

Noise from outdoor shooting ranges



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Introduction

A Gunshot noise can be disturbing and irritating. It is loud and intrusive, with an impulsive character that increases annoyance. Buffering and noise control measures need to be considered for outdoor shooting ranges to ensure that they do not affect amenity.

In 1991 EPA published the *Interim gunshot noise guidelines*. Later, EPA published the *Using the interim gunshot noise guidelines* (EPA publication 920) to supplement the interim guidelines. This document combines both these guidelines so that the content is readily accessible in one place without changing the intended environmental outcomes or obligations of shooting range operators.

Purpose of this Guideline

This guideline provides duty-holders with advice on the recommended requirements for establishing a new shooting range, changing or operating an existing range, so that noise emissions do not affect amenity or sleep during normal sleeping hours.

Councils and EPA can use this guideline when assessing noise complaints about shooting ranges to determine acceptable outcomes in relation to shooting range noise.

Application of this Guideline

The aim for new shooting range developments is to achieve acceptable outcomes. It is possible that the responsible authority (usually the local council) may decide that acceptable outcomes can be achieved, even though the recommended noise levels may not be met.

In deciding to vary from the recommended levels, the fundamental considerations are whether shooting noise will be annoying, unreasonably intrusive or disturb sleep during normal sleeping hours.

Role of the council (the responsible authority)

In considering a planning permit application, one of the council's roles under its planning scheme is to decide whether the proposal will produce acceptable outcomes. In doing so, councils must consider a range of likely impacts, including on environmental factors such as soil and water quality, and impacts of the emission of noise, dust and odours.

This guideline assists councils in their decision-making of whether the potential noise impact of a planned outdoor shooting range is acceptable.

Role of the applicant

In applying for a planning permit for an outdoor shooting range, the applicant needs to describe all the potential impacts of the proposal, including the level of compliance

with this guideline. Applicants should take a pro-active attitude towards seeking community input before and after submitting a proposal.

Open discussion is critical to successful planning, ensuring that key issues for consultation are raised early in the process. Even if no potentially contentious issues are raised, independent testing and assessment by a qualified acoustic consultant is still recommended.

Legal status of this Guideline

This guideline provides advice to help applicants and operators of shooting ranges ensure that noise emissions do not affect amenity or sleep during normal sleeping hours. If the shooting range emits noise that is unreasonable in the circumstances, EPA will take into account whether this guideline has been followed when deciding if enforcement action is necessary.

Noise levels or outcomes specified in a planning permit or other statutory approval will have precedence over the recommended levels in this guideline.

Recommended requirements

The gunshot noise level (measured as dB(A)l) should be below the recommended level in a noise sensitive area.

For daytime, the recommended noise level is the higher of:

- the daytime recommended level specified in table 1 for the appropriate number of days of shooting per week
- the background sound level + 10 dB(A)l.

For the evening, the recommended noise level is the higher of:

- the evening recommended level specified in table 1 for the appropriate number of days of shooting per week
- the background sound level + 5 dB(A)l.

Shooting shall be restricted to the following hours:

- Monday - Saturday 9am - 10pm
- Sunday 12noon - 10pm.

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Table 1. Recommended levels for shooting range noise

		Days of shooting per week	<1	1	2	3-5	6-7
Long established range	Day	Monday - Saturday	80	75	70	65	60
		Sunday	75	70	65	60	55
	Evening	Monday - Saturday	75	70	65	60	55
		Sunday	70	65	60	55	50
Operating range	Day	Monday - Saturday	60	55	50	45	45
		Sunday	55	50	45	45	45
	Evening	Monday - Saturday	55	50	45	40	35
		Sunday	50	45	40	35	35
Planned range	Day	Monday - Saturday	60	55	50	45	45
		Sunday	55	50	45	45	45
	Evening	Monday - Saturday	55	50	45	40	35
		Sunday	50	45	40	35	35

Note: <1 means shooting on no more than one day per month.

Measurement

Measurement point

Noise from the shooting range shall be measured outdoors in a noise sensitive area, which is generally a residential site (or residential land). This includes a residential hotel or motel, a hospital, caravan park, or any similar premises where the long-term amenity of people may be affected. This does not include people at work or passers-by.

The measurement point should be within 20 metres of the most exposed external wall of the affected building on the site. For example, the measurement would not be done at the boundary of a large residential block unless a house is constructed within 20 metres of the block boundary. The measurement would not be done on the opposite side of the house from the shooting range.

Measurement method

The measurement of the noise level of each shot is the maximum level of the A-weighted sound level using the 'I' (Impulse) time-weighting.

The gunshot noise level is the logarithmic average of a number of shots as follows:

$$\text{Gunshot noise level} = 10 \times \log_{10} \left(\frac{\sum_{i=1}^N L_i}{N} \right)$$

- where L_i is the maximum level of the i^{th} gunshot measured in dB(A) and N is the number of shots measured.

The 'I' (Impulse) setting is used especially to measure impulsive type noises such as gunshot noise. The 'I' setting on a sound level meter allows the indicated level to rise very quickly after the gunshot and then fall very slowly so the maximum level can be determined.

The maximum noise level is measured and may be either:

- observed directly on the meter as the highest sound level during the gunshot
- obtained using a maximum-hold feature on the meter
- measured and recorded using a measurement storage and recall function on the meter.

The level shall be determined as the average of at least 40 individual gunshot measurements or the average over a period of 30 minutes, whichever occurs first. If there are no more than 40 shots in a 30 minute period then the gunshot noise level is the average of the noise levels of all the shots occurring within the selected 30 minute period.

Weather conditions

Noise levels at the measurement point will depend significantly on the weather conditions, especially over long distances. Wind blowing from the measurement point in the noise sensitive area towards the range may make noise less audible, but on still days or with wind blowing towards the measurement point, noise levels may be quite high and cause a noise problem.

The assessment of noise should be made when weather conditions favour the propagation of sound from the range to the measurement point. These conditions are when there are still conditions or a slight breeze from the range towards the measurement point.

If measurements are made under other conditions, the measurements should not be interpreted as the worst-case scenario and may need to be repeated.

Background noise

The background sound level is measured as the level exceeded for 90 per cent of the time interval in question, using the 'A' frequency-weighting and the 'F' (Fast) time-weighting (i.e. L_{A90}).

The L_{A90} is determined by sampling the background sound level over a specified time and determining the level

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which is exceeded for 90 per cent of the time. The background sound level is therefore a measure of the lower sound levels observed. It does not represent the peak noise level of a car passing or a bird chirping, for example.

Ideally, the measurement should be made over the entire day or evening period (or that part of the period for which the shooting range is used) so that an average hourly L_{A90} background can be determined for each period.

At a minimum, the measurement of background noise should be made over a period of at least 15 minutes.

The L_{A90} may be measured using an integrating sound level meter or environmental noise logger.

To ensure a representative noise measurement, the background sound level should be measured at such a time that the measured level is representative of the background level in calm to low-wind conditions with no rain.

Definitions

In this guideline the following definitions apply:

A-weighted sound level: The sound pressure level measured using the A-weighting network which approximates the human ear response to sound.

Background sound level: the sound level measured in the absence of gunshot noise or other intruding noise. (See the measurement section).

Days of shooting per week: in any week the number of days of shooting (except that "<1" means shooting occurring at a maximum of one day per month). For example, if shooting occurs two times per week, but only on six weeks of the year, then the recommended level is based on two days per week of shooting even though the average days of shooting is less than once per week. The exception is "<1" days per week which means no more than one day of shooting per month. Where shooting occurs during both the daytime period and the evening period on a single day it shall be regarded as two days of shooting per week.

Daytime: 9am - 6pm Monday to Saturday;
12noon - 6pm Sunday.

Evening: 6pm - 10pm every day of the week.

Operating range: any shooting range which is not a planned range or long established range (see definition of long established range below).

Gunshot noise level: the logarithmic average of the 'A'-weighted sound levels of a series of gunshots measured using the 'I' time-weighting. (See the measurement section).

Long established range: any range that was operating in its current form and level of activity prior to February 1991, and was not assessed by EPA or given direct advice by EPA concerning noise emissions prior to February 1991.

Planned range: any range not currently in operation.

Shooting range: any rifle, pistol or shotgun range, whether used for sport/recreation or for firearms training or practice.

Applying the recommended noise levels

A major extension of an operating range or long established range should also be treated as a planned range. This would include a physical extension to the range use or a significant increase in shooting frequency. For example, an existing pistol club that wished to establish a clay-target (shotgun) range would need to ensure that the new range and existing activities meets the noise levels for a planned range.

A long established rifle range wishing to significantly increase their frequency of operation (for example, from once per month to once per week) would need to reduce noise levels to those of a planned range. This may be a significant undertaking requiring earthworks for noise barriers, enclosures, or reorientation of shooting directions.

Example approach to the application process for a planned range

This example illustrates relevant considerations in using this guideline for a planned range. Each application involves unique circumstances that may not be covered by this example.

Example

An applicant wishes to establish a new rifle range in the outskirts of a major Victorian city. The area chosen is sparsely populated and is currently designated as a farming zone.

Before submitting the application

Before a final site is chosen, the applicant informally approaches council planners to determine:

- whether potential sites are prohibited or constrained
- the most appropriate site in the area, considering current and possible future zoning and development
- relevant council concerns (and potentially those of the community)
- the council's planning scheme provisions and application process.

The applicant also talks with local residents near sites under consideration to determine likely impacts and issues residents might have with the proposal. The residents may be concerned about tranquillity when the community population is boosted by weekend occupants. The residents may want certainty around the timetabling of shooting days and times, or the availability of noise-free sensitive days, rather than just strict decibel level adherence.

Awareness of residents' needs helps produce acceptable local amenity outcomes and helps to prevent misunderstandings and problems, which may complicate the planning process.

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The applicant then chooses the best suited site and hires professional consultants to advise on the planning process and assess potential noise impacts on nearby residents. With the help of the consultants the applicant prepares an application that addresses any concerns raised by the council and local residents.

The consultant arranges noise testing to help determine the appropriate level of operation for the rifle range based on the recommended levels.

In this case the acoustic consultant calculates that at the worst-affected residence, a gunshot noise level of 53 dB(A) would be reached, even after careful choice of range orientation and shooting enclosures to reduce noise impact.

The applicant's proposal is to operate the rifle range two days per week; every Friday and Saturday. At this level of operation the day recommended level of 50 dB(A) (from table 1) would be exceeded.

After discussing the issue further with local residents, the applicant decides to proceed with the application but makes some changes to the proposed operating frequency, providing some noise-free Saturdays, and offering to provide a yearly schedule to residents to give some certainty about operating days and times.

Application evaluation

In evaluating the application, the planner considers the degree of compliance with the recommended levels. While the predicted noise levels in the application do not technically comply with the recommended levels, this would not determine the outcome of the application without further consideration.

The planner considers the guidelines as part of the assessment of whether acceptable amenity outcomes can be achieved. The planner also considers:

- social impacts
- economic benefits
- whether further noise control works are possible
- the frequency and predictability of disturbance
- the nature of the area in terms of likely amenity expectations.

Consultation

The council consults the residents and objectors and involves the applicant in this process. All parties are encouraged to put forward alternative solutions. These may be more or less prescriptive than the recommended levels but are focussed on achieving acceptable amenity and operational outcomes for all parties.

During consultation, areas of disagreement arise and the proposed solutions or outcomes vary. Some parties want more frequent operating days in some weeks, with reduced days in others. Other parties agree to some exceedance of the recommended levels in lieu of some noise-free days/weekends. The residents make it clear that they prefer no shooting on any Saturday.

Alternative arrangements are considered in an effort to gain a compromise. In this example, the parties agree that

an extra weekday of shooting could be allowed in lieu of the weekend.

Council's decision

After consultation, the council must decide whether a planning permit should be issued or not. The council may decide to grant a permit having come to a solution that is more flexible than imposing the recommended levels and maximises economic development, while adequately addressing community concerns.

Alternatively, if the council considers that the amenity loss to the community is too significant then they may decide to refuse the application.

In the event that no objections to the application are received, the council must still determine whether an acceptable outcome can be achieved.

More information

For more information visit EPA's website

www.epa.vic.gov.au

or phone EPA on 1300 EPA VIC (1300 372 842).