

Association of Australasian Acoustical Consultants Guideline for Child Care Centre Acoustic Assessment

Version 3.0



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1.0 INTRODUCTION

The shortage of child care facilities has become a topical issue in Australia resulting in increased pressure to develop new centres in a diverse range of urban settings.

This guideline has been prepared by members of the Association of Australasian Acoustical Consultants (AAAC) to assist child care centre developers, child care centre operators, architects, local council or regulatory officers, AAAC and other acoustical consultants to assess the noise impact from proposed child care centres consistently, accurately and fairly.

This guideline is advisory in nature and is not a statutory document, but provides guidance in relation to the assessment and management of noise associated with child care centres. The AAAC recommend the use of this guideline, to inform its decision-making on the environmental regulation and management of noise from child care centres. It sets out feasible and reasonable noise management measures which should be considered and a process for predicting noise levels and determining achievable statutory noise limits for development consents.

It is noted that the criteria used in each State or Territory may vary and the procedures in this guideline may need to be modified by AAAC members in each State or Territory to meet specific State requirements. However, the principles will remain the same. The recommendations in this guideline are based on the common practice of AAAC members. Additionally, many local councils have their own specific requirements and policies regarding child care centres, which should be checked when carrying out an assessment. If the requirements are non-specific or not fully detailed, then this guideline will assist in determining the assessment procedure.

A child care centre is considered to be a building or place which is used to provide a Children's Service but excludes Home-Based Children's Services, Mobile Children's Services or Family Day Care Children's Services.

This guideline refers to the noise impact of child care centres with 10 or more children. It does not limit the number of children at any one centre, however councils or other relevant authorities may have limits that should be adhered to. Generally, the lower the number of children at a centre, the less noise is produced and more chance of a new child care centre being approved by the local or appropriate authority. The size of the centre needs to be balanced with other operational and viability factors.

2.0 OBJECTIVE

The high density usage of small spaces combined with insufficient variety, diversity and number of play opportunities for children are a known cause of a breakdown in children's behaviour with an ensuing increase in noise. In addition, the competing requirements of locating accessible child care centres in residential neighbourhoods, providing generous and unencumbered outdoor spaces for children to enjoy their activities and the right of nearby neighbours to a reasonable acoustic environment are potentially at conflict and require a considered approach to a child care centre's planning.

The objectives of this guideline are:

- To protect the reasonable acoustic privacy of nearby residents in their dwellings and private open spaces;
- To provide noise goals and noise control recommendations to ensure that a child care centre in a residential area does not generate unacceptable noise levels to adversely impact on residents within adjoining properties and other properties close to the site; and
- To protect children from excessive noise which may be experienced due to the close proximity to high noise environments, including busy roads, aircraft or rail operations, and commercial and industrial premises.

Child care centres typically operate from 7:00 am to 6:00 pm, Monday to Friday for up to 52 weeks per year, however, this can vary slightly from centre to centre.



3.0 NOISE CRITERIA

Although, the acoustic criteria used in different States and Territories may vary, the criteria used within this Guideline are based around an emergence above the background noise level.

Note : For definition of terms, see the “Terminology” Tab on the AAAC web site.

3.1 Background Noise Monitoring

Background Noise Level

The background noise level should be measured using continuous noise logging for a period of at least five consecutive weekdays. If the child care centre is proposed to operate on Saturday and/or Sunday, these days should also be included. At least three of those days must not be affected by adverse weather. Meteorological data may be measured on site or accessed from the nearest Bureau of Meteorology weather station.

Note: The determination of background is to be as outlined in the Regulation or Guideline for each State or Territory.

Logger Location

For the assessment of noise emission, the noise logger should be located to measure the background noise environment at a location most representative of the most affected sensitive receiver locations. If monitoring at this location is not possible, the acoustical consultant shall select another suitable and equivalent location. This measured representative noise environment should be used to establish relevant criteria for all sensitive receivers.

Additional noise logging may be necessary to assess the impact of noise intrusion into the centre. The acoustical consultant shall select a suitable location for such monitoring.

Instrumentation

The existing background noise level shall be measured using acoustical instrumentation which conforms to Australian Standard AS/NZS IEC 61672.1:2019 ‘Electroacoustics – Sound Level Meters – Specifications’ as a class 1 or class 2. Acoustical instrumentation that conforms to AS 1259.2-1990 ‘Acoustics - Sound Level Meters – Integrating – Averaging’, Type 1 or 2 may also be used.

3.2 Criteria – Residential Receptors

3.2.1. Outdoor Play Area

The noise impact from children at play in a child care centre differs from the domestic situation in that it is a business carried out for commercial gain, the number of children can be far greater than in a domestic situation and the age range of the children at the centre does not significantly vary over time as it would in a domestic situation. However, the noise from children is vastly different, in both character and duration, from industrial, commercial or even domestic machine noise. The sound from children at play, in some circumstances, can be pleasant, with noise emission generally only audible during the times the children play outside. Night time, weekend or public holiday activity is not typical and child care centres have considerable social and community benefit.

Base Criteria – With the development of child care centres in residential areas, the background noise level within these areas can at certain times, be low. Thus, a base criterion of a contributed $L_{eq,15min}$ 45 dB(A) for the assessment of outdoor play is recommended in locations where the background noise level is less than 40 dB(A).

Background Greater Than 40 dB(A) – The contributed $L_{eq,15min}$ noise level emitted from an outdoor play and internal activity areas shall not exceed the background noise level by more than 5 or 10 dB at the assessment location, depending on the usage of the outdoor play area. AAAC members regard that a total time limit of approximately 2 hours outdoor play per morning and afternoon period should allow an emergence above the background of 10 dB (ie background +10 dB if outdoor play is limited to 2 hours in the morning and 2 hours in the afternoon).

Up to 4 hours (total) per day – If outdoor play is limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed $L_{eq,15\text{ minute}}$ noise level emitted from the outdoor play shall not exceed the background noise level by more than 10 dB at the assessment location.

More than 4 hours (total) per day – If outdoor play is not limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed $L_{eq,15\text{ minute}}$ noise level emitted from the outdoor play area shall not exceed the background noise level by more than 5 dB at the assessment location.

The assessment location is defined as the most affected point on or within any residential receiver property boundary. Examples of this location may be:

- 1.5 m above ground level;
- On a balcony at 1.5 m above floor level;
- Outside a window on the ground or higher floors.

3.2.2. Other Noise Emission

The cumulative $L_{eq,15\text{ minute}}$ noise emission level resulting from the use and operation of the child care centre, with the exception of noise emission from outdoor play discussed above, shall not exceed the background noise level by more than 5 dB at the assessment location as defined above. This includes the noise emission resulting from:

- Indoor play;
- Mechanical plant;
- Drop off and pick up;
- Other activities/operations (not including outdoor play).

3.2.2.1. Indoor Play

Noise emission from indoor play and activities should be considered, including scenarios with windows and doors both open and closed. Some child care centres may need to close their windows and doors during active indoor play or music.

3.2.2.2. Mechanical Plant

Child care centres may include air-conditioning plant and equipment, kitchen and wet area exhaust fans, car park and garbage room ventilation fans. Depending on the requirements of the state or territory where the centre is located, any such mechanical equipment should be assessed in accordance with this section and should not be audible outside the premises between 6pm and 7am.

3.2.2.3. Pick up and Drop off

Depending on the requirements of the state or territory where the centre is located, noise emission from vehicles on site should be considered.

3.2.2.4. Other Activities/Operations

Other activities which should be considered include deliveries, cooking, cleaning and laundry activities.

3.2.3. Sleep Disturbance

The noise impact of staff arrivals, setup, cleaning or other on-site activities prior to 7am or during night-time hours should be assessed at nearby residential premises. The L_{Amax} noise level emitted from vehicles arriving and parking, depending on the requirements of the state or territory where the centre is located shall not exceed the background noise level by more than 15 dB outside the nearest habitable room window.

3.3 Commercial Receptors

The cumulative $L_{eq,15min}$ noise level emitted from the use and operation of the child care centre shall not exceed 65 dB(A), from all activities (including outdoor play), when assessed at the most affected point on or within any commercial property boundary.

3.4 Other Sensitive Receivers

Where appropriate, assessment should include consideration of noise emission to other sensitive uses including schools, hospitals, places of worship and parks (active and passive). Depending on the requirements of the state or territory where the centre is located, in the absence of applicable noise criteria for such a sensitive use, the cumulative $L_{eq,15min}$ noise level emitted from the use and operation of the child care centre shall not exceed 65 dB(A), from all activities (including outdoor play), when assessed at the most affected point on or within the sensitive property boundary, and shall not exceed 45 dB(A) internally, with windows or doors of the sensitive receiver open.



4.0 SOUND POWER LEVELS

The effective sound power level (L_w) of various noise sources should be determined for a proposed child care centre. The L_w of children playing varies widely depending on the age of the children and the activity that the children are engaged with. The L_w of mechanical plant can normally be predicted with accuracy depending on the type of plant, location and/or number of items of plant. Similarly, the L_w of traffic noise can be predicted given the traffic flows and type of vehicles.

4.1 Children – Outdoor Play

The sound levels of children playing in the indoor and particularly, the outdoor areas vary widely depending on many factors such as the:-

- number of children vocal at any one time;
- activity that the children are engaged in;
- type of voice (from shout to whisper);
- age of the children;
- directionality of voice;
- distance between the children and the receiver point for outdoor and indoor areas;
- height of the child (i.e. whether standing or seated) for outdoor areas; and
- reverberation ('echo') in the room for indoor or semi-enclosed areas.

Children under 1 year of age are generally not walking or talking, although, they do cry and make sound. Nevertheless, they do not significantly contribute to 15 minute averaged noise levels in outdoor areas.

For older children, there are marginal differences in groups of children from 2 to 3 years of age and those from 3 to 5 years of age.

Table 1 provides recommended sound power levels for lots of 10 children, within the different age groupings, along with a recommended source height.

Table 1 – Effective Sound Power Levels ($L_{Aeq, 15min}$) for Groups of 10 Children Playing

Number and Age of Children	Sound Power Levels [dB] at Octave Band Centre Frequencies [Hz]								
	dB(A)	63	125	250	500	1k	2k	4k	8k
10 Children - 0 to 2 years	78	54	60	66	72	74	71	67	64
10 Children - 2 to 3 years	85	61	67	73	79	81	78	74	70
10 Children - 3 to 5 years	87	64	70	75	81	83	80	76	72

Notes:

- 1 If applicable, an adjustment to the above sound power levels of -6 dB could be applied in each age group for children involved in passive play.
- 2 For simplicity, based upon a review of World Health Organization (WHO) data, a single recommended source height of 1metre is suggested as the source heights.

To calculate the effective sound power level for a specific number of children, the following formula shall be used:

$$\text{Effective Sound Power Level for 'n' children} = \text{Effective Sound Power Level for 10 children} + 10 \log (n/10)$$

Notes:

- 1 The noise level of boys and girls are assumed to be very similar and therefore are not differentiated in this guideline.
- 2 For every doubling of the number of children, 3 dB is added.

4.2 Mechanical Plant

Ideally the proposed mechanical plant should be designed and selected specifically for the project, however it is not uncommon for the mechanical plant to not be selected prior to submitting a development application. Mechanical plant may include air-conditioning and exhaust systems. A typical range of sound power levels for mechanical plant is given below in Table 2.

Table 2 – Sound Power Levels (L_{Aeq}) for Mechanical Plant

Small (single fan) condenser (outdoor unit)	65 dB
Medium (double fan) condenser (outdoor unit)	70 dB
Large (double fan) condenser (outdoor unit)	80 dB
Small exhaust fan (toilet, garbage room)	60 dB
Small kitchen exhaust fan	70 dB
Carpark exhaust fan	85 dB

4.3 Vehicles Within Premises

The noise from cars and small delivery vans arriving at the centre may be a significant source of noise and should be considered. Typical sound power levels for vehicles within the car park area of a child care centre are given below in Table 3.

Table 3 – Sound Power Levels for Traffic (L_{Aeq})

Car	81 dB
Delivery Van	86 dB



5.0 EXTERNAL NOISE IMPACT ON CHILDREN

For proposals that are located within 60 metres of an arterial road, railway line, industry or within close proximity to an airport, a noise intrusion assessment should be submitted with the development application.

5.1 Road, Rail Traffic and Industry

The predictions of noise levels from road traffic on a child care centre can be calculated using basic formula as given, for example, in the Calculation of Road Traffic Noise from the UK Department of Transport, Welsh Office (1988).

The $L_{Aeq,1hr}$ noise level from road traffic, rail or industry at any location within the outdoor play or activity area during the hours when the Centre is operating should not exceed 55 dB(A).

The $L_{Aeq,1hr}$ noise level from road traffic, rail or industry at any location within the indoor activity or sleeping areas of the Centre during the hours when the centre is operating shall be capable (ie with doors and / or windows closed) of achieving 40 dB(A) within indoor activity areas and 35 dB(A) in sleeping areas.

5.2 Aircraft

The L_{ASmax} noise level from aircraft at any location within the indoor play or sleeping areas of the centre during the hours when the Centre is operating shall not exceed 50 dB(A) in accordance with Australian Standard AS 2021.

6.0 NOISE CONTROL RECOMMENDATIONS

Where the predicted level of noise exceeds the criteria at the noise assessment location, noise control measures should be considered to enable compliance with the acoustic criteria to be achieved.

The following indicative noise controls may be used to achieve compliance with the noise criteria. Site-specific controls should be recommended in the child care centre noise assessment.

6.1 Building Design

The design of the child care centre should aim to locate sleep rooms and outdoor play areas away from external noise sources.

Where feasible, building designs could be based on a "U" shaped or "L" shaped layout, with outdoor play areas positioned such that the building structures act as a noise barrier.

Orienting the building and outdoor play spaces having regard to impacts on neighbours (for example, locating play areas away from neighbouring sensitive spaces).

Maximise the separation between the active outdoor play area (as opposed to passive activities such as painting, drawing etc) and the façade of any neighbouring residential premises.

Ensuring operable windows of the child care centre and external play areas do not have a direct line of sight to neighbouring noise sensitive areas.

Locate access ramps away from neighbouring sensitive premises where possible.

Include low noise features such as self closing gates with soft closure hinges, selection of low noise air-conditioning condensers, minimize the use of speed humps and ensure car park surfaces and access ways are smooth.

6.2 Outdoor Play Areas

Outdoor play areas should be located to minimise the noise impact on adjoining neighbours.

For 'green field' sites consideration should be given to surrounding or screening the outdoor play area with the child care centre building either totally or partially where practical.

Consideration should be given to noise minimisation related to hard-paved areas and pathways within the children's play area to reduce reflective noise.

6.3 Indoor Activity Areas

The weakest acoustical link from activity areas to the outside is typically through windows or glazed doors. However, with proper design considerations, noise emanating from within a child care centre, even with windows and doors open, would at the neighbouring receptors normally be significantly less than that received from the children within the outdoor play area. Even so, there may be situations where, due to the orientation or layout of the child care centre, internal activity spaces are located adjacent or near to neighbouring receptors. In these cases, thicker glazing should be used (e.g. minimum 6.38 mm laminated glazing) in the indoor playroom windows/doors. Additionally, preference should be given to casement or awning type windows, with compressible seals.

Indoor or partially enclosed play areas can be fitted with acoustically absorbent panels to the ceilings (or walls) to minimise the reverberant noise within the internal areas. This will also have a beneficial effect on the acoustical environment for both children and staff and enhance communication and speech intelligibility. A ceiling with a noise reduction coefficient (NRC) of at least 0.7 should be considered.

6.4 Buildings and Other Structures

Buildings and other structures such as storage sheds or covered shade areas may be incorporated into the outdoor play area to provide acoustic shielding.

6.5 Boundary Fences / Barriers

The standard height for a boundary fence is 1.8 metres although fences with heights of 2.1 metres are not uncommon. Higher fences that are solid and free from visible gaps will reduce the noise impact for ground floor receptors. The local Council should provide guidance on the allowable height of fences.

These fences or walls around the outdoor play area will often need to be constructed to act as an effective acoustic barrier. Sound reductions of 6 to 10 dB should be obtainable with a 1.8 to 2.1 metre high barrier which is well constructed depending upon various factors. It is important to note that noise barriers must not have any untreated holes or gaps.

Fences or walls acting as acoustic barriers should be constructed from any impervious material such as lapped and capped timber, corrugated sheet steel, a transparent solid material (e.g. glass or *Perspex*), masonry or a combination of these. They must not contain any acoustically untreated holes or gaps, including beneath the fences at the base. In most cases the minimum surface density of the boundary fence should be 15 kg/m².

Alternatively, a standard fence plus a cantilevered top to the total required height may be constructed to reduce the noise impact. In this case the barrier may require guttering and downpipes to control rain run-off.

All external pedestrian gates should be fitted with appropriate door closers to provide a slow and regulated closing of the gate to prevent the generation of impact sound.

6.6 Limiting the Number of Children Outside

The number of children within the Centre or playing in the outdoor play areas at any one time may be limited to reduce the noise impact. A reduction in the number of children by half will reduce the noise impact by approximately 3 dB.

6.7 Car Parking

Noise mitigation measures should be implemented to minimise adverse impact to neighbours caused by car doors slamming and the sounds of parents and children arriving or departing the centre.

Such measures could include the judicious positioning of arrival and departure access points and pathways away from residential property boundaries, the appropriate placement of buildings constructed on site to shield the noise or the provision of acoustic fencing or landscaping.

6.8 Noise Management Plan

One of the most effective measures that should be implemented in conjunction with the physical noise controls is a noise management plan (NMP). The NMP should be incorporated within the Centre's overall management plan.

The following are examples of management measures that may be incorporated into a Noise Management Plan (NMP).

- A separate daily program for both the warmer and cooler months should be established to regulate the total time spent outdoors and indoors;
- The NMP should be made publicly available to parents and neighbours;
- A contact phone number for the Centre's director should be made available to neighbours to facilitate communication and to resolve any neighbourhood issues that may arise due to operation of the Centre;
- The number of children playing outside at any one time may need to be limited to meet the noise criteria;
- The type of outdoor activities may be programmed to only allow quiet or "passive" activities such as painting, garden exploration, reading, block play or drawing in certain areas of the centre's outdoor play area;
- Crying children should be taken inside the centre and comforted;
- The behaviour of children should be monitored and modified as required by adequately trained child care workers;
- Parents and guardians should be informed of the importance of noise minimisation when entering the site, dropping off or picking up children;
- Carers / staff should be educated to control the level of their voice while outside; and
- To meet the noise criteria, amplified music may need to be controlled.

Other Published AAAC Guidelines:

AAAC Guideline for Apartment and Townhouse Acoustic Rating

AAAC Guideline for Child Care Centre Acoustic Assessment

AAAC Guideline for Commercial Building Acoustics

AAAC Guideline for Educational Facilities Acoustics

AAAC Guideline for Health Care Building Acoustics

AAAC Guideline for Report Writing

AAAC Guideline for Selection of an Acoustical Consultant

For definition of terms, see the Terminology Tabs on the AAAC website.

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