CMPA

Environmental Noise Management Guideline

Issue 1

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"CMPA Environmental Noise Management Guideline."

Author: Jean Meaklim, Senior Principal – Risk Assessment (Health & Environment), Greencap Pty Ltd

Consultative Advisory Team

David McKelvie – DMcK Management Pty Ltd trading as **SAFEMIX**

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Consultative Advisory Team for CMPA Noise Management Guideline 2016

Graeme Campbell - SLR

Ron Kerr – Conundrum Holdings Pty Ltd.

Disclaimer

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The guidelines here may not apply in all circumstances and should not replace a quarry manager's considered assessment of a particular situation before them.

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1. Overview

The potential health risks of environmental noise are gaining increasing attention as more people in Australia are being exposed to environmental noise. There is evidence showing that environmental noise *(unwanted sound)* can adversely affect health and well-being with outcomes ranging from sleep disturbance to stress and cardiovascular disease[1, 2], and there are more requirements for industry to take actions to reduce environmental noise exposure to the community.

The Victorian *Environment Protection Act 2017* (the Act) and the general environment duty (GED) change the focus of noise compliance and enforcement in Victoria.

All businesses must comply with the **general environmental duty** to take reasonable steps to minimise harm to human health and the environment from pollution and waste, including noise.

Under the Act and the GED, any source of noise can be unreasonable, depending on the situation.

Businesses must not cause **unreasonable noise** or aggravated noise. They must make sure that any noise from their activities or premises doesn't unreasonably impact the local community. This includes being responsible for contractors or tradespeople they hire.

This CMPA Environmental Noise Management Guideline (the Guideline) aims to support members to meet the requirements of the Victorian *Environment Protection Act 2017* and *Environment Protection Regulations 2021* (the Regulations).

In this Guideline, the CMPA aims to provide members with appropriate advice and management practices required to comply with new requirements to prevent unreasonable noise impacts to the community arising from construction materials industry operations, and to minimise potential health risks or environmental impacts.

2. Scope

This CMPA Environmental Noise Management Guideline covers the health risks and environmental impacts of environmental noise, the legislative requirements to manage environmental noise, and associated advice on controlling impacts to the community.

It is a companion to the CMPA Workplace Noise Management Guideline 2022.

This Guideline focuses on businesses involved in the construction materials processing industry, including quarries, concrete batching plants, construction and demolition materials recycling plants and other businesses where the activity is an ongoing and operates from a designated place.

It may not apply in full to short-term or temporary activities such as construction and demolition activities on building sites.

[1] Commonwealth Department of Health Australia 2018, *The health effects of environmental noise:* The health effects of environmental noise

[2] World Health Organization 2018, *Environmental Noise Guidelines for the European Region:* noise-guidelines-exec-sum-eng.pdf (who.int)

3. Relevant Legislation, Policy and Resource Materials

Legislation

- Victorian Environment Protection Act 2017 (EP Act 2017)[3]
- Victorian Environment Protection Regulations 2021 (EP Regulations 2021)[4]

Legislation and policy overview

Environmental noise from industry, including quarries and the construction materials industry, is primarily regulated by EPA Victoria under the Environment Protection Act 2017 and Environment Protection Regulations 2021, which both came into operation on 1 July 2021.

The new Act changes Victoria's focus for environment protection and human health to a prevention-based approach, underpinned by the general environmental duty (GED).

The GED requires everyone, including businesses and individuals, conducting activities that pose a risk to human health or the environment from pollution or waste to understand those risks and take reasonably practicable steps to eliminate or minimise them.

The GED includes a duty on all businesses to prevent harm from noise pollution.

Policy and Guidance Material

- Noise limit and assessment protocol, EPA Publication 1826 (1826.4, May 2021 or as updated)[5] Technical guide: Measuring and analysing industry noise and music noise, EPA Publication 1997, June 2021 1997.pdf
- Environment Reference Standard (ERS), Part 3 – Ambient Sound[6]
- Civil construction, building and demolition guide, EPA Publication 1834, Nov 2020 1834.pdf
- Assessing and controlling risk: A guide for business, EPA Publication 1695.1, 2019. *A risk management framework that businesses (of any size and with varying risks) can use to help prevent harm to human health and the environment. Available in multiple languages*. 1695.1: Assessing and controlling risk: A guide for business | Environment Protection Authority Victoria (epa.vic.gov.au)

Superseded documents (may contain relevant guidance information)

- Noise Control Guidelines – EPA publication 1254 1254 2.pdf

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[3] Link: Environment Protection Act 2017 (legislation.vic.gov.au)
[4] Link: ENVIRONMENT PROTECTION REGULATIONS 2021 (SR NO 47 OF 2021) (austlii.edu.au)
[5] Link: ***Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues*** (EPA Publication 1826)
[6] Environment Reference Standard (ERS), Government Gazette No. S25, GG2021S245.pdf (gazette.vic.gov.au)

- Environmental guidelines for major construction sites – EPA publication 480 480.pdf
- Technical Guidelines: Noise Guidelines – Construction and Maintenance Works, VicRoads 2007 NoiseGuidelinesConstructionandMaintenanceWorks.PDF

Environmental Noise Duties

Environmental noise is regulated through the Victorian Environment Protection Act 2017 and EP Regulations 2021[7]. The overarching duty under the Act for all businesses is the **General Environmental Duty (GED)**, which requires that

"A person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste must minimise those risks, *so far as reasonably practicable*."

- **Minimise means to eliminate the risks (so far as reasonably practicable) and if not, reduce the risks.**

Employers Duties

Employers and company directors have a duty to exercise due diligence to ensure that the business complies with the Environment Protection Act and Regulations (as well as the OHS Act and Regulations).

This includes taking all reasonable steps to ensure that the business has assessed its noise risks – to workers and to neighbours - and uses appropriate resources and processes to eliminate or minimise those risks and comply with environmental noise limits[8] including:

- having a noise management plan that covers environmental noise assessment and mitigation[9]; and
- training and supervising workers to implement the noise management plan and any controls needed to protect the health of the community as well as their own health and safety

.

There are penalties for businesses for non-compliance with the Act ranging from infringement notices to criminal charges, depending on the severity and the frequency of the non-compliances. Criminal penalties can include jail time for company owners/directors.

Businesses should consider including responsibilities for environmental noise management in position descriptions where relevant, for example for HSE managers or Directors, where actions to manage or reduce environmental noise are assigned with clear accountabilities and review dates.

[7] Workplace noise is regulated through the Victorian OHS Act 2004 and specifically the Victorian OHS Regulations 2017, part 3.2. Noise – including relevant legislation and guidance to protect workers and employers' health and safety associated with noise exposure – is covered in the CMPA Workplace Noise Management Guideline.

[8] See this Guideline **Section 5** and **Section 6**

[9] See this Guideline **Section 13**

Workers Duties

Workers have a duty under the OHS Act and Regulations as well as under the **General Environmental Duty** to take reasonable care for their own health and safety and to ensure that they do not adversely affect the health and safety of other persons including neighbours.

Workers must comply with any reasonable instruction and cooperate with any reasonable policy or procedure relating to health and safety at the workplace to protect themselves and neighbouring properties.

Plant and Equipment Design and Installation – Noise considerations

To comply with the GED, business owners, directors and senior managers should ensure that plant and equipment is designed, manufactured, installed and used so that its overall noise emission is as low as reasonably practicable inside and outside the facility and doesn't unreasonably impact the local community.

Plant and equipment suppliers are required to provide information about noise emissions their products. This information should be factored into decisions on purchase and installations as part of noise minimization.

What is 'reasonably practicable'?

The GED requires environmental risks – including environmental noise - to be minimised or reduced as far as reasonably practical. It depends on:

a) **the likelihood of the hazard or risk occurring;**

b) **the degree of harm that would result if the hazard or risk eventuated;**

c) **what the person concerned knows, or ought reasonably to know, about the hazard or risk and ways of eliminating or reducing it *("state of knowledge")*;**

d) **the availability and suitability of ways to eliminate or reduce the hazard or risk;**

e) **the cost of eliminating or reducing the hazard or risk** (relative to the risk – costs of control should be proportional to the risk)

Note dot point (c); *ignorance is not an excuse*. EPA expects businesses to be aware of the available information on environmental risks and their controls, including relevant guidance from EPA and other government sources such as WorkSafe, and industry publications such as this CMPA Guideline. Some previous EPA publications – such as those mentioned in **Section 3** in 'Policy and Guidance Material' including some superseded material - can all contribute to the "state of knowledge" where relevant.

4. What is Noise?

Noise is a sound that is not wanted by the receiver because it may be unpleasant, loud, interfere with their hearing, disturb their concentration or impact negatively on their way of living. This results in the subjective discretion between "sound" and "noise", where a sound may be considered *pleasing and welcome* or *unwelcome noise*, depending on the type or sound and on the receiver.

Noise pollution takes place when there is either an excessive amount of noise or an unpleasant sound that causes temporary or permanent disruption in the natural background sound level and may result in harm to human hearing and other impacts on wellbeing or animal life.

This definition usually applies to sounds or noises that are unnatural in either their volume or tone or other characteristics and are often generated by industry. Background sound may be lower in rural areas in comparison to cities or towns (urban areas), and industrial noise provides greater impact when background sound is low.

Environmental Noise

Noise is a common hazard across all industry and has the potential to adversely affect the health of receivers, e.g., workers (occupational noise) and surrounding communities (environmental noise). Without effective controls, the construction materials industry has the potential to generate unreasonable noise levels to neighbours through many processes including operation of fixed plant, mobile equipment and road trucks as well as the blasting of hard rock.

Environmental noise is emitted from industry to receivers in the community, e.g., neighbours, and is often mixed with other noise sources, e.g., road traffic, railways and civil works that increases the overall noise level heard by the receiver.

Workplace noise transmitted to the environment is influenced by many factors such as workplace layout, workplace controls and weather conditions[10] that can impact on how the noise is carried to the receiver (may increase or decrease).

Noise pollution – Impacts on Community and Environmental Health

Environmental noise can have a negative effect on the receiver including hearing impairment, hypertension, elevated stress levels, general annoyance and sleep disturbance. Some studies conclude that environmental noise at night can also affect directly or indirectly the health of the cardiovascular system of persons exposed.

Community health is not only extremely important to the community, as it can have a direct impact on health, lifestyle and general ambience, but it is also vital to the sustainability of the environment and our industry. Working quarries are known to be a repository for wildlife and, as has been done by quarries in the past, impacts of noise on wildlife such as nesting birds should be considered and minimised where practicable.

The communities we work and reside in as an industry allow us a “social license to operate” and can easily reject that license if we do not respect their rights by adhering to legislative requirements.

Hard Rock Quarry within close proximity to a community

[10] Weather conditions are discussed in **Section 6 RURAL AREAS - Noise limits for Quarries in Rural Areas** and **Section 10 Alternative Assessment Locations**

5. Environmental Noise Limits

Under the **Environment Protection Regulations 2021** (Part 5.3, Division 3), noise limits apply to commercial, industrial and trade premises of all sizes.

Environmental noise limits for business depends on the:

- time of day the noise occurs (day, evening or night)
- location of noise sensitive areas[11] (urban or rural)
- land use zoning – the mix of businesses and residences in the area
- existing background noise
- noise from other businesses nearby and "cumulative noise impacts". (If 2 or more commercial, industrial and trade premises emit noise that contributes to the effective environmental noise level, each business must take all reasonable steps to ensure that the combined noise contribution from each premises does not exceed the noise limit for relevant noise sensitive areas; see EP Regulation 119).

Note: This section doesn't all apply to temporary activities such as construction and demolition activities on a building site, e.g., the noise limits don't strictly apply to temporary business activities.

However, the General Environmental Duty applies to all activities and requires that all noise impact is reduced as far as reasonably practicable.

Unreasonable and Aggravated Noise

Unreasonable noise

Environmental noise exceeding the relevant noise limit is deemed "unreasonable noise" (unreasonable in volume, intensity or duration; character or tone; the time, place and other circumstances in which it is emitted; how often it is emitted; or any other prescribed factors).

Aggravated noise

Aggravated noise is louder than "unreasonable noise". Emission of aggravated noise is a serious offence and significant penalties apply. Noise from commercial, industrial and trade premises is aggravated noise if it exceeds the noise limit by a certain amount (described in Section 7).

[11] "noise sensitive area" means land that is within 10 metres of the outside of the external walls of:

- a dwelling (including a residential care facility); a residential building; or a noise sensitive residential use which means a community care accommodation, dependent person's unit, dwelling, residential aged care facility, residential village, retirement village or rooming house (the same meaning as in the Victorian Planning Provisions); *OR*
- a bedroom, living room, ward or dormitory, of a caretaker's house; a hospital; a hotel, residential hotel or motel; a specialist disability accommodation; a retirement village; a residential village; a corrective institution; or a tourist establishment, campground or caravan park (Campgrounds and tourist grounds where an outdoor entertainment event or outdoor entertainment venue is also being operated, are not noise sensitive areas *in rural areas only); OR*
- a classroom or learning space in a school (Primary or secondary), kindergarten or childcare centre (during their operating hours).

EPA actions to control noise from businesses

EPA can use remedial powers to deal with risks of harm to human health and the environment and unreasonable noise, including businesses exceeding the noise limits. These remedial powers include statutory remedial notices to take action necessary to comply, stop an activity and/or carry out investigations.

Remedial notices are issued if it is found that a duty holder (e.g., a business) is not complying with the *Environment Protection Act 2017* (the Act). The Notices require action to remedy the non-compliance or stop the activity.

Aggravated noise attracts higher penalties for emitting or allowing noise emissions, up to 500 penalty units (currently up to $91,000) for an individual or 2500 penalty units (currently up to $455,000) for a company.

The Noise Protocol

Environment Protection Regulation 113 requires that all noise assessments are undertaken in accordance with the EPA Publication 1826, *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues* (Noise Protocol). The Noise Protocol supersedes previous EPA publications such as the SEPP N-1 (Noise SEPP)[12] and Noise from Industry in Regional Victoria (NIRV) (publication 1411).

The Noise Protocol sets out methods to predict, measure and assess noise emissions coming from commercial, industrial or trade premises to determine if they comply with noise limits. The noise limits are measured in decibels (A-weighted)[13] or dB(A).

Noise limits for environmental noise from commercial, industrial and trade premises are set out in the Noise Protocol Part 1.A, with specific noise limits for earth resources sites such as quarries - along with procedures to determine variations to those limits – in Part 1.A5.

Assessment of noise from commercial, industrial and trade premises is conducted using Part I.B of the Noise Protocol. The measured noise is adjusted where relevant for background noise[14] and for noise character, including tonality, intermittency, and duration.

The measured noise level - adjusted where relevant as described above - is compared with the relevant noise limit to determine whether the premises complies with the Noise Protocol and the Regulations.

Note that noise from blasting undertaken in association with earth resources activity is not to be included in the noise measurement, nor construction and demolition from building sites and a range of other temporary or transient noises such as emergency sirens; see the full list in *Regulation 117*[15]. (Blasting in quarries is covered in this Guideline **Section 8 Vibration and Blasting**.)

Noise limits apply to any part of the land that is within the boundary of the potentially affected property and 10 m from the external wall of the dwelling.

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[12] State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 (SEPP N-1).

[13] A-frequency weighting : Frequency weighting representing the human response to sound and its variation with frequency, in the typical range of magnitude for environmental noise levels, as specified in Australian Standard *AS/NZS IEC 61672.1:2019 Electroacoustics—Sound level meters, Part 1: Specifications*.

[14] Background level for the purpose of Part I (Commercial, industrial and trade premises): The arithmetic average of the hourly LA90 levels that represents the background sounds in a noise sensitive area, in the absence of noise from any commercial, industrial or trade premises which appears to be intrusive at the point where the background level is measured, when measured according to the Noise Protocol Part I, section A4.

[15] Environment Protection Regulations 2021 (legislation.vic.gov.au)

6. Which noise limits apply?

Noise Limits by Time of Day

The Environment Protection Regulations sets noise limits at residential premises, with separate limits for the day, evening, night and weekends, as shown in Table 1.

Table 1: Definitions of daytime, evening, and night-time periods *(Regulation 116)*		
Period	**Day**	**Time**
Day	Monday to Saturday	7 am to 6 pm
Evening	Monday to Saturday Sunday and public holidays	6 pm to 10 pm 7 am to 10 pm
Night	Monday to Sunday	10 pm to 7 am

Noise Limits by location (Urban and Rural)

Noise limits depend on the assessment method used for Urban and Rural areas at different times. The Noise Protocol provides base noise limits for commercial, industrial and trade premises in urban and rural areas for each period (day, evening or night) as shown in Table 2.

Table 2: Comparison noise limits for Commercial, Industrial & Trade premises			
Area	**Base Noise Limit, dB(A)**		
	Day	**Evening**	**Night**
Urban	**45**	**40**	**35**
Rural	**45**	**37**	**32**

Alternative noise limits may also be derived by a specialist considering the land use zoning of the noise sensitive area and the background noise levels at different times.

The Noise Protocol sets out two methods for deriving alternative noise limits for commercial, industrial and trade noise[16] depending on the location of the noise sensitive area where the noise is assessed:

- rural areas; or
- urban areas – large regional towns, cities and the outskirts of Melbourne.

CMPA premises are largely based in rural areas – e.g., quarries – but some are also in outer urban areas – e.g., concrete batching plants may be in rural or urban areas. Noise management guidance is provided for rural and urban areas.

[16] These noise limits don't apply to noise from roads and railways, from residential properties or from wind turbines at wind energy facilities.

RURAL AREAS

The Noise Protocol provides different methods for deriving alternative noise limits in rural areas for:

- commercial, industrial and trade premises
- utilities, including telecommunications, battery storage, gas, oil, water and sewerage infrastructure
- earth resources premises (including mines and quarries and ancillary infrastructure[17] located within the site's approved working area).

Noise limits for commercial, industrial and trade premises in Rural Areas (other than utilities and earth resources)

The Noise Protocol provides methods to adjust the base noise limits (where relevant) based on land use zone[18] and on the distance between the zone where the noise generator is located and the location of the noise sensitive receiver. The distance adjustment can be up to 9 dB(A) and is detailed in the Noise Protocol Part 1.A2 (distance adjustment methodology[19]) and Annex B (for land use zones). Any distance adjustment must be applied to the zone level for the day, evening and night periods.

Another adjustment may be relevant for background noise level if the noise sensitive area is in a *background relevant area;* the relevant noise limits can be derived with a background level noise assessment[20] (see Noise Protocol, Section 2.4 and Section 4).

Background relevant area: A noise sensitive area within a rural area where background levels may be higher than usual. This includes areas where freeway or highway traffic is a significant background noise source. It also includes coastal areas, where representative background levels are elevated by the sound of surf.

Background level assessment is not mandatory where the noise being assessed will meet the base noise limit (as shown in Table 2) and there is no other contributing noise source from another commercial, industrial or trade premises.

In *background relevant areas,* the noise limit is the higher of the base limit or background-adjusted limits:

Daytime Background level + 8 dB(A) – Day period;

Evening Background level + 5 dB(A) – Evening period;

Night Background level + 5 dB(A) – Night period.

The noise limit for commercial, industrial and trade premises for the night period must not exceed 55dB(A) or it will be ***unreasonable noise***

[17] Infrastructure such as evaporation pond facilities, ventilation shafts, tailings dams or pumping stations.
[18] Land use zone as defined by the relevant planning scheme.
[19] Distance adjustments for:
a. noise generator and receiver are in the same contiguous zone: the distance adjustment is 0 dB;
b. noise generator and receiver in different land use zone codes: subtract 1 dB for every 100m distance
c. noise generator and receiver in same land use zone code and there is an intervening zone (not a road or railway line): subtract 1 dB for every 100 m distance (ignore road or railway line dividing a noise-emitting zone, treat as contiguous).
[20] Background level assessment: If a noise sensitive area is in a background relevant area, the background level must be assessed (unless the noise meets the base noise limit). A background assessment may be made where the assessment location in the noise sensitive area is further than 600 metres from the boundary of the land-use zone in which the commercial, industrial or trade premises is located, to ensure the noise limit is not set below the background level.

Noise limits for Quarries in Rural Areas[21]

The Noise Protocol provides specific guidance on noise limits for 'Earth resources premises' – such as quarries and mines - based on noise sensitivity of land use zone as defined by the relevant planning scheme, as shown in Table 3.

No distance adjustment applies to these earth resources levels - these earth resources base limits in Table 3 are treated as the distance-adjusted levels. (They are slightly higher than the base limits for commercial, industrial and trade premises shown in Table 2.)

As for other commercial/industrial premises in rural areas, a background noise adjustment may be made where relevant.

Table 3: Noise limits for quarries in rural locations, according to noise-sensitive planning zone

Quarry location by Noise-Sensitive Zone	Base Noise Limit, dB(A)		
	Day	**Evening**	**Night**
(Most sensitive zones) Green Wedge A Zone (GWAZ); Rural Conservation Zone (RCZ); Rural Living Zone (RLZ)	45	38	33
Industrial 3 Zone (IN3Z); Special Use Zone (SUZ) *(no residence except caretaker house)*	51	46	41
(Least sensitive zones) Industrial Zones 1 & 2 (IN1Z, IN2Z) Commercial 2 Zone (C2Z)	56	51	46
All other situations	46	41	36
In *background relevant areas* The noise limit is the higher of the base limit or background-adjusted:	Relevant Base limit *(as above)* OR Background level (day) + 8 dB(A)	Relevant Base limit *(as above)* OR Background level (evening) + 5 dB(A)	Relevant Base limit *(as above)* OR Background level (night) + 5 dB(A) *Maximum 55 dB(A)**

** The Night noise level for commercial, industrial and trade premises must not exceed 55dB(A).*

[21] Where the quarry and the related noise sensitive area are located in a major urban area, the relevant noise limits for earth resources premises are the same as other urban sources.

Variations for specific open-air activities in quarries

The noise limits for quarries (as determined for rural or urban areas) apply to general quarry operations, including overburden removal and depositing; any activity occurring below the natural surface; and the handling or disposal of waste material. The noise limits may be varied (increased) if needed for particular open-air activities with significant open-air surface activity during site preparation, clearing, operations or rehabilitation as shown in Table 4.

The variation must not be applied when the noise limits can be achieved. This helps the business to comply with the General Environmental Duty.

Table 4: Noise variations for specified quarry activities

Activity	Application of variation	Variation to noise limits
Installation of constructed noise-control works	The variation applies to: • Construction of structures specifically designed to control noise (such as walls or earth bunds); • Noise control works to protect different noise sensitive areas at a later stage in the project e.g., where extraction works take place in a different part of a large site. *The variation does not include mining or quarrying works carried out during the project that have a coincidental, secondary noise-control benefit e.g., general overburden stockpiling, or building construction or demolition.*	Noise from the activity may be exempted from noise limits during the day period.
Site clearing and preparation works	The variation applies to removal of vegetation, topsoil or subsoil, road construction and civil works such as site drainage where the activity will happen before acoustic mounds can feasibly be constructed. *The variation does not apply to overburden removal.*	
Site rehabilitation	The variation applies to progressive and final site rehabilitation, occurring at the final surface level. *The variation does not apply to backfilling a pit.*	During the day, the noise limit may be increased by up to 10 decibels, to a maximum of 68 dB(A).
Necessary unshielded work	The variation applies to waste dump extensions (at a mine or quarry) or tailings dam construction that is necessary but cannot practicably be shielded by barriers, landforms or natural topography.	

When undertaking noise modelling for these operations, it should be assumed that atmospheric conditions (wind, temperature, etc) may exist that increase noise at sensitive areas (weather conditions favourable to sound propagation sound [22]) regardless of the actual conditions when the works occur.

[22] Wind, humidity and temperature gradients can influence sound propagation over long distances (e.g., more than 200m) and complicate noise measurements. For example, in the evening, when temperature cools near the ground, this makes sound bend down toward the ground and gives louder noise levels at the listener position.

URBAN AREAS

Urban Areas - For quarries and other CMPA premises in urban areas, the Noise Protocol - Annex A *(Designation of zones for urban area method for commercial, industrial and trade premises)* is used to determine noise limits for neighbouring noise-sensitive premises.

The Protocol identifies the Urban Area as metropolitan Melbourne and the Melbourne growth boundary, plus 33 urban areas designated as 'Major Urban Areas' in 26 Local Government Areas, shown in Table 5 (adapted from Table A3 in the Noise Protocol, Appendix A).

The boundaries of major urban areas in Victoria are based on:

- An urban growth boundary (identified in a planning scheme) for a town or city with more than 7000 people, including Melbourne's urban growth boundary; OR
- The urban centre boundary (as defined by the Australian Bureau of Statistics) for a town or city with more than 7000 people, including land within the whole of a Residential Zone, Industrial Zone, Commercial Zone or Urban Growth Zone that is crossed by the urban centre boundary.

Table 5: M*ajor urban areas outside Melbourne metropolitan/urban growth boundary*

Local Government Area	Designated Major Urban Area (*)
Moorabool	Bacchus Marsh
East Gippsland	Bairnsdale
Ballarat	Ballarat
Benalla	Benalla
Greater Bendigo	Bendigo
Mount Alexander	Castlemaine
Colac-Otway	Colac
Baw Baw	Drouin Warragul
Greater Geelong	Drysdale - Clifton Springs Geelong Lara Leopold Ocean Grove - Barwon Heads
Campaspe	Echuca
Macedon Ranges	Gisborne
Southern Grampians	Hamilton
Horsham	Horsham

Conversely, a decrease in humidity will result in a decrease in noise level.

Central Goldfields	Maryborough
Mildura	Mildura
Latrobe	Moe - Newborough Morwell Traralgon
Glenelg	Portland
Wellington	Sale
Greater Shepparton	Shepparton - Mooroopna
Swan Hill	Swan Hill
Surf Coast	Torquay - Jan Juc
Wangaratta	Wangaratta
Moyne	Warrnambool
Wodonga	Wodonga
Bass Coast	Wonthaggi
Moira	Yarrawonga

Noise limits in Major Urban Areas

In major urban areas, the noise limits at a noise sensitive area (e.g., a residence or school, etc)[23] are based on the land use zoning[24] of that noise sensitive area and the measured background sounds *without noise from industry*.

Land use zoning

Each land use planning zone is given a designated noise-sensitivity type (1, 2, or 3) used to calculate noise limits[25].

Table 6: Land use zone and designated noise-sensitivity type	
Land use zone	**Noise sensitivity type**
Residential, rural, open space or similar zones	Type 1
Commercial, office and industrial 3 [light industry] zones	Type 2
Industrial 1 and 2 [general industry] and similar zones	Type 3

[23] The land use zone within 200 metres of a noise sensitive area is used when determining the limits at that noise sensitive area for noise emitted by commercial, industrial and trade premises in a major urban area.
[24] Land use zone as defined by the relevant planning scheme.
[25] The Noise Protocol, Annex A (Tables A.1, A.2 and A.4) contains a full list of designated types for **download**, including types for newly created planning zones.

Background noise level assessment

The background noise must be assessed to determine whether it is neutral, low or high, relative to the zoning level, for each period as relevant.

Table 7: Assessment of Background Noise			
Background Noise Category	**Background Noise Level, Compared to Zone level dB(A)**		
	Day	**Evening**	**Night**
Low	>12 dB below	>9 dB below	>9 dB below
Neutral	6-12 dB below	3-9 dB below	3-9 dB below
High	<6 dB below	< 3 dB below	< 3 dB below

The Noise Protocol Part 1.A1 sets out the methods to calculate the derived noise limit for neutral, low or high background noise, in different zone levels.[26]

7. Aggravated Noise

Aggravated noise is a serious offence and significant penalties apply (as noted in **Section 5**). Noise from commercial, industrial and trade premises is aggravated noise if it exceeds the Aggravated Noise Levels shown in Table 8.

Table 8: Aggravated Noise Levels		
Time	**Prescribed Aggravated Noise Level, dB(A)**	**Alternative level, dB(A)**
Day	75	Derived Noise level + 15
Evening	70	Derived Noise level + 15
Night	65	Derived Noise level + 15

'Alternative noise level' is a level derived for a specified location (e.g., urban or rural including rural quarries) and time (day, evening or night) based on distance and background noise levels where relevant.

[26] Noise Protocol Part I: Commercial, industrial and trade premises Section A: Determining noise limits for commercial, industrial and trade premises 1. Noise limits – urban area method.

8. Vibration and Blasting

Under the Environment Protection Act, Section 3, "Noise" includes sound and vibration. Vibration is not covered in the Noise Protocol and the noise limits in Section 6 do not apply to blasting activities.

Quarries undertaking blasting should follow the guidelines "Ground vibration and airblast limits for blasting in mines and quarries"[27]. The Guidelines sets out the policy and recommendations of the Department of Jobs, Precincts and Regions (DJPR) on limiting blasting impacts at residential premises and other sensitive sites (any land within 10 metres of a residence, hospital, school, or other premises in which people could reasonably be expected to be free from undue annoyance and nuisance caused by blasting)[28].

Uncontrolled blasting at quarries can cause adverse impacts on neighbouring premises, and proper control of blasting practices is necessary to protect employees and the community. Blasting causes ground vibration and airblast (vibrations and noise through the air) at levels which can cause objects in nearby residences to rattle; however, structural damage is most unlikely to occur. The noise levels experienced from blasting are unlikely to cause hearing damage to people living nearby.

Annoyance and discomfort from blasting can occur when noise startles individuals or when airblast and/or ground vibration causes vibration of windows or other items. The degree of annoyance is influenced by the level of airblast and ground vibration as well as factors such as the time of day, the frequency of occurrence and the sensitivity of individuals. Blasting at open cut or surface mines and quarries should only occur during the DJPR daytime period (9.00am-5.00pm Monday to Saturday). Blasting outside these hours may sometimes be justified with permission from DJPR and WorkSafe along with appropriate community consultation.

The recommended limits on ground vibration and airblast are set to minimise annoyance and are lower than levels that would damage competent buildings and structures (i.e., in good/sound condition). More stringent limits may be required to protect fragile structures and historic buildings.

Separate limits apply to sites in operation before or after 1 July 2001, as shown in Table 9.

Table 9 - Impacts due to blasting – Allowable levels at sensitive sites

Site timing	Impact at sensitive site	Allowable Level	Allowable Exceedances
Existing sites, Pre-2001	Ground Vibration	10mm/s (ppv*)	Nil
	Airblast Overpressure	120dB (Lin Peak**)	Nil
New sites, Post-2001	Ground Vibration	5mm/s (ppv)	5% of total blasts in a year
		10mm/s (ppv)	Nil
	Airblast Overpressure	115 dB (Lin Peak)	5% of total blasts in a year
		120 dB (Lin Peak)	Nil

[27] Link: Ground vibration and airblast limits for mines and quarries - Earth Resources, Department of Jobs, Precincts and Regions. The Guidelines are based on the Australian and New Zealand Environment Council's *Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration*, 1990 (ANZEC Guidelines 1990).

[28] Technical information on blasting, including operational, preparation, safety and environmental matters, can be found in *AS 2187.2-2006 Explosives - Storage and Use - Use of Explosives.*

* **PPV - Peak Particle Velocity:** the instantaneous sum of the velocity vectors (measured in millimetres per second) of the ground movement caused by the passage of vibration from blasting.

** **Lin Peak - Linear Peak:** the maximum level of air pressure fluctuation measured in decibels without frequency weighting. (Frequency weightings are often applied to sound measurements to ensure the measured parameter is indicative of the level experienced by the human auditory system. Weighting is not applied to airblast measurements as much of the sound from an airblast is at inaudible frequencies and would therefore be excluded)

The Guidelines provide advice on change of operations or change of neighbouring land use (encroachment), and on monitoring and measurement of blasting outputs and impacts.

Monitoring of vibration and air blast overpressure should be conducted to ensure allowable levels are not exceeded.

9. The Environment Reference Standard

The Environment Reference Standard (ERS)[29] is a new tool under the Environment Protection Act. It gives objectives for environmental values for the air, water and noise environments, including *ambient sound.* (Ambient sound refers to the 'external sound environment' or 'background noise' in a particular location, such as wind, rain, rustling vegetation, traffic, passing pedestrians, etc. It does not include sound/noise inside buildings or structures but does include vibration.)

The ERS Part 3 - Ambient Sound gives noise values for 5 different land use types (categories I – V) ranging from 35 - 55 dB(A) for nighttime and 40-60 dB(A) for daytime.

The land uses that are typically around quarry operations correspond with the ERS Category IV: *Lower density or sparse populations with settlements that include smaller hamlets, villages and small towns that are generally unsuited for further expansion. Land uses include primary industry and farming*.

Category IV land uses have the sound objectives of 35 and 40 dB(A) for night and daytime respectively.

However, quarries and concrete batching plants are also often located closer to their end use (such as industry or infrastructure projects) and may be in a Special Use Zone, or Commercial or Industrial Zones, which are more likely Category I or Category II land uses (e.g. Category 1 = *An urban form with distinctive features or characteristics of taller buildings, high commercial and residential intensity and high site coverage*) with objectives of 50-55 (nighttime) and 55-60 dB(A) (daytime) respectively.

The ERS notes that the objectives for each land use category are typical ambient sound level values and are not noise limits or noise design criteria. They are aspirational objectives and do not take precedence over the Regulations; the ERS gives reference values for consideration, not for compliance.

For comparison, typical sound levels (non-industrial) that the community may experience range from 0 – 80 dB(A), from the hearing threshold to heavy traffic levels, as shown in Table 10.

Table 10: Examples of Sound Levels from Common Sources	
Typical Sound Level in dB	**Sound Source**
80	Kerbside Heavy traffic
70	Loud conversation
60	Normal conversation
40	Quiet radio music
30	Whispering
10	Rustling leaves
0	Hearing threshold

A lawnmower may be 90 dB(A) and a jet engine may be 140 dB(A)[30]. (*Safe Work Australia 'Common Source and Sound Level Table')*

[29] ERS under the Environment Protection Act 2017 section 93, "to be used to assess and report on environmental conditions in Victoria". Government Gazette No. S 245, 26 May 2021. GG2021S245.pdf (gazette.vic.gov.au)

[30] This compares with Victoria's workplace noise exposure standard of 85 decibels (A-weighted) averaged over an eight-hour period, with a peak level of 140 decibels (C-weighted). The workplace standard relates to noise measured at the worker's ear and doesn't account for any PPE protection.

10. Noise Monitoring & Measurement

Assessing compliance with noise limits

This section applies to activities that are required to comply with noise limits – such as ongoing production or operational activities, e.g., quarries, concrete batching plants, recycling depots.

It does not apply to short-term, temporary activities such as construction and demolition activities on a building site.

Noise monitoring should be conducted using the Noise Protocol, as required by the EP Regulations. The Noise Protocol method involves taking the measurement from any nearby noise sensitive areas where the noise limit applies. A noise sensitive area includes residences and other places where people live and sleep, such as hotels and tourist facilities. It also includes kindergartens, schools and childcare centres (during school hours/operational times), plus campgrounds and caravan parks in rural areas.

Details on measuring noise is provided in the Noise Protocol, Part 1, Section B, including guidance on:

- Monitoring location;
- Effective noise level calculations;
- Noise measurements;
- Adjustments for atmospheric conditions, noise duration and noise character (tonality[31], pulsing and intermittency).

Additional information on assessing noise can be found in the guideline **Technical guide: Measuring and analysing industry noise and music noise** (EPA Publication 1997).

Results should be recorded in a company Noise Monitoring Schedule (an attachment to your Noise Management Plan) and compared against the relevant legislative requirements and relevant Noise Limits using the Noise Protocol methodology as described in Section 5, 6 and 7 of this Guideline.

A noise assessment should be done by a competent person in accordance with the procedures in the Noise Protocol and *AS/NZS 1269.1 Measurement and Assessment of Noise Imission and Exposure*.

The more complex the situation, the more knowledgeable and experienced the 'competent person' needs to be.

A competent person is one who has sufficient training and experience to:

- Understand what is required by the Noise Protocol;
- Can accurately calibrate noise measuring instruments before and after testing and knows how to check the performance of the instruments;
- Knows how to use the instrument and take noise measurements properly; and
- Can interpret and report the results of the noise measurements.

Some businesses may have staff who can undertake these tasks in-house, but many will need to engage a consultant to measure noise from the business. A qualified acoustic engineer or occupational hygienist or environmental consultant with experience in assessing environmental noise can be

[31] See *Noise Protocol, Annex C: Objective method for tonal adjustment for commercial, industrial and trade premises*. When the noise emission is tonal in character, this method may be used to determine the value of the tonal adjustment.

engaged to measure noise from your business. The **Association of Australian Acoustical Consultants** or the **Australian Acoustical Society** lists suitably qualified consultants.

EPA Victoria has a 2-page information sheet on engaging environmental consultants on their website.[32]

Monitoring Environmental Noise

Noise monitoring should be conducted by a competent person or appropriately qualified consultant at identified sensitive receptors or noise sensitive areas where the maximum effective noise level occurs or, for proposed premises, is predicted to occur, to measure the noise levels using the Noise Protocol methods at scheduled intervals or where a complaint or enquiry has identified a need to address an issue regarding noise management.

Air blast overpressure monitoring – where required (see **Section 8 Vibration and Blasting**) - should be conducted in the vicinity of the relevant sensitive locations in accordance with *AS2187.2:2006 Explosives - Storage and Use - Use of Explosives* for every shot undertaken.

Measurement Location

When undertaking a noise assessment, it is essential to note the following on a site map:

- Location of noise source;
- Background noise measurement location;
- Source noise measurement location; and
- Topography between noise source and sensitive receivers.

Appropriate measurement locations and descriptors (e.g., type of location, monitoring height, vegetation present, any other notable information to allow repeat measurements if required) should be referenced in Noise Management Plans (covered in **Section 13 Environmental Noise Management Plan**).

Alternative Assessment Locations

For practical reasons it may not be possible to take measurements in a noise sensitive area. In such cases an alternative assessment point is chosen (previously called a derived point). The Noise Protocol allows alternative assessment locations to be set outside a noise sensitive area, under the circumstances listed below.

(a) Multiple industries producing cumulative noise impact

Alternative assessment points may be appropriate when two or more premises contribute to the noise received at the noise sensitive area and a measurement point is required that is not influenced by noise from any other commercial, industrial or trade premises; and/or a measurement point is required that is not influenced by extraneous noise. Alternative points should be selected so that the noise of an individual premise is measured at each point, and that the distance from the premises is sufficient for it to appear as a point source.

Where there are multiple noise sources in the premises, it may be necessary to set multiple points to control individual pieces of equipment.

If using alternative assessment points, the derived noise criterion must be set so that compliance with this noise level will result in the noise limit at the noise sensitive area not being exceeded, for each relevant operating time period.

[32] EPA Publication 1702: Fact Sheet – Engaging consultants 1702 (1).pdf

(b) Atmospheric effects

As mentioned in **Section 6 RURAL AREAS - Noise limits for Quarries in Rural Areas**, weather conditions can affect the noise level received at a noise sensitive area[33]. This is particularly important when the noise level is low and the distance between the noise sensitive area and the source exceeds 200 m. When the noise received at a noise sensitive area is affected by weather conditions, then an alternative assessment point may be used, closer to the emitting premises under investigation and not affected by atmospheric conditions.

It is advisable to use this point in all cases where the noise source is more than 200 m from the noise sensitive area because weather conditions are likely to be the major source of variability in the noise level at this distance.

Measurement Method

While most businesses engage a consultant to measure environmental noise, this section provides general advice for businesses with competent staff to conduct their own monitoring.

Handheld Quick Assessment

The handheld assessment method is useful to get an indication of noise levels. To obtain the most accurate data using this method, hold out the Sound Level Meter (SLM) at arm's length and hold it out to your side with the microphone pointed upwards (i.e., vertical to the ground) to allow soundwaves to travel over the microphone's membrane (rather than against it).

Sound Level Meter (SLM) including microphone mounted on the tripod placement

SLM mounted on a tripod is the standard method for most noise measurements for statutory compliance/enforcement actions.

Difficulties can arise in the measurement of noise due to the placement of the SLM microphone and tripod. For example, if a microphone is located too close to an acoustically reflecting surface, then reflections from that surface may artificially increase the noise level. If the tripod is placed on a rigid surface, vibration through the legs of the tripod may affect the measured level. Noise levels can vary from place to place because of shielding by buildings or other structures.

The microphone should be located so reflections from nearby surfaces are minimised and where a maximum noise level (unaffected by reflections) is obtained. Other difficulties with measurements can include invalid calibration, the quality of model, rough handling of equipment, weather and effects of other unrelated noise.

Noise measurement and assessment for environmental compliance should be carried out by a professional acoustical consultant, using sound level meters that meet performance standards in the AS/NZS IEC 61672-1:2019 *Electroacoustics - Sound level meters Specifications*[34].

[33] Wind, humidity and temperature gradients can influence sound propagation over long distances (e.g., more than 200m). Cooler temperatures at ground level causes sound to bend downward toward the ground and results in louder noise levels for listener. Conversely, decreased humidity results in decreased noise level.

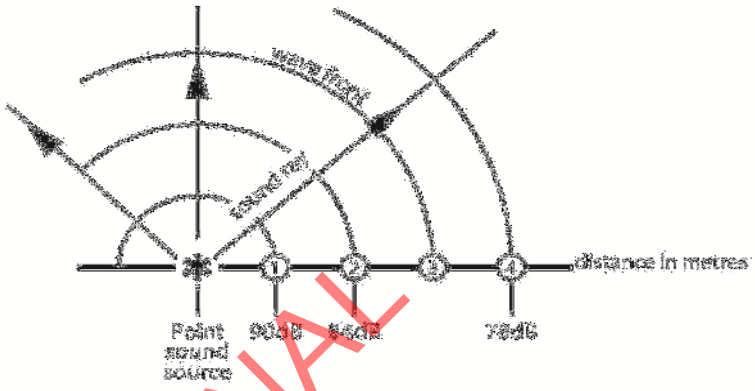
[34] Equivalent to *IEC 61672-1:2013 Electroacoustics - Sound level meters - Part 1: Specifications*

11. Managing Environmental Noise

Once the potential noise risk has been assessed, a business is required to manage any identified risk to the community in noise sensitive areas.

Most Environmental Noise is a result of uncontrolled workplace noise, i.e., the more effort focused on reducing workplace noise, there is less noise to travel. Therefore, the primary means of controlling environmental noise is by controlling workplace noise, by means of hours of operations, work methods, and equipment used - including shielding if necessary.

> Sound spreading in an open space away from reflecting surfaces and measured at a certain distance from the source is reduced by about 6 dB for each doubling of that distance. Sound is reduced less when spreading inside an enclosed space, i.e., it is partially contained and tends to build up inside the space and the external sound is reduced.



> If a small sound source produces a sound level of 90 dB(A) at a distance of 1 m, the sound level at 2 m distance is 84 dB(A), and at 4 m is 78 dB(A), etc.
>
> *(Extract from SWA Code of Practice - Managing Noise and Preventing Hearing Loss at Work)*

Common Sources of Hazardous Noise which can become Environmental Noise

Quarries and Sand Plants

- Mobile Equipment - loaders, drills, rock hammers, dump trucks, reverse alarms, water carts, grader, dozer;
- Overburden stripping and rehabilitation activities;
- Blasting, and blast warning sirens;
- Fixed Plant - crushers, screens, pug mills, conveyors, start up sirens, hydraulic power packs, compressors, water pumps;
- Maintenance and workshop activities; and
- Road transport.

Concrete Plants

- Mobile Equipment – loaders;
- Fixed Plant – batch stations, conveyors and alarms, bin filling, compressor;
- Maintenance and workshop activities, de-dagging activities;
- Road transport; and
- Public address systems.

Crushing and Screening Plant located in Pit so as to reduce Environmental Noise

Workplace controls

Workplace noise can easily transmit to environmental noise and is influenced by many factors such as workplace layout and workplace controls as well as weather conditions[35] that may assist in carrying the noise to sensitive receivers. Environmental noise will be reduced with reduced workplace noise (which a business can control) and with distance between the workplace and noise-sensitive areas (which a business often cannot control).

Long-term workplace Controls - e.g., Elimination, Substitution, Isolation and Engineering controls (see CMPA Workplace Noise Management Guidelines) – can be used to reduce or manage overall operational noise and also environmental noise.

Examples of workplace controls that minimise environmental impact include:

- Amend times of blasting, rock pick activity or other noise transmitting processes to times more amicable to the community;
- Establishing enclosures or sound proof covers around noise sources;
- Enclosing crushing and screening plant or batch plant discharge / mixing stations in a building clad with sound absorbent materials;
- Using barriers or screens to block the direct path of sound;
- Locating fixed plant in pit surrounded by rehabilitated benches that reflect or absorb sound.

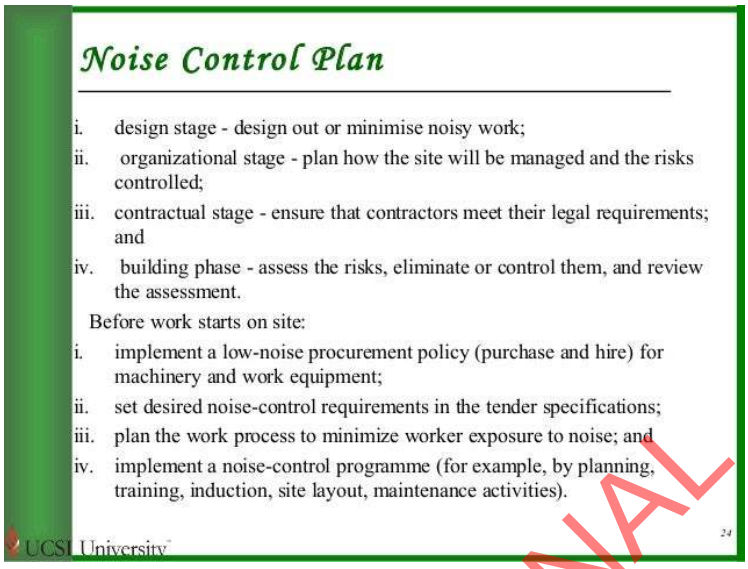
[35] Weather conditions are discussed in **Section 6 RURAL AREAS - Noise limits for Quarries in Rural Areas** and **Section 10 Alternative Assessment Locations**

Workplace Changes

A noise assessment should be conducted where change to the physical work environment or an introduction of new or modified plant and equipment has the potential to create a noise hazard.

Any design or re-design of workplace environment and its associated equipment should take into account any potential noise hazards and identify controls to ensure workplace noise levels are reduced as far as is reasonably practicable, which will also reduce environmental noise

Designers, manufacturers, suppliers and installers of plant and equipment all have a duty under the Victorian OHS Regulations 2017 to provide details of the noise emissions being generated from their intended design, manufacture, supply or installation.



Example noise control plan extract from UCSI University Malaysia UCSI University | Top 350 1.1% in the world.

Employers have a duty under the Victorian OHS Regulations 2017 to ensure they request and take into account these details and act on them accordingly with the objective of reducing hazardous workplace noise as far as is reasonably practicable.

For more advice on reducing workplace noise, see CMPA Workplace Noise Management Guideline 2022.

12. Administrative Controls

Environmental Noise Management Training

Workers should be trained on workplace controls to reduce environmental noise as well as hazardous workplace noise. The General Environmental Duty (GED) requires training and monitoring of staff to ensure they have the knowledge and skills to prevent harm from pollution including noise pollution.

Training should be recorded, including details of content covering environmental noise along with other training content.

Safe Work Procedures

Documentation of work practices (such as Safe Work Procedures, Work Instructions, Job Safety Assessments and Safe Work Method Statements) should include information on ensuring controls to prevent hazardous noise and/or to reduce transmission of environmental noise are working effectively.

Community Engagement

The communities we reside and operate in as an industry allow us a "social license to operate" and the community can easily reject that social license if we do not respect their rights by adhering to legislative requirements.

Potentially impacted communities should be identified (e.g., those in noise-sensitive areas in the vicinity of a quarry or other operation) and consultative meetings arranged and scheduled on a regular basis (e.g., quarterly or annually, or as agreed with the community group, depending on their interest and on the site details) and on an 'as needs basis' when changes occur. The community meetings will help to identify and manage any issue or concern before they become a complaint.

A procedure to immediately act on any community issues, concerns or complaints should be established and sustained, and included in the site Environmental Noise Management Plan.

13. Environmental Noise Management Plan

Objective of the Plan

The objective of a site Environmental Noise Management Plan is to protect the acoustic environment at the surrounding residences (sensitive receptor), to demonstrate the site's ability to control environmental noise, to minimise the likelihood of a complaint and to demonstrate compliance with the General Environmental Duty.

Specifically, the plan will:

- Identify existing sensitive receptors;
- Identify background readings for the Work Authority;
- Identify performance targets for the Work Authority;
- Identify the potential noise sources emitted by the Work Authority;
- Detail what controls will be in place; and
- Detail procedures to engage the community and to handle any issues or complaints.

The Environmental Noise Management Plan can be included as part of an overall Site Noise Management Plan to control workplace noise as well as environmental noise. Noise Management Plans should include a process for review of the Plan and of Noise Controls and assign responsibility for any actions identified.

Guidance for preparing a noise management plan for quarries – which also may be useful for other CMPA members particularly for large sites - is provided in the DJPR Guideline '*Preparation of Work Plans and Work Plan Variations | Guideline for Extractive Industry Projects'*[36] Noise management guidance is provided alongside guidance on assessing and managing other environmental risks. Specific advice on noise controls is in pp 59-60, within *Appendix C - Example Control Measures*.

[36] Preparation-of-Work-Plans-and-Work-Plan-Variations-Guideline-for-Extractive-Industry-Projects.pdf (earthresources.vic.gov.au) Appendix A and Appendix B provide guidance on Risk assessment and Risk Management Plan preparation.

Review of Noise Controls

Risk controls to reduce workplace noise and environmental noise should be reviewed and monitored after implementation, on a regular basis (e.g., annually), and/or if complaints are received and/or when any changes to the controls or work procedures occur. This helps the business comply with the General Environmental Duty to be proactive in preventing or minimising risks to health and the environment as far as reasonably practicable.

The review should be conducted in consultation with a qualified person to ensure that the controls:

- Have either eliminated the risk or reduced the risk to an acceptable level;
- Do not create another hazard;
- Are sustainable and are maintaining that risk at the targeted level.

Consulting workers and their health and safety representatives

The review of risk controls should be conducted in consultation with relevant workers, such as those who work within, maintain or clean the workplace; those who use, store or handle the product; and those who operate or maintain or clean the plant or equipment as well those who may be affected by the hazard.

Worker and HSRs consult should consider the following:

- Are the control measures working effectively in both their design and operation?
- Are all noisy activities being identified?
- Have new work methods or new plant made the work quieter?
- Has instruction and training provided to workers been successful?
- Have new requirements or information indicated that current controls are no longer the most effective?
- Is an alteration planned to any structure, plant or process that is likely to result in a worker or community members being exposed to hazardous or unwanted noise?
- Have any incidents occurred that resulted in a worker or community member being exposed to hazardous or unwanted noise?

These consultation activities help the business to gain their workers knowledge of the site hazards and the control measures as well as sharing the knowledge among staff and keeping them informed, trained and updated on site activities, hazards and the need for control measures.