



# Noise Mitigation

## Overview

Managing noise is crucial for enhancing the liveability of a dwelling. Noise can be generated internally within a building (e.g. noise from surrounding neighbours' voices, music or appliances) or externally (e.g. traffic noise from automobiles, buses, trains, aircraft, industrial activities or surrounding neighbours). Noise can also be classified as either air-borne or structure-borne. Air-borne noises are transmitted through openings, closed windows, doors, walls and floors. Structure-borne noises (or impact sounds) are transmitted through building materials from sound sources such as vehicular or foot traffic, banging, or objects being dropped to the floor and can also be associated with vibrations. The design solutions for limiting air-borne and structure-borne noises are not always the same.

Different levels of annoyance are associated with various sources of noise. Minimising noise impacts can have the following liveability benefits:

- Improved comfort levels and health (e.g. reduced annoyance and sleep disturbances)
- Better relationships between neighbours
- Reduced distractions and improved productivity
- Greater resident satisfaction with dwelling and surrounding neighbourhood

While it is important to insulate and provide barriers against noise, it is also important to look at measures to control noise at the source. Managing noisy neighbours can be achieved through following good neighbour protocols [see Factsheet 5]. This factsheet focuses on ways to reduce the impacts of both air-borne and structure-borne noise which may undermine the liveability of dwellings for residents.

*According to the Australian State of the Environment Report, noise can lead to associated health impacts such as disturbed sleep and headaches yet the most common impact is annoyance. [1]*

## What our findings revealed...

[Annoying noises](#)

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## Annoying noises

Survey results from our QUT High-Density Liveability Study indicated the most commonly heard noise was motor vehicle noise, yet neighbours' voices, music or sounds from animals were identified as the most annoying noise. Varying tolerance to these different types of noise may result from the nature of the noise, be it constant, intermittent, anonymous or identifiable, as well as the time of day in which it occurs.

## Noise transference

Being aware of how noise travels within a building is important for noise management from both a building design point of view and the residents' perspective of wishing to minimise noise within their dwelling. The following quote by a resident who lives in a unit with two other flatmates explains how their general household noise travels in the building.

*But due to our spot here we've had a couple of noise complaints here even though it's just been the three of us at home listening to music. So I guess the sound might travel a bit downstairs.*

Residents also identified building materials they believed contributed to noise transference, such as timber floors and echoing from brick walls.

*There has been a move in recent years for unit owners to change their floors to timber. The buildings were built with carpet flooring and owners have been changing them to timber and it's caused a lot of disputes in a lot of buildings, you may have heard of other cases, and that is causing problems. Units on both sides of us have converted their floors to timber and as a result we're getting noise transference through which we used not to get.*

*And the people on the very ground floor are three women. I can hear them when they have a row because that's a stone, brick wall. It just echoes straight up. I can hear them sneeze sometimes.*

## Mixed residential areas – noise from houses

Interviewees living in high-density dwellings in mixed residential areas commonly cited noise from surrounding houses as a greater source of noise pollution (or annoyance) than that generated from surrounding high-density dwellings.

*[It would] probably be better if we had another block of units next door instead of the houses because sometimes they make so much noise. Yeah, actually they're the worst. It's all the millionaires that live around here, that party and they're the ones that make all the noise.*

*[T]he only bit of noise you get here actually [is from] across the road, some sort or half way house. [I]t used to be a nursing home. And occasionally they tend to get very noisy.*

*And being on the end of the block, you don't get much noise from the block itself. The only other source of noise is houses that your balcony faces onto ... [F]ortunately we've got the owners in the house behind my apartment but it was rented out for a period and that was terrible.*

## Balancing noise pollution and natural air-flow

Intermittent noise was considered more disturbing than constant noise. For example, night-time traffic noise that was dispersed caused problems for some residents, while steady flow of traffic during the day was more tolerable. To control external noise, residents would close their doors or windows – yet, at times, this had the undesirable effect of reduced natural air-flow.

*If it wasn't for the traffic noise (would open the windows at night). But I mean this sort of noise ... in fact is worse at night, because during the day it's a steady noise. At night you'll get a motorbike roar past, an ambulance go by with the sirens going... if anything, it's worse at night than during the day. There might be less vehicles but it's a different type of noise.*

## Recommended Guidelines

The following table presents practical suggestions for Residents, Building Managers, Designers and Developers for managing noise in the dwelling.

	Residents	Building Manager	Designer	Developer
Pay careful consideration to the level of noise and the source of noise that could potentially enter the listening environment – is the noise structure-borne or airborne? Take appropriate measures to reduce structure-borne or airborne noises	✓		✓	✓
Design according to the noise source: Utilise mass to contain airborne sound; high mass, dense and well sealed materials generally offer improved sound insulation. Utilise space (an air gap or similar unobstructed area) to avoid transmitting structure-borne sound. Transference of structure-borne noise can be reduced by increasing vibration isolation in a system (methods can include increasing the size of the air gap between panels, using 'soft' connecting material such as rubber or isolation springs between the building elements)			✓	✓
Ensure that the provision of private and shared outdoor space does not compromise the sound privacy requirements of neighbouring units	✓	✓	✓	
Retrofit Options for Residents' management of air-borne noise: <ul style="list-style-type: none"> <li>• Hang tapestries, and wall hangings on the wall or ceiling closest to the noise source</li> <li>• Lay carpet pads and rugs on floor, if the noise is coming from beneath</li> <li>• Curtains, drapes and soft-furnishings can also contribute towards noise absorption</li> </ul>	✓			

If a resident is considering a major renovation, an acoustic consultant should be employed to conduct an assessment of the property and the proposed design in order to ensure that the new finishes do not compromise the acoustic amenity of other building residents.

✓	✓	✓	
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## Further Information

### Your Home Technical Manual and Website – Noise Factsheet

<http://www.yourhome.gov.au/technical/fs27.html>

### State of the environment report

<http://www.environment.gov.au/soe/2001/publications/theme-reports/settlements/settlements04-2.html>

### E-how.com (How to do just about Everything) “How to Reduce Noise Levels in An Apartment”

[http://www.ehow.com/how\\_2258962\\_reduce-noise-levels-apartment.html](http://www.ehow.com/how_2258962_reduce-noise-levels-apartment.html)

### Royal Melbourne Institute of Technology (RMIT) Fact Sheet 9: Sound Insulation for Floors

<http://sound.sial.rmit.edu.au/ADR/FactSheets/Floors.pdf>

### Building code of Australia has codes regarding acoustic insulation

<http://www.abcb.gov.au/go/home>

## References

1. State of the Environment Report. 2001 [cited 24 May 2009]; Available from: <http://www.environment.gov.au/soe/2001/publications/theme-reports/settlements/settlements04-2.html>.
2. Photography Page 1: Kalara McGregor, 2008.