

EPA Information Bulletin

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Explanatory notes

State environment protection policy (control of noise from commerce, industry and trade) No. N-1

1. Purpose of state environment protection policies

State environment protection policies (SEPPs) set out policies of the Government to control and reduce environmental pollution. They protect the environment from pollution caused by waste discharges and noise.

This Policy sets out the Government's objectives for controlling noise from industrial and commercial activities in the Metropolitan Region (the Melbourne metropolitan area).

2. Aims

State Environment Protection Policy N-1 aims to protect people from the effects of noise in noise sensitive areas where people sleep, or carry out other normal domestic activities. Noise sensitive areas include residential buildings, hospital wards, hotels and motels.

The Policy is also a planning tool, and new and proposed industries are required by the Policy to be designed so that the Policy noise limits are not exceeded.

3. Background

SEPP N-1 first came into operation on 4 May 1981. After a number of years, it became apparent that the Policy's assessment procedures could be improved and simplified. Subsequently they were revised and a draft released for public comment in December 1987. This policy incorporates several changes as a result of the public comments and replaces the SEPP declared in 1981.

4. Major change to the 1981 SEPP N-1

The major change to the Policy has been the introduction of a new assessment procedure. The original Policy specified an intricate assessment procedure for all premises. This method was appropriate for large industries but was excessively time consuming for small premises. This made the resolution of simple problems unnecessarily long.

The revised Policy divides industries into major and minor premises. Major premises are those premises contained in Schedule 3 of the Environment Protection (Scheduled Premises and Exemptions) Regulations. All other premises are classified as minor premises.

Major premises are large, potentially noisy industries. These are assessed using a similar procedure as contained in the original Policy.

Minor premises are smaller industries and shops and are assessed using a simplified procedure.

Measurement and assessment procedures including adjustments made for the character of the noise have been simplified. A number of requirements have been deleted from the Policy and are now included in EPA report 'A guide to the measurement and analysis of noise'. These requirements are standard procedures used by acousticians. The terminology and wording used in the Policy has been simplified.

5. How the Policy works

The Policy is divided into a number of Parts and Schedules. The following is a brief explanation of the contents of the Policy:

5.1 Boundaries of area affected (Part I)

The Policy only applies to the Melbourne metropolitan area. The boundaries are shown in Figure 1.

5.2 Beneficial uses protected (Part II)

The Policy aims to protect normal domestic and recreational activities. Sleep at night is included as an important beneficial use to be protected.

5.3 Premises of application (Part III)

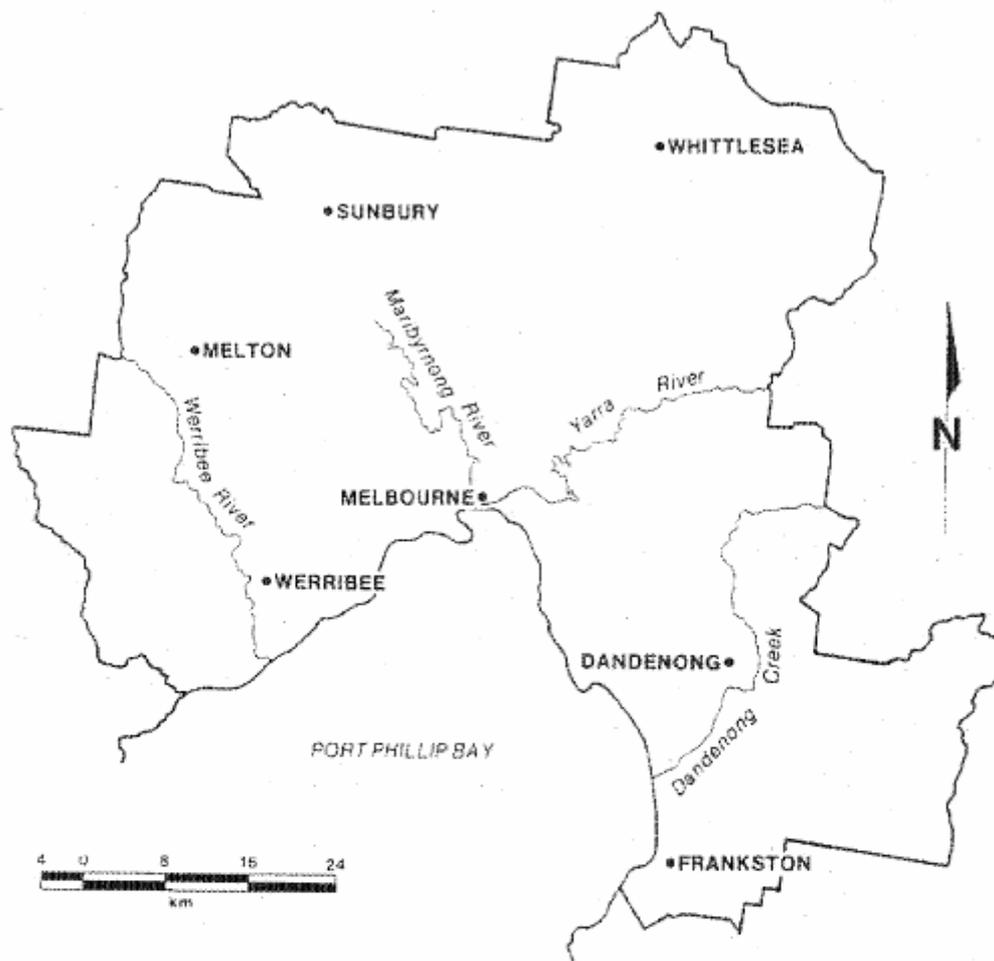
To protect beneficial uses described in Part II, objectives are set for commercial, industrial and trade premises.

Certain types of noise are not covered by the Policy. They are listed under 'Premises of application' and include music, firearms and construction noise. Other more suitable methods are available to assess and control these types of noise. Further information is available from the EPA.

5.4 Environmental quality objectives and indicators (Part IV)

Environmental quality objectives specify the standards that commercial, industrial or trade premises should meet to ensure beneficial uses are protected. In the Policy the objectives are termed 'noise limits' and specify the maximum levels of noise that may be emitted from commercial, industrial and trade premises.

Environmental quality indicators are physical properties that define and measure the environmental quality. In the Policy the indicator is the effective noise level, which is the level of noise from commercial, industrial or trade premises received at a measurement point.



AREA OF APPLICATION

FIGURE 1.

5.5 Attainment program (Part V)

This part sets out the main objectives of the Policy, such as:

- (a) the measured noise level of the industry (effective noise level) must not exceed the maximum allowed noise level (noise limit) in a noise sensitive area;
- (b) the effective noise level for a derived point (an alternative measurement point) must not exceed the maximum noise level allowed at a derived point (derived noise limit); and,
- (c) where it is proposed to build new premises, the noise limit must not be exceeded upon completion.

Prompt action is required to reduce noise levels where they exceed the maximum allowable noise limit. Sometimes it is not practical for a company to immediately reduce noise levels below the limits set in the Policy. The noise abatement equipment may take time to install, or may not be readily available. In these circumstances EPA can set a compliance date to take such difficulties into account (Clause 16).

5.6 Definitions (Part VI)

The definitions specify the meanings of various words and terms used throughout the Policy. They are not meant to provide a glossary of technical terms but to give specific meanings to words and terms used.

5.7 Measurement of noise - Schedule A

Schedule A sets out the procedure to be followed to measure noise from major and minor premises.

The noise level of the industry (L_{Aeq}) is measured at a point within the noise sensitive area or, under special circumstances, at a derived point. The level is an energy average of the noise received at the measurement point. The level is then adjusted for additional factors that increase the annoyance of the noise, such as a tonal hum or hammering. After all adjustments have been made to the L_{Aeq} the final level is called the effective noise level, and is compared with the noise limit to determine compliance.

(a) Measurement

The noise of both major and minor premises is measured at a measurement point, normally in a noise sensitive area where a maximum level will be obtained. The method of measurement will vary, but usually a tape recording will be taken for major premises and a short direct reading (hand-held) measurement will be made for minor premises. A tape recording must be made for major premises if the noise is tonal or impulsive.

(b) Tonal adjustment

A noise is more annoying when it has a tonal component (a perceptible hum or whine). An adjustment is made to allow for the additional annoyance caused by the tone.

Different procedures are used for major and minor premises.

The adjustment for major premises is determined from one-third octave analyses of the noise. This procedure requires a tape recording to be analysed using suitable analysis equipment. Adjustments of between one and seven decibels apply for most tonal noises.

The adjustment for minor premises is determined without tape recording and analysis equipment. The adjustment is based on a subjective assessment of the noise when the level is being measured. Two different adjustments of two and five decibels are applied for a slightly tonal or a prominently tonal noise respectively.

(c) Impulsive adjustment

A noise is more annoying when it has an impulsive component (rapid repetitive banging). An adjustment is made to allow for the additional annoyance caused by the impulses.

Different procedures are used for major and minor premises.

For major premises the 'adjustment' is added during analysis of a tape recording of the impulsive noise by sampling with the time-weighting set to I on the sound level meter. This typically raises the level by between one and six decibels.

The impulse adjustment for minor premises is determined in a similar way to the procedure for tones. It is based on a subjective assessment and an adjustment for noises that are slightly (plus two decibels) or prominently impulsive (plus five decibels) is made.

(d) Duration adjustment

A noise that is not audible for significant periods of time is less annoying than a noise that is continuous. When the noise being measured is not audible in the noise sensitive area for a full 30 minute period a negative adjustment is made. The same adjustment is made for both major and minor premises.

(e) Intermittency adjustment

A noise that changes in level rapidly is more annoying than a steady one. For example, a refrigeration plant cycling on and off, or a machine operating periodically in a factory, can cause serious disturbance, particularly to sleep. An intermittency adjustment is made which ranges from three to five decibels. The same adjustment is made for both major and minor premises.

(f) Indoor adjustment

Whenever possible, the noise measurement is taken out of doors as the Policy only sets limits for outside areas. The level of noise is reduced when it passes from the outside to the inside of a building. Therefore an outside noise limit cannot be used inside a building. The Policy allows a microphone, attached to a boom, to be placed outside a window so an outdoor measurement can be taken when a noise sensitive area is located in a multi-storey building.

Cases do arise when an indoor measurement cannot be avoided. This mainly occurs when windows are sealed or noise is transmitted into the room through a wall, floor or ceiling and there is no rear or front yard. For such cases, appropriate adjustments are specified

in the Policy which are added to the indoor measured level to give an equivalent outdoor L_{Aeq} .

(g) Reflection adjustment

Hard surfaces such, as a wall or fence, reflect noise back towards the microphone and will combine with noise coming directly from the source, resulting in an artificially raised L_{Aeq} . If the microphone is placed within one to two metres of an acoustically reflecting surface, an adjustment of -2 dB is made to the L_{Aeq} for minor and major premises.

5.8 Determination of noise limits - Schedule B

The maximum noise level allowed in a noise sensitive area is called the noise limit. Schedule B sets out the procedure to be used to determine the noise limit.

The acceptability of a noise is related to the area where it is occurring and to the background level. For example, a person living in an industrial area will expect it to be more noisy than a residential area. Generally the background level of a noise sensitive area located beside an industrial area or a busy main road will be higher than a residential area. High background levels may mask industrial noises, reducing the annoyance of such noises. The method specified in the Policy for determining the noise limit takes into account the type of area in which the noise sensitive area is located and the background level of the area by requiring the measurement of zoning and background levels. These terms are explained below:

(a) Zoning level

The first step in determining the noise limit is to calculate the zoning level which is characteristic of expected noise levels in differing industrial, commercial and residential areas during the day, evening and night periods. This is determined from the proportion of industrial and commercial type land use around the noise sensitive area. An example of how the zoning level is determined is given in sub-section 5.8 (d) (i) of these notes.

(b) Neutral background

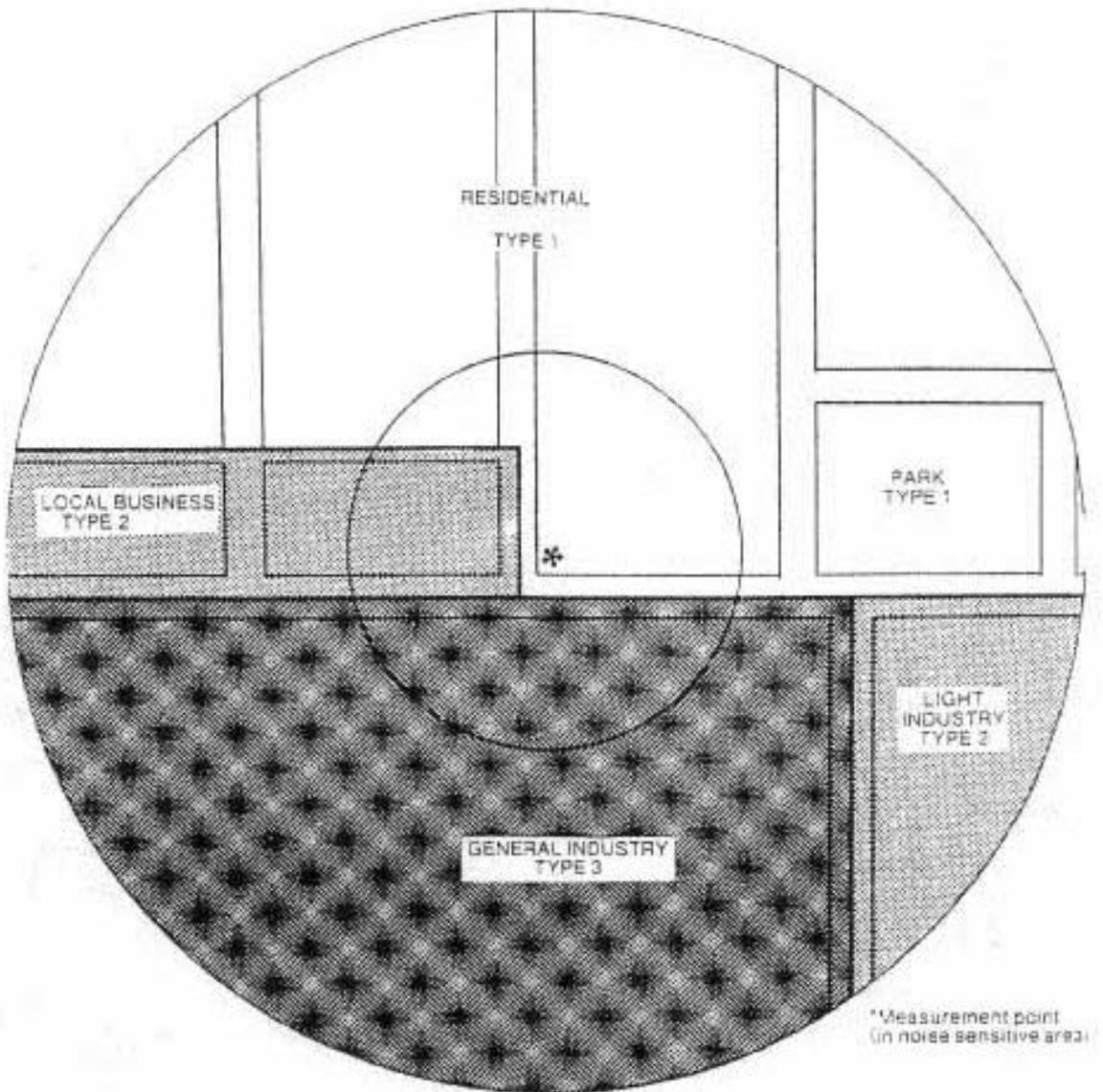
After the zoning level has been determined, the background level is measured to judge if it is neutral. The background is neutral if it is not significantly higher or lower than the zoning level. If the background is neutral, the noise limit is the zoning level. An example of how the noise limit is determined for neutral backgrounds is given in sub-section 5.8 (d) (i) of these notes.

(c) Background level not neutral

If the background level is not neutral (i.e. it is high or low) then the noise limit is based on the background level.

Where low background levels exist, the noise limit must not be less than minimum levels specified in schedule B3.3 of the Policy.

Examples of the procedures to be followed for high and low backgrounds are given in sub-section 5.8 (d) (ii) and (iii).



AREAS: OUTER CIRCLE - TYPE 1 - 726 units TYPE 2 - 237 units TYPE 3 - 584 units
INNER CIRCLE - TYPE 1 - 58 units TYPE 2 - 38 units TYPE 3 - 75 units
ALL ROADS MINOR - TRAFFIC NEGLIGIBLE

FIGURE 2

(d) Examples

(i) Example 1: Procedure for determining the zoning level.

Figure 2 shows a map of an area containing land zoned as residential, local business, light industry and general industry according to the local planning scheme. The area of the map is contained within a circle of 400 metres diameter, while a smaller circle of 140 metres diameter is also shown. Both circles are centred on the measurement point which is within a residential allotment (a noise sensitive area). The different areas zoned on the map according to the planning scheme are categorised as type 1, type 2 or type 3 according to Table 1 of the Policy. The total area for each type is determined for both the 140 metre and 400 metre circles using a planimeter. Other methods of area measurement may be used or the fraction of each circle occupied by type 2 and 3 zones and reservations may be used. The influencing factor is not highly sensitive to errors in measurement.

The influencing factor is calculated as follows:-

$$\begin{aligned} \text{IF} &= \frac{1}{2} \left(\frac{(\text{Area Type 3}) + \frac{1}{2} (\text{Area Type 2})}{\text{Total area of Circle}} \right) && \text{of 140 metre diameter circle} \\ &+ \frac{1}{2} \left(\frac{(\text{Area Type 3}) + \frac{1}{2} (\text{Area Type 2})}{\text{Total area of Circle}} \right) && \text{of 400 metre diameter circle} \\ &= \frac{1}{2} \left(\frac{75 + \frac{1}{2} \times 38}{201} \right) + \frac{1}{2} \left(\frac{584 + \frac{1}{2} \times 237}{1,547} \right) \\ &= 0.46 \end{aligned}$$

The influencing factor is used to determine the zoning level from Figure 3 of the Policy. The zoning levels for an influencing factor of 0.46 are as follows:

Day period	(0700-1800 hours)	58 dB(A)
Evening period	(1800-2200 hours)	52 dB(A)
Night period	(2200-0700 hours)	47 dB(A)

In this example the background levels for the area were measured according to Schedule C2 of the Policy and compared with the zoning levels. The following results were obtained:

	Zoning levels	Background levels
Day period	58 dB(A)	49 dB(A)
Evening period	52 dB(A)	47 dB(A)
Night period	47 dB(A)	41 dB(A)

The Policy specifies that the background level is neutral when it is at least six dB, and no more than 12 dB, below the zoning level for the day period. For other periods it is neutral when at least three dB, and no more than nine dB, below the zoning level. In this example the background level is neutral and the noise limit is the zoning level.

(ii) Example 2: High background level procedure

In the previous example the noise limit was calculated for a measurement point in a noise sensitive area where the background level was neutral. If the background level for the noise sensitive area shown in Figure 2 is not neutral then the noise limit is determined from section B3 of the Policy. This section is used when the background level plus six exceeds the zoning level for the day period, or the background level plus three exceeds the zoning level for the evening or night periods. In these cases the noise limit is the background level plus six dB(A) for the day period and the background level plus three dB(A) for the evening and night periods.

In this example the background level was measured according to Schedule C2 of the Policy and found not to be neutral. The background level was then measured according to Schedule C3 and found to be high.

The table below shows background levels and zoning levels for the measurement point shown in Figure 2.

	Zoning Levels	Background levels
Day period	58 dB(A)	60 dB(A)
Evening period	52 dB(A)	55 dB(A)
Night period	47 dB(A)	46 dB(A)

According to the Policy the background levels in this example are high. Therefore, the noise limits for the measurement point are based on the background level plus adjustments for the day, evening and night periods. The table below shows the background levels, adjustments and noise limits:

	Background level	Adjustment	Noise limit
Day period	60 dB(A)	+ 6 dB	66 dB(A)
Evening period	55 dB(A)	+ 3 dB	58 dB(A)
Night period	46 dB(A)	+ 3 dB	49 dB(A)

(iii) Example 3: Low background level procedure

The Policy states that the background is low when the zoning level is 13 dB or more above the background level for the day period and 10 dB or more for the evening and night periods.

In this example the background level was found not to be neutral. The following results were obtained when the background levels were measured according to Schedule C3 and the zoning levels calculated:

	Zoning level	Background level
Day period	58 dB(A)	44 dB(A)
Evening period	52 dB(A)	43 dB(A)
Night period	47 dB(A)	30 dB(A)

According to the Policy the background level for the day and night periods are low. The noise limits are calculated according to Schedule B3.2 of the Policy as follows:

Day period

The following equation is used to calculate the noise limit for the day period:

$$\begin{aligned}\text{Noise limit} &= 1/2(\text{zoning level} + \text{background level}) \\ &\quad + 4.5 \text{ dB(A)} \\ &= 1/2(58 + 44) + 4.5 \text{ dB(A)} \\ &= 55.5 \text{ dB(A)}\end{aligned}$$

Evening period

The background level for the evening period is not low. The noise limit for this period is therefore the zoning level.

$$\text{Noise limit} = 52 \text{ dB(A)}$$

Night period

The noise limit for the night period is calculated as follows:

$$\begin{aligned}\text{Noise limit} &= 1/2(\text{zoning level} + \text{background level}) \\ &\quad + 3 \text{ dB(A)} \\ &= 1/2(47 + 30) + 3 \text{ dB(A)} \\ &= 41.5 \text{ dB(A)}\end{aligned}$$

5.9 Derived point and derived noise limits - Schedules A and D

It is not always possible to measure noise at a point inside a noise sensitive area. For example, noise received within a noise sensitive area may come from two or more industries. It may not be possible to measure individually the amount of noise received from each of the industries. Atmospheric effects, such as wind and inversion layers, can cause large variations to the received noise level if the noise sensitive area is distant from the noise source. In such cases it is better to use an alternative site (a derived point) closer to the industry.

Schedule A of the Policy allows a derived point to be used when it is difficult to measure noise within the noise sensitive area. A maximum noise level (derived noise limit) is determined for the derived point which will, when complied with, ensure that the noise limit within the noise sensitive area is not exceeded. Schedule D sets out the procedure to be used to determine the derived noise limit at a derived point.

The level of noise received at a site distant from a source can be predicted using standard procedures. These methods take into account factors that can affect the received noise level such as distance, weather and barriers (hills and buildings). The derived noise limit is determined from the noise limit using a suitable prediction method.

5.10 Typical noise limits

Below are examples of typical noise limits for various types of land uses.

Description of Area	Typical Noise Limit dB(A)		
	Day* 0700-1800 hours	Evening 1800- 2200 hours	Night 2200-0700 hours
Mainly residential area	50-54	44-48	39-43
Area with some commerce or industry	54-59	48-52	43-47
Commercial district or bordering an industrial area	59-63	52-57	47-52
Predominantly industrial area	63-68	57-61	52-56

* On Sundays and public holidays between 0700 and 1800 hours the evening noise limit applies.

5.11 Glossary of acoustic terms

A complete glossary of acoustic terms has been published by the Standards Association of Australia as Australian Standard 1963 - 1974 and should be referred to for precise definitions. The following is a glossary of some acoustic terms which appear in the Policy giving simple explanations that reflect the way the terms are used in that document.

Term	Explanation
(A)-weighting	A response provided by an electronic circuit which modifies sound in such a way that the resulting level is similar to that perceived by the human ear
Decibel (dB)	A measurement of sound. A logarithmic scale unit used in the comparison of sound pressures. Zero decibels is the limit of hearing.
Equivalent Continuous Sound Level (L_{Aeq})	A measurement unit which takes into account all variations in noise level. (For a steady sound with small fluctuations, its value is close to the average sound pressure level.)
Hertz (Hz)	A measure of the frequency of sound. It measures the number of pressure peaks per second passing a point when a pure tone is present.
L_{A90} Level	An (A)-weighted sound measurement unit which is the level exceeded for 90 per cent of the time. It is a measure of the lower levels of the varying sound level and in this Policy is used to measure background noise.

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