



# CCAA Guideline – Assessment and Control of Environmental Noise Emission from Quarries – Queensland





## About our industry

### About Cement Concrete & Aggregates Australia

Cement Concrete & Aggregates Australia (CCAA) is the peak industry body for the \$12 billion-a-year heavy construction materials industry in Australia.

Our members are involved in the extraction and processing of quarry products, and the production and supply of cement, pre-mixed concrete and supplementary materials. CCAA's Queensland membership accounts for the vast bulk of the extractive materials produced in the State, as well as more than 90% of the pre-mixed concrete produced in the State. All cement produced in Queensland is by CCAA members. In Queensland, the industry is a key part of the building and construction industry, and provides direct employment for over 6000 people, with thousands more indirectly employed.

In Queensland, our members play a critical role in building the economy and delivery of the State's infrastructure, particularly through the materials supplied for critical pieces of development such as roads, bridges, schools and hospitals. We work cooperatively with the public and other stakeholder groups in creating greater awareness of the cement, concrete and extractive industries, and to support our member companies in being ecologically sustainable and responsible corporate citizens.

We are a key component of the supply chain for the building industry, and the ability of our members to provide product to market is of fundamental importance. We also provide technical advice and support to the building industry on all aspects associated with the usage of concrete products.

### About the Extractive Industry

The extractive industry is a critical industry for Queensland and supplies the construction materials needed for the State's built environment. The industry operates in diverse geographic and environmental settings, ranging from built up urban environments to remote outback settings. The scale of operations range from large hard rock quarries producing more than two million tonnes per annum to small sand pits producing a few hundred tonnes per annum. Also the nature of the industry is diverse, and includes large fixed plant quarries using blasting for extraction, small mobile plant pits using bulldozers or excavators for winning material and floating dredges using a variety of dredging methods.



## About this document

This document presents the strategy to be adopted to control environmental noise emission from Queensland quarries. The noise control strategy comprises three elements for setting the appropriate limit for the acceptable level of noise emission from any particular quarry.

The three elements are:

1. Adoption of default noise limits based on time of day, with a 45 dBA limit during the day time period.
2. Adoption of site specific noise limits where the default limits are not appropriate
3. Adoption of Industry Best Practice Noise Control.

For any particular quarry, either element one or element two will apply, along with element 3 which applies to all quarries. Broadly speaking, Element 1 would normally result in the most stringent noise level limits, while Element 2 would usually result in less stringent noise emission criteria.

Element 2 includes a requirement to justify the adoption of that particular element as the basis for setting less stringent noise emission criteria for the particular quarry being examined.

CCAA Guideline *Assessment and Control of Environmental Noise Emission from Quarries - Queensland* will be a “living document” so that it can be adapted as necessary to ensure consistency is maintained with changes to relevant legislation. It has been supported by the Department of Environment and Heritage Protection (EHP) as being consistent with the *Environmental Protection Act 1994* and will be used in the Environmental Authority assessment process for determining noise limits. However, it should be noted that, consistent with legislative requirements, for certain higher risk locations EHP may impose more stringent site specific conditions.

This guideline is applicable to both new and existing quarry sites, and may be used as a basis for an amendment application requesting a review of existing Environmental Authority noise limits.

It is intended that this document will be used directly by both commercial quarry operators as well as by State Government. It is intended that this document will be used by Local Government as a reference document for guidance in relation to planning and quarry compliance matters.

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# 1 Purpose of this Document

The purpose of this document is fourfold:

- a. To provide guidance to the operators of Queensland quarries regarding the appropriate procedures to adopt to control environmental noise when:
  - (i) making an application for approval of a new quarry,
  - (ii) making application for approval of an extension to an existing quarry or
  - (iii) investigating a complaint relating to environmental noise emission.
- b. To streamline the assessment and approval process for quarries as it pertains to the control of environmental noise emission.
- c. To provide improved consistency of the conditions of approval of new and expanded quarries relating to the control of environmental noise emission, both:
  - (i) for all quarries across the state as well as
  - (ii) against Industry Best Practice Noise Control.
- d. To be used as a basis for amending existing Environmental Authorities to achieve certain, consistent and achievable noise limit.





## 2 Nature of Quarrying

“Quarrying” is the open extraction from the earth of common substances used for building materials. Depending upon the nature of the materials and the type of quarry, quarrying may frequently also include the on-site sizing of these materials.

Quarrying is a communal “good”. It supplies the essential building materials for housing, offices, schools, hospitals and vital infrastructure including roads, rail lines, ports, bridges and airports. A modern vibrant economy is critically dependent upon a ready supply of low-cost high-volume quarry products for its health and wellbeing.

Quarry material includes sand, gravel, rock, clay, soil and other substances found in the earth. Materials are extracted and processed for use in concrete, road bases, asphalt, rail track ballast, retaining walls, breakwater construction, drainage materials, mortar and plaster and a wide range of other products.

Quarries can be broadly classified into two groups:

- (i) sand and gravel operations
- (ii) hard rock quarries.

In general, sand and gravel is “won” from the earth by dredging, ripping and digging. Blasting is seldom, if ever, required.

By contrast, hard rock materials are extracted by drill-and-blast techniques.

For both types of quarry, it will usually be necessary to

remove overburden prior to commencing extraction.

In addition, at both sand and gravel quarries and hard rock quarries, extracted materials will usually be sized before sale and delivery to the market. For sand and gravel operations, sizing may be conducted using mechanical screening and washing techniques only. It may not be necessary to undertake any crushing activities. At hard rock quarries, sizing requires both crushing and screening.

After sizing, quarry materials are usually stockpiled for subsequent sale and dispatch by road truck (most commonly) as well as by rail (occasionally).

Activities ancillary to principal quarrying operations include blending of materials, wastewater treatment, land rehabilitation and maintenance of plant and equipment.



### 3 Quarrying Noise Sources

The type and number of individual quarrying noise sources will vary depending upon the nature and size of the quarry.

The full range of noise sources is listed below:

- Overburden removal: Bulldozer, scraper, excavator, haul truck
- Quarry pit: Excavator, front end loader, rock breaker, haul truck
- Quarry bench: Rock drill, haul truck, excavator, front end loader
- Processing area: Haul truck, crushing and screening equipment, front end loader
- Sales area: Front end loader, road truck, haul truck

While some noise sources will be operated more-or-less continuously, other noise sources will operate only intermittently. Overall, however, the noise from quarrying activities would be best described as fluctuating, ie noise that varies over time.

For most large quarries, crushing and screening equipment will be operated at a fixed location. At smaller quarries, mobile crushing and screening equipment may be used. In addition, mobile crushing and screening plant may be employed at large quarries for short-term campaign processing of materials.

At some quarries, extraction of relatively low strength material from the earth may be carried out by ripping by using bulldozer and/or excavator.

### 4 Noise Issues Specific to Quarrying

Quarrying is unique among the broad range of industry types. There are four important differences about quarrying that set it aside from other industries.

Firstly, a quarry can be established only where the resource exists. This is simply a function of geology and not a matter that can be varied by humans.

Secondly, for reasons of economic efficiency and environmental responsibility, quarries must be located close to the market that they serve. For reasons of good town planning principles as well as matters relating to the cost of land, quarries are seldom located in very close proximity to high density residential land.

Thirdly, much of the activity of quarries must be carried out in the open air. Where it is economically feasible to do so, it is possible to enclose fixed crushing and screening plant. Drilling equipment, mobile earth moving plant and mobile modular crushing and screening plant, however, cannot be enclosed.

Finally, quarrying activities involve noise sources which will move across the earth and which will traverse the high ground as well as the low ground. In addition, quarries, by their very nature, alter the nature of the ground over which they operate.

Given the need to locate in accordance with local geology, while at the same time being close to but not in a particular market, it is often the case that quarries are located adjoining or close to low density residential developments. In many instances, quarries adjoin rural residential developments. Commonly, quarries are in operation prior to the establishment of the low density residential development. Rural residential areas are often characterised by low to very low ambient and background noise levels.

Because it is not possible to enclose all of the noise generating equipment operating at a quarry, there will always be a physical constraint to the extent to which noise emission from quarrying activities can be controlled. Favourable shielding by intervening high ground and preservation of buffers around quarries can assist in minimising the degree of noise emission. In addition, because mobile plant and equipment will move across large distances – both on a day-to-day basis as well as over the longer term – and quarrying may remove some or all of the intervening high ground over time, the benefit provided by shielding and buffers may alter over the life of the quarry.





## 5 How Regulatory Authorities Manage Noise from Quarrying Activities

Currently, regulatory authorities manage noise from quarrying activities by imposing conditions on the development permit/environmental permit for the quarry. These conditions place limits on the permissible level of noise emission from the quarry.

Almost invariably, the conditions of approval also include a requirement to carry out an investigation of the level of noise emission from quarrying activities in the event of a complaint. In these circumstances, the objective criteria for acceptable levels of noise emission would be those imposed by the relevant condition in the development permit/environmental permit.

There are also a number of general obligations under the *Environmental Protection Act 1994* that apply to quarrying activities.

At s.319 of the Act, there is an overarching general environmental duty imposed upon the operator of a quarry which requires that “a person must not carry out any activity that causes, or is likely to cause, *environmental harm* unless the person takes all reasonable and practical measures to prevent or minimise the harm (the general environmental duty).” As defined in ss.14-15 *environmental harm* includes nuisance caused by noise.

Other relevant provisions of the Act are spelled out in s.430 *Contravention of condition of environmental authority*, s.431 *Environmental authority holder responsible for ensuring competition is complied with*, s.437-439 *Causing serious or material environmental harm* and, with specific reference to environmental noise, s.440 *Causing environmental nuisance*.



## 6 Criteria for Measuring and Controlling Noise from Quarrying Activities

### 6.1 Historical Overview

Historically, a number of guidelines, policies and regulations have been used as the basis for setting limits for acceptable levels of noise emission from quarries. Using these documents, the noise level limits that have been imposed under various development permits/environmental permits for quarries and the noise level parameters to be used to determine compliance with these limits have tended to vary from one quarry to the next, sometimes in quite a significant manner.

This has resulted in undesirable inconsistencies between quarries as well as across quarrying companies. Furthermore, for applications for the establishment of a new quarry or for the expansion of existing quarry, there can be some not-inconsiderable technical difficulty associated with making accurate predictions of future noise levels in terms of the more commonly adopted noise level parameters, ie  $L_{Amax\ adj,T}$  and  $L_{A01\ adj,T}$

While it is clear that there are site-specific constraints and opportunities at each quarry which will determine how readily compliance with any particular limit can be achieved and, hence, a case for ensuring that noise limits are sensitive to these constraints and opportunities, it is equally clear that there is a real need to ensure that a consistent approach to setting the appropriate noise level limits is developed and adopted.

In doing so, there is opportunity to not only preserve the acoustical amenity of the community, but also to remove confusion and inconsistencies from the limit setting regime

and to ensure that fairness and equity between quarries and quarrying companies is achieved.

### 6.2 Environmental Protection Act 1994 and Environmental Protection (Noise) Policy 2008

Sections 440K-440ZC of *Environmental Protection Act 1994* deal with offences relating to noise standards. Other than for blasting, which is addressed at s.440ZB, none of the noise sources listed in s.440K-s.440ZC has direct relevance to quarrying activities.

For quarrying activities, it is understood that it is usual practice for regulatory authorities to set acceptance criteria for environmental noise emission from quarries by reference to *Environmental Protection (Noise) Policy 2008* (EPP-N 2008) and more specifically to Part 4 Clause 10 *Controlling background creep* of EPP-N 2008 which states at Clause 10(2):-

“To the extent that it is reasonable to do so, noise from an activity must not be:-

- (a) for noise that is **continuous** noise measured as  $L_{A90,T}$ , more than nil dBA greater than the existing acoustical environment measured by  $L_{A90,T}$ ; or
- (b) for noise that **varies over time** measured by  $L_{Aeq\ adj,T}$ , more than 5dBA greater than the existing acoustic environment measured by  $L_{A90,T}$ .”

$L_{A90,T}$  is the background noise level.







Consequently, it is not uncommon for the noise condition that is included in the approval of a development permit/ environmental permit for a quarry to impose noise level limits based on a specified tolerance for the permitted exceedance of the background noise level. Commonly, drawing from Clause 10(2)(b), the tolerance is set at 5dBA for the quarrying activities conducted during normal daytime period (ie 7:00am to 6:00pm) during weekdays.

It needs to be remembered, however, that if Clause 10 of EPP-N 2008 is to be invoked, due regard should also be given to the requirement that consideration be given to the reasonableness of imposing a requirement to constrain the noise emitted from particular activities that are being controlled such that the level of noise emitted does not exceed the limits specified in Clauses 10(2)(a) and 10(2)(b).

It needs also to be remembered that controlling background creep is only part of the regime for managing noise that is presented in Part 4 of EPP (Noise) 2008.

Part 4 Clause 9 of EPP (Noise) 2008 presents a management hierarchy for noise. This is reproduced below:-

- 1) This section states the management hierarchy for an activity involving noise.
- 2) To the extent that it is reasonable to do so, noise must be dealt with in the following order of preference —
  - (a) firstly — avoid;

*Example for paragraph (a) - locating an industrial activity in an area that is not near a sensitive receptor*

- (b) secondly — minimise, in the following order of preference —

- (i) firstly — orientate an activity to minimise noise;

*Example for subparagraph (i) - facing a part of an activity that makes noise away from a sensitive receptor*

- (ii) secondly — use best available technology;

- (c) thirdly — manage.

*Example for paragraph (c) - using heavy machinery only during business hours*

Taken together, Clauses 9 and 10 present a combination of practical strategies and, if reasonable to apply, noise level limits for control of noise from industrial activities.

The acoustic quality objectives of EPP-N 2008 also have relevance.

EPP-N 2008 presents a table of acoustic quality objectives which are “prescribed for enhancing or protecting the environmental value(s). ... It is intended that the acoustic quality objectives be progressively achieved as part of achieving the purpose of this policy over the long term.”

It should also be noted that the definition of sensitive receptor includes both the inside and outside of places where people reside or spend significant periods of time (eg homes, motels, schools, hospitals, offices, etc.) as well as public thoroughfares, parks and public gardens.





## 7 Recommended Noise Control Strategy

### 7.1 Background

A fully developed noise control strategy needs to address each of the following requirements:

- Maintenance of acoustical amenity in the community in accordance with the requirement to preserve the environmental values for the acoustic environment
- Avoidance of inconsistencies
- Feasibility/practicality of noise control and the achievement of fairness and equity when setting noise control objectives

Each of these requirements is discussed further below.

### 7.2 Discussion

#### Maintenance of acoustical amenity

Limits for maintaining acoustical amenity can be derived from the analysis presented above in Section 6. From this analysis, it can be concluded that, to the extent that it is reasonable to do so, the  $L_{Aeq\ adj,T}$  level of noise generated by quarrying activities should not exceed a value equal to the background noise level plus 5dBA.

In addition, as also derived above in Section 6, the desirable long-term targets for enhancing or protecting the environmental values are 30dBA  $L_{Aeq\ adj,1hr}$  for the period from 6:00am to 7:00am and 35dBA  $L_{Aeq\ adj,1hr}$  for the period from 7:00am to 6:00pm, as measured at the sensitive receptor (eg dwelling).

#### Avoidance of inconsistencies

As outlined above in Section 6, there are significant differences between the noise level parameters that have been adopted to set limits for acceptable levels of noise emission from quarries. This has given rise to a number of inconsistencies, all of which could have been avoided. To address these inconsistencies, it would be appropriate to ensure that the limits for acceptable levels of noise emission are described in terms of one parameter only. Drawing on the discussion presented in Section 6, the appropriate parameter would be  $L_{Aeq\ adj,T}$

#### Feasibility/practicality of noise control and the achievement of fairness and equity

As outlined above, the ability of any particular quarry to comply with specific noise limits will depend on many factors. These include:

- (i) the nature of the quarrying activities,
- (ii) the hours of operation,
- (iii) the proximity of noise-sensitive premises to the noise generating activities,
- (iv) the prevailing background noise levels,
- (v) the presence or otherwise of high ground between the quarry and at any nearby residences,
- (vi) the extent of local vegetation,
- (vii) the feasibility/practicality of enclosing and shielding noise sources.

The significance of several of these factors is recognised at Part 4 Clause 9 of EPP (Noise) 2008, ie the management hierarchy for controlling noise emission.

In order of importance, the key components of this hierarchy are:

- (i) Avoidance, ie avoid locating noise generating activities close to residential premises.
- (ii) Minimisation, (a) orient noise generating activities to face away from sensitive receptor locations, (b) take advantage of shielding provided by intervening high ground and (c) adopt Industry Best Practice Noise Control.
- (iii) Management, ie adopt appropriate management techniques to minimise the intrusiveness of noise emission, eg by constraints on the hours for operation.

Taken together, it can be concluded that a quarry should be located as far as possible from nearby noise-sensitive premises, noise-generating equipment should be located so that the beneficial shielding provided by intervening high ground is maximised/preserved, Industry Best Practice Noise Control should be adopted and appropriate constraints on the hours of operations should be in place

Naturally, given the differences between the operating circumstances of many quarries, there will be limitations on how effective these particular noise control measures can or will be. Even so, provided the key elements of the hierarchy are observed and implemented as appropriate, a high degree of fairness and equity when setting noise control objectives should be achieved.



When addressing the question of the specific noise control objective to be achieved, it is appropriate to have regard to EPP-N 2008 which as noted above states that, in situations where it is reasonable to do so, the  $L_{Aeq\ adj,T}$  level of noise produced by the noise-generating activities should not exceed a value equal to the background noise level plus 5dBA.

Notwithstanding, it is well known that historically there have been significant difficulties in both:

- (i) designing new and expanded quarries to achieve compliance with a limit based on a 5dBA exceedance of the background noise level and
- (ii) after the quarry is operating making accurate determinations of the degree of compliance against such a limit.

These difficulties stem from the dynamic nature of the background noise level (ie the significant variability in the short term noise level over any day as well as from day-to-day and season-to-season) and the fact that the  $L_{Aeq\ adj,T}$  generated by the otherwise prevailing ambient noise sources is generally at least 10dBA higher than the background noise level over the same time period.

Given these difficulties, it has been determined to be more appropriate to set noise level targets as fixed values. Having regard to the acoustical quality objectives, and EHPs Guideline - Planning for Noise Control, these appropriate targets for noise as measured as the nearest sensitive receptor are;

- 30dBA  $L_{Aeq\ adj,T}$  for the period from 10:00pm to 7:00am,
- 35dBA  $L_{Aeq\ adj,T}$  for the period from 6:00pm to 10:00pm
- 45dBA  $L_{Aeq\ adj,T}$  for the period from 7:00am to 6:00pm.

### 7.3 Overview

In summary, the appropriate strategy for controlling noise emission from quarries can be distilled to the following three key elements:-

#### Element 1 – Adoption of default noise limits based on time of day

Wherever feasible/reasonable to do so, the  $L_{Aeq\ adj,T}$  level of noise generated by quarrying activities should not exceed the following limits (as measured at the sensitive receptor);

30dBA  $L_{Aeq\ adj,T}$  for the period from 10:00pm to 7:00am,  
35dBA  $L_{Aeq\ adj,T}$  for the period from 6:00pm to 10:00pm  
and 45dBA  $L_{Aeq\ adj,T}$  for the period from 7:00am to 6:00pm.

#### Element 2 – of site specific noise limits where the default limits are not appropriate

In circumstances where ambient noise levels are relatively high or the distances to sensitive receptors are relatively short, site specific noise limits may be set based on the principals set out in the EPP-N and EHPs guideline - Planning for Noise Control.

#### Element 3 – Adoption of Industry Best Practice Noise Control

In addition, noise from the operation of the quarry should be controlled by adopting each of the key components of the management hierarchy for controlling noise emission outlined in Part 4, Clause 9 of the EPP (Noise) 2008, and, in particular, ensuring that Industry Best Practice Noise Control as it applies to the specific quarry is adopted and implemented at all times.



## 8 Details of Recommended Noise Control Strategy

### Element 1 – Adoption of default noise limits based on time of day

Wherever feasible/reasonable to do so, the  $L_{Aeq,adj,T}$  level of noise generated by quarrying activities should not exceed the limits as set below in Table 1.

For any Material Change of Use application pertaining to a new or existing quarry, adoption of Element 1 would require that this limit be met at all times when the quarry is operating. This includes sales activities, crushing and screening of product, extraction of product and normal maintenance activities.

The method of measurement and reporting of noise levels must comply with the Department of *Environment Noise Measurement Manual* EM1107 May 2013 Version 1, or more recent additions or supplements to that document as become available.

In addition, Best Practice Noise Control is to be adopted. When determining the extent of Best Practice Noise Control to be implemented, the guiding principle to be followed is that it is to be at a level appropriate for the receiving environment. Furthermore, in making this determination, it is expected that reference will be made to several other matters including (i) acoustical efficacy, (ii) technical feasibility and (iii) financial feasibility/responsibility.

\*\* The default night-time noise limits at a sensitive receptor are set relatively low in order to protect the health and wellbeing of residents at the sensitive receptor in relation to the ability to sleep. Whilst the Environmental legislation defines daytime as commencing at 7:00am, it is recognised that in many areas of Queensland daybreak occurs well before this time and residents are often awake before 7:00am. It is also recognised that the quarry industry may need to commence operations before 7:00am in order to meet delivery deadlines. EHP will therefore support setting less stringent noise limits for the period 6:00am to 7:00am (Monday to Friday) where it can be reasonably demonstrated that this is unlikely to cause a noise nuisance at a sensitive receptor, and when a condition stating that noise generating operations would cease if justified complaints were received is applied. In sensitive environments, one way this could be achieved is through the application of “soft starts” e.g. site access, pre-start checks and maintenance from 6.00am to 6.30am. Sales, load and dispatch from 6.30am with full site operation from 7.00am.

**Table 1 – Element 1 Schedule of Acceptable Noise Levels**

Day	Period	Noise level at a noise sensitive place measured as the equivalent continuous sound pressure level ( $L_{Aeq,adj,T}$ )
Monday - Friday	7:00am – 6:00pm	45dBA
Monday - Friday	6:00pm – 10:00pm	35dBA
Monday - Friday	10:00pm – 7:00am**	30dBA
Saturday	7:00am – 6:00pm	45dBA
Saturday	6:00pm – 10:00pm	35dBA
Saturday	10:00pm – 7:00am	30dBA
Sunday and Public Holidays	8:00am – 6:00pm <b>Emergency Maintenance only</b>	40dBA
All other times		Not audible



## Element 2 – Adoption of site specific noise limits where the default limits are not appropriate

In circumstances where ambient noise levels are relatively high and the separation distances between quarrying activities and residential premises are relatively low, the target limits for noise emission should be derived using EHP's Guideline – Planning for Noise Control.

For example, if the daytime (ie 7:00am to 6:00pm) background noise level were to be determined to be 40-45dBA and the existing residences (i) were located 200m from the acoustic centre of the quarry and (ii) were to have direct line of sight to the crushing and screening plant, it is very unlikely that compliance with the noise level limits set by Element 1 would be met even if the crushing and screening plant were to be fully enclosed. Furthermore, given the relatively high background noise levels, it would be quite difficult to justify the imposition of a 45dBA noise level target for the operation the quarry.

In these circumstances, it would be appropriate to consider adoption of Element 2 as the appropriate means of setting the relevant noise level limits.

Before Element 2 can be adopted, however, justification will need to be provided to support this choice. This justification will consist of an assessment of the current background noise levels together with (i) an adequately detailed evaluation of the level of noise emission from the activities of the quarry and (ii) a detailed assessment of the Best Practice Noise Control that will be implemented to achieve compliance with the derived noise level target. This work would need to be undertaken by an appropriate qualified and experienced acoustical engineer.

It should be noted that when determining the extent of Best Practice Noise Control to be implemented, the guiding principle to be followed is that it is to be at a level appropriate for the receiving environment. Furthermore, in making this determination, it is expected that reference will be made to several other matters including (i) acoustical efficacy, (ii) technical feasibility and (iii) financial feasibility/responsibility.

As with Element 1, the method of measurement and reporting of noise levels must comply with the Department of *Environment Noise Measurement Manual* EM1107 May 2013 Version 1, or more recent additions or supplements to that document as become available.



## 9 General Format of Noise Conditions

To achieve harmonisation with the current EHP model Noise Conditions, it is intended that the conditions for approval of quarry will include the following specific noise conditions.

**Note:** As agreed with Department of Environment and Heritage Protection, level of noise emitted by the quarry is to be measured at the noise sensitive place/s rather than at the boundary. For the time being, the conditions relating to blasting activities, ie Conditions N6-N11, have been removed from the pro forma conditions. (The noise from blasting activities is not addressed by this Guideline.)

Noise	
<b>N1</b>	Noise from the activity must not exceed the levels identified in Table 2 — Noise limits when measured in accordance with the associated monitoring requirements.
<b>N2</b>	When required by the administering authority, noise monitoring must be undertaken in accordance with the associated monitoring requirements of Table 1 — Noise Limits, and the results notified within 14 days to the administering authority. Monitoring must include: <ol style="list-style-type: none"> <li>1. LAeq, adj, T</li> <li>2. Background noise (Background) as LA 90, adj, T</li> <li>3. MaxLpA,T</li> <li>4. The level and frequency of occurrence of any impulsive or tonal noise</li> <li>5. Atmospheric conditions including wind speed and direction</li> <li>6. Effects due to extraneous factors such as traffic noise</li> <li>7. Location, date and time of recording.</li> </ol>
<b>N3</b>	The method and measurement of noise levels must comply with the latest edition of the <b>administering authority's</b> Noise Measurement Manual.

**Table 2 - Noise Limits**

Noise Level Measured in dBA	Monday to Saturday			Sunday (and Public Holidays)		
	7am-6pm	6pm-10pm	10pm-7am	8am-6pm	6pm-10pm	10pm-8am
LAeq adj, 1hr						

**Where:**

**LAeq adj,T** means the adjusted A weighted equivalent continuous sound pressure level measures on fast response, adjusted for tonality and impulsiveness, during the time period T, where T is measured for a period no less than 15 minutes when the activity is causing a steady state noise, and no shorter than one hour when the approved activity is causing an intermittent noise.

**MaxLpA,T** means the maximum A-weighted sound pressure level measured over a time period T of not less than 15 minutes, using Fast response.



## 10 Complaint Investigation

As noted above in Section 1 of the Guideline, one of the objectives of the Guideline is to improve the consistency of the conditions of approval of new and expanded quarries. To achieve this goal, the level of noise permitted to be emitted by any new or expanded quarry will be set by reference to one of the three elements proposed above.

Because there is a hierarchy of stringency of noise limits imposed by these elements, the process of determination of the appropriate element to apply to any particular quarry will ensure that the most stringent set of limits that can feasibly be applied to the quarry will be imposed. In turn, this will result in a progressive reduction in the level of noise emission from quarries across the state and, correspondingly, a further and continuing reduction in the level of complaint.

Notwithstanding, in the event of a complaint about noise that the administering authority considers is reasonable, then the emission of noise from the activity must not result in levels greater than those specified in Schedule of Acceptable Noise Levels included as part of the development permit/ environmental permit for the specific quarry.

For the purposes of checking compliance with Schedule of Acceptable Noise Levels, monitoring and recording of the noise levels from the activities of the quarry must be undertaken for the following descriptors, characteristics and conditions:

- Emitted noise level determined as  $L_{Aeq,adj,T}$ ;
- Background noise level determined as  $L_{A90,T}$ ;
- The level and frequency of occurrence of impulsive or tonal noise;
- Atmospheric conditions including temperature, relative humidity and wind speed and direction; and
- Effects due to extraneous factors such as traffic noise, aircraft, birds, wind in the trees, etc.

The method of measurement and reporting of noise levels must comply with the Department of Environment *Noise Measurement Manual* EM1107 May 2013 Version 1, or more recent additions or supplements to that document as become available.





## 11 Amendment process for an existing Environmental Authority

Current legislation allows the holder of an environmental authority to apply for an amendment to an existing Environmental Authority at any time. This process allows an existing Environmental Authority holder to apply to amend their noise limits, and have them reassessed against the principles outlined in this guideline.

EHP encourages operators considering amendment of their existing noise conditions to request a pre-lodgement discussion with EHP, to discuss whether this would be appropriate for their particular site and to agree on what information would need to be provided.

Broadly speaking, any amendment application needs to include an assessment of the likely impact of the proposed amendment on the relevant environmental values, in this case the potential for nuisance caused by noise.

Thus, an amendment application to review existing noise limits would, typically, need to be accompanied by a detailed history of any noise complaints regarding operations at the site, details of nearest sensitive receptors, any recent background noise monitoring data, and details of current noise mitigation practices at the site.

An amendment application would be assessed on its merits, against the legislative requirements and new conditions applied in accordance with the principles outlined in this guideline.





## 12 Expected Effect of this Guideline

Currently, it is estimated that only 5% of quarries operating in Queensland would achieve compliance with the Background Noise Level plus 5dBA noise level limits that have been imposed in previous times. By contrast, the majority of quarries operating in Queensland (approximately 60%) would comply with the noise level limits set under Elements 1 and 2, with the balance (approximately 40%) generating higher noise levels.

With the implementation of the noise control strategy outlined in this Guideline, it is fully expected that there would be significant increase in the percentage of quarries achieving compliance with the noise level limits of Elements 1 and 2.

The ease with which compliance with the noise level limits may be achieved will be a function of many site-specific matters. These will usually include:

1. Nature of the quarry, eg hard rock or sand and gravel
2. Type of crushing and screening plant, eg fixed or modular mobile
3. Hours of operation of the quarry
4. Proximity of the nearest residences
5. Otherwise prevailing background noise levels
6. Local terrain
7. Local vegetation
8. Extent of noise control already adopted

Naturally, the acoustical significance of each of these matters will vary from one quarry to another. Notwithstanding, it is possible to provide some very basic guidance regarding the likely distance of separation of residential premises from the quarry if compliance with the noise level limits of Element 1 is to be achieved<sup>1</sup>.

In very broad terms only, for a hard rock quarry situated in flat open ground, compliance with the noise level limits of Element 1 may require that specific noise control actions be implemented if the quarry is located within 1-2km of residential premises. In undulating country, ie whether there is minor beneficial shielding provided by local high ground, the separation distance may reduce to approximately 1000-1500m before specific noise control actions are required.

If, for the same hard rock quarry situated in flat open ground, the crushing and screening plant is fully enclosed, compliance with the limits under Element 1 may be achieved if residences are located no closer than about 800-1200m from the crushing and screening platform.

If crushing and screening activities occur on weekdays only during the period from 7:00am to 6:00pm, compliance with the noise level limits may be achieved at distances of:

- (i) about 1000-1500m if the crushing and screening plant is unenclosed and
- (ii) approximately 450m if the crushing and screening plant is fully enclosed.



<sup>1</sup> The information presented in this section of the Guideline is provided by way of general guidance only. No reliance should be placed upon it for assessing the requirement for implementing noise control into any particular quarry. In circumstances where advice is required to ascertain the expected impact of noise emission from the operation of any specific quarry, or where a determination of the necessary distances of separation is to be made, well-considered technical advice specific to the quarry in question will need to be sought from an appropriately qualified and experienced acoustical engineer.

## 12 Definitions

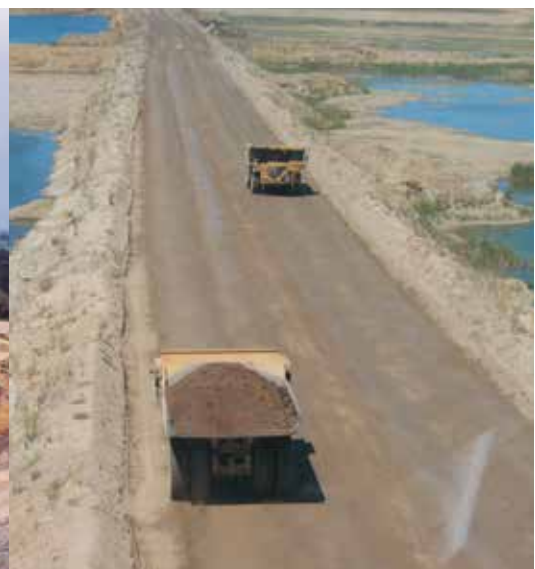
**Industry Best Practice Noise Control** means that those prudent noise control treatments and actions that constitute the most advanced approach to noise control currently adopted in Australia by the quarrying industry. For any particular new or expanded quarry, the schedule of Industry Best Practice Noise Control to be adopted for that specific quarry will be determined by reference to several matters including:

- (i) acoustical efficacy
- (ii) technical feasibility and
- (iii) financial feasibility/responsibility

The full range of Industry Best Practice Noise Control will include, but not be limited to, the following treatments and actions.

### Expansion of a quarry

1. The selection of major items of noise generating plant, and in particular rock drills, to ensure that only “low noise” plant and equipment is used.
2. The adoption of a well-structured equipment maintenance program to ensure that the source sound power levels of all mobile processing plant and earthmoving equipment are maintained at low levels for the entirety of their use. Elements of this maintenance program will include:
  - (i) the installation of broadband reversing signals to all earthmoving equipment as well as all road trucks operated by the quarry operator
  - (ii) routine inspection of mufflers and sound suppression devices fitted to earthmoving equipment to ensure that they are operating at their optimum acoustical performance and
  - (iii) frequent inspection of bulldozers to ensure that a high level of lubrication is maintained to all bulldozer tracks.
3. Where both technically and financially feasible, full enclosure of fixed crushing and screening plant with openings let into the enclosures for the entry and passage of product and conveyors only.
4. Wherever feasible, the preservation of local high ground between noise-generating activities and noise-sensitive premises together with the strategic placement of product stockpiles to maximise the shielding of sales activities from nearby noise-sensitive premises.
5. As appropriate, the implementation of purpose-designed fixed or movable acoustical screens or barriers to provide supplementary shielding of nearby noise-sensitive premises from exposed, high sound power level noise sources, eg rock drills and mobile crushing and screening plant.
6. Preparation and implementation of a detailed Noise Management Plan to ensure that all of the noise control strategies and each of the specific noise control treatments and actions are maintained at their maximum efficiency and acoustical performance.





## New quarry

Items 1-6 above, plus:-

- 7 Detailed engineering analysis and optimisation of:
  - (i) the operation and staging of the quarry and
  - (ii) the placement of processing and sales areas with the objective of (a) maximising the separation distance of noise-generating activities from noise-sensitive premises, (b) orientation of the opening to the tip head enclosure in a direction away from the likely most affected noise-sensitive premises and (c) maximising the beneficial shielding provided by intervening high ground, whether natural or supplemented by purpose-designed as mounds and/or acoustic barriers.
- 8 The placement of a constraint on the time during which overburden removal activities to be carried out during establishment phases of the quarry (ie prior to commencement of the operational phase of the quarry). The appropriate constraint would normally be 7:00am to 6:00pm Monday to Friday.
- 9 During the establishment phases of the quarry, the design and construction of acoustic barriers and/or the construction of temporary earth mounds to provide any required shielding between earthmoving equipment carrying out overburden removal and the nearest noise-sensitive premises.

**Note:** It is intended that the full range of Industry Best Practice Noise Control will be reviewed at regular intervals to ensure that it remains current with the most advanced approach to noise control currently being adopted locally.

**Background** means noise, measured in the absence of the noise under investigation, as LA90,T being the A-weighted sound pressure level exceeded for 90 percent of the time period of not less than 15 minutes, using Fast Response.

**LAeq adj,T** means the adjusted A weighted equivalent continuous sound pressure level measured on fast response, adjusted for tonality and impulsiveness, during the time period T, where T is measure for a period no less than 15 minutes when the activity is causing a steady state noise, and no shorter than one hour when the approved activity is causing an intermittent noise.

**MaxLpA,T** means the maximum A-weighted sound pressure level measured over a time period T of not less than 15 minutes, using Fast Response.

**Maintenance** means the act of maintaining plant or equipment to achieve the following:

- to keep the plant or equipment in due condition, operation, or force; and
- to keep the plant or equipment in a specified state or position.

**Emergency maintenance** means maintenance that is occasioned by the unforeseen, unexpected or imminent failure of an item of plant or equipment where that item of plant or equipment is essential to the safe or efficient operation of the quarry and where there is no replacement item of plant or equipment which could be readily brought into operation to substitute for the failed or failing item of plant or equipment.





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Acknowledged nationally and internationally as Australia's foremost cement, concrete and aggregate information body, CCAA takes a leading role in education and training, research and development, technical information and advisory services and is a significant contributor to the preparation of Codes and Standards affecting building and building materials.

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