4.0 Using the Detailed Design Guidelines

INTRODUCTION

This part of the document outlines design objectives and performance criteria that guide the detailed resolution of buildings. These performace criteria are an additional layer of controls to those outlined in 'block-by-block controls' in Part 3 of this document. All development applications must satisfy the performance criteria outlined in this section.

OBJECTIVES

These outline the design intention/intentions. Diagrams have been included to assist in communicating the design objectives. It must be demonstrated that a development seeks to achieve all the design objectives outlined in this section.

PERFORMANCE CRITERIA

The performance criteria demonstrate ways in which the objectives may be achieved. They may not be applicable to every site. These criteria directly relate to the controls outlined in Part 3 [Block-by-block controls] of this document. All development applications shall be assessed against the objectives and performance criteria outlined in this section.

PART 4 DETAILED DESIGN GUIDELINES

4.1 Site Configuration

4.1.1 DEEP SOIL ZONES

Deep soil zones are areas of natural ground with relatively natural soil profiles retained within a development. Deep soil zones have important environmental benefits, which include promoting healthy growth of large trees with large canopies, protecting existing mature trees and allowing infiltration of rain water to the water table and reduction of stormwater runoff.

Objectives

- To assist with management of the water table.
- To assist with management of water quality.
- To improve the amenity of developments through the retention and/or planting of large and medium size trees.

Performance Criteria

i. Deep soil zones, wherever indicated in Part 3 [Block-by-block controls] of this document, are to be complied with.

ii. In urban areas where there is limited capacity for water infiltration, stormwater treatment measures are to be integrated with the design of the buildings.

A picket and pillar fence defines the street boundary, clearly demarcating 'public' and 'private' space.

Materials and planting are combined in a good ratio of solid to void, to enhance visual amenity of the street, whilst ensuring privacy and security to the residents.

4.1.2 FENCES + WALLS

Fences and walls include all built vertical landscaping elements designed to define boundaries between one space and the next or to rationalise a change in level. The design of fences and walls has an impact on the real and perceived safety and security of residents as well as on the amenity of the public domain and the identity of the residential apartment development.

Objectives

- To define the edges between public and private land.
- To define the boundaries between areas within the development having different functions or owners.
- To provide privacy and security.
- To contribute positively to the public domain.
- To ensure that fencing does not result in the undesirable obstruction of the free flow of floodwaters.
- To ensure that fencing does not become unsafe during floods such that it may become moving debris which threatens the safety of people or the integrity of structures.

Performance Criteria

i. Private and public domain are to be clearly demarcated by:
   - designing fences and walls which provide privacy and security whilst not eliminating views, outlook, light and air.

ii. Fences are to contribute to the amenity, beauty and useability of private and communal open spaces by incorporating some of the following in their design: benches and seats, planter boxes, pergolas and trellises, barbeques, water features, composting boxes and worm farms.

iii. The amenity of the public domain is to be retained and enhanced by:
   - avoiding the use of continuous lengths of blank walls at street level
   - using planting to soften the edges of any raised terraces to the street, such as over sub-basement car parking, and reduce their apparent scale.

iv. Fences are to be made of durable materials, which can be easily cleaned and are graffiti-resistant.

v. Fences on front boundaries are to be a maximum height of 1.2 metres. Variations may be permitted dependent upon the context, siting, safety, privacy and design of the building.

vi. Fencing is to be constructed in a manner which does not affect the flow of floods so as to detrimentally increase flood affectation on surrounding land.

vii. For developments in high and medium flood risk areas, a suitably qualified engineer must certify that the proposed fencing is adequately constructed so as to withstand the forces of floodwaters, or to collapse or open in a controlled manner to prevent the undesirable impediment of floodwaters.

PART 4 DETAILED DESIGN GUIDELINES

4.1 Site Configuration

4.1.3 LANDSCAPE DESIGN

Landscape design includes the planning, design, construction and maintenance of all utility, open space and garden areas. It is fundamental to the design of residential flat development. Together, landscape and buildings operate as an integrated and sustainable system, resulting in greater aesthetic quality and amenity for occupants and the adjoining public domain. As such, it should not be generated by left-over spaces resulting from building siting and location.

Landscape design builds on the existing site's natural and cultural features to contribute to a development's positive relationship to its context and site. Landscape design should optimise useability, privacy and social opportunity, equitable access and respect for neighbours' amenity. It should also provide for practical establishment and long-term management.

The site's topography has been used to create a series of smaller more intimate spaces using retaining walls and planter beds, which step down across the site.

Objectives

- To add value to residents' quality of life within the development in the forms of privacy, outlook and views.
- To provide habitat for native indigenous plants and animals.
- To improve stormwater quality and reduce quantity.
- To improve the microclimate and solar performance within the development.
- To improve urban air quality.
- To provide a pleasant outlook.
- To provide for the retention of A'Becketts Creek (north of the Neil Street bridge)

The detailing of the courtyard edge allows a visual connection between the street and the communal space, while clearly defining public and private realms.

Performance Criteria

i. The amenity of open space is to be improved with landscape design by:
   - providing appropriate shade from trees or structures
   - providing accessible routes through the space and between buildings
   - screening cars, communal drying areas, swimming pools and the courtyards of ground floor units
   - allowing for locating art works where they can be viewed by users of open space and/or from within apartments.

ii. Developments are to contribute to streetscape character and public domain amenity by:
   - relating landscape design to the desired proportions and character of the streetscape
   - using planting and landscape elements appropriate to the scale of the development
   - selecting appropriate indigenous species in accordance with Council's preference
   - mediating between and visually softening the bulk of large development for the person on the street.

iii. The energy and solar efficiency of dwellings and the microclimate of private open spaces are to be improved by planting design solutions including:
   - trees for shading low-angle sun on the eastern and western sides of a dwelling
   - trees that do not cast a shadow over solar collectors at any time of the year
   - deciduous trees for shading of windows and open space areas in summer
   - locating evergreen trees well away from the building to permit the winter sun access
   - varying heights of different species of trees and shrubs to shade walls and windows

- locating pergolas on balconies and courtyards to create shaded areas in summer and private areas for outdoor living
- locating plants appropriately in relation to their size at maturity.

iv. Landscape design should contribute to water and stormwater efficiency by integrating with water and stormwater management by:
- using plants with low water demand to reduce mains consumption
- using plants with low fertiliser requirements
- utilising permeable surface
- using water features
- incorporating wetland filter systems.

v. Sufficient depth of soil above paving slabs is to be provided in order to enable growth of mature trees.

vi. Maintenance is to be minimised by using robust landscape elements.

vii. Minimum soil depths to be provided on roofs are to be as follows:
- trees and shrubs - 600mm
- groundcover - 300mm.

viii. A'Becketts Creek is to be retained north of the Neil Street bridge, and a 19m wide riparian zone is to be provided. The pedestrian / cycle way is not to be located in the riparian zone.

4.1 Site Configuration

4.1.4 OPEN SPACE

Open space is breathing space for residential flat development. It may be public (accessible and useable by the general public), communal (shared by all residents of a development) or private (associated with a single dwelling unit and for the exclusive use of the occupants). The primary function of open space is to provide amenity in the form of:

- landscape design
- daylight access to apartments
- visual privacy
- opportunities for recreation and social activities
- water cycle management
- an improved public domain

Objectives

- To provide residents with passive and active recreational opportunities.
- To provide an area on site that enables soft landscaping and deep soil planting.
- To ensure that communal open space is consolidated, configured and designed to be useable and attractive.
- To provide a pleasant outlook.
- To provide open space adjacent to new roads

Performance Criteria

i. Communal open space:

- may be provided on a podium or roof(s) in mixed-use buildings in urban areas where deep soil zones limited on the site.
- is to comprise a minimum of 25% of the site area.
- is to be located to optimise daylight access in winter and shade in summer
- is to be consolidated on the site into recognisable areas with reasonable space, facilities and landscape.
- is to be designed such that its size and dimensions allow for the 'program' of uses it will contain.
- is to be designed such that ventilation duct outlets from basement car parks are located and detailed for minimum impact (noise and fumes).
- is to provide a pleasant outlook and increased visual privacy between apartments

ii. Private open space:

- for each apartment is to be capable of enhancing residential amenity, in the form of balcony, deck, terrace, garden, yard, courtyard and/or roof terrace.
- of apartments at ground level, or similar space on a structure, such as on a podium or car park, is to have a minimum area of 25m^2, and a minimum dimension in one direction of 4metres.

iii. Public open space:

- is to be located as identified in the DCP Master Plan to provide for areas for the overland flow path and to serve the needs of the new Neil Street community.

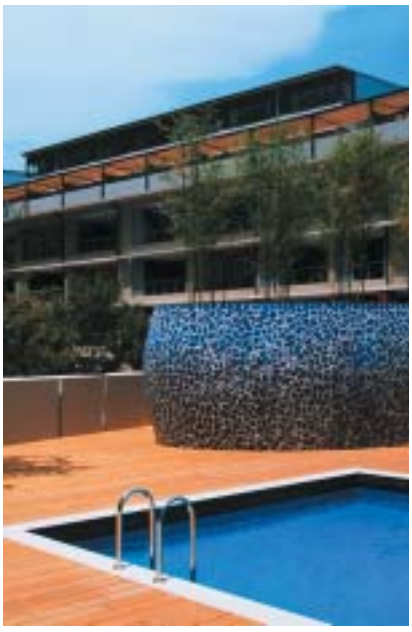
iv. Open space is to provide environmental benefits including habitat for native fauna, native vegetation and mature trees, a pleasant microclimate, rainwater percolation and outdoor drying area.

A central courtyard with mature trees, lawn and a swimming pool provides a pleasant microclimate from surrounding apartments in a dense environment.

The pool provides an informal meeting place and passive recreational areas for residents.

Courtyard gardens provide private open space for residents within a larger common landscaped space.

Shade trees and planters enclose a small courtyard and provides intimacy within a larger communal open space.



Sculptural planters provide adeqaute depth for small trees and visually enhance the design of adjacent spaces.

4.1.5 PLANTING ON STRUCTURES

An increasingly common scenario in urban areas is the establishment of landscaped areas on top of basement car parks, on podiums, and/or on roofs. Quality landscape design and open space amenity relies in part on the quality and health of plants. The plants in these areas are grown in total containment with artificial soils, drainage and irrigation. Plants grown in such situations are subject to a range of environmental stresses that affect the health and vigour of the plants, and ultimately their survival.

Objectives

- To contribute to the quality and amenity of communal open space on roof tops, podiums and internal courtyards
- To encourage the establishment and healthy growth of trees in urban areas

Performance Criteria

i. Plant growth is to be optimised by:
   - providing soil depth, soil volume and soil area appropriate to the size of the plants to be established
   - providing appropriate soil conditions and irrigation methods
   - providing appropriate drainage.

ii. Planters are to be designed to support the appropriate soil depth and plant selection by:
   - ensuring planter proportions accommodate the largest volume of soil possible. [minimum soil depths will vary depending on the size of the plant however, soil depths greater than 1.5 metres are unlikely to have any benefits for tree growth]
   - providing square or rectangular planting areas, rather than long narrow linear areas.

iii. Minimum soil depths are to be increased in accordance with:
   - the mix of plants in a planter for example where trees are planted in association with shrubs, groundcovers and grass
   - the level of landscape management, particularly the frequency of irrigation anchorage requirements of large and medium tree soil type and quality.

iv. Minimum soil depths are to be provided in accordance with the following:
   - *Large trees* such as figs (16 metres canopy diameter at maturity)
   minimum soil volume 150 cubic metres
   minimum soil depth 1.3 metre
   minimum soil area 10 metre x 10 metre area or equivalent
   - *Medium trees* (8 metre canopy diameter at maturity)
   minimum soil volume 35 cubic metres
   minimum soil depth 1 metre
   - *Shrubs*
   minimum soil depth 500-600mm
   - *Ground cover*
   minimum soil depth 300-450mm
   - *Turf*
   minimum soil depth 100-300mm

Any subsurface drainage requirements are in addition to the minimum soil depths quoted above.

PART 4 DETAILED DESIGN GUIDELINES

4.1 Site Configuration

4.1.6 STORMWATER MANAGEMENT

Stormwater is the run off from buildings and the paved areas surrounding them. The design and implementation of appropriate management practices during construction, and during the life of the building, can reduce the potentially significant impact of development upon natural waterways. Water sensitive urban design seeks to minimise impacts on the total water cycle by reducing the stormwater discharge rate and protecting stormwater quality. There is a connection between effective stormwater management and the stability of the water table.

Objectives

- To minimise the impacts of residential flat development and associated infrastructure on the health and amenity of natural waterways.
- To preserve existing topographic and natural features, including watercourses, creeks and wetlands.
- To minimise the discharge of sediment and other pollutants to the urban stormwater drainage system during construction activity.

Performance Criteria

i. The volume impact of stormwater on infrastructure is to be reduced by retaining it on site. Design solutions may include:
   - minimising impervious areas by using pervious or open pavement materials
   - retaining runoff from roofs and balconies in water features as part of landscape design or for reuse for activities such as toilet flushing, car washing and garden watering
   - landscape design incorporating appropriate vegetation
   - minimising formal drainage systems (pipes) with vegetated flowpaths (grass swales), infiltration or biofiltration trenches and subsoil collection systems in saline areas
   - water pollution control ponds or constructed wetlands on larger developments

ii. Developments are to seek to optimise the amount of deep soil zones within the site.

iii. Structural stormwater treatment measures such as the following are to be used:
   - litter or gross pollutant traps to capture leaves, sediment and litter
   - onsite detention storage

iv. Stormwater quality is to be protected by providing for:
   - sediment filters, traps or basins for hard surfaces
   - treatment of stormwater collected in sediment traps on soils containing dispersive clays

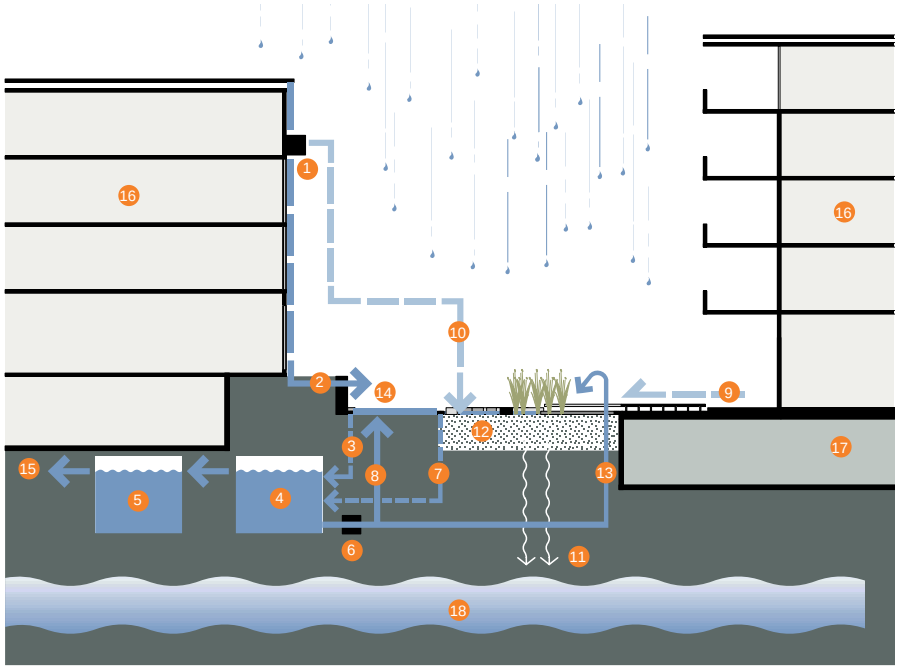
v. The need for expensive sediment trapping techniques is to be minimised by controlling erosion. Design solutions include:
   - landscape design incorporating appropriate vegetation
   - stable (non-eroding) flowpaths conveying water at non-erosive velocities

vi. Provide on-site detention for all buildings and carparks built above and / or over the flood path

vii. Where sites are next to the rail corridor, adequately dispose of or manage drainage from the development such that it is not distributed into the rail corridor unless prior approval has been obtained from the State Rail Authority.

clean water
contaminated water

1 first flush diversion valve
2 diversion to water feature spout
3 over flow from water feature
4 retention tank
5 detention tank
6 pump and filter
7 overflow from court yard detention
8 water feature supply
9 pavement runoff
10 first flush roof water (15mm)
11 infiltration to water table
12 biosink/wetland filter system
13 irrigation
14 water feature
15 municipal storm water system
16 apartment building
17 basement parking
18 water table



The diagram above illustrates an integrated stormwater recycling system. Stormwater quantities can be reduced and water quality increased, by circulating rainwater through a connected water feature and wetland system.

4.1.7 FLOOD MANAGEMENT

The Neil Street Precinct is severely affected by flooding. The location, requirements, and layouts of roads, infrastructure, open space and buildings have been designed in response to the site constraints to manage the impact of flooding.

Objectives

- To effectively manage flood affectation
- To ensure that redevelopment of the site can occur
- To enable the built form vision for the precinct to be achieved

Performance Criteria

i. Building footprints are to be placed to allow best movement of flood waters (eg. 30m separation between buildings on the southern end of New Road (1) north)

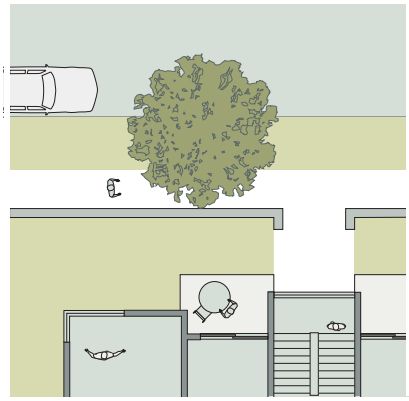
ii. Basement car parking entrances and all inverts to basement vents are to be a minimum of 0.15m above the 100-year ARI flood levles

iii. Finished floor levels:
   - for commercial uses, are to be a mininum 0.3m above 100-year ARI flood levels
   - for residential uses, are to be a minimum 0.5m above 100-year ARI flood levels

iv. Management of the redevelopment of the site must be undertaken in a whole-of-site approach. Amalgamation and resubdivision is required to manage redirection of the floodway.

v. Provide a 40m floodway through the site, comprising roads, parks, swales and a natural creek system.

vi Design materials to be flood compatible in accordance with Holroyd Council's *Managing Our Flood Risk* policy



Windows, balconies and front doors address the street, provide surveillance and make both the street and the apartment building more secure during

Landscape lighting, common stairwell lighting and projected internal lighting increases safety within the common areas in the development

4.2.1 SAFETY + SECURITY

The built environment has an impact on perceptions of safety and security, as well as on the actual opportunities for crime. A development which provides safe ground level entry and exit during all times of the day and night will minimise opportunities for crime. Design for safety works by enabling casual surveillance, reinforcing territory, controlling access and managing space.

Objectives

- To ensure that residential flat developments are safe and secure for residents and visitors.
- To ensure that ground floor commercial / retail uses provide for natural surveillance and promote pedestrian activity
- To contribute to the safety of the public domain.

Performance Criteria

i. The development boundary is to be reinforced to strengthen the distinction between public and private space. This can be actual or symbolic and may include:
   - employing a level change at the site and/or building threshold
   - signage
   - entry awnings
   - fences, walls and gates
   - change of material in paving between the street and the development.

ii. Visibility, functionality and safety of building entrances are to be optimised by:
   - orienting entrances towards the public street
   - providing clear lines of sight between entrances, foyers and the street
   - providing direct entry to ground level apartments from the street rather than through a common foyer
   - providing separate and clearly defined entries to residential and commercial uses
   - providing direct and well-lit access from car parks to dwellings, lift lobbies, and to all commercial and apartment entrances.

iii. Casual surveillance opportunities are to be improved by:
   - orienting living areas with views over public or communal open spaces, where possible
   - using bay windows and balconies, which protrude beyond the building line and enabling a wider angle of vision to the street
   - using corner windows, which provide oblique views of the street
   - providing casual views of common internal areas, such as lobbies and foyers, hallways, recreation areas and car parks.

iv. Opportunities for concealment are to be minimised by:
   - avoiding blind or dark alcoves near lifts and stairwells, at the entrance and within indoor car parks, along corridors and walkways
   - providing well-lit routes throughout the development
   - providing appropriate levels of illumination for all common areas
   - providing graded illumination to car parks and illuminating entrances higher than the minimum acceptable standard.

4.2 Site Amenity

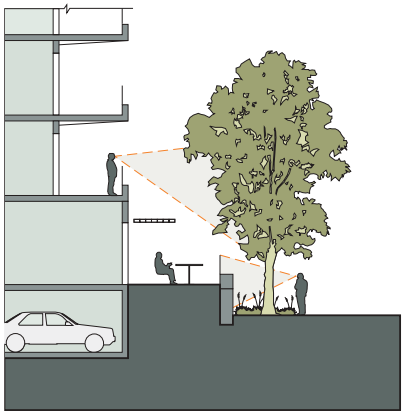
v. Access to the development is to be controlled by:

- making apartments inaccessible from the balconies, roofs and windows of neighbouring buildings
- separating the residential component of a development's car parking from any other building use and controlling car park access from public and common areas
- providing direct access from car parks to apartment lobbies for residents
- providing separate access for residents in mixed-use buildings
- providing an audio or video intercom system at the entry or in the lobby for visitors to communicate with residents
- providing key card access for residents.

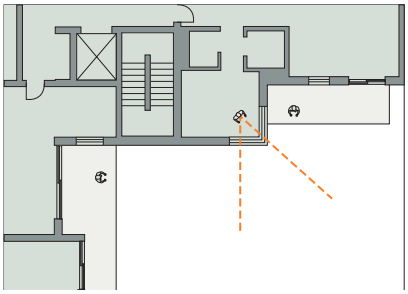
vi. A formal crime risk assessment is to be carried out for all residentialdevelopments consisting of 20 or more new dwellings.

vii. Commercial / retail / business uses on the ground floor should open on to or overlook the street and provide opporutnities for a high level of passive surveillance.

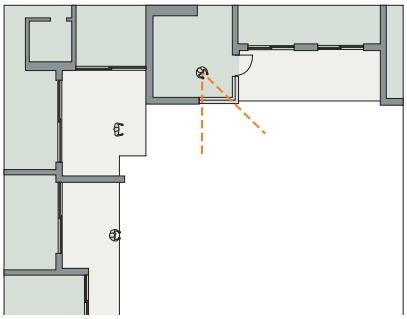
Projecting bay windows increases surveillance along the street



A change in level, retaining walls, and vegetation, define a boundary between private open space and communal open space.



Locating circulation cores at the re-entrant (internal) corners of buildings can improve separation and privacy between apartments.



Re-entrant corner balconies are best used as a secondary outlook for an apartment.

4.2.2 VISUAL PRIVACY

Visual privacy protects residents' ability to carry out private functions within all rooms and private open spaces without compromising views, outlook, ventilation and solar access or the functioning of internal and external spaces. It relates to the adjacent context, site configuration, topography, the scale of the development and the layout of the apartments.

Degrees of privacy are influenced by a number of factors such as:

- the nature of activities in areas
- the times and frequency of use of the spaces
- occupants' expectations of privacy and their ability to control overlooking with screening devices.

Objectives

- To provide reasonable levels of visual privacy externally and internally, during the day and at night.
- To maximise outlook and views from principal rooms and private open spaces without compromising visual privacy.

Performance Criteria

i. New development is to be located and oriented to maximise visual privacy between buildings on site and adjacent buildings by:
   - providing adequate building separation
   - employing appropriate rear and side setbacks
   - utilising the site layout to increase building separation by orienting buildings on narrow sites to the front and rear of the lot, thereby utilising the street width and rear garden depth to increase the separation distance.

ii. Building layouts are to be designed such that direct overlooking of rooms and private open spaces is minimised in apartments by:
   - locating balconies to screen other balconies and any ground level private open space
   - separating communal open space, common areas and access routes through the development from the windows of rooms, particularly habitable rooms
   - changing the level between ground floor apartments with their associated private open space, and the public domain or communal open space

iii. Detailed site and building design elements are to be used to increase privacy without compromising access to light and air. Design detailing may include:
   - offseting windows of apartments in new development and adjacent development windows
   - recessing balconies and/or vertical fins between adjacent balconies
   - using solid or semi-solid balustrades to balconies
   - using louvres or screen panels to windows and/or balconies
   - providing appropriate fencing

4.2 Site Amenity

- providing vegetation as a screen between spaces
- incorporating planter boxes into walls or balustrades to increase the visual separation between areas
- utilising pergolas or shading devises to limit overlooking of lower apartments or private open space
- providing appropriate fencing

Building elements provide privacy between spaces, pergolas limit overlooking, solid walls and sliding screens limit horizontal views.

Lower level balconies have solid balustrades, limiting views from the street. Higher level balconies are set back beyond pedestrian sightlines and therefore glazed balconies are appropriate.

This is a well-defined entry as it is well-differentiated by a change in colour from the surrounding streets.

Multiple private entries along a street can activate the street and create visual interest.

The facade of this building distinguishes the residential entry from the commercial shop fronts with a vertical element.

4.3.1 BUILDING ENTRY

Entrances define the threshold between the public street and private areas within the building. They may lead into a common entry or directly into the private space of an apartment from the street. Building entries provide a public presence and interface within the public domain thereby contributing to the identity of the development.

Objectives

- To create entrances which provide a desirable identity for both commercial and residential developments.
- To orient the visitor.
- To contribute positively to the streetscape and building façade design.

Performance Criteria

i. The presentation of the development to the street is to be improved by:

- locating entries so that they relate to the existing street and subdivision pattern, street tree planting and pedestrian access network
- designing the entry as a clearly identifiable element of the building in the street
- utilising multiple entries-main entry plus private ground floor apartment entries-where it is desirable to activate the street edge or reinforce a rhythm or entry along a street.

ii. Direct physical and visual connection is to be provided between the street and the building entry.

iii. Clear lines of transition are to be achieved between the public street, the shared private circulation spaces and the apartment unit.

iv. Equal accessibility is to be ensured for all, in both commercial and residential developments.

v. Safe and secure access is to be provided. Design solutions include:

- avoiding ambiguous and publicly accessible small spaces in entry areas
- providing a clear line of sight between one circulation space and the next
- providing sheltered, well lit and highly visible spaces to enter the building, meet and collect mail.

vi. Separate entries from the street are to be provided for:

- pedestrians and cars
- different uses (for example, for residential and commercial users in a mixed-use development)
- ground floor apartments, where applicable

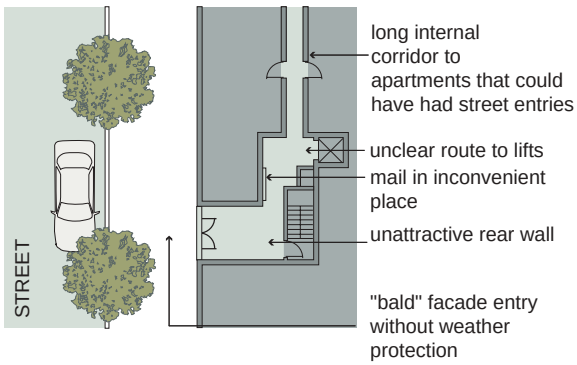
vii. Separate entries for different uses are to be provided from the car park (eg. separate residential and commercial entries in mixed use developments)

viii. Entries and associated circulation space are to be designed of an adequate size to allow movement of furniture between public and private spaces.

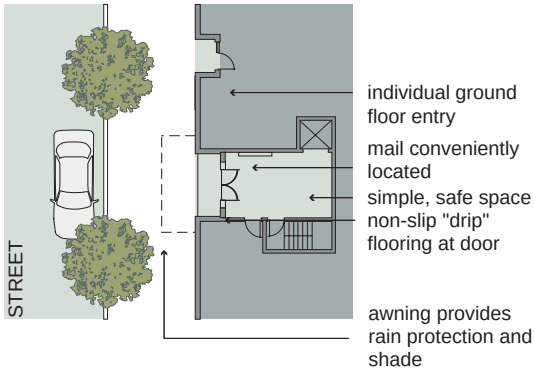
ix. Mailboxes are to be provided and designed to be convenient for residents. They are not to clutter the appearance of the development from the street. Design solutions include:

- locating them adjacent to the major entrance and integrated into a wall, where possible
- setting them at 90 degrees to the street, rather than along the front boundary.

4.3 Site Access



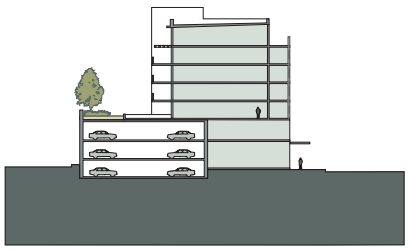
poor building entry



well designed building entry

This diagram illustrates a contrast between undesirable practice (top) and better design practice (bottom) for entry and lobby design.

Where on-grade car parking is necessary, its impact can be reduced by quality paving and landscaping between smaller groups of car spaces.



Locating above-ground car parking to the rear of the site behind commercial and retail uses, is a good way of screening it from the main road.

4.3.2 PARKING

Accommodating parking on site, underground and on-grade, has a significant impact on the site layout, landscape design, deep soil zones and stormwater management. The amount of parking provided is related to the size of the development, however, parking provision should also be considered in relation to the local context.

The location of public transport facilities, services and recreational facilities within walking or cycling distance may reduce the need for parking spaces.

Objectives

- To minimise car dependency for commuting and recreational transport use and to promote alternative means of transport-public transport, bicycling, and walking.
- To provide adequate car parking for the building's users, customers and visitors, depending on building type and proximity to public transport.
- To integrate the location and design of car parking with the design of the site and the building.

Performance Criteria

i. Parking is to be accomodated underground, whenever possible.

ii. Deep soil zones are to be retained and consolidated.

iii. Natural ventilation is to be facilitated to basement and sub-basement car parking areas, wherever possible and with regard to flooding issues.

iv. Ventilation grills or screening devices of car park openings are to be integrated into the overall façade and landscape design of the development.

v. Safe and secure access is to be provided for building users, including direct access to residential apartments, wherever possible.

vi. A logical and efficient structural grid is to be provided. There may be a larger floor area for basement car parking than for upper floors above ground. Upper floors, particularly in slender residential buildings, do not have to replicate basement car parking widths.

vii. Where above ground enclosed parking cannot be avoided, it is to be ensured that the design of the development mitigates any negative impact on streetscape and street amenity by integrating the car park, including vehicle entries, into the overall façade design, for example, by using appropriate proportions and façade details.'Wrapping' the car parks with other uses, for example, retail along street edges with parking behind, increases the potential for active streets.

viii. The impact of on-grade car parking is to be minimised by:

- locating parking on the side or rear of the lot away from primary street frontage
- screening cars from view of streets and buildings
- allowing for safe and direct access to building entry points
- incorporating car parking into the landscape design of the site. Considerations include: vegetation between parking bays to ameliorate views, selection of paving material and screening from communal and private open space areas.

ix. All car parking must be provided within development sites.

4.3 Site Access

x. **Car parking** is to be provided in accordance with the following requirements:

Residential development:

- Generally provide a minimum of 1 space per dwelling.
- Where dwellings are designed to be accessible, the car spaces associated with those dwellings must also be for accessible parking.

Dwelling type	*Maximum car spaces per dwelling*
studio	1
l bedroom	1
2 bedroom	1.2
3 bedroom	1.5
visitors	1 space per 5 units
disabled spaces for visitors	1 space per 50 units

Retail and Commercial development:

gross lettable floor area	spaces required
1 - 500m2	1 per 20m2 (minimum 1 per shop)
> 500 m2	1 per 20m2 + 1 per additional 40 m2 over 500 m2

xi. Car park dimensions are to be as stated in Holroyd DCP no. 1 Guidelines for Parking, sections 6.1 - 6.2 inclusive. Summary requirements are:

- minimum length for angle parking 5.5 metres
- minimum width 2.5 metres
- minimum width, disabled space 3.2 metres
- minimum clearance height 2.3 metres
- minimum aisle width undercover 7.0 metres

xii. **Bicycle parking** is to be provided in all developments, and should be easily accessible from ground level and from the apartments. Secure bicycle storage is to be provided in accordance with the following requirements:

Residential development:

Dwelling type	*Minimum no of bicycle storage* spaces required
studio	none
l bedroom	0.5
2 bedroom	0.5
3 bedroom	0.5
visitors	1 per 12 dwellings

Retail and Commercial development:

- 1 bicycle space per 300 sq.m gross leasable floor area
- 1 visitor bicycle space per 2500 sq.m of gross leasable floor area

A safe pedestrian pathway mediates between private building entries and on-grade car parking.

4.3.3 PEDESTRIAN ACCESS

Design for pedestrians focuses on delivering high quality, safe and pleasant walking environments. It is person-centred rather than vehicle-centred. Pedestrian access should also be equitable access, which provides a barrier-free environment where all people who live and work in, and who visit the development can enjoy the public domain, and can access communal use areas and apartments.

Objectives

- To promote development which is well connected to the street and contributes to the accessibility of the public domain.
- To ensure that workers, residents and visitors, including users of strollers and wheelchairs and people with bicycles, are able to reach and enter their workspaces, retail areas and apartments directly and efficiently.
- To ensure that people can access communal areas via minimum grade ramps, paths, accessways or lifts.

Performance Criteria

i. The site and its planning is to be utilised to optimise accessibility to the development.

ii. High quality accessible routes are to be provided to public and semi-public areas of the building and the site, including major entries, lobbies, communal open spaces, site facilities, parking areas, public streets and internal roads.

iii. Equity is to be promoted by:

- ensuring that the main building entrance is accessible for all from the street and from car parking areas

- integrating ramps into the overall building and landscape design.

iv. Ground floor apartments are to be designed to be accessible from the street, where applicable, and to their associated private open space.

v. The number of accessible, visitable and adaptable apartments in a building is to be maximised.

vi. Pedestrian accessways and vehicle accessways are to be separate and clearly distinguishable.

vii. The provision of public through-site pedestrian accessways is to be considered in large development sites.

viii. The access requirements from the street or car parking area to the shop / commercial office / apartment entrance are to be identified.

ix. The accessibility standard set out in Australian Standard AS 1428 (parts 1 and 2), is to be followed as a minimum.

x. Barrier-free access is to be provided to at least 20% of dwellings in the development.

4.3 Site Access

4.3.4 VEHICLE ACCESS

Vehicle access is the ability for cars and maintenance and service vehicles to access the development. The location, type and design of vehicle access points to a development will have significant impacts on the streetscape, the site layout and the building façade design. It is important that vehicle access is integrated with site planning from the earliest stages to balance any potential conflicts with streetscape requirements and traffic patterns and to minimise potential conflicts with pedestrians.

Objectives

- To integrate adequate car parking and servicing access without compromising street character, landscape or pedestrian amenity and safety.
- To encourage the active use of street frontages.

Performance Criteria

i. Pedestrian safety is to be maintained by minimising potential pedestrian / vehicle conflicts. Design approaches include:
   - limiting the width and number of vehicle access points
   - ensuring clear site lines at pedestrian and vehicle crossings
   - utilising traffic calming devices
   - separating and clearly distinguishing between pedestrian and vehicular accessways.

ii. Adequate separation distances are to be ensured between vehicular entries and street intersections.

iii. The opportunities for active street frontages and streetscape design are to be optimised by:
   - making vehicle access points as narrow as possible
   - consolidating vehicle access within sites under single body corporate ownership
   - locating car park entry and access from secondary streets and lanes.

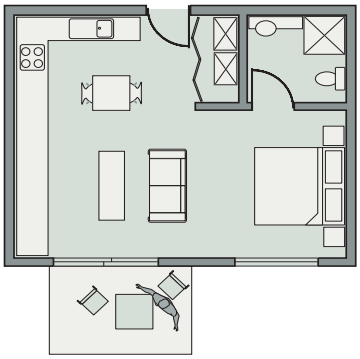
iv. The appearance of car parking and service vehicle entries are to be improved for by:
   - locating or screening garbage collection, loading and servicing areas visually away from the street, but where they are still practical for use.
   - setting back or recessing car park entries from the main façade line
   - avoiding black holes in the façade by providing security doors to car park entries
   - where doors are not provided, ensuring that the visible interior of the car park is incorporated into the façade design and material selection and that building services pipes and ducts are concealed
   - returning the façade material into the car park entry recess for the extent visible from the street as a minimum.

v. The width of driveways is to be limited to a maximum of 6 metres, or 8 metres for commercial loading docks and servicing.

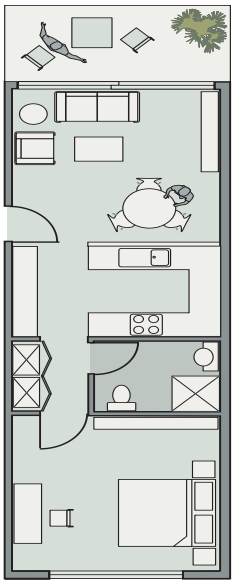
A safe pedestrian pathway mediates between private building entries and on-grade car parking.

This elevation treats the car park entry as part of the whole elevation. It narrows the width of the entry and defines an opening in proportion to the other facade elements.

This small site on a steep terrain, has split the entry and exit driveways to maintain a consistent scale of facade openings.



Studio apartment



One-bedroom cross-through apartment

4.4.1 APARTMENT LAYOUT

The internal layout of an apartment establishes the spatial arrangement of rooms, the circulation between rooms, and the degrees of privacy for each room. In addition, the layout directly impacts the quality of residential amenity, such as access to daylight and natural ventilation, and the assurance of acoustic and visual privacy. The apartment layout also includes private open space.

Objectives

- To ensure that apartment layouts are efficient and provide high standards of residential amenity.
- To maximise the environmental performance of apartments.

Performance Criteria

i. The following minimum sizes (internal area) of apartments are to complied with:

- studio apartment	40m2
- 1 bedroom apartment	50m2
- 2 bedroom apartment	70m2
- 3 bedroom apartment	95m2
- 4 bedroom apartment	120m2

ii. Single-aspect apartments are to have a maximum depth of 8 metres.

iii. The back of a kitchen should be no more than eight metres from a window.

iv. The width of cross-over or cross-through apartments over 15 metres deep is to be 4.5 metres or greater to avoid deep narrow apartment layouts.

v. It is to be ensured that apartment layouts are resilient over time. Design issues include:

- accommodating a variety of furniture arrangements
- providing for a range of activities and privacy levels between different spaces within the apartment
- utilising flexible room sizes and proportions or open plans
- ensuring circulation by stairs, corridors and through rooms is planned as efficiently as possible thereby increasing the amount of floor space in rooms.

vi. Apartment layouts are to be designed to respond to the natural environment and optimise site opportunities by:

- providing private open space in the form of a balcony, a terrace, a courtyard or a garden for every apartment
- orienting main living spaces toward the primary outlook and aspect and away from neighbouring noise sources or windows
- locating main living spaces adjacent to main private open space
- locating habitable rooms, and where possible kitchens and bathrooms, on the external face of the buildings thereby maximises the number of rooms with windows
- maximising opportunities to facilitate natural ventilation and to capitalise on natural daylight, for example by providing
  - corner apartments
  - cross-over or cross-through apartments
  - split-level or maisonette apartments
  - shallow, single-aspect apartments.

vii. Avoid locating kitchens as part of the main circulation spaces of an apartment, such as a hallway or entry space.

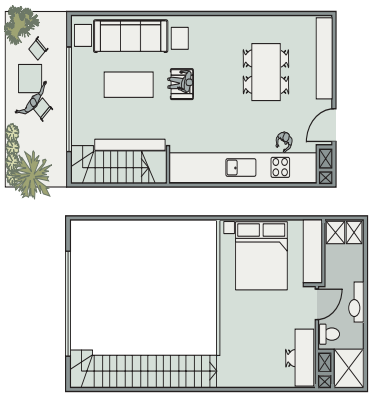
4.4 Building Configuration

viii. Adequate storage space is to be included in the apartments.

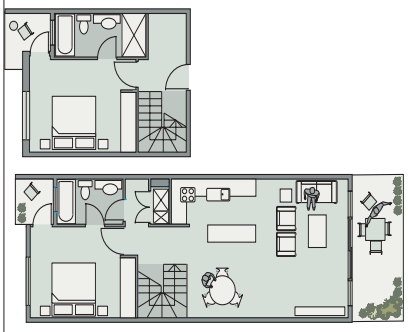
ix. Ensure that apartment layouts and dimensions facilitate furniture removal and placement.

One bedroom single aspect apartment

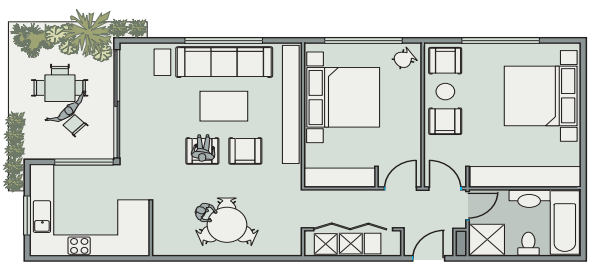
Two bedroom cross through apartment



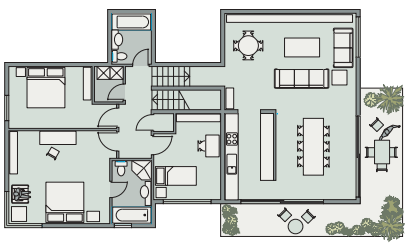
One bedroom maisonette/loft apartment



Two bedroom cross over apartment



Two bedroom corner apartment



Three bedroom apartment

4.4.2 APARTMENT MIX

A mix of apartment types provides housing choice and supports equitable housing access. By accommodating a range of household types, a mix of apartments can ensure apartment buildings support the needs of society now and in the future. This is particularly important because apartment buildings form a significant and often permanent part of the urban fabric.

Objectives

- To provide a diversity of apartments types, which cater for different household requirements now and in the future.
- To maintain equitable access to new housing by cultural and socio-economic groups.

Performance Criteria

i. A variety of apartment types between studio-, one-, two-, three- and three plus bedroom apartments are to be provided.

ii. Studios and 1-bedroom apartments are not to exceed 20% of the total apartment mix within each development.

iii. A mix of one- and three-bedroom apartments is to be located on the ground level where accessibility is more easily achieved for disabled, elderly people or families with children.

iv. The number of accessible and adaptable apartments is to be optimised to cater for a wider range of occupants. The minimum is 20% of all dwellings (see 4.4.6 Flexibility)

v. The possibility of flexible apartment configurations is to be investigated, which supports change in the future.

4.4 Building Configuration

4.4.3 BALCONIES

Balconies are outdoor rooms, which enhance the amenity and lifestyle choices of apartment residents. They provide private open space, extend the living spaces of the apartment and capitalise on the temperate climate. Balconies are also important architectural elements, contributing to the form and articulation of apartment buildings.

Objectives

- To provide all apartments with private open space.
- To ensure balconies are functional and responsive to the environment thereby promoting the enjoyment of outdoor living for apartment residents.
- To ensure that balconies are integrated into the overall architectural form and detail of residential flat buildings.
- To contribute to the safety and liveliness of the street by allowing for casual overlooking and address.

Performance Criteria

i. Each apartment is to have at least one primary balcony.

ii. Primary balconies are to have a minimum depth of 2.4m and a minimum area of 10m2

iii. Primary balconies are be:

- located adjacent to the main living areas, such as living room, dining room, kitchen to extend the dwelling living space

- sufficiently large and well proportioned to be functional and promote indoor / outdoor living. A dining table and two to four chairs should fit on the majority of balconies in any development. Consider supplying a tap and gas point.

iv. Secondary balconies (including Juliet balconies or operable walls with balustrades) may be provided to increase residential amenity and apartment choice, for example:

- in larger apartments

- adjacent to bedrooms.

v. Where balconies are sited off laundries or bathrooms they are to be screened from the public domain.

vi. Balconies are to be detailed and designed in response to the local climate and context, thereby increasing their usefulness.This may be achieved by:

- locating balconies facing predominantly north, east or west to provide solar access

- utilising sun screens, pergolas, shutters and operable walls to control sunlight and wind

- providing balconies with operable screens, Juliet balconies or operable walls / sliding doors with a balustrade in special locations where noise or high winds prohibit other solutions—along rail corridors, on busy roads or in tower buildings

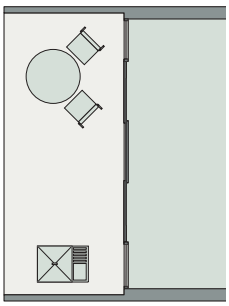
- choose cantilevered balconies, partially cantilevered balconies and/or recessed balconies in response to daylight, wind, acoustic privacy and visual privacy

- ensuring that balconies are not so deep that they prevent sunlight entering the apartment below.

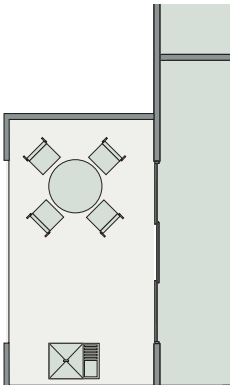
Balconies allow for privacy while at the same time giving a view and surveillance over the street they face.

Ensure that balconies have enough depth to accomodate a table and chairs.

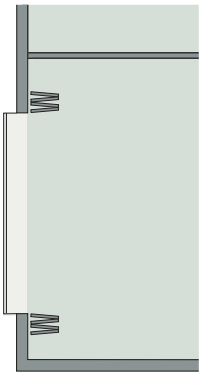
The detailed design of these partially solid balustrades, sun shades and privacy screens contribute to the overall facade composition of the building.



A 2m deep balcony can comfortably accomodate a table and two chairs.



A 2.4 m deep balcony is required to comfortably accomodate a table and four chairs.



Operable walls may be more appropriate in some contexts where there is limited space available, for example.

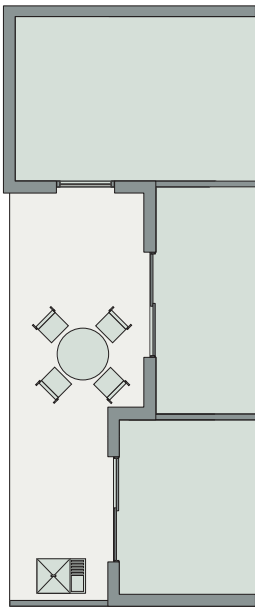
vi. Balustrades are to be designed to allow views and casual surveillance of the street while providing for safety and visual privacy. Design considerations may include:

- detailing balustrades using a proportion of solid to transparent materials to address site lines from the street, public domain or adjacent development (full glass balustrades do not provide privacy for the balcony or the apartment's interior, especially at night)
- detailing balustrades and providing screening from the public, for example, for a person seated looking at a view, bicycle storage or air conditioning units.

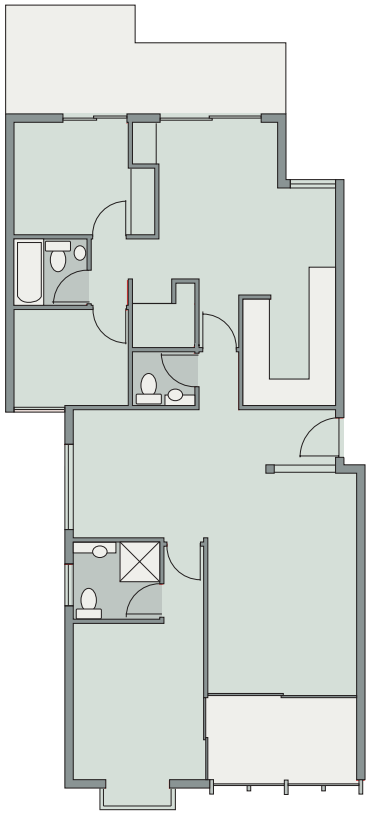
vii. Design balconies to include a screened clothes drying area to promote energy efficiency and reduce the use of non-sustainable resources

viii. Building services, such as drainage pipes, are to be coordinated and integrated with overall façade and balcony design. As an example, drainage pipes under balconies are often visible from below in taller buildings and negatively impact the overall façade appearance.

ix. Scale plans are to be provided with furniture layout, to confirm adequate area of useable balcony space.



Balconies with access from mutiple rooms improve the amenity of an apartment.



This 3-bed apartment has 2 balconies which cater to the varying needs of a family.

4.4 Building Configuration

4.4.4 CEILING HEIGHTS

Ceiling heights are measured from finished floor to finished ceiling level. Ceiling heights are design elements for defining the three-dimensional space of an apartment, in conjunction with walls and floors. Well designed and appropriately defined ceilings ensure quality residential amenity and create spatial interest and hierarchy in apartments.

Variation in height of different floors adds to the articulation/visual quality of the building.

Objectives

- To increase the sense of space in apartments and provide well proportioned rooms.
- To promote the penetration of daylight into the depths of the apartment.
- To contribute to flexibility of use.
- To achieve quality interior spaces while considering the external building form require ments.

Guidelines

i. Ceilings are to:

- define a spatial hierarchy between areas of an apartment using double height spaces, raked ceilings, changes in ceiling heights and/or the location of bulkheads
- enable better proportioned rooms, for example, smaller rooms often feel larger and more spacious when ceilings are higher
- maximise heights in habitable rooms by stacking wet areas from floor to floor. This ensures that services and their bulkheads are located above bathroom and storage areas rather than habitable spaces
- promote the use of ceiling fans for cooling and heating distribution.

ii. Better access to natural light is to be facilitated by using ceiling heights which:

- promote the use of taller windows, highlight windows and fan lights. This is particularly important for apartments with limited light access, such as ground floor units and apartments with deep floor plans
- enable the effectiveness of light shelves in enhancing daylight distribution into deep interiors.

iii. Ceiling heights are to be designed to promote building flexibility over time for a range of other uses, including retail or commercial, where appropriate.

iv. Internal ceiling heights and slab levels are to be coordinated with external height requirements and key datum lines. External building elements requiring coordination may include:

- datum lines and parapet lines set by the context or structure plan
- adjacent heritage building's cornices and string courses
- exterior awing levels or colonnade heights

v. Double height spaces with mezzanines are to be counted as two storeys.

vi. The following minimum dimensions, measured from finished floor level (FFL) to finished ceiling level (FCL), are to be complied with:

- 3.5 metre minimum for ground floor retail or commercial in mixed use buildings, to promote flexibility of use
- 3.3 metre for first floor (or second floor where relevant) retail, commercial or residential in residential flat buildings in mixed use buildings, to promote flexibility of use
- 2.7 metre minimum for all habitable rooms on all floors
- 2.4 metres for all non-habitable rooms

The double height in this apartment spatially unifies the two floor levels, creating a pleasant well-lit living area.

- for two storey units, 2.4 metre minimum for second storey if 50 percent or more of the apartment has 2.7 metre minimum ceiling heights
- for two-storey units with a two storey void space, 2.4 metre minimum ceiling heights.

4.4 Building Configuration

4.4.5 CORNER BUILDINGS

Buildings on the corner of two streets/roads are termed as 'corner buildings'. Corner buildings are highly visible owing to their location, with address and visibility from two streets.

Objective

- To ensure that corner buildings, which are by their location often highly visible, are well designed and respond to the different characteristics of the streets they address.

Performance Criteria

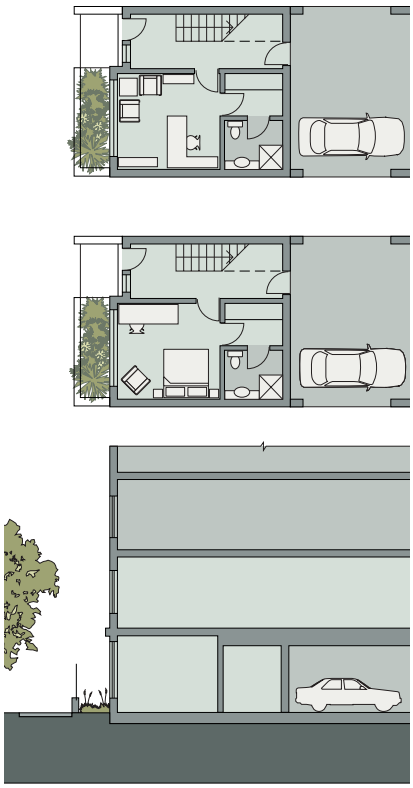
i. Buildings are to align and reflect the corner conditions. This is to:
   - accentuate the topography.
   - clarify the street hierarchy.
   - reinforce the spatial relationships.

ii. Corner buildings are to reflect the architecture, hierarchy and characterstics of the streets they address.

iii The higher corner component of buildings identified in the masterplan is generally to be no more than 18 metres in both directions, unless otherwise specified in the specific block controls.

This corner building, owing to its alignment to both streets, helps pedestrians to align/place themselves relative to the two roads it addresses.

Corner buildings, if well-treated, help in reinforcing important junctions.



Locating a bedroom with an ensuite on the ground floor of this 2-storey apartment facilitates a variety of uses:
1. Small business
2. Third bedroom
3. Shared housing for independent adults
4. Housing for an elderly parent

4.4.6 FLEXIBILITY

Flexible design ensures that buildings have the capacity for adaptability and can accommodate a wider range of inhabitants and their changing lifestyle needs, such as:

– household structure changes: single, couple, family, extended family
– live/work housing arrangements
– changing mobility and access needs, including the elderly or young children in prams
– future changes in use: residential to commercial office.

Objectives

- To encourage housing designs which meet the broadest range of the occupants' needs possible.
- To promote 'long life loose fit' buildings, which can accommodate whole or partial changes of use.
- To save the embodied energy expended in building demolition.

Performance Criteria

i. Robust building configurations are to be provided, which utilise multiple entries and circulation cores, especially in larger buildings over 15 metres long, for example by:
   - thin building cross sections, which are suitable for residential or commercial uses
   - a mix of apartment types
   - higher ceilings on the ground floor and first floor
   - separate entries for the ground floor level and the upper levels
   - sliding and/or movable wall systems.

ii. Apartment layouts which accommodate the changing use of rooms are to be provided. Design solutions include:
   - windows in all habitable rooms and to maximum number of non-habitable rooms
   - adequate room sizes or open-plan apartments, which provide a variety of furniture layout opportunities
   - dual master-bedroom apartments, which can support two independent adults living together or a live/work situation.

iii. Structural systems, which support a degree of future change in building use or configuration, are to be utilised. Design solutions may include:
   - a structural grid, which accommodates car parking dimensions, retail, commercial and residential uses vertically throughout the building
   - the alignment of structural walls, columns and services cores between floor levels
   - the minimisation of internal structural walls
   - higher floor to floor dimensions on the ground floor and possibly the first floor
   - knock-out panels between two adjacent apartments to allow future amalgamation.

iv. Provide a total of 20% of dwellings as adaptable housing by ensuring that:
   - a minimum of 10% of all apartments within a development comply with AS4299-1995 *Adaptable House Class A*.
   - a minimum of 10% of all apartments within a development comply with AS4299-1995 *Adaptable House Class C*.

vi. All commercial/retail components of mixed use buildings comply with AS1428-2001.

vii. Accessibility and adaptability are to be promoted by ensuring that:
   - the amount of accessible retail / commercial / communal space is optimised
   - the number of accessible and visitable apartments is optimised
   - adequate pedestrian mobility and access is provided.

viii. Pre- and post-adaptive designs are required to be submitted at DA stage to demonstrate compliance with the relevant sections of the checklist provided in Appendix A of AS 4299-1995.

4.4 Building Configuration

4.4.7 GROUND FLOOR APARTMENTS

Ground floor apartments are special because they offer the potential for direct access from the street and on-grade private landscape areas and provide opportunities for the apartment building and its landscape to respond to the streetscape and the public domain at the pedestrian scale. Ground floor apartments also support housing choice by providing accessibility to the elderly and/or disabled and support families with small children. Ground floor apartments extend the lifestyle choices available in apartment buildings by facilitating activities, such as gardening, play and pet ownership.

Planting along fences visually screens private terraces from the car park.

Objectives

- To contribute to the desired streetscape of an area and to create active safe streets.
- To increase the housing and lifestyle choices available in apartment buildings.

Performance Criteria

i. Housing choice is to be promoted by:

   - providing private gardens, which are directly accessible from the main living spaces of the apartment and support a variety of activities
   - maximising the number of accessible and visitable apartments on the ground floor
   - supporting a change or partial change in use, such as a home office accessible from the street or a corner shop

ii. Adequate privacy and safety of ground floor units in urban areas with no street setbacks (those units not required to be accessible) by:

   - stepping up the ground floor from the level of the footpath a maximum of 1.2 metres
   - designing balustrades and establishing window sill heights to minimise site lines into apartments, particularly in areas with no street setback
   - determining appropriateness of individual entries
   - ensuring safety bars or screens are integrated into the overall elevation design and detailing.

iii. Opportunities for solar access to ground floor units is to be increased by:

   - providing higher ceilings and taller windows
   - choosing trees and shrubs which provide solar access in winter and shade in summer

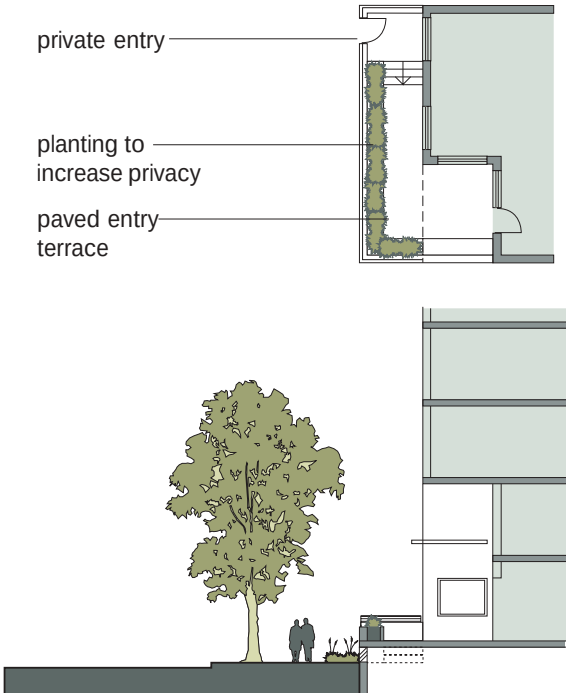
iv. Ground floor apartments are to be provided with access to private open space, preferably as a terrace or garden which contribute to the spatial and visual structure of the street while maintaining adequate privacy for apartment occupants. This can be achieved by: animating the street edge, for example, by promoting individual entries for ground floor apartments. This creates more pedestrian activity along the street and articulates the street edge by:

   - balancing privacy requirements and pedestrian accessibility
   - providing appropriate fencing, lighting and/or landscaping to meet privacy and safety requirements of occupants while contributing to a pleasant streetscape
   - utilising a change in level from the street to the private garden or terrace to minimise site lines from the streets into the apartment for some apartments
   - increasing street surveillance with doors and windows facing onto the street.

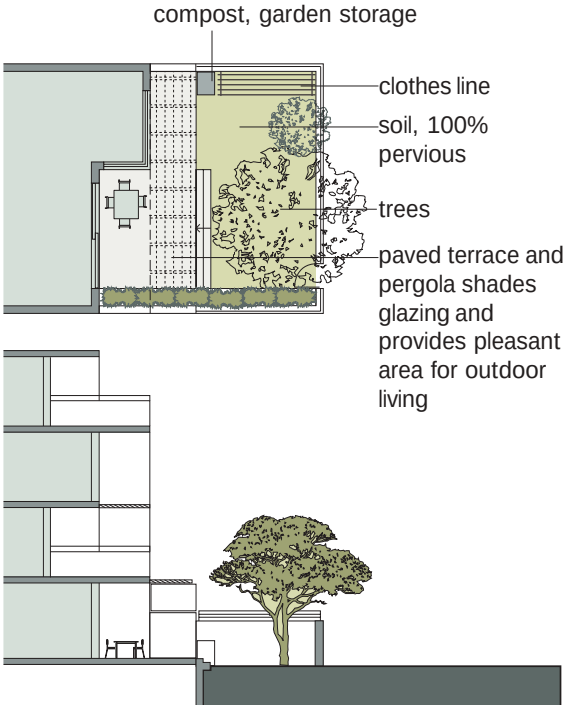
The use of multiple lift and stair cores promotes more number of entries along the street and thus helps in articulating a long building facade.

Street level picket fencing with planting provides screening to car park ventilation louvres.

4.4 Building Configuration



This private entry is raised above ground to provide and to facilitate car park ventilation. Planting along the terrace edge contributes to a quality streetscape.

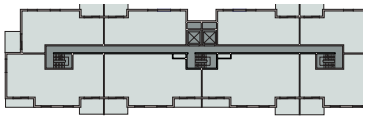


Well-landscaped private courtyards extend the liveable space of the apartment and provide a variety of paved and soft landscaped areas. Utility functions such as clothes drying, are also provided.

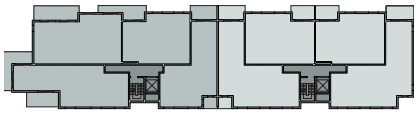
4.4 Building Configuration

4.4.9 INTERNAL CIRCULATION

Lobbies, stairs, lifts and corridors make up the common circulation spaces within a building. Important design considerations include safety, amenity and durability. In addition, the location, proportion, extent and frequency of these elements have a direct relationship with the building's form, layout and articulation.



Conventional practice locates single aspect units along a double loaded corridor.



Better practice uses multiple cores to support more dual aspect apartments with better daylight access and cross-ventilation.

Objectives

- To create safe and pleasant spaces for the circulation of people and their personal possessions.
- To facilitate quality apartment layouts, such as dual aspect apartments.
- To contribute positively to the form and articulation of the building façade and its relationship to the urban environment.
- To encourage interaction and recognition between residents to contribute to a sense of community and improve perceptions of safety.

Performance Criteria

i. Where apartments are arranged off a double-loaded corridor, the number of units accessible from a single core/corridor is to be limited to eight.

ii. Amenity and safety in circulation spaces is to be increased by:

- providing generous corridor widths and ceiling heights, particularly in lobbies, outside lifts and apartment entry doors
- providing appropriate levels of lighting, including the use of natural daylight, where possible
- minimising corridor lengths to give short, clear sight lines
- avoiding tight corners
- providing legible signage noting apartment numbers, common areas and general directional finding
- providing adequate ventilation.

iii. Better apartment layouts are to be supported by designing buildings with multiple cores which:

- increase the number of entries along a street
- increase the number of vertical circulation points
- give more articulation to the facade.
- limit the number of units off a circulation core on a single level.

iv. Longer corridors are to be articulated by:

- changing the direction or width of a corridor
- utilising a series of foyer areas
- providing windows along or at the end of a corridor.

vii. Maintenance is to be minimised and durability is to be maintained by using robust materials in common circulation areas.

4.4.10 STORAGE

Providing storage space for items ancillary to people's living needs is particularly important in residential developments where the size of dwellings and their configuration are constrained. Storage is conventionally calculated on an apartment by apartment basis, proportional to the size of the apartment.

Objectives

- To provide adequate storage for everyday household items within easy access of the apartment.
- To provide storage for sporting, leisure, fitness and hobby equipment.

Performance Criteria

i. Storage is to be located conveniently for apartments.

ii. A minimum of least 50% of the required storage within each apartment is to be accessible from either the hall or living area. Storage within apartments is best provided as cupboards accessible from entries and hallways and/or from under internal stairs.

iii. Dedicated storage rooms may be provided on each floor within the development, which can be leased by residents as required.

iv. Storage can be provided in dedicated and/or leasible storage in internal or basement car parks. Where this is provided, it must be contained in fire-safe compartments (Leasing of storage provides choice and minimises the impact of storage on housing affordability).

v. Storage is to be provided to accommodate larger items such as surfing and skiing equipment, bicycles, etc.

vi. Storage which is provided separate from the apartments is to be safe and secure for individual use.

vi. Where basement storage is provided, it is to be ensured that it does not compromise natural ventilation in car parks or create potential conflicts with fire regulations.

viii. Additional storage may be provided in smaller apartments in the form of built-in cupboards to promote a more efficient use of small spaces.

ix. In addition to kitchen cupboards and bedroom wardrobes, accessible storage facilities are to be provided at the following rates as a minimum requirement:

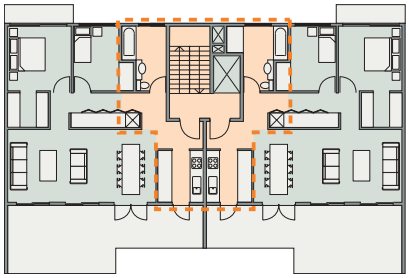
- studio apartments 6m^3
- one-bedroom apartments 6m^3
- two-bedroom apartments 8m^3
- three plus bedroom apartments 10m^3

The above minimum storage areas shall be excluded from apartment size calculations.

4.5 Building Amenity

4.5.1 ACOUSTIC PRIVACY

Acoustic privacy is a measure of sound insulation between apartments and between external and internal spaces. Designing for acoustic privacy relates to the location and separation of buildings within a development and the arrangement of apartments and internal spaces within apartments.



This apartment layout locates living spaces away from noise sources such as the lift and stairs. Quiet bedrooms are also located separate from main living areas.

Objective

- To ensure a high level of amenity by protecting the acoustic privacy of residents within residential flat buildings within apartments and in private open spaces.
- To ensure acoustic privacy between uses within mixed-used buildings and in adjacent buildings
- To minimise impacts from noise generating uses (train, traffic, service & loading vehciles, air conditioners and other plant)

Performance Criteria

i. The site and building layout are to maximise the potential for acoustic privacy by:

- providing adequate building separation within the development and from neighbouring buildings.

- ensuring vertical as well as horizontal separation between conflicting uses generating different levels of noise

ii. Where there are commercial / office uses and residential uses located adjacent to each other, particular attention is to be paid to the location of airconditioning units, building entries, and the design and layout of areas serving after-hours uses.

iii. A minimum RW rating of 55 is to be provided between apartments and between shared walls and floors of apartments, unless the BCA specifies a higher rate, in which case the higher rating will apply.

iv. Apartments are to arranged within a development to minimise noise transition by:

- locating busy, noisy areas next to each other and quieter areas next to other quiet areas, for example, living rooms with living rooms, bedrooms with bedrooms

- using storage or circulation zones within an apartment to buffer noise from adjacent apartments, mechanical services or corridors and lobby areas, minimising the amount of party (shared) walls with other apartments.

- using service areas / corridors to buffer 'quiet' areas such as bedrooms from noise generators including traffic, railway line, service and loading vehicle entries.

v. The internal apartment layout is to be designed to separate noisier spaces from quieter spaces by grouping uses within an apartment i.e. bedrooms with bedrooms and service areas like kitchen, bathroom, laundry together.

vi. Conflicts between noise, outlook and views are to be resolved by using design measures such as double glazing, operable screened balconies and continuous walls to ground level courtyards where they do not conflict with streetscape or other amenity requirements.

vii. Noise transmission is to be reduced from common corridors or outside the building by providing seals at entry doors.

viii. For buildings over three storeys, building separation shouuld increase in proportion to building height to ensure appropriate acoustic privacy for building occupants. The following minimum building separations are to be complied with:

- up to 4 storeys /12 metres	12 metres between habitable rooms/ balconies 9 metres between habitable/balconies and non-habitable rooms 6 metres between non-habitable rooms
– 5 to 8 storeys / 12 metres to 25 metres	18 metres between habitable rooms/balconies 13 metres between habitable rooms/balconies and non-habitable rooms 9 metres between non-habitable rooms

A combination of louvres provides shading for different times of the day.

4.5.2 DAYLIGHT ACCESS

Daylight consists of skylight-diffuse light from the sky-and sunlight-direct beam radiation from the sun. It changes with the time of day, season, and weather conditions. This variability contributes to the pleasant environments in which to live and work. Within an apartment, daylighting reduces reliance on artificial light, improving energy efficiency and residential amenity.

Objectives

- To ensure that daylight access is provided to all habitable rooms and encouraged in all other areas of residential flat development.
- To provide adequate ambient lighting and minimise the need for artificial lighting during daylight hours.
- To provide residents with the ability to adjust the quantity of daylight to suit their needs.

Performance Criteria

i. The site is to be planned to optimise northern aspect of office spaces and apartments.

ii. Direct daylighting to communal open spaces is to be ensured between March and September and appropriate shading is to be provided in summer.

iii. Daylighting is to be ensured to habitable rooms and private open spaces, particularly in winter.

iv. Living rooms and private open spaces for at least 70 percent of apartments in a development are to receive a minimum of three hours direct sunlight between 9 am and 3 pm in mid-winter.

v. The number of single-aspect apartments with a southerly aspect (SW–SE) is to be limited to a maximum of 10 percent of the total number of units proposed.

vi. Skylights, clerestory windows and fanlights are to be used to supplement daylight access.

vii. Two-storey and mezzanine ground floor apartments are to be promoted to facilitate daylight access to living rooms and private open spaces on the ground level where daylight access is limited.

viii. The depth of single aspect apartments is to be limited to 8 metres.

ix. It should be ensured that single aspect, single-storey apartments have a northerly or easterly aspect.

x. Living areas are to be located to the north and service areas to the south and west of the development, as much as possible.

xi. The number of south-facing apartments is to be kept at a minimum and where they occur, their window area is to be maximised.

xii. Buildings are to be designed for shading and glare control, particularly in summer by:

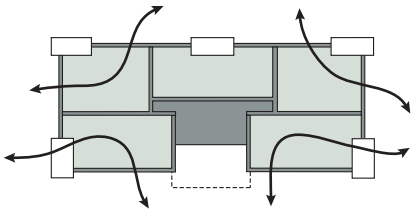
- using shading devices, such as eaves, awnings, colonnades, balconies, pergolas, external louvres and planting
- optimising the number of north-facing living spaces
- providing external horizontal shading to north-facing windows
- providing vertical shading to east or west windows
- using high performance glass but minimising external glare off windows by avoiding reflective films, using a glass reflectance below 20 percent and by considering reduced tint glass.

Sun shading is an integral component of the building form and facade design.

4.5 Building Amenity

xiii. Lightwells are prohibited from being used as a primary source of daylight to habitable rooms. Where they are used:

- they are to be of a minimum dimension of 6 x 6 metres.
- building services are to be concealed and appropriate detail and materials are to be provided to visible walls.
- they are to be fully open to the sky.



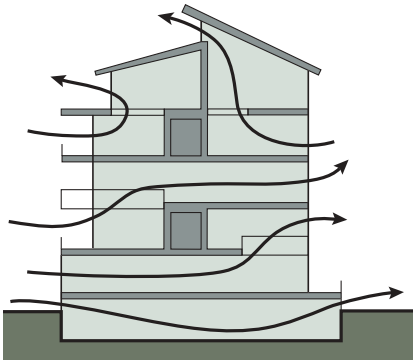
Corner apartments achieve effective natural ventilation.

4.5.3 NATURAL VENTILATION

Natural ventilation is the circulation of sufficient volumes of fresh air through an apartment to create a comfortable indoor environment. Designing for natural ventilation exercises sustainable practice by responding to the local climate and by reducing or eliminating the need for mechanical ventilation. To achieve natural ventilation the design concept must address the building's orientation, the apartment's configuration and the external building envelope.

Objectives

- To ensure that apartments are designed to provide all habitable rooms with direct access to fresh air and to assist in promoting thermal comfort for occupants.
- To provide natural ventilation in non-habitable rooms, where possible.
- To reduce energy consumption by minimising the use of mechanical ventilation, particularly air conditioning.



Good cross-ventilation can be achieved with the following:
1. Cross-over apartments
2. Maisonette apartments
3. Semi-basement car parks

Performance Criteria

i. The site is to be planned promote and guide natural breezes by:
   - determining prevailing breezes and orienting buildings to maximise use
   - locating vegetation to direct breezes and cool air as it flows across the site
   - selecting planting or trees that do not inhibit airflow.

ii. The building layout and section are to be utilised to increase the potential for natural ventilation. Design solutions include:
   - facilitating cross ventilation by designing narrow building depths and providing dual aspect apartments (eg cross through apartments and corner apartments)
   - facilitating convective currents by designing units which draw cool air in at lower levels and allow warm air to escape at higher levels (eg maisonette apartments and two-storey apartments)

iii. Residential building depth is to be limited to 18 metre (glass line to glass line) to support natural ventilation.

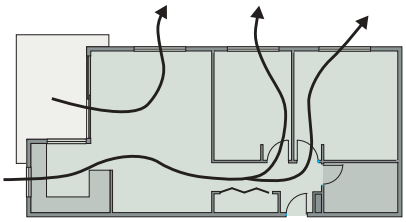
iv. The internal layout of apartments are to be designed to promote natural ventilation by:
   - minimising interruptions in air flow through an apartment. The more corners or rooms airflow must negotiate, the less effective the natural ventilation
   - grouping rooms with similar usage together, for example, keeping living spaces together and sleeping spaces together. This allows the apartment to be compartmentalised for efficient summer cooling or winter heating

vi. A minimum of 60% of residential apartments are to have access to natural ventilation.

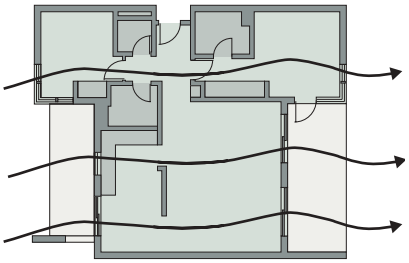
vii. A minimum of 25% of kitchens within a development are to have access to natural ventilation.

viii. Doors and operable windows are to be selected to maximise natural ventilation opportunities established by the apartment layout. Design solutions may include:
   - locating small windows on the windward side (facing the prevailing winds) and larger windows on the leeward side (away from the prevailing winds) of the building thereby utilising air pressure to draw air through the apartment
   - using higher level casement or sash windows, clerestory windows or operable fanlight windows-including above internal doors-to facilitate convective currents. This is particularly important in apartments with only one aspect
   - selecting windows which the occupants can reconfigure to funnel breezes into the apartment, such as vertical louvred, casement windows and externally opening doors

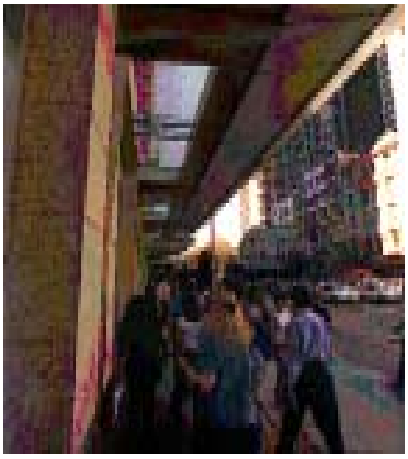
ix. Innovative technologies to naturally ventilate internal building areas or rooms-such as bathrooms, laundries and underground car parks (eg using stack-effect ventilation or solar chimneys), are to be explored.



Corner apartments draw cross ventilation through windows having diffrerent orientations. The above layout works well in upper floor apartments.



This layout allows for air flow directly from one side of the apartment to the other.



Awnings give pedestrians protection from the weather.

Well-designed awnings create interest in the streetscape.

Signage contributes to the building's image from a distance.

Signage gives identity to the building entry and provides legibility for visitors.

4.6.1 AWNINGS + SIGNAGE

Awnings increase the useability and amenity of public footpaths by protecting pedestrians from sun and rain. They encourage pedestrian activity along streets and, in conjunction with active edges such as retail frontages, support and enhance the vitality of the local area. Awnings, like building entries, provide a public presence and interface within the public domain thereby contributing to the identity of a development.

Signage is an important consideration in the design of residential flat buildings located in mixed-use areas. Where signage is required for business identification its design should be compatible with the desired streetscape character, with the scale, and proportions of the development and without obscuring or dominating important views.

Objectives

- To provide shelter for public streets and building entries.
- To ensure signage is in keeping with desired streetscape character and with the development in scale, detail and overall design.

Performance Criteria

Awnings

i. Pedestrian activity on streets is to be encouraged by providing awnings to retail/ commercial strips, where appropriate, which:
   - give cover in areas which have a desired pattern of continuous awnings
   - give cover to entries and areas of high pedestrian activity in areas where there are landscaped front setbacks
   - complement the height, depth and form of the desired character or existing pattern of awnings
   - provide sufficient protection from sun and rain.

ii. Awnings are to be located over building entries in order to contribute to the legibility of the building and amenity of the public domain .

iii. Pedestrian safety is to be enhanced by providing under-awning lighting.

iv. New awnings are to follow the general alignment of existing awnings in the street.

v. Continuous awnings are to be provided in highly trafficked pedestrian areas, for example Pitt Street and Neil Street.

vi. All awnings are to comply with Holroyd City Council DCP 16 - Guidelines for Advertising and Advertising Structures, and State Environmental Planning Policy No 64 (SEPP 64) - Advertising and Signage.

Signage

i. Signage is to be integrated with the design of the development by responding to scale, proportions and architectural detailing.

ii. Signage is to provide clear and legible way-finding for residents and visitors.

iii. Signage on blinds is not permitted.

iv. All signage is to comply with Holroyd City Council DCP 16 and State Environmental Planning Policy No 64 (SEPP 64) - Advertising and Signage.

4.6 Building Form

4.6.2 FACADES

Facades are the public face of buildings. Their architectural quality contributes to the character and design of the public domain. High architectural quality requires the appropriate composition of building elements, textures, materials and colours and reflects the use, internal design and structure of a development.

The composition and detailing of the building façade has an impact on its apparent scale as well as its appearance. The pattern or rhythm established by the proportions of the façade, the modulation of the external walls, the design of façade elements, their materials and their detailing are all important considerations.

This facade has as strong balance of horizontal and vertical framing elements with sunscreen and balustrade infill components which gives it visual interest.

This facade has a distinct base, middle and top, and utilises materials which are sypathetic to the local context.

The clear expression of various parts of this building, and the composition of the various elements of the facade adds interest to the street as a whole.

Objectives

- To promote high architectural quality in buildings.
- To ensure that new developments have facades which define and enhance the public domain and desired street character.
- To ensure that building elements are integrated into the overall building form and façade design.

Performance Criteria

i. The relationship between the whole building form and the façade and/or building elements is to considered.

ii. Columns, beams, floor slabs, balconies, window opening and fenestrations, doors, balustrades, roof forms and parapets are elements, can be revealed or concealed and organised into simple or complex patterns, to create interest in the facade.

iii. Facades are to be composed with an appropriate scale, rhythm and proportion, which respond to the building's use and the desired contextual character. Design solutions may include:

- defining a base, middle and top related to the overall proportion of the building
- expressing key datum lines in the context using cornices, a change in materials or building set back
- expressing the internal layout of the building, for example, vertical bays or its structure, such as party wall-divisions
- expressing the variation in floor to floor height, particularly at the lower levels
- articulating building entries with awnings, porticos, recesses, blade walls and projecting bays
- selecting balcony types which respond to the street context, building orientation and residential amenity (Cantilevered, partially recessed, wholly recessed, or Juliet balconies will all create different façade profiles)
- detailing balustrades to reflect the type and location of the balcony and its relationship to the façade detail and materials
- using a variety of window types to create a rhythm or express the building uses
- incorporating architectural features which give human scale to the design of the building at street level (These can include entrance porches, awnings, colonnades, pergolas and fences using recessed balconies and deep windows to create articulation and define shadows thereby adding visual depth to the façade)

iv. Facade design is to reflect the orientation of the site using elements such as sun shading, light shelves and bay windows as environmental controls, depending on the façade orientation.

v. Important corners are to be expressed by giving visual prominence to parts of the façade (eg a change in building articulation, material or colour, roof expression or increased height)

vi. Building services such as drainage pipes are to be coordinated and integrated, with the overall façade and balcony design.

Rectilinear elements, clearly defined volumes and a change of materials creates visual interest on this building facade.

The use of varying alignments on the facade and sunscreens has articulated the taller mass of this building.

This facade is more traditional and uses a variety of repeated forms, and a restrained material palette.

vii. Security grilles and screens, ventilation louvres and car park entry doors are to be coordinated with the overall façade design

ix. Roller shutters and opaque security screens are not permitted as they do not facilitate natural surveillance into or out of a building.

4.6 Building Form

4.6.3 ROOF DESIGN

The roof is an important architectural element for the overall composition and expression of a building. The shape and form of a roof and its associated elements responds to the environment and the context. Quality roof design responds to various viewpoints within the local context, such as the roofscape observed from adjacent taller buildings and the silhouette viewed from the street below. In some areas the roof forms part of a distant view and sits within a larger skyline.

The feature roof line of this building gives it a strong identity.

Objectives

- To provide quality roof designs, which contribute to the overall design and performance of residential flat buildings.
- To integrate the design of the roof into the overall facade, building composition and desired contextual response.
- To increase the longevity of the building through weather protection.

Performance Criteria

i. Roof design is to be related to the desired built form. Some design solutions include:

   - articulating the roof, or breaking down its massing on large buildings, to minimise the apparent bulk or to relate to a context of smaller building forms

   - minimising the expression of roof forms which gives prominence to a strong horizontal datum in the adjacent context, such as an existing parapet lineusing special roof features, which relate to the desired character of an area, to express important corners.

ii. The roof is to be designed to relate to the size and scale of the building, the building elevations and 3D building form. This includes the design of any parapet or terminating elements and the selection of roof materials.

iii. Roof design is to respond to the orientation of the site, for example, by using eaves and skillion roofs to respond to sun access.

iv. The visual intrusiveness of service elements is to be minimised by integrating them into the design of the roof. These elements include lift over-runs, service plants, chimneys, vent stacks, telecommunication infrastructures, gutters, downpipes and signage.

v. In urban areas, support the use of roofs for quality private or communal open space by:

   - providing space and appropriate building systems to support the desired landscape design

   - incorporating shade structures and wind screens to encourage open space use, ensuring that open space is accessible to all users.

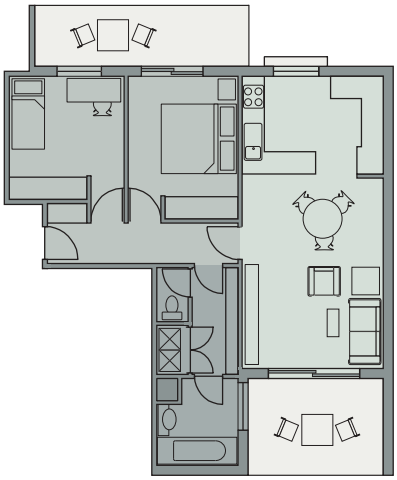
vi. The use/future use of the roof for sustainable functions is to be facilitated by:

   - allowing rainwater tanks for water conservation

   - orienting and angle roof surfaces suitable for photovoltaic applications

   - allowing for future innovative design solutions, such as water features or green roofs.

vii. Copying of elements and detailing of single family houses in larger flat buildings is to be avoided as this often results in inappropriate proportion, scale and detail for apartment buildings.



This illustration shows how a plan can be organised into separable heating and cooling zones.

4.7.1 ENERGY EFFICIENCY

The ability of buildings to optimise thermal performance, thermal comfort and daylighting will contribute to the energy efficiency of buildings, provide increased amenity to occupants and reduce greenhouse emissions and, with them, the cost of supplying energy.

Objectives

- To reduce the necessity for mechanical heating and cooling.
- To reduce reliance on fossil fuels.
- To minimise greenhouse gas emissions.
- To support and promote renewable energy initiatives.

Performace Criteria

i. All heating and cooling devices used are to be povided with a minimnum NatHERS rating of 3.5 stars.

ii. Passive solar design techniques are to be incorporated to optimise heat storage in winter and heat transfer in summer by:

- maximising thermal mass in floor and walls in northern rooms of dwelling/building
- polishing concrete floors and/or using tiles or timber floors rather than carpets
- limiting the number of single aspect apartments with a southerly aspect (SW–SE) to a maximum of 10 % of the total units proposed
- insulating roof/ceiling to R2.0, external walls to R1.0 and the floor, including separation from basement car parking, to R1.0.

iii. The control of space heating and cooling is to be improved by:

- designing heating/cooling systems to target only those spaces which require heating or cooling, not the whole apartment
- designing apartments so that entries open into lobbies or vestibules and are isolated from living areas by doorways
- allowing for adjustable awnings and blinds to be attached to the outside of windows to keep the heat out in summer
- providing gas bayonets to living areas, where gas is available
- providing reversible ceiling fans for improving air movement in summer and for distributing heated air in winter
- ensuring that each typical layout and thermal exposure condition achieves a minimum 3.5 star NatHERS rating.

iv. Photovoltaic panels are to be provided or planned for in the future by:

- designing the roof so that photovoltaic panels can be mounted parallel to the roof plane
- locating trees where they will not shade existing or planned photovoltaic installations.

v. The efficiency of hot water systems is to be improved by:

- installing a hot water system/systems with a Greenhouse Score of 3.5 or greater and which suits the needs of the development and/or individual dwellings
- installing water-saving devices, such as flow regulators, AAA rated shower heads and tap aerators.

vi. Reliance on artificial lighting is to be reduced by:

- providing a mix of lighting fixtures, including dimmable lighting, to provide for a range of activities in different rooms
- designing to allow for different possibilities for lighting the room, for example, low background lighting supplemented by task or effect lighting for use as required
- using separate switches for special purpose lighting.

- using high efficiency lighting, such as compact fluorescent, for common areas
- using motion detectors for common areas, lighting doorways and entrances, outdoor security lighting and car parks.

vii. The efficiency of household appliances is to be maximised by:

- selecting an energy source with minimum greenhouse emissions
- installing high efficiency appliances, eg. refrigerators/freezers, clothes washers and dishwashers with a minimum 3.5 star energy rating.
- providing outdoor areas for clothes drying which have a mininum 2 hours solar access on June 21.
- ensuring that outdoor communal lighting is solar powered.

viii. From October 2004 new residential flat development will be expected to be tested against a comprehensive sustainaiblity index, BASIX, being developed by the Department of Infrastructure, Planning and Natural Resources.

4.7.2 MAINTENANCE

Detailed design and material selection support long-term maintenance of buildings. On-going maintenance ensures the longevity of quality architectural and landscape design, sustains and increases the value of property and minimises the life-cycle cost of a development to owners.

Objective

- To ensure long life and ease of maintenance for the development.

Performance Criteria

i. Windows are to be designed to enable their cleaning from inside the building, where possible.

ii. Manually operated systems, such as blinds, sunshades, pergolas and curtains are to be selected in preference to mechanical systems.

iii. Building maintenance systems are to be incorporated and integrated into the design of the building form, roof and façade.

iv. Durable materials, which are easily cleaned and are graffiti resistant, are to be selected.

v. Appropriate landscape elements and vegetation are to be selected and appropriate irrigation systems are to be provided.

vi. For developments with communal open space, a garden, maintenance and storage area are to be provided, which is efficient and convenient to use and is connected to water and drainage.

vii. The area of painted exterior walls is to be limited, for example by incorporating colour in materials rather than painting over rendering.

4.7.3 WASTE MANAGEMENT

The minimisation and management of waste from buildings can contribute 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, from construction to demolition. It also includes the way in which waste is stored and collected.

Objectives

- To avoid the generation of waste through design, material selection and building practices.
- To plan for the types, amount and disposal of waste to be generated during demolition, excavation and construction of the development.To encourage waste minimisation, including source separation, reuse and recycling.
- To ensure efficient storage and collection of waste and quality design of facilities.

Performance Criteria

i. Existing built elements are to be incorporated into new work, wherever possible.

ii. Demolished materials are to be recycled and reused, where possible.

iii. Building materials that can be reused and recycled at the end of their life, are to be specified.

iv. Waste management processes are to be integrated into all stages of the project, including the design stage.

v. Waste management is to be supported during the design stage by:

- specifying modestly for the project needs
- reducing waste by utilising the standard product/component sizes of the materials to be used
- incorporating durability, adaptability and ease of future services upgrades.

vi. A waste management plan is to be prepared for all new developments for green and putrescible waste, garbage, glass, containers and paper and other recyclables.

vii. Storage areas for rubbish bins are to be located away from the front of the development where they have a significant negative impact on the streetscape, on the visual presentation of the building entry and on the amenity of residents, building users and pedestrians, within a practicable distance from the final collection point.

viii. Every dwelling is to be provided with a waste cupboard or temporary storage area of sufficient size to hold a single day's waste and to enable source separation.

ix. On-site composting is to be incorporated in self contained composting units on balconies or as part of the shared site facilities.

x. All development applications and master plans are to comply with Holroyd City Council DCP No. 35 – Guidelines for Planning for Less Waste.

4.7.4 WATER CONSERVATION

Water is our most precious resource. Building design can contribute to environmental sustainability by integrating measures for improved water efficiency. Water can be conserved in two ways: by reducing water demand from the mains by re-using water which would otherwise be lost as run off or waste water.

Objectives

- To reduce mains consumption of potable water.
- To reduce the quantity of urban stormwater run off.

Performance Criteria

i. AAA rated appliances are to be used to minimise water use.

ii. The use of rainwater tanks is required.

iii. Rain water is to be collected, stored and used on site. This may be used for car washing, watering the garden, toilet flushing, laundry and clothes washing. Once treated, rainwater can also be used for potable supply.

iv. Local indigenous native vegetation is to be incorporated into landscape design.

4.7 Building Performance

4.7.5 MANAGING EXTERNAL NOISE + VIBRATION

The Neil Street Precinct is bounded on the eastern side, by the south western railway line and is traversed by Neil Street and Pitt Street. Buildings adjacent to, or within 60 metres of, the railway line and immediately adjacent to either Neil or Pitt St, will need to consider the impact of external noise and vibration on any building(s) proposed, to ensure the protection of sleep and amenity of the residents and occupiers. For any development applications affecting these sites, a report from an acoustic consultant having the technical eligibility criteria required for membership of the Association of Australian Acoustical Consultants (AAAC) and/or grade membership of the Australian Acoustical Society (MAAS)'is required as a part of the planning documentation.

Objectives

- To ensure that consent is not granted to development on land, affected by external noise if, in the opinion of Council, will be affected by noise and vibration, unless the development will incorporate attenuation measures to the satisfaction of Council.
- To ensure development adjacent to either the railway line, or Neil and Pitt Streets, mitigate, through the use of appropriate building materials, and/or effective design and articulation, the impacts of external noise on the amenity of the residential and commercial buildings to an acceptable level.
- To require all proposed buildings adjacent to, or within 60 metres of, an operational railway line to comply with the State Rail Authority and Rail Infrastructure Corporation's "*Interim Guidelines for Applicants – Consideration of Rail Noise and Vibration in the Planning Process"* November 2003

Performance criteria

- Development proposals within 60m of the south western railway line and/or adjacent to Neil Street or Pitt Street must provide a report, to be submitted with the development application, demonstrating that the development will comply with the following criteria. The report shall be prepared by an acoustic consultant having the technical eligibility criteria required for membership of the Association of Australian Acoustical Consultants (AAAC) and/or grade membership of the Australian Acoustical Society (MAAS).
- Prior to the issues of an Occupation Certificate, a noise compliance report shall be submitted to the Principal Certifying Authority (PCA) confirming that the building/s comply with the noise criteria following. The report shall be prepared by an acoustic consultant, other than the consultant responsible for the preliminary/design report, having the technical eligibility criteria required for membership of the Association of Australian Acoustical Consultants (AAAC) and/or grade membership of the Australian Acoustical Society (MAAS).
- Acoustic reports prepared under this Plan must be prepared in accordance with the specified methodology provided in the Appendix.
- Floor vibration levels in habitable rooms should comply with the criteria in British Standard BS6472: 1992 *Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)*. This is the vibration standard recommended by the Department of Infrastructure Planning and Natural Resources (DIPNR) and the Department of Environment and Conservation (DEC). It is similar to AS2670.2 – 1990 but includes additional guidance in relation to intermittent vibration such as that emitted by trains.

Controls

Comply with the following Australian Standards:

- AS 1055-1997 Acoustics - Description and Measurement of Environmental Noise
- AS 1259-1990 Acoustics - Sound Level Meters Parta 2 Integrating – Averaging
- AS 1633-1985 Acoustics - Glossary of Terms and Related Symbols
- AS 2107-2000 Acoustics - Recommended Design Sound Levels and Reverberation Times for Building Interiors

- Noise Criteria for buildings affected by airborne rail noise from the south western railway line:

Internal Space	Time Period	Railway Noise Level
Living and sleeping areas	Day (7am to 10pm)	$L_{Aeq(1hr)}$ 40dB(A)
	Night (10pm to 7am)	$L_{Aeq(1hr)}$ 35dB(A)
Sleeping areas	Day (7am to 10pm)	L_{Amax} 55dB(A)
	Night (10pm to 7am)	L_{Amax} 50dB(A)
Non residential developments	Refer to the 'Recommended Maximum' design sound level in AS2107:2000 *Acoustics – Recommended design sound levels and reverberation times for building interiors.* The L_{Aeq} should be measured as an $L_{Aeq(1hr)}$ during the peak 1 hour that the type of occupancy/activity is in use. Where there is no relevant category in AS2107:2000, an acoustic consultant may provide guidance on an appropriate indoor design sound level.	

Source: NSW RIC-SRA 2003 Interim Guidelines for Councils – Consideration of Rail Noise and Vibration in the Planning Process

- Noise Criteria for buildings affected by ground-borne rail noise from the south western railway line:

Internal Space	Time Period	Railway Noise Level
Living and sleeping areas	Day (7am to 10pm)	L_{Amax} 40dB(A)
	Night (10pm to 7am)	L_{Amax} 35dB(A)

Source: NSW RIC-SRA 2003 Interim Guidelines for Councils – Consideration of Rail Noise and Vibration in the Planning Process

- Noise Criteria for buildings affected by road traffic noise from Neil Street or Pitt Street:

Internal Space	Time Period	Railway Noise Level
Sleeping areas	Day (7am to 10pm)	L_{Amax} 40dB(A)
	Night (10pm to 7am)	L_{Amax} 35dB(A)
Other living areas	Day (7am to 10pm	$L_{Aeq(1hr)}$ 45dB(A)
	Night (10pm to 7am)	$L_{Aeq(1hr)}$ 40dB(A)
Non residential developments	Refer to Table 2 of the NSW Government's *Environmental Criteria for Road Traffic Noise*, or where not defined in Table 2 refer to the 'Recommended Maximum' design sound level in AS2107:2000. The L_{Aeq} should be measured as an $L_{Aeq(1hr)}$ during the peak 1 hour that the type of occupancy/ activity is in use. Where there is no relevant category in AS2107:2000, an acoustic consultant may provide guidance on an appropriate indoor design sound level.	

Source: NSW EPA 1999 Environmental Criteria for Road Traffic Noise, AS2107:2000 Acoustics – *Recommended design sound levels and reverberation times for building interiors.*

4.8 Public Art + Design

4.8 PUBLIC ART + DESIGN

Public art includes art and design elements, installations, fixtures and treatments that enhance public environments and buildings. These may include:

- Paving design
- Lighting design
- Sculpture
- Fencing design
- Decorative elements as part of architectural and engineering work
- Landscape and planting work with specially designed elements and
- Temporary or ephemeral work.

Objectives

- To celebrate local heritage and culture
- To explore community cultural identity
- To instigate the feeling of 'community' in the town centre
- To articulate the nature and special qualities of the town in the public domain

Performance Criteria

i. Artworks are to be integrated into broader development and planning.

ii. Art and design that enhances the pedestrian experience are to be encouraged.

iii. Projects that develop cultural, social and environmental themes that are relevant to the locality and its community are to be encouraged.

iv. Public art is to be used to help define important spaces in the locality.

v. Stand-alone projects that fail to address the locality and its culture, are to be avoided.

vi. Elements such as seating, paving, bus shelters and other street furniture, whilst being functional, are to be visually appealing and of a high design quality.

vii. The following thematic areas are to be considered in the public art/design within the precinct:

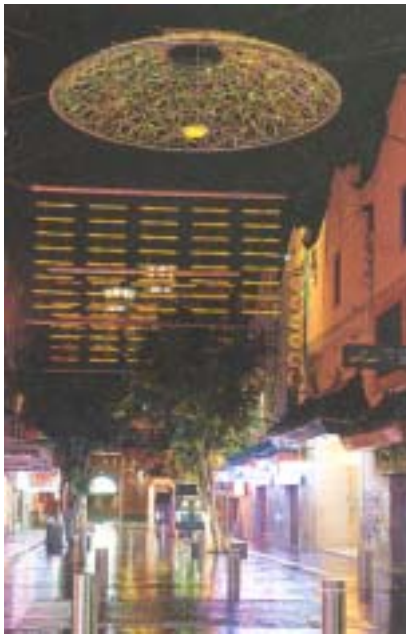
-The industrial heritage of the locality including the grain mills, brick works and railway.

-The multicultural population of Merrylands.

-The link between the locality and the Children's Museum and its association with children's play and learning.

- A'Becketts Creek and the natural environment.

ix. The proposed artwork(s) comply with Council's Public Art Policy.



This space, by way of its public art, reflects the local culture and lightens up the area by night.

Public spaces should be able to attract people by way of their design and detailing, and the sense of security/safety that they convey.

Public art is a good way of reflecting local talent. It also helps instill the feeling of 'community' within people of the locality.

This Appendix sets out the technical requirements and data acquisition methods acceptable to Council for acoustic reports required under this Precinct Plan.

1.0 DEFINITIONS

Facade Noise Level:	the sound pressure level experienced from measurements taken within 1m of the facade of the building or free field measurements adjusted by a correction of +2.5dB(A) to account for facade reflections.
Logarithmic average:	the average obtained using the following formula $10LOG\Sigma10^{SPL1/10} + 10^{SPL2/10}……./N$
Daytime/night time:	daytime is defined as between 7.00am to 10.00pm and night time is defined as 10.00pm to 7.00am.
Sound Exposure Level	(SEL or L_{AE}) is defined in lay terms as the time integral (amount of acoustic energy over time) of a noise event compressed or normalised to a one (1) second period and expressed in dB(A).
LAeq	the value of the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval has the same mean square sound pressure level as a sound under consideration.
ESD	ecologically sustainable development. Has the same meaning as prescribed in the Environmental Planning & Assessment Act, 1979.
AADT	average annual daily traffic count.

2.0 QUANTIFYING THE EXISTING ACOUSTICAL ENVIRONMENT

The external acoustic environment shall be quantified using the methods outlined below. Methods departing from the procedural requirements outlined shall be supported by a scientifically valid rationale to demonstrate that the method is no less accurate than described.

2.1 Road Noise

Preliminary $L_{Aeq(1hr)}$ noise measurements shall be undertaken between the periods 7am to 9am or 4:30pm to 6:30pm. Where the measured $L_{Aeq(1hr)}$ exceeds 60dB(A), the requirements of this Plan are triggered and long-term, unattended measurements are required. Long-term, unattended measurements should be conducted over a minimum of three consecutive weekdays (ie Monday to Friday, not weekends). Noise measurements should be conducted in accordance with Australian Standard AS2702-1984 *Acoustics – Methods for the measurement of road traffic noise*.

$L_{Aeq(1hr)}$ is the L_{Aeq} noise level for a specific 1 hour period. For assessment purposes, the $L_{Aeq(1hr)}$ represents the highest tenth percentile hourly A-weighted L_{eq} noise level (or if this cannot be accurately defined, the L_{Aeq} noise level for the noisiest hour) during the period 7am to 10pm or the period 10pm to 7am, as relevant. It is recommended that the L_{Aeq} be measured on a 15-minute basis. To calculate the logarithmic average over a 1 hour period, $L_{Aeq(1hr)} = 10 \times \log_{10}((\text{“}_{i = 1 \text{ to } 4} 10^{(L_{Aeq,15min,i/10})})/4)$, where there are 4 x 15 minute measurements conducted over a 1 hour period.

Noise measurements should be carried out in positions representative of the facade noise level. Where this is not possible, select a location where accurate extrapolation of the facade noise level can be made from the measurement position. Where measurements are acquired in the free field a facade correction factor of +2.5dB(A) shall be applied.

Measurement positions should represent the range of traffic noise conditions encountered in the area of interest. Avoid locations where there are significant noise sources other than road traffic. Where this is not possible, document these other noise sources and estimate their contribution to the measured noise level.

2.1.2 Rail Noise

Due to the potential for intermittent movements of rail traffic, rail movements shall be assessed in terms of both amenity and sleep disturbance. This will require the acquisition of acoustic data capable of quantifying the acoustic parameters of L_{Amax} and $L_{Aeq, 1hr}$. Where the rail line features freight traffic the L_{Cmax} shall also be acquired to assess the need for a low frequency correction factor.

The sleep disturbance analysis may be dispensed with where it can be demonstrated that the number of rail movements does not indicatively exceed 2 per day and one per night. Daytime being 7.00am – 10.00pm and nighttime being 10.00pm – 7.00am.

The following procedures may be adopted to quantify the rail noise exposure of the relevant facade/s in terms of amenity and sleep disturbance. Alternative methods may be considered where justification is valid.

Amenity Evaluation

1. Measure a representative number of rail events at the site of the relevant residential facade using the acoustic measure of Sound Exposure Level (L_{AE} or SEL). The rail event measurements should be representative of the types of movements experienced on the line ie freight and passenger movements. The SEL is defined in lay terms as the time integral (amount of acoustic energy over time) of a noise exposure event compressed or normalised to a one (1) second period and expressed in dB(A).

   NOTE: The L_{Amax} noise levels of the rail event measurements should be acquired at the same time for use in the sleep disturbance analysis. Where it is determined that the rail line under consideration is used for freight purposes L_{Amax} and L_{Cmax} data shall be acquired for that particular class of movement.

2. Derive the energy average (logarithmic average as opposed to arithmetic average) of the rail events. Where the line usage includes both freight and passenger movement's the energy average for both classes of movement should be derived. Energy averages can be simply derived in the following way:

   Energy Average = $10\text{Log}_{10} \sum (10^{0.1LAE}...)$/number in the set

3. Contact the responsible authority for the particular rail line and establish a schedule of movements per hour. Subjectively establish the average repeatable maximum hourly rail movements. Using the established energy average SEL and the rail movement number the $L_{Aeq, 1hr}$ can be established using the following algorithm. Where the line usage includes both freight and passenger movements the LAeq, 1hr calculation shall have regard for the derived SEL's for each class of movement (ie freight & passenger) and the frequency of occurrence obtained from the line authority.

   LAeq, 1hr = $10\text{Log}10 (\sum 10^{0.1LAE(1)})$ 35dB(A)

4. The resultant $L_{Aeq, 1hr}$ can be used as the rail noise exposure for the development and used to establish the sound insulation requirements to satisfy the indoor amenity criteria of the policy.

Sleep Disturbance Evaluation

1. From the acoustic data acquired from the above procedures select the highest L_{Amax} measurement from the rail movements.

2. The highest L_{Amax} shall be used to establish the sound insulation requirements to satisfy the indoor sleep disturbance criteria for bedrooms only.

Rail Vibration

1. Measure a representative number of rail events at the façade of the proposed building, at a location representative of a habitable building space. The rail event measurements should be representative of types of movements on the line, including freight and passenger movements. All vibration measurements should be conducted in accordance with British Standard BS6472-1992 *Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz)*.

2.3 Operating Conditions of the Building - Ventilation

Where the indoor design noise levels cannot be satisfied with windows open to 5% of the floor space of the room under consideration alternative means of ventilation are required. The following hierarchy of alternatives should be considered in the options analysis with (i) being most preferred and (ii) least preferred.

(i) Design the building to ensure that passive ventilation will not seriously compromise the acoustic integrity of the building. Noise sensitive uses should be located as far as practicable from noise sources. Windows should be orientated away from noise sources.

(ii) Provide the building with mechanical ventilation satisfying the requirements of the Building Code of Australia.

For the purpose of design analysis a room by room approach is acceptable and hence assumes that internal doors are closed and that negligible noise transfer between rooms occurs. If a perimeter approach is adopted the lower indoor design noise level shall be adopted for the composite space.

2.4 Acoustic Compliance Reporting

2.4.1 Preliminary Report

Development Applications shall be accompanied by a Preliminary Report demonstrating that façade noise levels comply with $L_{Aeq(1hr)}$ 60dB(A) between 7am and 9am or 4:30pm and 6:30pm. Where façade noise levels exceed $L_{Aeq(1hr)}$ 60dB(A), the Preliminary Report will state that a Design Report for road traffic noise is triggered.
The preliminary report will confirm whether the site (or part of) is located within 60m of a land corridor accommodating an operational railway line. Where the site is within 60m zone, the Preliminary Report shall include an assessment of rail noise in accordance with Section 2.1.2 (revised Section 2.2) of this Plan. Where the assessment shows that the performance criteria cannot be achieved, the Preliminary Report will state that a Design Report for rail noise is triggered.
In addition, where the site is within the 60m zone, the Preliminary Report shall include an assessment of rail vibration in accordance with British Standard BS6472-1992 *Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz)*. Where the assessment shows that the performance criteria cannot be achieved, the Preliminary Report will state that a Design Report for rail vibration is triggered.
The Preliminary Report, as a minimum shall include:

- A site plan of the development proposal showing the location of the noise/ vibration measurement points;
- A summary of the measured or adjusted façade road traffic noise levels and/or rail noise and vibration levels;
- A statement qualifying whether the measured or adjusted façade road traffic noise levels comply with $L_{Aeq(1hr)}$ 60dB(A) between 7am and 9am or 4:30pm and 6:30pm, or whether a Design Report is required.
- Statement/s qualifying whether the measured rail noise/ vibration levels comply with rail noise/ vibration criteria, or whether a Design Report is required.

2.4.2 Design Report

The design report shall be submitted with the Development Application when the Preliminary Report has demonstrated that the Plan is applicable. That is, preliminary road traffic noise measurements exceed $L_{Aeq(1hr)}$ 60dB(A) between 7am and 9am or 4:30pm and 6:30pm; or rail noise/ vibration measurements exceed the performance criteria.
The design report shall include:

- A site plan of the development proposal showing the location of the noise/ vibration measurement points;
- A graphical representation of the acquired road traffic noise data over the minimum three day period (refer Section 2.1);
- Tabulated representation of the acquired rail noise level for representative train types, and schedule of train movements per hour and calculated $L_{Aeq(1hr)}$ train noise level for the peak 1 hour;

- A graphical representation of the acquired rail vibration levels for representative train types;
- A statement quantifying the measured or adjusted façade noise levels derived for design purposes for both road and rail noise, and rail vibration as applicable;
- Recommendations for specific façade upgrades to satisfy the indoor design noise levels of the Plan or vibration isolation requirements to satisfy the vibration criteria of the Plan. Where appropriate the recommendations shall include a listing of suppliers of recommended elements; and
- A statement indicating that the design noise/ vibration levels will be achieved following the effective implementation of the required noise controls.

2.5 Validation requirements

Following completion of the building a statement from 'an acoustic consultant having the technical eligibility criteria required for membership of the Association of Australian Acoustical consultants (AAAC) and/or grade membership of the Australian Acoustical Society (MAAS)' will be required clearly indicating that the acoustic recommendation of the design report have been satisfactorily incorporated into the building. Periodic inspections by the acoustic consultant may be warranted to ensure that retrofitting of the acoustic recommendations is not required at the completion of the project. This statement is to be supported by validation measurements within at least two (2) bedrooms and one (1) living room for developments comprising up to ten (10) units. Additional rooms will be required to be validated on the basis of one (1) additional room per ten (10) additional units, or alternatively as nominated by Council.

The validation measurement period may be reduced to an LAeq,15min per room. The time of the validation assessment shall be determined from an analysis of the acoustic data obtained under Part 2 of this Appendix in order to determine the time of the maximum external noise period. The time of the validation measurements shall be clearly stated in the validation report and justified. External noise measurements may be used to justify the selected time to demonstrate that the period selected was indicative of the maximum external noise used in the design process. The validation statement shall be submitted to the Principal Certifying Authority (PCA) and approved prior to the issue of occupation certificates. s

In addition, where vibration isolation requirements are recommended in the Design Report to satisfy the vibration criteria, validation shall be conducted as per paragraph 1, during the peak 1 hour, ensuring that a representative sample of rail events is captured during the measurement period.

Acoustic privacy	refers to a measure of sound insulation between dwellings and between external and internal spaces
Adaptable housing	housing that is designed and built to accommodate the needs of occupants with mobility impairments or life cycle needs (Australian Standard 1499: Adaptable Housing)
Amenity	the 'liveability' or quality of a place which makes it pleasant and agreeable to be in for individuals and the community. Amenity is important in both the public and private domain and includes the enjoyment of sunlight, views, privacy and quiet.
Boundary	lot boundary relating to proposed subdivision pattern, not existing land ownerships
Build to line	a setback expressed as a required distance from the property boundary to the edge of the building envelope. In urban areas the build to line often corresponds to a zero front setback, to establish a consistent streetscape.
Building envelope	a three dimensional zone that limits the extent of a future building in any direction by defining the extent of the building zone. Building envelopes are defined in this DCP in plan and section and also illustrated with 3D massing models.
Building height	is calculated as the distance measured vertically from the ground level taken from each point on the boundary of the site to the underside of the topmost ceiling, excluding above-ground component (1.2 metres) of sub-basement car parking. There is no provision for attics in this DCP.
Building Sustainability Index	**(BASIX)** a State Government comprehensive menu of best practice sustainability measures based on their relative effectiveness
Core	vertical circulation (eg lift, stairs)
Cornice	decorative horizontal moulding at the top of a building which 'crowns' the external facade
Cross over apartments	apartments with two opposite aspects and with a change in level between one side of the building and the other
Cross through apartments	apartments on one level with two opposite aspects
Deck	an external platform, usually elevated, located alongside and accessible from an interior space and often made of timber
Double loaded corridor	corridor with apartments off both sides, generally associated with single aspect apartments
Dual aspect apartment	apartments which have at least two major external walls facing in different directions, including corner, cross over and cross through apartments
Facade	the external face of a building
Glass line	the inside face of windows on the external walls of a building
Ground level	means the level of the site that existed at the appointed day, that is, at the day of commencement of this Plan
Habitable room	any room or area used for normal domestic activities, including living, dining, family, lounge, bedrooms, study, kitchen, sun room and play room
Indigenous plants or animals	a plant or animal species occurring at a place within its historically known natural range and forming part of the natural biological diversity of a place
Juliet balcony	small projecting balcony, generally ornamental or only large enough for one person standing
Lightwell	a shaft for air or light, enclosed on all sides or which has the potential to be enclosed by future adjoining development, and either open to the sky or glazed
Long life loose fit	buildings can accommodate a range of existing and future uses
Maisonette apartment	a two-storey apartment, where the storeys are vertically stacked
Mezzanine	the second storey of an apartment, fully or partially open to a void (double height) space shared by both storeys
Mixed use development	one or more dwellings attached to, or on the same parcel of land as, a building intended to be used for non-residential purposes (being non-residential purposes that are permissible on the land on which the building is located).

GLOSSARY

Non-habitable room	specialised spaces occupied infrequently or for short periods, including bathrooms, toilets, pantries, store rooms, walk-in wardrobes, corridors, lobbies, photographic darkrooms and clothes drying rooms
On-grade	on ground level (not on a building structure)
Open plan	apartment layouts where spaces are not divided into discrete rooms, but are open and connected to allow flexibility of use (typically living, dining, kitchen and study areas)
Open space	Public open space is space which is accessible to the public and useable at all times, day or night. Communal open space is private and shared, for the use of residents or tenants of a development. Private open space is associated with a single dwelling unit and is for the exclusive use of its occupants.
Operable screening device	sliding, folding or retractable elements on a building designed to provide shade, privacy, and protection from natural elements
Operable walls	internal walls which can be moved, for example by sliding, folding, or pivoting, to allow for different room configurations
Parapet	a horizontal low wall or barrier at the edge of a balcony or roof.
Perimeter block development	where buildings are generally aligned to the street, enclosing or partially enclosing an area in the middle of the block
Plan depth or width	measured from inside face of wall to inside face of wall or from inside face of glass to inside face of glass
Potable water	water which conforms to Australian Standards for drinking quality
Private courtyard	private open space which may be on a structure (eg. podium, parking deck) or at ground level
Setback	the distance between the boundaries of a site and the external wall of a building erected or proposed to be erected.
Silhouette	a building outline viewed against the sky
Stack-effect ventilation /	air convection resulting from hot air being pushed up and out by
Solar chimney	colder denser air which is drawn in at a lower level
Storey	means the space within a building, between one floor level and the floor level next above or, if there is no floor level above, the underside of the ceiling above, but does not include space used for car parking, basement laundries or storerooms, so long as the ceiling above the space is not more than 1.2m above ground level (measured from each point on the boundary on the site).
Terrace (outdoor area)	an unroofed private open space area area which may be elevated on a podium structure or at grade over basement car parking.
Underground car parking	parking below ground or less than 1.2 metres above ground level

ABBREVIATIONS

AS 1428	Australian Standard 1428: Design for Access and Mobility Series
AS 4299	Australian Standard 4299: Adaptable Housing
BCA	Building Code of Australia
BASIX	Building Sustainability Index
SEPP	State Environmental Planning Policy

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IMAGE CREDITS

RESIDENTIAL FLAT DEVELOPMENTS FEATURED

Atlas, Alexandria NSW – Turner + Associates and Stanisic Associates (architecture); McGregor + Partners (landscape architecture); Brett Boardman (photography)

Crown Street Housing, Surry Hills NSW – Architectus (architecture and landscape architecture); Walter Glover, Architectus (photography)

Domain, Marrickville NSW - Stanisic Associates and Turner + Associates (architecture); Frank Stanisic (photography)

The Hudson, Alexandria NSW – Allen Jack + Cottier (architecture); Anton James Design (landscape architecture); Nic Bailey (photography)

Kings Bay, Five Dock NSW – DEM Design Group (architecture); Philip Fischer (photography)

Lyndhurst Gardens, Wollahra NSW – Gilbert Hughes and Maloney (architecture); Brett Boardman (photography)

MacArthur Street Housing, Ultimo NSW – Tonkin Zulaikha Greer in association with Roderick Simpson (architecture); Eric Sierins (photography)

Moore Park Gardens, East Redfern NSW – Allen Jack + Cottier (architecture)

Newcomen Street Apartments, Newcastle NSW – JTCW Savage (architecture); Paul Foley, Martin Hunt (photography)

Newington Apartments, Newington NSW – HPA Architects in association with Bruce Eales and Associates, Vote Associates, Hassell, Peddle Thorpe and Walker (architecture); Patrick Bingham-Hall, Geoff Amber (photography)

Paddington Green, Paddington NSW – Allen Jack + Cottier (architecture)

The Peninsula, Manly NSW – Conybeare Morrison and Partners (architecture); Janet Marsden, Ron Israel (photography)

The Point, Pyrmont NSW – Candalepas Associates (architecture); Patrick Bingham-Hall, John Gollings (photography)

Presidio, Newtown NSW – Stanisic Associates and Turner + Associates (architecture); DM Taylor Landscape Architects; Brett Boardman (photography)

Rockwall Gardens, Potts Point NSW – Architects Johannsen and Associates (architecture); Fretwell Photography (photography)

Wylde St Apartment, Potts Point NSW – Aaron Bolot (architecture); Brett Boardman (photography)

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