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GUIDELINE

Draft Guideline on Environmental Noise for Prescribed Premises

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Accessibility
This document is available in alternative formats and languages on request.

Definitions of terms

Term	Definition
Ambient noise	Noise from all sources present at the time of measurement.
AS 1055.1-1997	Australian Standard AS 1055.1 – 1997: Acoustics - Description and measurement of environmental noise.
Assigned level	Noise level not to be exceeded at receiving premises, defined by Part 2, Division 1 of the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations).
Baseline monitoring	Initial measurements and recording of existing conditions that will be compared with future measurements.
CEO	Defined in the *Environmental Protection Act 1986* as the Chief Executive Officer of the Department of Environment Regulation (DER).
dB	Decibel, a unit of measurement of sound level.
dB(A)	A-weighted decibel, a unit of measurement of sound level weighted to reflect the frequency response of the human ear.
EP Act	The *Environmental Protection Act 1986* (EP Act).
Frequency	The frequency of noise is the periodic vibration measured in hertz (Hz). It is the property of sound that determines pitch.
Hertz	(Hz) Hertz is a unit of frequency and is the number of cycles per second associated with a sound wave.
Impulsive noise	Noise which contains almost instantaneous (thus impulse-like) sharp sounds and meets the definition of *Impulsiveness* as defined by Part 2 Division 1 of the Noise Regulations.
Influencing factor	An adjustment applied to the base assigned level in relation to noise received at a highly sensitive area on a noise sensitive premises, means the influencing factor determined under Schedule 3 of the Noise Regulations.
$L_{AS\ 1}$	A sound level, determined as an $L_{A\ Slow}$ value, exceeded for 1% of the time period over which the level is determined.
$L_{AS\ 10}$	A sound level, determined as an $L_{A\ Slow}$ value, exceeded for 10% of the time period over which the level is determined.
$L_{AS\ 90}$	A sound level, determined as an $L_{A\ Slow}$ value, exceeded for 90% of the time period over which the level is determined (commonly referred to as the background noise level if a measurement of the ambient noise is made before the proposal is in operation).

$L_{A\ eq}$	The equivalent continuous sound level that has the same energy as the fluctuating sound under consideration over the time period which the level is determined.
$L_{AS\ max}$	Maximum sound level, determined as a $L_{A\ Slow}$ value.
$L_{A\ Slow}$	Reading in decibels (dB) obtained using the A frequency weighting characteristic and the S time weighting characteristic on the sound level meter as defined by Part 1 of the Noise Regulations.
Modulation	A variation in the intensity or frequency of the emission of noise that is regular, cyclic and audible as defined Part 2 Division 1 of the Noise Regulations.
Noise	Unwanted sound, defined in the EP Act to include vibration of any frequency, whether transmitted through air or any other physical medium.
Noise level	The sound level of noise determined in decibels.
Noise sensitive premises	Premises referred to in Schedule 1 Part C of the Noise Regulations that are not industrial, utility or commercial premises.
Practicable	Defined in the EP Act to mean reasonably practicable having regard to, among other things, local conditions and circumstances (including costs) and to the current state of technical knowledge.
Premises	Defined in the EP Act to mean residential, industrial or other premises of any kind whatsoever and includes land, water and equipment.
Significantly contribute	A level of noise which exceeds a value which is 5 dB below the assigned level at the point of reception if the overall level received is above the assigned level as defined by Part 2 Division 1 of the Noise Regulations.
Sound power level (SWL)	The sound energy constantly transferred per second from the sound source determined in decibels, in this document described as an A-weighted decibel level dB(A).
Tonality	Noise containing a prominent frequency and characterised by a definite pitch as defined by Part 2 Division 1 of the Noise Regulations.

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1. Introduction

The Department of Environment Regulation (DER) undertakes regulatory functions under Part V of the *Environmental Protection Act 1986* (EP Act). In guiding DER in its regulatory function, the *Guidance Statement: Regulatory Principles* has been published outlining good regulatory principles to support effective and efficient environmental regulation. The guidance statement forms the overarching policy for DER.

The *Guidance Statement: Regulatory Assessment Framework* has been developed to provide guidance on DER's decision-making process for applications, amendments and renewals or works approval and licences under Part V of the EP Act. The *Guidance Statement: Environmental Risk Assessment Framework* sets out DER's risk assessment framework for works approvals and licences under Part V of the EP Act. Both guidance statements form the framework around which emission guidelines will be considered and applied by DER.

This *Guideline: Environmental Noise for Prescribed Premises* (Guideline) provides guidance for applicants, licensees, consultants, members of the public and DER staff on the assessment of noise emissions from prescribed premises. Prescribed premises are defined in Schedule 1 of the *Environmental Protection Regulations 1987.* The Guideline must be applied to new applications, amendments to works approvals or licences, or renewals involving noise emissions.

2. Purpose

The purpose of this Guideline is to set out DER's requirements for the prediction and assessment of noise emissions for works approvals and licences under Part V of the EP Act.

This Guideline should be read in conjunction with DER's *Guidance Statement: Environmental Regulatory Assessment Framework*.

This Guideline provides guidance on:

(a) screening for noise risk;
(b) detailed assessment;
(c) sound measuring equipment;
(d) noise control; and
(e) the recommended content for an acoustic assessment report.

3. Context

3.1 What is Noise?

The EP Act defines noise to include "vibration of any frequency, whether transmitted through air or any other physical medium'. It is commonly recognised as an emission of sound but may also include ground or structure-borne vibration.

Factors that influence the impact of noise emissions include:

- received noise levels influenced by the distance and barriers between the emitter and receptor;
- audibility;
- recurrence of noise;
- whether noise is continuous or intermittent;
- whether noise has modulating, tonal or impulsive components;

- whether there are vibrational impacts;
- frequency range of the emission (Hz);
- times of day that it occurs;
- character of the receiving environment, including existing ambient noise; and
- sensitivity of receptors.

4. Emission Assessment Process

When an application for a works approval or licence for prescribed premises is made to DER, an assessment of the key inherent risks attributable to the premises category will be made in accordance with the *Guidance Statement: Regulatory Controls* (see Figure 1).

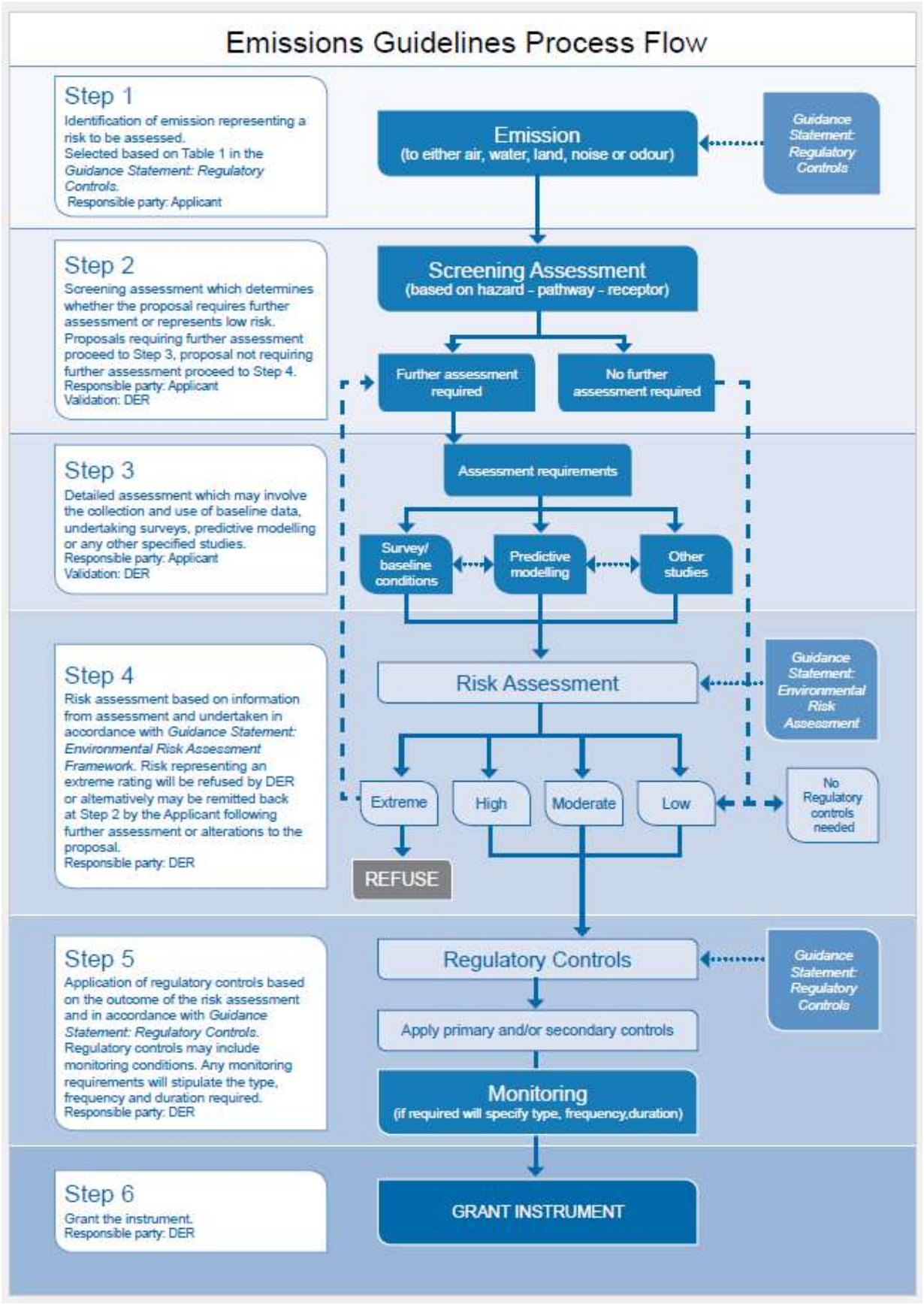

Figure 1: Emission Assessment Process

The Emission Assessment Process outlined in Figure 1 sets out the following steps:

Step 1 Applicant identifies the inherent risk of a noise emission from the category of prescribed premises in accordance with Table 1: Risks for Prescribed Premises contained in the Regulatory Control Matrix in DER's *Guidance Statement: Regulatory Controls*.

Step 2 Applicant undertakes a screening assessment of the inherent risk of a noise emission and submits it to DER with the application using the Environmental Noise Screening Tool (Screening Tool) in Appendix 1 of this Guideline.

DER reviews the applicant's supporting documentation and validates the screening undertaken by the applicant, using the Screening Tool to determine whether or not additional work including modelling is required for the purpose of assessment.

Step 3 **A**. If the screening assessment identifies that no further assessment for noise emission is required, then the noise emission will be considered to be low risk and regulatory controls will not need to be applied (**go to Step 4**).

B. If the screening identifies further detailed assessment is required, the applicant will prepare an acoustic assessment report detailing the results and interpretation of any baseline monitoring, predictive modelling and/or other studies undertaken if required, in accordance with this Guideline. Details of the recommended content of an acoustic assessment report are contained in Appendix 2 of this Guideline.

Step 4 The detailed assessment and other studies will inform DER risk assessment, in accordance with DER's *Guidance Statement: Environmental Risk Assessment Framework*.

If the risk is found to be *extreme,* the application may be refused by DER or remitted back to the applicant for amendment and re-assessment at **Step 2**, or the applicant may wish to apply for an exemption under Regulation 17 of the Noise Regulations if it can be shown that the proposal cannot practicably and reasonably comply with the assigned noise levels. Note that the process for assessing and granting exemptions is set out in the Noise Regulations and is separate to DER's regulatory functions under Part V of the EP Act.

Step 5 If required, regulatory controls will be set by DER in accordance with Table 2: Risks and Controls of DER's *Guidance Statement: Regulatory Controls*. These controls will be commensurate with the risk identified by the risk assessment at **Step 4.**

Step 6 DER will grant the instrument, subject to necessary conditions.

5. Screening

5.1 Requirement for Screening

Where noise is an identified inherent risk for the proposed works, a screening assessment will be required using the Screening Tool contained in this Guideline (Appendix 1).

Inherent risk of a noise emission from the category of prescribed premises is determined in accordance with *Table 1: Risks for Prescribed Premises* contained in the Regulatory Control Matrix in DER's *Guidance Statement: Regulatory Controls*.

The Screening Tool contained in Appendix 1 is a worksheet addressing:

(a) description of prescribed works;
(b) separation distances;
(c) cumulative noise;
(d) impact on commercial, industrial and sensitive receptors; and
(e) predictive modelling.

The Screening Tool is a desktop noise screening analysis which is required to be submitted as part of an application for a works approval, licence, and licence renewal or licence amendment. DER will review the completed screening assessment and accompanying documentation submitted by the applicant.

5.2 Next Steps

The screening assessment will determine whether:

- further assessment is not required; or
- further assessment is required. Further assessment may include ambient monitoring, predictive modelling, and prediction verification noise monitoring or other studies in accordance with this Guideline.

The results and reports of the detailed assessment will inform DER's risk assessment, which will be conducted in accordance with DER's *Guidance Statement: Environmental Risk Assessment Framework.*

5.3 Limitations

The Screening Tool provides a conservative desktop indication as to whether noise is likely to be a significant issue. The Screening Tool is not a precise assessment procedure as there are a number of factors which the tool does not take into account. For this reason, there may be circumstances where following the screening assessment, a detailed assessment may be subsequently undertaken and shows the noise impact to be of low significance.

6. Detailed Assessment

If the outcome of the Screening Tool requires further detailed assessment, the types of assessments required are set out in Table 1 below.

Detailed assessment is generally not required where the activity is of a typical size and scale and is not situated within the separation distance to noise-sensitive premises, in accordance with DER's *Guidance Statement: Separation Distances.*

Typical size and scale will be determined by benchmarking against premises undertaking similar activities.

Table 1: Types of Assessments

Type of assessment	Circumstances when required
Ambient Noise Monitoring (Section 6.1) - monitoring of ambient noise levels to establish baseline data. DER may not require ambient noise monitoring in some circumstances.	• Separation distances are not met and there are sensitive receptors in close proximity to the activity and the assigned levels may be exceeded. • Cumulative impacts from existing noise sources and the proposed activity may lead to an exceedence of assigned levels. i.e., the proposed activity will significantly contribute. • Activity is an expansion or change to existing operations and impacts from the activity may exceed assigned levels or significantly contribute to an exceedence of assigned levels.
Predictive Modelling (Section 6.2) - noise modelling that demonstrates compliance with the assigned noise levels can be achieved. DER may not require ambient noise monitoring in some circumstances.	• Separation distances are not met and there are sensitive receptors in close proximity to the activity, and the assigned levels may be exceeded. • Cumulative impacts from existing noise sources and the proposed activity may lead to an exceedence of assigned levels. • Activity is an expansion or change to existing operations, and impacts from the activity may exceed assigned levels or significantly contribute to an exceedence of assigned levels. • To demonstrate the effectiveness of proposed noise control measures.
Prediction Verification Noise Monitoring (Section 6.5)	• Where predictive modelling has been undertaken, verification monitoring must be undertaken prior to works approval certification and granting of a licence or amendment.
Other studies (Section 6.6)	• May be required on a case-by-case basis.

Detailed noise assessments must be carried out by persons competent in environmental noise assessment and have qualifications and experience that qualifies them for membership of the Australian Acoustical Society or the Association of Australian Acoustical Consultants. DER will require assessments to be submitted with a declaration by consultants in the form set out in Appendix 3.

6.1 Ambient Noise Monitoring

6.1.1 Why is Ambient Noise Monitoring Required?

Ambient monitoring is required in order to:

- establish a baseline to compare the impact of noise level increases over the existing noise levels;
- identify the likelihood of exceedence of noise standards resulting from the combination of the ambient noise with that of the activity; and
- enable the assessment of audibility of noise characteristics.

Ambient noise monitoring must be undertaken in accordance with the following requirements:

(a) Monitoring must be carried out before commencement of construction or operation of the proposed works to establish the baseline conditions.
(b) If the application is for an expansion of an existing operation, then the noise of the normal existing operations must be included in the ambient noise levels. The operating periods for the existing operations must be logged and documented in the acoustic assessment report along with the ambient noise data.
(c) Monitoring must be conducted at location(s) representative of the noise environment, at or near the nearest noise-sensitive premises. Where ambient noise varies significantly across the area of interest, measurements at more than one location may be required.
(d) Measurements must be conducted in accordance with Clause 6 of Australian Standard 1055.1:1997 *Acoustics – Description and measurement of environmental noise*. Note that 'Slow' time weighting should be used for statistical levels.
(e) Noise levels must be logged continuously at one or more locations over a period that takes into account the variability of emissions due to operating schedules and activities over daytime, evenings, nights, Sundays and public holidays and be of at least one week duration.
(f) The measurement period must include days which are representative of the typical quietest and noisiest ambient noise in the area of interest.
(g) Relevant noise parameters must be measured at intervals of not less than 15 minutes or more than one hour and be appropriate for capturing the dynamic variability of the ambient noise.
(h) Relevant meteorological factors such as wind speed and direction.
(i) In cases where the audibility of tonal, modulation or impulsive components may be marginal, a one-third octave band spectrum of the lowest typical background noise must be presented for the relevant time period.

6.1.2 Data Presentation

Baseline noise monitoring data must include the following and be reported in the acoustic assessment report:

(a) The noise level data presented graphically as $L_{AS\ 1}$, $L_{AS\ 10}$, $L_{A\ eq}$ and $L_{AS\ 90}$ noise levels (see Definition section of this Guideline) logged over not less than 15 minutes and not more than one hour, with no more than one week of data to one A4 sized page.
(b) The meteorological data and the operating times of any existing operations on the subject site must be presented in the acoustic assessment report.
(c) Details of location specifying:
    (i) the local government area where the premises are located;
    (ii) an aerial photograph, as well as a map of the premises; and

(iii) Geographic Information System (GIS) coordinates, which must be provided where cadastre are not used as a premises boundary.

6.2 Predictive Modelling

6.2.1 Computer Models

Noise level predictions must be carried out:

- using a computer noise model, such as SoundPLAN employing the CONCAWE algorithm or similar computation; and
- by a person competent in environmental noise assessment and who has qualifications and experience that qualifies them for membership of the *Australian Acoustical Society* or the *Association of Australian Acoustical Consultants*.

Noise modeling will require:

(a) inputting of topographical data over the area of interest, and including any pits, noise barriers or significant buildings;
(b) modelling of noise sources in terms of the sound power level of an equivalent point source, line source or plane source and locating each source or group of sources on the map at a given height above ground level;
(c) nominating types of ground cover;
(d) assigning 'worst-case' meteorological conditions; and
(e) the 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 in more detail below.

6.2.2 Topographical Data

The area of interest must 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, sufficient detail must be maintained. Where the resolution in the ground contours is sufficiently coarse as to affect the model accuracy, a note must be made in the acoustic assessment report.

Details of any pits, bund walls or noise barriers included in the topographical model must be recorded and documented in the acoustic assessment report.

In selecting ground absorption parameters, modelling for summer conditions must be included when the ground is typically very hard with minimal cover.

6.2.3 Source Sound Power Levels

The major noise sources associated with the proposed operations must be identified and point, line or plane sound power levels (SWL) determined for each source in an octave or one-third octave band format. Data derived from measurement must have a sound basis in terms of both the original measurements and subsequent calculations to determine source SWL.

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

- sources of the original data, noting whether the sound power levels are manufacturer-guaranteed levels or realistic measured levels;
- 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 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;
- explanation where directional sources are assumed;
- sources included in each noise source grouping; and
- the location and height of each noise source group on the map.

SWL must be representative of the specific equipment that is to be used. In most cases, manufacturer's SWL data are available and should be used. Where alternative SWL are assumed, it is important that the reasoning for their use is clearly explained. Where compliance is found to be marginal and reliant on the SWL of specific plant and equipment, the applicant must use that specific model or a quieter model and it may be appropriate to condition some applications accordingly.

6.2.4 Meteorological conditions

The meteorological conditions selected for the model can have a significant effect on the result. While the proposed operations are required to be managed such that compliance can be achieved at all times, the selection of suitable meteorological conditions is essential to enable the model to demonstrate this.

The "default meteorological conditions" for noise modelling in Table 1 below can be used to approximate the typical worst-case weather conditions for enhancement of sound propagation.

Table 1: Default Conditions for Noise Modelling

Parameter	'Day' (0700-1900)	'Night' (1900-0700)
Wind speed	4m/s	3m/s
Temperature inversion lapse rate or - Pasquill Stability (CONCAWE)	0 E	2 ^{o}C /100m F
Temperature	20^{o}C	15^{o}C
Relative humidity	50%	50%

Applicants may 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. Submissions must be based on detailed analysis of comprehensive meteorological data recorded at or near the subject site over a period of at least one year. Conditions that represent the worst two per cent of the time during the day, and night periods above, for the month of the year in which the worst-case weather conditions prevail should be used. DER will consider such submissions for assessment purposes on a case-by-case basis.

The wind directions selected for the model must 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.

The model must include either:

- four models, each with the wind blowing from a different quarter; or
- a composite model with four directions included on the one map.

The diagrams of the model output must be labeled to identify the modelled meteorological conditions.

6.2.5 Noise Model Calibration and Verification

Where a noise model is used to represent an existing situation, a series of verification measurements must be conducted to check the accuracy of the existing model.

The applicant may wish to propose a minor adjustment to a noise-predictive model based on either:

- data from a detailed sound propagation study conducted at the site to be incorporated into the noise model as a calibration adjustment; or
- data from field verification measurements (as noted above) for incorporation as a verification adjustment.

The applicant must provide documentation to substantiate the proposed adjustments. Major adjustments must not be applied to the model predictions. Field studies that show a significant departure from the model predictions and/or indicate a systemic failure within the acoustic model will require investigation and re-evaluation.

6.3 Analysing Noise Data

6.3.1 Compliance with the Noise Regulations

Where the Noise Regulations apply to a noise emission, noise data from monitoring and modelling must be assessed. Where the noise emission is the result of blasting, regulation 11 applies and for all other sources, regulation 7 provides the assessment criteria.

Regulation 7 requires that a noise emission must not cause, or significantly contribute to a level of noise which exceeds the assigned level when received at the nearest receptor. A noise emission is taken to significantly contribute to a level of noise if the emission exceeds a value which is 5 dB below the assigned level at the point of reception.

6.3.2 Influencing Factor

The assigned levels for highly sensitive areas of noise-sensitive receptors rely on an influencing factor which is determined in accordance with Schedule 3 of the Noise Regulations. The assessment report must set out the calculation of influencing factors and must show the following in detail:

- All noise sensitive premises for which an influencing factor has been calculated.
- Land areas taken to be Type A or Type B.
- Any assumptions made about land for which the land use zoning may be unclear.
- Major or secondary roads and relevant traffic flow data.
- Where a proposal causes a change of the land use which affects the influencing factor, the influencing factor with and without the proposal must be stated.

6.3.3 Tonality, Modulation and Impulsive Components

The first analysis of the received noise must determine whether tonality, modulation and impulsive components are likely to be present and whether they can be removed. If it is not practicable to remove the noise characteristic, then adjustments must be applied to the measured (predicted) noise level in accordance with the Noise Regulations.

Noise contours or noise levels predicted for individual locations must be presented without adjustments for noise character, and additional results presented to show the effect of any adjustments.

Where noise is assessed indoors, or the noise emission contains tonality, modulation or impulsiveness, these adjustments must be added to the predicted or measured levels of the noise emission and they must not be subtracted from the assigned levels.

If intrusive characteristics have been assessed as not being audible at the receptor, justification must be provided based on initial ambient measurements and spectral data.

6.3.4 Methods to Demonstrate Compliance

There are two methods by which compliance with the Noise Regulations may be demonstrated. These are by:

- individual noise receptor (for example, via point-to-point calculations) with the predicted level(s) compared with assigned levels (or other criteria), including any adjustments for noise character; and
- area, using a map of noise contours, from which noise-affected areas and locations can be identified.

Individual noise receptor

This method involves:

(a) calculation of the influencing factor and determination of the assigned noise levels ($L_{AS\ max}$, $L_{AS\ 1}$ and $L_{AS\ 10}$) for the following time periods –
  (i) 7am to 7pm Monday to Saturday (day);
  (ii) 7pm to 10pm Monday to Saturday (evening);
  (iii) 9am to 10pm on Sunday or a public holiday (Sunday); and
  (iv) 10pm to 7am every day or to 9am on a Sunday or public holiday (night);

(b) determination of the predicted $L_{AS\ max}$, $L_{AS\ 1}$ or $L_{AS\ 10}$ levels for the activity, for each of the four time periods. It is acceptable to focus on a single level and time of the day if these can be shown to represent the worst case;

(c) adjustment of the predicted levels to account for any tonal, modulation or impulsive characteristic which cannot be practicably removed;

(d) comparison of the adjusted predicted levels with the assigned levels and tabulate any exceedences;

(e) where the adjusted predicted levels are below and within 5 dB of the assigned levels, the combined contributions of the emission noise and ambient noise will need to be considered;

(f) if the combined contributions exceed the assigned levels, the ambient noise sources will need to be identified; and

(g) where those ambient sources are identified as industrial sources to which the Noise Regulations apply, the noise emission must be reduced to less than 5 dB below the assigned levels, so as not to significantly contribute to an exceedence of the assigned levels.

Multiple noise receptors - Comparison over an area

Where the propagation of noise may affect multiple recipients, it is appropriate to present the results in the form of an assessment of predicted levels (in the form of noise contours) against the assigned noise criteria over a geographical area.

The assessment must follow the same steps as for the individual noise receptor, however, the applicant must provide maps and/or aerial photographs overlain by contours of the predicted levels.

There may be cases where it would be helpful to present the results as a comparison of predicted noise levels and assigned levels over an area. The applicant is encouraged to develop graphical representation in these cases.

6.4 Noise Emissions with Special Considerations

There are activities that, because of their occasional nature, are not normally included in an acoustical model. These may include emergency warning systems and rare operations such as steam venting or flaring.

These types of noise sources are capable of resulting in significant noise disturbance and must not be omitted from the noise assessment.

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

- Where the noise is rare but unavoidable, its noise emission must be predicted and the likely impact discussed in the acoustic assessment report in terms of the level, duration and time of day of the emission.
- Where audible safety warning devices are used as part of a safe working system, for example, reversing alarms on mobile equipment, comment must be provided on the likely noise impacts and the potential for use of alternative systems in order that the impact can be minimised.

6.5 Prediction Verification Noise Monitoring

Where noise modelling has been undertaken to predict the impacts of the proposed works, the acoustic assessment report may be required to include a noise verification plan aimed at verifying the acoustical model by measurements once the activity is in operation.

This may involve noise measurements in proximity to major plant items to confirm their SWLs, and/or noise measurements in the affected community to determine received noise levels. A verification plan may be required on a case-by-case basis.

6.6 Other Studies

In undertaking the detailed assessment it may become apparent that other supporting studies may be required to fully inform and justify the detailed assessment. Applicants and their consultants must consider whether any additional studies or information may be required to support their application.

Where such information is not provided, the information may be requested by DER and determination of the application may be delayed.

Additional sources of information may include, but are not limited to:

- traffic studies to better understand noise sources contributing to ambient noise levels; and

- SWLs determined from measurement of existing plant and equipment to enable assessment of the cumulative emissions from existing and proposed operations.

Additional noise studies may be required in certain situations during DER's assessment of an application, because of the environment within which the proposal occurs and/or in order to protect a particular environmental value.

7. Sound Measuring Equipment

7.1 Specific Standards

Schedule 4 to the Noise Regulations specifies in detail the standards for sound measuring equipment including performance specifications for:

(a) sound level meters;
(b) analog and digital audio recording devices, level recorders, spectrum analysers and computers;
(c) filter sets used with any sound level meter or spectrum analyser; and
(d) standard sound sources (acoustic calibrators and piston phones) used for field performance checks.

Equipment used for a detailed assessment must comply with these requirements and appropriate certification must be included in the assessment report.

7.2 Field Performance Checks

Schedule 4 to the Noise Regulations, sets out requirements for field performance checks of sound measuring equipment. The Noise Regulations detail the methodology and performance required to ensure the validity of measurements taken.

8. Noise Control

As a general approach, noise reduction controls must be considered either:

(a) *at the noise source* – this involves good site selection and layout, plant design incorporating noise control, and appropriate management measures to minimise noise emissions; and
(b) *in the noise propagation path* – this may involve erection of noise barriers, etc.

In order to demonstrate compliance with assigned levels, it may be necessary to incorporate noise reduction measures into the noise model. The predicted levels before and after noise reduction measures must be presented, and any assumptions made must be documented in detail.

8.1 Controlling Noise at Source

Where the activity involves a plant with multiple noise sources, the applicant must use the noise model to develop noise control scenarios based on a noise source ranking. This ranks the individual contribution of each noise source to the noise level received at a given receptor, and allows the overall noise reduction to be estimated if a given noise reduction is applied to each of the major contributors.

8.2 Controlling Noise Propagation Path

The use of noise walls, bunds and buildings as noise barriers can be effective in reducing the noise from a number of sources at once, without disturbing those sources.

In describing noise barriers assumed in a noise model, the following details must be provided in the noise assessment:

(a) Position of the barrier.
(b) Height of the barrier relative to a known reference.
(c) Width or length of the barrier or details of any gaps, bends or returns in the barrier.
(d) Any details relevant to the final construction of the barrier, for example, materials, or whether the barrier was assumed to be absorptive on one side.

9. Bibliography

Department of Environment Regulation, 2015, *Guidance Statement: Regulatory Controls Division 3, Part V Environmental Protection Act 1986.*

Standards Australia AS 1055.1 – 1997: *Acoustics – Description and measurement of environmental noise.*

Standards Australia AS IEC 61672.1-2004 *Electroacoustics-Sound level meters Part 1: Specifications*.

Standards Australia AS IEC 60942-2004 *Electroacoustics-Sound calibrators.*

Environmental Protection Act 1986 (WA)

Environmental Protection Regulations 1987 (WA)

Environmental Protection (Noise) Regulations 1997 (WA)

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Environmental Noise Screening Tool

Relevant Legislation

General

This screening procedure is to be used to assist applicants and licensing officers in deciding whether environmental noise is significant enough to require detailed assessment.

It enables applicants to conduct preliminary and detailed noise screening to determine whether or not predictive modelling is required for a more detailed assessment, as per Section 6.2 of this Guideline.

Applicants will be required to provide sufficient information to DER with their application to substantiate their screening assessment.

Part 1 – Preliminary Screening

1. Description of Prescribed Works

Please describe the proposed and existing (if any) prescribed activity and category as identified by Schedule 1 of the *Environmental Protection Regulations 1987*.

2. Separation Distances

Separation distances for Schedule 1 premises are identified in DER's *Guidance Statement: Separation Distances 2016*.

a) Separation distance (from *Guidance Statement: Separation Distances*)	……m
b) Distance to nearest sensitive land use as defined in the *Guidance Statement: Separation Distances*	……m
Is distance B less than distance A? (i.e. does the nearest noise receptor lie within the separation distance?)	☐ **Yes – detailed screening required, continue to Q.3**
	☐ **No – Screening assessment complete**

Part 2 – Detailed Screening

3. Cumulative Noise

The Noise Regulations require that a noise emission must not cause or significantly contribute to an exceedence of the assigned levels.

A noise emission is taken to significantly contribute to a level of noise if the noise emission is less than 5 dB below the assigned level at the point of reception.

Note: The assistance of an acoustical consultant may be needed to estimate the contribution of the emission at the point of reception.

Is the noise emission from the proposed works less than 5 dB below the assigned level at the point of reception?	☐	Yes - Predictive Modelling required, continue to Part 3
	☐	Can't determine – continue to Q.4
	☐	No – continue to Q.4

4. Impact on Commercial, Industrial and Sensitive Receptors

Where the proposal is adjacent to commercial, industrial or noise sensitive properties - a) Estimated total sound power for all sources on site for:- • Daytime (7am to 7pm, Monday-Saturday); and • Nighttime (any other time) b) Distance to nearest noise receptor; c) Plot the two points (a) and (b) on Figure 2 Note: The assistance of an acoustical consultant may be needed to estimate the total sound power level.		……dB(A) ……dB(A) …….m
Is estimated noise above the relevant line in Graph 1: • at the boundary of an industrial receptor in the Kwinana industrial Area (KIA) • at the boundary of an industrial receptor (other than within the KIA); • at the boundary of a commercial receptor; or • at a noise-sensitive receptor (day or night or Sunday or public holiday)?	☐	**Yes - Predictive Modelling required, continue to Part 3**
	☐	**No – screening assessment complete**

Part 3 – Detailed Assessment

5. Detailed Assessment

Undertake detailed assessment which may include ambient monitoring, predictive modelling, prediction verification noise monitoring or other studies as outlined in Section 6 of this Guideline

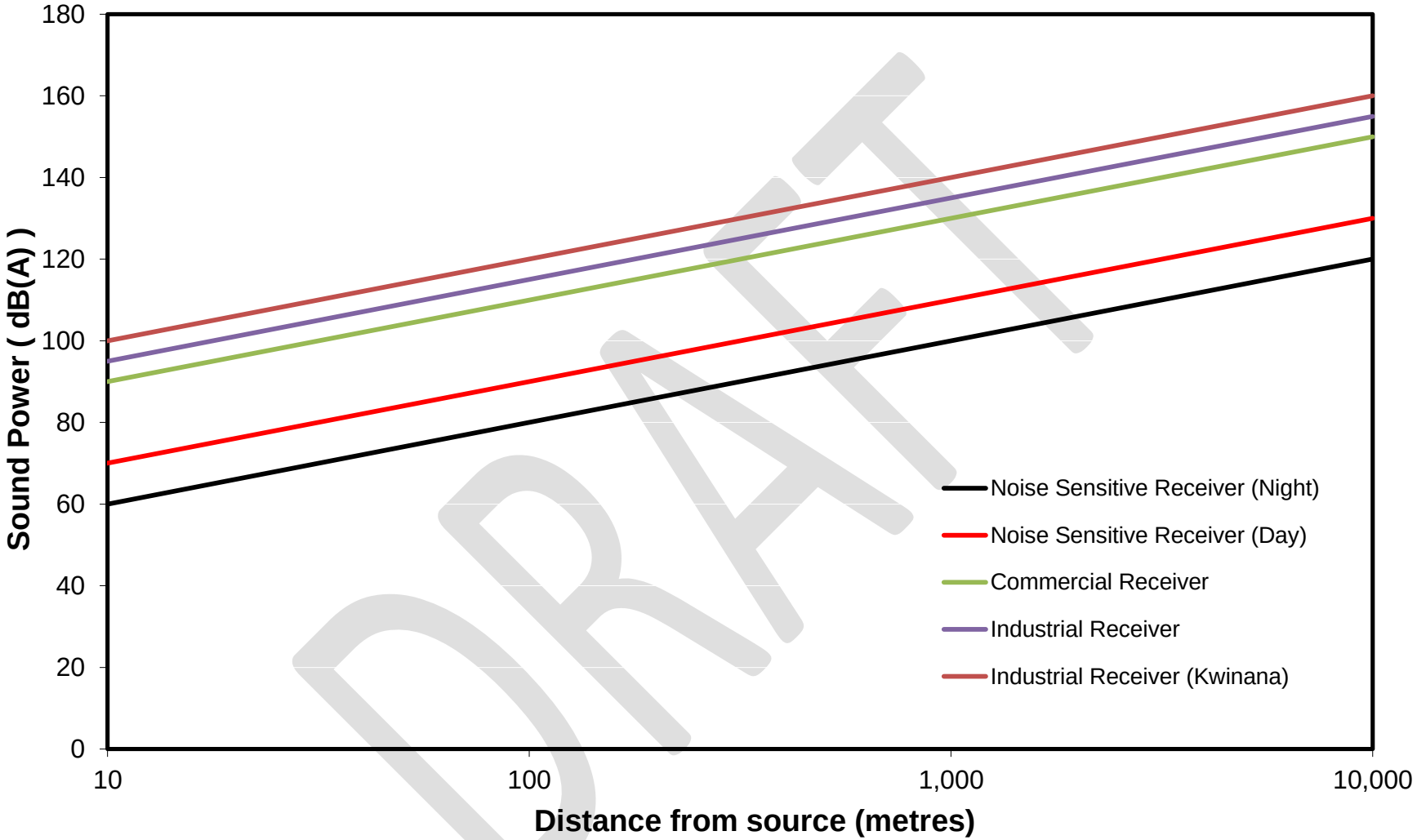

Figure 2

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Recommended Content – Acoustic Assessment Report

Relevant Legislation

Note: It is not intended that all items below need to be included in every report, rather that relevant items should be covered at the consultant's discretion. Nor is it meant to be a complete list of all issues that should be covered in a consultant's report, as no guide could anticipate all issues that can occur in individual cases.

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 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 receptor 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 and scale

Noise Criteria

Relevant noise criteria have been referenced and applied to the project:

☐	*Environmental Protection (Noise) Regulations 1997* – assigned noise levels (including influencing factor calculations)

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 source is present; or to define noise levels of proposed sources where similar equipment can be measured elsewhere.

- ☐ 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 i.e., 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
- ☐ Sound power levels as A-weighted and one-third octave band levels indicating:
  - ☐ 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
  - ☐ Describing selected parameters, e.g., ground type
- ☐ Meteorological conditions indicating:
  - ☐ Worst case scenario modelled
  - ☐ Selected parameters

☐	Appropriate conditions
☐	Receptor locations
☐	Adjustments made for tonality, modulation and impulsiveness

Analysis and Results The results should be displayed clearly and analysed appropriately to incorporate the following:	
Results for Noise Measurement	
☐	Justification of choice of statistical indicators
☐	Measurement duration, date, time, etc.
☐	Distance from noise source and operating conditions, as relevant
☐	Adjustments included for any annoying noise characteristics e.g., tonality and modulation, and relevant spectral data are provided to show justification
Results for Noise Prediction	
☐	Justification of choice of statistical indicators
☐	Individual receptor (point calculation) or multiple receptors (contour maps)
☐	Weather condition scenarios modelled with assumptions indicated e.g., worst-case, calm and wind direction(s)
☐	Noise source ranking (optional)

Discussion and Recommendations	
☐	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 and further study
☐	Recommendations are sufficiently detailed to be turned into conditions
☐	An overall noise management strategy is clearly identified

Conclusion and Summary A conclusion or 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 referred to in the text of the report may include:	
☐	Calibration certificates
☐	Ambient noise data
☐	Detailed wind and meteorological data
☐	SWL or frequency data
☐	Noise contour maps
☐	Noise management plan
☐	Prediction verification plan

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Declaration by Consultants
Relevant Legislation

Declaration for Acoustic Consultants

I certify that the acoustic report and materials submitted for the noise assessment has been prepared by a person competent in environmental noise assessment who has qualifications and experience that qualifies them for membership of the Australian Acoustical Society or the Association of Australian Acoustical Consultants.

Name of person:……..

Qualification/s:…….

Membership:

☐ Australian Acoustical Society

☐ Association of Australian Acoustical Consultants

Signature:

Date:……..