measurements, the operator will record any significant quarry generated noise sources (ie haul trucks, dozers, crushers, etc) and collect information regarding the operating equipment and machinery. In addition, the operator will obtain copies of the relevant fixed plant and mobile quarrying equipment operating shift logs.

## 6 DOCUMENTING, REPORTING AND CORRECTIVE ACTION

### 6.1 Operator Attended Noise Surveys

The measured contributed noise emissions from quarrying, processing and transporting operations will be evaluated and assessed against the noise emission criteria presented in Table 2 of the Approval.

## 6.2 Reporting

The BPQ reporting requirements are outlined in Condition 6(d), Schedule 3 of the Approval. Condition 6(d) requires the Proponent to report on the effectiveness of the noise management system on the site. This would, in turn, require reporting any exceedance of the goals/limits/performance criteria or an incident causing (or threatening to cause) material harm to the environment. Such a report would be submitted to the d and any other relevant agencies within 7 days of the exceedances or incident (refer to Condition 7, Schedule 5 of the Approval).

Condition 4, Schedule 5 of the Approval requires the Proponent to submit an annual review of environmental performance to the satisfaction of the Secretary each March. .

## 6.3 Excessive Noise Emissions and Corrective Action

Condition 2, Schedule 5 of the Approval details procedures to follow should a situation occur where monitored project impacts are greater than the relevant impact assessment criteria.

Condition 2 states that:

*“Where any exceedance of these criteria and/or performance measures has occurred, the Proponent shall, at the earliest opportunity:*

- (a) take all reasonable and feasible measures to ensure that the exceedance ceases and does not recur;*
- (b) consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measure or other course of action; and*
- (c) implement remediation measures as directed by the Director-General, to the satisfaction of the Director-General.”*

## Noise Management Zone

Depending on the degree of exceedance of the project specific criteria (1 dBA to 5 dBA) noise impacts could range from negligible to moderate. It is recommended, in accordance with the INP, that management procedures be implemented including:

- Noise monitoring on site and within the community, as outlined in **Section 4**.
- Prompt response to any community issues of concern.
- Refinement of on site noise mitigation measures and quarry operating procedures, where practical.
- Discussions with relevant property holders to assess concerns.
- Consideration of acoustical mitigation at the receivers.

## 7 BLAST MANAGEMENT/MONITORING PROGRAM

Condition 13, Schedule 3 of the Approval requires the preparation and implementation of a Blast Monitoring Program.

### 7.1 Overview

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

The blast emissions will be quantified for all blast events conducted at the project site.

In the event that the quarry's blast monitoring equipment is unavailable for service, due to installation or calibration requirements throughout the monitoring program, then blast emissions will be monitored by alternative calibrated instrumentation.

## 7.2 Monitoring Locations

A portable blast emissions monitor (to measure airblast and vibration) will be positioned at the nearest potentially affected residences or other blast emissions sensitive receivers to the blasting operations, if required, as a response to community feedback or concern.

Figure 1 shows the location of the potentially affected residences.

## 7.3 Instrumentation Requirements

### 7.3.1 Blast Emission Monitors

BPQ will ensure that the level of airblast from blasting at the quarry does not exceed the criteria in Table 3 at any residence on privately owned land.

**Table 3 Airblast Impact Assessment Criteria for Residences on Privately Owned Land**

Airblast Level (dB(Lin Peak))	Allowable Exceedance
115	5% of the total number of blasts over a period of 12 months
120	0%

Note 1: To determine compliance with these limits, airblast from the quarry is to be measured at the most affected point at the residential boundary, or at the most affected point within 30 metres of the dwelling where the dwelling is more than 30 metres from the boundary (subject to the landowners consent).

Note 2: Airblast is not to be measured within 3.5 metres of any building.

BQP will ensure that the ground vibration level from blasting at the quarry does not exceed the criteria in Table 4 at any residence on privately owned land.

**Table 4 Ground Vibration Impact Assessment Criteria for Residences on Privately Owned Land**

Ground Vibration Level (mm/s)	Allowable Exceedance
5	5% of the total number of blasts over a period of 12 months
10	0%

Note 1: To determine compliance with these limits, ground vibration from the project is to be measured at the most affected point at the residential boundary, or 30 metres from the dwelling where the dwelling is more than 30 metres from the boundary (subject to the landowners consent).

### 7.3.2 Weather Monitoring Equipment

A regional automatic anemometer and wind vane station will be considered representative of wind propagation conditions in relation to blast emissions throughout the Blast Monitoring Program.

## 7.4 Blast Design Records and Predicted Emission Levels

Blast design records will be maintained for individual blast events. The purpose of the record is to assist in the design and optimisation of future events, 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 blast parameters prior to each blast event of the blast site and the maximum explosive mass Maximum Instantaneous Charge (MIC) to be detonated in any 8 ms interval.

Blast emissions data from every blast will be used (via Blast Emissions Site Laws) to refine subsequent blast designs in order to control blast emission levels, particularly for later blasting when operating closer to residences.

As the blast emission data (extra to those presented in the EA for the Development Application) becomes available, these will be used to establish statistically reliable blast emissions (airblast and ground vibration) prediction site laws. All subsequent blast emissions will be predicted using the continually updated site laws.

For the blast emission site law graphs, the median of the measured data will be plotted. Further, in accordance with the Consent Condition 7 of the Approval, allowance of exceeding the general airblast and ground vibration criterion for 5% of the total number of blasts, the "5% exceedance line" will also be plotted. Using the 5% exceedance site laws, calculations will subsequently be conducted to determine the allowable MICs for compliance with the nominated blast emission criteria at the nearby residential receivers.

BPQ (or their blasting contractor) will verify and approve the proposed blast design with respect to potential blast emissions based initially on the current predictive site laws for airblast and ground vibration presented in the Environmental Assessment.

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 by BPQ in a Blast Design Record for each blast event. An example of a suitable format (from AS 2187.2-1993) is attached as **Appendix C**.

## **7.5 Notifying Landowners or Occupiers of Blast Events**

Schedule 3, Condition 12(b) of the Approval states that:

*During blasting operations, the Proponent shall:*

*(b) operate a suitable system to enable the public to get up-to-date information on the proposed blasting Schedule on site, to the satisfaction of the Director-General.*

Bass Point Quarry operates a Blasting Information Hotline which is available 24 hours a day, 7 days a week. The Blasting Information Hotline allows landowners and the public access to up-to-date information regarding the blasting operations at Bass Point Quarry. The Blasting Information Hotline number is signposted at the quarry entrance as well as available on the Hanson website. The blasting schedule is also available for public viewing on the Hanson website.

## **7.6 Proactive Response Procedure**

The Quarry Manager (or equivalent role) will perform visual checks and assess monitoring data and meteorological data on a regular basis (i.e. daily for meteorological conditions and on a monthly basis for review of monitoring results) to ensure that operations are relocated, modified and/or halted as required to ensure adverse noise and air quality impacts are not realised at off-site sensitive receptor locations.

If adverse weather conditions occur during a planned blasting event, the Quarry Manager or Shot Supervisor will assess the risk, taking into account all variables to ultimately decide whether to fire or delay to a later time or date. This risk based assessment allows flexibility for the Quarry Manager to manage the people involved in blast events and the unpredictability of weather conditions.

## 7.7 Monitoring Checklists

In order to assist the on-site management and control of this monitoring program, BPQ will develop specific checklists that will identify the appropriate prompt actions prior to the monitoring activity associated with each blast. The checklist will be completed and retained in site files and will provide a record of the planned actions.

A suitable checklist for use when preparing to undertake the airblast and ground vibration monitoring is included in **Appendix D**. This checklist will be upgraded with the contact details of all people referenced in it, after experience is obtained in its use.

## 8 BLAST FUME EMISSIONS

### 8.1 Blast Fume Mitigation

Mitigation measures for fume control during blasting include:

- Fine material collected during drilling will not be used for blast stemming.
- All blastholes would be adequately stemmed with aggregate.
- Blasting will only occur between the hours 8.00 am and 5.00 pm, Monday to Friday, or as otherwise approved by the EPA as per the EPL conditions.
- In excessive wind events (ie prolonged visual dust in a particular area or following receipt of dust monitoring results in exceedance of the dust criteria), blasting activities will be temporarily halted and resumed only when weather conditions have improved following an appropriate assessment of weather conditions.

Blasting should only occur following an appropriate assessment of weather conditions by the Quarry Manager and/or Supervisor (or equivalent roles) to ensure that the prevailing wind speed and direction will not result in excessive fume (or dust) emissions from the site in the direction of sensitive receptor locations. This measure will be effective at 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 minimise the emission of fumes (as well as dust and odour) in order to ensure compliance with site specific blasting conditions.

The blasting schedule will also be made available to the public via the BPQ website.

Further details on blast fume mitigation and monitoring is contained in the Bass Point Quarry Project Air Quality Management Plan.

Fumes can be generated by the mechanisms as outlined in **Table 5**. Potential control measures are also presented in **Table 5**. It is noted that wet product is used in both wet and dry blastholes to minimise blast fume generation.

**Table 5 Possible Causes and Controls for Blast Fume Generation**

<b>Possible Cause</b>	<b>Potential Control Measures</b>
<b>Explosive Formulation</b>	
Explosive incorrectly formulated or not manufactured to specifications	<ul style="list-style-type: none"><li>• Track explosive mix back with supplier</li><li>• Perform visual check at discharge point</li><li>• Use supplier who operates under an externally accredited quality system</li></ul>
Improper mixing of raw materials / incorrect metering	<ul style="list-style-type: none"><li>• Perform visual check at load point</li><li>• Ensure Mobile Manufacturing Unit (MMU) calibrated every 6 months by the explosives supplier.</li></ul>
<b>Blast design</b>	
Inappropriate priming and/or placement	<ul style="list-style-type: none"><li>• Follow manufacturer's recommendations on placement of initiating explosives</li></ul>

Adapted from BHP Billiton Mt Arthur Blast Management Plan (MAC-ENC-MTP-015).

## **8.2 Monitoring Programme for Blast Fume Emissions**

The blast fume emissions will be monitored by a visual assessment being conducted by the Blast Supervisor/Quarry Manager or his delegate immediately after the blast.

The following factors (taken from the Code of Good Practice: Prevention and Management of Blast Generated NO<sub>x</sub> Gases in Surface Blasting issued by the Australia Explosives Industry and Safety Group Inc.) should be considered for inclusion in a post-blast report if identified on site:

- Date and time of blast.
- Presence of noticeable post-blast NO<sub>x</sub> gases.
- Post-blast NO<sub>x</sub> gas rating, eg 0-5 (refer **Appendix E**).
- Extent of post-blast NO<sub>x</sub> gas event, eg A, B or C (refer **Appendix E**).
- Duration of any post-blast NO<sub>x</sub> gas event (measure of time to disperse).
- Direction of movement of any post-blast NO<sub>x</sub> plume.
- Movement of any post-blast NO<sub>x</sub> gas plume relative to the established exclusion zone and any establishment management zone (ie maintained within, exceeded).
- Relevant climate conditions, including temperature, humidity, wind speed and direction, cloud cover, rain.
- Results/readings of any NO<sub>x</sub> monitoring equipment employed for the blast.
- Video results of blast where relevant.

THE MINISTER FOR PLANNING AND INFRASTRUCTURE PROJECT APPROVAL NO 08\_0143

EPA RESPONSE TO A REVIEW OF THE NOISE AND BLAST MANAGEMENT PLANS

EXAMPLE BLAST DESIGN RECORD SHEET

35

AS 2187.2—1993

FORM B

GENERAL ..... DATE .....

QUARRY/MINE ..... BENCH LOCATION .....

WEATHER ..... WIND DIRECTION ..... STRENGTH .....

BLAST TYPE ..... BLAST SITE ..... TIME .....

ROCK TYPE ..... OTHER .....

BLAST DETAILS

Burden ..... m Spacing .....

Face height ..... m Stemming .....

Blast hole:  
 Diameter ..... Nos .....

Row 1 depth ..... m Subgrade ..... Vertical angle .....

Row 2 depth ..... m Water depth ..... m

Charge details ..... Total quantity ..... kg  
 Mass per hole ..... kg Mass per delay ..... kg  
 Initiation (sequence/time delays) .....

MONITORING DETAILS

Test by ..... Test site .....

Equipment .....

Settings .....

Blast distance ..... m

Scaled distance ..... m/kg

Measured ground vibration ..... mm/s

Airblast ..... dBL

SKETCH OF BLAST

ADDITIONAL DETAILS AND POST-BLAST COMMENTS

.....

.....

SIGNATURE .....  
 SHOTFIRER

**AIRBLAST AND GROUND VIBRATION MONITORING CHECKLIST****1. PRIOR TO BLASTING**

The Blast Supervisor will ensure the co-ordination of the blast monitoring. This is required to confirm that the monitoring equipment is in place and ready to record prior to blasting. Blasting must not occur until the monitoring equipment is ready.

**2. AFTER BLASTING**

- Obtain monitoring data from the blast monitor and store in site records.
- Discuss the data with the Blasting Contractor and check compliance with the nominated criteria.
- Incorporate the blast emissions (airblast and ground vibration) monitoring data into the respective site law and re-calculate the minimum allowable MIC based on the 5% exceedance formulae.
- Appropriately respond to non-compliance if recorded and required.
- Advise the BPQ Manager of blast monitoring results, highlighting any non-compliance and planned response.
- Implement planned responses.

**Appendix E**

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VISUAL NOX FUME RATING SCALE AND FIELD COLOUR CHART