



# Part 4

## Designing the building

*This part addresses the design of apartment buildings in more detail. It focuses on building form, layout, functionality, landscape design, environmental performance and residential amenity. It is to be used during the design process and in the preparation and assessment of development applications*

### Amenity

- 4A Solar and daylight access
- 4B Natural ventilation
- 4C Ceiling heights
- 4D Apartment size and layout
- 4E Private open space and balconies
- 4F Common circulation and spaces
- 4G Storage
- 4H Acoustic privacy
- 4J Noise and pollution

### Configuration

- 4K Apartment mix
- 4L Ground floor apartments
- 4M Facades
- 4N Roof design
- 4O Landscape design
- 4P Planting on structures
- 4Q Universal design
- 4R Adaptive reuse
- 4S Mixed use
- 4T Awnings and signage

### Performance

- 4U Energy efficiency
- 4V Water management and conservation
- 4W Waste management
- 4X Building maintenance

## 4A Solar and daylight access

Solar and daylight access are important for apartment buildings, reducing the reliance on artificial lighting and heating, improving energy efficiency and residential amenity through pleasant conditions to live and work.

Solar access is the ability of a building to receive direct sunlight without the obstruction from other buildings or impediments, not including trees. Sunlight is direct beam

radiation from the sun. Daylight consists of sunlight and diffuse light from the sky. Daylight changes with the time of day, season and weather conditions.

Access to sunlight for habitable rooms and private open space is measured at mid winter (21 June) as this is when the sun is lowest in the sky, representing the 'worst case' scenario for solar access.

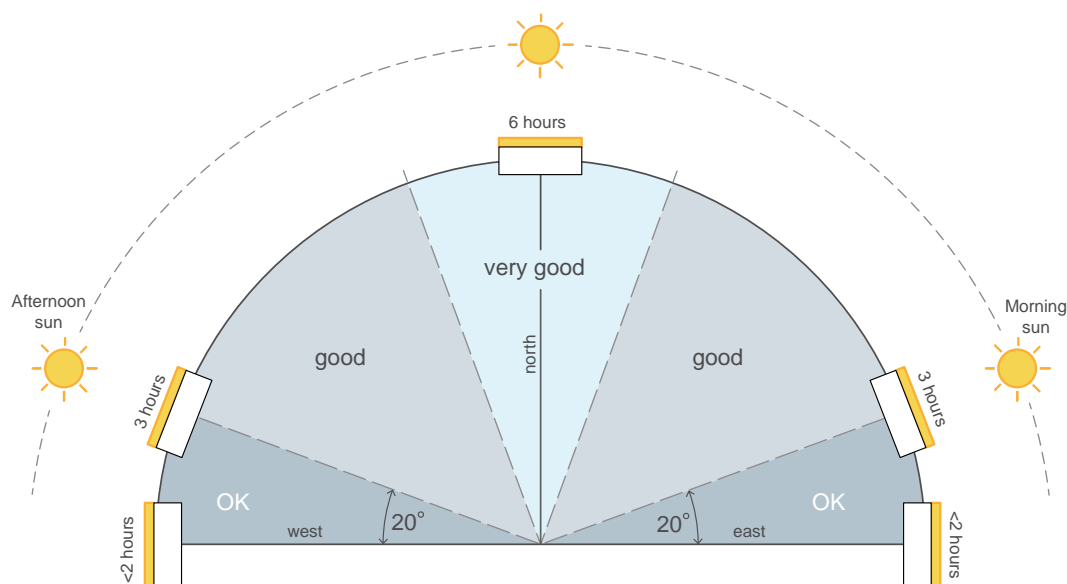


Figure 4A.1 The hours of sunlight that can be expected in mid winter are directly related to the orientation of the facade. This diagram shows the optimal orientation for habitable rooms and balconies  
*Note: An additional design and assessment tool is provided at Appendix 5 to assist in confirming the level of sunlight access to apartments*



Figure 4A.2 Shading devices on balconies should shade summer sun and allow winter sun access to living areas



Figure 4A.3 Horizontal louvres are most effective on north facing elevations and achieve summer shade and winter sun access



Figure 4A.4 These operable screens can be adjusted by residents according to the season, weather conditions and time of day

### Objective 4A-1

To optimise the number of apartments receiving sunlight to habitable rooms, primary windows and private open space

#### Design criteria

1. Living rooms and private open spaces of at least 70% of apartments in a building receive a minimum of 2 hours direct sunlight between 9 am and 3 pm at mid winter in the Sydney Metropolitan Area and in the Newcastle and Wollongong local government areas
2. In all other areas, living rooms and private open spaces of at least 70% of apartments in a building receive a minimum of 3 hours direct sunlight between 9 am and 3 pm at mid winter
3. A maximum of 15% of apartments in a building receive no direct sunlight between 9 am and 3 pm at mid winter

#### Design guidance

The design maximises north aspect and the number of single aspect south facing apartments is minimised

Single aspect, single storey apartments should have a northerly or easterly aspect

Living areas are best located to the north and service areas to the south and west of apartments

To optimise the direct sunlight to habitable rooms and balconies a number of the following design features are used:

- dual aspect apartments
- shallow apartment layouts
- two storey and mezzanine level apartments
- bay windows

To maximise the benefit to residents of direct sunlight within living rooms and private open spaces, a minimum of 1m<sup>2</sup> of direct sunlight, measured at 1m above floor level, is achieved for at least 15 minutes

Achieving the design criteria may not be possible on some sites. This includes:

- where greater residential amenity can be achieved along a busy road or rail line by orientating the living rooms away from the noise source
- on south facing sloping sites
- where significant views are oriented away from the desired aspect for direct sunlight

Design drawings need to demonstrate how site constraints and orientation preclude meeting the design criteria and how the development meets the objective

## 4A Solar and daylight access



Figure 4A.5 At least 70% of all apartments in a building should receive a minimum of 2 hours direct sunlight in mid winter in the Sydney Metropolitan Area and in the Newcastle and Wollongong local government areas, and at least 3 hours direct sunlight elsewhere in NSW

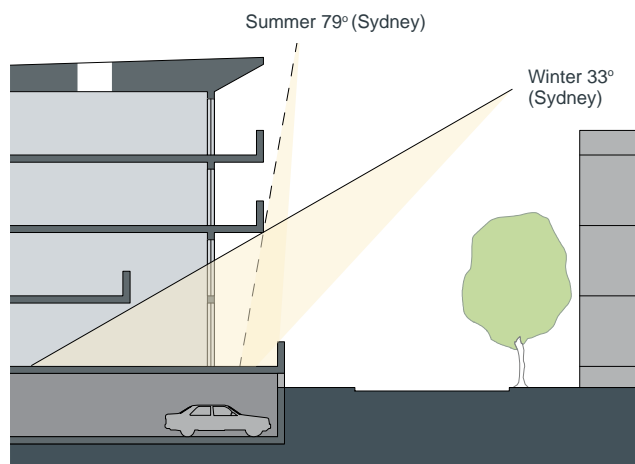


Figure 4A.6 Double height apartments and skylights on roofs increase sunlight and daylight access  
*Note: angles will vary slightly for different locations in NSW*



Figure 4A.7 Vertical louvres are an effective sun management technique for east and west-facing windows and balconies



Figure 4A.8 Trees help shade building facades. For east and west facing facades consider planting deciduous species



Figure 4A.9 Courtyards can provide for daylight access to common areas. For habitable rooms of apartments, they should only be used as a secondary light source

### Objective 4A-2

Daylight access is maximised where sunlight is limited

#### Design guidance

Courtyards, skylights and high level windows (with sills of 1,500mm or greater) are used only as a secondary light source in habitable rooms

Where courtyards are used :

- use is restricted to kitchens, bathrooms and service areas
- building services are concealed with appropriate detailing and materials to visible walls
- courtyards are fully open to the sky
- access is provided to the light well from a communal area for cleaning and maintenance
- acoustic privacy, fire safety and minimum privacy separation distances (see section 3F Visual privacy) are achieved

Opportunities for reflected light into apartments are optimised through:

- reflective exterior surfaces on buildings opposite south facing windows
- positioning windows to face other buildings or surfaces (on neighbouring sites or within the site) that will reflect light
- integrating light shelves into the design
- light coloured internal finishes

### Objective 4A-3

Design incorporates shading and glare control, particularly for warmer months

#### Design guidance

A number of the following design features are used:

- balconies or sun shading that extend far enough to shade summer sun, but allow winter sun to penetrate living areas
- shading devices such as eaves, awnings, balconies, pergolas, external louvres and planting
- horizontal shading to north facing windows
- vertical shading to east and particularly west facing windows
- operable shading to allow adjustment and choice
- high performance glass that minimises external glare off windows, with consideration given to reduced tint glass or glass with a reflectance level below 20% (reflective films are avoided)

## 4B Natural ventilation

Natural ventilation is the movement of sufficient volumes of fresh air through an apartment to create a comfortable indoor environment. Sustainable design practice incorporates natural ventilation by responding to the local climate and reduces the need for mechanical ventilation and air conditioning. To achieve adequate natural ventilation, apartment design must address the orientation of the building, the configuration of apartments and the external building envelope.

Natural cross ventilation is achieved by apartments having more than one aspect with direct exposure to the prevailing winds, or windows located in significantly different pressure regions, rather than relying on purely wind driven air. Apartment layout and building depth have a close relationship with the ability of an apartment to be naturally ventilated. Generally as the building gets deeper, effective airflow reduces.

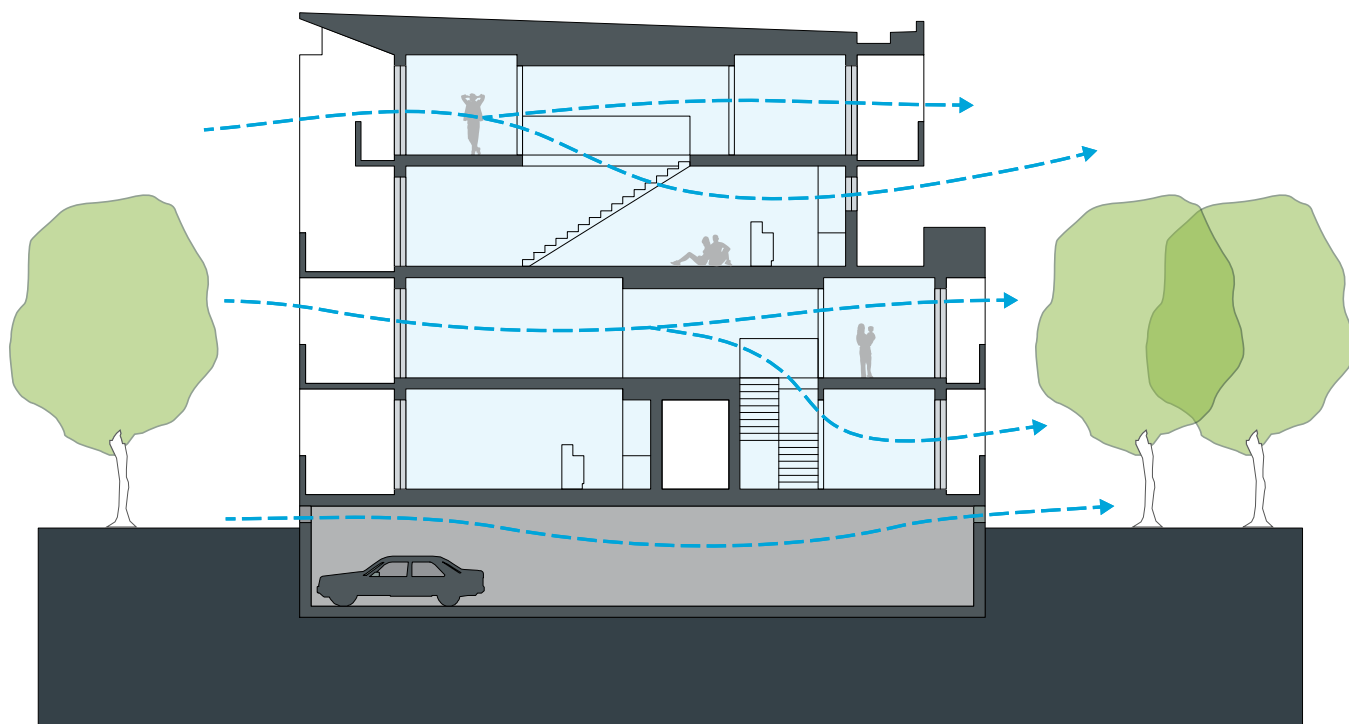


Figure 4B.1 Prevailing winds vary for different locations and depend on local conditions. For coastal areas in NSW, cooling sea breezes in summer tend to come from a north-easterly direction



Figure 4B.2 Operable balcony screens allow occupants to customise their environment and regulate access of natural light and ventilation

### Objective 4B-1

All habitable rooms are naturally ventilated

#### Design guidance

The building's orientation maximises capture and use of prevailing breezes for natural ventilation in habitable rooms

Depths of habitable rooms support natural ventilation

The area of unobstructed window openings should be equal to at least 5% of the floor area served

Light wells are not the primary air source for habitable rooms

Doors and operable windows maximise natural ventilation opportunities by using the following design solutions:

- adjustable windows with large effective openable areas
- a variety of window types that provide safety and flexibility such as awnings and louvres
- windows which the occupants can reconfigure to funnel breezes into the apartment such as vertical louvres, casement windows and externally opening doors

### Objective 4B-2

The layout and design of single aspect apartments maximises natural ventilation

#### Design guidance

Apartment depths are limited to maximise ventilation and airflow (see also figure 4D.3)

Natural ventilation to single aspect apartments is achieved with the following design solutions:

- primary windows are augmented with plenums and light wells (generally not suitable for cross ventilation)
- stack effect ventilation / solar chimneys or similar to naturally ventilate internal building areas or rooms such as bathrooms and laundries
- courtyards or building indentations have a width to depth ratio of 2:1 or 3:1 to ensure effective air circulation and avoid trapped smells

## 4B Natural ventilation

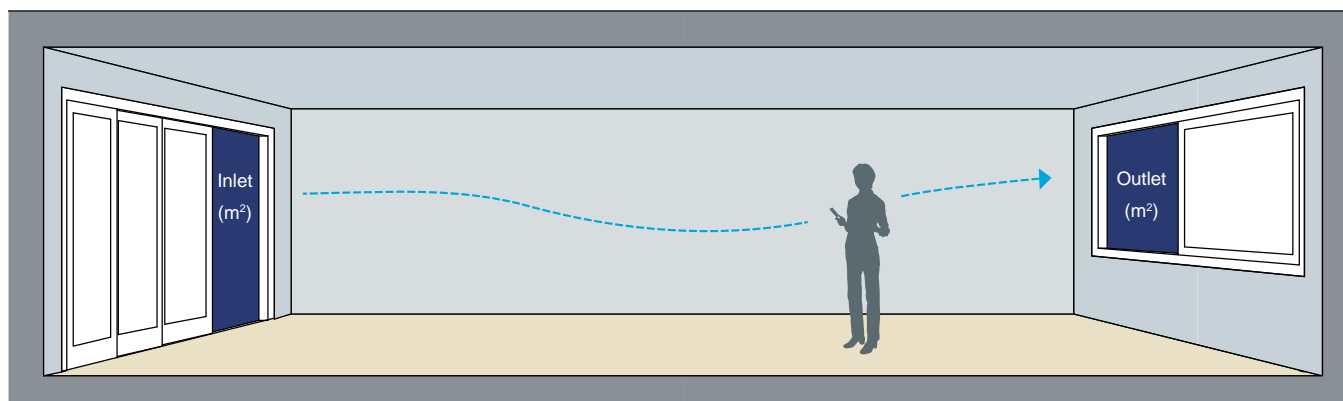


Figure 4B.3 Effective cross ventilation is achieved when the inlet and outlet have approximately the same area, allowing air to be drawn through the apartment using opposite air pressures on each side of the building

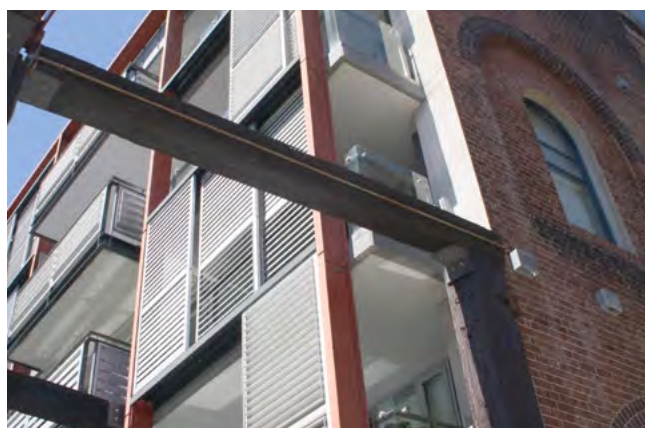


Figure 4B.4 Responding to the local climate reduces the need for mechanical ventilation and air conditioning



Figure 4B.5 Natural cross ventilation is facilitated by limited apartment depths and use of dual aspect apartments



Figure 4B.6 Natural ventilation is further enhanced by using generous window and door openings



Figure 4B.7 Operable louvres allow residents to regulate natural ventilation



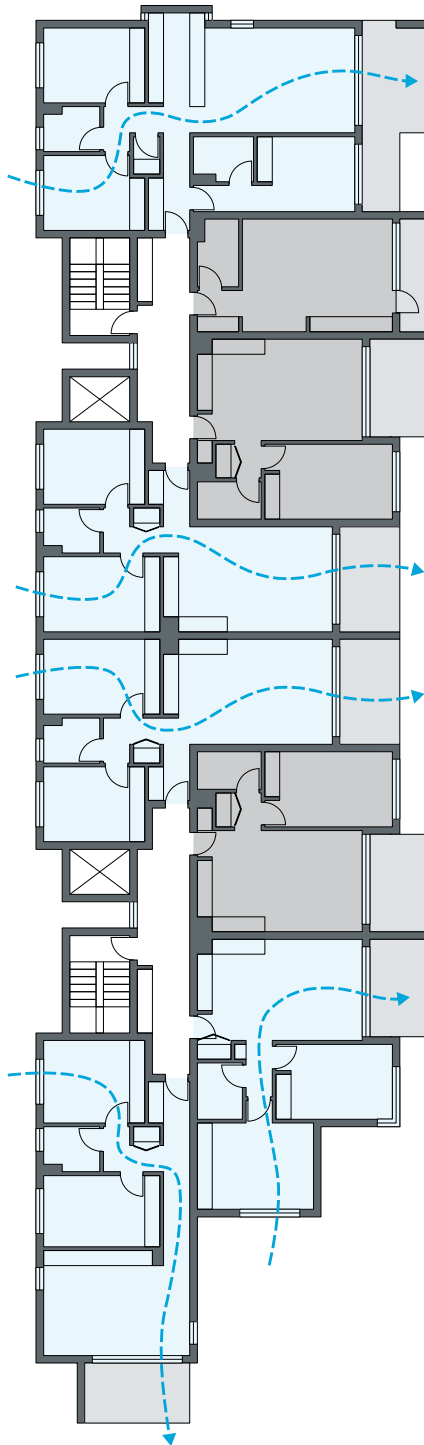


Figure 4B.8 The floor plan above demonstrates one approach for how five of a total of eight apartments achieve natural cross ventilation

### Objective 4B-3

The number of apartments with natural cross ventilation is maximised to create a comfortable indoor environment for residents

#### Design criteria

1. At least 60% of apartments are naturally cross ventilated in the first nine storeys of the building. Apartments at ten storeys or greater are deemed to be cross ventilated only if any enclosure of the balconies at these levels allows adequate natural ventilation and cannot be fully enclosed
2. Overall depth of a cross-over or cross-through apartment does not exceed 18m, measured glass line to glass line

#### Design guidance

The building should include dual aspect apartments, cross through apartments and corner apartments and limit apartment depths

In cross-through apartments external window and door opening sizes/areas on one side of an apartment (inlet side) are approximately equal to the external window and door opening sizes/areas on the other side of the apartment (outlet side) (see figure 4B.4)

Apartments are designed to minimise the number of corners, doors and rooms that might obstruct airflow

Apartment depths, combined with appropriate ceiling heights, maximise cross ventilation and airflow

## 4C Ceiling heights

Ceiling height is measured internally from finished floor level to finished ceiling level. The height of a ceiling contributes to amenity within an apartment and the perception of space. Well designed and appropriately defined ceilings can create spatial interest and hierarchy in apartments.

Ceiling height is directly linked to achieving sufficient natural ventilation and daylight access to habitable rooms. The ground and first floor levels of mixed use apartment buildings should have increased ceiling heights to ensure their longer term adaptability for other uses.

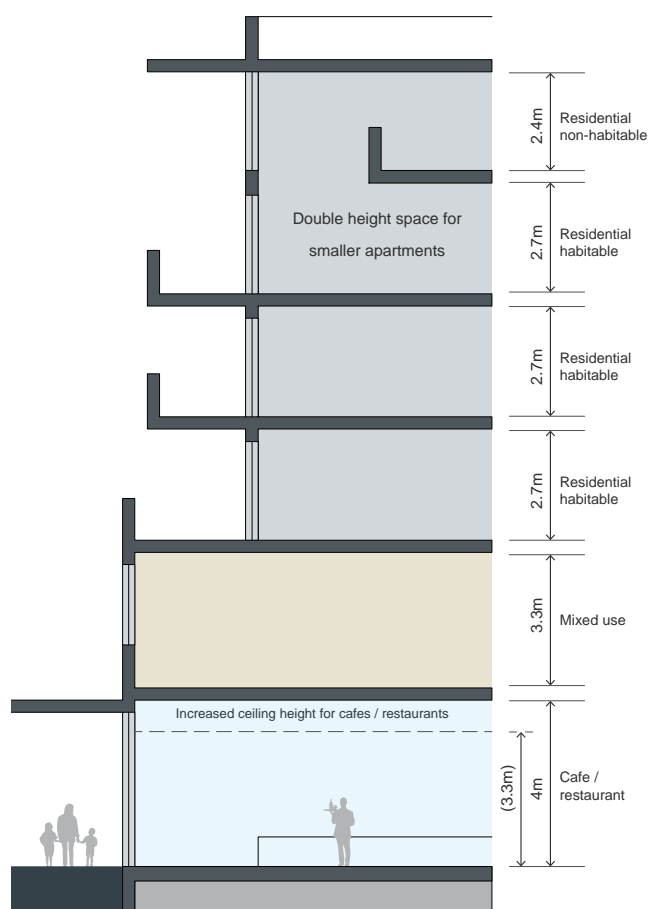


Figure 4C.1 Greater than minimum ceiling heights for retail and commercial floors of mixed use developments are encouraged to promote flexibility of use. Cafe and restaurant uses need greater minimum ceiling heights of 4m to allow for additional servicing needs

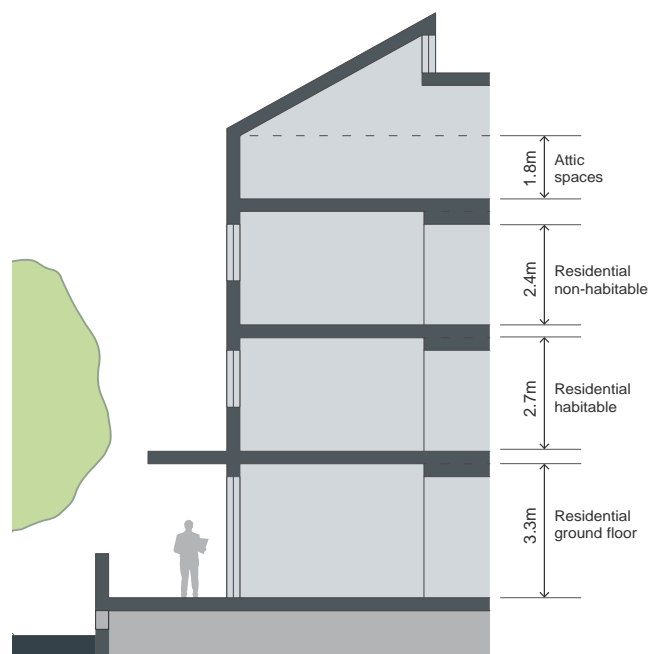


Figure 4C.2 Ceiling heights of minimum 2.7m help to achieve good daylight access and natural ventilation to residential apartments

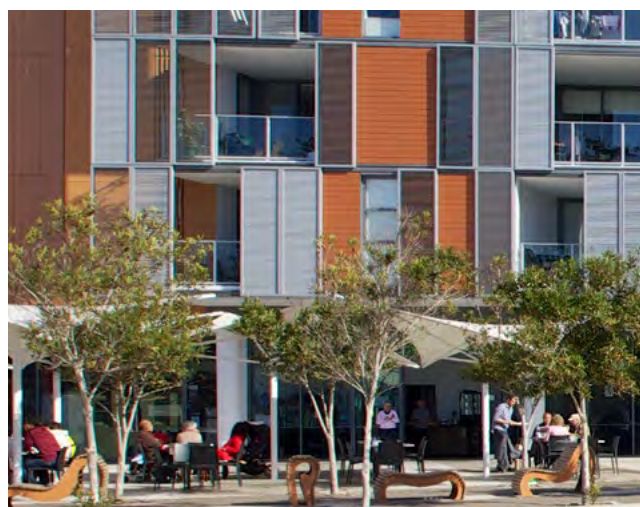


Figure 4C.3 Ground floors often need to accommodate a range of uses such as retail, cafes and restaurants, and should provide increased ceiling heights to allow for maximum flexibility of use



Figure 4C.4 Differing ceiling heights are an opportunity to provide visual interest in the building facade

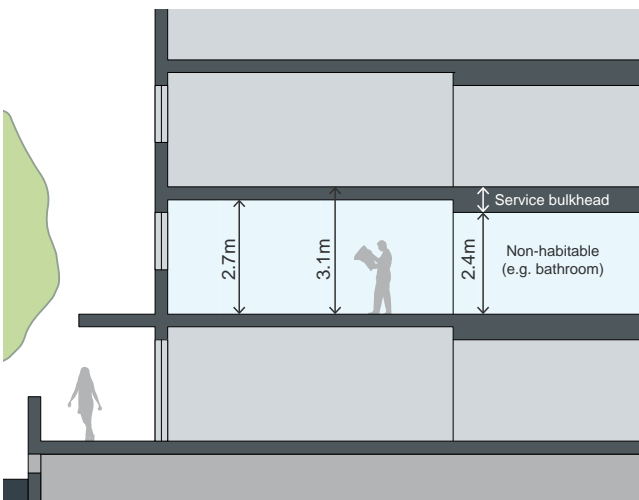


Figure 4C.5 Service bulkheads are wholly contained within non-habitable rooms and do not intrude into habitable spaces

### Objective 4C-1

Ceiling height achieves sufficient natural ventilation and daylight access

#### Design criteria

1. Measured from finished floor level to finished ceiling level, minimum ceiling heights are:

Minimum ceiling height for apartment and mixed use buildings	
Habitable rooms	2.7m
Non-habitable	2.4m
For 2 storey apartments	2.7m for main living area floor 2.4m for second floor, where its area does not exceed 50% of the apartment area
Attic spaces	1.8m at edge of room with a 30 degree minimum ceiling slope
If located in mixed used areas	3.3m for ground and first floor to promote future flexibility of use

These minimums do not preclude higher ceilings if desired

#### Design guidance

Ceiling height can accommodate use of ceiling fans for cooling and heat distribution

### Objective 4C-2

Ceiling height increases the sense of space in apartments and provides for well proportioned rooms

#### Design guidance

A number of the following design solutions can be used:

- the hierarchy of rooms in an apartment is defined using changes in ceiling heights and alternatives such as raked or curved ceilings, or double height spaces
- well proportioned rooms are provided, for example, smaller rooms feel larger and more spacious with higher ceilings
- ceiling heights are maximised in habitable rooms by ensuring that bulkheads do not intrude. The stacking of service rooms from floor to floor and coordination of bulkhead location above non-habitable areas, such as robes or storage, can assist

### Objective 4C-3

Ceiling heights contribute to the flexibility of building use over the life of the building

#### Design guidance

Ceiling heights of lower level apartments in centres should be greater than the minimum required by the design criteria allowing flexibility and conversion to non-residential uses (see figure 4C.1)

## 4D Apartment size and layout

The layout of an apartment establishes the way rooms of different functions are arranged and located, the size of the rooms, the circulation between rooms and the degree of privacy for each room.

In addition, the layout directly impacts the quality of residential amenity by incorporating appropriate room shapes and window designs to deliver daylight and sunlight, natural ventilation, and acoustic and visual privacy. The apartment layout also includes private open space and conveniently located storage.

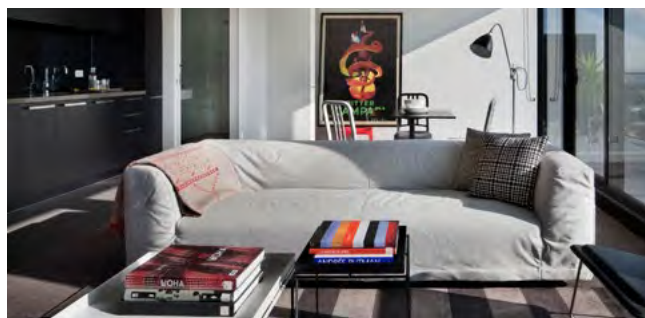


Figure 4D.1 This living area has a combined kitchen dining area that opens directly onto the balcony



Figure 4D.2 For open plan layouts, combining the living room, dining room and kitchen, the maximum room depth is 8 metres from a window

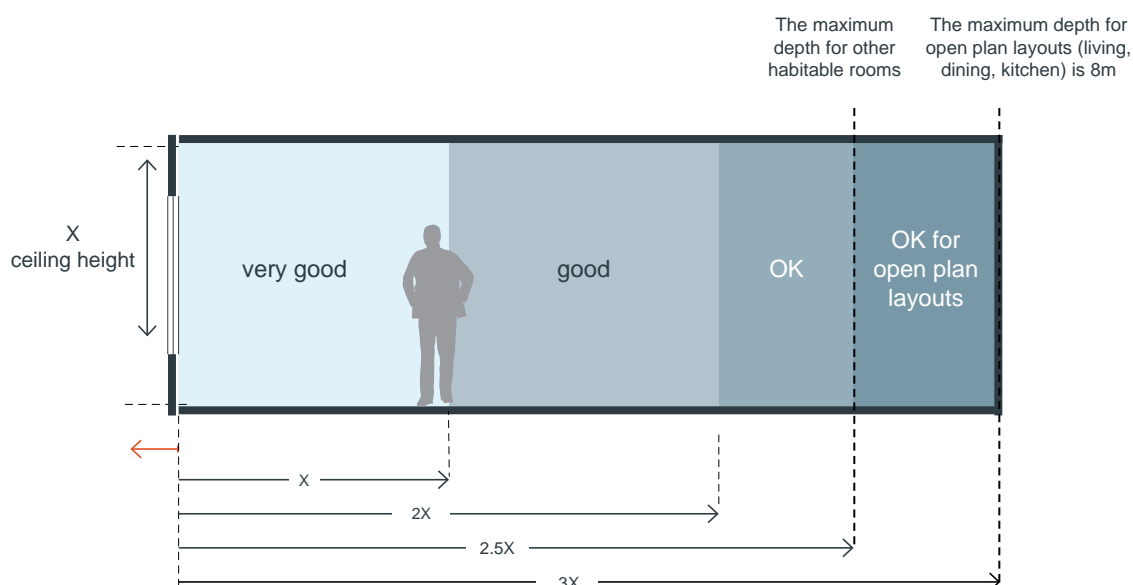
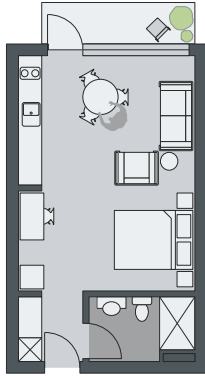


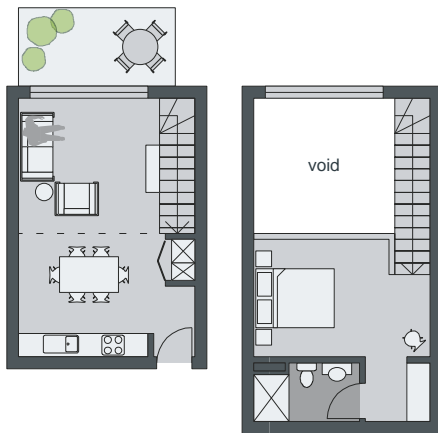
Figure 4D.3 The depth of a single aspect apartment relative to the ceiling height directly influences the quality of natural ventilation and daylight access. The maximum depth of open plan layouts that combine living, dining and kitchen spaces is 8 metres

## Indicative layouts

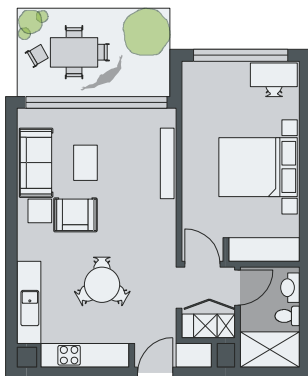
### studio



### 1 bedroom



1 bedroom single aspect mezzanine



1 bedroom single aspect

Figure 4D.4 Diagrams showing indicative layouts for small apartments  
Note: these do not represent the only solutions

## Objective 4D-1

The layout of rooms within an apartment is functional, well organised and provides a high standard of amenity

### Design criteria

1. Apartments are required to have the following minimum internal areas:

Apartment type	Minimum internal area
Studio	35m <sup>2</sup>
1 bedroom	50m <sup>2</sup>
2 bedroom	70m <sup>2</sup>
3 bedroom	90m <sup>2</sup>

The minimum internal areas include only one bathroom. Additional bathrooms increase the minimum internal area by 5m<sup>2</sup> each

A fourth bedroom and further additional bedrooms increase the minimum internal area by 12m<sup>2</sup> each

2. Every habitable room must have a window in an external wall with a total minimum glass area of not less than 10% of the floor area of the room. Daylight and air may not be borrowed from other rooms

### Design guidance

Kitchens should not be located as part of the main circulation space in larger apartments (such as hallway or entry space)

A window should be visible from any point in a habitable room

Where minimum areas or room dimensions are not met apartments need to demonstrate that they are well designed and demonstrate the usability and functionality of the space with realistically scaled furniture layouts and circulation areas. These circumstances would be assessed on their merits

## Objective 4D-2

Environmental performance of the apartment is maximised

### Design criteria

1. Habitable room depths are limited to a maximum of 2.5 x the ceiling height
2. In open plan layouts (where the living, dining and kitchen are combined) the maximum habitable room depth is 8m from a window

### Design guidance

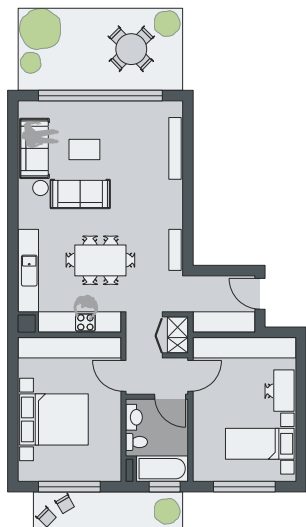
Greater than minimum ceiling heights can allow for proportional increases in room depth up to the permitted maximum depths

All living areas and bedrooms should be located on the external face of the building

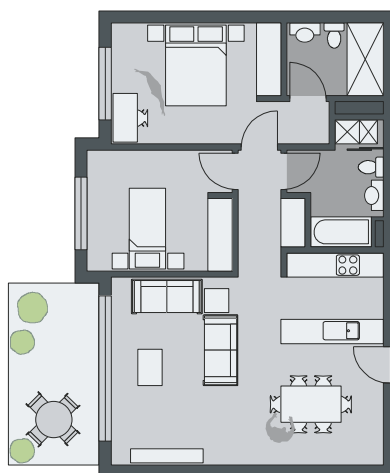
# 4D Apartment size and layout

## Indicative layouts

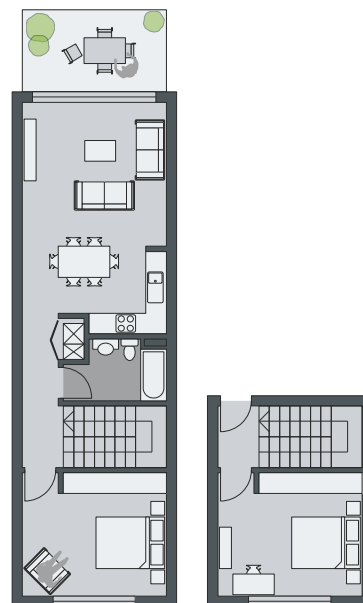
### 2 bedroom



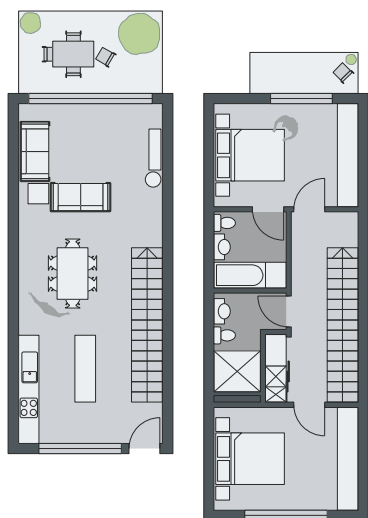
2 bedroom "L" dual aspect apartment



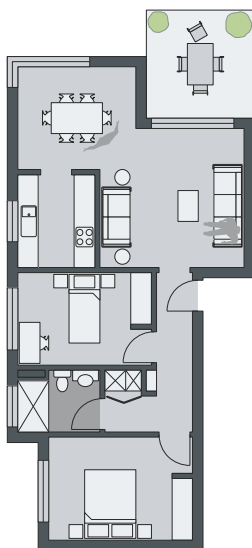
2 bedroom mid-floor plate single aspect



2 bedroom mid-floor plate cross-over



2 bedroom mid-floor plate 2 storey gallery access

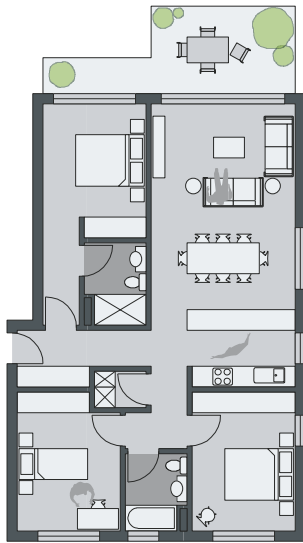


2 bedroom corner apartment

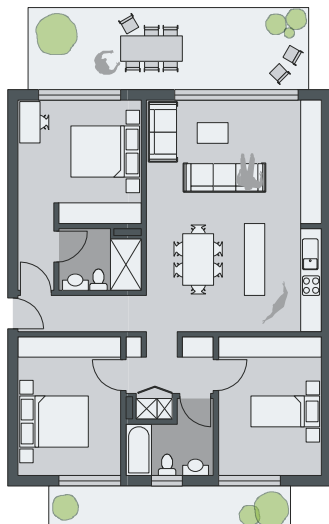
Figure 4D.5 Diagrams showing indicative layouts for 2 bedroom apartments  
 Note: these do not represent the only solutions

## Indicative layouts

### 3 bedroom



3 bedroom corner apartment



3 bedroom mid-floor plate cross-through apartment

Figure 4D.6 Diagrams showing indicative layouts for 3 bedroom apartments  
*Note: these do not represent the only solutions*

Where possible:

- bathrooms and laundries should have an external openable window
- main living spaces should be oriented toward the primary outlook and aspect and away from noise sources

### Objective 4D-3

Apartment layouts are designed to accommodate a variety of household activities and needs

#### Design criteria

1. Master bedrooms have a minimum area of 10m<sup>2</sup> and other bedrooms 9m<sup>2</sup> (excluding wardrobe space)
2. Bedrooms have a minimum dimension of 3m (excluding wardrobe space)
3. Living rooms or combined living/dining rooms have a minimum width of:
  - 3.6m for studio and 1 bedroom apartments
  - 4m for 2 and 3 bedroom apartments
4. The width of cross-over or cross-through apartments are at least 4m internally to avoid deep narrow apartment layouts

#### Design guidance

Access to bedrooms, bathrooms and laundries is separated from living areas minimising direct openings between living and service areas

All bedrooms allow a minimum length of 1.5m for robes

The main bedroom of an apartment or a studio apartment should be provided with a wardrobe of a minimum 1.8m long, 0.6m deep and 2.1m high

Apartment layouts allow flexibility over time, design solutions may include:

- dimensions that facilitate a variety of furniture arrangements and removal
- spaces for a range of activities and privacy levels between different spaces within the apartment
- dual master apartments
- dual key apartments

*Note: dual key apartments which are separate but on the same title are regarded as two sole occupancy units for the purposes of the Building Code of Australia and for calculating the mix of apartments*

- room sizes and proportions or open plans (rectangular spaces (2:3) are more easily furnished than square spaces (1:1))
- efficient planning of circulation by stairs, corridors and through rooms to maximise the amount of usable floor space in rooms

## 4E Private open space and balconies

Private open spaces are outdoor spaces of the apartment, including balconies, courtyards and terraces, which enhance the amenity and indoor/outdoor lifestyle of residents. They capitalise on New South Wales' temperate climate, providing an area for external activities and an extension of living spaces.

Balconies that are safe and appropriately designed can provide space for children to play outdoors, and the opportunity for pet ownership.

Private open spaces are also important architectural elements on the outside of an apartment building, contributing to the form and articulation of the building with fences, balustrades and screens.

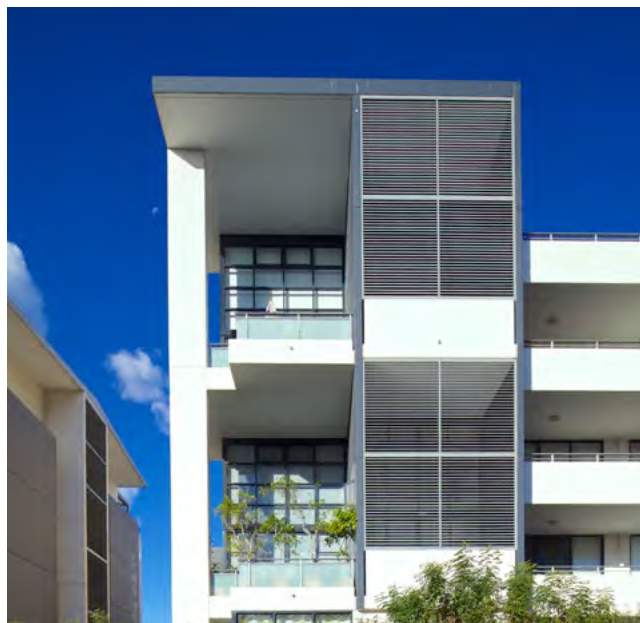


Figure 4E.1 Balconies, courtyards and terraces enhance the amenity and indoor/outdoor lifestyle of residents

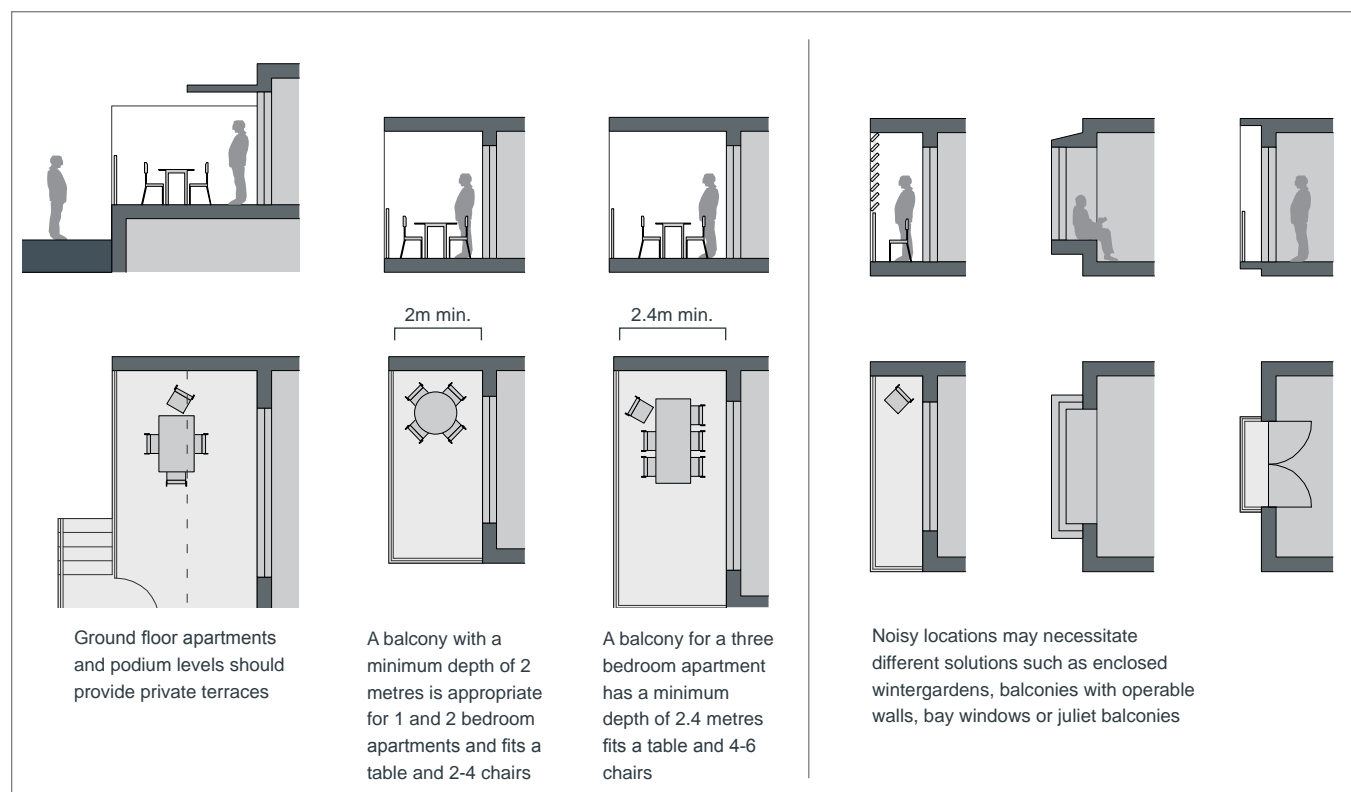


Figure 4E.2 Diagrams illustrating minimum balcony depth and options for noise treatment



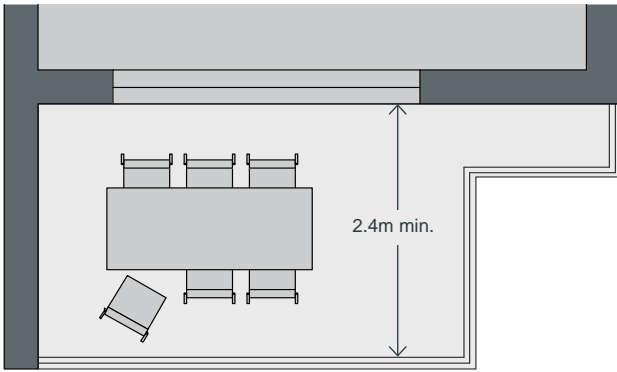


Figure 4E.3 Minimum balcony depths ensure that the balcony area is useable and can be easily accessed



Figure 4E.4 Building layout should maximise balcony use by allowing access from the main living area and a bedroom (where possible). Secondary balconies provide further amenity to apartment living and are best accessed off kitchens and laundries



Figure 4E.5 Primary balconies provide outdoor living, articulate the building facade and contribute to the safety of the public domain through increased surveillance opportunities

### Objective 4E-1

Apartments provide appropriately sized private open space and balconies to enhance residential amenity

#### Design criteria

1. All apartments are required to have primary balconies as follows:

Dwelling type	Minimum area	Minimum depth
Studio apartments	4m <sup>2</sup>	-
1 bedroom apartments	8m <sup>2</sup>	2m
2 bedroom apartments	10m <sup>2</sup>	2m
3+ bedroom apartments	12m <sup>2</sup>	2.4m

The minimum balcony depth to be counted as contributing to the balcony area is 1m

2. For apartments at ground level or on a podium or similar structure, a private open space is provided instead of a balcony. It must have a minimum area of 15m<sup>2</sup> and a minimum depth of 3m

#### Design guidance

Increased communal open space should be provided where the number or size of balconies are reduced

Storage areas on balconies is additional to the minimum balcony size

Balcony use may be limited in some proposals by:

- consistently high wind speeds at 10 storeys and above
- close proximity to road, rail or other noise sources
- exposure to significant levels of aircraft noise
- heritage and adaptive reuse of existing buildings

In these situations, juliet balconies, operable walls, enclosed wintergardens or bay windows may be appropriate, and other amenity benefits for occupants should also be provided in the apartments or in the development or both. Natural ventilation also needs to be demonstrated

### Objective 4E-2

Primary private open space and balconies are appropriately located to enhance liveability for residents

#### Design guidance

Primary open space and balconies should be located adjacent to the living room, dining room or kitchen to extend the living space

Private open spaces and balconies predominantly face north, east or west

Primary open space and balconies should be orientated with the longer side facing outwards or be open to the sky to optimise daylight access into adjacent rooms

## 4E Private open space and balconies



Figure 4E.6 For one and two bedroom apartments, balconies should be at least 2m deep to allow enough space for a small table



Figure 4E.7 Balconies should be designed to be safe outdoor spaces for children

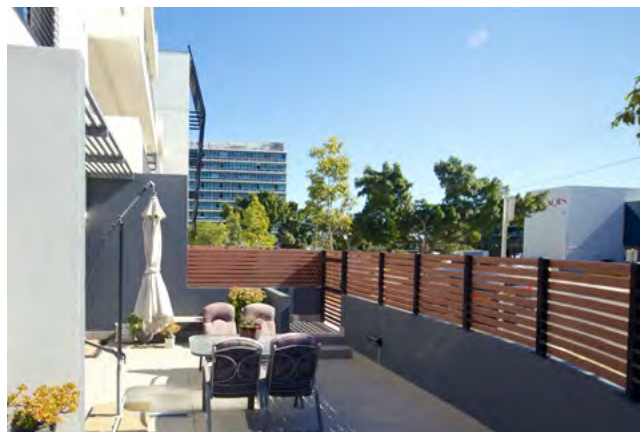


Figure 4E.8 Partially solid fences and balustrades allow views and passive surveillance of the street while maintaining visual privacy to ground level apartments

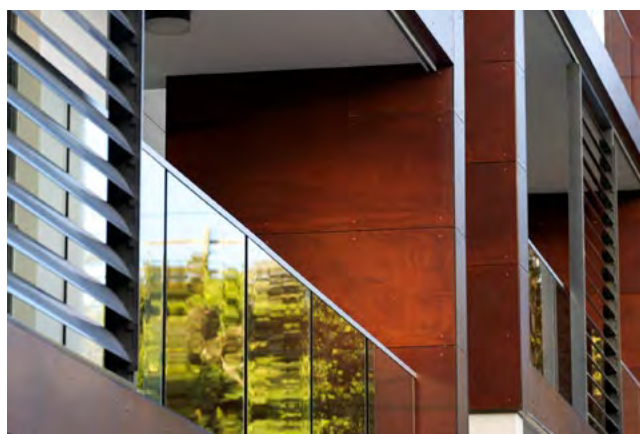


Figure 4E.9 A combination of solid and transparent materials balances the need for privacy with surveillance of the public domain



Figure 4E.10 Viewed from the inside, screening increases privacy and allows for storage and external clothes drying



Figure 4E.11 Setting the balustrade back from the building edge allows for landscaping towards the street for increased privacy



Photo: Michael Zamardo

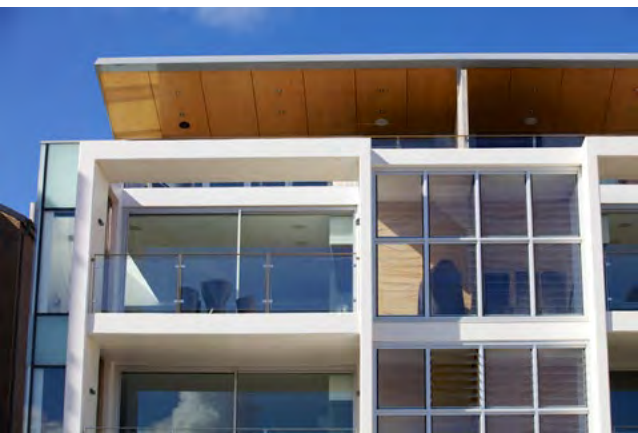


Figure 4E.12 Soffits and undersides of balconies should be well detailed as they are visible from the street

### Objective 4E-3

Private open space and balcony design is integrated into and contributes to the overall architectural form and detail of the building

#### Design guidance

Solid, partially solid or transparent fences and balustrades are selected to respond to the location. They are designed to allow views and passive surveillance of the street while maintaining visual privacy and allowing for a range of uses on the balcony. Solid and partially solid balustrades are preferred

Full width full height glass balustrades alone are generally not desirable

Projecting balconies should be integrated into the building design and the design of soffits considered

Operable screens, shutters, hoods and pergolas are used to control sunlight and wind

Balustrades are set back from the building or balcony edge where overlooking or safety is an issue

Downpipes and balcony drainage are integrated with the overall facade and building design

Air-conditioning units should be located on roofs, in basements, or fully integrated into the building design

Where clothes drying, storage or air conditioning units are located on balconies, they should be screened and integrated in the building design

Ceilings of apartments below terraces should be insulated to avoid heat loss

Water and gas outlets should be provided for primary balconies and private open space

### Objective 4E-4

Private open space and balcony design maximises safety

#### Design guidance

Changes in ground levels or landscaping are minimised

Design and detailing of balconies avoids opportunities for climbing and falls

## 4F Common circulation and spaces

Common circulation and spaces within a building are shared communally by residents. They include lobbies, internal corridors and external galleries, vertical circulation such as lifts and stairs, as well as community rooms and other spaces.

Common circulation spaces provide opportunities for casual social interaction among residents and can assist with social recognition. Important design considerations include safety, amenity and durability. In addition, the choice of common circulation types has a direct influence on the apartment types provided, building form, articulation and the building's relationship to the street.

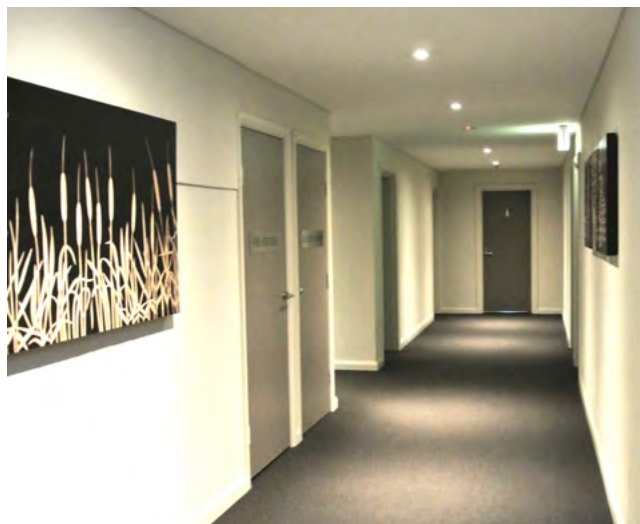


Figure 4F.1 The maximum number of apartments sharing a circulation core is eight



Figure 4F.2 The total number of apartments accessed off one circulation core should be eight or fewer



Figure 4F.3 External gallery access can be useful to maximise a desirable aspect for apartments or as a buffer to a noise source



Figure 4F.4 Multiple cores improve natural cross ventilation and provide more entries along the street, increasing activity and passive surveillance



Figure 4F.5 Mixed use buildings may have a range of circulation spaces including multiple cores, gallery access and double-loaded corridors with cross-over apartments



Figure 4F.6 Common areas should be provided in larger developments

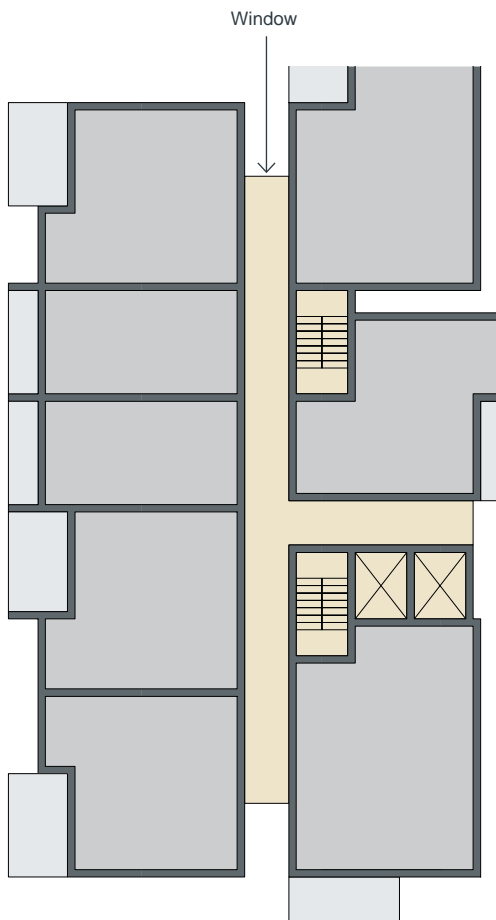


Figure 4F.7 Windows provide daylight and natural ventilation to common circulation spaces

### Objective 4F-1

Common circulation spaces achieve good amenity and properly service the number of apartments

#### Design criteria

1. The maximum number of apartments off a circulation core on a single level is eight
2. For buildings of 10 storeys and over, the maximum number of apartments sharing a single lift is 40

#### Design guidance

Greater than minimum requirements for corridor widths and/or ceiling heights allow comfortable movement and access particularly in entry lobbies, outside lifts and at apartment entry doors

Daylight and natural ventilation should be provided to all common circulation spaces that are above ground

Windows should be provided in common circulation spaces and should be adjacent to the stair or lift core or at the ends of corridors

Longer corridors greater than 12m in length from the lift core should be articulated. Design solutions may include:

- a series of foyer areas with windows and spaces for seating
- wider areas at apartment entry doors and varied ceiling heights

Design common circulation spaces to maximise opportunities for dual aspect apartments, including multiple core apartment buildings and cross over apartments

Achieving the design criteria for the number of apartments off a circulation core may not be possible. Where a development is unable to achieve the design criteria, a high level of amenity for common lobbies, corridors and apartments should be demonstrated, including:

- sunlight and natural cross ventilation in apartments
- access to ample daylight and natural ventilation in common circulation spaces
- common areas for seating and gathering
- generous corridors with greater than minimum ceiling heights
- other innovative design solutions that provide high levels of amenity

Where design criteria 1 is not achieved, no more than 12 apartments should be provided off a circulation core on a single level

Primary living room or bedroom windows should not open directly onto common circulation spaces, whether open or enclosed. Visual and acoustic privacy from common circulation spaces to any other rooms should be carefully controlled

## 4F Common circulation and spaces



Figure 4F.8 Incidental spaces can be used to provide seating opportunities for residents



Figure 4F.9 Natural daylight improves the amenity of common circulation areas and increases the likelihood of social interaction between residents



Photo: Michael Zanardo

Figure 4F.10 Common circulation spaces should provide short sight lines and be well lit at night



Figure 4F.11 Space for seating in common circulation spaces promotes opportunities for social interaction

### Objective 4F-2

Common circulation spaces promote safety and provide for social interaction between residents

#### Design guidance

Direct and legible access should be provided between vertical circulation points and apartment entries by minimising corridor or gallery length to give short, straight, clear sight lines

Tight corners and spaces are avoided

Circulation spaces should be well lit at night

Legible signage should be provided for apartment numbers, common areas and general wayfinding

Incidental spaces, for example space for seating in a corridor, at a stair landing, or near a window are provided

In larger developments, community rooms for activities such as owners corporation meetings or resident use should be provided and are ideally co-located with communal open space

Where external galleries are provided, they are more open than closed above the balustrade along their length

## 4G Storage

Adequate storage is an important component of apartment design. It is calculated by volume as opposed to floor area and should be provided proportionally to the size of the apartment.

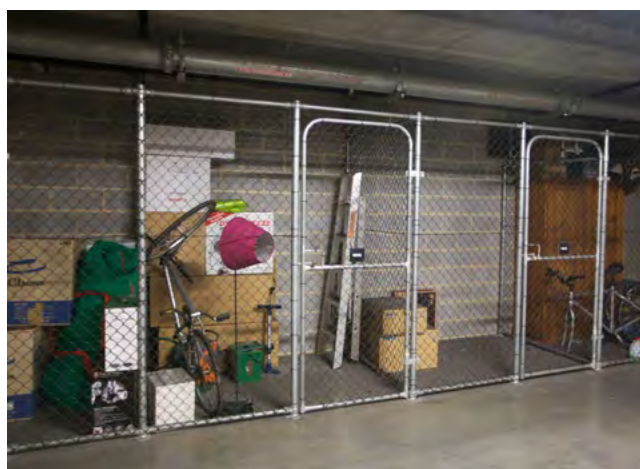
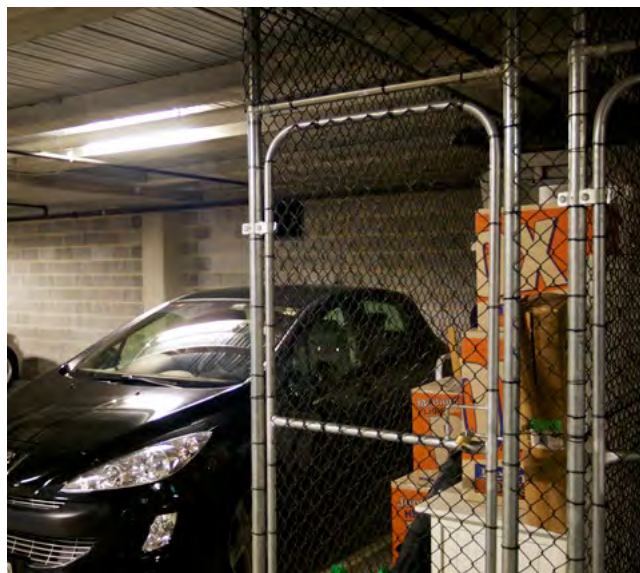


Figure 4G.1 Areas in car parks provide an opportunity to incorporate secure and convenient storage facilities for residents





Figure 4G.2 Storage within an apartment needs to be convenient and accessible from circulation or living areas



Figure 4G.3 Storage located on private balconies or within courtyards should be fully integrated and screened from view

### Objective 4G-1

Adequate, well designed storage is provided in each apartment

#### Design criteria

1. In addition to storage in kitchens, bathrooms and bedrooms, the following storage is provided:

Dwelling type	Storage size volume
Studio apartments	4m <sup>3</sup>
1 bedroom apartments	6m <sup>3</sup>
2 bedroom apartments	8m <sup>3</sup>
3+ bedroom apartments	10m <sup>3</sup>

At least 50% of the required storage is to be located within the apartment

#### Design guidance

Storage is accessible from either circulation or living areas

Storage provided on balconies (in addition to the minimum balcony size) is integrated into the balcony design, weather proof and screened from view from the street

Left over space such as under stairs is used for storage

### Objective 4G-2

Additional storage is conveniently located, accessible and nominated for individual apartments

#### Design guidance

Storage not located in apartments is secure and clearly allocated to specific apartments

Storage is provided for larger and less frequently accessed items

Storage space in internal or basement car parks is provided at the rear or side of car spaces or in cages so that allocated car parking remains accessible

If communal storage rooms are provided they should be accessible from common circulation areas of the building

Storage not located in an apartment is integrated into the overall building design and is not visible from the public domain

## 4H Acoustic privacy

Acoustic privacy is about protecting sound transmission between external and internal spaces, between apartments and communal areas and between apartments within a building.

Designing for acoustic privacy considers the site context, surrounding uses, building separation, the location of public and private open spaces and the arrangement of internal spaces in a building.

This section outlines typical considerations for acoustic privacy. For constrained sites such as sites near a rail corridor, major roads or underneath flight paths, refer to section 4J Noise and pollution for further guidance.

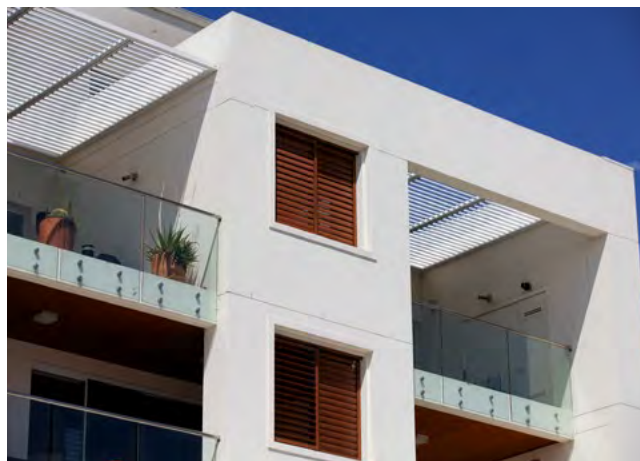


Figure 4H.1 Appropriate finishes, treatments and construction methods help reduce noise transmission through walls and floors

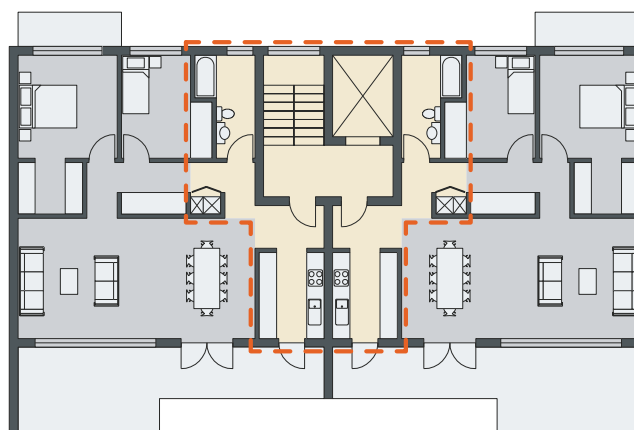


Figure 4H.2 The building layout should ensure that amenity impacts from noise are reduced to both living areas and bedrooms. The plan above locates living spaces away from the noisy access core



Figure 4H.3 The timing and extent of activities allowed in common areas should be considered and appropriately managed



Figure 4H.4 Bedrooms should be located at least 3m away from noise sources such as driveways and garage doors



Figure 4H.5 In addition to mindful siting and orientation of the building, acoustic seals and double or triple glazing are effective methods to further reduce noise transmission

### Objective 4H-1

Noise transfer is minimised through the siting of buildings and building layout

#### Design guidance

Adequate building separation is provided within the development and from neighbouring buildings/adjacent uses (see also section 2F Building separation and section 3F Visual privacy)

Window and door openings are generally orientated away from noise sources

Noisy areas within buildings including building entries and corridors should be located next to or above each other and quieter areas next to or above quieter areas

Storage, circulation areas and non-habitable rooms should be located to buffer noise from external sources

The number of party walls (walls shared with other apartments) are limited and are appropriately insulated

Noise sources such as garage doors, driveways, service areas, plant rooms, building services, mechanical equipment, active communal open spaces and circulation areas should be located at least 3m away from bedrooms

### Objective 4H-2

Noise impacts are mitigated within apartments through layout and acoustic treatments

#### Design guidance

Internal apartment layout separates noisy spaces from quiet spaces, using a number of the following design solutions:

- rooms with similar noise requirements are grouped together
- doors separate different use zones
- wardrobes in bedrooms are co-located to act as sound buffers

Where physical separation cannot be achieved noise conflicts are resolved using the following design solutions:

- double or acoustic glazing
- acoustic seals
- use of materials with low noise penetration properties
- continuous walls to ground level courtyards where they do not conflict with streetscape or other amenity requirements

## 4J Noise and pollution

Properties located near major roads, rail lines and beneath flight paths can be subject to noise and poor air quality. Similarly, hostile and noisy environments such as industrial areas, substations or sports stadiums can have impacts on residential amenity. Careful design solutions can help to improve quality of life in affected apartments by minimising potential noise and pollution impacts.

This section addresses design responses on sites that are affected by significant noise and pollution sources. Section 4H Acoustic privacy deals with more typical residential developments that do not face these challenges.

### Development near rail corridors and busy roads

The NSW Government's *Development near Rail Corridors and Busy Roads - Interim Guideline* as called up by *State Environmental Planning Policy (Infrastructure) 2007* assists in the planning, design and assessment of development in, or adjacent to, rail corridors and busy roads. SEPP 65 development in these locations must have regard to this Guideline.



Figure 4J.1 Where balconies are oriented away from a noise source, changes in facade texture and detail along the busy road can assist in dispersing noise. This mixed use development is located on a busy road and is designed with limited openings exposed to the noise source

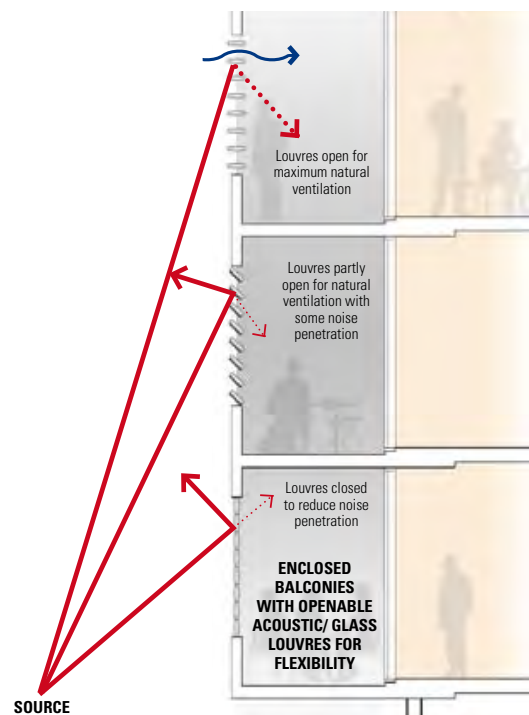


Figure 4J.2 Enclosing balconies to function as wintergardens is an effective means of reducing road and rail noise (Source: Development Near Rail Corridors And Busy Roads – Interim Guideline, NSW)

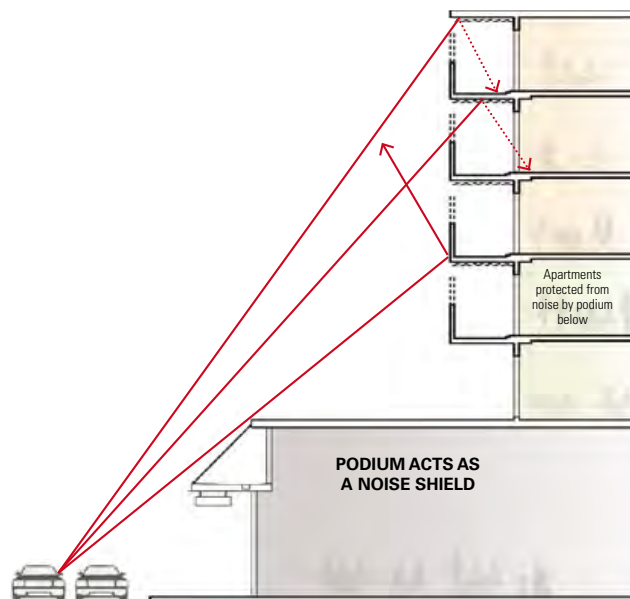


Figure 4J.3 Setting back the residential component above a podium helps shield apartments from major noise. Balcony soffits can be treated with sound absorption to assist to mitigate noise (Source: Development Near Rail Corridors And Busy Roads – Interim Guideline, NSW)

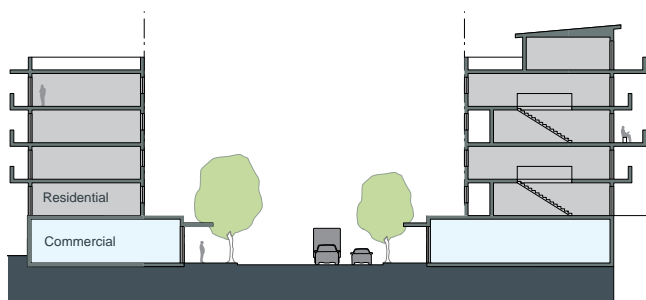


Figure 4J.4 Manage noise and pollution by providing non-residential uses at lower levels (vertical separation), setting-back residential uses (horizontal separation) and orienting private open space and windows that provide natural ventilation to habitable rooms away from the busy road or rail corridor

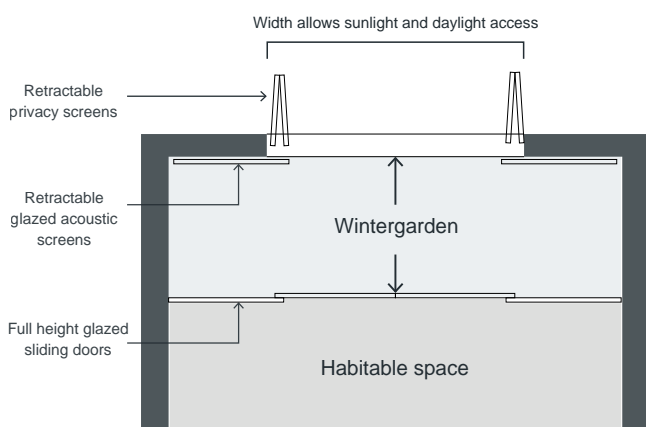


Figure 4J.5 Balconies designed as acoustically sealed wintergardens can improve liveability of the balcony and adjoining habitable rooms. In considering how much of the facade is solid or open, the width of the openings needs to be sufficient to allow sunlight and daylight access

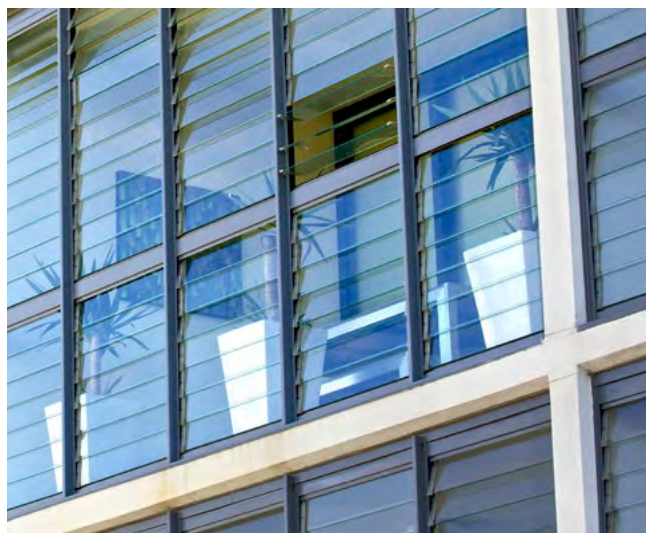


Figure 4J.6 Wintergardens can be either closed off or incorporated as living space, depending on the time of day and local conditions

### Objective 4J-1

In noisy or hostile environments the impacts of external noise and pollution are minimised through the careful siting and layout of buildings

#### Design guidance

To minimise impacts the following design solutions may be used:

- physical separation between buildings and the noise or pollution source
- residential uses are located perpendicular to the noise source and where possible buffered by other uses
- non-residential buildings are sited to be parallel with the noise source to provide a continuous building that shields residential uses and communal open spaces
- non-residential uses are located at lower levels vertically separating the residential component from the noise or pollution source. Setbacks to the underside of residential floor levels should increase relative to traffic volumes and other noise sources
- buildings should respond to both solar access and noise. Where solar access is away from the noise source, non-habitable rooms can provide a buffer
- where solar access is in the same direction as the noise source, dual aspect apartments with shallow building depths are preferable (see figure 4J.4)
- landscape design reduces the perception of noise and acts as a filter for air pollution generated by traffic and industry

Achieving the design criteria in this Apartment Design Guide may not be possible in some situations due to noise and pollution. Where developments are unable to achieve the design criteria, alternatives may be considered in the following areas:

- solar and daylight access
- private open space and balconies
- natural cross ventilation

### Objective 4J-2

Appropriate noise shielding or attenuation techniques for the building design, construction and choice of materials are used to mitigate noise transmission

#### Design guidance

Design solutions to mitigate noise include:

- limiting the number and size of openings facing noise sources
- providing seals to prevent noise transfer through gaps
- using double or acoustic glazing, acoustic louvres or enclosed balconies (wintergardens)
- using materials with mass and/or sound insulation or absorption properties e.g. solid balcony balustrades, external screens and soffits

## 4K Apartment mix

Apartment mix refers to the percentage of apartments with different numbers of bedrooms in a development. The number of bedrooms is directly related to floor area which in turn determines the yield that can be generated on the site.

A mix of apartment types provides housing choice and supports equitable housing access. By accommodating a range of household types, apartment buildings support the needs of the community now and into the future. This is particularly important because apartment buildings form a significant and often long term part of the urban fabric.



Figure 4K.1 The mix of apartments provided in a development should respond to the housing needs of the local area



Figure 4K.2 Apartment mix that is reflected in the facade composition adds variety and visual interest

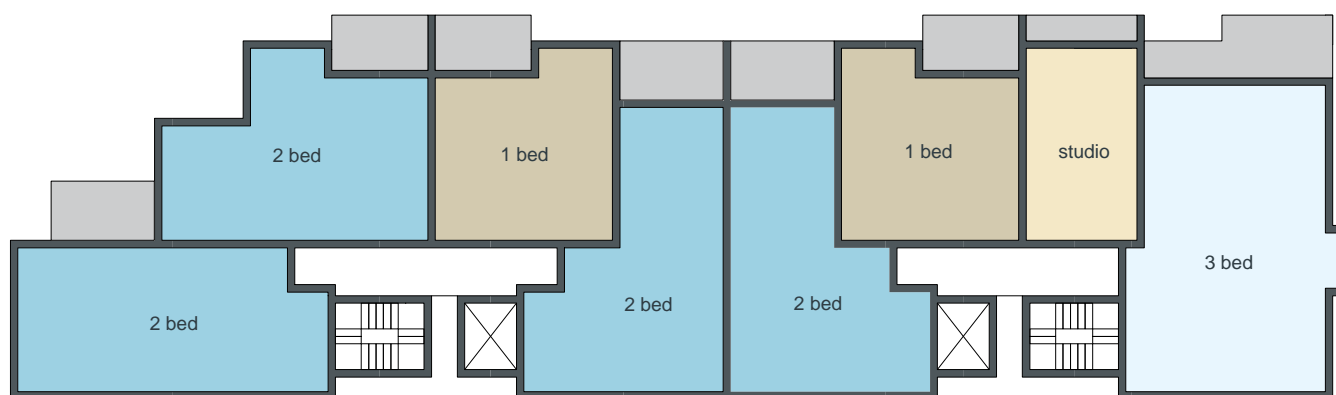


Figure 4K.3 A variety of apartments can be accommodated within a floor plate

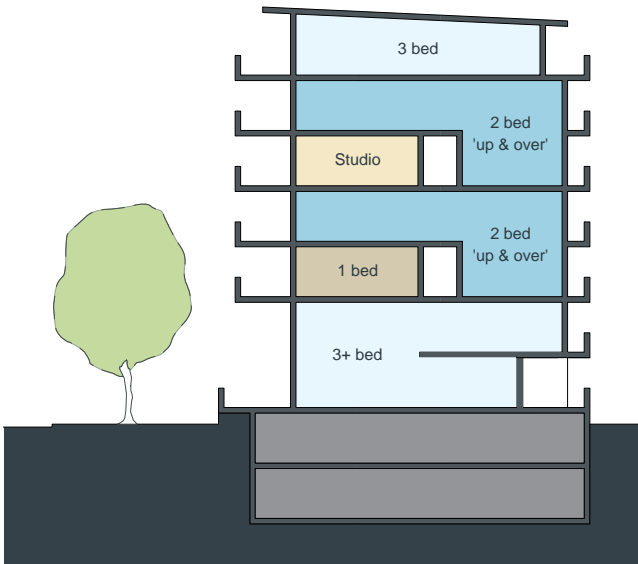


Figure 4K.4 Large apartments are often located on the ground or roof level due to opportunities for increased private open space. Internal common circulation (e.g. corridors) can be reduced by adding 'up and over' apartments to the mix



Figure 4K.5 Flexible apartment configurations should be provided to support diverse household types and stages of life

### Objective 4K-1

A range of apartment types and sizes is provided to cater for different household types now and into the future

#### Design guidance

A variety of apartment types is provided

The apartment mix is appropriate, taking into consideration:

- the distance to public transport, employment and education centres
- the current market demands and projected future demographic trends
- the demand for social and affordable housing
- different cultural and socioeconomic groups

Flexible apartment configurations are provided to support diverse household types and stages of life including single person households, families, multi-generational families and group households

### Objective 4K-2

The apartment mix is distributed to suitable locations within the building

#### Design guidance

Different apartment types are located to achieve successful facade composition and to optimise solar access (see figure 4K.3)

Larger apartment types are located on the ground or roof level where there is potential for more open space and on corners where more building frontage is available

## 4L Ground floor apartments

Ground floor apartments offer the potential for at-grade landscaped private open spaces and direct access from the street. They also provide opportunities for the apartment building and its landscape to respond to the human scale of the streetscape. On steep sites they may be located over different floors of the building stepping down the site.

Ground floor apartments can be of particular benefit to the elderly and disabled as they are generally more accessible. They also suit families with small children and extend the lifestyle choices available in apartment buildings by facilitating activities such as home business, gardening, outdoor play and pet ownership.

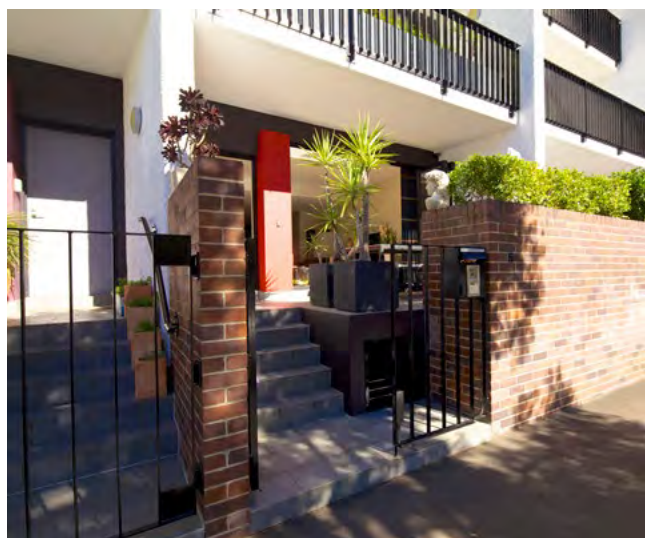


Figure 4L.1 Ground floor apartments should address the public domain and be accessed directly from the street



Figure 4L.2 The ground floor component of this double storey apartment is flexible and can be used as a home office

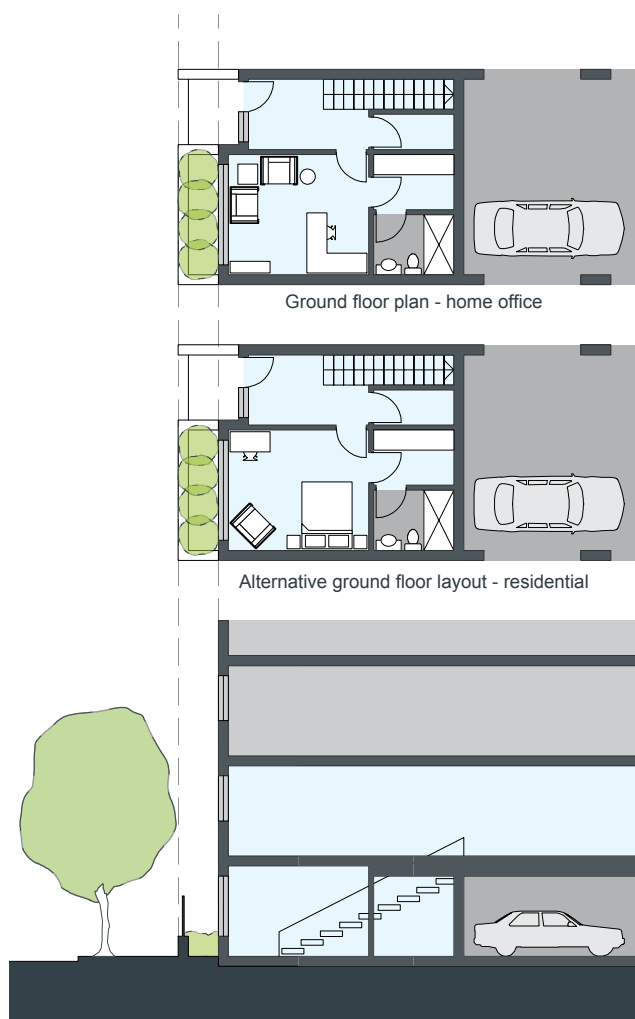


Figure 4L.3 Plan and section of a double storey apartment which is directly accessible from the street



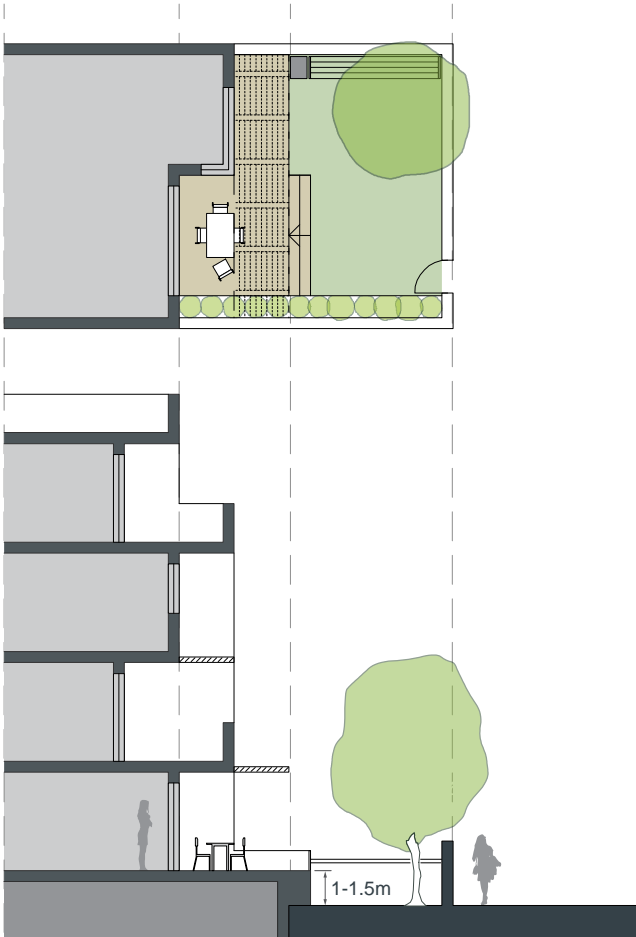


Figure 4L.4 Plan and section of a ground floor apartment with an elevated terrace and a level private courtyard

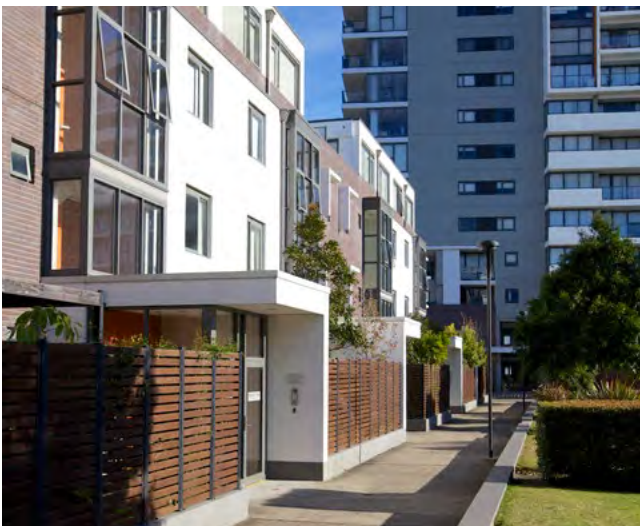


Figure 4L.5 The design of courtyards should balance the need for privacy of ground floor apartments with surveillance of public spaces

### Objective 4L-1

Street frontage activity is maximised where ground floor apartments are located

#### Design guidance

Direct street access should be provided to ground floor apartments

Activity is achieved through front gardens, terraces and the facade of the building. Design solutions may include:

- both street, foyer and other common internal circulation entrances to ground floor apartments
- private open space is next to the street
- doors and windows face the street

Retail or home office spaces should be located along street frontages

Ground floor apartment layouts support small office home office (SOHO) use to provide future opportunities for conversion into commercial or retail areas. In these cases provide higher floor to ceiling heights and ground floor amenities for easy conversion

### Objective 4L-2

Design of ground floor apartments delivers amenity and safety for residents

#### Design guidance

Privacy and safety should be provided without obstructing casual surveillance. Design solutions may include:

- elevation of private gardens and terraces above the street level by 1-1.5m (see figure 4L.4)
- landscaping and private courtyards
- window sill heights that minimise sight lines into apartments
- integrating balustrades, safety bars or screens with the exterior design

Solar access should be maximised through:

- high ceilings and tall windows
- trees and shrubs that allow solar access in winter and shade in summer

## 4M Facades

The design of facades contributes greatly to the visual interest of the building and the character of the local area. Facades that face the street have an impact on the public domain, while side and rear facades often influence the amenity of neighbouring buildings and communal and private open spaces.

High quality facades are a balanced composition of building elements, textures, materials and colour selections. Well designed facades also reflect the use, internal layout and structure of an apartment building.

The composition and detailing of a facade is not only important to the appearance of the building, it also influences its perceived scale. The pattern and repetitions of the facade, the proportions and articulation of external walls and the detailed design of facade elements are all important considerations.



Figure 4M.1 Thoughtful modulation of the facade reduces the perceived depth and bulk of a building



Figure 4M.2 Building facades should have an appropriate scale, rhythm and proportion relative to the streetscape



Figure 4M.3 Building articulation such as balconies and deeper window reveals provide visual interest to the facade



Figure 4M.4 The terracotta tile cladding used on this building contrasts with the white framed balconies and roof line, adding visual interest



Figure 4M.5 Changing facade materials, building articulation or height effectively highlights prominent corners

### Objective 4M-1

Building facades provide visual interest along the street while respecting the character of the local area

#### Design guidance

Design solutions for front building facades may include:

- a composition of varied building elements
- a defined base, middle and top of buildings
- revealing and concealing certain elements
- changes in texture, material, detail and colour to modify the prominence of elements

Building services should be integrated within the overall facade

Building facades should be well resolved with an appropriate scale and proportion to the streetscape and human scale. Design solutions may include:

- well composed horizontal and vertical elements
- variation in floor heights to enhance the human scale
- elements that are proportional and arranged in patterns
- public artwork or treatments to exterior blank walls
- grouping of floors or elements such as balconies and windows on taller buildings

Building facades relate to key datum lines of adjacent buildings through upper level setbacks, parapets, cornices, awnings or colonnade heights

Shadow is created on the facade throughout the day with building articulation, balconies and deeper window reveals

### Objective 4M-2

Building functions are expressed by the facade

#### Design guidance

Building entries should be clearly defined

Important corners are given visual prominence through a change in articulation, materials or colour, roof expression or changes in height

The apartment layout should be expressed externally through facade features such as party walls and floor slabs

## 4N Roof design

The roof is an important element in the overall composition and design of a building. Quality roof design provides a positive addition to the character of an area and can form an important part of the skyline. Roofs also provide opportunities for open space where appropriate and can add to the sustainability performance of a building.

The *Standard Instrument (Local Environmental Plans) Order 2006* allows for architectural roof features that can exceed the maximum building height. This is an important tool for achieving high quality roof design and articulation.



Figure 4N.1 Special roof features need to be proportionate to the overall building size, scale and form



Figure 4N.2 Architectural roof features and articulation are generally allowed to exceed the maximum statutory building height



Figure 4N.3 Solar access to apartments can be maximised by tilting roof elements towards the north



Figure 4N.4 The composition of this roof form creates a skyline silhouette and contributes to the identity and character of the area



Figure 4N.5 The composition and contemporary design of this roof top level adds visual interest

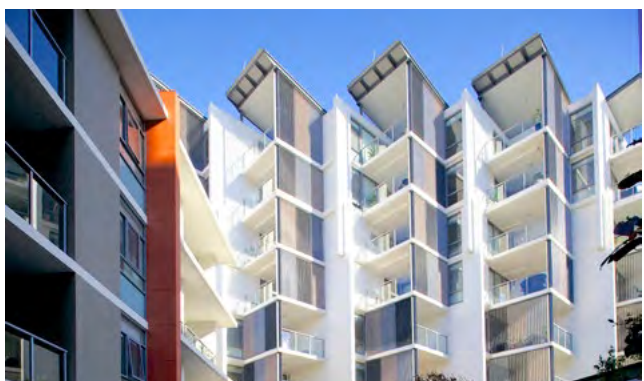


Figure 4N.6 This roof design creates an interesting view from street level, improves solar access and accentuates the built form rhythm

### Objective 4N-1

Roof treatments are integrated into the building design and positively respond to the street

#### Design guidance

Roof design relates to the street. Design solutions may include:

- special roof features and strong corners
- use of skillion or very low pitch hipped roofs
- breaking down the massing of the roof by using smaller elements to avoid bulk
- using materials or a pitched form complementary to adjacent buildings

Roof treatments should be integrated with the building design. Design solutions may include:

- roof design proportionate to the overall building size, scale and form
- roof materials compliment the building
- service elements are integrated

### Objective 4N-2

Opportunities to use roof space for residential accommodation and open space are maximised

#### Design guidance

Habitable roof space should be provided with good levels of amenity. Design solutions may include:

- penthouse apartments
- dormer or clerestory windows
- openable skylights

Open space is provided on roof tops subject to acceptable visual and acoustic privacy, comfort levels, safety and security considerations

### Objective 4N-3

Roof design incorporates sustainability features

#### Design guidance

Roof design maximises solar access to apartments during winter and provides shade during summer. Design solutions may include:

- the roof lifts to the north
- eaves and overhangs shade walls and windows from summer sun

Skylights and ventilation systems should be integrated into the roof design

## 40 Landscape design

Successful landscape design complements the existing natural and cultural features of a site and contributes to the building's setting. Landscape design includes the planning, design, construction and maintenance of all external spaces.

Incorporating landscape design early in the design process provides optimal outcomes for residential apartments. It needs to be coordinated with other disciplines to ensure the building design and service locations complement the landscape and public domain.



Figure 40.2 Landscape design should include plants endemic to the region, enhancing biodiversity and providing habitat for native wildlife



Figure 40.1 Existing landscape features such as significant trees contribute to the overall quality of residential developments



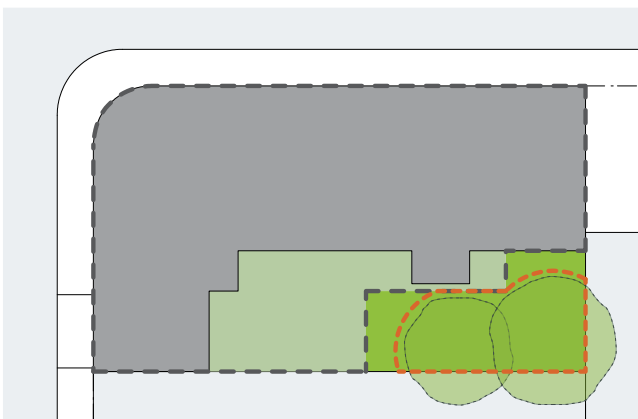
Figure 40.3 Landscape design should respond to the local context by using complementary materials and planting schemes

Table 4 Recommended tree planting in deep soil zones

Site area	Recommended tree planting
Up to 850m <sup>2</sup>	1 medium tree per 50m <sup>2</sup> of deep soil zone
Between 850 - 1,500m <sup>2</sup>	1 large tree or 2 medium trees per 90m <sup>2</sup> of deep soil zone
Greater than 1,500m <sup>2</sup>	1 large tree or 2 medium trees per 80m <sup>2</sup> of deep soil zone



Figure 40.4 Shading trees improve the microclimate and are particularly effective along the eastern and western elevations of buildings



- tree protection zone
- construction zone

Figure 40.5 Where trees are retained, tree protection zones need to be established during construction to protect the canopy and roots

**Objective 40-1**

Landscape design is viable and sustainable

**Design guidance**

Landscape design should be environmentally sustainable and can enhance environmental performance by incorporating:

- diverse and appropriate planting
- bio-filtration gardens
- appropriately planted shading trees
- areas for residents to plant vegetables and herbs
- composting
- green roofs or walls

Ongoing maintenance plans should be prepared

Microclimate is enhanced by:

- appropriately scaled trees near the eastern and western elevations for shade
- a balance of evergreen and deciduous trees to provide shading in summer and sunlight access in winter
- shade structures such as pergolas for balconies and courtyards

Tree and shrub selection considers size at maturity and the potential for roots to compete (see Table 4)

**Objective 40-2**

Landscape design contributes to the streetscape and amenity

**Design guidance**

Landscape design responds to the existing site conditions including:

- changes of levels
- views
- significant landscape features including trees and rock outcrops

Significant landscape features should be protected by:

- tree protection zones (see figure 40.5)
- appropriate signage and fencing during construction

Plants selected should be endemic to the region and reflect the local ecology

## 4P Planting on structures

Planting on structures is where plants are on top of built structures such as basement car parks, podiums, roofs and walls. Planting on structures can provide amenity, improve air quality and microclimate, and reduce direct energy use and stormwater runoff. It can also supplement deep soil planting on sites where opportunities for this are limited or restricted, e.g. in high density areas.

Common ways of planting on structures include green roofs, green walls, raised planters and roof top gardens. Plants grown in these situations are subject to a range of environmental stressors that affect both the health and vigour of the plants. Designing soil profiles, irrigation and systems that provide adequate oxygen, water and nutrients is crucial for plant survival.



Figure 4P.1 Green walls and facades make positive contributions to the environment and to urban amenity more generally. They can also improve the sustainability performance of a building

Table 5 Minimum soil standards for plant types and sizes

Plant type	Definition	Soil volume	Soil depth	Soil area
Large trees	12-18m high, up to 16m crown spread at maturity	150m <sup>3</sup>	1,200mm	10m x 10m or equivalent
Medium trees	8-12m high, up to 8m crown spread at maturity	35m <sup>3</sup>	1,000mm	6m x 6m or equivalent
Small trees	6-8m high, up to 4m crown spread at maturity	9m <sup>3</sup>	800mm	3.5m x 3.5m or equivalent
Shrubs			500-600mm	
Ground cover			300-450mm	
Turf			200mm	

Note: The above has been calculated assuming fortnightly irrigation. Any sub-surface drainage requirements are in addition to the above minimum soil depths





Figure 4P.2 Planting on structures are a way to create open space, in particular where opportunities for deep soil zones are restricted



Figure 4P.3 Roof top planting requires careful plant selection and an understanding of the local climate conditions



Figure 4P.4 Methods for planting on structures include raised planters and a mix of shallow and deep profile garden beds

### Objective 4P-1

Appropriate soil profiles are provided

#### Design guidance

Structures are reinforced for additional saturated soil weight

Soil volume is appropriate for plant growth, considerations include:

- modifying depths and widths according to the planting mix and irrigation frequency
- free draining and long soil life span
- tree anchorage

Minimum soil standards for plant sizes should be provided in accordance with Table 5

### Objective 4P-2

Plant growth is optimised with appropriate selection and maintenance

#### Design guidance

Plants are suited to site conditions, considerations include:

- drought and wind tolerance
- seasonal changes in solar access
- modified substrate depths for a diverse range of plants
- plant longevity

A landscape maintenance plan is prepared

Irrigation and drainage systems respond to:

- changing site conditions
- soil profile and the planting regime
- whether rainwater, stormwater or recycled grey water is used

### Objective 4P-3

Planting on structures contributes to the quality and amenity of communal and public open spaces

#### Design guidance

Building design incorporates opportunities for planting on structures. Design solutions may include:

- green walls with specialised lighting for indoor green walls
- wall design that incorporates planting
- green roofs, particularly where roofs are visible from the public domain
- planter boxes

Note: structures designed to accommodate green walls should be integrated into the building facade and consider the ability of the facade to change over time

## 4Q Universal design

Universal design is an international design philosophy that enables people to continue living in the same home by ensuring that apartments are able to change with the needs of the occupants. Universally designed apartments are safer and easier to enter, move around and live in. They benefit all members of the community, from young families to older people, their visitors, as well as those with permanent or temporary disabilities.

Incorporating universal design principles in apartment design is a step towards producing a robust, flexible housing stock. It ensures that simple and practical design features are incorporated into new buildings that would be difficult and costly to retrofit at a later date.

Universal design is different to adaptable housing which is governed by *Australian Standard AS 4299-1995 Adaptable Housing* and is specifically designed to allow for the future adaptation of a dwelling to accommodate the occupant's needs.

In addition flexible apartment design is also desirable to allow buildings to accommodate a diverse range of lifestyle needs such as different household structures, live/work housing arrangements and future changes in use.



Figure 4Q.1 A universally designed apartment provides design features such as wider circulation spaces, reinforced bathroom walls and easy to reach and operate fixtures



Figure 4Q.2 Wide and barrier free entries and common circulation spaces help accessibility

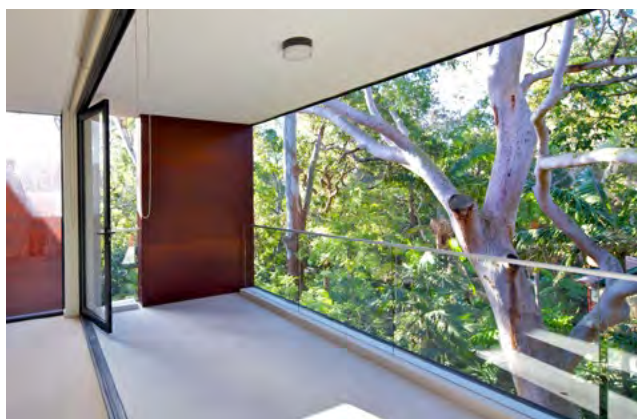


Figure 4Q.3 Level threshold transitions eliminate trip hazards

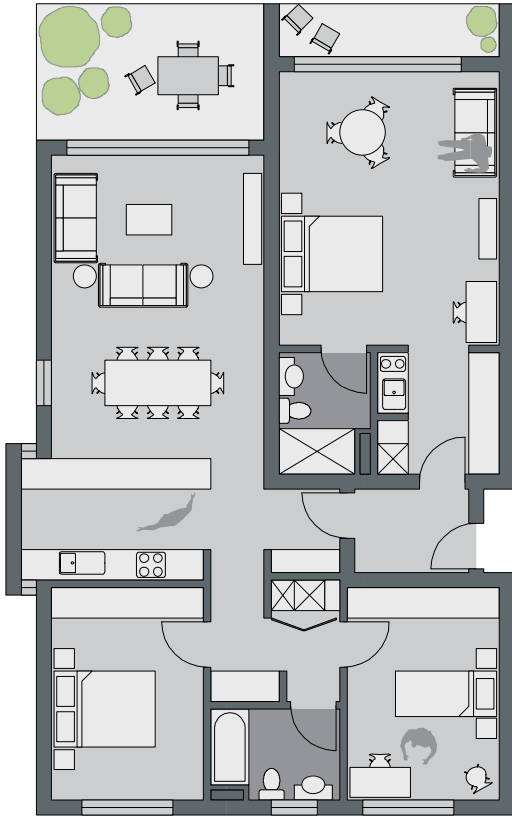


Figure 4Q.4 A flexible dual key apartment design allows for a variety of configurations including home office or separate tenancy  
*Note: dual key apartments which are separate but on the same title are regarded as two sole occupancy units for the purposes of the BCA and for calculating dwelling mix*

#### Objective 4Q-1

Universal design features are included in apartment design to promote flexible housing for all community members

##### Design guidance

Developments achieve a benchmark of 20% of the total apartments incorporating the Livable Housing Guideline's silver level universal design features

#### Objective 4Q-2

A variety of apartments with adaptable designs are provided

##### Design guidance

Adaptable housing should be provided in accordance with the relevant council policy

Design solutions for adaptable apartments include:

- convenient access to communal and public areas
- high level of solar access
- minimal structural change and residential amenity loss when adapted
- larger car parking spaces for accessibility
- parking titled separately from apartments or shared car parking arrangements

#### Objective 4Q-3

Apartment layouts are flexible and accommodate a range of lifestyle needs

##### Design guidance

Apartment design incorporates flexible design solutions which may include:

- rooms with multiple functions
- dual master bedroom apartments with separate bathrooms
- larger apartments with various living space options
- open plan 'loft' style apartments with only a fixed kitchen, laundry and bathroom

## 4R Adaptive reuse

Buildings adapted for reuse as apartments can range from large houses, redundant industrial buildings, major institutional buildings and groups of buildings to commercial office towers.

There are many benefits of retaining existing buildings including sustainability, aesthetics, character and valuing their social and cultural significance. Adaptation of an existing building for a new residential use provides for its repurposing and should be approached in a way that acknowledges the past and respects its sense of place. The significance of heritage items or buildings in conservation areas needs to be respected. Modifications should ensure the building's continued relevance in the future. Residential adaptive reuse projects should be sensitively designed, to respect existing elements and character.

Non-residential buildings often have dimensions, layouts and orientations that are not designed for residential use. A balance must be achieved between the benefits of retaining existing buildings versus the quality of residential amenity that can be achieved.



Figure 4R.1 Modern materials can be used if their proportions and details suit the building and context, and allow for interpretation of old and new building elements



Figure 4R.2 Residential conversion of these silos successfully acknowledges the industrial past of this local landmark



Figure 4R.3 New building elements should be distinguishable from the original structure



Figure 4R.4 Contemporary infill can create an interesting dialogue between old and new, adding to the character of a place



Figure 4R.5 Places that demonstrate a connection to the past by reusing older structures often become popular destinations for people



Figure 4R.6 Adaptive reuse should respect the original building fabric and facade rhythm

### Objective 4R-1

New additions to existing buildings are contemporary and complementary and enhance an area's identity and sense of place

#### Design guidance

Design solutions may include:

- new elements to align with the existing building
- additions that complement the existing character, siting, scale, proportion, pattern, form and detailing
- use of contemporary and complementary materials, finishes, textures and colours

Additions to heritage items should be clearly identifiable from the original building

New additions allow for the interpretation and future evolution of the building

### Objective 4R-2

Adapted buildings provide residential amenity while not precluding future adaptive reuse

#### Design guidance

Design features should be incorporated sensitively into adapted buildings to make up for any physical limitations, to ensure residential amenity is achieved. Design solutions may include:

- generously sized voids in deeper buildings
- alternative apartment types when orientation is poor
- using additions to expand the existing building envelope

Some proposals that adapt existing buildings may not be able to achieve all of the design criteria in this Apartment Design Guide. Where developments are unable to achieve the design criteria, alternatives could be considered in the following areas:

- where there are existing higher ceilings, depths of habitable rooms could increase subject to demonstrating access to natural ventilation, cross ventilation (when applicable) and solar and daylight access (see also sections 4A Solar and daylight access and 4B Natural ventilation)
- alternatives to providing deep soil where less than the minimum requirement is currently available on the site
- building and visual separation – subject to demonstrating alternative design approaches to achieving privacy
- common circulation
- car parking
- alternative approaches to private open space and balconies

## 4S Mixed use

Mixed use development includes multiple uses in one building. In apartment buildings this is commonly achieved vertically with different uses stacked above one another. A vertical mix of uses is more likely to increase activity through the day and night which in turn improves passive surveillance of the public domain.

In areas zoned for mixed use development building design should allow for a range of non-residential uses. Where the location or site constraints are not suited for retail uses, the design should accommodate other uses such as commercial offices. Non-residential uses should be located on lower levels of buildings in areas where residential use may not be appropriate or desirable, such as along main roads or railway lines.

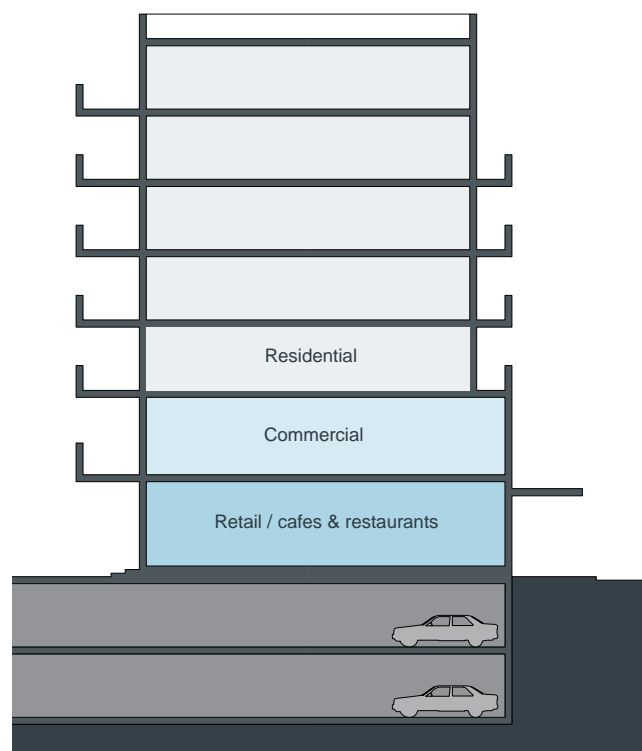


Figure 4S.2 Commercial floors are an appropriate buffer between residential apartments and busy active ground floor uses such as cafes



Figure 4S.1 A residential apartment building in a centre has retail uses at the ground floor level



Figure 4S.3 Shop and office entries, service areas and loading zones in a mixed use development should be separate from lobby entries to residential apartments



Figure 4S.4 A compact and varied mix of uses improves access to services and promotes walking, social interaction and safety



Figure 4S.5 Mixed use development should maximise retail and commercial activity at ground level

### Objective 4S-1

Mixed use developments are provided in appropriate locations and provide active street frontages that encourage pedestrian movement

#### Design guidance

Mixed use development should be concentrated around public transport and centres

Mixed use developments positively contribute to the public domain. Design solutions may include:

- development addresses the street
- active frontages are provided
- diverse activities and uses
- avoiding blank walls at the ground level
- live/work apartments on the ground floor level, rather than commercial

### Objective 4S-2

Residential levels of the building are integrated within the development, and safety and amenity is maximised for residents

#### Design guidance

Residential circulation areas should be clearly defined. Design solutions may include:

- residential entries are separated from commercial entries and directly accessible from the street
- commercial service areas are separated from residential components
- residential car parking and communal facilities are separated or secured
- security at entries and safe pedestrian routes are provided
- concealment opportunities are avoided

Landscaped communal open space should be provided at podium or roof levels

## 4T Awnings and signage

Awnings are prominent streetscape elements requiring considerable design attention. Continuous awnings encourage pedestrian activity along streets and in conjunction with active frontages, support and enhance the vitality of the local area. Together with building entries, awnings provide a public address, thereby contributing to the identity of a development.

Signage is also an important consideration in the design of apartment buildings located in mixed use areas, and should be integrated with the awning or street wall without obscuring or dominating important views.



Figure 4T.1 Continuous awnings should be provided where there is high pedestrian activity e.g. in centres and along active frontages



Figure 4T.2 Awnings should be designed as an integral element of the building and incorporate lighting for added safety



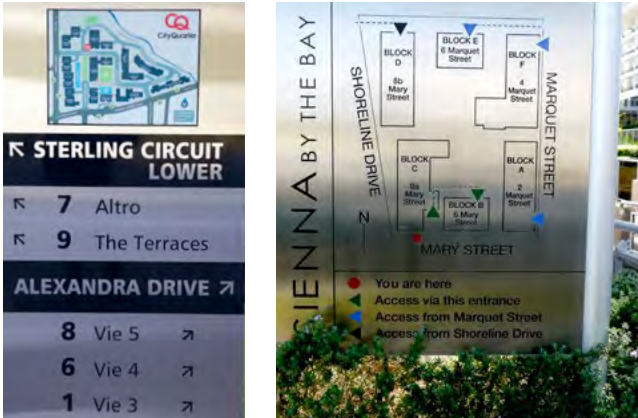


Figure 4T.3 Clear way-finding signage is important to both residents and visitors, in particular in larger residential developments



Figure 4T.4 Building address signage can be integrated as a feature of the facade design



Figure 4T.5 Signage should respond to the scale, proportion and detailing of the development and its surrounds

### Objective 4T-1

Awnings are well located and complement and integrate with the building design

#### Design guidance

Awnings should be located along streets with high pedestrian activity and active frontages

A number of the following design solutions are used:

- continuous awnings are maintained and provided in areas with an existing pattern
- height, depth, material and form complements the existing street character
- protection from the sun and rain is provided
- awnings are wrapped around the secondary frontages of corner sites
- awnings are retractable in areas without an established pattern

Awnings should be located over building entries for building address and public domain amenity

Awnings relate to residential windows, balconies, street tree planting, power poles and street infrastructure

Gutters and down pipes should be integrated and concealed

Lighting under awnings should be provided for pedestrian safety

### Objective 4T-2

Signage responds to the context and desired streetscape character

#### Design guidance

Signage should be integrated into the building design and respond to the scale, proportion and detailing of the development

Legible and discrete way finding should be provided for larger developments

Signage is limited to being on and below awnings and a single facade sign on the primary street frontage

## 4U Energy efficiency

Passive environmental and energy efficient design is about the ability of an apartment to manage thermal performance (thermal comfort) and daylight access, providing increased amenity to occupants and reducing energy costs.

This section offers guidance on meeting BASIX sustainability requirements and other rating systems through better design practice. For additional design practice linked to passive environmental design and energy efficiency see sections 4A Solar and daylight access, 4B Natural ventilation and 4D Apartment size and layout.



Figure 4U.1 Shading trees and landscaping contribute to the energy efficiency of buildings

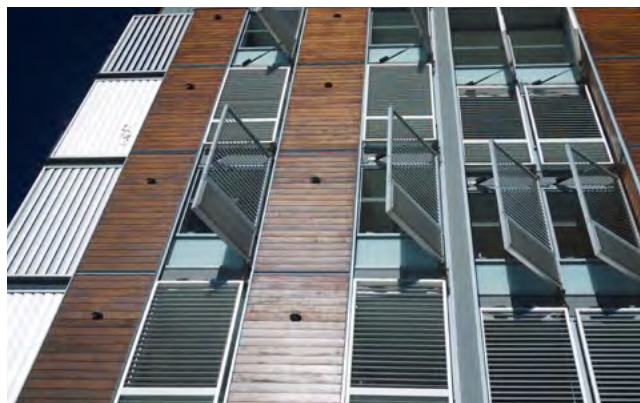


Figure 4U.2 Example of shading devices that can be operated by the resident to manipulate the level of daylight and sun access

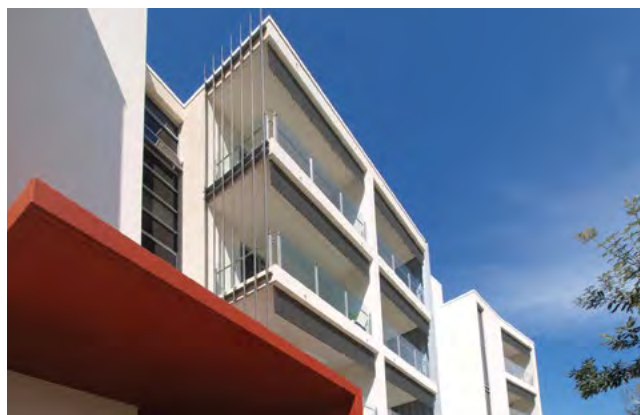


Figure 4U.3 Thermal mass in floors and walls allow for heat storage in winter and reduced heat transfer in summer

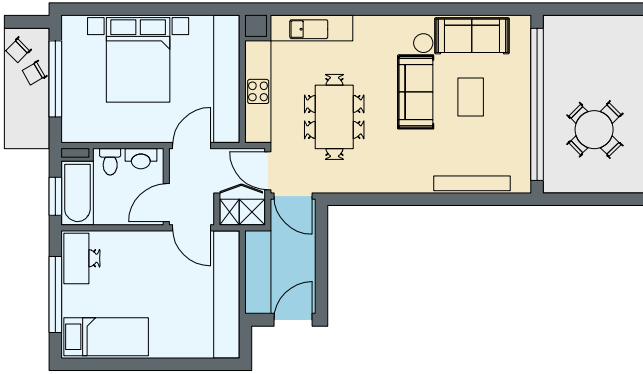


Figure 4U.4 Grouping rooms with similar uses together creates different zones in an apartment, helping to optimise energy use



Figure 4U.5 Environmental technology, integrated into the overall design, adds to the sustainable performance of buildings

#### Objective 4U-1

Development incorporates passive environmental design

##### Design guidance

Adequate natural light is provided to habitable rooms (see 4A Solar and daylight access)

Well located, screened outdoor areas should be provided for clothes drying

#### Objective 4U-2

Development incorporates passive solar design to optimise heat storage in winter and reduce heat transfer in summer

##### Design guidance

A number of the following design solutions are used:

- the use of smart glass or other technologies on north and west elevations
- thermal mass in the floors and walls of north facing rooms is maximised
- polished concrete floors, tiles or timber rather than carpet
- insulated roofs, walls and floors and seals on window and door openings
- overhangs and shading devices such as awnings, blinds and screens

Provision of consolidated heating and cooling infrastructure should be located in a centralised location (e.g. the basement)

#### Objective 4U-3

Adequate natural ventilation minimises the need for mechanical ventilation

##### Design guidance

A number of the following design solutions are used:

- rooms with similar usage are grouped together
- natural cross ventilation for apartments is optimised
- natural ventilation is provided to all habitable rooms and as many non-habitable rooms, common areas and circulation spaces as possible

## 4V Water management and conservation

Water sensitive urban design is the integrated management of water in urban areas. It takes into account all of the elements of the urban water cycle including potable (drinking quality) water, rainwater, wastewater, stormwater and groundwater.

Best practice water management considers water measures at all stages of the project. This ranges from initial site planning measures that maximise deep soil areas for water infiltration to detailed building design that captures and recycles stormwater and wastewater for building services.

The Building Sustainability Index (BASIX) ensures that all new dwellings are designed to minimise potable water use and reduce greenhouse gas emissions. To support the requirements of BASIX there are a number of planning and design considerations that are relevant to apartment developments.

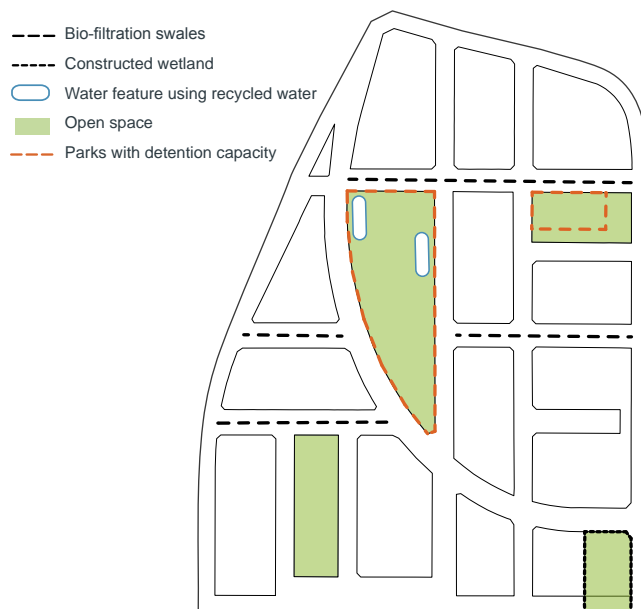


Figure 4V.1 Streets and parks of larger developments should be designed to treat stormwater runoff and accommodate flooding events

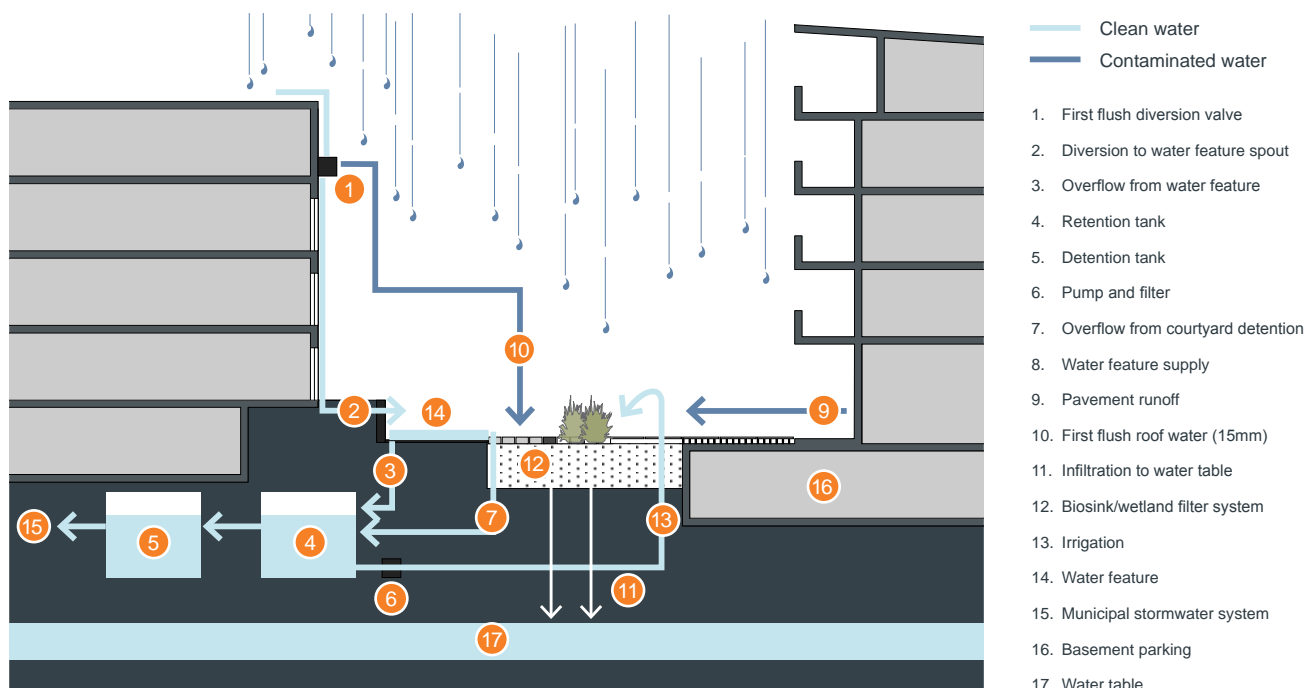


Figure 4V.2 Stormwater quantities can be reduced and water quality increased by circulating rainwater through a connected water feature and wetland system



Figure 4V.3 Water sensitive features are attractive elements able to effectively filter and reuse stormwater runoff

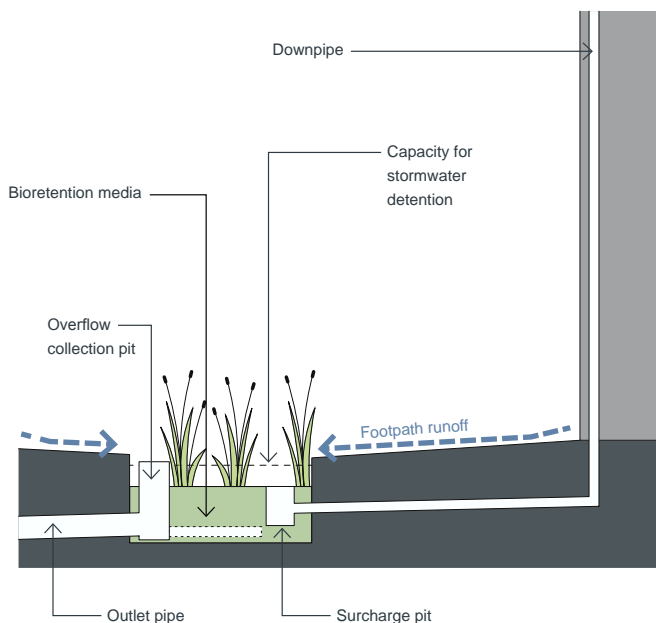


Figure 4V.4 A bioretention garden improves water quality by using plants to treat roof and surface water runoff

#### Objective 4V-1

Potable water use is minimised

##### Design guidance

Water efficient fittings, appliances and wastewater reuse should be incorporated

Apartments should be individually metered

Rainwater should be collected, stored and reused on site

Drought tolerant, low water use plants should be used within landscaped areas

#### Objective 4V-2

Urban stormwater is treated on site before being discharged to receiving waters

##### Design guidance

Water sensitive urban design systems are designed by a suitably qualified professional

A number of the following design solutions are used:

- runoff is collected from roofs and balconies in water tanks and plumbed into toilets, laundry and irrigation
- porous and open paving materials is maximised
- on site stormwater and infiltration, including bio-retention systems such as rain gardens or street tree pits

#### Objective 4V-3

Flood management systems are integrated into site design

##### Design guidance

Detention tanks should be located under paved areas, driveways or in basement car parks

On large sites parks or open spaces are designed to provide temporary on site detention basins

## 4W Waste management

The minimisation and effective management of domestic waste from apartments contributes to the visual and physical amenity of the building as well as limiting potentially harmful impacts on the environment.

Minimising waste is relevant to all stages of the building's life cycle and also includes safe and convenient collection and storage of waste and recycling. Waste management should be considered early on in the design process.



Figure 4W.1 Alternative waste disposal, such as composting, can be incorporated into the design of communal open space areas



Figure 4W.2 Common waste and recycling areas should be screened from view and well ventilated



Figure 4W.3 This residential development incorporates compost bins and a community garden for residents



Figure 4W.4 Well designed, easily accessible and clean waste and recycling rooms improve the collection and management of household waste

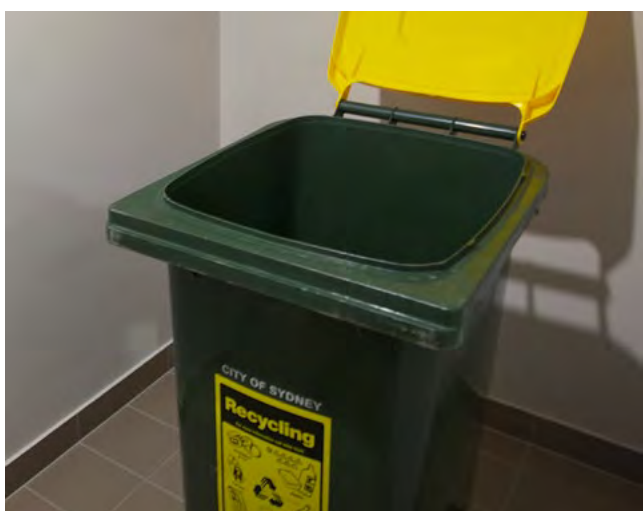


Figure 4W.5 Waste and recycling areas should allow for sufficient space to manoeuvre bins and sort waste for recycling

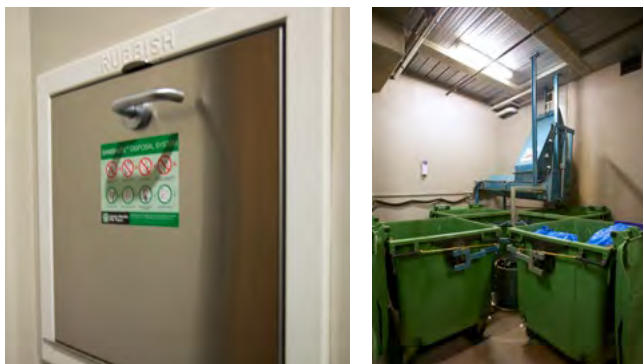


Figure 4W.6 For taller developments, garbage chutes can be located on floors to allow for convenient disposal of waste and recycling

### Objective 4W-1

Waste storage facilities are designed to minimise impacts on the streetscape, building entry and amenity of residents

#### Design guidance

Adequately sized storage areas for rubbish bins should be located discreetly away from the front of the development or in the basement car park

Waste and recycling storage areas should be well ventilated

Circulation design allows bins to be easily manoeuvred between storage and collection points

Temporary storage should be provided for large bulk items such as mattresses

A waste management plan should be prepared

### Objective 4W-2

Domestic waste is minimised by providing safe and convenient source separation and recycling

#### Design guidance

All dwellings should have a waste and recycling cupboard or temporary storage area of sufficient size to hold two days worth of waste and recycling

Communal waste and recycling rooms are in convenient and accessible locations related to each vertical core

For mixed use developments, residential waste and recycling storage areas and access should be separate and secure from other uses

Alternative waste disposal methods such as composting should be provided

## 4X Building maintenance

Careful design and material selection can reduce the long term maintenance obligations of apartment development. In addition, effective maintenance of the development ensures the longevity of buildings, sustaining the value of the property and reducing the life-cycle cost to owners.



Figure 4X.1 Building facades should use materials that are long lasting and weather well over time, such as brickwork, tiles and glass

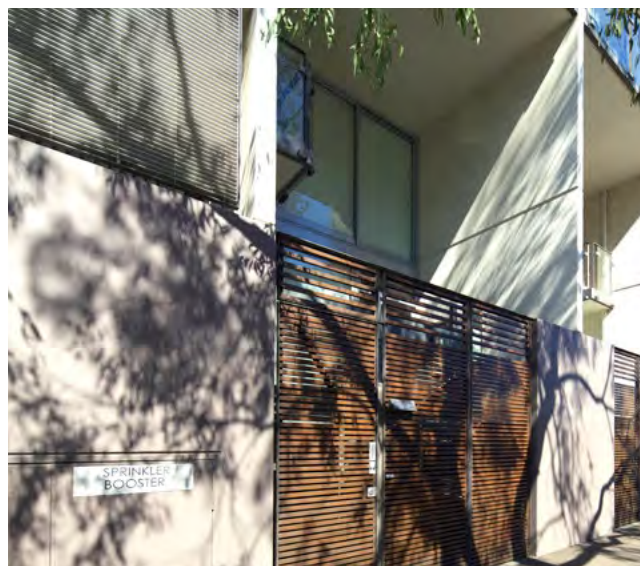


Figure 4X.2 The building layout should provide easy access for maintenance and inspection of services and plant equipment





Figure 4X.3 Roof overhangs, hoods and drip lines protect walls from the elements (rain, sun and wind) reducing maintenance costs

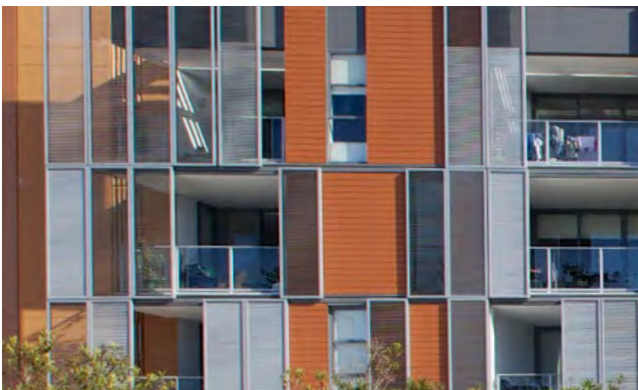


Figure 4X.4 Apartment windows should be designed so that they are easy to access and clean by residents

### Objective 4X-1

Building design detail provides protection from weathering

#### Design guidance

A number of the following design solutions are used:

- roof overhangs to protect walls
- hoods over windows and doors to protect openings
- detailing horizontal edges with drip lines to avoid staining of surfaces
- methods to eliminate or reduce planter box leaching
- appropriate design and material selection for hostile locations

### Objective 4X-2

Systems and access enable ease of maintenance

#### Design guidance

Window design enables cleaning from the inside of the building

Building maintenance systems should be incorporated and integrated into the design of the building form, roof and facade

Design solutions do not require external scaffolding for maintenance access

Manually operated systems such as blinds, sunshades and curtains are used in preference to mechanical systems

Centralised maintenance, services and storage should be provided for communal open space areas within the building

### Objective 4X-3

Material selection reduces ongoing maintenance costs

#### Design guidance

A number of the following design solutions are used:

- sensors to control artificial lighting in common circulation and spaces
- natural materials that weather well and improve with time such as face brickwork
- easily cleaned surfaces that are graffiti resistant
- robust and durable materials and finishes are used in locations which receive heavy wear and tear, such as common circulation areas and lift interiors

