

NOISE READY RECKONER

The “Noise Ready Reckoner” (NRR) has been created to assist City of Adelaide residents in assessing their indoor noise exposure to different sources of City noise. Based on information provided by the user, the NRR will calculate the probability that the user will experience acceptable, marginal or unacceptable noise intrusion into a residence from traffic, general activity and/or aircraft noise.

It should be noted that some simplifications and assumptions have been made during the creation of the NRR, and it should be used only as a guide. In critical situations, and for noise not addressed by the NRR, more detailed calculations and analysis will be required.

The acoustic terminology used in this Fact Sheet is explained in *Fact Sheet 11: Acoustic Terminology*.

Scope

The NRR applies to three categories of noise sources: road traffic noise, general activity noise and commercial aircraft noise. It should be noted that the NRR does not cover music noise from pubs and clubs. This is covered by the Adelaide (City) Development Plan.

Additionally, the NRR should only be used to evaluate noise intrusion into existing residences. New developments should refer to the Adelaide (City) Development Plan when considering their requirements for noise control.

Usage Guide

The first step for a user of the NRR is to input the properties of the room which they have identified as being subject to significant noise intrusion. These general properties of the room include:

- room type: living or sleeping;
- room finishings or sound absorption; and
- room dimensions.

The second step is to input the number and type of openings that exist as possible noise transmission paths. These include doors, windows and the ceiling. It must be noted that only exterior doors and windows with a clear path to the noise source should be considered. The required inputs are:

- number of windows;
- average window dimensions;
- type of windows;
- number of doors;
- average door dimensions;
- type of doors; and
- type of roof/ceiling.

The user will be able to view descriptions of the different door, window and ceiling types via a popup link next to the selection panel.

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The final step in the process is to input the parameters defining the source of the noise. The NRR allows users to choose from the three categories of different noise source types at one time.

For traffic noise the following properties must be defined:

- classification of the street, i.e. A (major road) through to E (quiet street); and
- distance from the kerb to the affected room.

The street classification system is outlined by a popup link. Users are also able to access a diagram indicating the relevant distance they should measure for streets with and without lines of parked cars.

For general activity noise, the required inputs are:

- type of activity: i.e. people talking, people shouting, bus passby, car horn; and
- distance from the activity to the affected room

As with traffic noise the user is able to access a diagram explaining the relevant distance.

For aircraft noise, the user is able to click on a map to identify where their residence is located, in order to define the aircraft zone. The user must also input the type of flight they are concerned about from the following options:

- International arrival, i.e. Boeing 747 or 777
- International departure, i.e. Boeing 747 or 777
- Domestic arrival, i.e. Boeing 737 or Airbus A32
- Domestic departure, i.e. Boeing 737 or Airbus A320

Noise Ready Reckoner		Bassett Acoustics
Example Form		
Instructions		
(i) Enter the specifics of the room associated with the noise issue(s)		
(ii) Enter the specifics of the possible noise transmission paths		
(iii) Enter the specifics for any or all of the three noise source types		
(iv) View the results for each of the noise sources entered		
(i) ROOM SPECIFICS		
Room Type	Living Area	
Room Finishings	Hard/Lively Room	Explanation
Room Dimensions		
Height (m)	2.4	
Width (m)	4	
Length (m)	3	
(ii) NOISE TRANSMISSION PATHS		
Number of subject windows	2	
Average Window height (m)	0.9	
Average Window width (m)	1.5	
Window Type	Fixed window (upgraded)	Explanation
Number of subject doors		
Average Door height (m)	2.1	
Average Door width (m)	0.9	
Door Type	Solid core door (seals)	Explanation
Roof/Ceiling Type	Additional story above ceiling	
(iii) NOISE SOURCES		
Street classification	General activity of concern	Aircraft Zone
A	Group of people talking	F
Index	Index	Clickable Map
Distance from room to kerb (m)	Distance from room to activity (m)	Aircraft Type
20	15	Domestic Departure
Figure 1	Figure 2	
(iv) OUTPUT		
Result	General Activity Noise	Aircraft Noise
Traffic Noise	Night time only	Living Day/Bedroom Night
Living Day/Bedroom Night	Likely to be acceptable	
	Marginal	
	Unlikely to be acceptable	

Noise Ready Reckoner
Source: Bassett Acoustics

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Output

The output of the NRR is presented in a 'traffic light' format once all the required inputs for a noise source have been entered. The NRR compares the noise criterion of the room to the expected level of noise intrusion, and determines which of the following colours to display:

- Green: noise intrusion is likely to be acceptable.
- Orange: acceptability of noise intrusion is marginal.
- Red: noise intrusion is unlikely to be acceptable - it is recommended that acoustic advice is sought. Windows, doors and openings may need to be acoustically treated to reduce noise, or the roof-ceiling system may need to be upgraded to reduce aircraft noise.

Noise Sources

Traffic Noise

The base level of traffic noise for a resident is calculated from the street classification that the resident selects from the options available. The street classifications are summarised in the table below.

Classification	Description	Approximate AADT ¹	Examples
A	Major Roads	> 30000	King William Rd, North Tce, West Tce, O'Connell St
B	Other Main Roads	10000 to 30000	Jeffcott St, Frome Rd, Currie St, Hindley St
C	Medium Roads	2000 to 10000	Carrington St, Angas St, Sturt St, Gilbert St
D	Connecting Streets	500 to 2000	Union St, Bank St
E	Quiet Streets	< 500	One-way streets, Lanes, No through roads

1 - Average Annual Daily Traffic

The average noise emission of each street classification has been calculated from the output of the Adelaide Noise Map (See *Fact Sheet 9: Adelaide City Road Traffic Noise Map*) which is based on traffic data provided by the City of Adelaide. The output, and base level for traffic noise is an average noise level (L_{Aeq}). The noise levels have been calculated for both daytime (7.00am to 10.00pm) and night time noise (10.00pm to 7.00am).



The criteria for traffic noise intrusion are derived from Australian/New Zealand Standard 2107. Street classifications A, B and C have been classed as major roads, and classifications D and E as minor roads. The traffic noise criteria are presented in the table below and are selected from the maximum recommended design sound level.

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Type of occupancy/activity	Recommended design sound level, L_{Aeq} , dB(A)	
	Satisfactory	Maximum
Housing and apartments near minor roads:		
Sleeping areas	30	35
Living areas	30	40
Housing and apartments near major roads:		
Sleeping areas	30	40
Living areas	35	45

The relevant criterion level is selected based on the user selection of room type and street classification. It is compared to the expected noise intrusion level which is calculated based on the expected base noise level that is transmitted through the doors and windows of the residence. For sleeping areas, only the night time traffic volume has been considered.

General Activity Noise

The base level of noise emission from a variety of activities has been estimated from previous noise levels measured by Bassett Acoustics. In order to compare the expected level to the relevant criteria, the typical maximum noise level (L_{max}) of these activities has been used.

The relevant criteria for general activity noise are the World Health Organisation (WHO) guidelines for community noise, which state that the maximum noise level inside a bedroom should be limited to 45 dB(A) to minimise the chance of sleep disturbance. As for traffic noise, the expected noise intrusion from the base noise level of the selected activity is then compared to this criterion level.

It should be noted that the general activity noise calculation performed by the NRR is only applicable to night time noise intrusion, and only into sleeping areas. As with traffic noise, the night time period is from 10.00pm to 7.00am.

Aircraft Noise

The maximum noise level (L_{max}) of different aircraft flight movements over the City of Adelaide area was based on the data provided for different aircraft models in Australian Standard 2021. Based on their distance from the centre line of the flight path of the aircraft, the base noise level can then be calculated for residents in different areas. The worst case (i.e. noisiest) aircraft model for each flight type was selected.



The relevant criteria for aircraft intrusion noise are available in AS2021. The criterion level is selected based on the room type.

Aircraft Noise Criteria

Building type and activity	Indoor design sound level, L_{max} , dB(A)
Houses, home units, flats, caravan parks:	
Sleeping areas	50
Other habitable spaces	55



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The expected noise intrusion level through the doors, windows and ceiling is then compared to the criterion level. The noise level in sleeping areas should only be applied to night time flights (10.00pm to 7.00am).

Limitations

The NRR makes a number of simplifications and assumptions when calculating the expected noise intrusion from a noise source. These assumptions include the following:

- Transmission loss of ceilings, doors and windows represents an average level.
- Room absorption level is an estimated quantity.
- Dominant noise transmission paths are the doors, windows and ceiling, i.e. no significant acoustic weaknesses in the walls.
- Traffic noise is based on an annual average of many road types.
- General activity noise is based on average of previously measured levels.
- Aircraft noise is based on worst case aircraft model data.

Because of these assumptions, the NRR output should be considered only as a guide to the acceptability of noise intrusion into a residence. Critical situations will require detailed measurements and calculations to be performed.

Acoustic Consultant

If you are considering any sound insulation, it is recommended that you verify any sound insulation specifications with your architect/builder and/or employ the services of an acoustic consultant to ensure the proposed changes provide significant noise reduction.

To contact an acoustic consultant visit the Yellow Pages Directory (under Acoustical Consultants) or for an acoustic consultant who is part of the Association of Australian Acoustical Consultants (AAAC) visit www.aaac.org.au

Other Fact Sheets

A number of other Noise Technical Fact Sheets complement the information in this document. These can be downloaded from the City of Adelaide website:
www.cityofadelaide.com.au/noise

Fact Sheet 1: Sound Insulation Guidelines

Fact Sheet 2: Gaps and Flanking Paths

Fact Sheet 3: Sound Insulation for Windows

Fact Sheet 4: Sound Insulation for Glazed Doors and Standard Doors

Fact Sheet 5: Sound Insulation for Exterior Walls and Facade Systems

Fact Sheet 6: Ventilation

Fact Sheet 7: Sound Insulation for Air Conditioners and Other External Mechanical Plant

Fact Sheet 8: Sounds in the City

Fact Sheet 9: Adelaide City Road Traffic Noise Map

Fact Sheet 10: Noise Ready Reckoner

Fact Sheet 11: Acoustic Terminology

Fact Sheet 12: Frequently Asked Questions

Fact Sheet 13: Sound Insulation for Internal/Common Walls

Fact Sheet 14: Sound Insulation of Floors

Fact Sheet 15: Mechanical Plant for Commercial Buildings

Fact Sheet 16: AAAC Star Rating

The Building Code of Australia Compliance

The Building Code of Australia (BCA) should be consulted to ensure that any sound insulation upgrades comply with the requirements of the BCA. It should be noted that although the upgrade of a building element may be acoustically beneficial, it may not comply with the requirements of the BCA.

Australian Building Codes Board

The Noise Technical Fact Sheets contain content sourced from the Building Code of Australia and Guidelines on Sound Insulation, published by the Australian Building Codes Board (ABCB). These documents can be purchased from the ABCB website: www.abcb.gov.au

Standards

The standards which apply in the Development Plan are:

- Australian/New Zealand Standard 2107:2000 “Acoustics - Recommended design sound levels and reverberation times for building interiors”
- World Health Organisation, Guidelines For Community Noise, Edited by B Berglund et al, 1999) (<http://www.who.int/docstore/peh/noise/guidelines2.html>)
- Recognised liquor licensing noise limits (www.olgc.sa.gov.au). These are modified to apply within bedroom and living areas.

Contacts / Additional Information

Additional information can be obtained from:

- Australian Association of Acoustic Consultants (www.aaac.org.au)
- Australian Acoustical Society (www.acoustics.asn.au)
- Office of the Liquor and Gambling Commissioner (www.olgc.sa.gov.au)
- South Australian EPA (www.epa.sa.gov.au/noise.html)
- South Australian Police (www.sapolice.sa.gov.au)
- Yellow Pages (www.yellowpages.com.au search “acoustic”)
- Australian Window Association (www.awa.org.au)



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Contact Us

For further information call City of Adelaide on (08) 8203 7203 or email city@cityofadelaide.com.au

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