

INTRODUCTION

THE TALLAWONG STATION PRECINCT SOUTH HAS BEEN DESIGNED TO CREATE AN ACTIVE AND WALKABLE NEIGHBOURHOOD WITH THE METRO STATION AT ITS CORE. IT WILL CONTAIN A BROAD RANGE OF MEDIUM AND HIGHER DENSITY HOUSING, A PUBLIC PARK, A NETWORK OF INVITING PUBLIC SPACES AND CONNECTIONS AND A SERIES OF MIXED-USE FACILITIES WITHIN 300 METRES OF THE NEW METRO STATION.

METHODOLOGY

These Design Quality Guidelines have been written to reflect the design principles and strategies used to design the concept proposal. These principles and strategies were developed from a careful site analysis that identified constraints and opportunities within the subject site and the broader context.

A range of documents have been considered in the design of the concept proposal and the preparation of these Design Quality Guidelines. These documents include:

- SEPP 65 Design Quality Principles and the Design Criteria contained within the Apartment Design Guide (ADG)
- Better Placed Design Policy for the Built Environment of NSW 2017
- Draft Greener Places Policy for NSW, 2017
- Blacktown Growth Centres Development Control Plan, September 2016
- Cudgegong Station Precinct (Area 20) Development Control Plan Precinct Specific Schedule 4, September 2016

APPLICATION OF THE GUIDELINES

These Design Quality Guidelines have been written to be specific to this development and will assist in the creation of a successful urban town centre through careful consideration of a wide range of elements including:

- · integration of the development with the Metro Station
- · urban hierarchy and character
- urban connectivity
- urban scale, legibility and ownership
- integrated green infrastructure
- · open space network and fine grain open spaces
- deep soil planting and tree canopies
- a new public park
- building heights, separation and setbacks
- diversity in housing typologies
- town centre activation though mixed use programs
- environmental considerations
- · crime prevention through passive environmental design
- car parking and servicing
- building articulation and material selection

SUPPORTING MATERIAL, DETAILED REPORTS AND TECHNICAL STUDIES

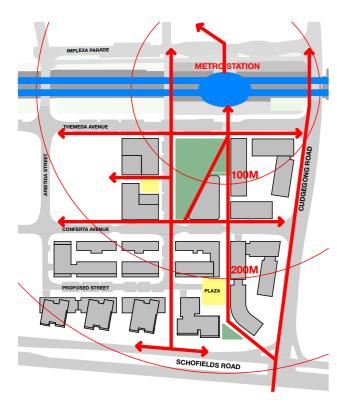
A range of technical studies were commissioned specifically to inform the Urban Design, Built Form, Civil Engineering, Public Domain and Landscape Design of the precinct. These documents will provide additional and more detailed information that supports these guidelines and should be referred to throughout the design process. These documents include:

- · Urban Design Report Bennett and Trimble
- · Design Verification Report Bennett and Trimble
- Public Domain and Landscape Strategy Clouston Associates
- Integrated Water Cycle Management Strategy Aecom
- · Social Needs and Impact Assessment GHD
- Access Design Assessment Report Design Confidence
- Ecologically Sustainable Development Report Aecom
- Civil Design Report Aecom
- Traffic and Transport Impact Assessment SCT Consulting
- Capital Investment Value Report Napier & Blakeley
- Heritage Assessment Report OCP Architects
- Waste Strategy Report Aecom
- Landscape and Visual Impact Assessment Aecom
- Crime Prevention through Environmental Design Assessment Aecom
- · Air Quality Review Aecom
- Utilities Report Aecom
- · Contamination and Soil Study ADE Consulting Group
- Retail and Commercial Land Use Analysis AEC
- · Bio-certification Eco Logical
- Noise and Vibration Assessment Acoustic Logic
- Bushfire Protection Assessment ABPP
- · Pedestrian Wind Environment Statement Windtech

DESIGN STRATEGY SUMMARY

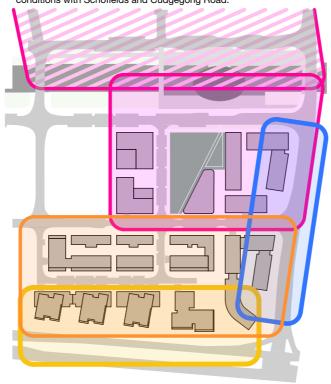
A CONNECTED DEVELOPMENT

Realise the benefits of rapid mass transit by developing an active and walkable town centre with the Metro station as its focus.



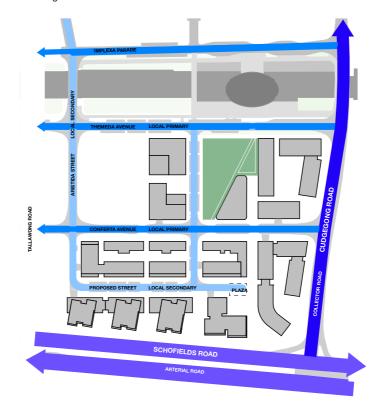
URBAN CHARACTERS

Identify and establish diverse urban characters across the site including an activated town centre, local residential community and urban edge conditions with Schofields and Cudgegong Road.



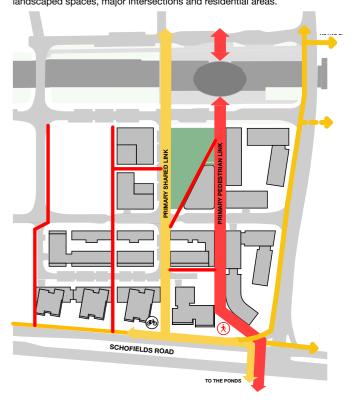
STREET NETWORK AND HIERARCHY

Provide a network of local and collector streets that provides a clear and legible urban town centre with a rational block structure.



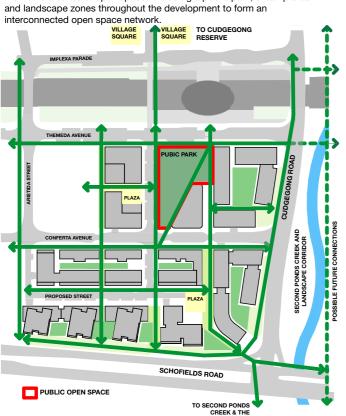
PEDESTRIAN AND CYCLE NETWORK

Create a series of through site links that extend the pedestrian and cycle network connecting key elements such as the Metro station with landscaped spaces, major intersections and residential areas.



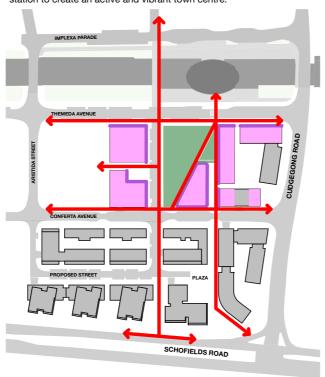
OPEN SPACE NETWORK

Distribute a series of open spaces including a public park, urban plazas



MIXED-USES AND ACTIVATION

Concentrate non-residential accommodation such as local retail, cafes, childcare, work hubs and community uses in close proximity to the station to create an active and vibrant town centre



A RANGE OF HOUSING TYPOLOGIES

A range of housing typologies are proposed including two storey terraces, maisonettes and apartments to accommodate and foster a



VARIATIONS IN HEIGHT AND SCALE

Vary the heights of building from 2 storeys to 8 storeys to create a variety of urban scales. Locate height strategically to alleviate overshadowing and to concentrate density with amenity.



FUTURE CHARACTER

THESE VIEWS DESCRIBE THE FUTURE URBAN CHARACTER OF THE TALLAWONG STATION PRECINCT SOUTH AND HAVE BEEN PREPARED TO ILLUSTRATE THE INTEGRATED DESIGN APPROACH SET OUT IN THE FOLLOWING DESIGN QUALITY GUIDELINES. THESE IMAGES SHOULD BE REFERRED TO IN CONJUNCTION WITH THE GUIDELINES TO INFORM THE DESIGN PROCESS.



View looking towards the public park across Themeda Avenue. The park together with the Metro Station and commercial/retail precinct forms the focal point for the proposed community.



View looking across the public park from Conferta Avenue with the Metro station in the distance. The streets, through-site links and public open space have been carefully considered to create a legible and walkable fine grain development.



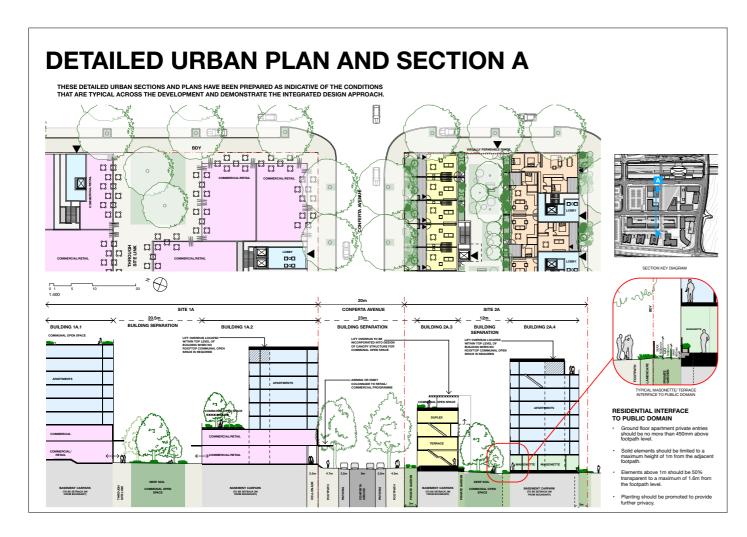
View looking south from the Metro Station canopy with the public park to the right and the pedestrian link to the southern sites and the adjacent suburb of The Ponds in the centre of the image.

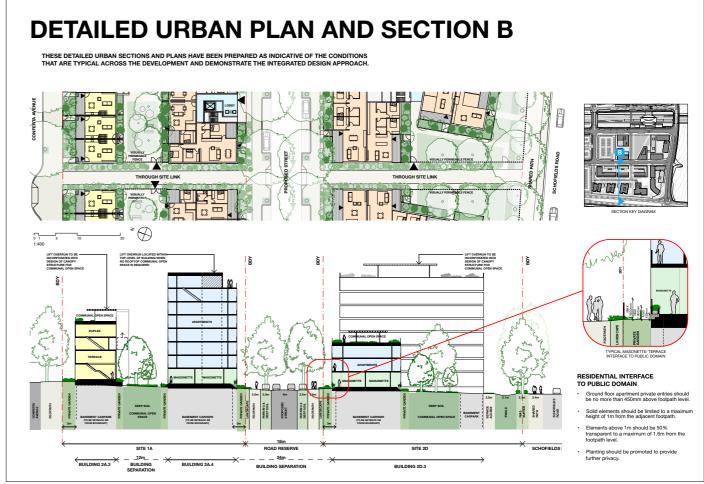


View looking north along the major pedestrian link that connects the Metro Station with the development and the adjacent suburb of The Ponds. A public plaza and shared way are located along the link and form part of the open space network of public spaces within the precinct.

AN INTEGRATED DESIGN APPROACH

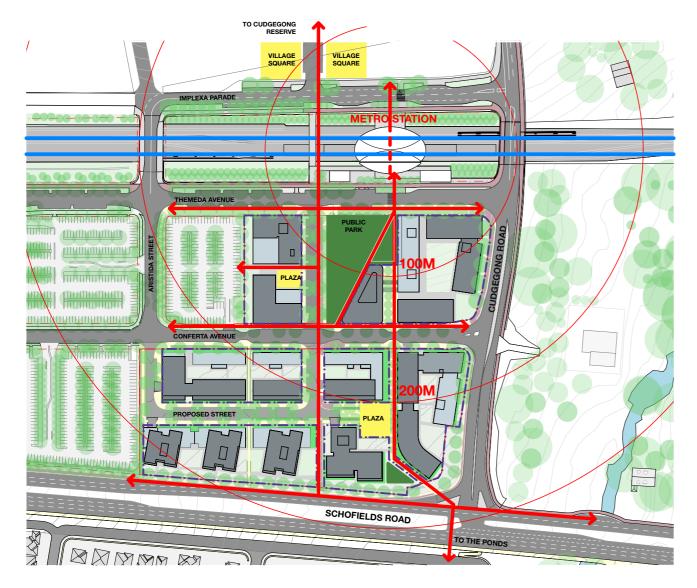
THESE DETAILED URBAN SECTIONS AND PLANS HAVE BEEN PREPARED TO ILLUSTRATE CONDITIONS THAT ARE TYPICAL ACROSS THE DEVELOPMENT AND DEMONSTRATE THE INTEGRATED DESIGN APPROACH SET OUT IN THE FOLLOWING DESIGN QUALITY GUIDELINES. THESE DRAWINGS INCLUDE KEY ELEMENTS SUCH AS STREET SECTIONS, DEEP SOIL PLANTING ZONES, BASEMENT CARPARKING, INTERFACES BETWEEN THE PUBLIC AND PRIVATE REALM, VARIED BUILDING TYPOLOGIES AND THE ARTICULATION OF BUILT FORM INCLUDING LIFT OVERRUNS, ROOF TERRACES, GROUND FLOOR APARTMENTS AND RETAIL ACCOMODATION. THESE DRAWINGS ARE INCLUDED AS FULL PAGES AT THE REAR OF THE DOCUMENT AND SHOULD BE REFERRED TO IN CONJUNCTION WITH THE GUIDELINES TO INFORM THE DESIGN PROCESS.





INTEGRATING THE METRO STATION

DESIGN THE TALLAWONG STATION PRECINCT SOUTH AS AN ACTIVE AND WALKABLE NEIGHBOURHOOD WITH THE METRO STATION AS AN INTEGRATED AND CENTRAL ELEMENT WITHIN THE PUBLIC DOMAIN.



The biggest urban rail project in Australian history Norwest Showground Cherrybrook Castle Hill Castle Hill Castle Hill Cherrybrook Castle Hill Apadematic Space of Cherrybrook Castle Hill Castle Hill Copening Castle Hill Copening Castle Hill Castle Hill Copening Castle Hill



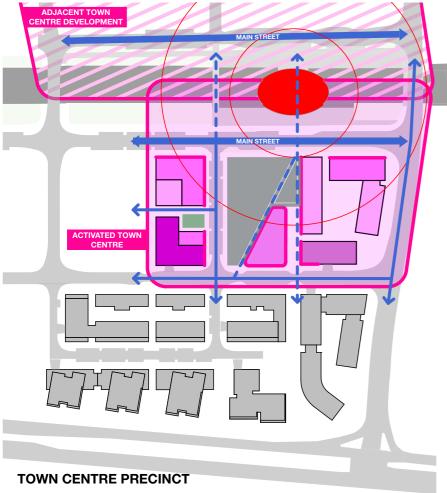
View looking across the public park from the Metro Station cand

A CONNECTED TOWN CENTRE

- Design the Tallawong Station Precinct South as an active and walkable neighbourhood with the Metro station at its core
- Integrate the Metro Station into the town centre as a central element within the public domain.
- Design the streets, public spaces, pedestrian and cycle links, and built form to reinforce the relationship between the Metro station elements including the station building, bridges and commuter carparks.

URBAN HIERARCHY & CHARACTERS

ESTABLISH AN INTEGRATED YET DIVERSE RANGE OF URBAN CHARACTERS ACROSS THE SITE TO CREATE AN ACTIVE, DIVERSE AND VARIED URBAN ENVIRONMENT.



URBAN CHARACTER

The town centre will form a focus for the development and will be used by local residents, visitors and commuters from within the development and from adjacent areas such as The Ponds. The town centre precinct will be activated by the Metro Station, the public park and retail, commercial and community uses located in buildings adjacent to the park and pedestrian links.

STREET CHARACTER

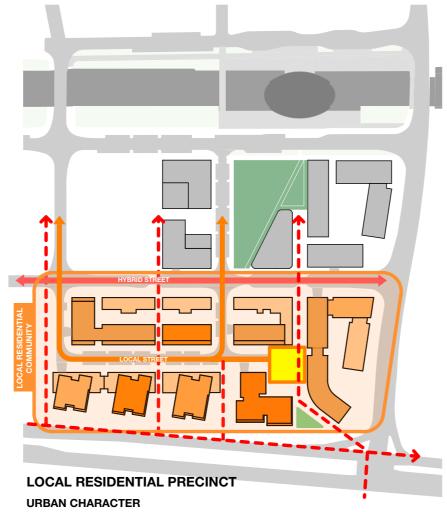
Establish active Main Streets (primary local) with retail/commercial accommodation to the ground and first floors. These streets will be used by residents, visitors and commuters for access to the local residential areas, the commuter carparks to the west as well as Metro Station drop-off / pick-up. On-street parking is provided for visitors on the north-south street adjacent to the park.

PUBLIC DOMAIN AND LANDSCAPE

Metro Station, Public Park, Retail Plaza, Through Site Links with retail/commercial activation

BUILT FORM

Predominantly 8 storey buildings with non-residential accommodation located on the ground and first floors and a range of residential accommodation on the upper levels. Buildings will have no setbacks and should be designed with a civic scale and respond to the adjacent conditions such as the park, plaza, through site link and Metro corridor. Loggias and awnings should be provided to the base of buildings to promote and accommodate mixed-use activity to these urban edges. Material selection and detailing should support the civic scale and character of the town centre.



The precinct will provide a quieter, less active and more densely landscaped precinct for local residents. The precinct will also provide a series of landscaped through site links for pedestrians and cyclists from within the development and from adjacent areas such as The Ponds.

STREET CHARACTER

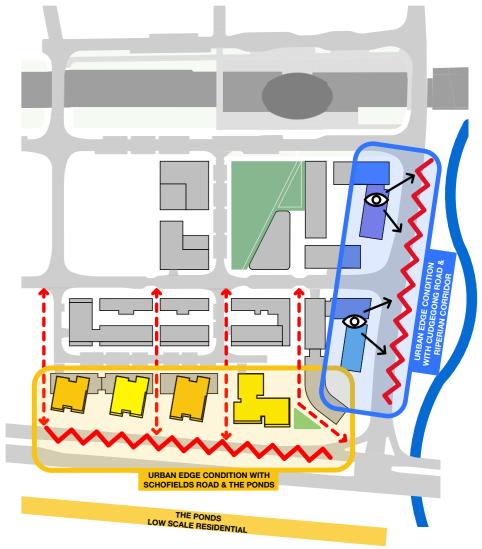
Establish a network of residential (secondary local) streets with 2-3metres landscape setbacks to the buildings. Residential buildings will have a primary street address as well as direct access to ground floor terraces and maisonettes with private gardens from the street. On-street parking is provided for visitors.

PUBLIC DOMAIN AND LANDSCAPE

Public Plaza, Through Site Links for pedestrian and cyclists with private gardens to terrace and maisonette residential typologies.

BUILT FORM

A range of medium density residential building typologies with heights from 3 to 8 storeys. Buildings should be aligned to the street and be setback 2-3metres to create additional landscaping and building separation for residents. Buildings should be articulated to reduce the perceived bulk of the development including the articulation of ground floor terraces and maisonettes, the setback of upper levels, and the careful consideration of lift overruns and plant spaces. Building articulation, material selection and detailing should reinforce the fine-grain residential character of the precinct with operable external screening to create privacy, visual interest and to express residential occupation.



URBAN EDGE PRECINCTS

The edge precincts of the development should be designed to create specific and appropriate urban forms and characters in response to the different contexts adjacent to the development.

URBAN EDGE TO CUDGEGONG ROAD / SECOND PONDS CREEK

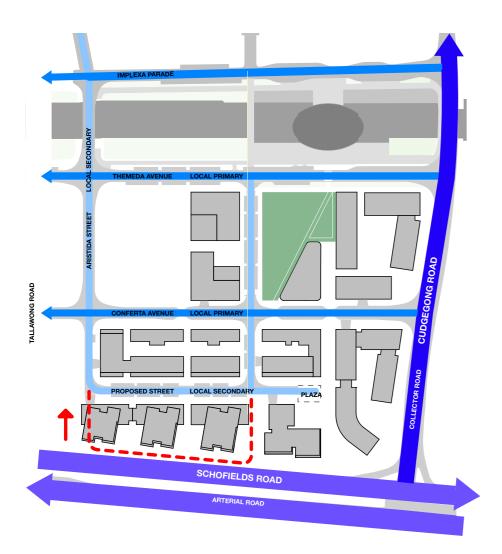
The precinct will be predominantly residential and buildings should respond to Cudgegong Road as a collector road with buildings setback 5 metres with a landscape buffer. Apartments should be configured to take advantage of the eastern aspect and views across the Second Ponds Creek. Built form and massing should respond to the sloping topography of this edge to reduce the perceived bulk. Buildings should be composed to be sympathetic to the adjacent precinct to the west but also create a distinct edge between the broader development and the Second Ponds Creek corridor to the east which will be seen from surrounding areas and the approach on Schofields Road from the Rouse Hill Town Centre.

URBAN EDGE TO SCHOFIELDS ROAD AND THE PONDS

This edge is described in the section "Addressing Schofields Road" in the Design Quality Guidelines.

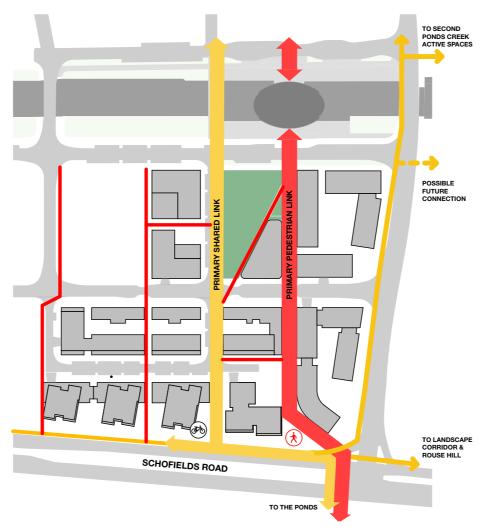
URBAN CONNECTIVITY

ESTABLISH AN INTEGRATED NETWORK OF STREETS, PEDESTRIAN CONNECTIONS AND CYCLEWAYS TO CREATE AN ACTIVE AND LEGIBLE URBAN CENTRE WITH A RATIONAL BLOCK STRUCTURE.



STREET NETWORK AND HIERARCHY

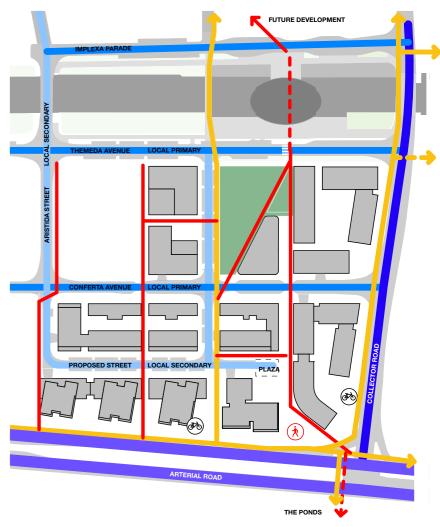
- Provide a hierarchy of streets to provide a clear and legible urban centre with a rational block structure.
- Locate 2 east-west (local primary) streets or pedestrian laneways between the collector roads (Cudgegong Road and Tallawong Road) to provide local access to the development, Metro station and the commuter carparks.
- Locate 2 north-south (local-secondary) streets or pedestrian laneways to create an urban grid and to split the site into smaller fine grain blocks.
- The southernmost street should be located within the site rather than
 adjacent to Schofields Road to create a finer urban grain, provide a
 better urban street with access, address and surveillance from both
 sides of the street, and to avoid locating multiple streets directly adjacent
 to each other on the southern edge of the site. This is described in the
 section "Addressing Schofields Road" in the Design Quality Guidelines.



PEDESTRIAN AND CYCLE NETWORK

- Design the pedestrian and cycle network as an integral element within the urban structure of the development.
- Establish a network of pedestrian and cycle links across the site that reinforces and extends the network of streets as well as breaks down the urban blocks into a finer grain urban structure.
- Position these pedestrian and cycle links to connect residents and commuters with key elements such as the Metro Station, public park, urban plaza and non-residential programs such as retail, childcare and work hubs.
- Locate these links strategically to also connect the Metro station and town
 centre development with the surrounding residential areas such as The
 Ponds to the south via the existing pedestrian and cycle link at the
 intersection of Schofields and Cudgegong Roads and future development
 to the north via the proposed link bridge over the excavated Metro corridor.

REFER TO DESIGN CONFIDENCE ACCESS DESIGN ASSESSMENT REPORT REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND LANDSCAPE STRATEGY FOR MORE DETAIL

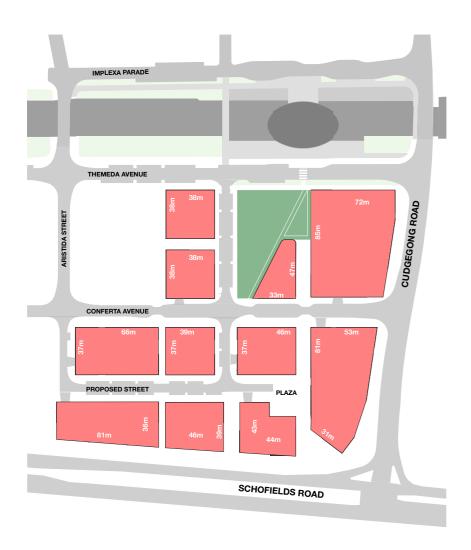


INTEGRATED NETWORK

 The design of the street hierarchy, pedestrian links and cycle links should be considered as an integrated network that creates a legible and walkable town centre development with a fine grain block structure.

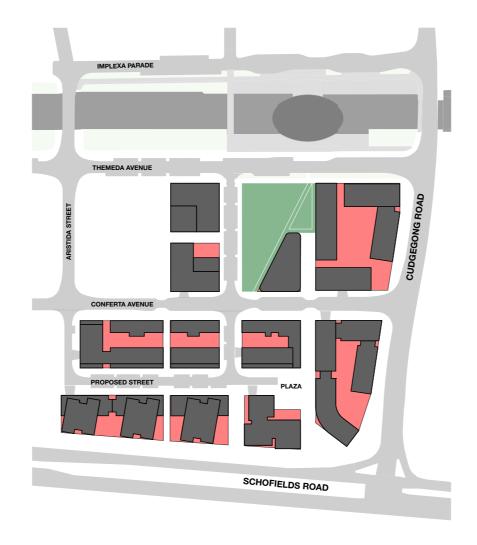
URBAN SCALE, LEGIBILITY AND OWNERSHIP

ESTABLISH A FINE GRAIN DEVELOPMENT WITH AN URBAN STRUCTURE THAT IS RATIONAL, LEGIBLE AND PERMEABLE, AND CAPTURE THIS WITH AN OWNERSHIP STRUCTURE THAT PRESERVES THE PUBLIC DOMAIN.



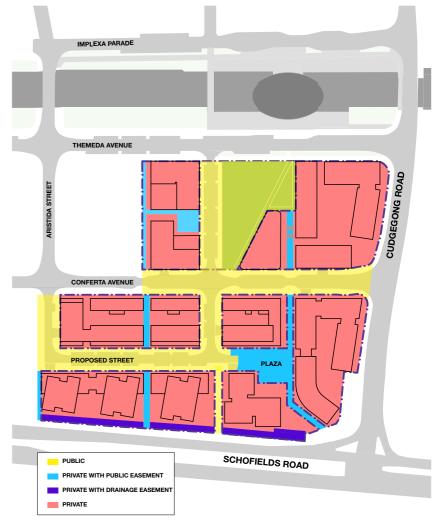
URBAN BLOCK STRUCTURE AND SCALE

- Establish a fine grain urban development with a structure that is rational, legible and permeable.
- Use the gridded overlay of the street, pedestrian and cycle networks to divide the site into a series of urban blocks with a scale appropriate for a walkable town centre.
- Create a series of blocks that support a variety of building massing, heights and housing typologies.
- Create a more diverse urban environment by developing different but complementary architectural responses to each site across the town centre.



URBAN LEGIBILITY AND STREET DEFINITION

- Create a legible urban structure by designing buildings that define the public domain including streets, through-site links, open spaces and parks.
- Buildings should be built to the edge of blocks or setbacks and planned to address and engage with the public domain through the careful design of lobbies, balconies, windows and gardens.
- Site and plan buildings to be outward looking to engage with their urban environment. Buildings should be planned to facilitate the passive surveillance of streets, pedestrian links and open spaces to create a safe and secure urban environment.

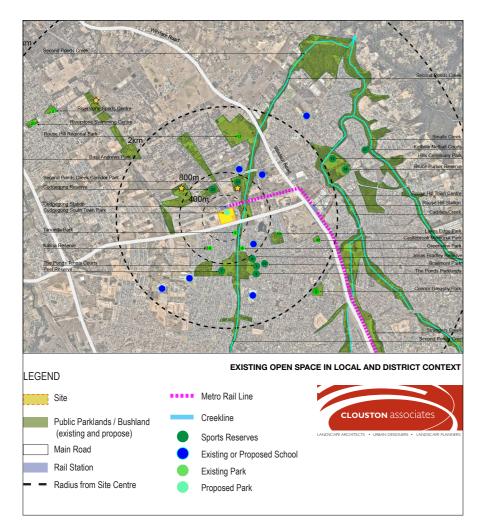


OWNERSHIP

Establish a clear ownership structure that creates a well defined, legible and permeable urban structure and preserves the public domain

INTEGRATED LANDSCAPE NETWORK

ESTABLISH A LOCAL OPEN SPACE NETWORK THAT IS INTEGRATED WITH AND CONNECTED TO THE WIDER GREEN INFRASTRUCTURE OF THE DISTRICT. THE PUBLIC DOMAIN SHOULD BE DESIGNED TO SUPPORT THE NEEDS OF THE LOCAL COMMUNITY AND COMPLIMENT THE **EXISTING OPEN SPACE NETWORKS IN SURROUNDING AREAS.**





WEST CENTRAL GREEN GRID

LANDSCAPE STRATEGY FOR MORE DETAIL

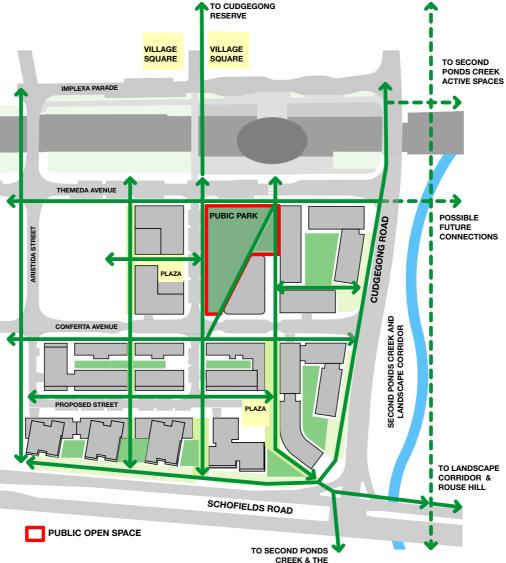
REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND

REFER TO GHD SOCIAL NEEDS AND IMPACT ASSESSMENT

INTEGRATED GREEN INFRASTRUCTURE

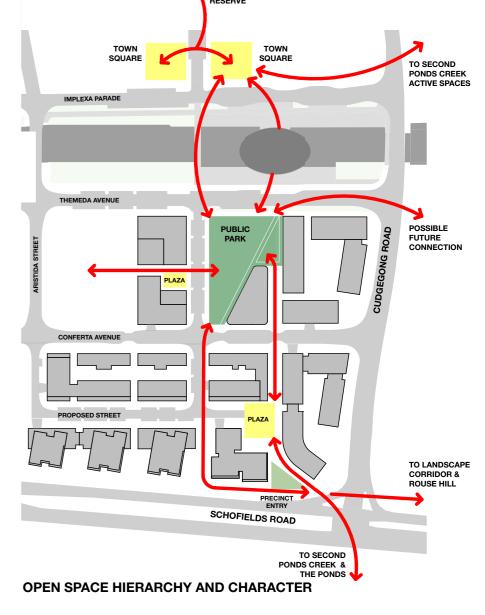
- Provide an open space network that is connected to and integrated with the surrounding local, district and regional green grid and green infrastructure.
- Provide a series of public open spaces that support the needs of the precinct's community and complement the existing open spaces in surrounding areas.
- **CREEK & THE OPEN SPACE NETWORK** an interconnected and walkable open space network.
- public park, urban plaza, landscaped zones and communal open spaces.
- passive uses that can be utilised by a diverse range of residents.
- amenity throughout the development, e.g. shaded pedestrian paths to the
- · Link this network to open spaces in adjacent suburbs to further increase the range of activities available and to encourage interaction with neighbouring

REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND LANDSCAPE STRATEGY FOR MORE DETAIL



- · Distribute a range of open spaces strategically across the site including a
- · Locate these spaces adjacent to the pedestrian and cycle networks to form
- Design the spaces within this network to support a wide variety of active and
- · Vary the microclimates these spaces will support to increase diversity and Metro station in summer and sunny open spaces in winter.





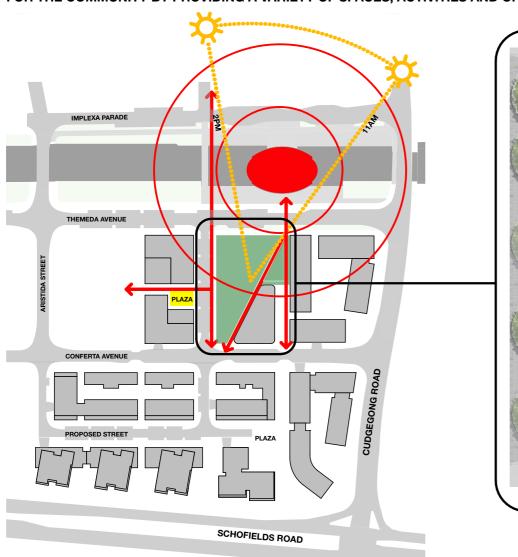
TO CUDGEGONG

- Establish a hierarchy of fine grain open spaces with a range of characters, urban scales and landscape characteristics.
- Locate these spaces to form a sequence of open spaces and experiences within the development for residents, pedestrians, cyclists and visitors.
- Ensure the open spaces reflect and respond to surrounding context, urban character and movement patterns ensuring fine grain open spaces are strategically located to complement larger public spaces such as parks and reserves in surrounding areas.
- · The major open spaces are described in more detail on the following pages.

REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND LANDSCAPE STRATEGY FOR MORE DETAIL

THE PUBLIC PARK

THE PUBLIC PARK SHOULD FORM A STRONG RELATIONSHIP WITH THE METRO STATION AND FOSTER THE IDEA OF A MEETING PLACE FOR THE COMMUNITY BY PROVIDING A VARIETY OF SPACES, ACTIVITIES AND OPPORTUNITIES FOR SOCIAL INTERACTION.









LOCATING THE PUBLIC PARK

- Provide a public park for the use of residents, commuters and visitors to the mixed-use facilities that surround the park.
- Design and locate the public park to maximise sun access and limit overshadowing from the neighbouring development.
- Locate the public park to form a strong relationship with the Metro station to create a town centre development with a public transport focus.
- Use the park edge to provide a gentle and accessible inclined pedestrian path linking the southern blocks of the development to the Metro station.

REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND LANDSCAPE STRATEGY FOR MORE DETAIL

DESIGNING THE PUBLIC PARK

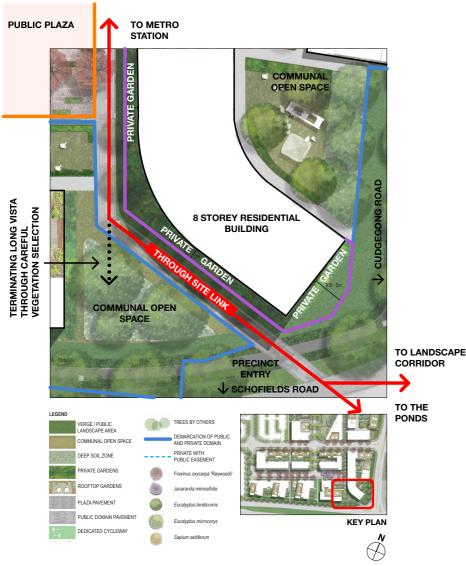
- · The design of the park should aim to:
 - Maximise useful and function space,
 - Enable delight and temporary respite,
 - Enable activation,
 - Facilitate circulation and movement,
- Provide universal access to adjacent buildings.
- The design of the park should foster the idea of a meeting place for the community by providing a variety of spaces, activities and opportunities for social interaction.
- Provide a series of level and accessible platforms across the sloping site to accommodate a range of activities and users.
- Use the diagonal eastern park edge to provide a gentle and accessible inclined pedestrian path linking spaces within the park and the southern blocks of the development to the Metro station.

- Provide a balance of hardscape and softscape depending on pedestrian and traffic use to accommodate a range of activities including market stalls, community events, water play and passive recreation.
- Provide spaces that complement the surrounding active nonresidential programs located at ground floor including retail, commercial and community accommodation.

REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND LANDSCAPE STRATEGY FOR MORE DETAIL

FINE GRAIN OPEN SPACES

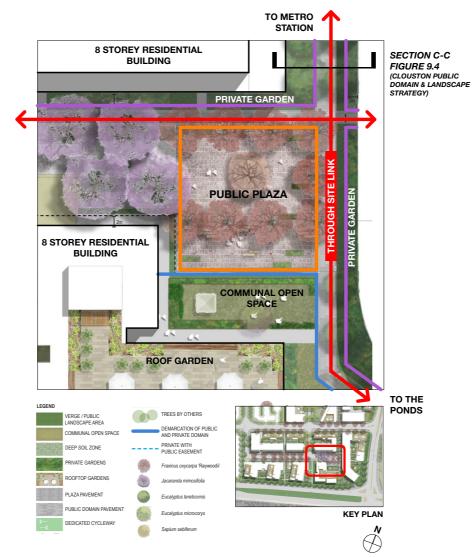
LOCATE A SERIES OF FINE GRAIN LANDSCAPE AND OPEN SPACES WITHIN THE DEVELOPMENT WITH A RANGE OF URBAN SCALES AND LANDSCAPE CHARACTERISTICS TO SUPPORT A RANGE OF USES.



PRECINCT ENTRY

- Provide a small green space marking the main southern entry into the precinct for pedastrians
- Design of the communal open space and adjacent landscaped zone should address and create a sense of arrival from the Schofields Road and Cudgegong Road intersection whilst addressing the adjoining residential buildings.
- Through site links and landscape should reinforce a visual hierarchy and clarity of all entry points into the development and adjoining private gardens and communal open spaces.
- Utilise large native trees, shrubs and grass species to reinforce a connection to the Second Ponds Creek.
- Provide an appealing interface between Schofields Road and the development and way finding opporunities.

REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND LANDSCAPE STRATEGY FOR MORE DETAIL

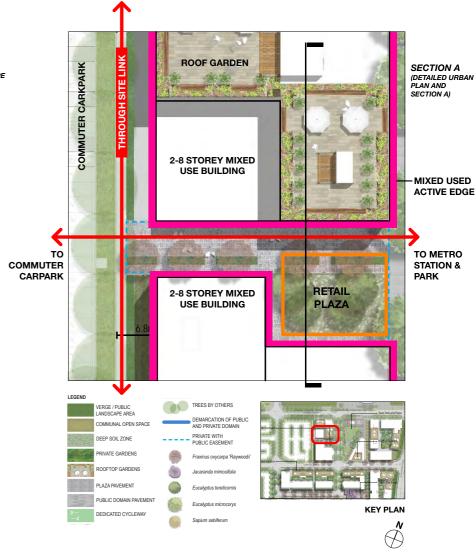


URBAN PLAZA

- Provide a large paved flexible plaza principally for use by adjoining residents with provision for occasional large vehicle turning and servicing.
- · A feature tree should be located to define the space and provide shade.
- The tree grid should feature deciduous species to ensure sufficient shade in summer and solar access in winter.
- Permeable raised paving, speed humps and a very low vehicle speed environment should be incorporated to reinforce the plaza as a shared space.
- The plaza should provide a balance of hardscape and softscape with basement entries not located off the plaza.
- Seating is to be provided to create a 'meeting place' and provide opportunities for interaction within the local residential community.

REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND LANDSCAPE STRATEGY FOR MORE DETAIL

- VISUALLY PERMEABLE FENCE / THRESHOLD BETWEEN
 PUBLIC DOMAIN & COMMUNAL OPEN SPACE
- VISUALLY PERMEABLE FENCE / THRESHOLD BETWEEN PUBLIC DOMAIN & PRIVATE RESIDENTIAL GARDEN



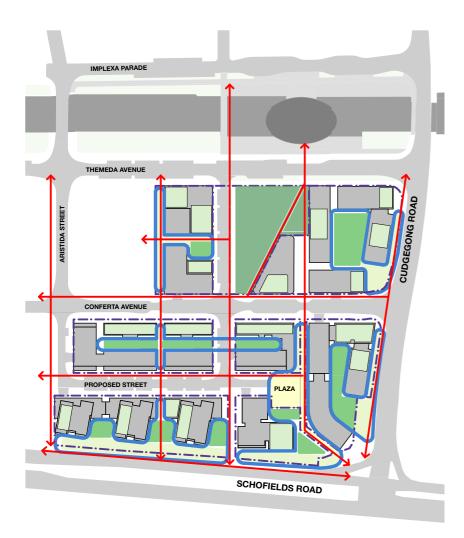
RETAIL PLAZA

- The design of the retail plaza should vary in response to the residential cul de sac plaza due to the proximity to non-residential programme.
- Overall design should provide an appealing interface between the commuter car park, non-commercial podium level tenancies and residential development above.
- The plaza should provide amenities for the immediate residents whilst responding to the pedestrian movement through the site.
- Design should provide public seating for neighbours and shoppers while also locating outdoor cafe seating for adjoining businesses.
- Provide shade for courtyard space from tree canopy, especially from westerly sun.

REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND LANDSCAPE STRATEGY FOR MORE DETAIL

COMMUNAL OPEN SPACE

STRATEGICALLY LOCATE A SERIES OF COMMUNAL OPEN SPACES FOR RESIDENTS WITHIN DEVELOPMENTS THAT ARE VISUALLY CONNECTED WITH THE PUBLIC DOMAIN TO FORM AN INTEGRATED NETWORK OF LARGER LANDSCAPED ZONES.



INTEGRATED COMMUNAL OPEN SPACE

- Provide a series of communal open spaces within sites that provide landscaped spaces to residents within buildings. These spaces should be co-located with deep soil zones.
- Locate these spaces to maximise amenity within sites with adequate sunlight, aspect and outlook.
- Create a broader series of landscaped spaces by locating them strategically to form larger landscape zones that sit adjacent to, or visually connected with streets, landscaped public spaces, links or other communal opens spaces.

REFER TO DETAILED URBAN PLAN AND SECTION REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND LANDSCAPE STRATEGY FOR MORE DETAIL



PUBLIC / PRIVATE INTERFACE

- A successful public realm should clearly define boundaries between public and private space through the limited visible presence of barriers as the key delineating feature. Boundaries between communal/private open space and adjoining public open space and through site links should utilise landscape to provide an intuitive definition of ownership.
- Fences where provided are to be visually permeable and limited in height with solid elements limited to 1m. Ensure fence design permits transparency to adjoining paths and communal open spaces for safety and passive surveillance whilst retaining privacy.
- Retain privacy of residential courtyards and private gardens, whilst maintaining visual glimpses of trees, shrubs and grass from the public space to extend the sense and effect of the borrowed landscape.

REFER TO DETAILED URBAN PLAN AND SECTION REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND LANDSCAPE STRATEGY FOR MORE DETAIL



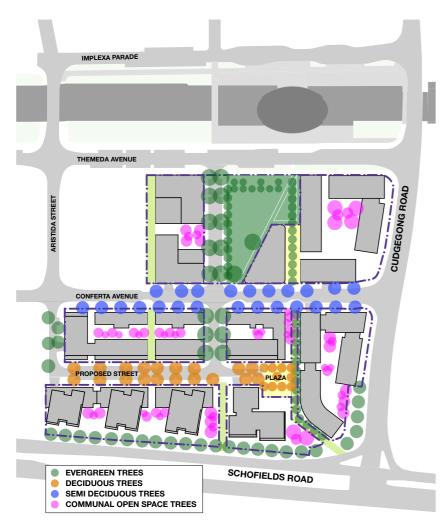
ROOFTOP GARDENS

- Provide a series of rooftop communal open spaces that provide landscaped spaces for the gathering of residents within sites.
- These spaces should take advantage of northerly aspects and panoramic views where available of the surrounding area, for example the Second Ponds Creek green corridor.
- Rooftop gardens may utilise raised planters to define smaller spaces for sitting and gathering and be located to prevent the overlooking of adjacent units.
- Planting selection should vary from the shade tolerant specifies located on ground floor communal open space to dryer, strappy or grassy species for rooftops that will cope with the greater exposure and varied environment.

REFER TO DETAILED URBAN PLAN AND SECTION REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND LANDSCAPE STRATEGY FOR MORE DETAIL

TREE CANOPY & DEEP SOIL NETWORK

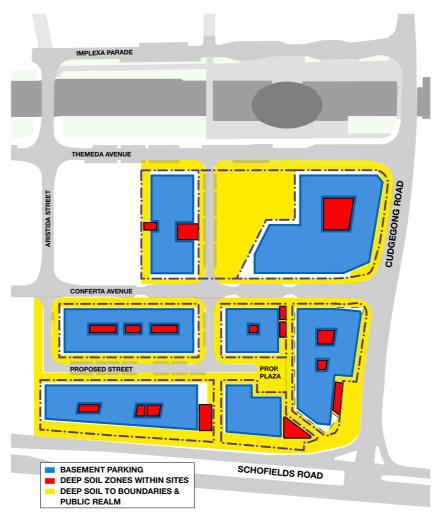
DISTRIBUTE DEEP SOIL ZONES OF SUFFICIENT SIZE THROUGHOUT THE PRECINCT AND WITHIN SITES TO PROVIDE EXTENSIVE TREE CANOPY COVERAGE FOR THE TOWN CENTRE PUBLIC DOMAIN AND COMMUNAL OPEN SPACES.



STREET PLANTING AND CANOPIES

- Design street planting to extend the green grid of the open space network, to provide shade, create local distinctiveness, seasonal variation and habitat opportunities.
- Use street trees to increase canopy coverage to the town centre and the adjacent commuter carparks to reduce the heat island effect.
- Select species strategically to provide winter sun and summer shade. Evergreen tree
 species should be used along north-south running streets whereas deciduous species
 are should be used along east-west running streets to maximise winter solar access
 to public and private spaces.
- The character of the planting can follow a native theme utilising, where practical, species that occur within the Cumberland Plain Vegetation Community. Utilising native species will help increase the ecological value of the park whilst also minimising the maintenance and watering requirements during establishment.
- Species should be selected that can grow large canopies relatively quickly that cast
 wide shade and that can bring visual and sensory delight. The landscape plan will
 locate various tree species in different locations to create a variety of atmospheres
 and microclimates transparency or intimacy, solar access or shade, native or exotic/
 European character, variety or consistency of colours and scents.

REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND LANDSCAPE STRATEGY



DEEP SOIL NETWORK

- Ensure deep soil zones are strategically distributed throughout the public domain and communal open spaces to ensure tree and shrub vegetation receive sufficient natural sunlight for healthy growth, provide shade for residents in adjacent buildings and encourage pedestrian permeability through the site.
- Locate native vegetation species, where practical, in deep soil zones. The selection of species within the Cumberland Plain Vegetation Community should be encouraged to increase ecological value of the site, while minimising maintenance and watering requirements.
- Ensure deep soil zones are strategically located throughout the site in accordance with basement parking design.

REFER TO DETAILED URBAN PLAN AND SECTION REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND LANDSCAPE STRATEGY FOR MORE DETAIL



DEEP SOIL NETWORK continued

- Provide a minimum 3m setback for basement parking from site boundaries to provide generous deep soil zones to facilitate boundary and street tree planting to promote healthy root growth and canopy coverage for street trees.
- Ensure basement parking is not located beneath publicly owned through site links to ensure a connected deep soil zone is present allowing for healthy tree planting to public streets and through site links.

REFER TO DETAILED URBAN PLAN AND SECTION REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND LANDSCAPE STRATEGY FOR MORE DETAIL

BUILDING HEIGHTS, SEPARATION & SETBACKS

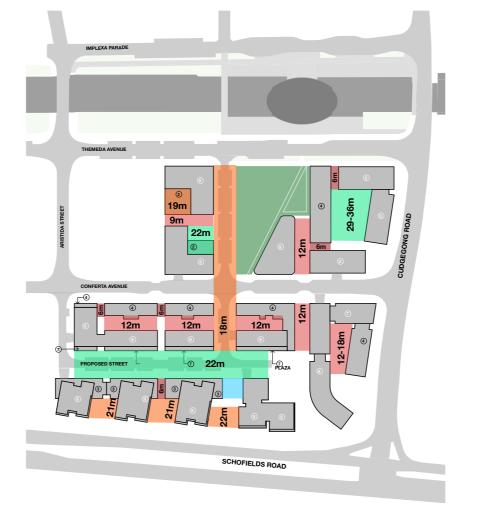
PROVIDE A RANGE OF BUILDING HEIGHTS FROM 2 TO 8 STOREYS WITH SETBACKS AND SEPARATIONS TO SUPPORT THE CHARACTER OF THE PRECINCT, CREATE A VARIETY OF URBAN SCALES, AND TO MAXIMISE AMENITY FOR RESIDENTS AND PEDESTRIANS.





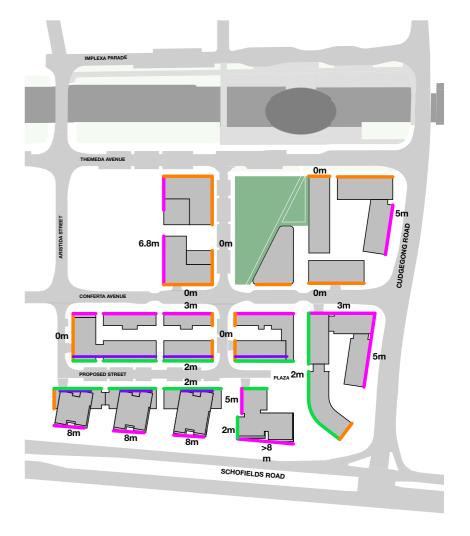
- Provide a range of building heights from 2 to 8 storeys to avoid uniformity, create a
 variety of urban scales across the development and to accommodate a range of housing
 typologies. Create a more varied and interesting skyline for the development when it is
 viewed from surrounding areas.
- Encourage a range of architectural solutions and building designs to create a diverse and interesting neighbourhood with careful consideration of massing, materials, fenestration and building scale.
- Position lower buildings to create an appropriate scale and character to streets and pedestrian links and to allow solar access to taller buildings within blocks.
- Locate taller buildings to take advantage of the amenity of the public park, views to the adjacent creek corridor and to increase density and activity in the town centre sites located closer to the Metro station.
- Configure the massing of buildings to the edges of the development (particularly the south and east) to avoid the perception of the development as a wall or closed enclave.

REFER TO BENNETT AND TRIMBLE URBAN DESIGN REPORT



BUILDING SEPARATION

- Provide building separations that comply or are greater than described in the ADG. Refer to Urban Design Report for clarification.
- Create separation between buildings that allows for appropriate levels
 of sun access, natural cross ventilation, acoustic and visual privacy to
 both the residents of the buildings and users of the public domain.
- Provide a range of building separations that create a series of streets, through-site links and open spaces with differing widths, scales and characters to create urban diversity.



BUILDING SETBACKS

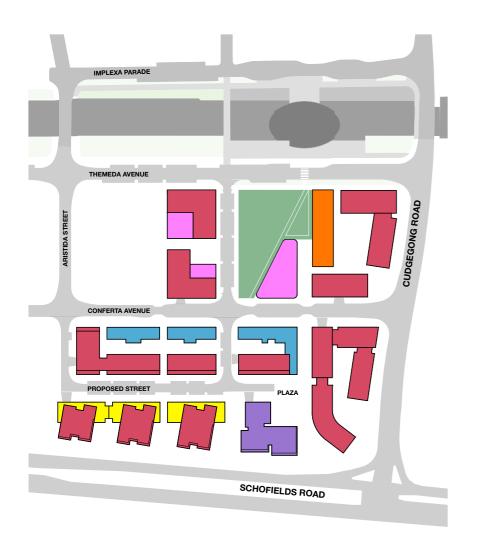
- Provide a range of building setbacks in response to context, typology and amenity.
- Buildings on sites adjacent to the public park and metro station where commercial and retail programs are located at lower levels require no setback to focus pedestrian activation to the street and create an energetic mixed-use town centre environment
- Setbacks are to be increased on sites not adjacent to the Metro station or the public park where residential accommodation is located on the ground floor.
- Buildings in these locations are to be setback 2 to 3 metres from the street to accommodate for terrace housing and maisonettes with private gardens accessed directly off the street and through-site links.

REFER TO BENNETT AND TRIMBLE URBAN DESIGN REPORT

REFER TO BENNETT AND TRIMBLE URBAN DESIGN REPORT

AN ACTIVE & DIVERSE TOWN CENTRE

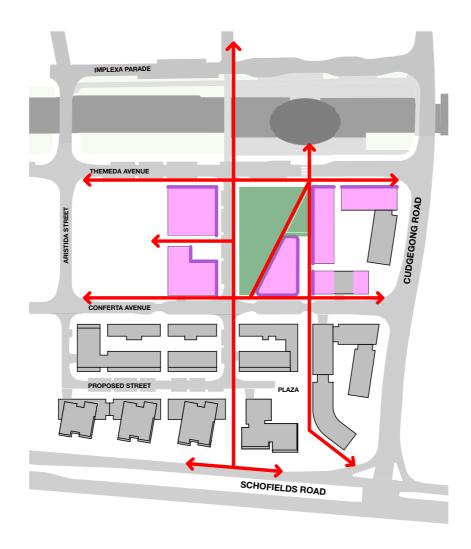
PROVIDE A WAIDE RANGE OF HOUSING TYPOLOGIES AND NON-RESIDENTIAL PROGRAMS TO FOSTER A DIVERSE AND ACTIVE COMMUNITY.



A RANGE OF HOUSING TYPOLOGIES

- Provide a range of housing typologies including two-storey terraces, maisonettes and apartments of a range of sizes to accommodate and foster a diverse community of residents.
- Maisonettes and terraces are to be provided with private gardens with direct street access to create ownership, passive surveillance and a range of garden styles to the streets and through-site links.
- Provide a wide range of block and building sizes to support and encourage a mix of accommodation models.
- Provide a range of housing models that support flexibility and adaptability as the needs of users change and the character of the neighbourhood evolves.
- Distribute housing types across the site to create diversity across the development and to encourage interaction between different demographic groups.

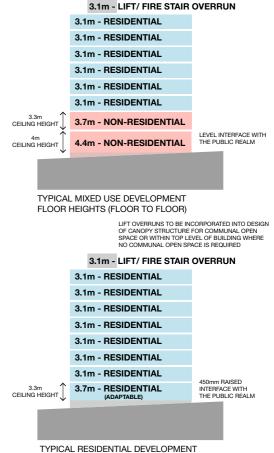
REFER TO BENNETT AND TRIMBLE URBAN DESIGN REPORT



MIXED-USES AND ACTIVATION

- A range of retail, commercial, entertainment, recreation and community uses are encouraged to serve the needs of the wider community and promote an active and vibrant Local Centre.
- · Active uses and facilities are co-located as much as possible to maximise activation.
- Concentrate non-residential programs in the buildings adjacent to the public park and Metro station to create an active and vibrant town centre within close proximity to rapid public transport.
- Locate these programs on the ground and first floors to focus activity on the streets and public spaces and to create a buffer to the residential apartments above.
- Ground floors on active frontages should demonstrate fine grained and intensive retail
 and commercial uses with no blank walls, numerous entrances to different shops, cafes,
 restaurants, offices, and display a variety of shops and uses. Loggias and awnings
 should be provided to the base of buildings to promote and accommodate mixed-use
 activity to these urban edges.
- These active uses should functionally and visually integrate internal spaces (i.e. the
 interior of shops and other businesses) and the public domain (i.e. streets, laneways and
 parks). This also means that frontages should display a high level of transparency.

REFER TO AEC RETAIL AND COMMERCIAL LAND USE ANALYSIS REFER TO GHD SOCIAL NEEDS AND IMPACT ASSESSMENT LIFT OVERRUNS TO BE INCORPORATED INTO DESIGN OF CANOPY STRUCTURE FOR COMMUNAL OPEN SPACE OR WITHIN TOP LEVEL OF BUILDING WHERE NO COMMUNAL OPEN SPACE IS REQUIRED



MIXED-USES AND ACTIVATION continued

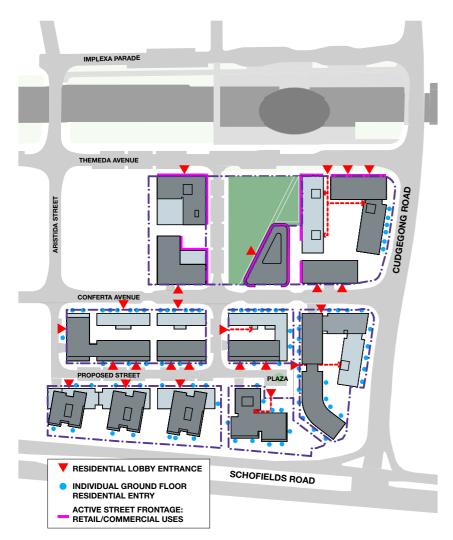
FLOOR HEIGHTS (FLOOR TO FLOOR)

- Cafes and restaurants should aim to have wide retractable doors to enable easy flow of customers and staff in and out of the footpath, shops or offices should have transparent windows around 80% of the frontage
- No non-residential unit should take more than 15 metres of active frontage unless demonstrating vibrancy, diversity and flexibility in activation.
- Larger format retail premises should have pedestrian access to the streets and other public spaces and are not to present blank walls or inactive facades.
 These larger premises should be located inside, at the core of non-residential offerings and leave a variety of shops and active uses facing the public domain.
- · These programs should include commercial programs such as
 - professional suites, work-hubs and gyms,
 - retail accommodation for a range of stores from mini-major markets to cafes,
 - childcare centres and
- community uses.

REFER TO BENNETT AND TRIMBLE URBAN DESIGN REPORT

BUILDING ENTRANCES, CARPARKING & SERVICING

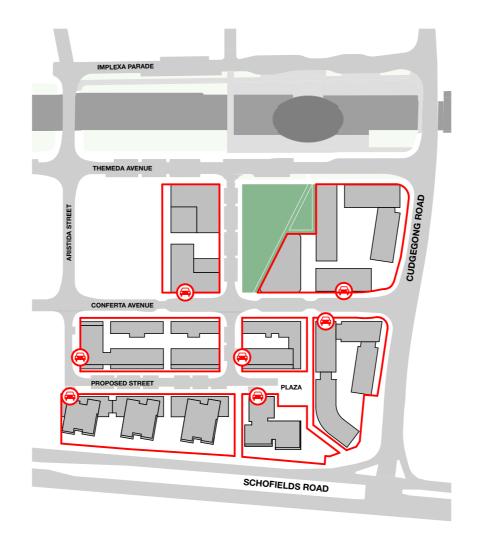
RESIDENTIAL BUILDINGS SHOULD BE DESIGNED WITH A LEGIBLE STREET ADDRESS AND A DISCRETE BASEMENT ENTRANCE FOR CARPARKING AND SERVICING.



RESIDENTIAL ENTRIES AND GROUND FLOOR ACTIVATION

- Provide each building with a street address and a clear and legible entrance location.
- Lobbies should be located to provide safe and secure access for residents and visitors and be monitored by the passive surveillance of residents and neighbours.
- Ground floor terraces and maisonettes with private gardens and direct street access should be located within each development where possible to promote interaction with and passive surveillance of the adjacent streets, open spaces and pedestrian links.
- Succession and repetition of private doors and access increases residential
 activation and interest. This helps passive surveillance of street, laneways
 and public spaces while safeguarding a level of privacy and intimacy for the
 ground floor levels of the terrace/maisonette type apartments.

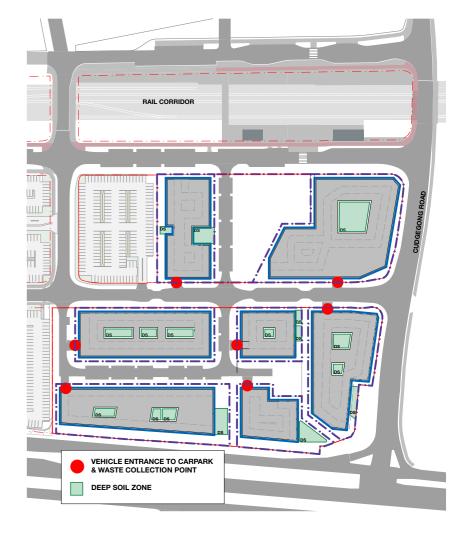
REFER TO DETAILED URBAN PLAN AND SECTION REFER TO BENNETT AND TRIMBLE URBAN DESIGN REPORT



VEHICULAR ACCESS

- All car parking and servicing for developments is to be located in basements.
- Access point to basement parking and services should be located in discrete locations that avoid the disruption of street patterns, active uses, landscaping and the overall appearance of developments.
- The number of entrances to basement parking and services should be minimised through the consolidation of basements and entrances.
- Entrance locations should be located to minimise the disruption of local street traffic.

REFER TO BENNETT AND TRIMBLE URBAN DESIGN REPORT



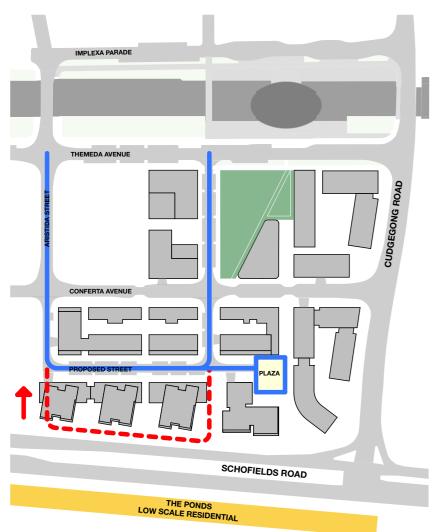
BASEMENT PARKING AND DEEP SOIL PLANTING

- Basements must be designed to accommodate Deep Soil Zones within each development. These zones are to be located to maximise landscape amenity to the residents of the development and to form part of an integrated landscape network across the development.
- These deep soil zones should be consolidated, grouped, or co-located to create larger zones of planting within or across sites with increased opportunities for screening, shading, habitat and variation in species.

REFER TO AECOM WASTE STRATEGY REPORT
REFER TO AECOM CIVIL DESIGN REPORT
REFER TO DETAILED URBAN PLAN AND SECTION
REFER TO BENNETT AND TRIMBLE URBAN DESIGN REPORT

ADDRESSING SCHOFIELDS ROAD AND THE PONDS

DESIGN THE BUILT FORM AND LANDSCAPE OF THIS EDGE PRECINCT TO ADDRESS THE PARTICULAR QUALITIES OF SCHOFIELDS ROAD AND THE ADJACENT SUBURB OF THE PONDS. THE EDGE SHOULD NOT BE DESIGNED OR PERCEIVED AS A BLANK WALL OR THE BACK OF THE PRECINCT BUT RATHER AN INHABITED AND ATTRACTIVE URBAN EDGE. THE DEVELOPMENT SHOULD BE DESIGNED TO MITIGATE THE ENVIRONMENTAL IMPACT ON THE PONDS.

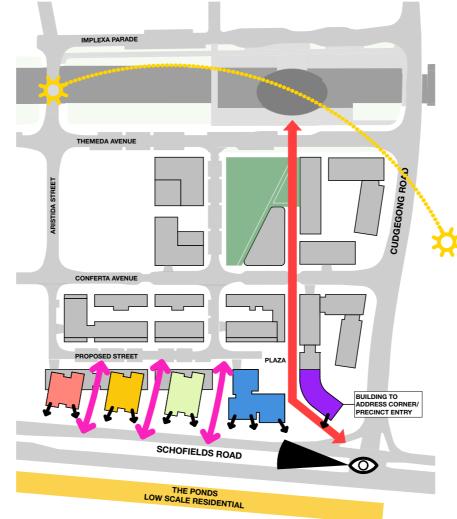


SHIFTING THE PROPOSED STREET NORTH

 Rather than locate the southernmost street adjacent to Schofields Road, the street has been shifted north to divide the southern sites in half to create a finer grain development and to avoid locating multiple streets directly adjacent to each other on the southern edge of the site.

MITIGATE IMPACTS ON THE PONDS

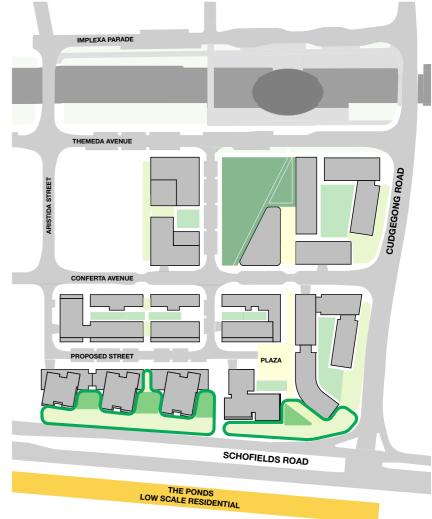
- Mitigate impacts of the development on the adjacent suburb of The Ponds including solar access, visual privacy, overlooking, views and other environmental impacts.
- Building should be designed to minimise overlooking of the existing suburb while still facilitating CPTED principles.
- Building materials should be selected to minimise reflectivity. Refer to Building Materials and Selection in these guidelines for more information.



BUILT FORM AND MASSING

- Configure the built form to address both the re-located street and Schofields Road, each with their own scale, character and levels of noise generation.
- The built form should be designed to avoid the appearance of a wall from Schofields Road. Rather than a continuous built edge, the built form should be designed as a series of individual and different building types with sufficient separations to permit adequate sunlight and wind penetration to the individual apartments, the broader proposed development, and the adjacent suburb of The Ponds.
- The buildings should not be designed with their backs to Schofields Road. The buildings should address both the proposed local street and Schofields Road to promote CPTED principles for both the proposed development and the wider area including the cycle and pedestrian path running parallel to Schofields Road. Living areas, kitchens and balconies should be located to provide passive surveillance while still complying with ADG guidelines. Ground floor apartments should have appropriate privacy and screening through the design of private courtyards and gardens.
- Apartments in close proximity to Schofields Road should be designed to minimise the acoustic exposure to noise generating sources with intelligent planning and integrated noise mitigation measures.

REFER TO DETAILED URBAN PLAN AND SECTION

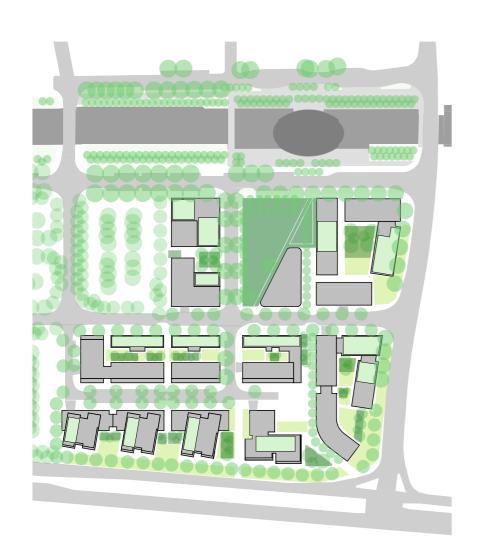


LANDSCAPE

- In shifting the southernmost street adjacent to Schofields Road to the north, a substantial connected landscape corridor will address and buffer Schofields Road.
- The landscape corridor should provide areas suitable for substantial tree establishment for viewing from The Ponds while also providing varied and intimate communal open spaces for the adjoining residents. The planting will also mitigate overlooking of The Ponds.
- Landscape design should integrate the green open swale to Schofields Road frontage with provision for maintenance access.
- Shrub planting to the boundary limited in height to maintain sight lines and passive surveillance to Schofields Road.

REFER TO DETAILED URBAN PLAN AND SECTION
REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND
LANDSCAPE STRATEGY

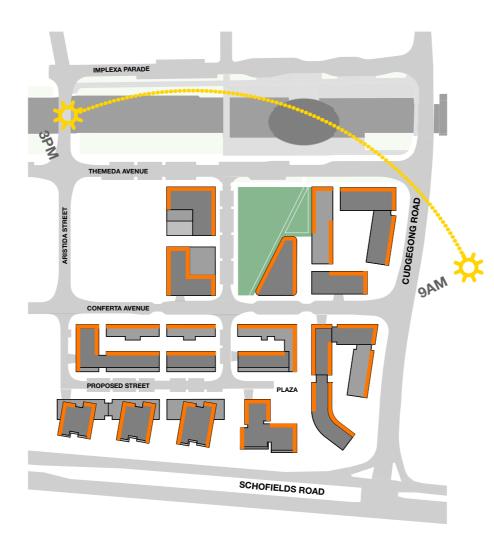
ENVIRONMENTAL CONSIDERATIONS



REDUCING HEAT ISLAND EFFECT

- Maximise street tree plantings to provide ample shade over reflective surfaces and promoting microclimatic cooling through evapotranspiration.
- Select strategic tree species to provide winter sun and summer shade for resident and communal open space adjacent to street trees. Evergreen tree species to be used along north-south running streets, while deciduous species along east-west running streets to reduce energy consumption from heating and cooling.
- Incorporate green roofs, or rooftop gardens, to reduce the temperature of roof surfaces and the surrounding micro-climate.
- Provide a series of communal open spaces that primarily contain trees, vegetation and lawn areas while minimising hardscape materials to prevent heat absorption and reflection.

REFER TO AECOM ECOLOGICAL SUSTAINABLE REPORT REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND LANDSCAPE STRATEGY



SOLAR ORIENTATION & OVERSHADOWING

- Buildings have been configured to balance the legible urban grid of the precinct with solar access to apartments, communal open space and the public realm.
- Building heights, separation and setbacks have been carefully calibrated to optimise solar access to each of the buildings.
- Volumes are stepped or rotated where feasible to increase solar access while maintaining street alignments and the passive surveillance of the public realm.
- Arrange building masses to minimise overshadowing to the public park and neighbouring properties in mid-winter.

REFER TO BENNETT AND TRIMBLE URBAN DESIGN REPORT & BENNETT AND TRIMBLE DESIGN VERIFICATION REPORT



ACOUSTIC & AIR QUALITY

- Locate, configure and plan the buildings and apartments in close proximity to the Metro corridor, Schofields Road, Cudgegong Road and commuter carparks to mitigate exposure to noise generating sources.
- Where required, integrate noise mitigation measures into the planning and design of dwellings and non-residential accommodation affected by noise generating sources.
- Potential mitigation measures relating to acoustic & air quality for apartments may include:
- Winter gardens to form a buffer to noise source.
- Building articulation to form acoustic shadows for ventilation sources.
- Trickle vents to windows and facades.
- Acoustic glazing.
- Locate mechanical ventilation intake (including air-conditioning) away from pollution sources.

REFER TO ACOUSTIC LOGIC NOISE AND VIBRATION ASSESSMENT

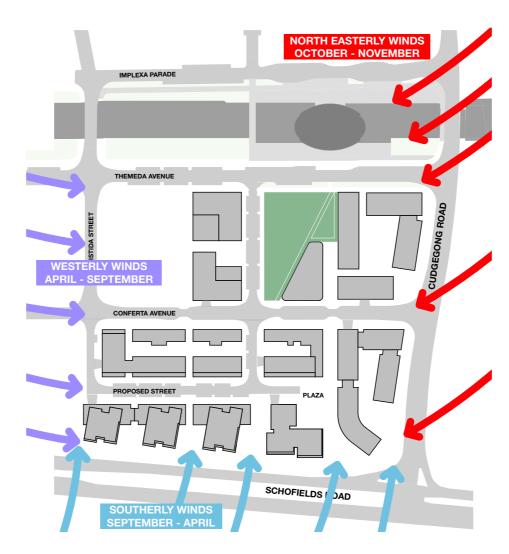
ENVIRONMENTAL CONSIDERATIONS



WATER MANAGEMENT

- Landscape design should respond to greater context overland flow paths and flood impact assessment.
- In addition to providing privacy and passive surveillance of the public realm, residential ground floor habitable levels should be raised 450mm as part of localised flood protection.
- Buildings should maximise potable water conservation through the integration of ESD initiatives including low flow fittings and fixtures within buildings.
- Sites should maximise stormwater collection and re-use for irrigation to reduce consumption.
- Street tree planting selection should facilitate passive irrigation and provide complementary bio-filtration network amongst parking bays for improved amenity, street tree health and canopy cover.

REFER TO AECOM INTEGRATED WATER MANAGEMENT STRATEGY REPORT REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND LANDSCAPE STRATEGY

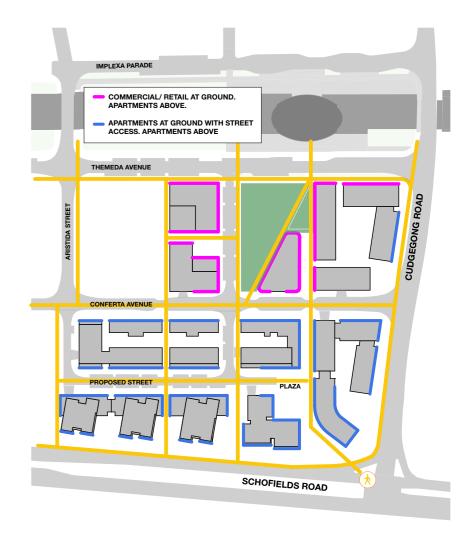


WIND MITIGATION

Address the potential for adverse wind effects impacting the comfort of pedestrians and residents within and around the development by considering the following wind mitigation measures:

- Include planting and vegetation throughout the site. For tree planting/landscaping
 to be effective as a wind mitigation device the species should be of a densely
 foliating variety to ensure year-round effectiveness. Trees should also be planted
 in clusters to effectively absorb incident winds. Undergrowth such as shrubs or
 hedges are expected to further improve wind conditions.
- Design continuous awnings over trafficable areas below buildings of significant height which are exposed to the prevailing winds.
- Provide localised screening where longer duration activities are to be undertaken.
- Design operable screening to be utilised by the various retail tenancy owners for patron flexibility.

REFER TO WINDTECH PEDESTRIAN WIND ENVIRONMENTAL STATEMENT



CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN

- Buildings should be planned and sited to facilitate the passive surveillance of streets, pedestrian links and open spaces to create a safe and secure urban environment.
- Large, insular and inwardly focused developments should be avoided in preference for small block developments with buildings aligned to streets, pedestrian links and open spaces. Buildings and apartments should be designed to be outward-looking and engaged with their urban environment.
- Ground floor terraces and maisonettes with private gardens and direct street access should be located within each development where possible to promote interaction with and passive surveillance of the adjacent streets, open spaces and pedestrian links.

REFER TO AECOM CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN

BUILDING DESIGN AND ARTICULATION

BUILDINGS SHOULD BE DESIGNED TO BE SYMPATHETIC YET DISTINCT TO NEIGHBOURING BUILDINGS TO CREATE A DIVERSE AND INTERESTING NEIGHBOURHOOD AND TO AVOID THE SINGULAR AESTHETIC OF MANY CONTEMPORARY DEVELOPMENTS.

- The aesthetics and composition of the proposed buildings are to be considered in relation to the surrounding buildings and context.
- Encourage a range of architectural solutions and building designs to create a diverse and interesting neighbourhood with careful consideration of massing, materials, fenestration and building scale.
- Provide a range of building heights from 2 to 8 storeys to avoid uniformity, create a variety of urban scales across the development and to accommodate a range of housing typologies.
- Smaller sites should be created to encourage a wide range of smaller buildings and architectural responses.
- Buildings should be carefully articulated to reduce the perceived bulk of the building including the articulation of ground floor programs such as terracetype housing, maisonettes, retail and commercial uses.
- Upper levels of the building should also be articulated such as setting back top floor apartments from the predominant facade and incorporating lift overruns and plant spaces within the design and consideration of landscaped roof terraces and associated structures.
- The design of balconies and windows should provide amenity and privacy to residents and be used to provide articulation to the modelling of facades through depth, pattern, shadow and scale.
- Buildings should be provided with external screening to balconies and windows to provide shading and privacy to residents and to further articulate the mass of the building.

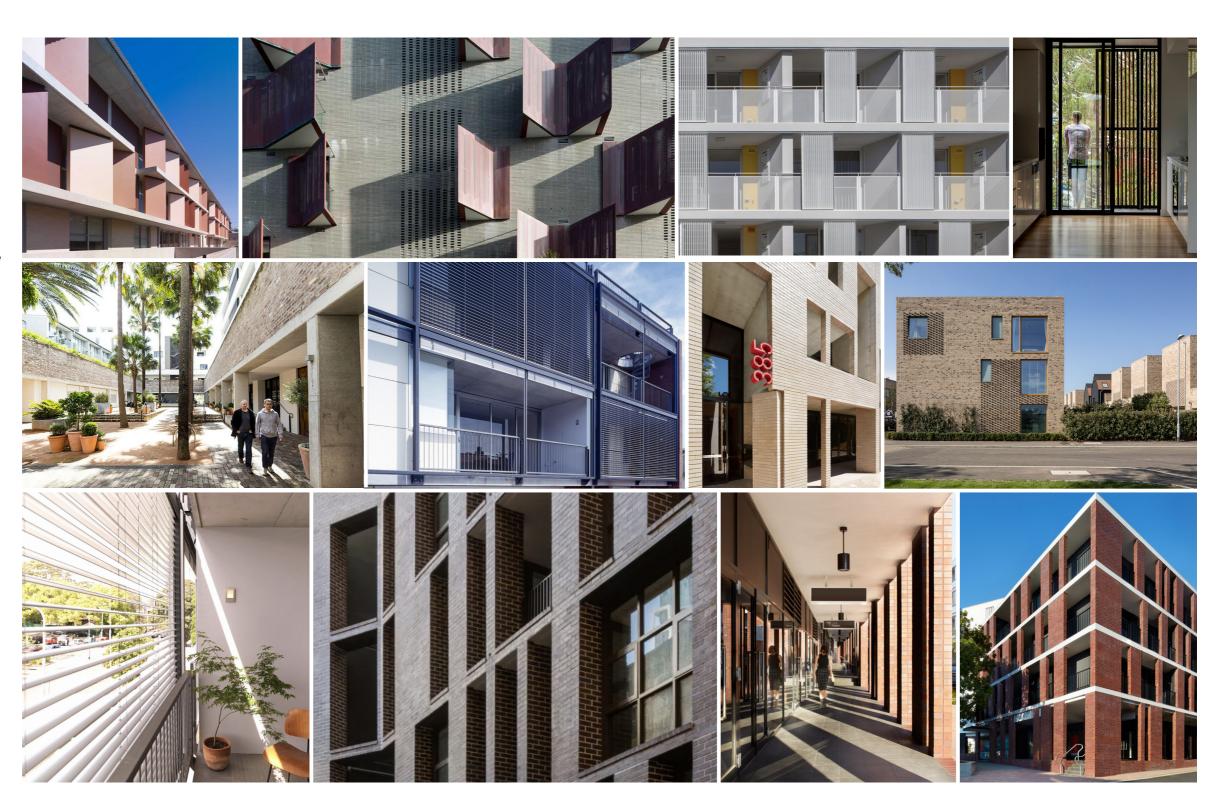


REFER TO BENNETT AND TRIMBLE DETAILED URBAN PLAN AND SECTION REFER TO FUTURE CHARACTER VIEWS WITHIN DESIGN QUALITY GUIDELINES

MATERIAL SELECTION AND DETAILING

SUCCESSFUL URBAN ENVIRONMENTS ARE TACTILE AS MUCH AS SPATIAL. THIS REQUIRES THE CAREFUL SELECTION AND INTEGRATION OF MATERIALS TO CREATE A RANGE OF BUILDINGS WITH THEIR OWN DISTINCTIVE IDENTITY, CHARACTER AND SCALE.

- The proposed materials should be utilised for structure cladding and screening.
- Materials should be robust to create a long lasting and low maintenance environment with a preference for natural materials such as clay and terracotta bricks, off-form concrete, stone and metal screening.
- Material should be selected with an understanding of the effects of weathering to ensure a high quality finish that endures for the life of the building.
- Materials should be selected for their low embodied energy and potential for future re-use or recycling.
- Materials should not be highly reflective to avoid glare and the transference of heat.
- The colours of materials should be those that are found naturally and sympathetic to the existing semi-rural and emerging character of the area.
- Materials to be selected to give a variety of visual and tactile social experiences in streets and public spaces.
- Street walls should be articulated through colour, texture and materiality to provide scale and street definition and pedestrian interest.

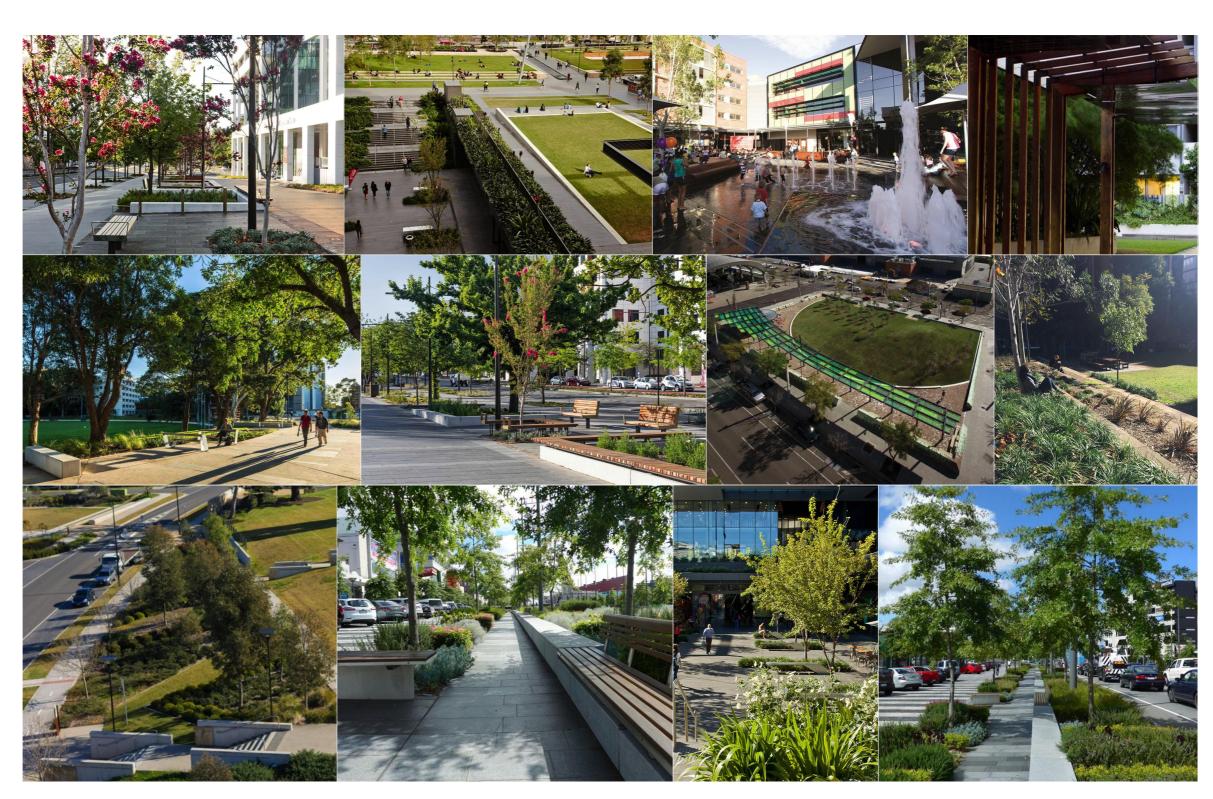


REFER TO BENNETT AND TRIMBLE DETAILED URBAN PLAN AND SECTION REFER TO FUTURE CHARACTER VIEWS WITHIN DESIGN QUALITY GUIDELINES

LANDSCAPE DESIGN & SPECIES SELECTION

A WELL-PLANNED PUBLIC REALM IS ONE OF THE KEY CONTRIBUTORS TO SOCIAL AND COMMUNITY COHESION. THIS INVOLVES THE PROVISION OF A SERIES OF VARIED AND CONTEXTUALLY RESPONSIVE LANDSCAPES AND OPEN SPACES CATERING FOR RANGE OF ACTIVITIES AND EXPERIENCES FOR RESIDENTS AND VISITORS.

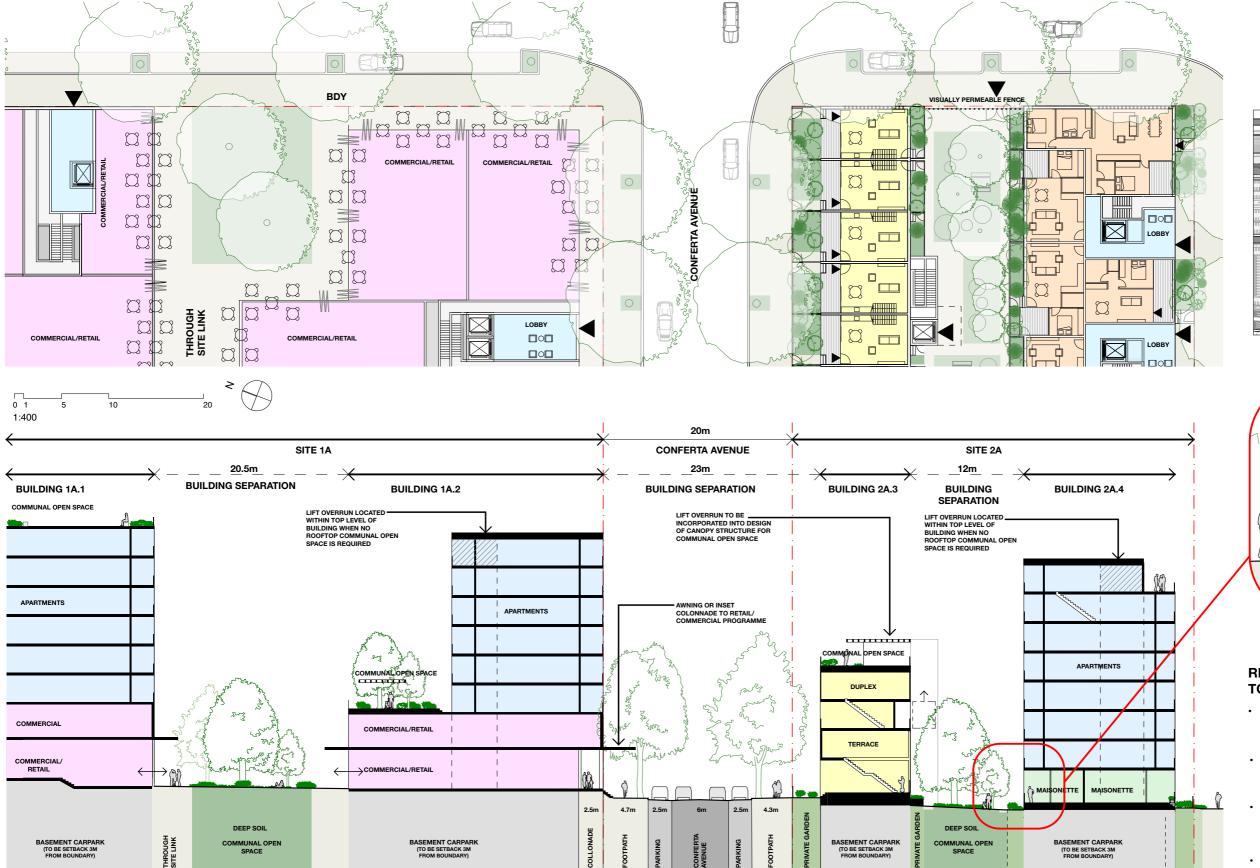
- The design of public open spaces and through site links should respond to the future pedestrian and cycle movement hierarchy whilst connecting into the greater open space network linked by the Second Ponds Creek corridor.
- Sheltered from prevailing winds and the hot summer sun, the courtyards should be designed to make use of mixed native and deciduous trees to provide a mix of solar access in winter months and dappled shade in summer.
- Rooftop garden planting should feature dryer strappy or grassy species that will better cope with the more exposed conditions. Rooftop design should nevertheless provide ample complementary shading in the for example in the form of canopy structures.
- Species selection and landscape design of site links and private ground floor gardens should be varied through buildings and across each site to provide distinctive and varied character, whilst facilitating means of privacy to ground floor apartments, terraces and maisonettes.
- Provisions should be made in private communal open spaces for community and infrastructure that will encourage community events, gatherings and activities that foster the community capacity of the building.



REFER TO CLOUSTON ASSOCIATES PUBLIC DOMAIN AND LANDSCAPE STRATEGY REFER TO FUTURE CHARACTER VIEWS WITHIN DESIGN QUALITY GUIDELINES

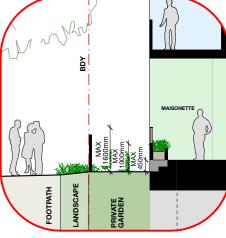
DETAILED URBAN PLAN AND SECTION A

THESE INDICATIVE DETAILED URBAN SECTIONS AND PLANS HAVE BEEN PREPARED TO ILLUSTRATE THE CONDITIONS THAT ARE TYPICAL ACROSS THE DEVELOPMENT AND DEMONSTRATE THE INTEGRATED DESIGN APPROACH.





SECTION KEY DIAGRAM



TYPICAL MASONETTE/ TERRACE INTERFACE TO PUBLIC DOMAIN

RESIDENTIAL INTERFACE TO PUBLIC DOMAIN

- Ground floor apartment private entries should be no more than 450mm above footpath level.
- Solid elements should be limited to a maximum height of 1m from the adjacent footpath.
- Elements above 1m should be 50% transparent to a maximum of 1.6m from the footpath level.
- Planting should be promoted to provide further privacy.

DETAILED URBAN PLAN AND SECTION B

THESE INDICATIVE DETAILED URBAN SECTIONS AND PLANS HAVE BEEN PREPARED TO ILLUSTRATE THE CONDITIONS THAT ARE TYPICAL ACROSS THE DEVELOPMENT AND DEMONSTRATE THE INTEGRATED DESIGN APPROACH.

