



## GUIDELINES

# NOISE CONTROL GUIDELINES

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## INTRODUCTION

These guidelines are primarily intended to be used by municipal officers to assist in the resolution of complaints or to avert a possible noise nuisance. Some guidelines have been prepared so that they could be incorporated into a permit condition of a development or embodied as a local law. The guidelines are designed, however, to be the basis of assessment and not the last word.

Many of the guidelines do not require an actual measurement of the noise. In these cases, the inherent nature of the activity outside of the hours suggested is sufficient to consider the activity unreasonable.

EPA appreciates feedback on issues where additional noise control guidelines are considered useful or where refinements to existing guidelines are considered necessary.

Note: These guidelines are a reproduction of the former EPA publication TG302/92. The publication has been updated to reflect regulatory changes under the *Environment Protection (Residential Noise) Regulations 2008* and to address queries raised through consultation for these regulations. The sections for fixed domestic plant; for construction and demolition site noise and for noise assessment have been updated, and the ordering of sections has been changed. Other minor amendments are:

- a requirement for waste collection has been added
- references and standards for aircraft noise, scaregun noise and noise from shops have been updated.

## ACKNOWLEDGEMENT

Some of the guidelines were adopted from noise control guidelines developed by the New South Wales Department of Environment and Climate Change (formerly the State Pollution Control Commission).

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## 1 FIXED DOMESTIC PLANT AND HOME OCCUPATION NOISE

*(such as domestic air conditioners, swimming pool equipment, spas, ducted heating, internal vacuum systems and home occupation noise)*

Noise from fixed domestic plant is subject to Section 48A of the *Environment Protection Act 1970* (EP Act) and the *Environment Protection (Residential Noise) Regulations 2008*.

### Night operation

Noise from any fixed domestic plant must not be audible within a habitable room of any other residence (regardless of whether any door or window giving access to the room is open) during prohibited hours prescribed by the *Environment Protection (Residential Noise) Regulations 2008*.

The following **prohibited hours** apply to air conditioners, swimming pool and spa pumps, ducted heating systems and the like:

- 10 pm – 7 am Monday–Friday.
- 10 pm – 9 am weekends & public holidays.

### Day/evening operation (non-prohibited times)

This guideline can assist assessment of the decibel intensity of fixed domestic plant noise. Noise measurements can contribute to assessment under s48A of the EP Act, where all the factors under s48A(4) must be taken into account.

Noise levels not meeting this guideline may be considered unreasonable if they interfere with use of home or property on a recurring or ongoing basis.

Where noise from any fixed domestic plant is audible beyond the boundary of the residential premises on which the plant is situated, the intrusive noise shall not exceed the background noise level by more than 5 dB at the measurement position.

Noise assessment must be made in accordance with noise assessment techniques listed in section 17 of these guidelines. Adjustment for tonality and/or impulsiveness must be included if applicable.

Assess at a time and circumstance representative of the likely worst case of impact, considering:

- when equipment is likely to be operating
- the equipment settings representative of normal operation (discuss with affected person and owner)
- that multiple items that generally operate together be assessed together
- representative background noise levels – noise from domestic plant will be more intrusive when background levels are lower.

For example, where noise affects a neighbour in the late evening, measurements of background and intrusive noise should be made at this time.

Background noise levels are normally lower in the evening than in the day and are highest during periods of peak traffic.

### Measurement position

The measurement location must be representative of the relevant indoor and/or outdoor area affected by the noise.

### Relevant outdoor areas

Relevant outdoor areas will generally exclude areas not normally used by the affected resident for rest, recreation or enjoyment, such as an access walkway.

The microphone should be located at the boundary of the property where the noise source is located. Where this is not practicable or not representative of an affected area, then a measurement within the affected area should be made.

### Relevant indoor areas

Relevant indoor areas are not limited to habitable rooms, but may exclude infrequently and briefly used rooms such as a laundry.

Where possible, a representative outdoor measurement (example, near the façade of the affected area) should be taken for noise affecting indoor areas. This helps to avoid potential indoor measurement complications such as reflections or internal extraneous noise.

## 2 CONSTRUCTION AND DEMOLITION SITE NOISE

This applies to:

- industrial and commercial premises
- large-scale residential premises under construction in non-residential zones, as defined in regulation 9 of the *Environment Protection (Residential Noise) Regulations 2008*.

Other than for some large-scale residential premises, this guideline does not apply to noise from construction of private residential dwelling(s). These are subject to the *Environment Protection (Residential Noise) Regulations 2008*.

The purpose of this guideline is to protect nearby residential premises from unreasonable noise. Commercial and other premises affected by noise should be considered and reasonable measures implemented to reduce impact on these premises.

### Community consultation and work scheduling

Community consultation is essential for large-scale projects or high-impact works. Where the community will be significantly impacted, consult on the benefits and drawbacks of different scheduling, planning and remediation options.

The following requirements apply to large projects with nearby sensitive uses:

- Inform potentially noise-affected neighbours about the nature of construction stages and noise reduction measures.
- Give notice as early as possible for periods of noisier works such as excavation. Describe the activities and how long they are expected to take. Keep affected neighbours informed of progress.
- Appoint a principal contact person for community queries.
- Provide 24-hour contact details through letters and site signage. Record complaints and follow a complaint response procedure suitable to the scale of works.
- Within normal working hours, where it is reasonable to do so:
  - schedule noisy activities for less sensitive times, (for example, delay a rock-breaking task to the later morning or afternoon)
  - provide periods of respite from noisier works (for example, periodic breaks from jackhammer noise).
- The weekend/evening work hours in the schedule (including Saturday afternoon or Sunday) are more sensitive times and have noise requirements consistent with quieter work.
- The weekend/evening periods are important for community rest and recreation and provide respite when noisy work has been conducted throughout the week. Accordingly, work should not usually be scheduled during these times.

### Work requirements

Noise reduction measures should be developed through initial project planning, tenders for equipment and subcontracts. Larger projects should develop a noise management plan (potentially part of a broader environmental management plan) and may require advice from an acoustic specialist, particularly if works are proposed outside of normal working hours.

The following measures apply:

- Where work is conducted in a residential area or other noise-sensitive location, use the lowest-noise work practices and equipment that meet the requirements of the job.
- Site buildings, access roads and plant should be positioned such that the minimum disturbance occurs to the locality. Barriers such as hoardings or temporary enclosures should be used. The site should be planned to minimise the need for reversing of vehicles.
- All mechanical plant is to be silenced by the best practical means using current technology. Mechanical plant, including noise-suppression devices, should be maintained to the

manufacturer's specifications. Internal combustion engines are to be fitted with a suitable muffler in good repair.

- Fit all pneumatic tools operated near a residential area with an effective silencer on their air exhaust port.
- Install less noisy movement/reversing warning systems for equipment and vehicles that will operate for extended periods, during sensitive times or in close proximity to sensitive sites. Occupational health and safety requirements for use of warning systems must be followed.
- Turn off plant when not being used.
- All vehicular movements to and from the site to only occur during the scheduled normal working hours, unless approval has been granted by the relevant authority.
- Where possible, no truck associated with the work should be left standing with its engine operating in a street adjacent to a residential area.
- Special assessment of vibration risks may be needed, such as for pile-driving or works structurally connected to sensitive premises.
- Noise from the site needs to comply with the requirements of the schedule, except for:
  - unavoidable works
  - night period low-noise or managed-impact works approved by the local authority.

**Unavoidable works** are works that cannot practicably meet the schedule requirements because the work involves continuous work – such as a concrete pour – or would otherwise pose an unacceptable risk to life or property, or risk a major traffic hazard. Affected premises should be notified of the intended work, its duration and times of occurrence. The relevant authority must be contacted and any necessary approvals sought.

**Low-noise or managed-impact works** are works approved by the local authority:

- that are inherently quiet or unobtrusive (for example, manual painting, internal fit-outs, cabling)
- or
- where the noise impacts are mitigated (for example, no impulsive noise and average noise levels over any half hour do not exceed the background) through actions specified in a noise management plan supported by expert acoustic assessment.

Low-noise or managed-impact works do not feature intrusive characteristics such as impulsive noise or tonal movement alarms.

**Schedule: Construction and demolition site noise**

**Normal working hours**

Noise to follow the requirements above during the hours of:

7 am – 6 pm Monday to Friday

7 am – 1 pm Saturdays

**Weekend/evening work hours**

Noise level at any residential premises not to exceed background noise by:

10 dB(A) or more for up to 18 months after project commencement

5 dB(A) or more after 18 months

during the hours of:

6–10 pm Monday to Friday

1–10 pm Saturdays

7 am – 10 pm Sundays and public holidays

**Night period**

Noise inaudible within a habitable room of any residential premises during the hours of:

10 pm – 7 am Monday to Sunday

Note: Noise from construction of large-scale residential premises in non-residential zones (see regulation 9 of the *Environment Protection (Residential Noise) Regulations 2008*) is subject to the unreasonable noise provisions of s48A(3) of the EP Act at all times of day. In all circumstances, the assessment may have regard to this noise control guideline.

This guideline affirms the minimum expectation that noise from these sites must not be audible within a habitable room of any residential premises between 10 pm and 7 am. This is considered unreasonable noise under the EP Act. However, provision is made for circumstances of unavoidable works or low-noise or managed-impact works.

This guideline does not limit the general ability of a local government or police officer to assess the unreasonableness of noise at any time. For example, if unavoidable works were done in an unnecessarily noisy way, this may be considered to be unreasonable. General noise at any time during the day might still be considered unreasonable, taking into account the work practices and circumstances of the noise. As specified in s48A(4) of the EP Act, assessment must consider the attributes of the noise and the time, place and circumstances in which it is emitted.

### 3 ROAD REPAIR AND TRACK MAINTENANCE

The following guidelines have been designed to limit the amount of noise impinging solely on residential premises. To this end, affected premises such as offices may be considered exempt from the schedule.

- All pneumatic tools operated in a residential area should be fitted with an effective silencer on their exhaust port.
- The unit with the lowest noise reading which meets the requirements of the job should be used where work is conducted in a residential area or other noise-sensitive location.
- All mechanical plant must be silenced by the best practical means using current technology. Mechanical plant, including noise-suppression devices, should be maintained to the manufacturer's specifications. Internal combustion engines are to be fitted with a suitable muffler in good repair.
- Unless involved in emergency repair or for safety reasons, all work should be conducted during the hours specified in the schedule.
- If routine work is planned outside the hours specified by the schedule, all affected premises in the residential area must be notified of the intended work, its duration and times of occurrence.
- Work that creates the most noise should be scheduled to minimise the impact on residential premises.

**Schedule: Road repair and track maintenance**

7 am – 6 pm Monday to Saturday

9 am – 6 pm Sunday and Public Holidays

### 4 DOG KENNELS

The problems caused by the perpetual barking of dogs has been known to exist at distances as far as 500 metres from the actual source. The following criteria for dog kennels have therefore been assembled to limit both the physical stimuli to the dogs and the outbreak of noise from the kennels.

- The kennels should be located at least 500 metres from residential areas.
- Some fully enclosed or acoustically baffled kennels should be available to house particularly noisy animals, at a ratio of 1:15.
- Electronic masking noise devices should be provided to reduce audible stimuli to the dogs.
- Kennels should be constructed to visually screen stimuli such as other dogs, animals, traffic or passers-by.
- Access to kennels should be restricted solely to staff.

- Feeding of the dogs should be restricted to the daytime hours of 7 am – 6 pm.
- Exercise of the dogs may only be performed between the hours of 9 am and 5 pm.
- A responsible person must be available on site 24 hours per day.
- Kennels should be constructed of such a material so as to provide an appropriate reduction in the emission of noise. Materials such as masonry and cement sheeting would provide a suitable structural basis.
- The kennels should be positioned so as to utilise the ability of the topography to reduce noise.

Note: Noise originating from dog kennels may be assessed using *State Environment Protection Policy (Control of noise from commerce, industry and trade) No. N-1*.

### 5 DOMESTIC REFUSE COLLECTION

The main annoyance produced by domestic refuse collections occurs in the early morning (in other words, before 7 am). Therefore, if possible, routes should be selected to provide the least impact on residential areas during that time.

Collection of refuse should follow the following criteria:

- Collections occurring once a week should be restricted to the hours 6 am – 6 pm Monday to Saturday
- Collections occurring more than once a week should be restricted to the hours 7 am – 6 pm Monday to Saturday
- Compaction should only be carried out while on the move.
- Bottles should not be broken up at the point of collection.
- Routes that service entirely residential areas should be altered regularly to reduce early-morning disturbance.
- Noisy verbal communication between operators should be avoided where possible.

### 6 INDUSTRIAL WASTE COLLECTION

Annoyance created by industrial waste collection tends to intensify in the early-morning period. To this end, early-morning collections should be restricted to non-residential areas to minimise early morning disturbances. Where a residential area is impacted by noise from the collection of refuse, then collections should be restricted to the times contained within the schedule.

- Refuse bins should be located at sites that provide minimal annoyance to residential premises.
- Compaction should be carried out while the vehicle is moving.

- Bottles should not be broken up at collection site.
- Routes which service predominantly residential areas should be altered regularly to reduce early morning disturbances.
- Noisy verbal communication between operators should be avoided where possible.

#### Schedule: Industrial waste collection

##### One collection per week

6:30 am – 8 pm Monday to Saturday

9 am – 8 pm Sunday and public holidays

##### Two or more collections per week

7 am – 8 pm Monday to Saturday

9 am – 8 pm Sunday and public holidays

### 7 MOBILE VENDORS

The owner or person in charge of a vehicle should not use or operate in any public place a noise or loudspeaker device for the purpose of informing members of the public that articles are on sale from that vehicle, or to promote a related business activity:

- while the vehicle is stationary
  - before 9 am or after 9 pm on any day
  - for longer than 30 seconds in any period of three minutes
- or

- more than once in any period of one hour in a section of a road between two intersecting crossroads which are nearest in each direction.

### 8 TRUCK-MOUNTED REFRIGERATION UNITS

Whether parked on residential or non-residential premises, the noise from the operation of a truck-mounted refrigeration unit must not be audible within a habitable room of any other residence (regardless of whether any door or window giving access to the room is open) during the hours contained in the schedule.

#### Schedule: Truck-mounted refrigeration units

**Non-residential premises** (e.g., noise from a delivery truck, whether moving or parked on the street)

10 pm – 7 am Monday to Saturday

10 pm – 9 am Sundays and public holidays

**Residential premises** (including a truck owner keeping their vehicle on the street outside their home)

8 pm – 7 am Monday to Friday

8 pm – 9 am weekends and public holidays

Note: Section 48(A) of the *Environment Protection Act 1970* deals with the emission of unreasonable noise from residential premises. This provision of the Act is

not limited to the schedule and may be enforced at any time.

## 9 DELIVERIES TO SHOPS, SUPERMARKETS AND SERVICE STATIONS

Where a residential area will be impacted by noise from deliveries, then deliveries should be inaudible in a habitable room of any residential premises (regardless of whether any door or window giving access to the room is open) outside the hours contained in the schedule.

### Schedule: Deliveries to shops, supermarkets & service stations

7 am – 10 pm Monday to Saturday

9 am – 10 pm Sundays and public holidays

Note: All ancillary motors or trucks should be turned off whilst making the delivery.

## 10 NOISE FROM SHOPS

Where amplified speech or music from shops (spruiking) is to be controlled, the following conditions may be specified.

Each loudspeaker or loudspeaker system to be placed in such a position that, while it is in use, it remains:

- located entirely inside the shop
- situated not less than three metres from any public entrance to the shop
- directed in such a manner that the device does not point towards any wall which contains an external window or entrance to the shop unless the wall is more than 15 metres from the device itself
- operating at a level that does not exceed 65 dB(L<sub>Aeq</sub>) two metres from the facade.

## 11 GARDENING ON NON-RESIDENTIAL PROPERTY

This guideline is intended to limit the amount of noise created by lopping or removal of trees, cutting of grass and so forth.

All internal combustion engines must be fitted with a suitable muffler in good repair.

Work carried out in proximity to a residential area should be restricted to the hours:

7 am – 6 pm Monday to Saturday

9 am – 6 pm Sundays and public holidays, unless involved in emergency work.

## 12 SCAREGUNS

### Background

Scareguns are devices for producing a loud explosive sound for the purpose of scaring away birds from crops and orchards. Scare guns, also known as gas guns or scatter guns, produce an explosive noise by the ignition of a charge of gas and air. Some scare guns rotate after firing so that the next blast is emitted in a different direction, which is intended to increase the surprise effect on birds.

Scareguns, when used as the sole bird deterrent, are likely to become significantly less effective after a few days. This is due to the birds becoming accustomed to the noise. For scareguns to remain effective it is necessary to vary and enforce the frightening effect. Methods which do this include the relocating of the scare gun every day or so and the use of 'birdfright' explosive cartridges.

The rate of firing the scaregun must be carefully considered. If the firing rate is set too high, the birds will very quickly become accustomed to the noise. However, if set too low, the birds will return from cover after being frightened away and will have time to feed.

For the guns to be most effective they should be used when the birds are most actively feeding. This will normally be in the early morning and late afternoon; but this could be dependent on the species. Most scareguns can be fitted with a timer that enables them to be automatically turned on and off.

Scareguns are not the only method of bird control available. Where scareguns cannot be used, other bird controls should be considered by the producer. These include:

- kites, shaped like birds of prey
- chemical sprays that are unpalatable to some species of small birds
- plastic strips that hum in the wind
- nets and plastic mesh
- noise generators such as 'Av-alarm', 'Pestaway Agricultural Noise Generator' or a 'white noise' generator. (The first two produce a high level of noise which may cause annoyance to residents if living nearby. The last-mentioned device produces a cicada-like sound and has been found to be particularly effective with silvereyes).

### Discussion

Birds that attack fruit and crops can cause significant losses to a producer. A scaregun, if used correctly, does offer some protection against this problem. However, the noise that frightens the birds can also cause significant annoyance to neighbours living in the area. As a consequence, when scareguns are used, there needs to be a balance set between the

producer's needs and the rights of residents. This guideline attempts to set this balance and should be seen as a reasonable compromise for both parties.

### Guidelines for the control of noise from scareguns

- A scaregun must not be used if the distance between the scaregun and any complainant's house is less than 300 m (See Note 2).
- The scaregun must not emit more than 70 blasts/day.
- The scaregun must not be used earlier than 7 am or later than sunset. Earlier starting times will be allowed if this is agreed to by the complainants.
- The total time of operation of a scaregun must not exceed 12 hours in any one day. However, the time of operation may be divided into two separate periods, provided the interval between blasts is not less than six minutes.
- The scaregun must be located as far away as possible from any complainant's house.
- Wherever possible, the shielding effects of natural features, buildings and so on shall be used to reduce the level of the blasts at complainants' houses.
- Wherever possible, the use of the scaregun shall be minimised.

#### Notes:

1. These guidelines are based on an average maximum level of 100 dB LIN Peak of the loudest 20 per cent of blasts measured at the complainant's home when the weather favours noise propagation. The dB LIN Peak is measured with the sound level meter set to linear ('Z') frequency-weighting and peak ('P') time weighting.
2. Where the level of the blast from a scaregun can be adjusted, then the distance between the scaregun and any complainant's house may be less than 300 m. In this case the adjusting mechanism must be permanently fixed such that the average maximum level of the blasts at the house does not exceed 100 dB LIN Peak.
3. Weather conditions affect the propagation of noise. Received levels are loudest when the wind blows from the source to the receiver. Temperature inversions, which often occur in the early mornings after a clear night, also increase noise propagation.

## 13 PUBLIC ADDRESS SYSTEMS

Public address systems are commonly used in conjunction with outdoor entertainment and sporting activities and can cause annoyance if used inappropriately. For the purpose of this guideline public address systems may be divided into two categories: low-power units needed for control of persons engaged in the activities or events; and high-

power units used for making public commentaries and announcements.

### Objectives

In all cases, the environmental objective should be noise intrusion of not more than 5 dB(A) above background at any affected residences or other noise-sensitive locations. Corrections for tonal or impulsive noise usually are not necessary, and further tolerance of up to 5 dB(A) may be allowed for unique or very infrequent activities with recognised social merit. Amplifier level settings must be minimised whilst ensuring conveyance of information to audience or participants is adequate.

Restrictions on the times of use of public address systems should be considered. Noise from PA systems must not be audible inside a residential dwelling during normal sleeping hours.

### Low-power systems for event control

These are usually small systems such as are used for controlling competitors in events like BMX bike races and go-kart races. Where such systems may cause noise annoyance, the following criteria should be applied:

- The public address system must only be used to control the event, not for giving commentaries, advertising or playing music.
- Speakers may only be installed in the essential control areas, such as marshalling sites.
- Speakers should be small, low-power horn units no more than 20 cm across the horn opening and operated by an amplifier of no more than 30 watts.
- Horn units are to incline downwards at an angle of approximately 45°, point in the appropriate direction and be mounted on poles approximately three metres tall, in such a way that the speaker is held firmly and cannot be rotated.
- A sound level limiting circuit should be incorporated in the amplifier to control the signal amplitude to a fixed level, regardless of the loudness of the operator's voice.
- Once the control knobs have been set to the correct positions, they should be removed and the potentiometer spindles covered with a fixed metal channel attached to the front panel of the amplifier.
- The spare microphone inputs should be covered with metal plates securely fitted to the rear or front panel of the amplifier, as the case may be.

### High-power systems for commentaries and announcements

These are usually much larger systems used, for example, to give a running commentary during a

sporting event or race meeting, to keep spectators entertained or for carnival-type advertising.

- Most of the criteria for lower power systems are applicable.
- Rather than use high-powered speakers placed in a few locations, it is preferable to place more low-powered speakers to cover the entire perimeter of the grounds, each pointing downward and inward towards the ground where the event is taking place.

Note:

1. Consideration should be given to substitution of sound systems by visual displays such as electronic scoreboards and video screens for large operations.
2. PA systems used for paging staff and patrons in business and catering operations may also be replaced where they adversely affect residences. In business, two-way radios or pocket beepers may be used. In hotels, meal ticket numbers may be presented on digital display boards instead of being announced.

## 14 MINI-MOTORCYCLE CIRCUITS

### Introduction

This guideline is intended to limit the amount of noise created by mini-motorcycles at a circuit controlled by a non-profit organisation within the Melbourne metropolitan area.

### Definitions

**Circuit** means the entire area controlled by the club and includes, but is not restricted to, the track area, pits area, warm-up area and car park area.

**Mini-motorcycle** means any two-wheeled vehicle, powered by an internal combustion engine, that cannot be registered for road use.

**Public holiday** means public holiday as published in the *Victoria Government Gazette* from time to time.

**Standard exhaust system** means either the complete exhaust system fitted to the mini-motorcycle at the time of manufacture or a complete system specified and distributed by the manufacturer of the mini-motorcycle as a suitable replacement.

### Noise guidelines

Only mini-motorcycles having an engine capacity of 100 cc or less should be permitted on the track, pits or warm-up areas and the engine of any mini-motorcycle may only be operated when the cycle is in one of these areas or being ridden between these areas.

All mini-motorcycles ridden on the track, pits or warm-up areas must have fitted a standard exhaust system or equivalent system capable of reducing the noise

emissions to a level of 96 dB(A) or less when tested in accordance with the motor cycle provisions of the *Environment Protection (Vehicle Emissions) Regulations 2003* made under the *Environment Protection Act 1970*.

No more than 15 mini-motorcycles are to be ridden on the track area at any one time, either during practice sessions or races of any kind.

The engines of mini-motorcycles located at the starting line prior to the start of any race are not to be operated for longer than two minutes.

No more than two mini-motorcycles are to be operated on the warm-up area at any one time.

The engines of mini-motorcycles located in the pits area should not be operated for excessive periods of time.

**Public address systems:** Section 13 of these guidelines cover the installation and use of these systems.

A sign or signs must be erected and maintained by the club, indicating that the circuit is only to be used by club members. The erection of a sign may need to comply with the requirements of the relevant planning scheme.

Regular club activities should be restricted to Saturdays, Sundays and public holidays, and the hours during which the engine of a mini-motorcycle can be operated on the circuit must fall within the interval 9 am to 6 pm on any Saturday and 10 am and 6 pm on any Sunday or public holiday. On each day that mini-motorcycles are ridden on a circuit there must be a continuous period of at least 45 minutes between 12 noon and 2 pm when the engine of any mini-motorcycle is not to be operated.

In any period of four consecutive weeks there should be at least one entire weekend during which no mini-motorcycles are to be operated on the circuit.

For each new circuit, the distance between any zone in which the use of mini-motorcycles is prohibited under the relevant planning scheme and the nearest part of the track area, pits area or warm-up area should not be less than 350 metres. In addition, consideration must be given to the following:

- other lawful uses in the same zone or reservation that are likely to be sensitive to noise, or whether any permits have been issued for such uses.
- any proposed rezoning or reservation of the area.

## 15 AIRCRAFT

The impact of aircraft noise is generally of major concern only in the vicinity of airports. In these situations levels of noise exposure can be mapped using either the Australian Noise Exposure Forecast (ANEF) system or the maximum noise levels from aircraft where an ANEF is not available.

The Commonwealth regulations for aircraft noise are the *Air Navigation (Aircraft Noise) Regulations 1984*. Complaints about noise from aircraft in flight should be directed to Airservices Australia, a Commonwealth government agency.

**Table 15.1: Building site acceptability near airports**

Building type	ANEF zone of site		
	Acceptable	Conditionally acceptable	Unacceptable
House, home unit, flat, caravan park	Less than 20 ANEF(Note 1)	20 to 25 ANEF(Note 2)	Greater than 25 ANEF
Hotel, motel, hostel	Less than 25 ANEF	25 to 30 ANEF	Greater than 30 ANEF
School, university	Less than 20 ANEF(Note 1)	20 to 25 ANEF(Note 2)	Greater than 25 ANEF
Hospital, nursing home	Less than 20 ANEF(Note 1)	20 to 25 ANEF	Greater than 25 ANEF
Public building	Less than 20 ANEF(Note 1)	20 to 30 ANEF	Greater than 30 ANEF
Commercial building	Less than 25 ANEF	25 to 35 ANEF	Greater than 35 ANEF
Light industrial	Less than 30 ANEF	30 to 40 ANEF	Greater than 40 ANEF
Other industrial	Acceptable in all ANEF zones		

Notes:

- 1 The actual location of the 20 ANEF contour is difficult to define accurately, mainly because of variation in aircraft flight paths. Because of this, AS 2021-2000 *Acoustics – Aircraft Noise Intrusion – Building Siting and Construction* specifies additional procedures for building sites outside but near to the 20 ANEF contour.
- 2 Within 20 ANEF to 25 ANEF, some people may find that the land is not compatible with residential or educational uses. Land-use authorities may consider that the incorporation of noise control features in the construction of residences or schools is appropriate (see also Figure A1 of Appendix A of AS 2021-2000 *Acoustics – Aircraft Noise Intrusion – Building Siting and Construction*).
- 3 There will be cases where a building of a particular type will contain spaces used for activities that would generally be found in a different type of building (for example, an office in an industrial building). In these cases this table should be used to determine site acceptability, but internal design noise levels within the specific spaces should be determined by Table 3.3 of AS 2021-2000 *Acoustics – Aircraft Noise Intrusion – Building Siting and Construction*.

**Table 15.2: Building site acceptability based on maximum noise levels without ANEF charts**

Building site	Aircraft noise level expected at building site, dB(A)					
	20 or fewer flights per day			More than 20 flights per day		
	Acceptable	Conditionally acceptable	Unacceptable	Acceptable	Conditionally acceptable	Unacceptable
House, home unit, flat, caravan park	<80	80 to 90	>90	<75	75 to 85	>85
Hotel, motel, hostel	<85	85 to 95	>95	<80	80 to 90	>90
School, university	<80	80 to 90	>90	<75	75 to 85	>85
Hospital, nursing homes	<80	80 to 90	>90	<75	75 to 85	>85
Public building	<85	85 to 95	>95	<80	80 to 90	>90
Commercial building	<90	90 to 100	>100	<80	80 to 90	>90
Light industrial	<95	95 to 105	>105	<90	90 to 100	>100
Heavy industrial	No limit					

NOTE: The forecast daily average number of aircraft flights affecting the site should be obtained from the aerodrome owner. However, each night-time flight between 7 pm and 7 am is to count as four operations.

Reference: AS 2021-2000 *Acoustics – Aircraft Noise Intrusion – Building Siting and Construction*.

## 16 HELICOPTERS

### Noise level criteria

The criteria comprise three separate components, each of which should be satisfied at the nearest affected buildings:

- The measured  $L_{Aeq,T}$  (measured over the entire daily operating time of the helipad) shall not exceed 55 dB(A) for a residence.
- The measured maximum noise level  $L_{Amax}$  shall not exceed 82 dB(A) at the nearest residential premises (See Note below).
- Operation outside the hours between 7 am and 10 pm shall not be permitted except for emergency flights.

Note: These levels will generally be met by a separation between the landing site and the residential premises of 150 m for helicopters of less than two tonnes all-up-weight, and 250 m for helicopters of less than 15 tonnes all-up-weight.

## 17 NOISE ASSESSMENT TECHNIQUE

When measurement of noise emissions is deemed necessary in the application of these guidelines then they should be performed in accordance with Australian Standard 1055.1-1997, *Acoustics – Description and Measurement of Environmental Noise. Part 1: General Procedures*.

Alternatively, a simple procedure that can be used for measuring environmental noise is described below.

### Measurement equipment

The equipment used should conform to the specifications for sound level meters of Class 1 or Class 2 as contained in *Australian Standard AS IEC 61672.1-2004, Electroacoustics – Sound level meters*.

### Laboratory calibration and maintenance

The sound level meter and portable sound level calibrator must be calibrated at least every two years by a calibration laboratory, as specified in AS 1055.1-1997.

### Field calibration checks

The performance of the sound level meter when in use shall be checked periodically with a portable sound level calibrator, pistonphone or other portable checking device appropriate to the sound level meter, and immediately before and after measurements are made.

For extended measurement periods, these checks should be performed before and after each measurement sequence.

If the instrumentation system registers a calibration discrepancy equal to or greater than  $\pm 1$  dB between consecutive checks, any measurements in the interval between the two checks shall be considered invalid.

### Measurement procedure

#### Measurement location

Having regard to any measurement location specified for a category of noise, the microphone will be located at a point where the highest sound pressure level of the noise under investigation will be obtained.

The measurement should be taken outdoors. The microphone of the sound level meter should be located between a height of 1.2 and 1.5 metres above the ground.

The measurement point should be no less than 3.5 metres from any reflective surface, such as walls or buildings, other than the ground.

The surface on which a noise source (such as an air conditioner) is located and the property boundary from where the noise is emitted are not considered as reflective surfaces.

Where it is not possible to locate the measurement point 3.5 metres from reflective structures, such as outdoor measurements near buildings, the preferred measurement positions are one metre from the facade and 1.2 to 1.5 metres above each floor level of interest.

Where the sound is directly incident on that facade, an adjustment of -2.5 dB should be made to the measured sound pressure level. 'Directly incident' means where the sound under observation is emitted from a location approximately opposite to the point on that facade nearest to where the measurement is being made.

Where measurement is made inside a habitable room of the noise-affected residential premises and a window or door is the major transmission path for the noise, it shall be fully open during the measurement.

#### Measurement settings

*Equivalent continuous sound pressure level ( $L_{eq}$ ) for noise under assessment*

The sound level meter must be set on A-frequency-weighting and equivalent continuous sound pressure level ( $L_{eq}$ ) integrating function. The level should be determined over a sufficiently long time to be representative of the noise and will be measured for not less than five minutes. The level must not include extraneous noise that could affect the level of the noise being assessed – extraneous noise must be excluded using the pause function of the meter.

## Alternative to $L_{eq}$

For meters without an  $L_{eq}$  function, the average instantaneous A-weighted sound pressure level ( $L_{PA}$ ) can be used as an equivalent, by taking the average of the levels measured during the time interval considered (for example, noting no less than 40 needle readings on the meter over the period of measurement and taking the arithmetic average of these levels). This method of assessment is only suited to steady noise sources that do not vary by more than 8 dBA.

## Method of background measurement

### 90 per cent exceedance sound pressure level ( $L_{90}$ ) for background measurement

The sound level meter shall be located at the measurement point used to determine the equivalent continuous sound pressure level ( $L_{eq}$ ) of the noise under assessment.

The meter must be set on A-weighting, fast response and  $L_{90}$  statistical weighting function. The level must be determined over a sufficiently long time to be representative of the background at the time of noise impact and will be measured for not less than five minutes. The intrusive noise under assessment and non-typical local noises (such as local construction noise or street cleaning) must be excluded.

### Alternative to $L_{90}$

For meters without a statistical weighting function, the background A-weighted sound pressure level ( $LA_{bg}$ ) shall be determined by taking the average of the lowest levels measured using the F (fast) time weighting, at the time of noise impact. The intrusive noise under assessment and non-typical local noises must be excluded.

## Adjustments

Adjustments may have to be made to the measured sound pressure level in some cases. The adjusted sound pressure level is the measured sound pressure level adjusted for tonal (for example, humming or whining) and impulsive (for example, hammering) characteristics of the noise. The presence of tonal or impulsive characteristics creates additional annoyance.

Assessment of tonality should consider both high-frequency and low-frequency tones. If a tone is present in the noise being measured, the adjustment shall be +2 dB for a tone just detectable by the observer and +5 dB for a tonal component prominently audible.

If impulsiveness is a significant characteristic of the noise being measured, the adjustment shall be +2 dB for an impulsiveness just detectable by the observer and +5 dB if it is readily detectable.

## Non-standard circumstances

The above measurement procedure may not be appropriate for some noise circumstances, e.g. fixed domestic plant generating intrusive low frequency noise, increased low frequency noise within the affected premises, or structurally transmitted noise.

In such cases a subjective judgement of impact may be needed, taking into account the place of effect (e.g. while lying in bed) and nature of the noise impact.

## 18. OTHER NOISE GUIDELINES AND USEFUL REFERENCES

A number of these publications are available from EPA's Information Centre, ground floor, 40 City Road, Southbank, Victoria 3006 (phone 03 9695 2722), or from [www.epa.vic.gov.au/noise](http://www.epa.vic.gov.au/noise).

1. *Interim guidelines for control of noise from industry in country Victoria*. EPA publication N3/89.
2. *Interim gunshot noise guidelines*. EPA publication N6/91.
3. *Using the interim gunshot noise guidelines*. EPA publication 920
4. *State Environment Protection Policy (Control of noise from commerce, industry and trade)*. No. N-1. Victorian Government Gazette No. S31, 15 June 1989.
5. *Explanatory notes: State Environment Protection Policy (Control of noise from commerce, industry and trade) No. N-1*. EPA Publication N4/91.
6. *State Environment Protection Policy (Control of music noise from public premises) No. N-2*. Victorian Government Gazette No. S43, 3 August 1989.
7. *Explanatory notes: State Environment Protection Policy (Control of music noise from public premises) No. N-2*.
8. *A guide to the measurement and analysis of noise*. EPA publication 280.
9. *Annoyed by noise?* EPA publication 406.
10. *Environment Protection (Residential Noise) Regulations 2008*.

**Note:** Regulations can be obtained from Information Victoria, 505 Little Collins St, Melbourne, Victoria 3000 (phone 1300 366 356).

Noise complaints from major industry and commerce can be made to EPA's Pollution Watch Line, phone 03 9695 2777.