



Environmental Protection Authority

# Guidance for the Assessment of Environmental Factors

(in accordance with the  
Environmental Protection  
Act 1986)

## **Environmental Noise**

Draft

No. 8

May 2007

Western Australia

## FOREWORD

The Environmental Protection Authority (EPA) is an independent statutory authority and is the key provider of independent environmental advice to Government. The EPA's objectives are to protect the environment and to prevent, control and abate pollution. The EPA aims to achieve this through the development of environmental protection Guidance Statements, to be used as reference material in the environmental impact assessment (EIA) of proposals.

Guidance Statements are written to assist proponents, consultants and the public generally to gain additional information about the EPA's thinking in relation to aspects of the EIA process. Guidance Statements provide the basis for EPA's evaluation of and advice on development proposals subject to EIA. The Guidance Statements are intended to assist proponents to achieve an environmentally acceptable proposal. Consistent with the notions of continuous environmental improvement and adaptive environmental management, the EPA expects proponents to take all reasonable and practicable measures to protect the environment and to view the requirements of this guidance as representing the minimum necessary to achieve an appropriate level of environmental protection.

This draft guidance deals with the assessment of environmental noise emissions, where those emissions come under the *Environmental Protection (Noise) Regulations 1997*, or other relevant acceptable standards. This guidance may also be used in assessing a proposed residential development which may be impacted by noise emissions from an existing industrial area. Guidance on road and rail transportation noise and aircraft noise is being developed separately.

This guidance material falls into two main parts:

- EPA policy covering a range of types of proposals that may emit noise; and
- EPA guidance on the assessment of noise and presentation of information to the EPA.

This guidance statement was first released for "stakeholder review" in 1998 and has since been widely used and accepted, without a final version having been produced. This version contains the results of extensive testing of the original guidance and experience of numerous EPA assessments involving noise issues since the 1997 noise regulations came into force.

I am hopeful that this Guidance will assist not only those engaged in the EPA's processes, but also stakeholders involved in local government planning and development processes, where noise is often a significant issue. I am pleased to release this document and encourage all stakeholders dealing with assessment of environmental noise issues to become familiar with it and to make comment on it as appropriate.



**Walter Cox**  
CHAIRMAN  
ENVIRONMENTAL PROTECTION AUTHORITY

May 2007

# **ENVIRONMENTAL PROTECTION AUTHORITY GUIDANCE FOR THE ASSESSMENT OF ENVIRONMENTAL FACTORS**

## **DRAFT GUIDANCE No. 8: GUIDANCE FOR ENVIRONMENTAL NOISE**

### **Public and stakeholder comment**

This document is released for public and stakeholder comment for an 8-week period, and your comments are welcome.

**The comment period closes on 2 July 2007.**

### **Further information**

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## Guidance No. 8

### Environmental Noise

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**Keywords:** Noise, guidance, regulations, noise prediction, noise assessment, noise modelling

#### 1 PURPOSE

The purpose of this statement is to provide guidance to proponents submitting proposals for environmental impact assessment:

- (a) to protect the environment as defined by the *Environmental Protection Act 1986* (the Act) with focus on noise emissions from premises;
- (b) to ensure that the noise emissions from the premises on which the proposal is based comply with the *Environmental Protection (Noise) Regulations 1997* (the regulations);
- (c) to provide a degree of certainty within the EIA process;
- (d) to address the factor of noise emissions from all types of proposals that result in noise emissions; and
- (e) to present to proponents who have proposals subject to environmental impact assessment (EIA), to consultants who act on their behalf, to local governments assessing planning and development proposals that result in noise emissions, and to the general public, the Environmental Protection Authority (EPA) position on noise emissions from premises to ensure adverse impacts are prevented.

#### 2 INTRODUCTION

##### 2.1 General

This document has been prepared to assist proponents (for both new projects and expansions to existing projects), their environmental consultants, acoustical consultants, local and State government officers and the public in the preparation and evaluation of noise impact assessments for the purposes of Part IV of the *Environmental Protection Act 1986*. This Guidance is also intended to assist not only those engaged in the EPA's processes, but also stakeholders involved in local government planning and development processes, where noise is often a significant issue.

The guidance material falls into two main parts:

- **EPA policy** covering a range of types of proposals that may emit noise; and
- **EPA guidance on the assessment** of noise and presentation of information to the EPA.

The noise assessment is dealt with in two ways:

- **a simple “screening” procedure** for deciding whether or not the noise emissions from a proposal are likely to require detailed analysis; and
- **detailed guidance** on the methodology to be followed for the derivation and presentation of technical information for the assessment of noise impacts.

The aim of the guidance material is to enhance the environmental approvals process whilst ensuring that an appropriate standard of technical and public information relating to noise impacts is presented in assessment reports.

This guidance statement does not address road and rail transportation noise.

## 2.2 Noise and its Effects

Section 3 of the *Environmental Protection Act 1986* defines “noise” as including “*vibration of any frequency, whether transmitted through air or any other physical medium*”. Thus, in considering whether a proposal may cause a noise impact, one may need to look at noise at frequencies below the audible frequency range (“infrasound”) or even above the audible frequency range (“ultrasound”) as well as in the audible frequency range, although the latter is by far the most common problem. An example of infrasound is the airblast overpressure wave associated with blasting operations, often perceived as shaking of the dwelling and rattling of the windows.

Similarly, vibration can also cause discomfort for building occupants, whether it is in the form of an impulsive shock or continuous vibration.

Audible noise is, however, the most common problem in most situations. Noise may cause disturbance to rest or recreational activities, especially for the elderly or sick. Noise which occurs at night is more likely to disturb a community than noise which occurs during the day only. Noise may interfere with educational activities, with communication or with work (although this guidance does not address occupational noise management). Noise may contain annoying characteristics that may increase its impact, such as tonality (“humming”, “whining”), modulation (regular changes in level or pitch, eg a siren), or impulsiveness (“hammering”).

People react to noise through a stress response, which the person may ignore or tolerate, but which may lead to feelings of anger or defeat, especially if the noise is perceived to be out of the hearer’s control. Individuals cope with noise in different ways: some choosing to complain about it, others adapting their lifestyle to accommodate the noise. The EPA’s position on noise complaints is that, while the issues raised by complainants may well be relevant to a noise assessment, the numbers of noise complaints should not be accepted as an indicator of community reaction to noise.

The EPA notes that there is a growing body of research linking long term environmental noise exposure to community health impacts. Compliance with the noise regulations and with other relevant standards is therefore seen as important, not only in maintaining and improving amenity, but in preserving the long term health of the community.

## **2.3 The Environmental Protection Act 1986**

Part IV of the Act sets out requirements for the referral of proposals to the Environmental Protection Authority (EPA) and for their assessment and implementation. Where a proposal is to be formally assessed under the Act, Section 40 (2) of the Act states that “*The Authority may, for the purposes of assessing a proposal... require the proponent to undertake an environmental review and to report thereon to the Authority...*”

The four possible forms which the environmental review may take are the Assessment on Referral Information (ARI), Environmental Protection Statement (EPS), Public Environmental Review (PER) and Environmental Review and Management Plan (ERMP). Information on possible noise impacts is normally presented in the environmental review report in summary form, with more detailed technical information in a supplementary report. The supplementary report has normally been prepared by a recognised acoustical consultant retained by a proponent.

Even in cases where the proposal has not been formally assessed under Part IV of the Act, it is quite common for a report on noise emissions to be prepared for the purpose of satisfying the Department of Environment and Conservation (DEC) that the noise emissions can be managed to achieve compliance with the noise legislation.

## **2.4 Noise Regulations**

The *Environmental Protection (Noise) Regulations 1997* were gazetted on 31 October 1997. A series of minor amendments were introduced in 2000, in relation to exemption for emergency vehicles and noise emissions from bellringing.

The requirements specified in regulations 7 and 11 are prescribed standards for noise emissions from premises under sections 51, 62 (4) (c), 65, 74 (3) (a) and clause 22 of Schedule 4 of the Act.

Regulation 7 requires that noise emitted from any premises must comply with assigned noise levels when received at any other premises and be free of the intrusive characteristics of tonality, modulation and impulsiveness. Further, the noise emissions must not “significantly contribute” to an exceedance of the assigned levels.

The assigned levels are specified under regulation 8, according to the type of premises receiving the noise. For noise-sensitive premises, the assigned levels recognise the time of day and the presence of commercial and industrial land use zonings and major roads within a 450 metre radius of the receiver. The regulations also specify requirements relating to tonality, modulation and impulsiveness, and to emissions that may “significantly contribute” to an exceedance. Regulation 11 specifies noise limits for airblast due to blasting.

The regulations make special provision for farming vehicles on rural premises (regulation 12), construction work on construction sites (regulation 13), specified equipment used on residential premises (regulation 14) and bellringing and calls to worship (regulation 15). Provided certain conditions are met, regulations 7 and 11 do not apply to noise emitted under these special regulations. There is also a category of noise emissions called “exempt noise” resulting from community activities, to which regulations 7 and 11 do not apply and for which no conditions are specified, but for which the regulations specify certain noise control procedures (regulation 16).

Regulation 17 provides for a person who believes that his or her proposal cannot reasonably or practicably comply with the assigned levels to apply to the Minister for the Environment for approval to allow the noise emission to exceed or vary from the assigned levels. The Minister makes a decision to grant or refuse the application on advice from the Environmental Protection Authority.

Regulation 18 provides for the Chief Executive Officer to grant an approval for a “non-complying event” (normally an outdoor concert), which would lose its character or usefulness if required to meet the assigned levels. Regulation 7 does not apply to the event provided the conditions of the approval are met.

This guidance statement focuses on proposals which need to demonstrate compliance with assigned levels specified by regulation 7 and the airblast limits in regulation 11. It is also applicable to persons applying under regulation 17 for approval to exceed or vary from the assigned levels as part of the assessment of a proposal under Part IV of the Act.

Further information on the regulations is contained in the booklet “*Environmental Protection (Noise) Regulations 1997 - Summary of the Regulations*”, which is available from the Department of Environment and Conservation’s website: [www.dec.wa.gov.au](http://www.dec.wa.gov.au), under noise/publications.

### 3 GUIDANCE

#### 3.1 The Environmental Objective

The EPA's environmental objective is that -

- a) all potentially significant noise impacts are identified and addressed in the environmental review information submitted by the proponent in a consistent manner which is acceptable to the EPA;
- b) the proposal can be managed to ensure that compliance with the *Environmental Protection (Noise) Regulations 1997* and/or with relevant acceptable standards is substantially achieved; and
- c) the proposal will be designed and managed in accordance with the "continuous improvement" and "as low as reasonably practicable" principles as outlined in the Act.

#### 3.2 EPA Policy

##### 3.2.1 Proposals required to meet assigned levels

*General –*

Where the noise emissions are covered by the assigned levels under the regulations, the EPA policy is that proponents must demonstrate that the proposal can be managed to achieve compliance with the relevant assigned levels.

Provided the EPA is satisfied with the acoustic analysis, then -

- compliance may be deemed to have been demonstrated when a proposal is shown not to have a significant noise component by using the Screening Procedure in Section 4 of this document; and
- compliance will be deemed to have been demonstrated when a proposal is shown to comply with the regulations when the Detailed Assessment in Section 5 of this document is followed.

*Typical "worst case" assessment –*

It should be recognised that the detailed procedure defines a typical "worst case" for the assumptions to be made in acoustic modelling, particularly in relation to meteorological conditions which can significantly affect sound propagation. This "worst case" may allow noise levels to exceed the regulations for a period of up to two per cent of the "worst month", that is, for up to seven hours at night and up to seven hours during the day in the month which has the weather conditions most suited to enhanced sound propagation. These conditions include low to moderate winds blowing from the noise source towards the receiver, possibly combined with temperature inversion conditions at night.

The choice of the “worst case” conditions has been made to provide proponents with a degree of certainty in the design of their project, such that noise controls can be specified to achieve a known noise level under defined conditions. At the same time, the public are provided with a very high degree of protection from noise, partly as a result of the strict noise limits in the regulations, but also because the “worst case” conditions are defined so as to occur only rarely. When these conditions do occur, the level of the noise emission would be unlikely to exceed the permitted level by more than a small amount.

This guidance statement position is not intended to in any way pre-empt the enforcement procedures of the DEC.

*Cumulative noise assessment –*

In situations where there are multiple noise emitters, the EPA policy is that cumulative noise emissions must be addressed as part of the assessment of a proposal involving one or more of the emitters, with the objective of the cumulative noise emissions ultimately achieving full compliance with the assigned levels.

Where the assigned levels are already exceeded at a premises receiving noise because of noise sources other than the proposal under consideration, the EPA policy is that the noise emissions from the proposal must meet the requirement of regulation 7(2), that is, the level of the noise emission must not exceed a value that is 5dB below the assigned level at the point of reception.

In this case the EPA would expect that compliance be demonstrated with the “5dB below” requirement in situations where the existing noise causing the exceedance is from other industrial or commercial activities; but not where the noise causing the exceedance is from natural sources such as wind in trees, fauna and the ocean, or from general ambient sources such as road traffic.

When assessing noise from a proposed industry that is part of a large existing industrial estate, e.g. Kwinana Industrial Area, the EPA policy is that the proposal should, as far as practicable, be designed to meet a noise target that is below the value that is 5dB below the assigned level at the point of reception. This target should be set by the relevant Industrial Council at a level consistent with –

- the size, nature and location of the proposal relative to other industries in the industrial area;
- avoiding any detectable increase in the overall noise emission levels from the industrial area; and
- the achievement of overall noise emissions from the industrial area that are in full compliance with the assigned levels at some time in the future.

When assessing a planning proposal for a proposed industrial estate, the EPA expects that the proponent will demonstrate that cumulative noise emissions from notional industries within the proposed estate should meet the assigned levels. The EPA expects the source sound power levels will be set at reasonable and realistic levels for the type of industry envisaged, and that the proposal will provide for realistic buffers, in order that the industries will not be unreasonably constrained, nor the buffers compromised. As a rule of thumb, the EPA envisages that the proponent will provide for a buffer for a

large industrial estate that is of the order of 3km wide.

*Where the proposal causes an increase in the assigned levels –*

Where noise is received within 15m of a dwelling (or the like) on noise-sensitive premises, the noise regulations require that the assigned levels be determined by inclusion of the “influencing factor”. This accounts for the presence of Industrial/Utility or Commercial land or major roads within 450m of the receiving premises, and involves a calculation procedure that uses the land use map for the area and traffic flow data. The assigned levels are determined by adding the influencing factor to the base noise levels given in Table 1 of the regulations.

In some cases the proposal itself may cause a significant increase in the influencing factor (and hence the assigned levels) at the receiving residences. This may occur where the introduction of a proposed industry on land adjacent to a residential area changes the land use to “Industrial/Utility”, thereby increasing the proportion of the land within 450m of the receiver that is classed as “Industrial/Utility” land, and thereby increasing the assigned level. An example would be a mineral sands mining proposal that will cause land adjacent to a nearby residence to become “Industrial”.

In these cases the proposal may cause a significant noise impact even though compliance with the new (elevated) assigned level is demonstrated. The EPA policy in such cases is that the increase in influencing factor should be identified and noted as representing part of the impact of the proposal. The noise management measures for the proposal should be aimed at ensuring noise emissions are below the new, elevated assigned level as far as is practicable, so as to minimise the overall noise impact.

*Non-compliance with assigned levels –*

In the assessment of any proposal that involves a non-compliance with the assigned levels, the EPA will be mindful of the impacts of the noise emissions on the community – especially any impacts that may be harmful to human health – and will expect these impacts to be clearly identified and addressed as part of the assessment. Proponents should be aware that the EPA may come a view that a severe residual noise impact is not acceptable.

Where a proponent proposes an upgrade to an existing facility that does not comply with the assigned levels, the proponent must, as part of their EPA assessment –

- provide and commit to a Noise Improvement Plan, detailing measures that will be taken, and timelines for completion, to ensure that the existing noise emissions will be brought into compliance; and
- provide a detailed assessment demonstrating that the proposed new plant to be installed will, by itself, emit noise below the assigned levels, such that the overall plant noise emission will eventually comply.

Where the proponent believes that the existing or upgraded plant – or their proposal for a new facility – cannot reasonably and practicably comply with the assigned levels, then the proponent must apply to the Minister for the Environment under noise regulation 17. This application must be made at the time of commencement of the EPA assessment. The EPA policy is that it will conduct its assessment of the noise regulation 17 application and provide its advice in parallel with the Part IV assessment. It should be noted that, if a proponent demonstrates that compliance is achievable during a Part

IV assessment, only to discover later that compliance is not achieved, the EPA would be unlikely to support a later application under regulation 17.

*Planning proposals for new noise-sensitive developments –*

The EPA policy is that it will in general not formally assess planning proposals for new noise-sensitive developments adjacent to existing industrial or commercial areas for noise reasons alone. This is because the proposal itself is not seen as generating an environmental impact. The EPA view is that the decision to approve such a proposal should be made through the statutory planning process, and the EPA will provide separate advice to assist that process.

When advising on planning proposals for new noise-sensitive developments adjacent to existing industrial or commercial areas, the EPA policy is that buffers should be established, such that the industry is reasonably and practicably capable of complying with the assigned levels at the new receiving premises. The buffer size should be predicated on the existing industry reducing its noise footprint as far as is reasonably practicable by implementing relevant noise reduction measures.

As a general rule, the EPA policy is that the noise emitter does not have the right to use another person's premises as their noise buffer, and therefore should ideally be in ownership of the required buffer. However, the EPA recognises that buffers are sometimes created through planning mechanisms, and would in these cases seek to ensure that the buffer is robust.

It should be noted that, where land around an industrial area is rezoned from Industrial or Commercial purposes to a noise-sensitive purpose, the effect is to reduce the assigned levels that the remaining industry must meet. In such cases, noise regulation 10 provides for the remaining industries to cause the previous zoning of surrounding land to be retained for the purpose of calculating assigned levels, thus helping to retain the previous higher assigned levels. To have effect, this regulation requires that the EPA acknowledge the change of zoning. The EPA supports this process, and will advise stakeholders if the resultant assigned levels are likely to be unacceptable for the new receivers.

It is recognised that, in some cases, noise-sensitive developments are approved in areas where noise emissions from the existing industries cannot reasonably and practicably comply with the assigned levels. In these cases, the EPA's position is that, as far as is practicable, the development should be designed such that both indoor and outdoor noise levels are in compliance with the assigned levels. This would require the application of both noise insulation for the dwellings and "quiet house" design principles to protect outdoor areas.

### **3.2.2 Proposals required to meet other acceptable standards**

*General –*

In relation to proposals where the assigned noise levels under the noise regulations do not represent the appropriate standard, the EPA may nominate other acceptable standards to which the proponent must be able to comply. In these cases, the EPA may nominate a relevant Australian (or International) Standard or develop an "aspirational goal" of its own. These standards may be made into requirements on the proponent through ministerial Conditions under section 45 of the Act.

*Construction noise –*

Under regulation 13, construction noise on a construction site is not required to meet the assigned levels provided certain conditions are met. The EPA's policy is that construction noise be managed so as to comply with the assigned levels where practicable; and where this is not achieved, regulation 13 be used as the basis of the Part IV assessment.

The EPA's interpretation of the definition of "construction noise" – as used for the purposes of recent Part IV assessments – are as follows:

- erection of a noise barrier, or construction of an earth bund for the purposes of noise reduction, will be regarded as construction noise;
- in mining operations, removal of topsoil to a maximum depth of 5 metres, and its storage, will be regarded as construction work, except if the topsoil is to be disposed of as a product;
- removal and/or dumping of mining overburden will not be considered as construction work.

*Wind farms –*

The detailed assessment procedures in Section 5 of this guidance require noise assessment only under "worst case" conditions with wind speeds up to 4km/h. This is because higher winds in local foliage tend to mask industrial noise emissions. However, wind farms generate noise that generally increases with wind speed.

In order to provide a consistent basis for assessment of this source, the EPA policy is that the assessment should be carried out in accordance with the procedure developed by the South Australian EPA (SA Environment Protection Authority, 2003). Noise predictions should be conducted with regard to the detailed requirements in Section 5 of this Guidance.

*Sporting and entertainment facilities –*

Proposals for facilities to be used for such activities as motor sports, shooting and concerts are referred to the EPA for assessment from time to time. The EPA notes that amendments to the noise regulations are proposed to regulate noise emissions from these types of facilities, through the approval of Noise Management Plans (NMPs). Until such time as the regulation amendments are in place, the EPA policy will be to require the proponent to develop a NMP as part of the assessment, in consultation with their local government and the community. If formally assessing the proposal, the EPA would consider placing s45 conditions on the proposal, requiring implementation of the NMP, and possibly limiting some of the activities proposed under NMP.

*Ground vibration –*

The definition of "noise" under the Act includes vibration. Ground vibration may be caused by such activities as blasting and construction work. When received in buildings, vibration may be perceived as shaking of the building; or as "regenerated noise", that is, vibration that has travelled through the building structure and is re-radiated into the room as noise.

With regard to vibration, the EPA policy is that building damage resulting from ground vibration is not an environmental impact, but should be treated as a civil matter. Nevertheless, proponents are advised to conduct building integrity surveys of nearby

properties prior to commencement of blasting or construction when vibration damage is considered possible. The EPA policy is that vibration emissions should be managed to meet human annoyance criteria, and notes that human annoyance tends to occur at lower levels than does building damage.

In the case of blasting, the EPA notes that the DEC licensing process no longer addresses blast vibration criteria. Accordingly, the EPA policy in relation to assessments of proposals that involve blasting is that the criteria previously adopted in licence conditions should apply:

Blasting during daytime (0700 – 1800 hours) –

- a) no vibration level resulting from blasting on any premises or public place, when received at any other premises, may exceed a peak particle velocity of 10mm/s; and
- b) the vibration levels for 9 in any 10 consecutive blasts (regardless of the interval between blasts) on any premises or public place, when received at any other premises, must not exceed 5mm/s.

Blasting out of hours (1800 – 0700 hours) –

- a) no vibration level resulting from blasting on any premises or public place, when received at any other premises, may exceed a peak particle velocity of 1.0mm/s; and
- b) the vibration levels for 9 in any 10 consecutive blasts (regardless of the interval between blasts) on any premises or public place, when received at any other premises, must not exceed 0.5mm/s.

With regard to vibration from construction work and like activities, the EPA policy is that vibration emissions should be managed to comply with the relevant criteria in Annex A of AS 2670.2-1990 (Standards Australia, 1990).

*Indoor noise levels –*

Where a proposal involves the achievement of acceptable standards in terms of indoor noise levels, the EPA policy is that indoor noise levels should meet the “satisfactory” criteria in Table 1 of AS 2107-2000 (Standards Australia, 2000), with the exception that noise levels in residential sleeping areas should not exceed an  $L_{Aeq}$  level of 35dB(A).

*Natural quiet –*

The EPA recognises that some areas need to be protected from noise to a standard commensurate with their status as important places of quiet. In these cases, the EPA may set an aspirational goal for noise emissions from a proposal located nearby.

The noise level goal would be set with regard to the following:

- the environmental value of the area;
- the existing ambient noise levels;
- the nature of human and/or animal activities in the area; and
- the risk that noise emissions associated with the proposal would be intrusive on the above.

The EPA may require specific studies into the above factors as part of the assessment.

*Impacts on animals –*

The EPA notes that there are limited studies available regarding the impacts of noise on terrestrial and marine animals; and that many of these studies show that animal populations appear to habituate to or avoid man-made noise. However, the EPA acknowledges that there may be less-obvious impacts that research has not revealed to date.

The EPA policy is that a precautionary approach should be adopted, using a two-step process: As a first step, the proponent should attempt to identify animal populations which may be at risk of noise impacts because of their need to hear signals clearly over ambient noise; their inability to escape from the noise; or their endangered status. Where the first step indicates an at-risk population, the proponent should as a second step conduct a risk assessment to estimate likelihood of possible adverse impacts.

Where a proposal involves operations in State-controlled waters that are adjacent to Commonwealth waters, the EPA will have regard to any noise assessment procedures conducted by the Commonwealth.

### **3.2.3 General requirements**

*Special considerations for noise-sensitive premises –*

It is the EPA's policy that, where a proposal will result in noise being received at noise-sensitive premises, the assessment (whether a screening assessment or detailed assessment) should address dwellings that receive noise in the following manner:

- if a residence is unoccupied but habitable, compliance with assigned levels and acceptable standards should be assessed at that dwelling;
- notwithstanding the above, if the occupiers of the dwelling are absent for a period by arrangement with the proponent, compliance need not be assessed at that dwelling;
- if a residence is owned by the proponent but sub-let to a tenant, then compliance should be assessed at that dwelling;
- if a residence is owned by the proponent but sub-let to an employee of the proponent, then compliance need not be assessed at that dwelling, but the aspirational goal for construction camps should apply (see below).

With regard to construction camps, it is the EPA's view that, if a construction camp is located on the same premises as the proposal, then compliance with the assigned levels is not required. In this case, the EPA policy is that an aspirational goal based on indoor levels inside the accommodation sleeping areas of  $L_{A 10}$  40dB(A) and  $L_{A \max}$  50dB(A) should be considered.

If a proponent's construction camp is located on separate premises that are impacted by noise from construction of the proposal, then the EPA policy would be to apply regulation 13 (see above). In this case, the aspirational goals outlined above may be made requirements through s45 Conditions.

With regard to camps for operational staff, the EPA policy is that these should be located and designed so as to achieve compliance with the assigned levels and acceptable standards.

*Community consultation –*

In relation to noise and vibration, the EPA expects that the community will be consulted thoroughly prior to and throughout the Part IV assessment process. The EPA expects that technical data will be presented clearly and accurately and that community concerns will be documented and addressed in detail.

Where a concurrent regulation 17 assessment is taking place, the proponent should ensure that the community understands what measures the proponent has already taken to reduce noise as far as practicable; the noise level limits are being applied for; and that they have an input into ameliorative measures that may be proposed to address residual noise impacts.

## 4 SCREENING PROCEDURE

### 4.1 General

When considering the likely environmental issues associated with a proposal, it is helpful to have a screening procedure to assist in deciding whether an issue such as noise is significant enough to require detailed assessment. The following procedure is designed to allow a quick preliminary noise analysis to be done for this purpose and takes the form of a worksheet (see Appendix 1 for a proforma).

The first question on the worksheet covers the general issue of community concern, viz:

- (1) *Is the proposal particularly sensitive within the community?* The community sensitivity could relate to the type of proposal (eg. a speedway) or to the history of the proposed site (eg. a proposed mine expansion adjacent to a town). If the answer is “yes”, then the proposal may warrant detailed assessment even if the remainder of the procedure indicates the noise issue may be insignificant.

The remainder of the screening procedure is based on answering the following questions about noise emissions:

- (2) *Are there any noise-sensitive premises within the buffer distances indicated in Guidance Statement No. 3 for this type of proposal?*
- (3) *Is operational noise likely to be above the relevant screening criterion?*
- (4) *Is construction noise likely to be above the relevant screening criterion?*
- (5) *Is the proposal likely to involve blasting?*

If the screening procedure indicates a “yes” answer in relation to any of the above issues, then the guidance material in Section 5 of this document for detailed assessment should be followed.

It should be recognised that this screening procedure is not a precise tool but merely provides a quick indication as to whether or not noise is likely to be a significant issue. There are a number of relevant factors which this procedure does not take into account, thus it includes a “safety factor”. For this reason, there will be some situations where a detailed assessment will show the noise impact to be of low significance. The procedure should also pick up proposals where a marginal noise impact is identified and can be brought within compliance by noise control measures.

### 4.2 Operational Noise

To determine whether noise emissions from the operations associated with the proposal are likely to require detailed assessment under Point (3) above, the screening procedure is as follows:

- (1) Identify a point on the proposed site where the noise sources could be said to be concentrated.
- (2) Estimate a total A-weighted sound power level for all noise sources on the site.

Notes:

- a) There may need to be a sound power level for sources operating during daytime which is separate to that for sources operating at night.
  - b) The assistance of an acoustical consultant may be needed to estimate the total sound power level.
  - c) The estimate should not include the effects of any specific noise control measures.
- (3) Identify the locations of all nearby residences not owned by the proponent and estimate their distances from the source point on the site.
  - (4) Plot the sound power level(s) for day and/or night operations on Graph 1 of Appendix 1 for the nearest residence or residences.
  - (5) If the plotted points are below the lines for daytime and night-time operations, respectively, then operational noise is not likely to be significant. If on or above the lines, operational noise needs to be assessed in detail (see Section 5.2 below).

### 4.3 Construction Noise

The screening procedure for construction noise involves two questions:

- (i) *If construction is likely to take place within the hours 7.00 am to 7.00 pm Monday to Saturday, are particularly noisy activities such as impact piling envisaged?* If the answer is “yes”, then detailed assessment procedures should be followed with a view to developing the elements of a noise management plan under regulation 13 (2) (c) for inclusion in the environmental review.
- (ii) *Is construction activity likely to take place outside the hours 7.00 am to 7.00 pm Monday to Saturday?* The noise regulations make allowance for construction activities carried out between the above hours, where the machinery used meets certain “normal” noise emission criteria, as specified in Australian Standard 2436-1981 (Standards Australia, 1981). Thus, if the answer to the question is “no”, then detailed assessment would not be required unless there was a particularly noisy activity proposed, as discussed above.

If it is reasonably necessary that on-site construction activities are to take place outside the hours 7.00 am to 7.00 pm, then the activities should be subjected to the screening procedure in 4.2 above. In this case, the sound power levels for various items of construction plant can be taken from Table D2 of AS 2436-1981 and summed according to Table B2 of that Standard.

Where the screening procedure in 4.2 shows that the noise emission is on or above the lines on Graph 1 of Appendix 1, then a detailed assessment should be conducted (see section 5.2 below), with a view to developing the elements of a noise management plan under regulation 13 (3) (c) for inclusion in the

environmental review.

If construction activity is likely to involve heavy vehicle movements through residential streets, the preliminary draft EPA Guidance Statement for EIA No. 14 - Road and Rail Transportation Noise (EPA, 1998) should be applied.

#### **4.4 Blasting**

The screening procedure for both operational and construction noise in relation to blasting involves only one question:

- (i) *Is construction activity likely to involve blasting?* If “yes”, then detailed assessment should be undertaken as per Section 5.2.7 below.

## **5 DETAILED ASSESSMENT**

### **5.1 General**

The following guidelines should be used where a detailed assessment is indicated through the screening procedure described in Section 4 above.

The detailed assessment should be carried out by a person competent in environmental noise assessment, eg. a member of the Australian Acoustical Society or the Australian Association of Acoustical Consultants.

### **5.2 Operational Noise**

#### **5.2.1 Ambient Noise**

*Rationale -*

Where a detailed assessment of operational noise is needed, measurements of existing ambient noise levels should be carried out.

The purpose of these measurements is threefold:

- to identify the impact of noise level increases over low ambient noise levels;
- to identify the likelihood of noise exceedances resulting from the combination of the ambient noise with that of the proposal; and
- to enable assessment of the likely audibility of any tonal, modulation or impulsive components in the noise from the proposal.

*Measurement Procedure -*

Ambient noise measurements should be carried out without any activity related to the proposal in progress. If the proposal is for an expansion of an existing operation, then the noise of the normal existing operations should be included in the ambient. In this case the operating periods for the existing operations need to be logged and reported along with the ambient noise data.

Ambient noise level measurements should be conducted at location(s) representative of the noise environment at or near the nearest affected residence(s) or other premises. One representative measurement location may suffice, or more than one may be needed if the noise environment varies significantly across the area of interest. The measurements should be conducted outdoors with the microphone at least 3 metres from any reflecting surface other than the ground, and at a height of at least 1.2 metres above the ground.

Noise levels should be logged continuously at one or more locations over a reasonably representative period, including a weekend where relevant, using sample periods of 15 minutes' duration. Continuously logged data may be supplemented with data taken over shorter overall measurement periods at other locations in the area of interest.

Measurements should be conducted in accordance with Clause 5 of Australian Standard 1055.1-1990 (Standards Australia, 1990).

The measurement period should contain days which are representative of the typical quietest ambient noise in the area of interest. It is desirable that relevant meteorological factors such as wind speed and direction and temperature lapse rate be logged during the measurement period, or if this is not practicable, “spot” measurements should be taken and supplemented with meteorological data from other sources such as the Bureau of Meteorology or the DEC.

#### *Data Presentation -*

The noise level data should be presented graphically as  $L_{A1}$ ,  $L_{A10}$  and  $L_{A90}$  noise levels with no more than one week of data to one A4 sized page. The meteorological data and the operating times of any existing operations on the subject site should also be presented on the graph.

In addition to the above, background noise levels should be determined for each measurement location, by extracting from the full data the “ $L_{90}$ ” of the  $L_{A90}$  noise levels. These data should be presented for the following periods:

- 0700-1900 hours Monday to Saturday;
- 1900-2200 hours Monday to Saturday and 0900-2200 hours on Sundays and public holidays; and
- 2200-0700 hours Monday to Saturday and 0900-2200 hours on Sundays and public holidays.

In cases where the audibility of tonal, modulation or impulsive components may be marginal, an octave band spectrum, or preferably a one-third octave band spectrum of the typical background noise, should be presented for the relevant time period.

## **5.2.2 Assigned noise levels**

Where noise is received within 15m of a dwelling (or the like) on noise-sensitive premises, the noise regulations require that the assigned levels be adjusted by inclusion of the “influencing factor”. This accounts for the presence of Industrial/Utility or Commercial land or major roads within 450m of the receiving premises, and involves a calculation procedure that uses the land use map for the area and traffic flow data. The assigned levels are determined by adding the influencing factor to the base noise levels given in Table 1 of the regulations.

It is important that the influencing factor calculations are shown in detail in the report. The report should show the land areas taken to be Industrial/Utility and Commercial and any assumptions made about land for which the land use zoning may be unclear. Traffic flow data should be provided for major or secondary roads.

### 5.2.3 Noise Level Predictions

#### *General -*

For most projects where a detailed assessment of noise is needed, noise level predictions are carried out using a computer noise model. It is not a requirement that predictions be done with a computer model and “hand” calculations are acceptable provided the principles outlined below for computer modelling are followed .

Experience with computer noise models is that the Environmental Noise Model (ENM) and “SoundPlan” have been the most common models used in Western Australia. While these and other packages would be acceptable, any model used should preferably have algorithms complying with the sound propagation methods laid down in ISO 9613 (Standards Australia, 1994).

These models generally involve:

- the inputting of topographical data over the area of interest, and including any pits, noise barriers or significant buildings;
- modelling of noise sources in terms of the sound power level of an equivalent point source and locating each source or group of sources on the map at a given height above ground level;
- nominating types of ground cover and meteorological conditions; and
- computation of received sound levels over the map area and presentation of the data as a series of noise contours or single-point sound levels.

These aspects are discussed further below.

#### *Topographical Data -*

The area of interest should be selected to cover all noise-sensitive or other receiving locations where noise levels may exceed assigned levels.

In selecting the spacing between grid points or radial lines, care should be taken to ensure sufficient detail is maintained.

Details of any pits, bund walls or noise barriers included in the topographical model need to be carefully recorded and documented in the report.

In selecting ground cover parameters, consideration needs to be given to modelling for summer conditions when the ground is typically very hard with minimal cover.

#### *Source Sound Levels -*

The major noise sources associated with the proposed operations should be identified and point sound power levels determined for each source in an octave or one-third octave band format. It is crucial that the data have a sound basis in terms of both the original measurements and subsequent calculations to determine point source sound power levels.

Data sources and assumptions made should be documented in the report, in particular:

- sources of original measurements;

- factors used for scaling from original data to equipment of different size, operating speed, etc;
- relevant operating conditions for the equipment modelled;
- the construction of any buildings in which equipment is proposed to be housed;
- specific noise control measures incorporated in any noise source or building;
- whether the sound level of a source represents its  $L_{max}$ ,  $L_1$  or  $L_{10}$  or other level;
- sources included in each noise source grouping; and
- location and height of each noise source group on the map.

*Meteorological Conditions -*

The meteorological conditions selected for the model can have a significant effect on the result. The EPA policy is that compliance with the assigned noise levels needs to be demonstrated for 98 per cent of the time, during the “day”, and “night” periods indicated below, for the month of the year in which the “worst case” weather conditions prevail.

The primary method by which this may be demonstrated under this policy is to use the following “default meteorological conditions” for noise modelling:

Parameter	Day (0700 - 1900)	Night (1900 - 0700)
Wind speed	4 m/s	3 m/s
Temperature inversion lapse rate		
ENM	Nil	2 °C/100m
SoundPlan - Pasquill Stability	“E”	“F”
Temperature	20 °C	15 °C
Relative humidity	50 %	50 %

These weather conditions approximate the typical “worst case” weather conditions for enhancement of sound propagation<sup>1</sup>. The temperature inversion conditions are given separately for ENM and SoundPlan, as the two models accept different inputs<sup>2</sup>.

The wind directions selected for the model should cover the worst-case situation as well as the prevailing wind direction, even if the worst-case wind direction may only occur for a small portion of the time. It is acceptable to produce up to four models, each with the wind blowing from a different quarter, or a composite model with four directions included on the one map.

<sup>1</sup> These default conditions are based on analysis of DEC meteorological data collected at the Cullacabardee Weather Station (DEP, 1998). The Department of Industry Resources initiated a study (SKM, 2002) to evaluate meteorological data from Collie and Kwinana as a means of assessing whether the Cullacabardee data could apply in other areas of the State. Essentially, the study found slightly higher temperature inversions at Kwinana and Collie than at Cullacabardee for 3m/s winds, but did not consider that the differences were sufficient to justify a change in the default conditions in Guidance 8. The study found clear directional differences at Kwinana, with near-neutral temperature lapse rates occurring with onshore winds, as may be expected. SKM also proposed that a further study be carried out for a tropical area and an arid inland area to further test the guidance, but no such study has been conducted to date.

<sup>2</sup> The default conditions for SoundPlan were based on a detailed analysis of the algorithms underlying ENM and SoundPlan, to determine the closest equivalent input parameters (SVT, 2007).

Note that at wind speeds greater than those shown above the wind itself is likely to elevate background noise levels from local vegetation, thus dominating the noise emission.

This Guidance allows proponents to propose an alternative worst case for noise modelling based on site-specific meteorological data, where the default conditions are considered to be significantly unrepresentative of the subject site. Such a submission would need to be based on detailed analysis of comprehensive meteorological data recorded at or near the subject site over a period of at least one year. The EPA will consider such a submissions for assessment purposes on a case-by-case basis.

The Guidance also allows proponents to use data from a detailed sound propagation study conducted at the subject site to be incorporated into the noise model, through a calibration adjustment to the predictive modelling results. Such submissions would need to be based on a methodology that was acceptable to the EPA, and the resulting noise model – including site-specific adjustments – would need to be clearly and accountably documented. It is envisaged that this approach may be particularly relevant for proposed industrial estates.

## 5.2.4 Adjustments to Predicted Noise Levels

### *General -*

The computer models predict the overall A-weighted sound levels over the area of interest. Before comparing these with the assigned noise levels, there are two factors which need to be considered:

- Do the predicted levels represent  $L_{A \max}$ ,  $L_{A 1}$  or  $L_{A 10}$  levels or another statistical indicator of the time history of the noise?
- Is adjustment required for tonal, modulation or impulsive noise characteristics?

### *Statistical Indicators -*

The assigned noise levels in the regulations are specified in terms of the  $L_{A \max}$ , (maximum level on the Slow meter response),  $L_{A 1}$  and  $L_{A 10}$  percentile level (the levels exceeded for 1 per cent and 10 per cent of a representative assessment period, respectively). The choice of representative assessment period should be justified in the report. Therefore, computer predictions need to specify which of the above parameters have been modelled, to enable comparison with the relevant assigned levels.

In creating  $L_{A \max}$ ,  $L_{A 1}$  and  $L_{A 10}$  models, it is acceptable to use the following methods:

- generate sound power levels for the various sources which are representative of the  $L_{A \max}$ ,  $L_{A 1}$  or the  $L_{A 10}$  noise level at the receiving premises; and/or
- determine the relationship between these parameters at the receiving locations from measurements on similar operations or by estimation, and adjust the predicted noise levels accordingly.

It should be noted that the difference between the maximum level and the  $L_{A 10}$  will normally diminish as one moves away from the region near the sources.

In carrying out these estimations it also should be noted that the sound propagation data used in ISO 9613 (on which some computer models are based) predicts an *average* attenuation. Thus in some situations, the use of maximum source sound power levels may well correspond to an  $L_A 10$  level at the receiving locations under worst case conditions.

It is important that all assumptions or base noise level measurements be well documented in the report.

*Adjustments for noise character -*

Under the regulations, the overall requirement is to eliminate tonality, modulation and impulsiveness as far as practicable. Thus, the first analysis of the received noise under the proposed regulations should be to determine whether these components are likely to be present and whether they can be removed. The process of identifying the source of the noise characteristic and assessing whether it can be removed needs to be documented.

If it is not practicable to remove the noise characteristic, then adjustments must be applied to the measured (predicted) noise level. Adjustments of +5 dB(A) are added for tonality and modulation; the adjustment for impulsive noise character is +10 dB(A), and the total adjustment is not to exceed +15 dB(A). If the emission is music, the adjustment is to be +10 dB(A), or +15 dB(A) if the sound is impulsive.

In the first instance, noise contours or noise levels predicted for individual locations should be presented without adjustments for noise character.

## 5.2.5 Comparison with Noise Criteria

### *General -*

There are two methods by which the comparisons with the relevant noise criteria are generally presented, as follows:

- by individual noise receiver, with the predicted level(s) compared with assigned levels, including any adjustments for noise character; and/or
- by area, using a map of noise contours with areas of noise exceedance shaded.

These methods are discussed further below.

### *Individual noise receiver -*

The procedure is as follows:

- (1) Determine the assigned noise levels ( $L_{A \max}$ ,  $L_{A 1}$  and  $L_{A10}$ ) in accordance with regulation 8 for the following time periods:
  - 0700-1900 hours Monday to Saturday (“Day”);
  - 1900-2200 hours Monday to Saturday and 0900-2200 hours Sunday or Public Holidays (“Evening”); and
  - 2200-0700 hours every day (“Night”).
- (2) Compare the Background Noise Levels (determined for the Day, Evening and Night periods in accordance with Section 5.2.1 above) with the assigned levels to identify whether the predicted levels need to be less than the assigned levels in order not to contribute to an exceedance of the assigned level.
- (3) Determine the predicted  $L_{A \max}$ ,  $L_{A 1}$  and  $L_{A 10}$  levels for the proposal, for each of the three time periods.
- (4) Adjust the predicted levels to account for any tonal, modulation or impulsive characteristic which cannot be practicably removed.
- (5) Compare the adjusted predicted levels with the adjusted assigned levels and tabulate any exceedances.

### *Comparison over an area -*

There may be cases where it would be helpful to present the results as a comparison of predicted levels and assigned levels over an area. The proponent is encouraged to develop graphical presentation approaches in such cases.

A full discussion of the results must be provided in the report.

## 5.2.6 Noise Reduction Measures

### *General -*

In order to demonstrate compliance with statutory noise levels, it is often necessary to incorporate noise reduction measures into the noise model. The assumptions made in so doing are often crucial in the noise management plan for the project and need to be carefully documented. In particular, an assessment report by an acoustical consultant needs to contain sufficient documentation to enable the proponent to present the noise reduction measures in the form of meaningful commitments in the main environmental review report.

The common types of noise reduction measures are as follows:

- procurement specifications for new equipment;
- retrofit treatments for existing equipment or groups of items, eg. enclosures, silencers;
- adjustments to site layouts to increase separation between sources and receivers and to provide shielding;
- provision of noise barriers; and
- management procedures to control the types of equipment or operating conditions at certain times of the day or under certain weather conditions.

While it is not necessary to provide an engineering specification of these measures, they need to be described unambiguously. Some guidelines for the description of such measures are given in more detail below.

### *Procurement specifications -*

In cases where the sound power levels assume some noise reduction measures, it is not sufficient to merely provide a list of equipment and sound power levels.

The consultant's report needs to identify the following:

- the equipment item involved;
- the type of noise test procedure which will be needed - this may include a reference to a published test method or details of the method to be used, including microphone position and so on;
- any specific operating conditions required for the test (given that these may need to be the same as those assumed in the model); and
- the required noise level(s).

### *Retrofit treatments -*

The description of retrofit treatments may include such details as:

- minimum insertion loss performance of a silencer, enclosure or louvre;
- typical wall/roof construction of a building or enclosure; or
- the type and extent of acoustical absorbing material in a sound absorptive treatment.

### *Noise barriers -*

In describing noise barriers assumed in a model, the following details are needed:

- the position of the barrier;
- the height of the barrier relative to a known reference;
- the width or length of the barrier or details of any gaps, bends or returns in the barrier; and
- any details relevant to the final construction of the barrier, eg. construction material, whether the barrier was assumed to be absorptive on one side.

#### *Management procedures -*

The acoustical consultant's report should identify the management areas which need to be involved in achieving and maintaining the modelled noise emissions through the noise management plan. A number of management areas may be affected by the noise management plan, including the following:

- plant design staff need to be aware of overall noise level constraints in the design stage;
- operations staff need to be aware of limitations on plant operating conditions and numbers and locations of plant items, and times of the day or meteorological conditions when restrictions may apply;
- purchasing staff need clear policy guidelines for procurement of new plant to ensure that noise levels do not increase over time; and
- maintenance staff may need to implement a maintenance programme to prevent noise levels increasing over time.

While the acoustical consultant's report and the environmental review report need not provide details of these programmes, the need for such programmes should be clearly identified in both reports.

### **5.2.7 Other Activities Associated with the Operations**

There are activities associated with many operations which, because of their occasional nature, are not normally included in an acoustical model. These may include public address systems, hooters, emergency warning systems and rare operations such as steam venting.

These types of noise sources are capable of resulting in significant noise disturbance and should not be omitted from the noise assessment. An attempt must be made to identify such noise sources within the proposal.

Some of the ways in which they may be dealt with are outlined below:

- where the noise is rare but unavoidable, its noise emission should be predicted and the likely impact discussed in the report;
- where it is believed that devices such as public address systems and hooters may be used, comment should be provided on the likely noise impacts and the need for appropriate design of the system or consideration of alternatives; and
- where audible safety warning devices are used as part of a safe working system, eg. reversing beepers on some mobile equipment, comment should be provided on the likely noise impacts and the potential for use of alternative systems in order that the impact can be minimised.

### **5.2.8 Blasting**

It is recognised that it is difficult to provide a detailed assessment of the likely impacts of blasting in terms of airblast overpressure and ground vibration levels prior to the actual blasting, as some of the factors involved in the predictions are site-specific.

Predictions of ground vibration levels should be carried out for the nearest adjacent premises for a typical blast of the size proposed, using Appendix J7 of AS 2187.2-1993 (Standards Australia, 1993). The results should be compared with the criteria given in this Guidance and where the predicted level exceeds 5 mm/s peak particle velocity, an initial limit on the charge per delay should be identified.

In relation to airblast levels, comment should be made regarding the likelihood of any impacts, based on the size of a typical proposed blast and the distance to nearest residences, and on experience with similar situations.

The environmental review report should include a commitment regarding compliance with regulation 11 in relation to airblast levels, and an appropriate monitoring and control programme for ground vibration and airblast as an appendix.

### **5.2.9 Noise Monitoring**

The acoustical consultant's report should identify the elements of a monitoring programme aimed at verifying the acoustical model by measurements. The overall environmental review report should also address the question of noise monitoring in a more general sense, and should contain an appropriate commitment to a monitoring programme.

## **5.3 Construction Noise**

### **5.3.1 On-site Operations**

Where a detailed assessment of the noise emissions of construction operations is indicated by the screening procedure, the following procedure should be used.

The construction activities would presumably be within the definition of "construction noise" and therefore would not need to comply with the assigned levels, provided they complied with the conditions specified in regulation 13.

Regulation 13 requires that construction work carried out between 0700 hours and 1900 hours on any day which is not a Sunday or public holiday need not comply with the assigned levels provided that -

- (i) the construction work was carried out in accordance with good noise control practice as defined in Section 6 of AS 2436-1981 (Standards Australia, 1981); and
- (ii) the equipment used was the quietest reasonably available.

The report must specify whether the work is to be carried out within these times. Should there be a need to work on a Sunday or public holiday, then in addition to the

above, the proponent would need to -

- (i) carry out the work in accordance with a noise management plan which has been approved by the CEO;
- (ii) notify the affected occupiers nearby at least 24 hours before the work started; and
- (iii) show the out-of-hours work was necessary,

or else meet the assigned noise levels specified under the regulations.

The report therefore needs to achieve the following:

- describe the main stages of construction work, identifying any activities likely to result in high levels of either noise or vibration;
- specify the hours of work for all relevant stages and activities;
- predict noise levels for the major construction activities. The operations should be modelled according to the procedure set out in Sections 5.2.2 to 5.2.4 above. This may not be necessary if it is shown that the total noise emission of construction operations is less than that of the normal operations;
- if the predicted noise levels are likely to exceed the assigned levels in regulations 7 and 8, the report should present a noise management plan in accordance with regulation 13; and
- if the predicted noise levels are not likely to exceed the assigned noise levels, then the results and assumptions need to be documented and consequent management measures identified.

If noise reduction measures are warranted, the comments in Section 5.2.6 above should be considered, together with the information in Appendices E and F of AS2436-1981.

The comments in Section 5.2.7 above also apply to any associated activities.

### **5.3.2 Construction Traffic**

The movement of light vehicles to and from the construction site, which normally peaks at shift changeovers, is generally unlikely to result in a significant noise impact. However, the estimated numbers of light vehicles and the shift changeover times should still be reported in the environmental review report.

The main noise impact usually results from heavy vehicles associated with earthworks, especially when the route is through residential streets or along quiet country roads and particularly if the movements occur outside daytime hours.

In such cases, the report should:

- estimate the likely volumes, routes and times of construction traffic; and
- present an analysis of likely noise impacts due to construction traffic and identify management measures as appropriate.

The analysis should be carried out in accordance with draft EPA Guidance for EIA

No. 14 - Road and Rail Transportation Noise (EPA, 1998).

### **5.3.3 Construction Blasting**

Where construction activities include blasting, the comments in Section 5.2.8 above should be noted.

## **6 APPLICATION**

### **6.1 Area**

This guidance statement applies to noise emitted from premises and public places throughout the State of Western Australia and shall apply to all new proposals.

### **6.2 Duration and review**

The public and stakeholder review will take place over a period of 8 weeks. For information on how to comment, see the beginning of this document.

### **6.3 Noise sources**

This guidance statement applies to noise sources which are covered by the *Environmental Protection (Noise) regulations 1997*, and excludes noise from -

- the propulsion and braking systems of traffic on roads;
- trains and aircraft, except model trains and aircraft; and
- noise from safety warning devices on emergency vehicles.

Road and rail transportation noise increases that are associated with a proposal are covered under Draft EPA Guidance for EIA No. 14 – Road and Rail Transportation Noise (EPA, 1998). General road and rail transportation proposals are assessed using the draft Statement of Planning Policy on Road and Rail Transport Noise (WAPC, 2005)

### **6.4 Proposed residential developments**

This guidance statement may be applied to noise assessments for proposed residential (or other) developments adjacent to noise sources such as industrial areas.

## 7 RESPONSIBILITIES

### 7.1 Environmental Protection Authority Responsibilities

The EPA will apply this guidance statement in deciding whether or not to assess proposals and when assessing such proposals.

The EPA will recommend to the Minister the imposition of requirements following its assessment of proposals for which environmental noise is a relevant factor, based on this Guidance.

### 7.2 Department of Environment and Conservation Responsibilities

The Department of Environment and Conservation will assist the EPA in applying this guidance statement in environmental impact assessment and in conducting its functions under Part V of the *Environmental Protection Act 1986*.

### 7.3 Proponent Responsibilities

Where proponents demonstrate to the EPA that these guidance requirements are accountably and enforceably incorporated into their proposals, the assessment of such proposals is likely to be facilitated.

## 8 DEFINITIONS

The following technical terms are used in this document -

<b>A-weighted</b>	an A-weighted sound level includes the “A” frequency weighting in the measurement of a sound, to approximate the frequency response of the normal human ear.
<b>dB(A)</b>	the level of a sound, measured in decibels, A-weighted.
<b>L<sub>A</sub> max</b>	the maximum A-weighted sound level in dB(A), measured on the “Slow” meter response.
<b>L<sub>A</sub> 1</b>	the A-weighted sound level exceeded for 1% of a specified period.
<b>L<sub>A</sub> 10</b>	the A-weighted sound level exceeded for 10% of a specified period.
<b>Noise-sensitive premises</b>	are defined as in regulation 2 (1) of the <i>Environmental Protection (Noise) Regulations 1997</i> .

## **9 LIMITATIONS CLAUSE**

This guidance statement has been prepared by the Environmental Protection Authority to assist proponents and the public. While it represents the contemporary views of the Environmental Protection Authority, each proposal which comes before the Environmental Protection Authority for environmental impact assessment will be judged on its merits. Proponents who wish to deviate from the requirements of this document should provide robust justification for the proposed departure.

## **10 REFERENCES**

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<b>Index</b>	<b>Draft Guidance</b> Revised Guidance Final Guidance	<b>June 1998</b> <b>May 2007</b>
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**Status** Endorsed by EPA at revised draft guidance stage.

**Citation** This draft guidance cannot be cited at this time but may be used by the EPA for the purposes of environmental impact assessment (EIA) with respect to this factor.

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## Appendix 1

### Sheet 1

### Screening Procedure for Noise - Worksheet

Detailed assessment should be done on any of the questions in **bold type** for which the answer is “Yes”.

#### 1. Community Concern

***Is the proposal particularly sensitive within the community?*** .....

#### 2. Buffer distances

(a) Buffer distance for this type of operation (from Guidance No. 3) .....m

(b) Distance to nearest residence .....m

***Is distance (a) greater than distance (b)?*** .....

#### 3. Operational noise

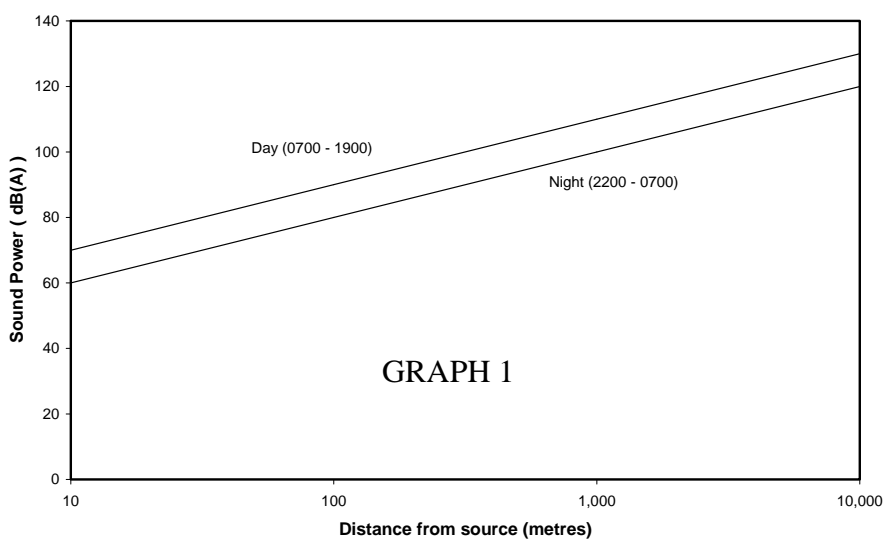
(a) Estimated total sound power for all sources on site

• daytime .....dB(A)

• nighttime .....dB(A)

(b) Distance to nearest residence .....m

(c) Plot the two points (a) against (b) on Graph 1 below –



(d) *Is operational noise above the relevant line in Graph 1?* .....

## Appendix 1

### Sheet 2

#### 4. Construction activities on site

4.1 Where construction activity is likely to take place within the hours  
7.00 am to 7.00 pm Monday to Saturday -

*Are particularly noisy activities such as impact piling  
envisaged?* .....

4.2 Where construction activity is likely to take place outside the hours  
7.00 am to 7.00 pm Monday to Saturday -

(a) Estimate total sound power for all sources on site -

• daytime .....dB(A)

• nighttime .....dB(A)

(b) Distance to nearest residence .....m

(c) Plot (a) against (b) on Graph 1 above.

(d) *Is construction noise above either line in Graph 1?* .....

#### 5. Blasting

(a) *Is the construction/operation likely to involve blasting?* .....

## Appendix 2

### Recommended content for an acoustic consultant's report

Disclaimer: This Appendix is a **guide only** for those who prepare or assess acoustic consultants' reports. It is not meant as a complete list of all issues that should be covered in a consultant's report, as no guide could anticipate all issues that could occur in individual cases. Therefore the EPA takes no responsibility for issues that may have been omitted.

#### **INTRODUCTION**

##### **Project Description**

An adequate description of the project has been provided incorporating all relevant information, for example:

- Background history or relevant previous studies
- Noise/vibration issues addressed and scope of work
- Objectives (optional)

##### **Site Map**

A detailed site map is provided that identifies key information, such as:

- Location of noise emitter
- Noise receiver locations (existing and proposed future residential areas)
- Major noise sources
- Topographical data – natural and constructed, development and surrounding land uses that may affect noise propagation
- Measurement or prediction locations
- North point & scale

#### **NOISE CRITERIA**

- Relevant noise criteria have been referenced and applied to the project – for example:
  - WA Environmental Protection (Noise) Regulations 1997* – assigned noise levels including influencing factor calculations
  - AS 2436:1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites
  - WAPC Statements of Planning Policy for Road, Rail and Aircraft Noise
  - AS/NZS 2107:2000 Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors
  - AS2670.2:1990 Evaluation of Human Exposure to Whole-body Vibration – Continuous and Shock-induced Vibrations in Building (1 – 80Hz)

## **METHODOLOGY**

Acoustic assessment reports are typically based on either **noise measurement** or **noise level prediction**. Where both are possible, measurement (actual) is generally preferred over prediction (estimate).

### **Methodology for Noise Measurement**

**Noise measurement** is used if the emitter is existing; or to define noise levels of proposed sources where similar equipment can be measured elsewhere; or for planning studies.

- Equipment/Instruments used
- Measurement duration
- Measurement locations
- Meter settings (typically A-weighted and Slow time response)
- Calibration details
- Ambient/background measurements (if indicated)
- Weather conditions (especially wind speed and direction)
- Operational conditions of noise source
- Adjustments made for any annoying characteristics, ie. tonality, modulation and impulsiveness

### **Methodology for Noise Level Prediction**

**Noise level prediction** is used if the proposal involves a new or upgraded noise-emitting facility; or to predict noise levels across a proposed development area.

- Type of computer noise modelling software used, i.e., SoundPlan, ENM or other method
- Sound power levels as A-weighted and octave band levels
  - Where they are derived from
  - Any adjustments for size/type of equipment
  - Any noise reduction measures assumed
- Noise source locations and source heights
- Topography settings
  - Are the selected parameters stated, e.g. ground type?
- Meteorological conditions
  - Is 'worst case' scenario modelled?
  - Are the selected parameters stated?
  - Are they appropriate conditions to choose?
- Receiver locations

- Adjustments made for tonality, modulation and impulsiveness

## **ANALYSIS / RESULTS**

The results should be displayed clearly and analysed appropriately to incorporate the following:

### **Results for Noise Measurement**

- Justification of choice of statistical indicators e.g.  $L_{A\ eq}$ ,  $L_{A\ 10}$ ,  $L_{A\ max}$
- Measurement duration
- Distance from noise source
- Correct adjustments are made for any annoying noise characteristics e.g. tonality and modulation, and relevant spectral data is provided to show justification

### **Results for Noise Prediction**

- Justification of choice of statistical indicators e.g.  $L_{A\ 1}$ ,  $L_{A\ 10}$ ,  $L_{A\ max}$
- Individual receiver (point calculation) or multiple receivers (contour maps)
- Weather condition scenarios modelled with assumptions indicated e.g. worst case, calm, wind direction(s)
- Noise source ranking (optional)

## **DISCUSSION / RECOMMENDATIONS / CONCLUSIONS**

- The discussion compares the relevant noise criteria with the measured / predicted results and tests for compliance
- Recommendations are included for reasonable and practicable measures needed to achieve compliance, e.g. noise control measures, plant design process, operational restrictions, further study
- Recommendations are sufficiently detailed to be turned into Conditions or Commitments
- An overall noise management strategy is clearly identified

## **SUMMARY (OPTIONAL)**

**A summary could clearly present the following;**

- Scope of work
- Criteria and compliance statement
- Recommended noise control measures (if required)
- Other recommendations, e.g. further assessment

### ***APPENDICES (AS REQUIRED)***

Documents or data often referred to in the text of the report include:

- Calibration certificates
- Ambient noise data
- Detailed wind & meteorological data
- Sound Power Level (SWL) or frequency data
- Noise contour maps
- Preliminary Noise Management Plan