CANTEBURY BANKSTOWN TALL BUILDING DESIGN STUDY

DOCUMENT FOR
CITY OF CANTEBURY BANKSTOWN
DOCUMENT NO. AA S12429/00
DESIGN REPORT

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BATESSMART™

CLIENT

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ISSUE REGISTER

01	08.07.2020	City of Cantebury Bankstown	Draft
02	04.09.2020	City of Cantebury Bankstown	Phase Two report incl. Council Phase One feedback and revised principles
03	16.09.2020	City of Cantebury Bankstown	Draft site testing - Bankstown Site B.1
04	08.10.2020	City of Cantebury Bankstown	Final Report - Draft Issue
05	22.01.2021	City of Cantebury Bankstown	Final Report - amended to address Council feedback
06	12.02.2021	City of Cantebury Bankstown	Final Draft for Exhibition

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EXECUTIVE SUMMARY

Purpose

This Tall Building Design Study has been prepared by Bates Smart for City of Cantebury Bankstown.

It is one of a suite of technical studies commissioned by Council to inform master planning and planning policy reform for the Bankstown City Centre and Campsie Town Centre.

It's purpose is to provide guidance regarding how future tall buildings can meet Council's Objectives relating to design excellence and sustainability.

Structure of this report

The study was developed through three distinct phases:

Phase One - Analysis: including review of background reports, case study research, and identification of preliminary Principles for Tall Building design in Bankstown + Campsie.

Phase Two - Integration: involved sharing and review of related technical studies and revision of Principles established in Phase One.

Phase Three - Site Testing and Recommendations: involved testing design approaches for tall buildings for two sites in each Centre. Sites and design parameters (such as use and height) were defined by Council. Numerous sub-options have been considered and evaluated, with key insights informing the concluding recommendations.

The structure of this report reflects the sequential nature of the process. Accordingly, the evolution and refinement of the Objectives and Principles can be observed throughtout the document.

Outcomes

This study concludes with a suite of site-specific design studies and recommendations to guide design quality and sustainability in tall buildings.

The site specific design studies are high level studies with the express purpose of informing Council's masterplans for Bankstown and Campsie. They are not exhaustive nor should they be considered to reflect the best or only outcomes for such sites. Their value is as tangible examples of different approaches to tall buildings in different circumstances.

The concluding Recommendations focus on key considerations considered essential to meeting Councils vision for high quality design and sustainable tall bulidings. They are presented as a set of seven Objectives, each with supporting Principles, and then specific Design Guidance organised by themes.

The Design Guidance avoids duplicating existing effective design policy or regulation (such as ADG).

Concluding remarks.

Building 'tall' comes with responsibility.

Without care and a commitment to quality, poorly designed tall buildings can detrimentally impact the character and amenity of a place, and have a signficant environmental impacts.

Conversely, good design can produce tall buildings that deliver social, environmental, and civic generosity.

Achieving designquality in tall buildings invariably requires the combination of capable design professionals, progressive proponents, and supportive authorities, each with a commitment to quality.

Prescribed minimum standards are a useful tool but tend to prevent poor outcomes rather than promote exceptional ones. As such, these recommendations extend to include guidance around how to define and evaluate design quality.

The key recommendation arising from this study is to establish a precondition for any tall building in Bankstown and Campsie a requirement to meet three requisite conditions:

1. Demonstration of design excellence

2. High levels of environmental sustainability

3. Provision of social benefit

INTRODUCTION

This Tall Building Design Study has been prepared by Bates Smart for City of Cantebury Bankstown.

It is one of a suite of technical studies commissioned by Council to inform master planning and planning policy reform for the Bankstown City Centre and Campsie Town Centre.

Background.

Bankstown and Campsie are the city's two strategic centres. Bankstown is a regional City Centre with commercial, retail and high density residential development. Campsie is a retail and health related centre, with medium to high density residential development.

Into the future, Bankstown City Centre will continue to be the premier location for commerce, civic, cultural, administrative and social activity for the city, and expand its catchment to be metropolitan wide. The City Centre is set to experience significant transformation with the delivery of Sydney Metro, a planned Western Sydney University and University of Technology City Campus and potential new hospitals.
Built form in the city is constrained by aviation activities at Bankstown Airport. By 2036, Council is targeting the delivery of an additional 12,500 dwellings and a total of 25,000 jobs and 25,000 students.

Campsie Town Centre will be a key civic, cultural, recreation, retail and local employment hub for the eastern part of the City. It will leverage off the Sydney Metro Station and Interchange at Campsie Station, presence of Canterbury Hospital and its proximity to the Cooks River, Tasker Park and the Canterbury Leisure and Aquatics Centre to become a destination centre. By 2036, Council is targeting the delivery of 5,600 additional dwellings and a total of 7,500 jobs.

To guide growth and change in the Local Government Area, Council is currently preparing a comprehensive Bankstown City Centre Master Plan (BCC Masterplan) and Campsie Town Centre Masterplan (CTC Masterplan), which will inform future amendments to the Local Environment Plan (LEP) and a new Development Control Plan (DCP).

Council's Objectives for this study..

The key objectives of Council with regards to the Tall Building Design Study are to:

1) Achieve planning and design excellence for tall buildings.

2) Improve local micro-climate conditions and mitigate negative impacts of tall buildings, such as wind effects, shade and carbon emissions.

3) Promote a human scale urban environment at street level and create places for people.

4) Recommend objectives and controls to ensure tall buildings promote safe, healthy, sustainable and liveable City Centre in Bankstown and Town Centre in Campsie.

5) Promote visual interest, complement neighbouring buildings and fit harmoniously with the surrounding context, the city skyline and desired future character of the City Centre and Town Centre.

6) Enhance and contribute positively to the public realm and the centre's greenery and biodiversity and foster active social life.

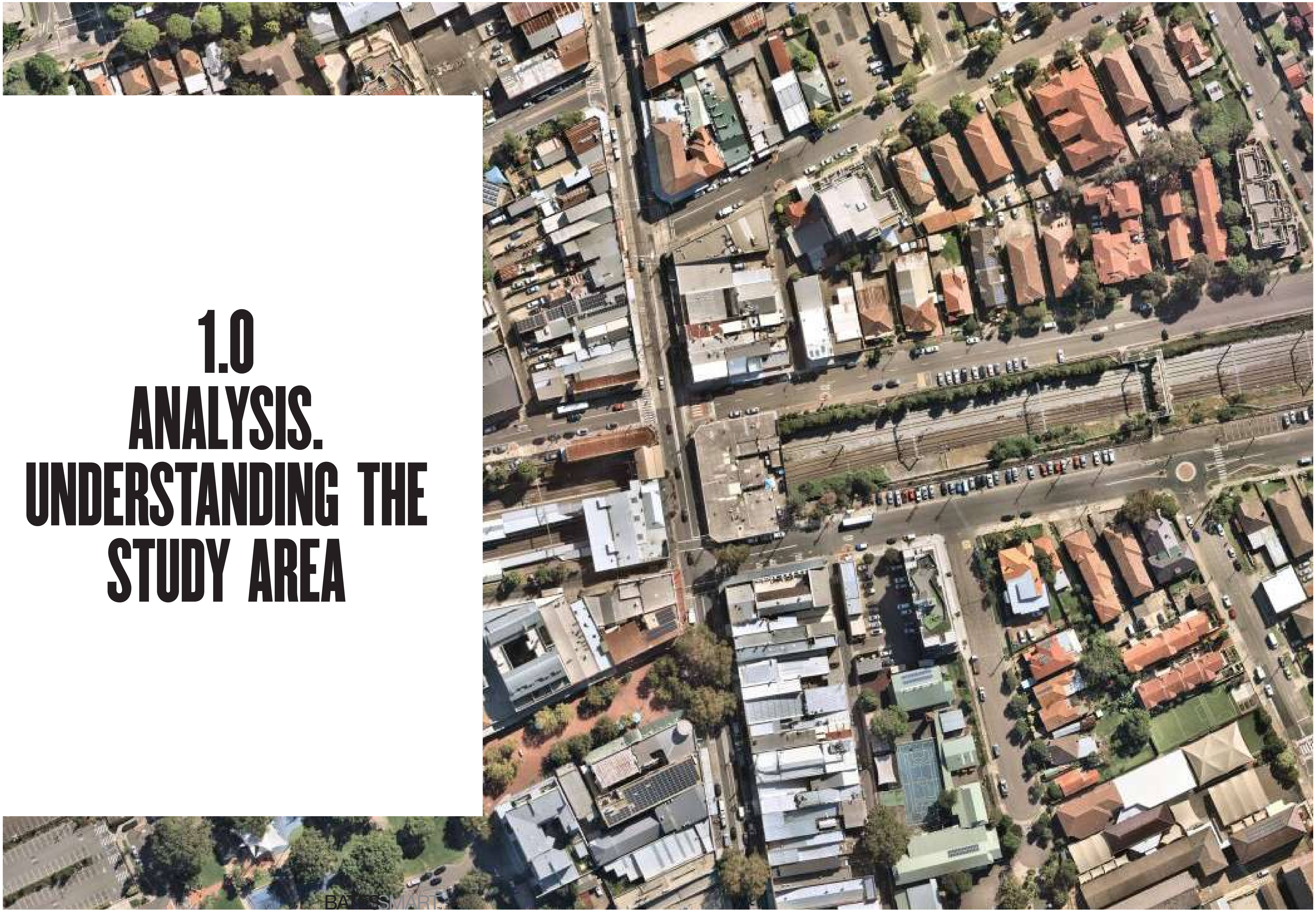
7) Deliver high-quality living and working environments for building occupants that meet the demographic demand for each centre, and provide housing choice and diversity including for smaller households through to genuine family living.

8) Meet the objectives and priorities in Connective City 2036 and the Bankstown and Bankstown Airport Place Strategy, particularly with regard to Sustainability and Design Quality.

9) Achieve the following principles:

- Climate resilience: tall buildings are resilient to the impacts of climate change, including heat, flooding and other natural hazards that may impact on buildings.
- Energy: tall buildings harness innovation and technology to secure affordable and low carbon energy use.
- Water: tall buildings integrate water sensitive design approach that supports the needs of the areas whilst minimising negative impacts to the natural ecology
- Resource Optimisation: tall buildings minimise the provision of waste to landfill and maximises use of waste as a resource
- Design and Land Use: Tall buildings will facilitate significant housing and jobs growth planned for Bankstown and Campsie, whilst ensuring high quality public domain, high standards of liveability and amenity.

1.0
ANALYSIS.
UNDERSTANDING THE STUDY AREA



1.1 DEFINING TALL BUILDINGS

This section considers what makes a 'tall building' to assist Council in defining the trigger for the application of future tall building controls.

It considers generic characteristics as well as relevant strategic policy.

INTERNATIONAL DEFINITION

COUNCIL ON TALL BUILDINGS AND URBAN HABITAT (CTBUH)

The Council on Tall Buildings and Urban Habitats (CTBUH) have developed an internationally recognised definition for Tall Buildings. They acknowledge there is no absolute definition of what constitutes a 'tall building' and recommend evaluation against one or more of the following indicators:

/ Height relative to context
/ Proportion
/ Embracing technologies relevant to tall buildings.

If a building can be considered as subjectively relevant to one or more of the above categories, then it can be considered a tall building.

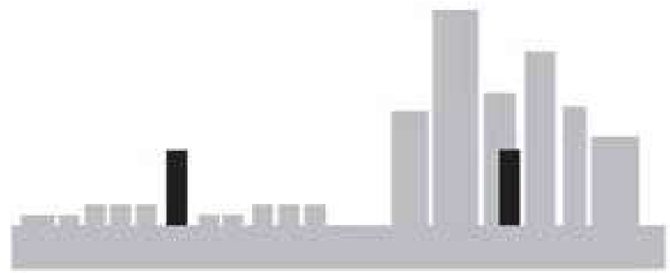
"Although number of floors is a poor indicator of defining a tall building...a building of 14 or more stories – or more than 50 meters in height – could typically be used as a threshold for a "tall building."

+50m CTBUH Height Criteria,

www.ctbuh.org accessed 9.6.20)

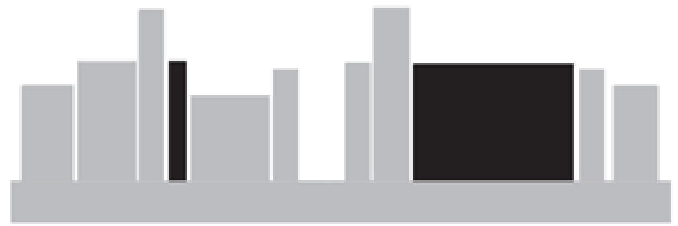
Height relative to context.

Where a building is distinctly taller than the prevailing scale of a locality it may be considered a 'tall building'. A 14-storey may not be considered tall in an established modern city, but in an historic setting, or urban renewal context, it may.



Proportion

Buildings with a high slenderness ratio - those considerably taller than they are wide - can give the appearance of a tall building. This is often the situation where small urban sites are subject to intensive redevelopment.



Embracing technologies relevant to tall buildings

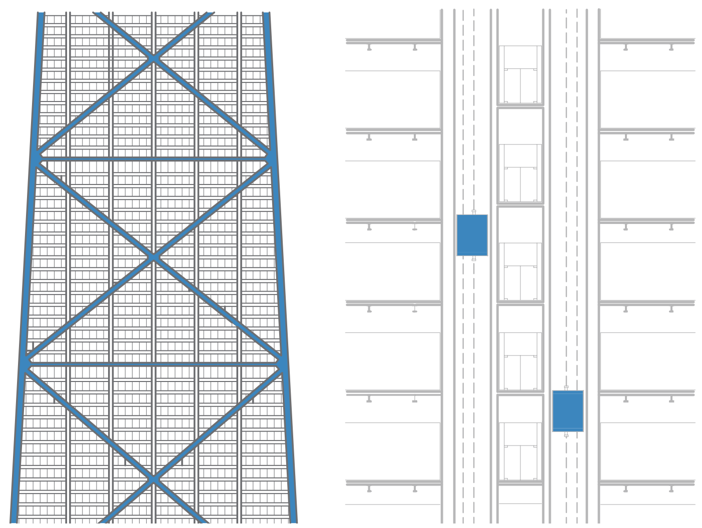
A building containing technologies specifically suited to, or necessary for, the construction or operation of a tall building. For example, specific structural solutions, wind bracing, or vertical transportation systems).

Some indicators including:

> Structural systems such as exo-skeletons, or outrigger systems, tend to be required in buildings above 200m height.

> Distributed plant + services tend to be relevant in buildings exceeding 20-28 storeys.

> Single bank of lifts is typically adequate up to approximately 20 storeys, beyond which multiple rises are required.



Figures: CTBUH Height Criteria, www.ctbuh.org (accessed 9.6.20)

Strategic policy considerations for defining tall buildings in this study.

BANKSTOWN CBD AND BANKSTOWN AIRPORT COLLABORATION AREA PLACE STRATEGY

GREATER SYDNEY COMMISSION

/ The transformation of the Collaboration Area into a health, academic, research and training precinct will result in new jobs, a mix of housing types and investment in infrastructure to support the transformation

/ Emphasis on providing employment floorspace, including potential for new private and public hospitals within Bankstown CBD.

/ Identification of desired 'Active Streets' with place focus.

/ Recognition of catalyst affect + opportunity associated with new Metro station + infrastructure.

/ Proposed 'vertical campus' model for Western Sydney University within CBD Civic Precinct.

/ Desire for provision of student housing within Bankstown Centre.

CONSIDERATIONS

A number of institutional uses are anticipated in the Place Strategy. Some typologies - such as health or 'vertical campus' education buildings - may be not be extremely tall but could be quite large. Such buildings can present challenges but also significant opportunities to positively influence the character and performance of a place.

Establishing a 'tall building' threshold for Bankstown should have regard to the significance of these buildings.

CB2028 COUNCIL'S COMMUNITY STRATEGIC PLAN

CANTEBURY BANKSTOWN COUNCIL

CBCity 2028 sets out the vision for the City and was informed by extensive engagement with the Canterbury Bankstown community. The plan sets out 7 Destinations that will deliver a City that is "Thriving, Dynamic and Real"

Of importance to the master planning and planning proposal process is the direction in Liveable and Distinctive destination. The community wants to see a well-designed, attractive city which preserves the identity and character of local villages.

CONSIDERATIONS

Strong community sentiment toward existing character suggests that buildings that are distinctly taller than the prevailing scale are likely to be considered 'tall'.

The threshold for tall building standards should be lower if masterplanning identifies a strategic imperative for uplift in existing low-scale streets with established and valued character.

CONNECTIVE CITY 2036

LOCAL STRATEGIC PLANNING STATEMENT

CANTEBURY BANKSTOWN COUNCIL

Connective City 2036 is the consolidated vision for Canterbury Bankstown to guide growth.

/ Recognises Bankstown City Centre and Campsie Town Centre as two strategic centres to stimulate growth and change.

/ Connective City 2036 aims to build the Bankstown as home to the City's major health and education infrastructure, as well as key civic and cultural places and industrial.

/ Importance of collaborative approach with Sydney Metro to promote and deliver well designed integrated station developments at Bankstown + Campsie

/ Provide capacity for 25,500 jobs in Bankstown City Centre by 2036. Maintain ground floor active uses.

/ Identifies the 'Eastern Lifestyle and Medical Precinct' from Campsie to Kingsgrove. Beamish Street will be the shopping, medical and cultural centre, supported by housing choice in high, medium, and low, density housing.

CONSIDERATIONS

Strategic importance and complexity of integrated station development associated with the metro warrants explicit consideration in this Study.

BANKSTOWN COMPLETE STREETS CBD TRANSPORT AND PLACE PLAN

CANTEBURY BANKSTOWN COUNCIL

'Complete Streets' is an approach that combines smart transport planning with good design to create an attractive destination. This approach designs for all ages, backgrounds and abilities, modes (walking, cycling, public transport and vehicles) and functions including transport, shopping and outdoor dining. Most importantly, it prioritises people first.

/ Twelve guiding principles regarding the function, appearance, and amenity of streets.

/ Emphasis on creating streets with great amenity and guided by a Movement + Place priority framework.

CONSIDERATIONS

Tall buildings can significantly influence the character of a street. Streets deemed to be of 'high place value' and characterised by a prevailing low scale, can be compromised by poorly designed tall buildings. Any height threshold for 'tall buildings' in this study should be relative to its context.

The different character of Bankstown and Campsie Centres will necessitate a localised place-specific approach to the masterplan. Tall Building standards, and thresholds for their application, should have regard to the desired character and function of key streets in the two Centres.

DEFINING TALL BUILDINGS

CAMPSIE TODAY

The Campsie Town Centre is a thriving commercial centre in the east of the LGA. It is a predominantly low scale neighbourhood traversed by a mainstreet (Beamish Street) and rail (future metro).

The urban block structure varies and includes some large parcels but is predominantly characterised by narrow frontages and fragmented ownership.

Built form includes 1-2 storey housing, 3 storey walk-ups, and a limited amount of mixed-use development up to 6 storey. Standalone commercial development is generally 2-3 storey.

LEP heights

Current maximum permissible heights in the Cantebury LEP 2012 are below 18m for the majority of the study area, with localised areas of up to 27m.

+27m

current maximum permissible height. Cantebury LEP

BANKSTOWN TODAY

Bankstown is recognised as a Strategic Centre and Health and Education Precinct in the Greater Sydney Region Plan. It features extensive retail, community, education and civic services within a CBD precinct focused on the northern and southern sides of Bankstown Station. Bankstown Hospital is currently located 2 kilometres south-west of the Bankstown City Centre.

Bankstown CBD includes high street shop fronts with office space or residential development above as well as larger commercial office buildings.

The Centre includes numerous buildings with relatively large floor plates at approximately 10 storeys, with recent developments in the order of 15 storeys.

LEP heights

Current maximum permissible heights in the Bankstown LEP 2015 are typically 35m within the B4 Mixed Use City Centre, with localised areas up to 53m. Four key sites are subject to a design excellence provision allowing up to 83m height.

+83m

maximum permissible height with Design Excellence bonus. Bankstown LEP

AIRPORT HEIGHT LIMITATIONS

(Source: CB Bankstown Background Report)

The Bankstown City Centre Study Area is within the operational airspace of the two (2) major civil airports and defence air-bases. The proximity to Bankstown Airport (3-4 km) means that the airspace is most affected by air traffic to and from Bankstown Airport.

Obstacle Limitation Surfaces (OLS) are a set of surfaces used as the fundamental threshold for the control and assessment of obstacles around an airport. The OLS height limits related to Bankstown Airport range from 51m to 71m Australian Height Datum (AHD). Any development over this range requires the concurrence of Bankstown Airport.

The height limit of Sydney Airport's OLS is some 85m-105m higher than that of Bankstown's — and thus for planning purposes Sydney Airport would not need to be consulted unless the maximum height planned for the study area were to exceed 156m AHD. A number of the LEP heights currently exceed the OLS height over the City Centre, including sites that can achieve up to 83m.

Bankstown is also subject to PANS-OPS limitations. The CB Bankstown City Centre Background Report notes that further modelling is required to establish clear PANS-OPS constraints but implies 83m is a reasonable indicator of likely maximum building height based on recent approvals.

OTHER DEFINITIONS

TALL BUILDINGS IN GREATER SYDNEY

The following references provide indicators for how 'Tall Buildings' are defined in other policy and localities in Greater Sydney.

City of Sydney

Whilst not a formal definition of 'tall building', 55m building height is recognised as a threshold above which additional measures are required to manage potentially detrimental impact on amenity, including wind and overshadowing. Measures include minimum site area and requirements for design excellence competitive design process (Sydney LEP2012).

Key height: 55m

SEPP 65 / Apartment Design Guide

No specific definition of 'tall building', however some requirement, such as building separation and natural ventilation requirements vary above 9-storey height in recognition of the different environmental conditions as height increases. This is not considered to be a material determinant.

6-storey

The Building Sustainability Index (BASIX), which applied in New South Wales, defines residential high rise as 6 storeys or more.

KEY INSIGHTS + INFLUENCES

/ Infrastructure investment (metro, health, education) is likely to drive significant transformation in both Centres.

/ The employment focus and opportunities at Bankstown may underpin demand for large (tall) dedicated commercial buildings. It is not clear whether similar demand will transpire in Campsie.

/ Cyclical demand for high-density housing is likely to support tall residential and/or mixed-use buildings in both Centres.

/ The various policy documents reviewed place consistent emphasis on the need for creating high quality and high amenity places;

/ Maintenance and enhancement of existing character is highlighted as being of importance to the community.

/ Bankstown + Campsie present very different existing contexts (built form + land parcels) that will inevitably affect how tall buildings are integrated and perceived. The fine-grain and low-scale of Campsie could result in buildings of a moderate height appearing tall.

/ Airport limitations in Bankstown are likely to limit building heights to moderate height - not ‘super-tall” and unlikely to require complex ‘tall building’ structural systems or building services.

DEFINING TALL BUILDINGS

PURPOSE

The purpose of this preliminary definition is to identify a height threshold for the application of design standards to improve design quality in Tall Buildings in Bankstown and Campsie.

The heights nominated here are intended to inform the Bankstown and Campsie Masterplans being developed by Council, and site specific design testing. These related activities may result in adjustment to these thresholds.

This report does not address recommended maximum building heights for specific sites or zones with the study area.

PRELIMINARY DEFINITION - RATIONALE

The CTBUH identify three indicators for determining 'tall buildings';

1. height relative to context.
2. proportion + slenderness
3. tall building technology.

The most relevant and instructive of these criteria for establishing a tall building threshold for Bankstown and Campsie is 'height relative to context'. A building appearing significantly taller than the prevailing context increases its prominence and therefore scrutiny by the community. Successful integration with the existing important fabric will be essential for achieving both the place-based and economic imperatives of the various strategic policies.

Currently, Bankstown includes numerous buildings in the vicinity of 50m height. Campsie, however, is characterised by a prevailing low-scale with localised development of nominally 6 storey. In recognition of the very different nature of the two centres, consideration should be given to two different thresholds. Indicative definitions may be:

Bankstown: buildings exceeding **50m**
Campsie: buildings exceeding **25m**

OTHER CONSIDERATIONS

Other matters such as floorplate efficiency, increased structural and services requirements, and fire egress requirements, do vary with building heights. They are not considered to be determining factors in establishing this preliminary tall building definition, however, they are likely to inform the detailed recommendations regarding design standards in the subsequent phase of this study.

1.2 BEST PRACTICE RESEARCH

This section highlights best practice tall buildings that relate to Council's objectives for design excellence and sustainability, organised through the following research themes:

1. CLIMATE RESILIENCE

Buildings that are resilient to the impacts of climate change and natural hazards.

2. ENERGY + WATER EFFICIENCY

Buildings are designed for optimal performance, to secure affordable and low carbon energy use, and integrate WSUD for user and ecological benefit

3. RESOURCE OPTIMISATION

Promote a whole of life approach to maximise resource use, recovery and reuse.

4. CONTEXTUAL, LIVEABLE + ATTRACTIVE PLACES

Tall buildings that are contextual, liveable and attractive, with human scale urban environments at street level.

5. COMFORTABLE MICROCLIMATES

Tall buildings provide for comfortable micro climates and limit undesirable impacts on surrounding urban amenity.

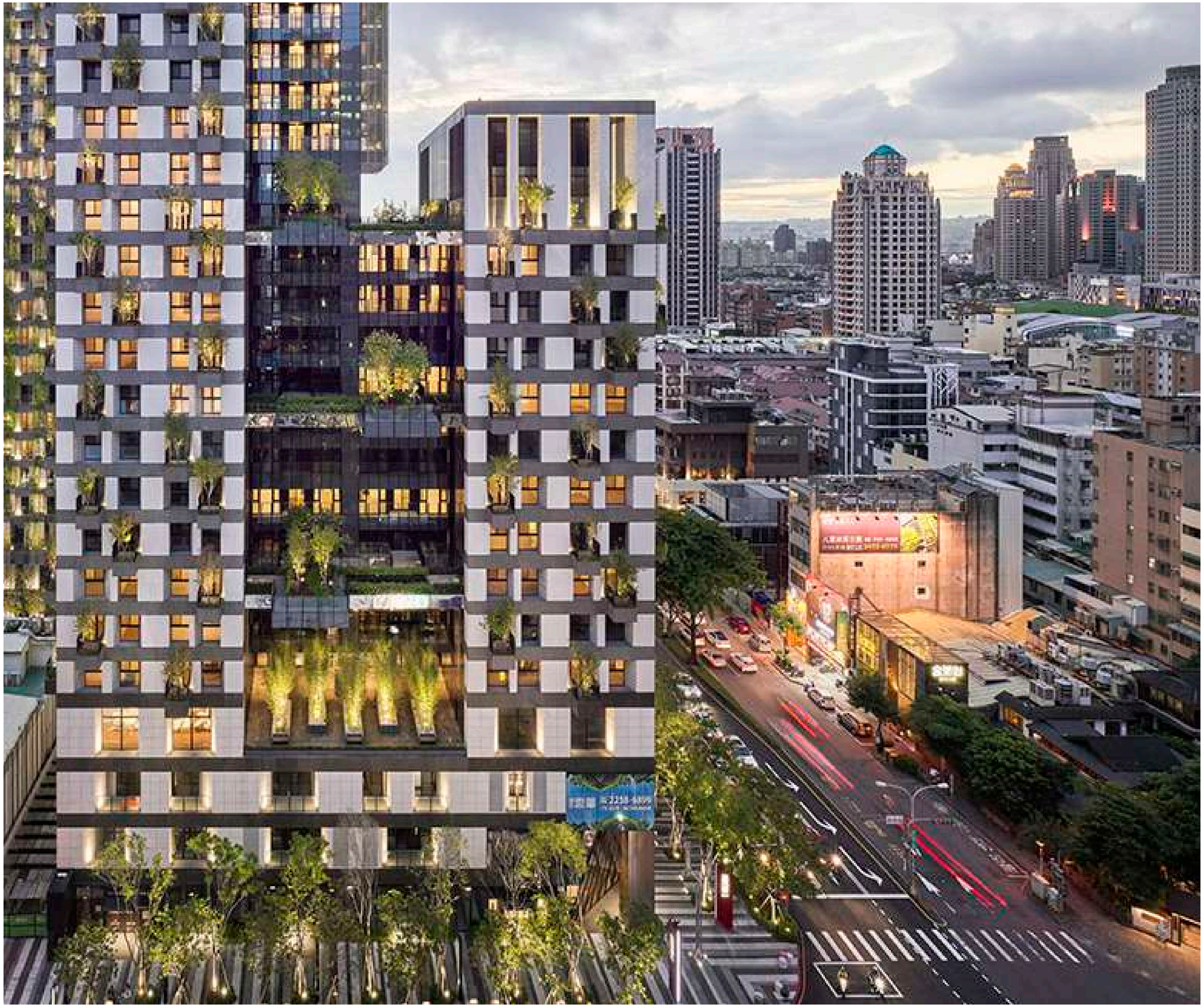
6. DIVERSE TYPOLOGIES

Tall buildings providing diverse housing and work environments for the changing demographics.

7. DESIGN EXCELLENCE PROCESSES

Exemplary processes that support and enable design excellence in tall buildings.

"CONNECTIVE CITY 2036 aims for a resilient and sustainable city with buildings, spaces and people that use and manage energy, water and waste efficiently."



Sky Green Tower, Taiwan. WOHA Architects

1.2.1 CLIMATE RESILIENCE

Objective: Tall buildings are resilient to the impacts of climate change, including heat, flooding, and other natural hazards that may impact on buildings.

CONSIDERATIONS

The design of an individual building has negligible influence on systemic climate change or natural hazards. However, collectively the design of the built environment can assist in mitigating, or redressing, the cumulative carbon emissions contributing to climate change.

Of more immediate and direct relevance to the design of individual tall buildings is their resilience to detrimental affects of climate change and the increased occurrence, duration, or severity of associated hazards.

In Bankstown and Campsie, the principle impacts relevant to tall buildings are likely to be a combination of:

- increased extreme heat events (magnitude + duration)
- water security
- energy security, including affordability pressures and unreliable supply, including blackouts.

These issues are related. Disruptions to water and energy supply will compound the effects of extreme heat, in turn effecting comfort, productivity, morbidity and mortality. These impacts can be further compounded in tall buildings with limited occupant control and reliance on power for movement (lifts) and cooling or ventilation.

BEST PRACTICE APPROACHES + INDICATORS

The most effective strategies for improving climate resilience in tall buildings is a combination of effective passive design strategies (shading / ventilation), high performance building envelope (walls + glazing), efficient services, and integration of green infrastructure. Specific considerations include:

- Avoid overheating. Mostly this means preventing heat from entering the building through effective insulation and shading. Nonresidential buildings can also overheat due to heat generated within the building.
- Effective natural ventilation. Careful sizing and placement of operable windows should provide adequate ventilation in residential buildings. Increased facade articulation or slender floorplates can improve airflow. In tall buildings air pressure and velocity require further consideration.
- Cross ventilation is more difficult to achieve in nonresidential buildings. Strategies such as mixed-mode systems, fresh-air HVAC cycles, or 'night-purge' ventilation systems can help manage heat load.
- Building envelope / floor area ratio for commercial buildings. Large floorplate office space has a low ratio of facade to area, diminishing the impact of a high performance facade. Smaller floorplates, or narrow plans, result in greater heat load per m2 and warrant high performance facade systems.
- Well designed tall buildings are designed to enable beneficial solar access (day-light to commercial and both day-light and sun-light to residential) whilst minimising excessive solar loads. This is achieved through building orientation and shading. Eccentric cores can be positioned on exposed facades (ie west) to provide a thermal barrier to occupied space.
- Integrating green infrastructure into and around tall buildings provides dual benefit of reducing actual and perceived temperatures.
- Resilience always benefits from redundancy. For example, combining natural ventilation, ceiling fans, and planting, provide three complementary cooling measures.
- Glazing - there is a tendency in Australia to provide too much glazing, resulting in high levels of heat gain. Glazing should be shaded and amount of glazing should be optimised for view, lighting and appropriate heat gains. This should mean different facade solutions for different orientations.
- Modern office buildings typically have Wall to Window Ratios (WWRs) of between 50-80%. However, research suggests the optimum WWR for the lowest heating, cooling and lighting energy requirements in offices is between 30-45% in temperate and warm climates, even using high performance glazing systems (Goia, 2016).

Source: Goia F. (2016) Search for the Optimal Window-to-Wall-Ratio in Office Buildings in Different European Climates and the Implications on Total Energy Saving Potential, Solar Energy, 132, 467-492

KEY PRINCIPLES
FOR BANKSTOWN + CAMPSIE

Design tall buildings to minimise use and reliance on energy for building operations, including heating and cooling.

Ensure facades are well-designed to manage and reduce heat loads in case of extreme weather events, through the use of operable windows, cross ventilation, external shading, and proportion of glazing.

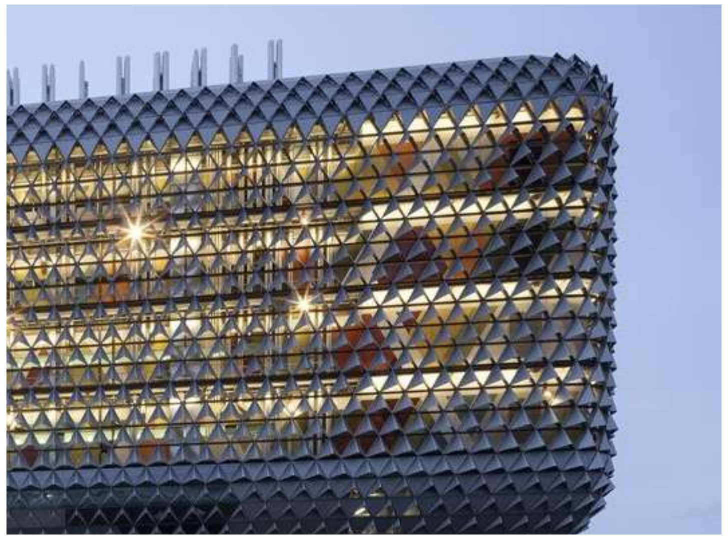
CLIMATE RESILIENCE

1/ HIGH SOLID TO VOID RATIO + DEEP REVEALS

2/ FACADE SHADING + EXTERNAL HEAT LOAD MANAGEMENT

PICTURED
1/ Sky Green Tower, Taiwan. WOHA Architects
2/ Bosco Verticale, Milan. Stefano Boeri Architetti
3/ New Acton Nishi Canberra, ACT. Fender Katsilidis Architects
4/ 1 Bligh Street Sydney, Ingehoven + Architectus
5/ SAHMRI, Adelaide. WoodsBagot

3/ FACADE SHADING - HEAT LOAD MANAGEMENT



5/ SUNSHADING - OPTIMISED TO MINIMISE HEATLOAD + MAXIMISE NATURAL LIGHT

4/ ATRIUM - NATURAL LIGHT + VENTILATION

1.2.2 ENERGY + WATER EFFICIENCY

Objective: Tall buildings are designed for optimal performance, to secure affordable and low carbon energy use, and integrate WSUD for user and ecological benefit

A net-zero carbon building is "an energy efficient building where the delivered energy imported is less than or equal to the on-site renewable exported energy"

(Accelerating Net-Zero High-Rise Residential Buildings in Australia, report prepared by Pitt+Sherry for City of Sydney, 2016.)

CONSIDERATIONS

Urbanisation - including increased density and taller buildings - provides system efficiencies as compared to lower scale distributed patterns of settlement ('urban sprawl'). However, tall buildings can be energy intensive with energy use associated with vertical circulation and air-conditioning tends to exceed that of lower-scale development.

The intensive nature of tall building development presents further challenges and limitations relating to the capacity and efficacy of on-site energy generation (and similarly water catchment).

Efforts to optimise performance of energy and water, relating to both environmental and economic benefit, relies on consideration of both demand reduction, and on-site generation (or re-use for water). Further benefit is likely to be found where a precinct-wide approach can be taken.

BEST PRACTICE APPROACHES + INDICATORS

ENERGY

- Energy demand in residential buildings can be significantly reduced through effective heat load management (insulation and shading) combined with effective natural ventilation.
- The size and articulation of residential floorplates will effect performance. Best practice will enable effective natural ventilation of all apartments and common areas, achieved through a combination of corner units, dual aspect units, breezeway corridors, and articulation.
- Commercial buildings are less suited to natural ventilation for reasons including disparate occupant requirements, floorplate size and depth, and internal heat generation (equipment + occupants). However, best practice commercial projects are increasingly utilising 'mixed-mode' systems enabling partial, or periodic, natural ventilation of office spaces. Energy reductions can be achieved through utilising combination of measures such as exposed thermal mass, 'night-purge' ventilation, fresh-air cycles.
- Gas should be eliminated and replaced by clean electricity supply.
- Rooftop Photo-voltaic installations provide effective and affordable on-site energy generation capable of supplementing supply. Further benefit can be gained from on-site battery storage, in particular in residential installations where the supply and usage profile is not aligned.
- Facade-based PVs are generally less effective than roof-based. Wind turbines on tall buildings have proven to be unreliable in built examples and so are generally considered unsuitable.

BEST PRACTICE APPROACHES + INDICATORS

WATER

- Best practice tall buildings combine water efficiency measures, water capture, and recycling.
- Rainwater harvesting in conjunction with green infrastructure offers multiple-benefits including eliminating stormwater discharge, water cleansing, cooling of building and environs, and improved wellbeing.
- A variety of WSUD measures including deep soil, rain gardens, on-structure planters, and green roofs can be integrated into tall buildings - residential or commercial..
- On-site or precinct-wide grey-water or black-water recycling systems provide further environmental benefits.

PRINCIPLES FOR BANKSTOWN + CAMPSIE

ENERGY

/ Eliminate fossil fuels, including gas.

/ Design for effective natural ventilation and efficient heating, ventilation, and air-conditioning (HVAC) systems

/ Design high-performance envelopes with good insulation, shading and appropriate building separation.

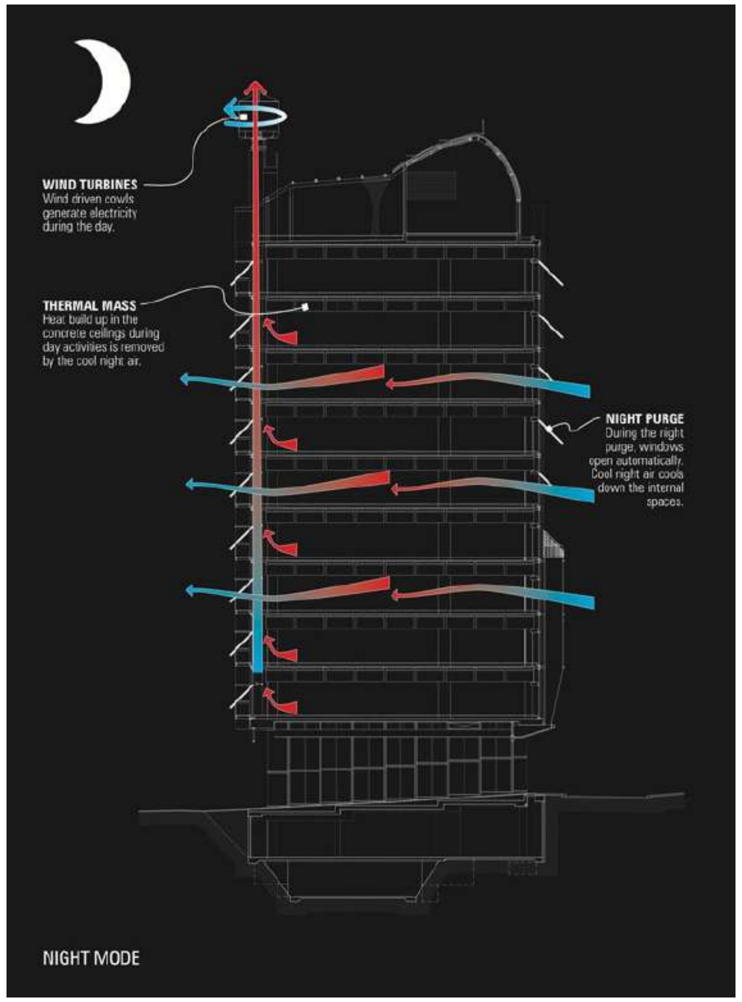
/ Maximise rooftop PV with battery storage

WATER

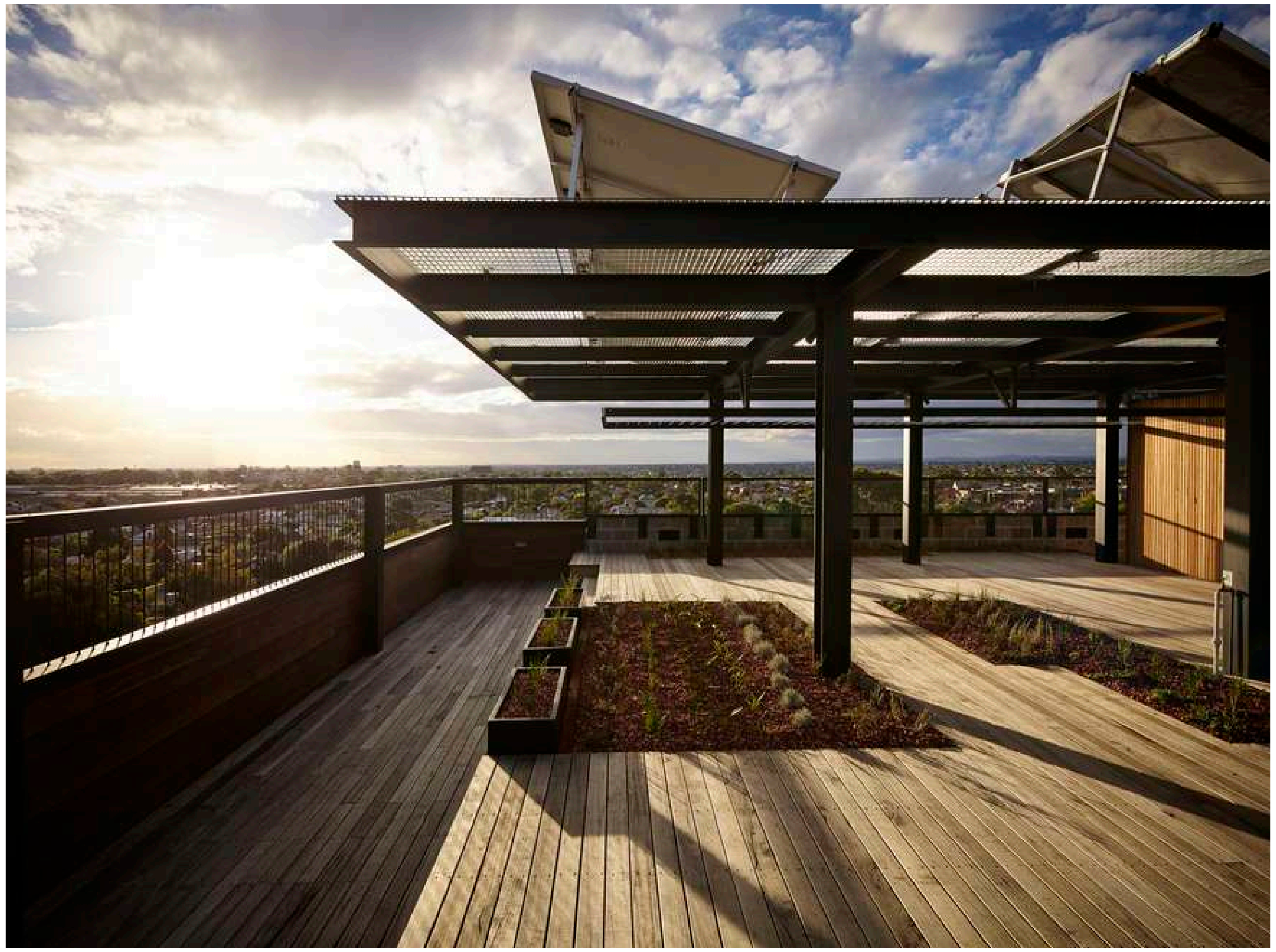
/ Maximise onsite capture + detention
/ Consider onsite recycling (grey or blackwater)
/ Maximise green infrastructure

ENERGY + WATER EFFICIENCY

1/ WIND TURBINES - ENERGY GENERATION + ASSISTS NATURAL VENTILATION



2/ NIGHT PURGE VENTILATION



3/ ROOF TOP PV INSTALLATION

4/ THERMAL MASS - EXPOSED CONCRETE CEILINGS

PICTURED
1/ Council House Melbourne, Mick Pearce / DesignInc
2/ Council House Melbourne, Mick Pearce / DesignInc
3/ The Commons Melbourne, Breathe Architecture
4/ Council House Melbourne, Mick Pearce / DesignInc

1.2.3 RESOURCE OPTIMISATION

Objective: Whole of life approach to resource use, recovery and reuse.

"The greenest building is the one that already exists"

Carl Elefante, FAIA, 2018 AIA President

CONSIDERATIONS

Vast amounts of energy is embodied in the materials used to construct a tall building. Across the lifecycle of a tall building, 30-50% of carbon emissions will be from materials and construction..

Adopting a whole-of-life approach to resource use, recovery, and reuse, presents an significant opportunity to minimise the environmental impact of buildings.

The much-used phrase "the greenest building is the one that already exists" is instructive and suggests consideration be given to adaptive re-use rather than demolition. Bankstown + Campsie are unlikely to have many tall buildings ready for reuse, but partial retention of buildings or elements can still provide benefit. In this context, greater benefit is likely to be found in designing new buildings that are readily adapted in the future.

The renewed interest in the circular economy is resulting in significant improvements to the handling and recovery of waste and development of valuable recovered materials for use in manufacturing and construction.

In addition to resource use associated with construction is consumer waste associated with building occupants. The location and nature of waste management facilities within a building can influence behaviours such as recycling.

BEST PRACTICE APPROACHES + INDICATORS

- Reuse buildings (in whole or part), rather than demolish and salvage and recycle materials from demolition.
- Green star 6 star rating mandates evidence of waste minimisation and recycling.
- Use materials that incorporate high amounts of recovered materials eg. recycled aggregates etc.
- Develop flexible buildings that are easy to adapt in the future and consider the ability to disassemble + recycle
- Materials such as concrete (cement) and steel are used extensively for structure in tall buildings. These materials typically have high embodied energy and represent significant portion of the carbon footprint of a tall buildings. Design and structural optimisation can achieve significant savings of resources and carbon footprint.
- Building elements have different life-cycles, ranging from 5-10years for fixtures, 25 years for facades, to 50+ years for structure. Adaptability is likely to be the best strategy for elements with longevity (structure) and resource recovery for those with shorter useful lifespans.

A CASE FOR TIMBER

Best practice tall buildings are replacing high-carbon materials with low carbon materials. In particular, structural timber is increasingly replacing conventional steel or concrete structure.

Timber buildings are technically viable in the order of 30 storeys, but currently beyond approximately 20 storeys challenges viability. Factors such as height, ground conditions, wind loads, and fire requirements (including regulatory) are likely to necessitate the use of a hybrid approach where timber (CLT) is combined with some conventional structure (core, or framing elements for examples).

- Consideration of floor-to-floor heights, floorplate depths, and vertical transportation can improve the ability for adaptive reuse. Conversion from commercial to residential tends to be more achievable than the reverse.
- Car-parking presents a specific opportunity for adaptive reuse. Whilst above ground parking (podium or similar) can present challenges with the appearance and street interface, it can provide opportunities for effective conversion to alternate uses should vehicle patronage reduce.

OPERATIONS

Promoting positive recycling and waste minimisation behaviours in tall buildings requires a multivalent approach to design and building management. Strategies include:

- Provide adequate space in convenient locations for separation and storage of a wide range waste items. Multi-residential buildings benefit from garbage chutes or floor-by-floor storage to avoid transferring waste in lifts.
- Onsite composting - providing convenient access to on-site composting systems (or worm farms) can provided an effective means to reduce or eliminate food waste and provide valuable resources if combined with productive gardens.

PRINCIPLES FOR BANKSTOWN + CAMPSIE

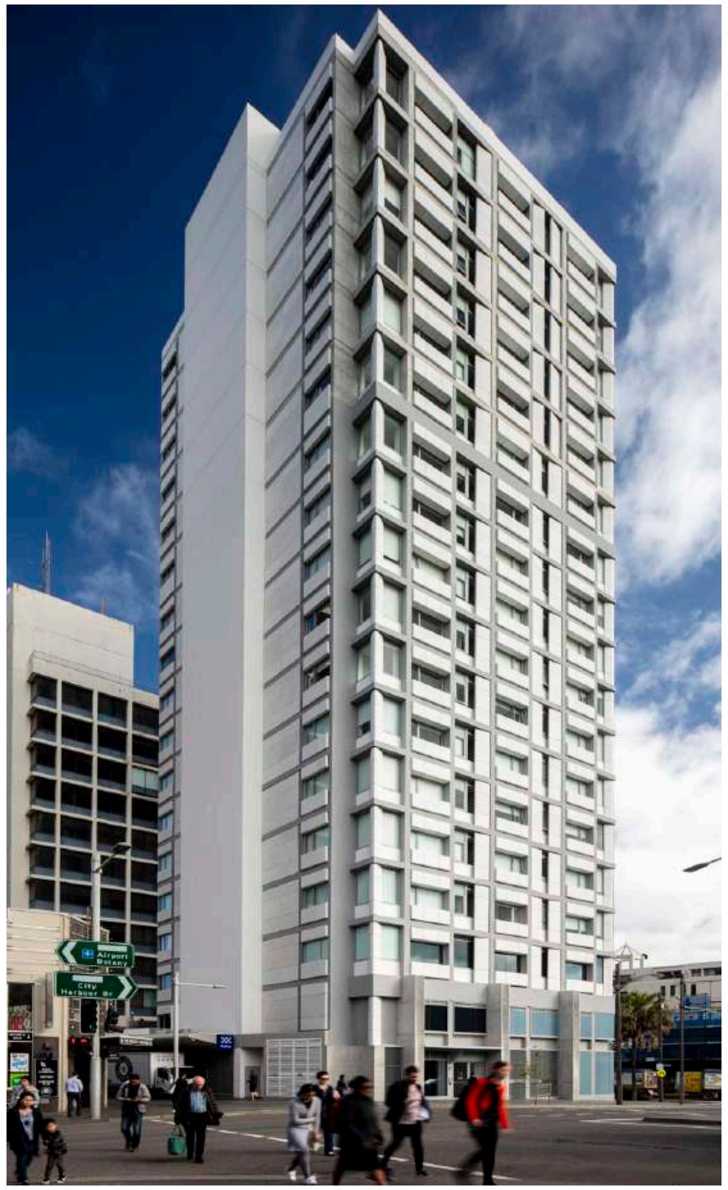
/ Encourage 'long-life loose-fit' buildings with inherent flexibility for future adaptation.

/ Promote buildings that are efficient and have been optimised to minimise material use and maximise potential for material recovery.

/ Use low-carbon, durable, low maintenance materials.

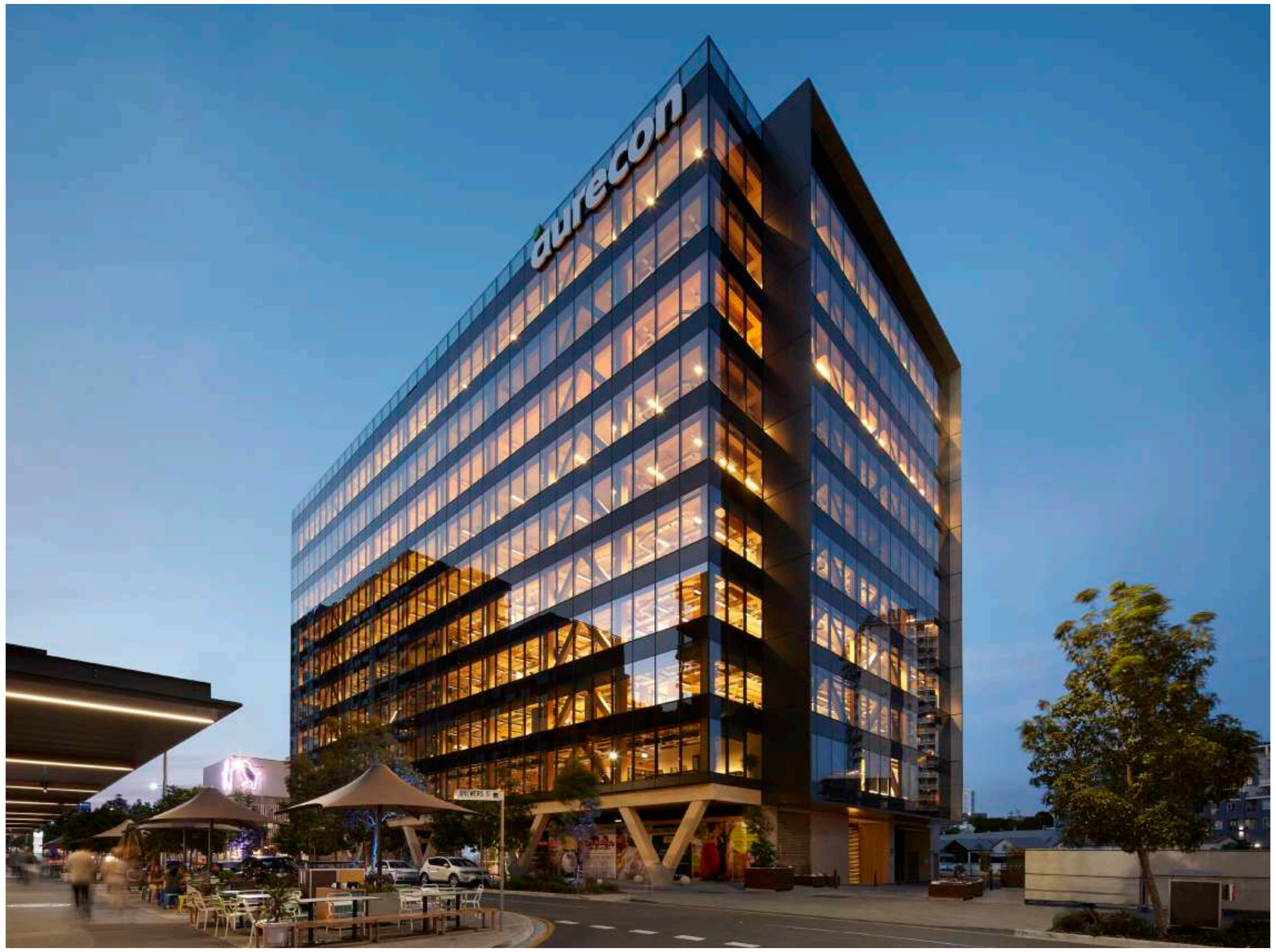
/ Design buildings to promote positive behaviours such as recycling and composting.

RESOURCE OPTIMISATION



1/ ADAPTIVE REUSE- COMMERCIAL TO RESIDENTIAL

2/ UPDATED FACADE + BUILDING SERVICING



3/ MASS TIMBER STRUCTURE - 25 KING

4/ NIGHTINGALE - PRODUCTIVE GARDENS

PICTURED
1/ Lawson Square, Candalepas / Wendy Lewin
2/ 2 Blight Street / Bates Smart Architects

3/ 25 King / Bates Smart Architects
4/ The Commons Melbourne, Breathe Architecture

-45%

Research suggests that an 18-storey tower in Sydney, with a hybrid timber and concrete structure would have 45% less embodied carbon than a concrete-only structure. This would be a saving in the order of 330kgCO2e/m2.

Source: Oldfield, Robati, Akbar Nezhad and Carmichael (2019). Carbon Value Engineering Project, CRC for Low Carbon Living.

RESOURCE OPTIMISATION - TIMBER CONSTRUCTION

Mass timber is emerging as a genuine alternative to conventional concrete and steel construction in tall buildings.

CONSIDERATIONS

A growing awareness of the role embodied carbon plays in sustainable construction underpins a growing interest and application of mass timber construction in tall buildings. A significant number of substantial buildings utilising timber as a primary structural element have now been completed or are under development globally and within Australia.

Mass timber construction requires significant amounts of prefabrication of components off-site in controlled environments. This allows a level of precision and quality not easily achieved with in-situ construction practices.

The assembly of prefabricated mass-timber construction can also impact the construction time - typically reducing the on-site construction program. This can have cost and operational benefits (such as reduced construction traffic, disruption etc.)

Commercial viability of timber construction is outside this scope of this study, however research undertaken by UNSW examines comparative cost and carbon reductions in various construction systems in an 18-storey commercial building in Sydney. The Carbon Value Engineering project concluded that it is possible to simultaneously reduced embodied carbon and capital cost in the detailed design phase of a building without changing the basic form or architecture.

Of the four scenarios examined, mass timber construction was the most carbon efficient, with a 13% reduction in embodied carbon and 5% reduction in capital costs.

Reference: 'Carbon Value Engineering: Reducing Carbon and Cost in Buildings, by Dr Philip Oldfield and Mehdi Robati, UNSW. published in the The Building Economist, 30 Sept 2019.

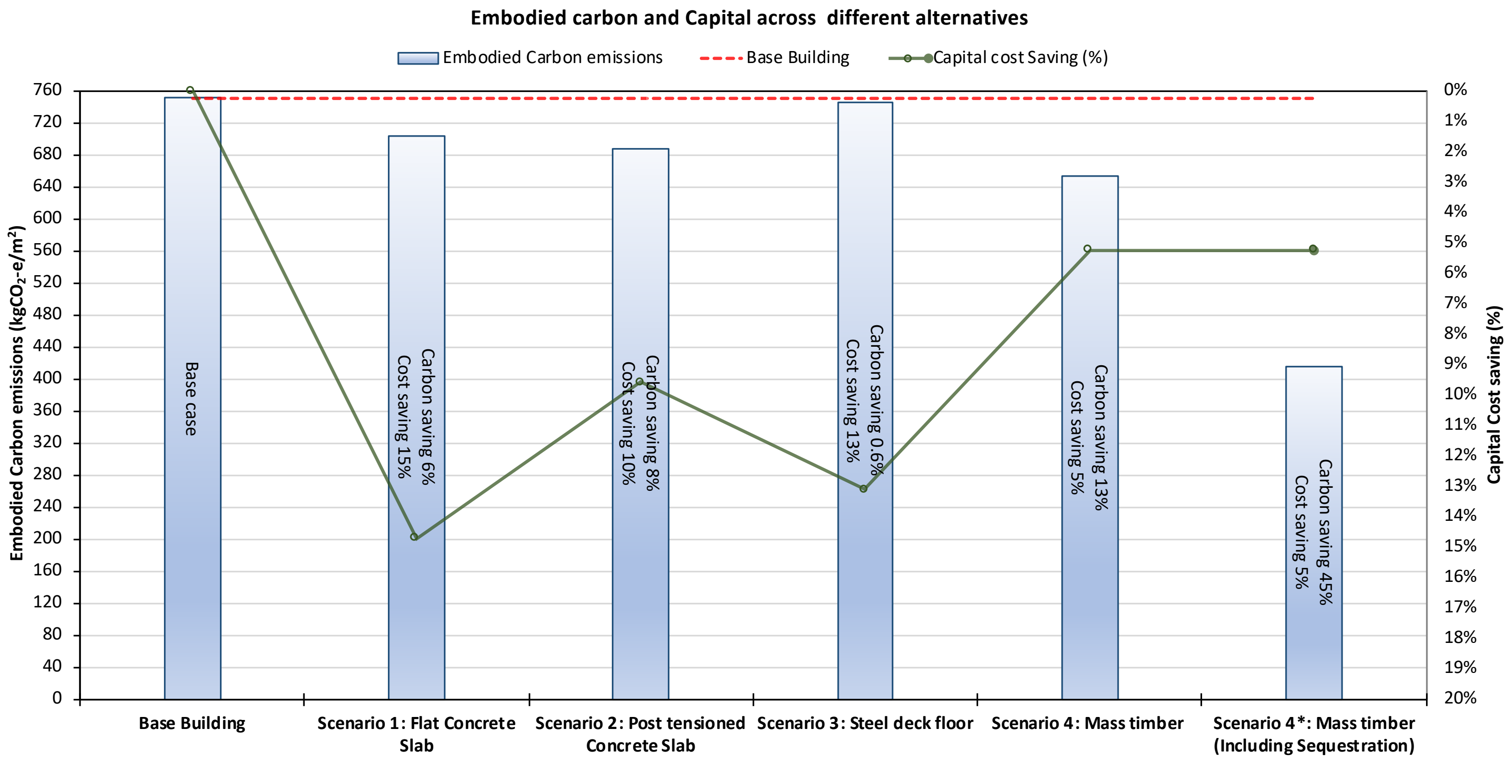


FIGURE: COMPARATIVE CARBON + COST BENEFITS OF DIFFERENT CONSTRUCTION SYSTEMS

'Carbon Value Engineering: Reducing Carbon and Cost in Buildings, by Dr Philip Oldfield and Mehdi Robati, UNSW. published in the The Building Economist, 30 Sept 2019

2/ 6 STOREY STUDENT HOUSING - PASSIVE HAUS + CLT TIMBER

3/ STUDENT HOUSING INTERIOR - EXPOSED TIMBER

1/ 10 STOREY COMMERCIAL BUILDING - MASS TIMBER CONSTRUCTION

5/ ATLASSIAN TOWER - 180M HYBRID STRUCTURE

4/ FORTE - 10 STOREY APARTMENTS

PICTURED
1/ 25 King / Bates Smart
2/3 Student Housing, Monash Uni. JCB Architects
4/ Forte Melbourne. Lend Lease
5/ Atlassian tower, Sydney. SHoP with BVN.

1.2.4 CONTEXTUAL, LIVEABLE, ATTRACTIVE PLACES

Objective: Tall buildings that are contextual, liveable and attractive with human scale urban environments at street level.

CONSIDERATIONS

Tall buildings can significantly influence the character and amenity of a place, especially a low-scale neighbourhood transitioning toward higher density and scale. Tall buildings not only change the appearance of the skyline, they invariably affect the perception and performance of streets and adjoining public places.

A contextual approach requires regard for both the existing and anticipated character of an evolving place. It requires careful management of how new buildings relate to immediate neighbours, the streetscape, and wider locality.

The liveability and attractiveness of a place - relates to a range of matters effected by tall buildings; For occupants, it includes how well a building is planned, how it functions, opportunities for pleasant outlook, views, solar access, storage, connection to nature, or connection to communal amenities.

Tall buildings affect the liveability and attractiveness of a street, or neighbourhood in a number of ways. In particular, well designed tall buildings can contribute positively to the public life of a place through increased visitation and well integrated 'active uses', while creating or maintaining comfortable environmental conditions in streets, parks, and other important 'people places'.

Conversely, poorly designed tall buildings can be detrimental to the character, amenity, and performance of a place.

BEST PRACTICE APPROACHES + INDICATORS

CONTEXTUAL AND ATTRACTIVE

- Well designed tall buildings relate to important existing characteristics of a place. Successful traits include relating directly to established streetwall heights, prevailing setbacks, or responding to nearby heritage buildings (form, scale, materials).
- Tall buildings will be visually prominent in streets with low streetwall height (dependant on street width, but nominally 4 storeys). In these situations, setting back any tower element may assist to integrate a taller building. However, other strategies such as recessed levels or street level awnings may also assist.
- Tall buildings themselves become an important part of a place's character. Whilst formal variety may create visual interest, some consistency may assist to 'settle' a tall building into its locality.
- Aesthetics is subjective - everyone will have different views about what makes a (tall) building or place attractive. Notwithstanding that, GANSW identifies the following relevant objective to promote 'Better look and feel'

  / Engaging - a building, place, or space that draws people in with features that generate interest.

  / Inviting: a building, place, or space that is welcoming to visitors, community and individuals.

  / Attractive: a building, place or space that is aesthetically pleasing.

LIVEABILITY

- Best practice commercial tall buildings contribute to liveability by providing for a range of economic, small business, and entrepreneurial activities in well connected and accessible places. This is further enhanced through provision of 'tenant amenities' such as cycling infrastructure + end-of-trip facilities, well being spaces, gyms, and integration of social infrastructure such as child-care or community facilities. These inclusions present significant opportunities to create and add social and economic value to a development and precinct, and contribute to diverse and engaging environments.
- Best practice residential tall buildings contribute to liveability of a neighbourhood by providing well designed dwellings for a wide range of demographics with qualities such as:

/ good solar access, ventilation, outlook, privacy, and storage.

/ spatial generosity and the ability to personalise one's home;

/ generous private and communal open space with connection to nature

/ pet-friendly dwellings, and opportunities for gardening (including food production).

/ buildings that are provide affordable living through low ongoing operating costs (energy + maintenance).

/ facilities and configurations that promote sense of community among residents (clusters, floor-by-floor, or whole of building.) Shared facilities such as communal gardens, laundries, 'men's sheds' etc.

PRINCIPLES FOR BANKSTOWN + CAMPSIE

/ Establish clear a vision for the desired future character of the centres and important streets. Ensure that tall buildings are designed to reinforce that desired character, with particular consideration of matters such as- streetwall height, tower setbacks and building separation, locations for active street frontages.

/ Pay particular attention to the quality of lower levels of buildings - providing a human scale to those frontages that are experienced up close.

/ Promote generous provision of elements that contribute to comfort and liveability, including open space, landscape, communal amenities such as opportunities for pets, recreation, and food production.

CONTEXTUAL LIVEABLE ATTRACTIVE PLACES

1/ LIVEABILITY - GENEROUS FUNCTIONAL PRIVATE OUTDOOR AREAS

2/ CONSISTENT STREET WALL / PODIUM + RECESSIVE TOWER FORM

3/ SCULPTURAL TOWER AND PODIUM RESPONDING TO THE DIVERSE CONTEXT OF KINGS CROSS

4/ RECESSIVE TOWER + HUMAN SCALE PODIUM WITH ACTIVE STREET FRONTAGE

5/ PODIUM FORMS AND MATERIALS RESPOND TO HERITAGE CONTEXT

PICTURED
1/ The Rochford / Fox Johnston Architects
2/ 420 George / Bates Smart Architect
3/ Omnia, Kings Cross / Durbach Block Jaggers
4/ IGLU Redfern / Bates Smart Architects
5/ The Spire, Brisbane, JWA Architects

1.2.5 COMFORTABLE MICRO-CLIMATES

Objective: Tall buildings provide for comfortable micro climates and limit undesirable impacts on surrounding urban amenity.

The Urban Heat Island Effect (UHI) is a local climate change phenomenon whereby urban areas present higher air temperatures than their rural proximities. The difference is often 3 4 C, but higher peak differences can reach 10 C."

(Source: "Cooling Western Sydney, A strategic study on the role of water in mitigating urban heat in Western Sydney", Low Carbon Living CRC, 2017)

CONSIDERATIONS

A comfortable micro-climate is a fundamental consideration when designing tall buildings in urban centres. The liveability of a place is directly affected by environmental conditions such as:

- Wind
- Shading
- Reflectivity

Tall buildings can aggravate these conditions when they are not wholly considered, creating uncomfortable spaces for people to live in and pass through.

Due to their scale, tall buildings have significant impacts on the air circulation of a place. Wind tunnels, wind shadows, and the canyon effect are all issues that must be minimised to maintain comfortable parks, streets and neighbouring sites.

BEST PRACTICE APPROACHES + INDICATORS

Wind behaviour is influenced by the combination of prevailing wind conditions, the design of individual buildings, and the cumulative affect of the built environment. Good amenity can be maintained through the following measures.

- Avoid wind canyons - a street height to width ratio greater than 2:1 may induce a wind canyon effect. Tower elements exceeding this ratio should be setback (nominally 6m) and / or separated from adjoining buildings with side setbacks.
- Building siting, separation, articulation and the careful design of canopies can reduce negative wind effects and improve pedestrian street level amenity.
- Cooling breezes in summer contribute to comfort. Building should be configured to preserve breezes for the benefit of other buildings and the public domain.
- Reflective and shiny materials can compromise visual amenity due to solar reflection and glare.
- Well designed tall buildings preserve solar access to adjacent residential properties and open space. In areas of high public value (such as parks, or important pedestrian streets), this should be considered a principal influence in establishing building height and / or form.
- The integration of green infrastructure can provide significant benefits through moderating microclimate and improving comfort. The cumulative affect can prevent urban heat island affect and maintain lower day-time and night-time temperatures.
- Integration of water in an urban environment can provide evaporative cooling to decrease the ambient temperature. Passive systems like pools, ponds and fountains are widely used in public spaces, while active or hybrid water components like evaporative wind towers, sprinklers and water curtains have been developed, installed and tested in urban public spaces around the world.
- 'Cool materials' provide additional means to moderate local peak ambient temperature. Cool materials with a high albedo prevents solar radiation from being absorbed. Use of cool materials on horizontal surfaces (pavements, roof etc) can reduce urban heat. Use of high albedo vertical surfaces can result in glare and should be used carefully.
- Research examining approaches to Urban Heat Island (UHI Mitigation in Western Sydney (including Bankstown) concluded that techniques based on the use of water, greenery and cool materials can reduce the average peak ambient temperature up to 2.5 o C. The research highlights that the application of such technologies can reduce heat-related deaths by 90% and reduce peak energy demand by 9%.

  (Source: "Cooling Western Sydney, A strategic study on the role of water in mitigating urban heat in Western Sydney", Low Carbon Living CRC, 2017)

PRINCIPLES FOR BANKSTOWN + CAMPSIE

/ Ensure buildings are oriented to promote air circulation and cross ventilation, but reduce negative wind conditions - such as wind tunnels, wind shadows, and the canyon effect - on the adjacent streets, public amenity and neighbouring buildings.

/ Consider establishing streetwall ratios of not greater than 2:1 (height to width)

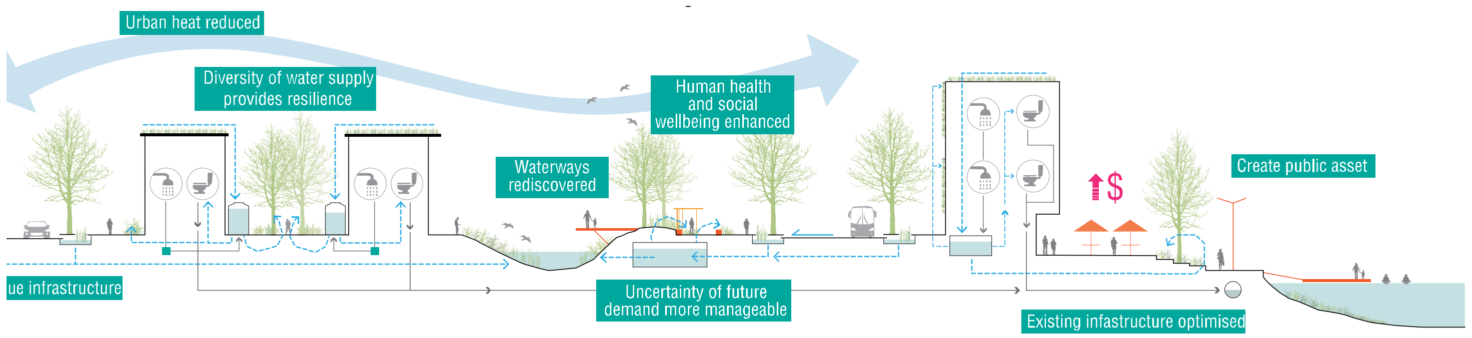
/ Utilise high-albedo materials for roofs and horizontal surfaces but avoid reflective facades.

/ Ensure public amenity spaces, such as parks, receive appropriate winter sun.

/ Ensure adjoining residential properties maintain at a minimum 2 hours of winter sun.

/ Given the affect of local conditions, including adjoining buildings, all proposed tall buildings should undertake a wind assessment.

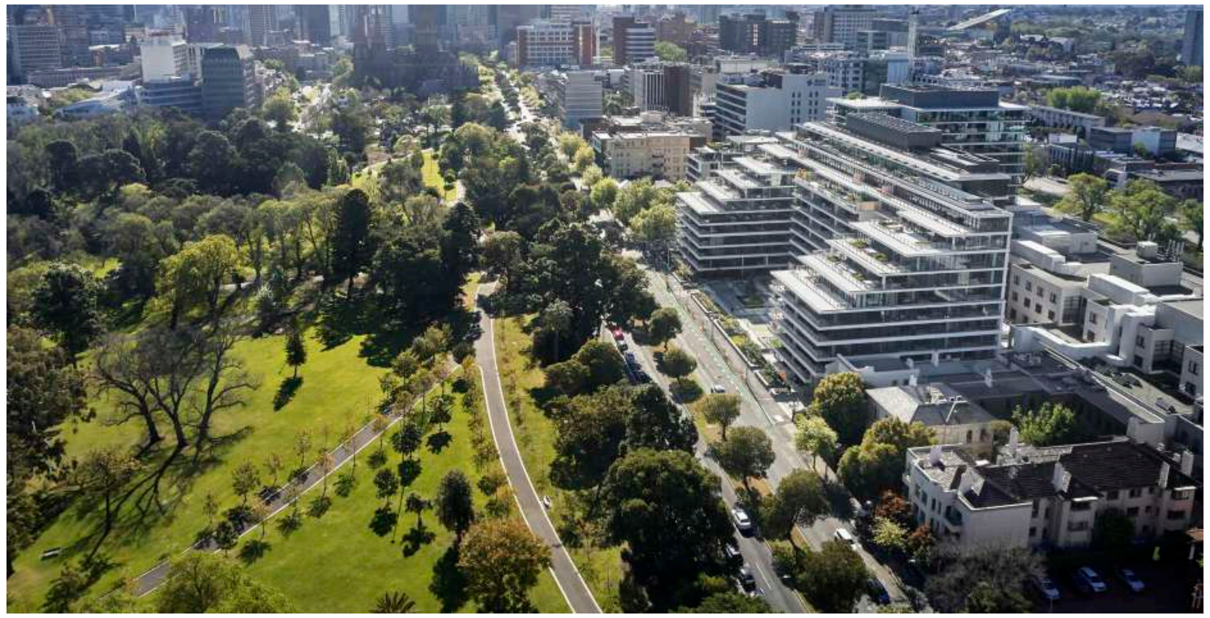
COMFORTABLE MICRO-CLIMATES



| Cooling Western Sydney

1/ OPPORTUNITIES FOR INTEGRATED WATER PLANNING

2/ APERTURE + STEPPING FORM ALLOWS SUNLIGHT TO PENETRATE PUBLIC PLAZA



5/ FORM RESPECTS CONTEXT + STEPS DOWN TO PARK

4/ WINTER SUN TO PUBLIC PARKS

3/ GROUND LEVEL SHELTER

PICTURED
1/ Cooling Western Sydney report, Sydney Water
2/ Infinity / Koichi Takada Architects
3/ 25 King / Bates Smart Architects
4/ Darling Square / Aspect Studios
5/ The Eastbourne Residential Complex / Bates Smart Architects

1.2.6 DIVERSE TYPOLOGIES

Objective: Tall buildings providing diverse housing and work environments for the changing demographics.

CONSIDERATIONS

Urbanisation drives tall buildings. Factors including scarcity of developable land in areas with good access, development economics and efficiencies of scale, commercial imperatives for aggregation and clustering, and tenant desires for large workplaces, are all drivers influencing the prevalence and type of tall buildings.

These drivers are contributing to expansion of familiar typologies - such as stand-alone office or apartment buildings - as well as less familiar individual uses or combinations being realised in tall buildings. Universities, hospitals, secondary schools, aged care, libraries and other civic buildings are now routinely developed as tall buildings.

Whilst not yet widespread in Australia, innovative mixed-use typologies are increasingly prevalent globally. Such mixed-use buildings stack vertically, or horizontally, a range of uses within one or more tall buildings.

In addition to land-economics, significant social and demographic changes occurring in Australia are promoting different typologies and development models for housing. Affordability and ageing are both disrupting conventional multi-residential housing models, with student housing, independent living, co-housing, rent-to-buy, and build-to-rent all emerging as influences in the Australian housing market. These diverse typologies each present design opportunities.

BEST PRACTICE APPROACHES + INDICATORS

- The NSW Apartment Design Guide promotes a mix of dwelling sizes and defines minimum apartment sizes. These provide reasonable benchmarks, however best practice suggests opportunities for much wider variety in housing types, including both smaller apartments (such as studios), and larger family-friendly dwellings.
- Dual-key arrangements can provide flexibility within a building - enabling expansion or contraction, sub-letting, etc.
- Well designed compact apartments (<40m2) can provide good quality housing for some demographics in accessible locations with good amenity.
- Global examples of co-housing (such as WeLive, PocketHousing, Baugruppen, Nightingale) illustrate potential alternate models with reduced emphasis on private ownership and greater emphasis on shared amenity (larger and varied communal facilities).
- Build-to-rent housing is a model whereby single (institutional) ownership provides long-term rental housing. These models typically provide furnished dwellings with high-levels of amenity and servicing. BTR present opportunities for new typologies and initiatives relating to ongoing operating costs (energy, green infrastructure) that are difficult to realise in speculative build-to-sell housing.
- The compact nature of student housing can enable high-density development of compact sites less suited to conventional apartments.
- Private vehicle ownership and usage is changing and expected to diminish as ride-share, mobility on demand, and autonomous vehicles become mainstream. Best practice developments are anticipating these shifts with reduced parking provision and / or designing parking bays to enable adaptive reuse.
- Disruptions to contemporary workplace models are driving sometimes contradictory trends. The specturm of commercial buildings includes large incorporates (finance, tech companies) seeking centralised buildings with large connected floorplates (2000-5000m2+) and totally 25,000-50000m2. Simultaneously, the innovation agenda and gig-economy is driving strong demand for alternate models such as co-working spaces.
- A consistent among commercial building types (and including institutional uses) is an expectation for building typologies, facilities, and services, that provide high levels of amenity and promote collaboration. Common amenities include gardens, wellbeing spaces, child-care, end-of-trip, exercise spaces etc.

PRINCIPLES FOR BANKSTOWN + CAMPSIE

/ Consider mechanisms for promoting a wide range of residential buildings aligned with the forecast demographic profiles for Bankstown and Campsie.

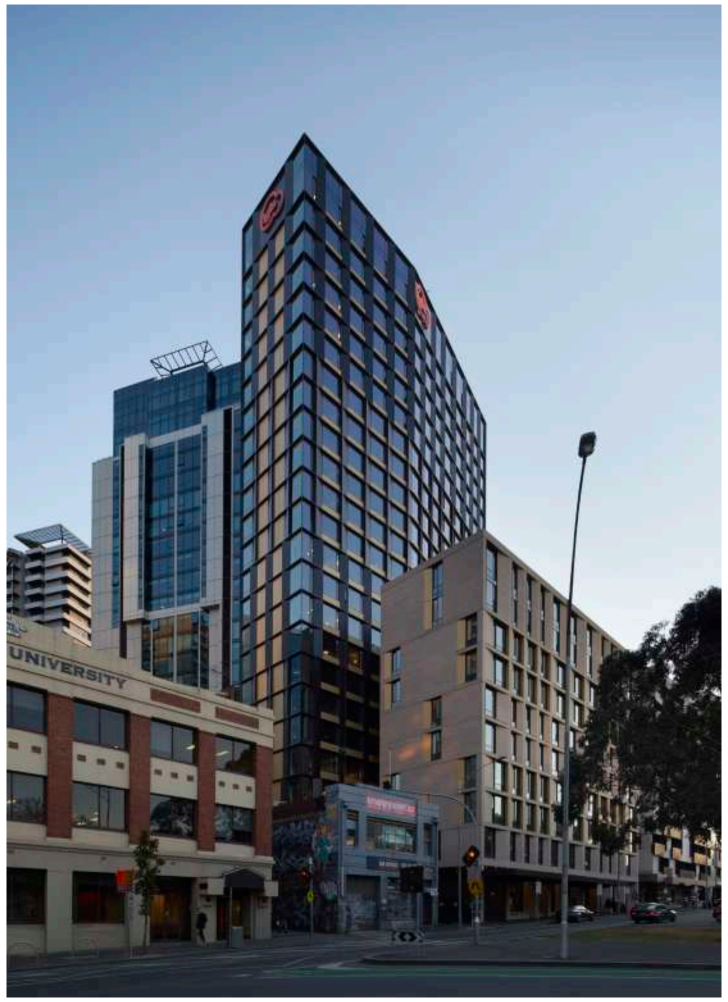
/ Innovation is not easily managed through prescriptive controls. Consider mechanisms to promote and support the delivery of innovative approaches that provide demonstrable social or environmental value.

/ Understand commercial demand and align policy to enable realisation of relevant commercial typologies.

/ Disruptions to car-parking present significant opportunities for diverse typologies (now or in the future). Promote parking solutions that enable adaptation to other productive uses.

DIVERSE TYPOLOGIES

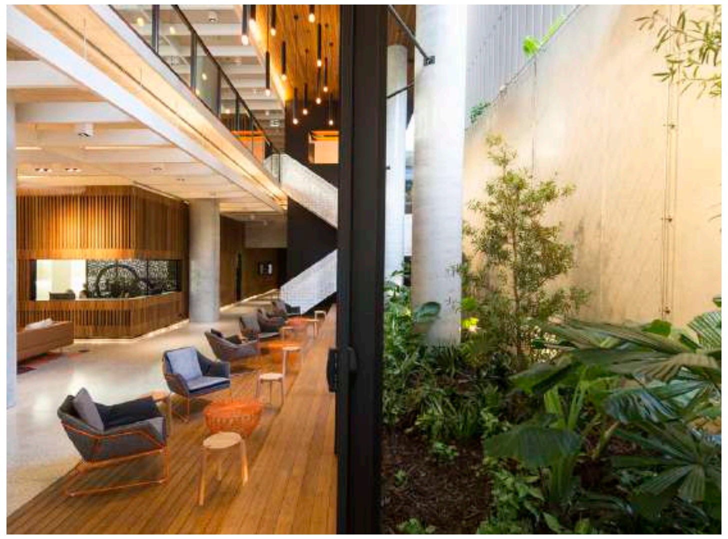
1/ BUILD TO RENT



2/ STUDENT HOUSING

PICTURED
1/ Pitt St Integrated Station Development / Bates Smart Architects
2/ IGLU Franklin St / Bates Smart Architects
3/ South Melbourne Primary School / Hayball
4/ IGLU Mary St / Bates Smart Architects
6/ 84.51° Centre / Gensler

3/ VERTICAL SCHOOL



4/ COMMUNAL AMENITIES

5/ ADAPTABLE PARKING INTEGRATED WITHIN COMMERCIAL BUILDING

1.2.7 DESIGN EXCELLENCE PROCESSES

Connective City 2036 recognises that we need visionary leadership to unite City designers in the common objective of improving design quality. All new projects in Canterbury-Bankstown should be delivered to global design standards.

Objective: Exemplary processes for supporting design excellence in tall buildings

CONSIDERATIONS

Design excellence is made possible through the combined efforts of many people involved in the design, planning, and development phases of projects. It occurs more frequently when there is a clear and shared vision and definition of 'good design' and supportive processes to promote and guide design quality.

Design standards and planning controls are important and useful tools for managing design quality. Arguably they are most effective in establishing acceptable baseline standards but in and of themselves they rarely promote innovation unless supported by other complementary processes.

Any form of development involves significant investment of time and capital and comes with risk. Understanding development economics is essential to achieving design quality. Processes characterised by consistency, productive flexibility, progressive certainty, timeliness, and incentivisation (time, yield, etc), are more likely to be widely embraced by proponents and lead to systemic improvements in design quality.

Connective City 2036 places clear emphasis on the importance of design quality, with an objective that 100% of new buildings in centres go through agreed design quality processes. It identifies the need for local leadership to promote a culture of design as well as specific initiates including a proposal to develop a Design Quality Manual and establish a Design Review Panel.

BEST PRACTICE APPROACHES + INDICATORS

NSW has numerous exemplary processes supporting design quality, including:

- State Design Policy: 'Better Placed - an integrated design policy for the built environment of New South Wales' provides a clear definition of good design, expressed through 7 objectives. Better Placed recognised that design is both process and outcome and uses the 7 objectives to guide better processes as well as inform and evaluate design projects. Better Placed will inform a new Design and Place SEPP, currently under development.
- Design Review Panels (DRP's) or similar (Design Advisory Panels, Design Excellence Panels etc.) currently exist at a local government level, often in the form of SEPP 65 panels; at a state level for specific projects, such as the Metro DRP; at a precinct scale such as the Sydney Olympic Park Authority DRP; and within state agencies such as Transport. Although not a requirement, the Apartment Design Guide (ADG) strongly recommends the establishment of DRPs at a local level to review SEPP 65 buildings as part of their assessment. The NSW SDRP remit includes State Significant Development and has included numerous health and institutional developments.
- Procurement models and processes can significantly influence design quality. Best practice processes foreground the need for capable design professionals, clearly define expected design quality, and include design expertise in tender assessment processes. Some proponents (governments / universities) may utilise a Design Review Process as part of their procurement process, which can assist to improve design quality.
- Design Excellence incentives: processes designed to support design quality can present additional time or cost imposts and act as a deterrent. Mechanisms to incentivise design excellence - such as height of FSR bonuses - can be useful tools for promoting systemic improvements in design quality.
- Competitions - there is considerable evidence demonstrating the ability for competitions to improve design quality, here in NSW and globally. Open 'ideas competitions' that allow wide participation can be useful for provoking ideas and interest in a project but can drive exploitative practices (many businesses working for free). Invited competitions administered by the consent authority provide a more affective method for systemically improving design quality in significant buildings.
- The City of Sydney's Competitive Design Process provides Australia's best example of a formalised competition process aimed at systemic improvement in design quality in tall, or significant, buildings. The CoS process combines private benefit (FSR / height incentives) with public benefit (design quality principles including emphasis on public amenity).

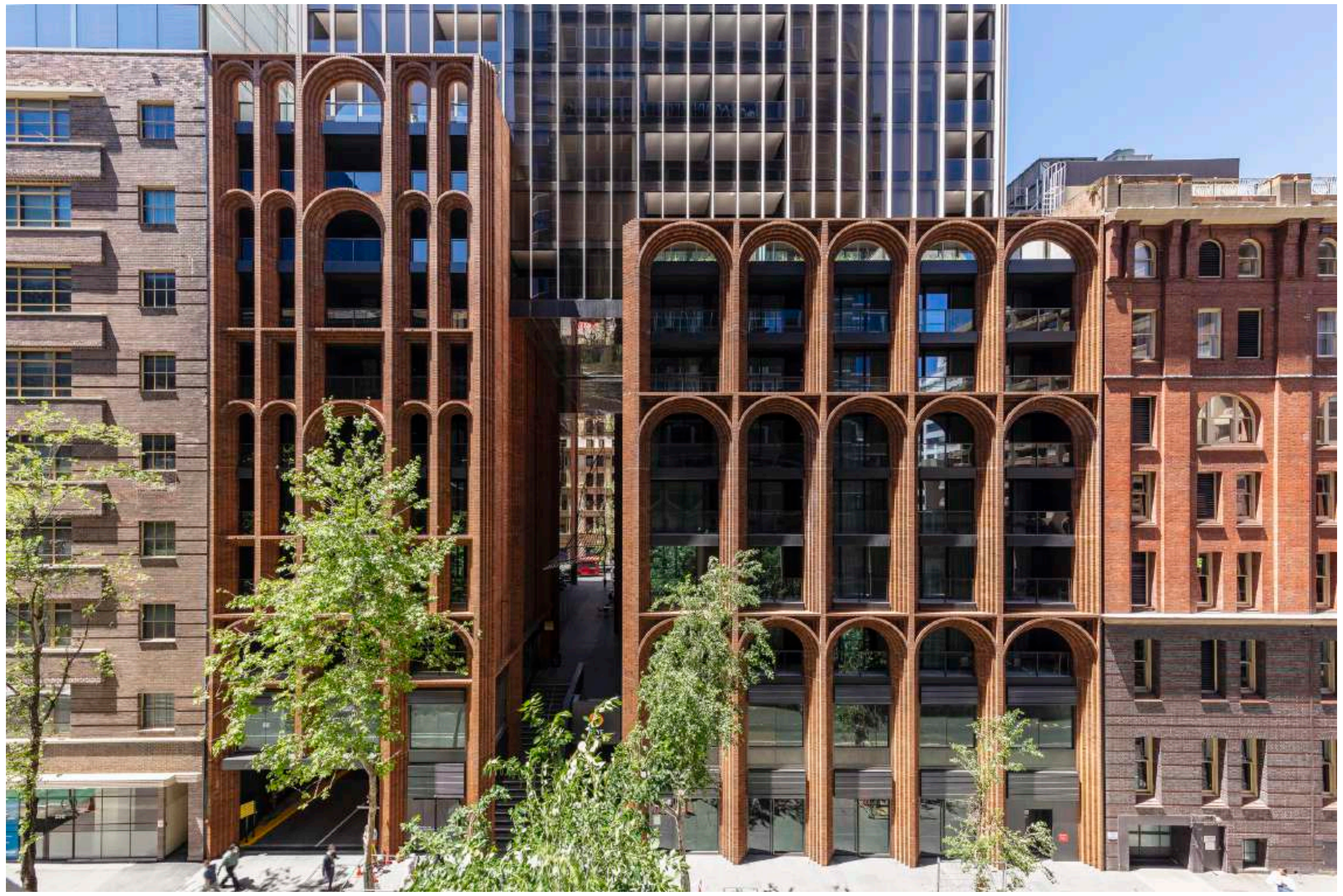
PRINCIPLES FOR BANKSTOWN + CAMPSIE

/ Align policy with Better Placed design objectives to promote consistent vision for design quality.

/ Consider how to complement prescriptive controls with processes that promote and support innovation and design excellence more broadly.

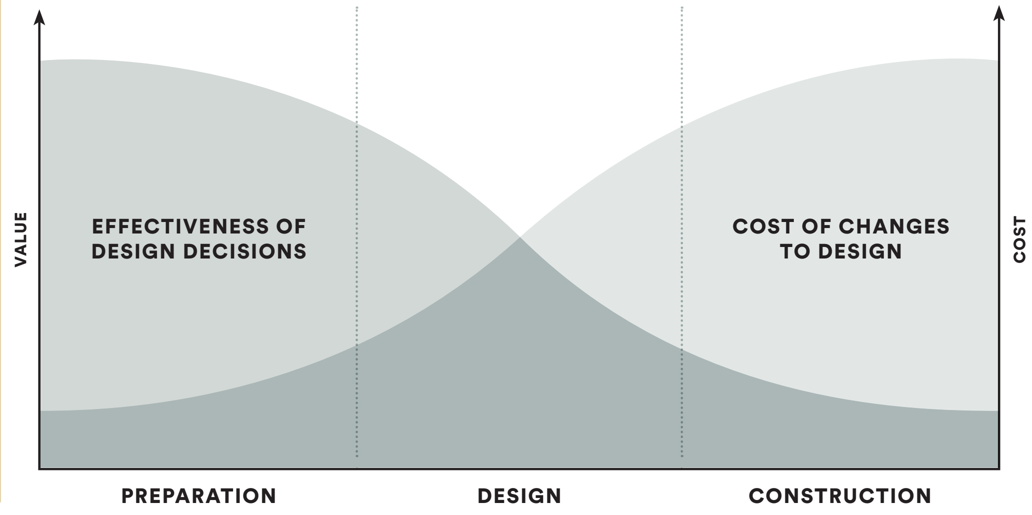
/ Consider planning mechanisms that ensure design quality is managed and delivered throughout the lifecycle of approvals and construction.

DESIGN EXCELLENCE PROCESSES

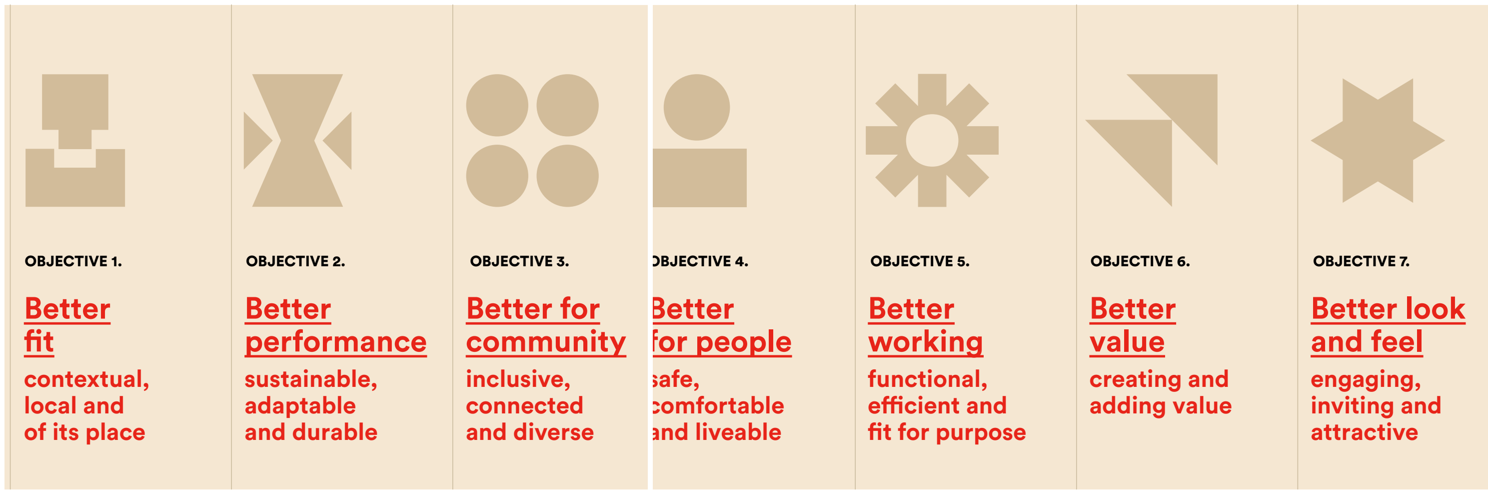


1/ DESIGN EXCELLENCE COMPETITIONS - AN AFFECTIVE WAY DRIVING SYSTEMIC IMPROVEMENTS IN DESIGN QUALITY

Design review is most effective when undertaken early in the life of a project when design changes are less costly, both in terms of time and money. (Adapted from the Office of the Victorian Government Architect diagram)



2/ DESIGN REVIEW - MOST VALUE WHEN UNDERTAKEN EARLY IN A PROJECT

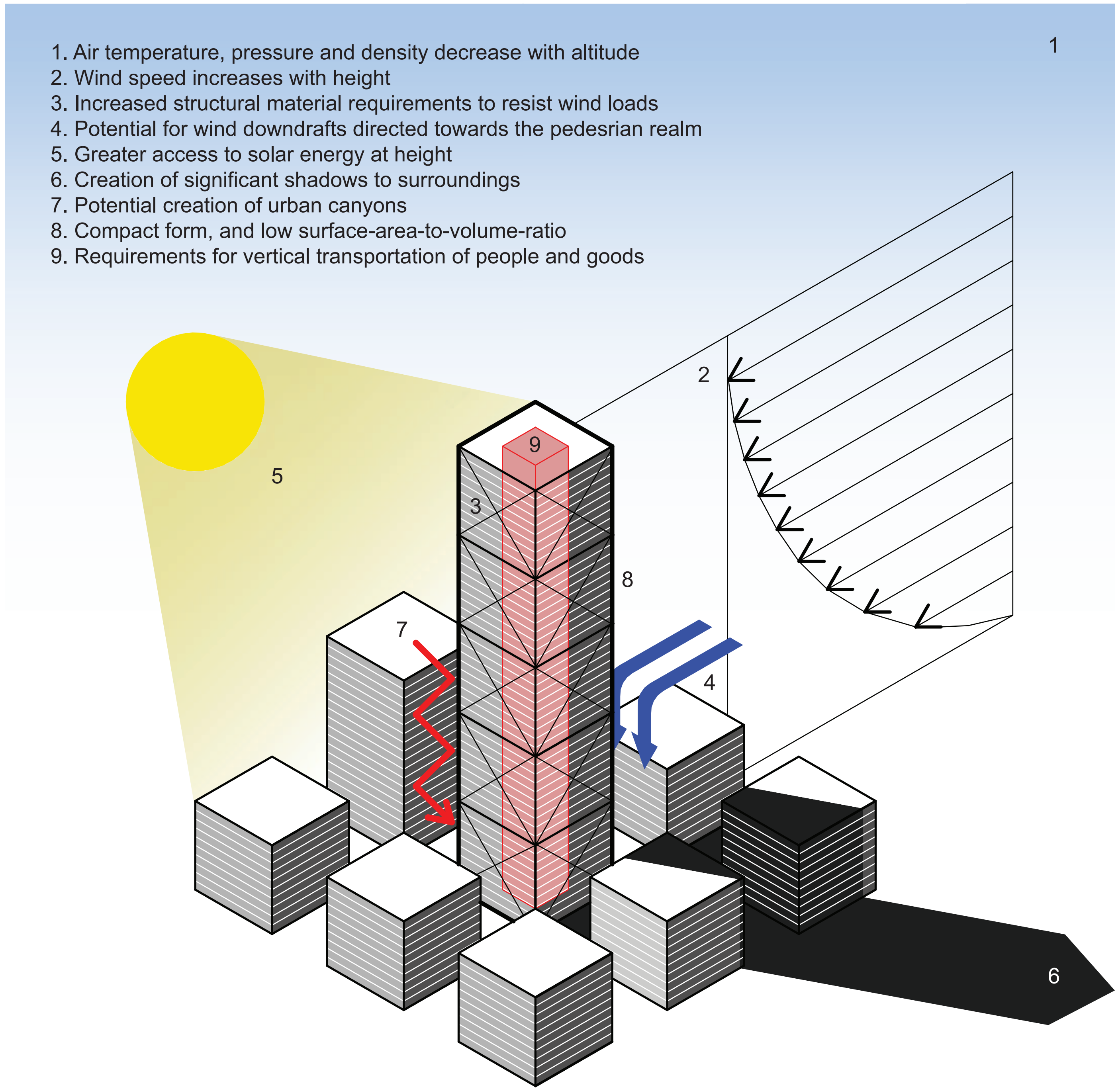


3/ BETTER PLACED - DESIGN OBJECTIVES FOR NSW

PICTURED
1/ The Arc, Koichi Takeda, Sydney - (City of Sydney Design Competition)
2/ Evaluating Good Design, GANSW
3/ Better Placed, GANSW

1.3 ISSUES + CONSIDERATIONS

An overview of key issues + considerations relating to the design of tall buildings and the implications for Bankstown and Campsie.

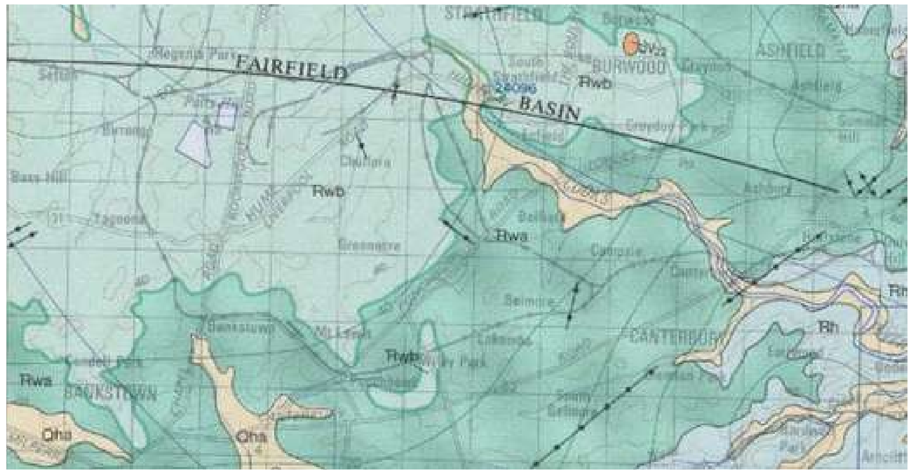


A SUMMARY OF ENVIRONMENTAL AND MICROCLIMATIC FACTORS INFLUENCED BY HEIGHT

Source: Philip Oldfield, The Sustainable Tall Building - A Design Primer, 2019 p13

ENVIRONMENTAL

	ISSUE	GENERAL CONSIDERATIONS	IMPLICATIONS FOR BANKSTOWN + CAMPSIE
1	Wind Conditions	/ Influence of wind typically increases with building height. Above ~300m, resisting lateral loads becomes the dominant design driver, informing building form + structure. The structural impost increases exponentially with building height. / Increased structure to for lateral stability and comfort (to resist sway) increases material consumption and embodied carbon and reduces building efficiency. / Subtle modelling of building form and plan can assist in management of wind pressure and vortices affecting lateral stability. Tapered or stepped forms, rounded corners, and other articulation, can effectively reduce wind load. / The impact of wind on a tall building will be influenced by prevailing wind direction but also proximity to other tall buildings. . / Wind can affect comfort of urban spaces in two ways. ''Urban canyons' - tall narrow streets with continuous built form (where height to width exceeds 2:1) can: • reduce airflow at street-level and reduce positive cooling benefits. • instigate down drafts create high velocity and gusty wind conditions. • Maintaining a streetwall height-width ratio of less than 2:1, provision of podia, and / or providing building separation, can be beneficial. / Wind velocity typically increases with height. Speeds above approximately 8m/s can make natural ventilation unviable or external spaces uncomfortable. In these situations, external spaces may need protection from prevailing winds.	/ Wind is unlikely to be a key design driver as airport restrictions will curtail heights to below thresholds whereby lateral restraint initiates specific structural systems such as outriggers or exoskeleton frames. / Bankstown + Campsie's wind environment is characterised by summer cooling breezes from the north-east and stronger cold winds from the south and south-west. Siting of tall buildings (or elements) should have regard to maintaining positive breezes and sheltering from cold winds. / Private open spaces and balconies should be oriented primarily to the east, north, or west. Exposure to cold southerly winds may require solid and/ or tall balustrades, screens, or wintergarden treatment to provide comfortable conditions. / Consideration should be given to provision of podiums + setbacks to important pedestrian oriented spaces (streets and parks).
2	Soil Types	/ Soil types may influence the design and viability of tall buildings in a number of ways including structural system, management of ground water, ground movement, affect on adjoining properties, and basement design.	/ The Geological Series Sheet 9130 (edition 1, 1983) indicates most of Campsie and Bankstown comprise Ashfield Shale. Localised areas in the southern portion of the Bankstown Study area, and adjacent Cooks River in the Campsie Study area are identified as alluvial sediment, with 'Silty to peaty quartz and, silt and clay' / The Department of Planning Industry and Environment soil profiles information notes potential limitations regarding the suiteablity for development, noting that "Despite extensive existing development this landscape is generally not capable of urban developmentwithout extensive drainage works and soil amelioration." / The implications of these soil types on potential tall building development and the commercial feasibility requires specialist geotechnical and structural advice.



	ISSUE	GENERAL CONSIDERATIONS	IMPLICATIONS FOR BANKSTOWN + CAMPSIE
3	Bird Strike	/ A significant number of birds die from crashing into tall buildings each year (~200000 deaths per annum inNew York City. / Migratory birds can travel at high speeds and at heights of 150m. / Bird strikes are attributed principally to reflectivity of predominantly glazed buildings with little articulation. Internal illumination further exaccerbates the problem, with birds unable to perceive the facade. / Mititagation strategies include introducing architecutral elements such as awnings, screens, grills, shutters, verandahs, or opaque glass, or application of 'fritting' using applied dots, stripes etc - similar to safety decals used to prevent people walking into clear glass. (source Norman Day, The Conversation, Feb11, 2020)	/ 23 bird species in Cantebury Bankstown have been listed by the NPWS as regionally significant species, seven of which are listed on the China-Australia Migratory Birds Agreement (CAMBA) and the Japan-Australia Migratory Birds Agreement (JAMBA). (www.cbcity.nsw.gov.au) / Specific migratory patterns are outside the scope of this report. However, consideration should be given to general principles to minimise bird strike, including avoiding reflective or fully transparent facades, and integration of other atriculation.

	ISSUE	GENERAL CONSIDERATIONS	IMPLICATIONS FOR BANKSTOWN + CAMPSIE
GREEN INFRASTRUCTURE			
4	Landscape integration	Green infrastructure can provide myriad benefits to building occupants and users, as well as contributing to the comfort and attractiveness of a precinct or neighbourhood. However, integrating landscape in tall buildings requires careful consideration of the following issues to ensure viability and longevity: / Location of planting: placed to optimise existing or adjoining landscape conditions and provide appropriate conditions to thrive - including adequate sunlight. / Deep soil - deep soil in natural ground can support soil profile to support large trees and enable stormwater infiltration. Opportunities to provide deep soil should be considered regardless of building height. / Planting on structures: Planting medium, and water, present significant additional loads on buildings. Location of planting (planters, green roofs, etc) should be coordinated with structural design to avoid additional structural members and increase in associated embodied energy and / or cost. / Soil profiles + irrigation: Planting should be supported by soil volume and depth appropriate to the planting type (species and size) and irrigation regime. Turf and ground covers typically require 200-450mm depth. Trees typically require 800-1200mm depth with 9m3 for a small tree. / Plant selections - species should be suited to their application (planter, greenwall etc), microclimate, and maintenance regime. Exposure to wind is a primary consideration. / Maintenance - integrated planting will typically require supplementary irrigation and periodic maintenance. The ease of access, safety, and ongoing costs, or maintenance should be considered. Planting in readily accessible areas such as communal roof terraces is likely to be easier to maintain than greenwalls on facades. Elaborate systems can result in significant ongoing costs.	/ Canterbury-Bankstown's local climate is getting hotter and more extreme. The number of days per year over 35 degrees recorded by the Bankstown Airport weather station has increased from 5 days in 1970 to 18 days in 2019. In addition, the increase in local temperatures, heat island and extreme heat events has a direct impact on electricity demand for air conditioning which is expected to increase peak electricity demands and household electricity costs (source: CCB Sustainability Study, Kinesis Report 2019). / Integrating landscape in tall building development can contribute toward Council's objective to improve climate resilience outcomes for the City, including increasing tree canopy in commercial areas and minimising stormwater run-off. / Landscape integrated within developments should have regard to the wider green network and prioritised in areas with low levels of existing tree canopy and susceptible to urban heat island. / Bankstown has an average rainfall of 866.4mm compared to Sydney 1213mm (source: BOM). Planting selection should be appropriate to this rainfall profile. / Consideration should be given to how and where green infrastructure is integrated in tall building development. The ongoing viability of integrated planting will depend on the provision of appropriate physical conditions (including planters, planting medium, irrigation) and sustained maintenance regimes which will likely incur ongoing costs for building owners or occupants. Approaches requiring minimal intervention should be promoted ahead of complex or expensive technical solutions.
MATERIALS			
5	Durability	/ Access to replace, repair, refinish, or maintain, external materials in tall buildings can be difficult and costly. Selected materials and systems should be durable and have long lifespans. / Resilient natural finishes tend to be more durable than applied finishes such as paint. Masonry, concrete with integral pigmentation, steel, glass are generally low maintenance. / Materials requiring ongoing maintenance or refinishing (painted surfaces, or timber requiring oiling / sealing) should be generally limited to areas that are less exposed to weather and easily and safely accessed (lower levels, accessible from balconies etc)	/ Painted precast concrete / masonry appears to be a common building material in Bankstown and Campsie with unsightly examples of peeling in relatively recent apartment buildings.
6	Safety	/ Selected materials should be safe to install and maintain, and provide a safe environment for occupants. Materials should be in accordance with National Construction Code and relevant Australian Standards and in particular not enable incipient spread of fire through combustible materials.	/ Glazing needs to be readily accessed for cleaning. Possible approaches include combinations of techniques such as Building Maintenance Units, trafficable gantries, or access via boom lifts or similar. Otherwise positive features such as building articulation or landscape on structures require coordination to ensure safe access can be provided.
7	Sustainability	/ Building materials contribute significantly to the carbon footprint of a development. Utilising recycled materials, those with limited cement content, and / or locally sourced materials, can minimise environmental impact.	/ Actively promote sustainable material selections to support Council's Net Zero Carbon target. / Consider providing guidance regarding the extent of glazing - noting the need to balance good daylight with the significant head load issues that glazing can exacerbate.

BUILDING ELEMENTS + SYSTEMS

	ISSUE	GENERAL CONSIDERATIONS	IMPLICATIONS FOR BANKSTOWN + CAMPSIE
8	Building Structure	/ In very tall buildings (above ~300m), resisting lateral loads becomes the dominant design driver, informing building form + structure. The structural impost increases exponentially with building height. / Buildings below approx 200m height can typically utilise a combination of core + frame, or shear walls. Above 200m, additional lateral restraint is required and typically achieved through an outrigger structure or braced frame. 75% of tall buildings over 300m use an outrigger system (source: ARUP). / Residential and Commercial buildings tend to have different structural grids relating to their spatial requirements. Residential buildings tend to utilised a structural grid of ~7.5m to accommodate unit modules and align with carparking structure to avoid or minimise structural transfers. Commercial tenants tend to want unencumbered floorplates, resulting in wider spans (8-9m). / Stacking of different uses in a mixed-use building can result in structural transfer levels or adoption of a structural grid that works across multiple typologies. / Mass Timber construction is emerging as a legitimate alternative to conventional steel and concrete structural systems for tall buildings and can provide significant environmental benefits through reduced embodied carbon and resource optimisation.	/ Airport height restrictions are likely to limit heights to well below a threshold requiring complex lateral restraint. However, buildings of moderate height with small floorplates (a high slenderness ratio), may necessitate additional restraint. / The alluvial soils found in the southern portion of Bankstown and adjacent Cooks River in Campsie are likely to influence the structural design of any tall buildings in those areas, including potentially requiring deep footings, ground anchors, and management of ground water. / / The use of timber as a primary structural system, or element in a hybrid structure, supports Council's sustainability objectives. Consideration should be given as to how this can be promoted in the tall building design standards and planning framework.
9	Vertical Circulation	/ Functional tall buildings depend on effective vertical transportation (VT) systems. The performance of VT systems depend on many variables including: building height, use, number of floors, number of occupants, system design. / The performance of a vertical transportation system is typically defined in terms of the Handling Capacity, Waiting Interval, and Waiting Time. The acceptable performance relates to the building type and quality, with commercial buildings guided by the Property Council of Australia (PCA) Guide to Office Building Quality. / Mixed-use buildings will typically provide separate lift services for distinct uses (residential / nonresidential), resulting in increased core size. / A single group of lifts serving all floors is typically suited to buildings of up to approximately 20 storeys. Taller buildings require other strategies, such as multiple lift rises (ie. groups of lifts servicing specific groups of floors such as low/mid/high rise). Two groups of lifts (low-rise & high-rise) will service 20-35 storeys. / Buildings above approximately 55 storeys may benefit from strategies such as 'sky lobbies' where shuttle elevators transfer passengers to an mid-floor lobby where they transfer to another lift to access upper floors. / A dedicated goods lift is recommended in a commercial building however a residential building will typically utilise one lift (oversized) / Social distancing restrictions and limitations on capacity arising from the Covid-19 pandemic have compromised the effectiveness of VT in tall buildings. Additional measures such as attractive and comfortable stairs can provide a viable alternative mode of moving between levels within a building.	/ Tall buildings in Bankstown and Campsie may necessitate multiple lift groups where heights exceed 20 storeys, or in mixed use buildings. This will result in increased core size in lower levels and may necessitate multiple lobbies at ground level. This can impact the ability to achieve active frontages on small or narrow sites. / Opportunity to promote stairs as an alternate form vertical transport within tall buildings. Provision of natural light and fresh air can encourage use, reduce energy consumption, and provide resilience against power outage.

	ISSUE	GENERAL CONSIDERATIONS	IMPLICATIONS FOR BANKSTOWN + CAMPSIE
BUILDING ELEMENTS + SYSTEMS			
10	Balconies	/ The Apartment Design Guide provides reasonable and clear minimum standards for residential balconies. / Balcony and balustrade design should consider potentially competing demands for views, privacy, and presentation to the public domain (including concealment of laundry or unsightly private possessions). Recessed balconies, partially solid balustrades, planters, or screens provide useful strategies. / Set-downs and flush thresholds can improve access to balconies for people with mobility or sight issues. / Appropriate irrigation should be provided to balcony planters. / Balconies can be susceptible to adverse wind or environmental conditions. The ADG notes that strategies such as juliet balconies, bay windows, winter gardens, may be a more appropriate solution at 10-storeys and above or where affected by consistently high winds or noise. / Tenants of contemporary commercial workplaces seek environments that provide access to fresh air and outdoor spaces. Conventionally this has included roof terraces or balconies provided as outdoor areas for breaks. Increasingly, tenants are seeking indoor-outdoor spaces that provide fresh-air, natural light, landscape, but also allow informal work and meetings. Examples of such spaces include winter gardens and atria spaces either entirely naturally ventilated or 'mixed-mode' space combining natural and mechanical ventilation. It is commercially beneficial if such spaces are well integrated with the principal office space and can either generate revenue as lettable area, or provide significant amenity to support higher rental revenues generally.	/ Whilst the NSW Apartment Design Guide (ADG) provides minimum sizes and dimensions for residential balconies, they relate to generic apartment types. At Bankstown and Campsie, the opportunity exists to promote designs that more explicitly anticipate the needs of different demographics or policy priorities, potentially resulting in larger and or more diverse balconies than described in the ADG. / The affect of wind is very site specific and affected by the context. Whilst the ADG principle relating to balconies at 10-storey's and above is reasonable, a case by case analysis should be undertaken to ensure good amenity for all private open space, regardless of height. / Tall buildings in Bankstown and Campsie are likely to benefit from a range of measures to ameliorate wind effects on balconies. Promoting the incorporation of some solid elements (screens or balustrades) may assist in providing a minimum level of protection from prevailing winds. If Council is concerned with the additional visual bulk arising from winter gardens, it may be necessary to limit additional measures such as operable screens or winter gardens to areas that are demonstrably affected by undesirable winds. / Provision of balconies, winter gardens, or atria, within commercial buildings can provide economic, social and environmental benefits aligning with Councils objectives for Campsie + Bankstown. Planning controls should have regard to the interrelationships between FSR, height, and built form controls, to ensure planning envelopes can optimise yield but also accommodate such spaces. / Balconies in commercial buildings are most successful when they are associated with social or communal spaces within the building rather than generic office space and should be promoted.
11	Lighting	/ Artificial lighting contributes significantly to the energy consumption of a tall building (particularly a commercial building). / Natural daylighting can reduce energy consumption and improve occupant comfort. Effectiveness of daylight penetration into a space is influenced by numerous inter-related factors including: floorplate depth, ceiling height, window height and placement, visable light transmittance of glazing, shading devices, and occupant behaviour. / Effective daylight penetration is generally limited to a ratio of 2.5:1 (floorplate depth relative to window height). with optimal daylight generally within 6m from glazing and generally ineffective beyond 10-12m in conventional commercial environments. / Night-time illumination of extensively glazed office buildings can contribute to bird-strike. Extensive areas of blank glazed facades should be avoided. / Artificial lighting provides opportunities for integrated public art highlighting architectural elements including roof features, feature planting, and public domain. External lighting should contribute to safety in the public domain or communal areas and avoid providing unwanted light-spill into residential dwellings.	/ Achieving good natural daylight (and reducing reliance on artificial lighting) requires an integrated design approach addressing myriad considerations. However, establishing shallow floorplates provides a reliable foundation for achieving good outcomes. A range of techniques - including limited floorplate depth, articulated forms, atria, or eccentric cores - can assist to maximise the proportion of floorspace benefitting from effective natural light. / Potential for Council to align Tall Building Design Guidance regarding lighting with future public art strategies for the Centres.

	ISSUE	GENERAL CONSIDERATIONS	IMPLICATIONS FOR BANKSTOWN + CAMPSIE
BUILDING ELEMENTS + SYSTEMS			
12	Floorplates + efficiencies	/ Structure, services, and vertical transportation systems in tall buildings tends to result in less efficient floorplates as height increases. (Efficiency defined in terms of useable area relative to gross building area). Consequently, efficiency is a major influence, driving both larger floorplates and optimised structure and core designs. / Net-to-gross efficiencies in buildings of 10-20 stories are typically 80-85%. Above 40 storeys the efficiency may be at nominally 75-80%. Efficiencies in super-tall towers (>300m may further reduce to ~70%). / Buildings in Australia with an effective height of 25m require at least two fire-isolated stairs irrespective of floorplate size (and other service requirements such as stair pressurisation that further increase core size). At this height the efficiency is reduced and land-economics are such that developers tend to prefer buildings exceed this height by some margin to compensate. 25m height can be regarded as an important threshold. / Premium locations with high-value and strong demand can support smaller floorplates with lower efficiencies. This is evident in the emergence of very small floorplate 'pencil-towers' being developed in cities such as New York, and to a lesser extent in Sydney + Melbourne CBD.	/ In addition to the various contextual and place-based considerations, Council should have regard to the implications of the land economics associated with the interplay between building height and floorplate efficiency. Efficiencies generally diminish with height due to increase structural, services and circulation requirements. An effective height of 25m is the first notable threshold, and developers generally assert that it is commercially necessary (or desirous) to exceed this height by some margin to justify the additional cost and reduced revenue. This sensitivity is not a design consideration per se but may influence setting of building heights by Council in the masterplan.
13	Floorplate sizes - commercial	/ In recent years, contemporary workplace trends in Sydney have favoured flexible floorplates in excess of 2000m2 and with significant numbers of tenants seeking campus-style arrangements allowing floorplates in excess of 4000m2. / 1000m2 NLA floorplate able to be subdivided would be considered a reasonable minimum for a dedicated commercial building. / Co-working spaces have emerged as a strong commercial sector and can be realised in a wide-variety of sizes and configurations. / Recent Covid-19 restrictions have disrupted conventional work patterns and raised questions regarding the future of commercial workplaces. Various forecasting suggests work-from-home, co-working, or distributed smaller workplaces may assume greater prominence. However, the implications on commercial building design is not yet clear. / Commercial floorplate depths are influenced by access to natural light. Conventional central core arrangements wrap office space of 10-14m depth around the core, resulting in floorplate depths of 26-36m nom. Tenant preferences have driven the prevalence of eccentric cores, with unobstructed floorplates of 15-24m width with a core located on one side.	/ Specialist economic advice is required to identify demand and tenant requirements for commercial space in Bankstown and Campsie to ensure planning controls are aligned with market conditions. Our observations suggest Bankstown appears more likely to sustain significant commercial floorspace in dedicated commercial buildings, however Campsie may be more suited to integrating smaller format space in dedicated or mixed-use developments. / Subsequent phases of this study will test the capacity and suitability of various floorplate sizes within Bankstown + Campsie, and review their consistency with other specialist Land-Use and Economics studies.
14	Floorplate sizes - residential	/ The NSW Apartment Design Guide establishes minimum apartment sizes and identifies eight dwellings as the maximum number of apartments to be serviced off a single lift core. Together with requirements for solar access and cross ventilation, these guidelines tend to moderate floorplate sizes to nominally 800m2 GFA. However, this is not absolute and larger floorplates are achieved through a combination of articulation, multiple cores, or larger units. / Residential floorplates with less than eight dwellings per floor can provide good amenity however may reduce the floor-plate efficiency (and increase cost). / The ADG requires 'cross-through ventilated apartments' not exceed 18m depth glass to glass. Apartment floorplates tend to be in the order of 21m depth including balconies but good apartments can be provided at up to 27m depth subject to core placement and size, and building articulation.	/ The ADG provides adequate guidance to ensure good amenity for dwellngs. In Bankstown + Campsie, minimum floorplates are likely to be determined by land economics, whereby a reasonable sized and efficiency will be a hurdle to enable viable development. / In determining any maximum floorplate sizes, Council should have regard to market expectations but also the impact of tall buildings on the appearance and amenity of the localities. In this regard, a range of performance based factors will be instructive - including maintaining solar access, ensuring comfortable wind conditions, and the appearance of building bulk in different parts of the Centres.

	ISSUE	GENERAL CONSIDERATIONS	IMPLICATIONS FOR BANKSTOWN + CAMPSIE
BUILDING ELEMENTS + SYSTEMS			
15	Carparking	/ Integration of car-parking has been a significant consideration in tall building design and is typically provided in one of three ways - within a basement, within a podium, of de-coupled form the building. / Basement parking has typically been favoured where maximising available building envelope and land-economics justify the cost. Podium parking can provide an economical approach but often results in blank or unsightly frontages. / Vehicle ownership and movement is changing and is predicted to further evolve with improved public transport, service-on-demand (ride-share), and autonomous vehicles. / Car-parking structures have specific spatial requirements. Column spacing, ceiling height, floorplate depth, and circulation, is typically optimised to be as efficient as possible. However, this can limit the ability to adapt to alternate use should demand change. Strategies such as providing flat slabs and increased floor-to-floor heights can future proof structures for future adaptation, especially within podia where natural light is available. / Provision of vehicle access can have a significant impact on streetscapes, especially with narrow allotments. / Parking efficiency tends to increase with site area. A minimum site dimension of ~24m is required for an aisle, dual parking pays, and circulation. Efficiency increases with sites above ~35m, allowing two aisles, 4 rows of parking, and efficient ramp systems.	/ Bankstown and Campsie will both benefit from investment in the Metro. Council's sustainability and design objectives suggest consideration should be given to reduced parking provisions in areas proximate to the station. / Vehicle access should be avoided in streets identified as being important places with a pedestrian focus. Access should be provided via rear lane / secondary streets and avoided on narrow allotments where the driveway will limit active uses. / The cost and environmental impact of basement construction is significant and presents limited opportunities for adaptive reuse. Consideration should be given to whether promoting some parking in podia can provide flexibility and resilience and also enable adequate activation and high-quality presentation to streets and public domain. / Many narrow sites within the Centres will not allow efficient parking. Larger, or consolidated sites of ~1500m2 and / or with minimum ~35m width will improve efficiencies and allow better integration of access.
16	Airport Restrictions	A number of restrictions relating to airport operations and safety can influence the design and construction of tall buildings. OLS The Obstacle Limitation Surfaces (OLS) are a set of surfaces — horizontal (flat) and rising slopes (as planar shapes to/from runways, and conical around the airport) — that are used as the fundamental threshold for the control and assessment of new or changed obstacles around an airport. An obstacle may be a permanent structure, such as a building or tree or antenna. A temporary obstacle may be a structure such as a crane used for construction. Any development breaking the OLS requires the concurrence of the relevant Airport and air services agencies under the Commonwealth Airports Act 1996 and associated regulations. PANS-OPS The PANS-OPS Surfaces used for prescribed airspace, as specified and used under the Airports (Protection of Airspace) Regulations, relate to the maximum permissible obstacle elevation — in heights expressed in the Australian Height Datum (AHD) — in areas covered by the protection surfaces for published Instrument Flight Procedures for approach and landing, and for departures (take-offs). These surfaces can be horizontal, sloping, conical and complex in nature, depending on type of procedure and the location within the protection area.	/ The Bankstown City Centre Study Area is within the operational airspace of the two (2) major civil airports (Bankstown Airport and Sydney International Airport), the proposed Western Sydney Airport, and additionally within the airspace of the RAAF Base Richmond and the small aerodrome used for training and recreation at Camden. However, the proximity of the study area to Bankstown Airport (3-4 km) means that the airspace is most affected by air traffic to and from Bankstown Airport. / The OLS height limits related to Bankstown Airport — range from 51m to 71m Australian Height Datum (AHD). Some permissible heights defined in the current LEP exceed this datum (ie. 83m height limit). / The Strategic Airspace Study (2016) analysed and mapped PANS-Ops surfaces in relation to the aircraft operations of Bankstown Airport. The Study mapped a maximum PANS-OP height of 135.9m AHD in the northern part of the centre, which tapers down to 130m AHD toward the south. However, the Study argued that a maximum of 152.4m AHD could be potentially achieved through negotiation with Bankstown Airport, Air Services Australia and other relevant stakeholders. However, the study is now out-dated, and Bankstown Airport has published a new Master Plan in 2019. / The various airport restrictions will influence which parts of study area are suited to increased building heights.

1.4 SUMMARY PRINCIPLES

Summary principles to inform Council's master plan, site specific design testing, and detailed design quality recommendations in subsequent phases of this study.

1. CLIMATE RESILIENCE

Buildings that are resilient to the impacts of climate change and natural hazards.

Design tall buildings to minimise use and reliance on energy for building operations, including heating and cooling.

Ensure facades are well-designed to manage and reduce heat loads in case of extreme weather events, through the use of operable windows, cross ventilation, external shading, and proportion of glazing.

2. ENERGY + WATER EFFICIENCY

Buildings are designed for optimal performance, to secure affordable and low carbon energy use, and integrate WSUD for user and ecological benefit

Design for effective natural ventilation and efficient heating, ventilation, and air-conditioning (HVAC) systems

Design high-performance envelopes with good insulation, shading and appropriate building separation.

Maximise rooftop PV with battery storage

Eliminate fossil fuels, including gas.

Maximise onsite water capture + detention and consider onsite recycling (grey or blackwater)

Maximise green infrastructure

3. RESOURCE OPTIMISATION

Promote a whole of life approach to maximise resource use, recovery and reuse.

Encourage 'long-life loose-fit' buildings with inherent flexibility for future adaptation.

Promote buildings that are efficient and have been optimised to minimise material use and maximise potential for material recovery.

Use low-carbon, durable, low maintenance materials.

Design buildings to promote positive behaviours such as recycling and composting.

4. CONTEXTUAL, LIVEABLE + ATTRACTIVE PLACES

Tall buildings that are contextual, liveable and attractive, with human scale urban environments at street level.

Establish clear a vision for the desired future character of the centres and important streets. Ensure that tall buildings are designed to reinforce that desired character, with particular consideration of matters such as- streetwall height, tower setbacks and building separation, locations for active street frontages.

Pay particular attention to the quality of lower levels of buildings - providing a human scale to those frontages that are experienced up close.

Promote generous provision of elements that contribute to comfort and liveability, including open space, landscape, communal amenities such as opportunities for pets, recreation, and food production.

5. COMFORTABLE MICROCLIMATES

Tall buildings provide for comfortable micro climates and limit undesirable impacts on surrounding urban amenity.

Ensure buildings are oriented to promote air circulation and cross ventilation, but reduce negative wind conditions on the adjacent streets, public domain and neighbouring buildings.

Consider establishing streetwall ratios of not greater than 2:1 (height to width)

Utilise high-albedo materials for roofs and horizontal surfaces but avoid reflective facades.

Ensure public amenity spaces, such as parks, receive appropriate winter sun. Ensure adjoining residential properties maintain at a minimum 2 hours of winter sun.

Given the affect of local conditions, including adjoining buildings, all proposed tall buildings should undertake a wind assessment.

6. DIVERSE TYPOLOGIES

Tall buildings providing diverse housing and work environments for the changing demographics.

Consider mechanisms for promoting a wide range of residential buildings aligned with the forecast demographic profiles for Bankstown and Campsie.

Innovation is not easily managed through prescriptive controls. Consider mechanisms to promote and support the delivery of innovative approaches that provide demonstrable social or environmental value.

Understand commercial demand and align policy to enable realisation of relevant commercial typologies.

Promote parking solutions that enable adaptation to other productive uses.

7. DESIGN EXCELLENCE PROCESSES

Exemplary processes that support and enable design excellence in tall buildings.

Align policy with Better Placed design objectives to promote consistent vision for design quality.

Consider how to complement prescriptive controls with processes that promote and support innovation and design excellence more broadly.

Consider planning mechanisms that ensure design quality is managed and delivered throughout the lifecycle of approvals and construction.

1.4.1 SPATIAL PRINCIPLES FOR BANKSTOWN + CAMPSIE

This section provides principles to inform Council's masterplan in support of the design excellence and sustainability objectives. It identifies locations in the Centres that are better suited for tall buildings based on a range of environmental and amenity considerations.

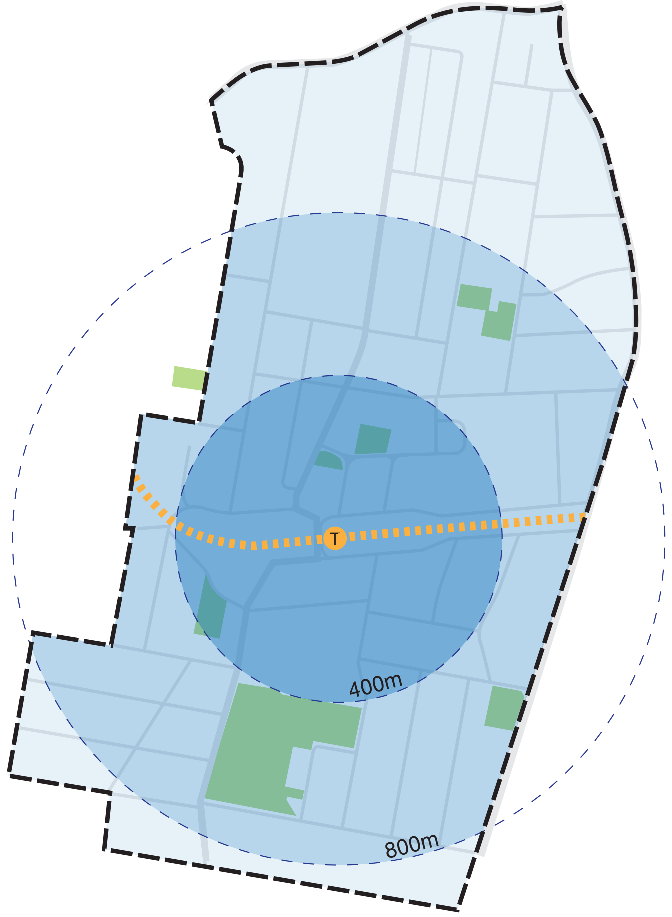
The analysis in section 1.4 is preliminary only and is aimed at assisting Council in developing the vision and directions for Campsie Master Plan. The identification of locations that are suitable for tall buildings are subject to a number of other considerations beyond the scope of this study but to be addressed by Council's own urban design and planning work.

The analysis in section 1.4 is preliminary only and is aimed at assisting Council in developing the vision and directions for Campsie Master Plan. The identification of locations that are suitable for tall buildings are subject to a number of other considerations beyond the scope of this study but to be addressed by Council's own urban design and planning work.

1.4.1 BANKSTOWN CITY CENTRE

01 / CONTEXT

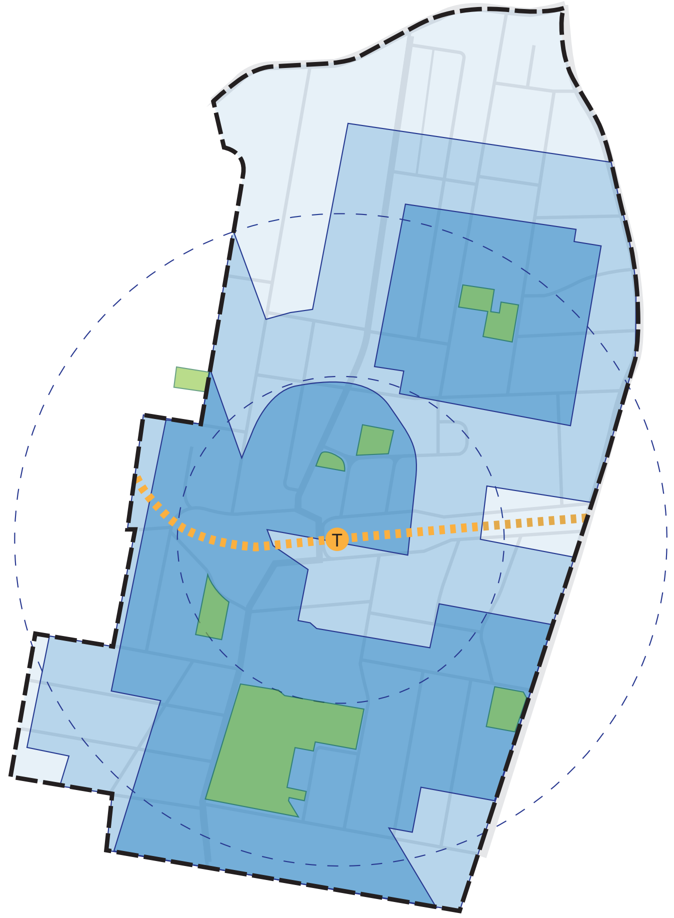
Key Places as identified by Council.



02 / PROXIMITY TO TRAIN STATION

Prioritise tall buildings within a walkable catchment (400m / 800m) of public transport.

- Very suited to tall buildings / within 400m
- Suited to tall buildings / within 800m
- Least suited to tall buildings / over 800m



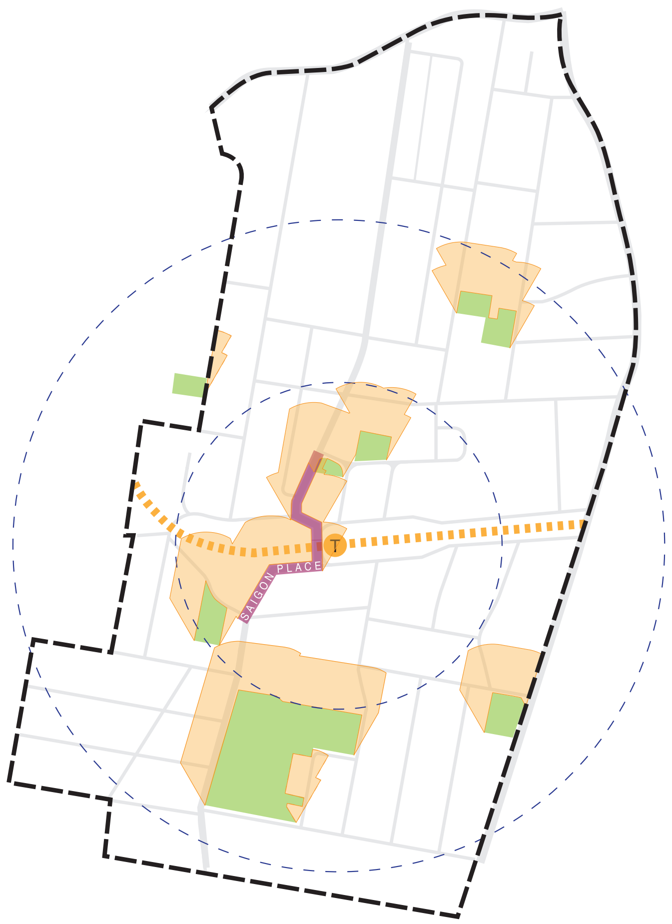
03 / PROXIMITY TO OPEN SPACE

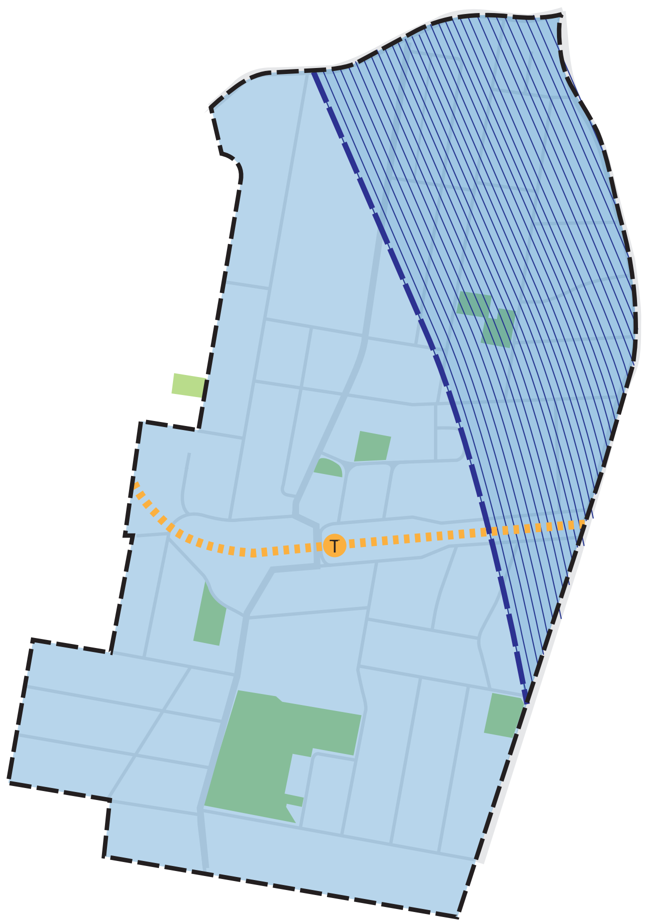
Prioritise tall buildings within a walkable catchment (200m / 400m) of public open spaces*

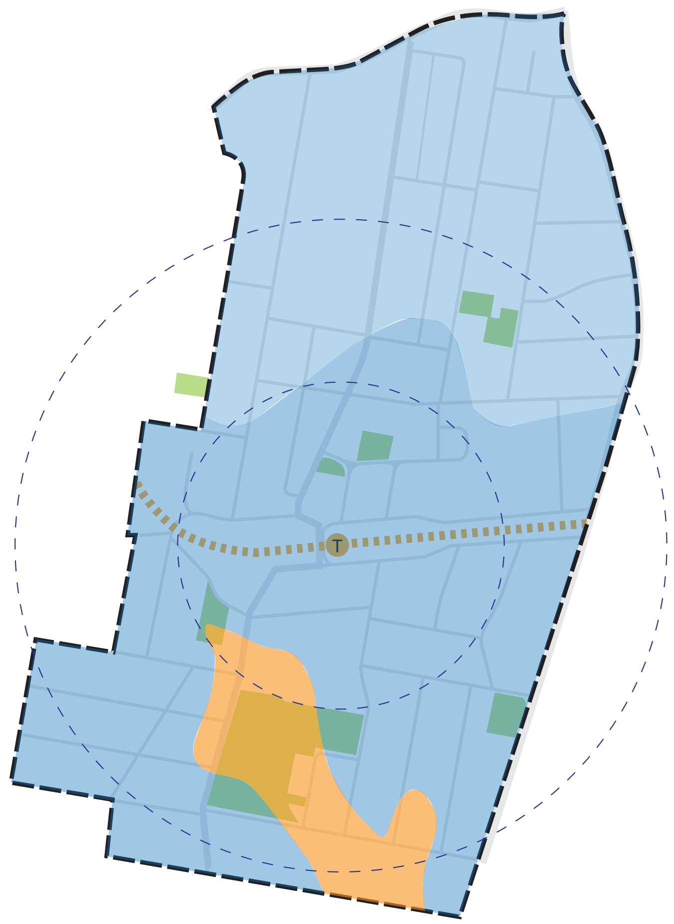
- Very suited to tall buildings / within 200m for residential
- Suited to tall buildings / within 400m for commercial
- Least suited to tall buildings / over 400m

* REFER GANSW DRAFT GREENER PLACES DESIGN GUIDE

The analysis in section 1.4 is preliminary only and is aimed at assisting Council in developing the vision and directions for Campsie Master Plan. The identification of locations that are suitable for tall buildings are subject to a number of other considerations beyond the scope of this study but to be addressed by Council's own urban design and planning work.







04 / SOLAR ACCESS TO PUBLIC DOMAIN

Maintain an appropriate level of solar access to public open space between key periods of high use (ie 10am-2pm in winter).

- Public Open Space
- Solar cone required to maintain sunlight to open space between 10am-2pm on winter solstice (assuming 83m building height).
- Saigon Place / Chapel Road is highlighted as an important street by council. - Consider maintaining sunlight to footpaths between 10am-2pm in winter.

05 / OLS

- Bankstown Airport OLS: 52 - 71m AHD
- Bankstown Airport OLS: 51m AHD flat plane

06 / SOIL CLASSIFICATION

- Black to dark grey shale + laminite
- Shale, Carbonaceous laminite, fine to medium grained lithic sandstone, rare coal
- Silty to peaty quartz sand, silt + clay.

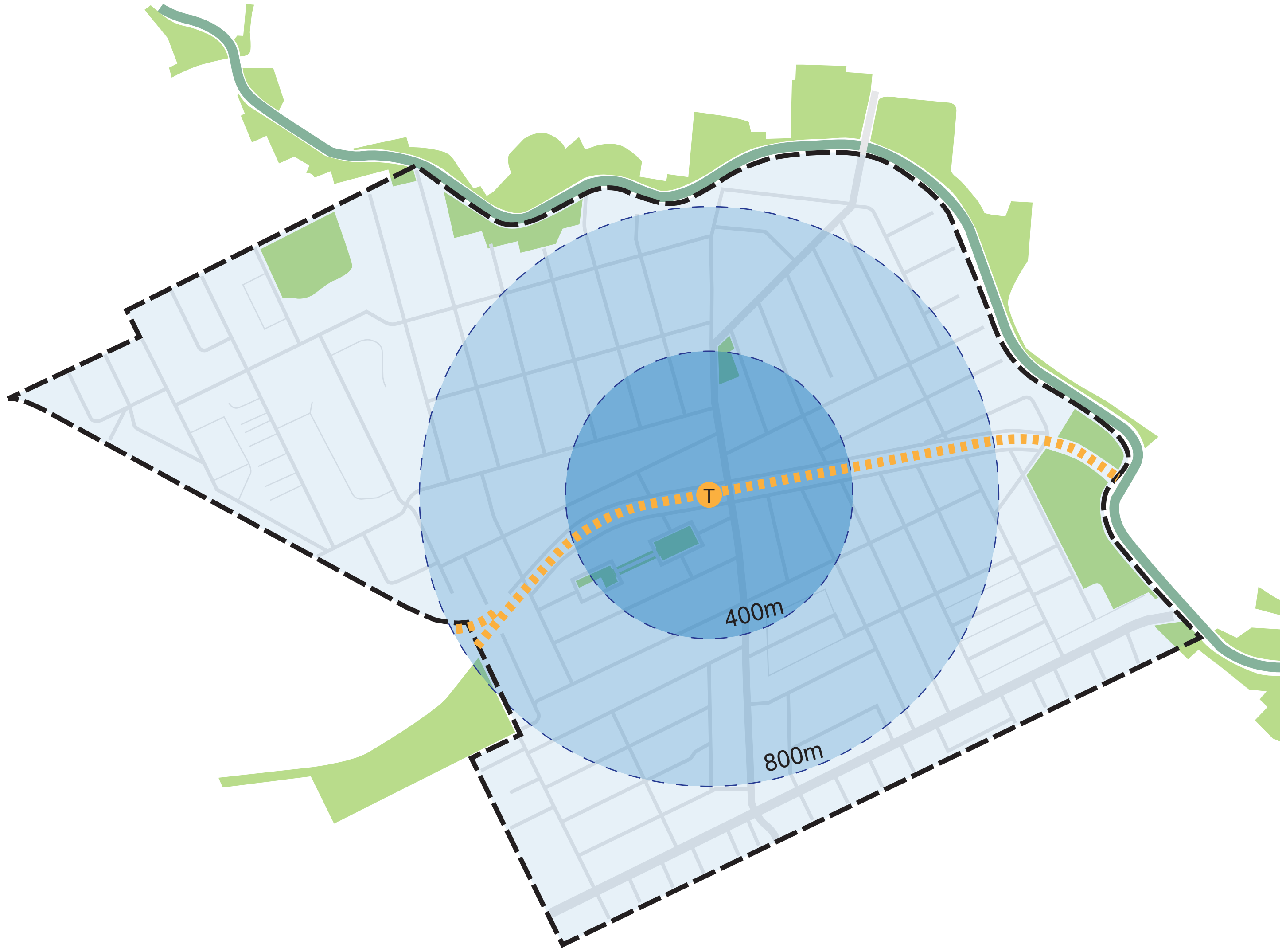
NOTE: the impact of soil types is outside the scope of this report but may impact structure, basements, cost, and other factors.

The analysis in section 1.4 is preliminary only and is aimed at assisting Council in developing the vision and directions for Campsie Master Plan. The identification of locations that are suitable for tall buildings are subject to a number of other considerations beyond the scope of this study but to be addressed by Council's own urban design and planning work.

1.4.2 CAMPSIE TOWN CENTRE

01 / CONTEXT

Key Places as identified by council.



02 / PROXIMITY TO TRAIN STATION

Prioritise tall buildings within a walkable catchment (400m / 800m) of public transport.

- Very suited to tall buildings / within 400m
- Suited to tall buildings / within 800m
- Least suited to tall buildings / over 800m

* REFER GANSW DRAFT GREENER PLACES DESIGN GUIDE

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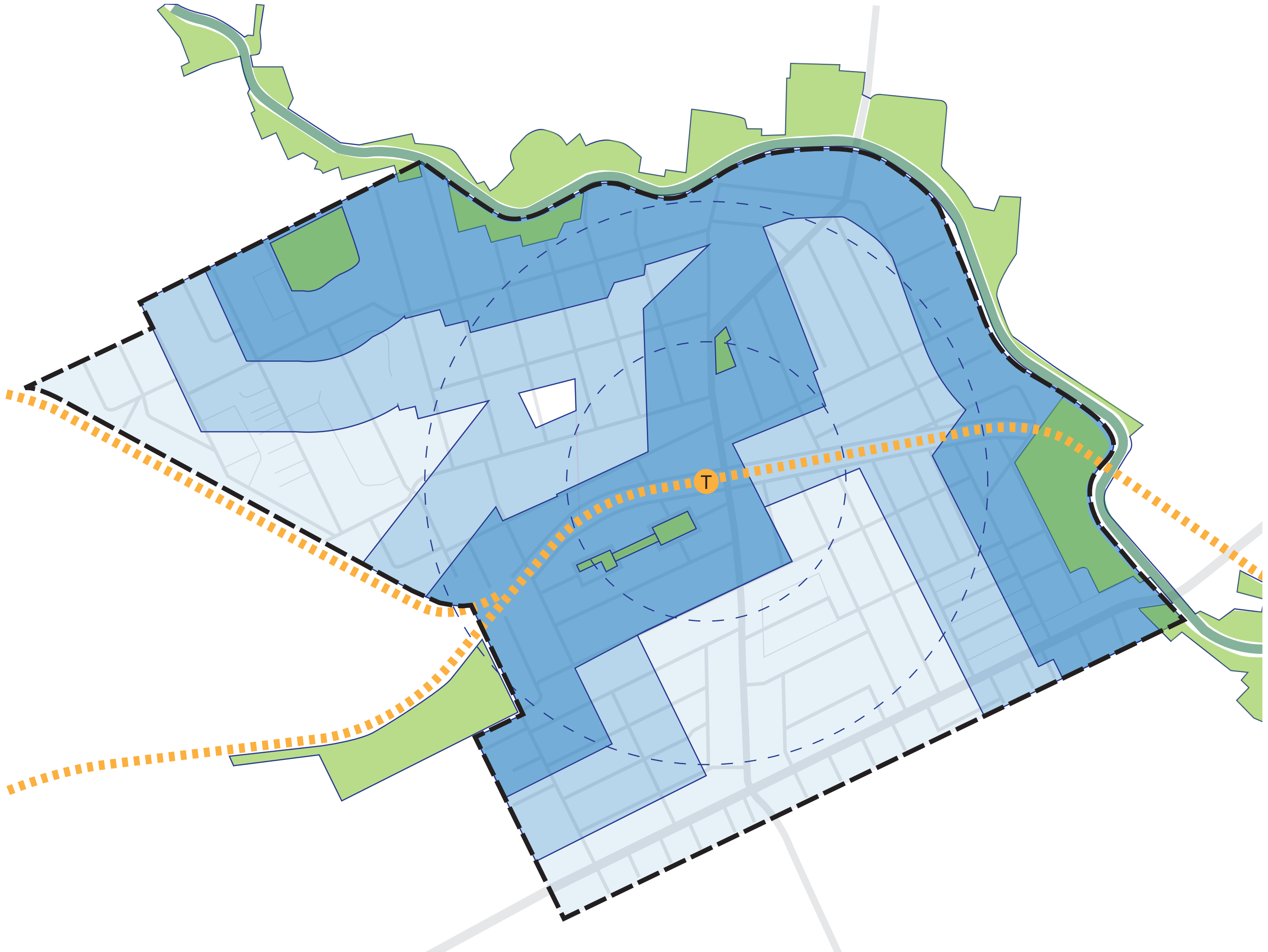
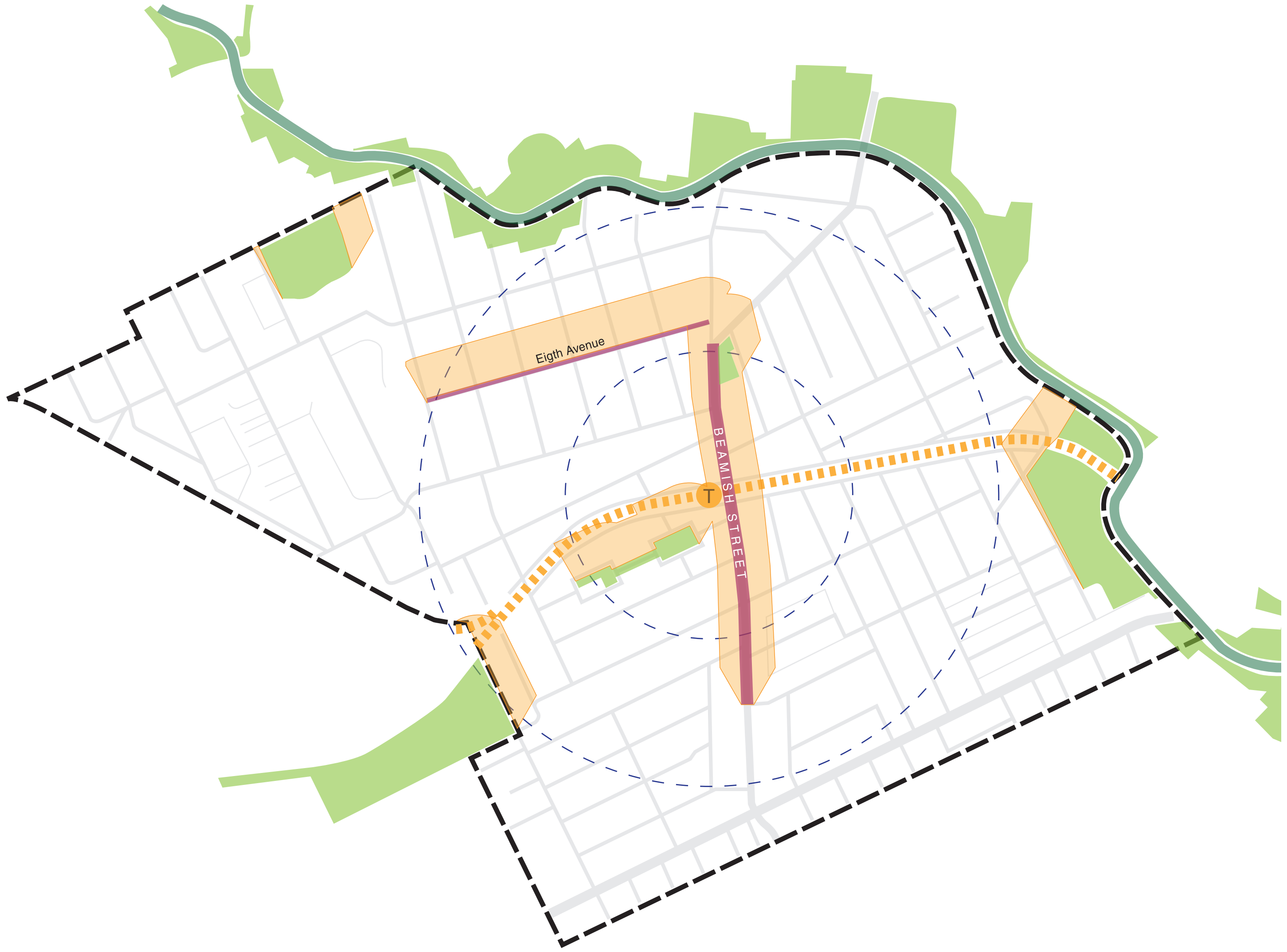


03 / PROXIMITY TO OPEN SPACE

Prioritise tall buildings within a walkable catchment (200m / 400m) of public open spaces.

- Very suited to tall buildings / within 200m for residential
- Suited to tall buildings / within 400m for commercial
- Least suited to tall buildings / over 400m

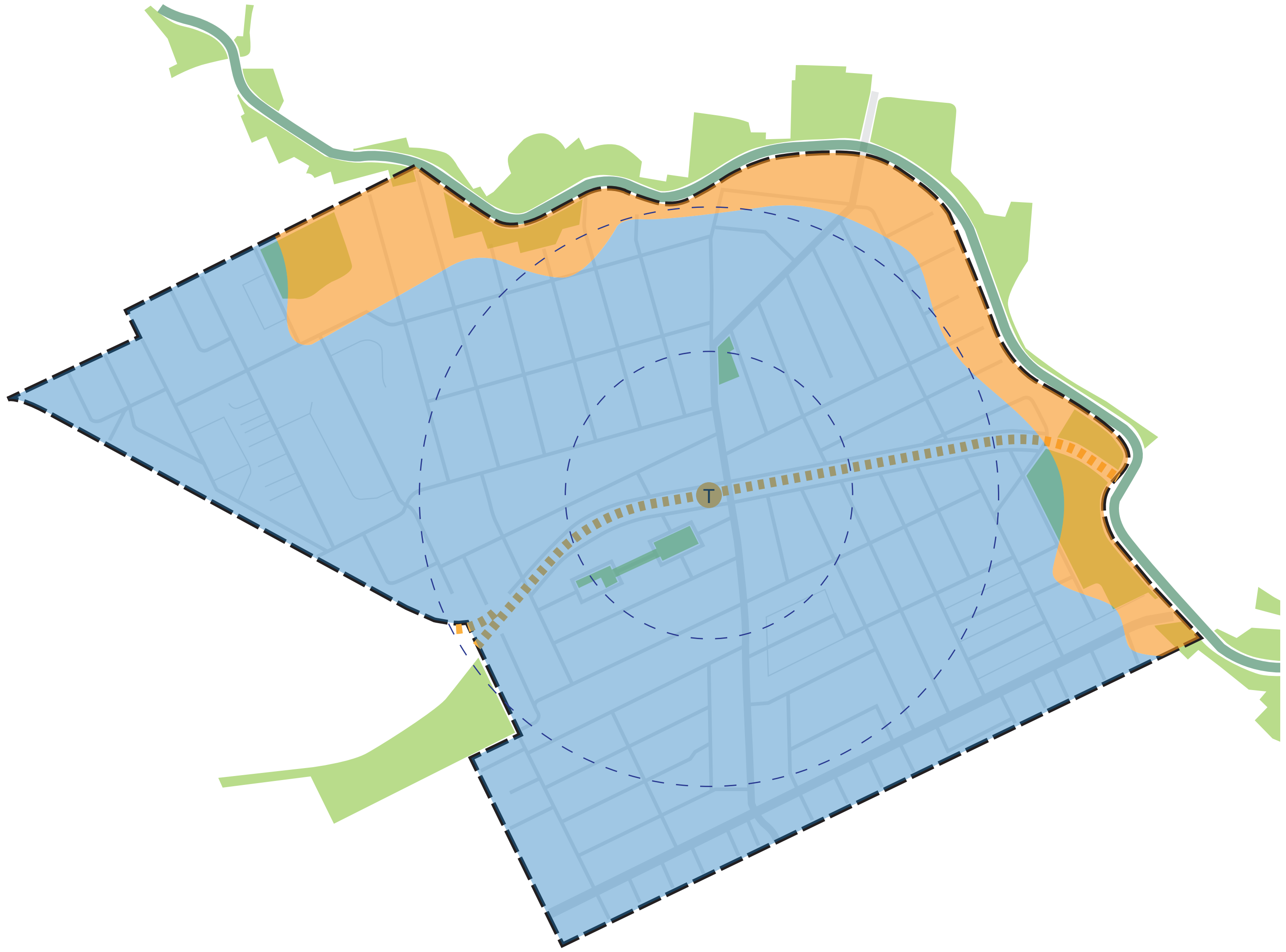


04 / SOLAR ACCESS TO PUBLIC DOMAIN

Maintain an appropriate level of solar access to public open space between key periods of high use (10am-2pm).

- Public Open Space
- Solar cone required to maintain sunlight to open space between 10am-2pm on winter solstice (assuming 83m building height).
- Beamish Street and Eight Avenue are highlighted as important streets by council - recommend maintaining sunlight to footpaths between 10am-2pm in winter.

The analysis in section 1.4 is preliminary only and is aimed at assisting Council in developing the vision and directions for Campsie Master Plan. The identification of locations that are suitable for tall buildings are subject to a number of other considerations beyond the scope of this study but to be addressed by Council's own urban design and planning work.



05 / SOIL CLASSIFICATION

Black to dark grey shale + laminite

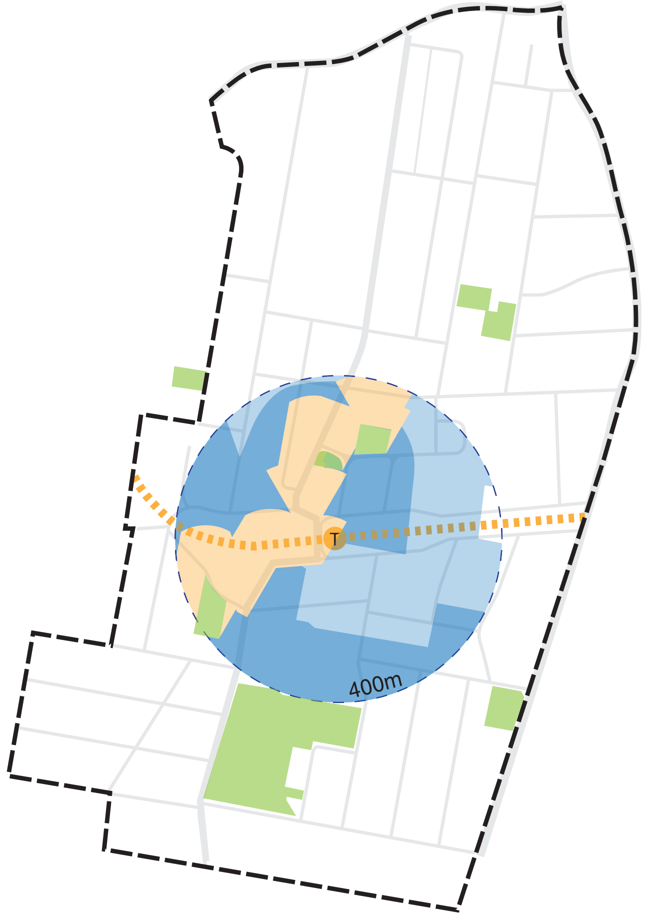
Silty to peaty quartz sand, silt + clay.

NOTE: the impact of soil types is outside the scope of this report but may impact structure, basements, cost, and other factors.

The analysis in section 1.4 is preliminary only and is aimed at assisting Council in developing the vision and directions for Campsie Master Plan. The identification of locations that are suitable for tall buildings are subject to a number of other considerations beyond the scope of this study but to be addressed by Council's own urban design and planning work.

1.4.3 SUMMARY PRINCIPLES

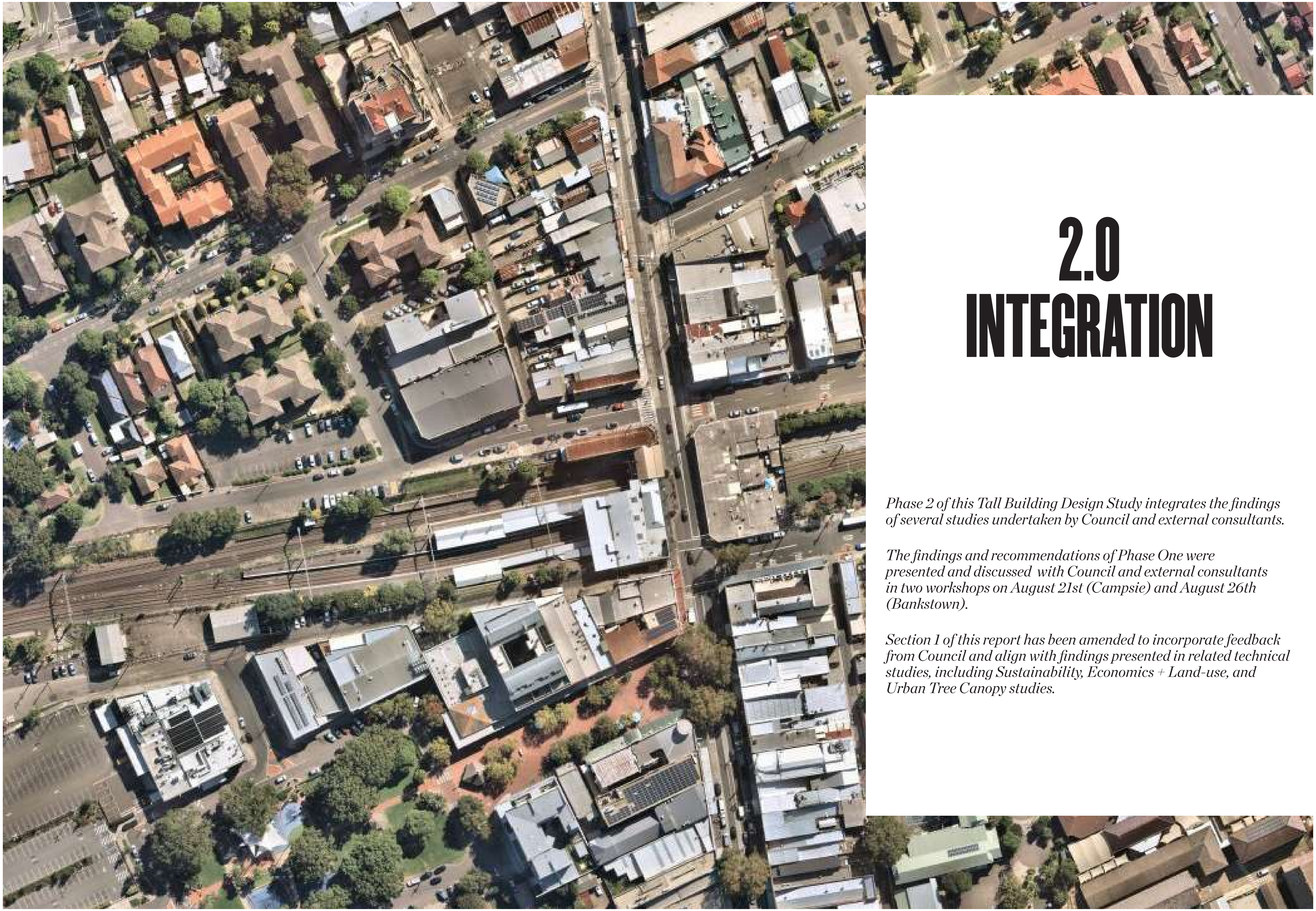
The following diagrams identify the optimum locations for tall buildings based on proximity to public transport and public open space as well as areas requiring careful management to preserve good solar access to important public domain.



BANKSTOWN - COMBINED PRINCIPLES

CAMPSIE - COMBINED PRINCIPLES

- Very suited to tall buildings / within 200m of public open space and 400m of the train station
- Suited to tall buildings / within 400m of public open space and 400m of the train station.
- Impact of building form on solar access of public domain requires careful consideration.



2.0 INTEGRATION

Phase 2 of this Tall Building Design Study integrates the findings of several studies undertaken by Council and external consultants.

The findings and recommendations of Phase One were presented and discussed with Council and external consultants in two workshops on August 21st (Campsie) and August 26th (Bankstown).

Section 1 of this report has been amended to incorporate feedback from Council and align with findings presented in related technical studies, including Sustainability, Economics + Land-use, and Urban Tree Canopy studies.

2.1 REVISED PRINCIPLES

Phase One draft principles have been refined in response to key findings and discussion points from the integration workshops.

1. CLIMATE RESILIENCE

Buildings that are resilient to the impacts of climate change and natural hazards.

1.1 Design tall buildings to minimise use and reliance on energy for building operations, including heating and cooling.

1.2 Ensure facades are well-designed to manage and reduce heat loads in case of extreme weather events, through the use of operable windows, cross ventilation, external shading, and proportion of glazing.

1.3 Plant and tree species should be resilient to increased heat, reduced rainfall, and adverse wind conditions. All planting should be supported by adequate planting conditions, maintenance regimes and covenants, to ensure ongoing viability.

2. ENERGY + WATER EFFICIENCY

Buildings are designed for optimal performance, to secure affordable and low carbon energy use, and integrate WSUD for user and ecological benefit

2.1 Maximise energy efficiency of buildings. Design for effective natural ventilation and efficient heating, ventilation, and air-conditioning (HVAC) systems

2.2 Design high-performance envelopes with good insulation, shading and appropriate building separation.

2.3 Maximise rooftop Photo-voltaic installations on all new buildings. Consider mandating minimum requirements.

2.4 Promote all-electric buildings to reduce carbon emissions and reliance on fossil fuels.

2.5 Maximise onsite water capture + re-use in all new buildings.

2.6 Maximise the integration of green infrastructure, prioritising canopy trees.

3. RESOURCE OPTIMISATION

Promote a whole of life approach to maximise resource use, recovery and reuse.

3.1 Encourage 'long-life loose-fit' buildings with inherent flexibility for future adaptation.

3.2 Promote buildings that are efficient and have been optimised to minimise material use and maximise potential for material recovery.

3.3 Use low-carbon, durable, low maintenance materials.

3.4 Design buildings to promote positive behaviours such as recycling and composting.

4. CONTEXTUAL, LIVEABLE + ATTRACTIVE PLACES

Tall buildings that are contextual, liveable and attractive, with human scale urban environments at street level.

4.1 Ensure that tall buildings are designed to reinforce that desired character of streets and neighbourhoods, with particular consideration of matters such as- streetwall height, tower setbacks and building separation, locations for active street frontages and integration of street trees.

4.2 Pay particular attention to the quality of lower levels of buildings - providing a human scale to those frontages that are experienced up close.

4.3 Promote generous provision of elements that contribute to comfort and liveability, including open space, landscape, communal amenities such as opportunities for pets, recreation, and food production.

5. COMFORTABLE MICROCLIMATES

Tall buildings provide for comfortable micro climates and limit undesirable impacts on surrounding urban amenity.

5.1 Ensure buildings are designed to promote air circulation and cross ventilation. Elements such as winter gardens should not compromise air flow.

5.2 Establish built-form parameters to allow air-flow between buildings whilst mitigating negative wind conditions on the adjacent streets, public domain and neighbouring buildings. Consider streetwall ratios of not greater than 2:1 (height to width) and generous tower separations.

5.3 Utilise high-albedo materials for roofs and horizontal surfaces but avoid reflective facades.

5.4 Provide clear built form controls to ensure public amenity spaces, such as parks, maintain excellent winter solar access. Ensure adjoining residential properties maintain at a minimum 2 hours of winter sun.

5.5 Given the affect of local conditions, including adjoining buildings, require all proposed tall buildings undertake a wind assessment.

6. DIVERSE TYPOLOGIES

Tall buildings providing diverse housing and work environments for the changing demographics.

6.1 Consider mechanisms for promoting a wide range of residential buildings aligned with the forecast demographic profiles for Bankstown and Campsie. Ensure built-form controls support a wide range of housing typologies.

6.2 Innovation is not easily managed through prescriptive controls. Consider mechanisms to promote and support the delivery of innovative approaches that provide demonstrable social or environmental value.

6.3 Ensure planning policy and controls align with market expectations to enable the realisation of relevant commercial typologies. Mixed-use buildings with inclusionary zoning requirements can support employment land-use targets but also introducestechnical and financial complexity that may inhibit development.

6.4 Promote parking solutions - including above ground - that enable adaptation to other productive uses.

7. DESIGN EXCELLENCE PROCESSES

Exemplary processes that support and enable design excellence in tall buildings.

7.1 Align policy with Better Placed design objectives to promote consistent vision for design quality.

7.2 Consider how to complement prescriptive controls with processes that promote and support innovation and design excellence more broadly.

7.3 Consider planning mechanisms that ensure design quality is managed and delivered throughout the lifecycle of approvals and construction.

7.4 Consider alignment between any design excellence provisions or incentives and any sustainability bonus schemes contemplated.

3.0 DEVELOPING THE MASTERPLAN

—

Phase 3 of this Tall Building Study includes site specific design testing to inform recommendations on development standards for tall building developments in Bankstown City Centre and Campsie Town Centre.

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3.1 SITE SPECIFIC TESTING INTRODUCTION + ASSUMPTIONS

INTRODUCTION

Phase 3 of this Tall Building Study includes site specific design testing to inform recommendations on development standards for tall building developments in Bankstown City Centre and Campsie Town Centre.

The subject sites were selected in collaboration with Council. The sites were selected on the basis that they aligned with one or more of the following considerations:

- locations exhibiting important existing character;
- locations undergoing change, or where significant change is contemplated;
- areas of focus in Council's Masterplan study;
- site configurations (size, proportions, and access) are representative of common or typical conditions in parts of the respective Centres;

The selected sites were considered to be useful test sites in their own right but also provided broad coverage of different conditions across the two Centres. The selection of these sites does not represent a particular strategic importance ahead of other sites, nor do the inclusion of these design studies represent their endorsement as being appropriate scale or development intensity for those sites or conditions.

Whilst not explicitly driven by a commercial brief or yield targets, the design studies were informed by the specialist Economics + Land Use Study and give regard to prevailing commercial considerations that invariably influence the viability of tall buildings in a context such as Bankstown or Campsie (such as floorplate size, mixed-use configurations, and overall building size).

The studies focus on foundational principles relating to building height, form, access, ground plane interface, and integration of landscape, with a view to establishing basic built form parameters that can reliably fulfil Council's design quality and sustainability objectives. Realising those objectives is dependent on additional detailed design considerations beyond the scope of these studies. Further guidance regarding such considerations is provided in Section 3.2 of this report.

Numerous options have been developed for each site. The range of options is not exhaustive and other approaches may be valid or considered preferable.

The breadth of options and accompanying commentary are intended to assist Council to understand the interplay of different considerations and constraints at play in achieving design quality in tall buildings, to inform Council's own Masterplan studies, and ultimately inform potential amendments to Council's LEP and / or DCP.

KEY DESIGN ASSUMPTIONS

The site specific design studies are based on some general assumptions and reliable 'rule-of-thumb' allowances. The plans indicate high level approaches to services locations rather than specific solutions.

/ Building efficiencies (GBA/GFA): 80%

/ Floor to floor heights: residential: 3.1m / commercial: 3.65m /ground + plant: 5.0m

/ Assumes waste collection occurs on site from loading / waste area. Should Council require waste holding and collection points at street, then additional space will need to be provided and reduce the extent of active frontage indicated.

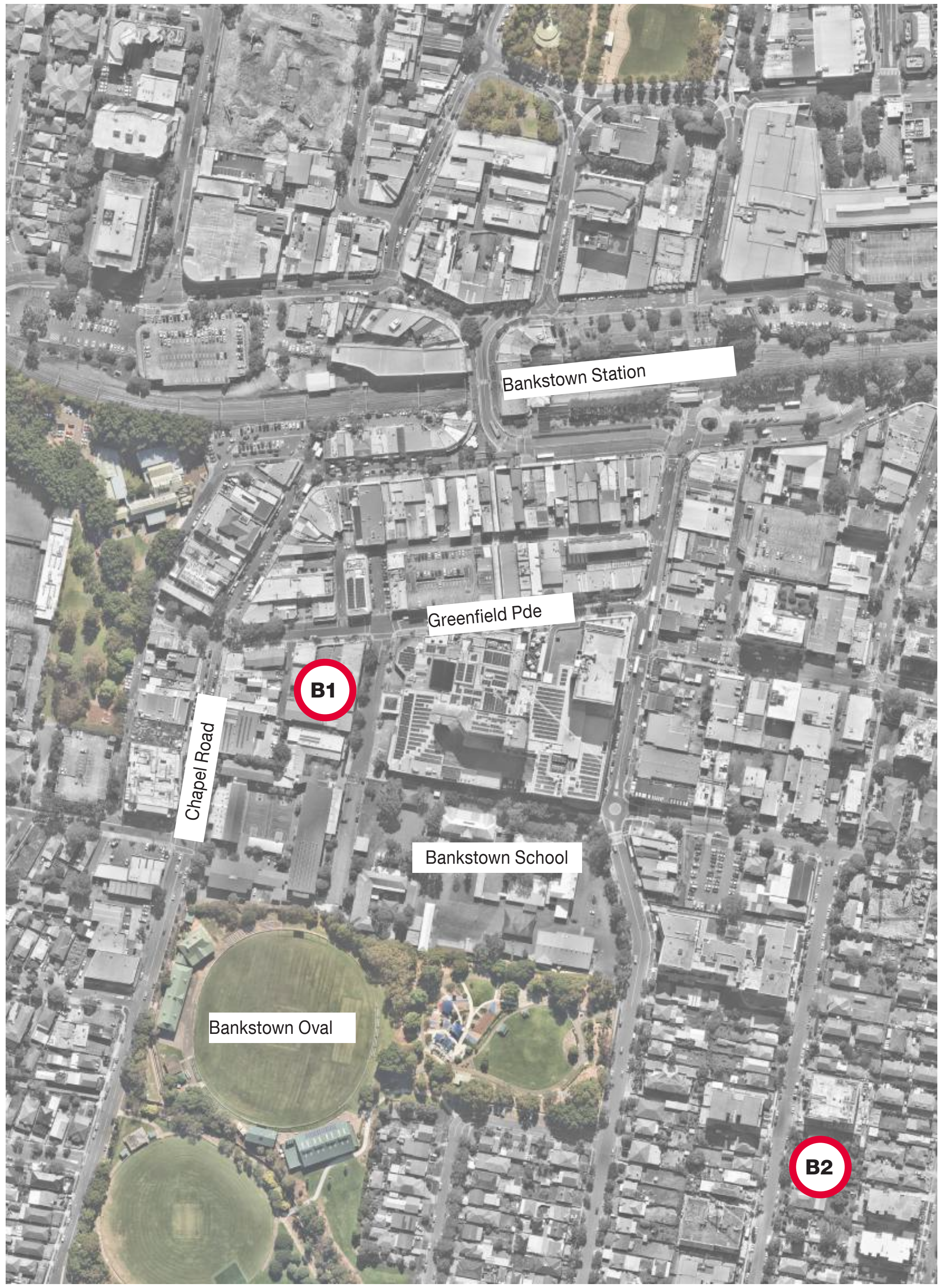
/ Assumes allowance of 6-8m frontage be dedicated to services to accommodate (or provide access to) key items being substation (4-5m) and fire hydrant boosters (2-3m). We have assumed an all electric building, eliminating the need for gas meter room at ground level. These allowances can vary depending on existing infrastructure, building demands, and authority's requirments. Items that don't require direct street frontage are assumed to be provided in back-of-house (including basements)

/ Assumes plant rooms are located in basement or roof levels.

/ Podium and intermediate terrace levels indicated as potential open space and landscape opportunities. Uppermost roof level generally assumed to accommodate plant, including solar panels, but may provide additional landscape opportunities.

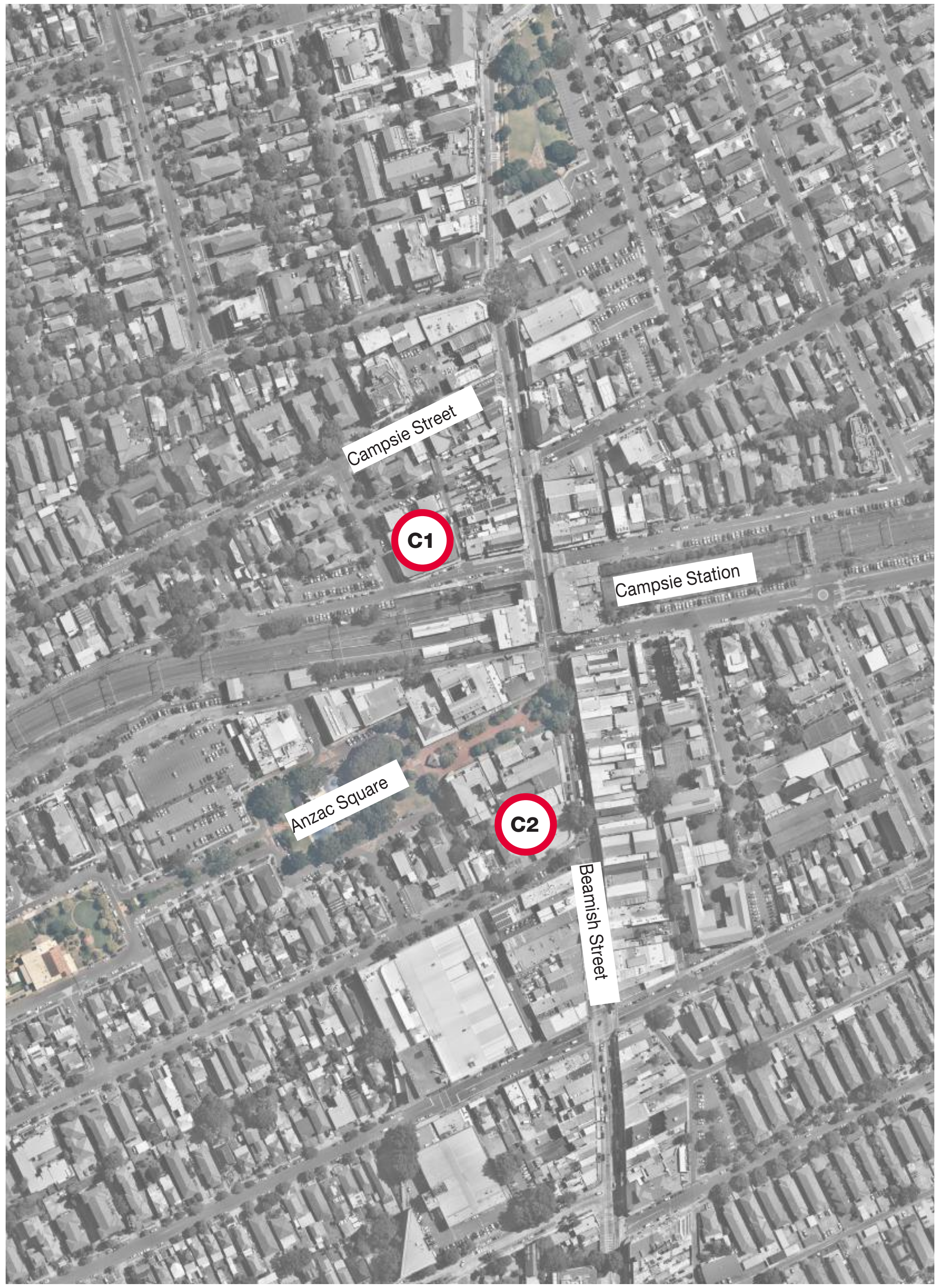
3.1 SITE LOCATIONS

Scope: In collaboration with Council, choose two typical sites from each centre, test building envelopes, size of services, car parking access and basement car parking and analyse the issues and constraints to inform development standards for tall buildings.



Bankstown Site Locations

B.1 1 Mona St and 16-20 Greenfield Parade
B.2 22-28 Leonard Street



Campsie Site Locations

C.1 8-10 London St and 43 North Parade
C.2 212-222 Beamish Street and 7-9 Amy Street

SITE DETAILS

B.1 Bankstown Location 1

Location
1 Mona St and 16-20 Greenfield Parade
Site Area: 2,866m²
Dimensions: 52-65.9m x 48.6m

Locality
Commercial area with mix of uses including specially retail, sports club, parking station. Predominantly low-scale buildings with nil street setbacks. 10-storey commercial and hotel building east of the site.

Brief / Design parameters

/ Commercial use with target 1500m2 floorplate
/ Ground level retail
/ Sleeved podium parking (adaptable)
/ Height - up to 83m subject to testing
/ Rear lane access (test with and without)

B.2 Bankstown Location 2

Location
22-28 Leonard Street
Site Area: 2,025m²
Dimensions: 50.1m x 40.3m

Locality
Predominantly residential streets comprising mid-century detached single-storey dwellings and recent apartment developments of up to six-storey. Generous front and rear gardens.

Brief / Design parameters

/ Predominantly residential use
/ Flexibility to include hotel / student housing
/ Potential non-residential use at ground
/ Test implications of rear lane
/ Basement parking
/ Height - subject to testing

C.1 Campsie Location 1

Location
06-10 London Street / 43 North Parade
Site Area: 2,908m²
Dimensions: 63.7m x 41.9m

Locality
Located between the commercial Beamish Street and the residential streets comprising of apartment building of up to four-storey.

Brief / Design parameters

/ Student accommodation
/ Commercial podium with sleeved parking
/ Ground level retail
/ Rear lane access (test with and without)
/ Height of 50m (15 storeys)

C.2 Campsie Location 1

Location
212- 222 Beamish Street / 7 Amy Street
Site Area: 2,754m²
Dimensions: 63.9m x 39.5m

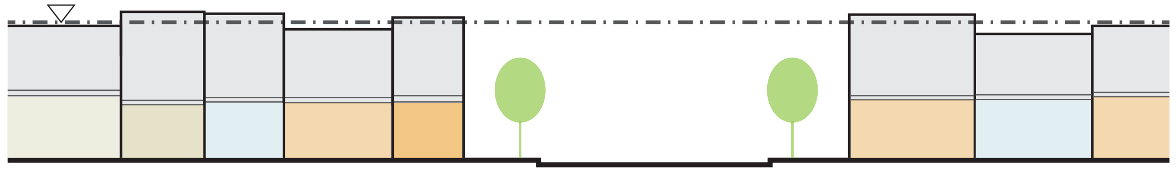
Locality
Located between the commercial Beamish Street and the residential streets comprising mid-century detached single-storey dwellings.

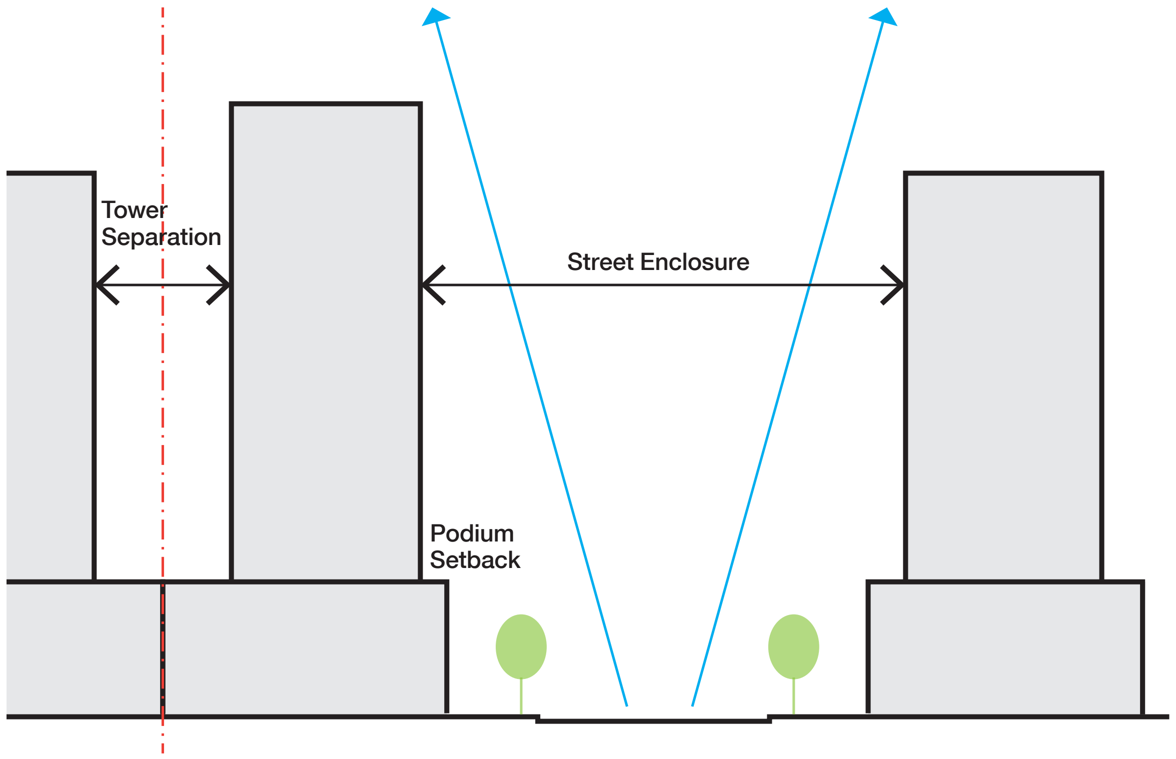
Brief / Design parameters

/ Residential Use
/ Commercial podium
/ Ground level retail
/ Basement parking
/ Height of 50m (15 storeys)

BUILT-FORM APPROACH

The site specific testing is informed by the following key considerations:





STREETSCAPE SCALE AND CHARACTER

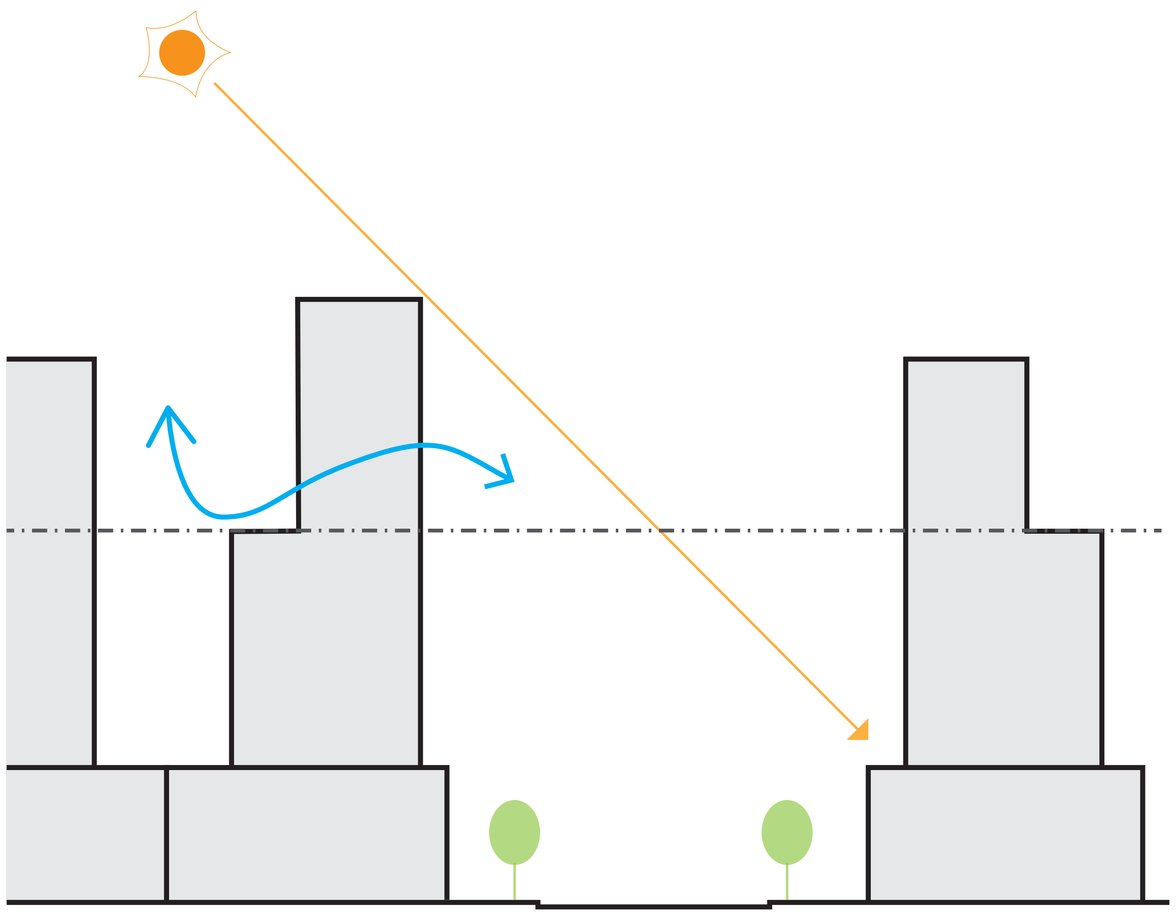
Establish a streetwall height and configuration that responds to the current and future desired context, by:

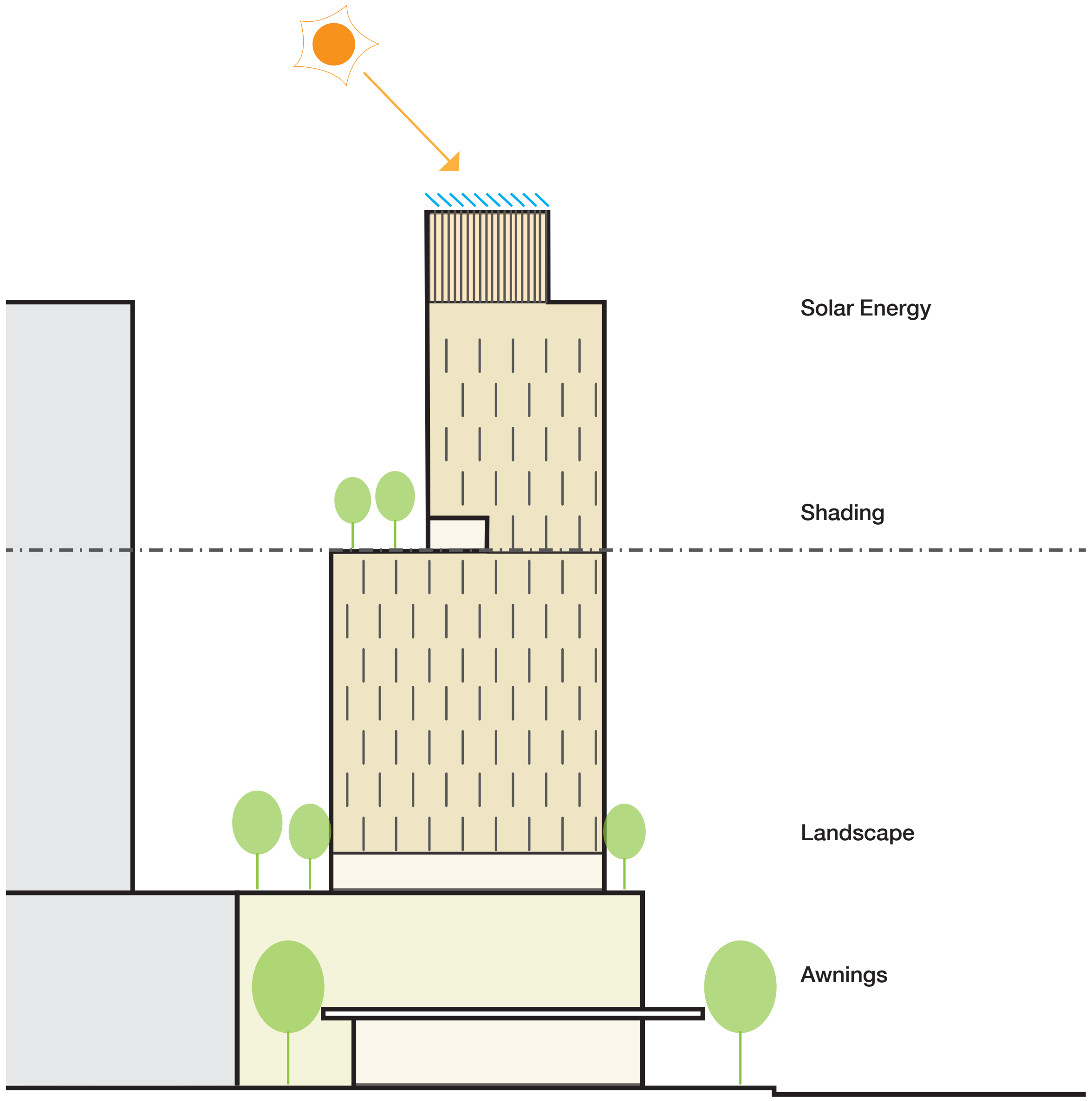
1. Relate to important individual buildings and / or dominant streetwall height and proportion. Recommend **2-4 storey** range.
2. Align frontages to achieve continuity and incorporate active frontages and/or landscaping, depending on the purpose of the locality.
3. Integration of vehicle and pedestrian movement.

TOWER FORM + SEPARATION

Establish tower form and separation including:

1. Setback tower from podium to manage perceived scale and create comfortable micro climates. Recommend **6m minimum** to street frontages.
2. Establish space between towers to allow airflow, light and privacy - achieve minimum 12m (or as per ADG for residential)





TOWER MODELLING

Refine tower massing to improve environmental performance and contextual fit. Consider additional tower setbacks or modelling with regard to:

1. Any prevailing intermediate scales within the locality;
2. To enable better solar access to adjoining public space or residential properties;
3. To improve sky-view factor and allow air movement around buildings.
4. To reduce the perceived bulk of tall buildings
5. To provide opportunities for skygardens / landscaped podiums including tree planting

ENVIRONMENTAL

Develop site specific response to facades and integration of landscape and environmental overlays, including:

1. Integration of landscape;
2. Provision of roof-top photo-voltaics
3. Facades and shading specific to orientation
4. Provision of communal spaces with access to outdoor terraces or similar.
5. Integration of awnings for amenity in the public realm.

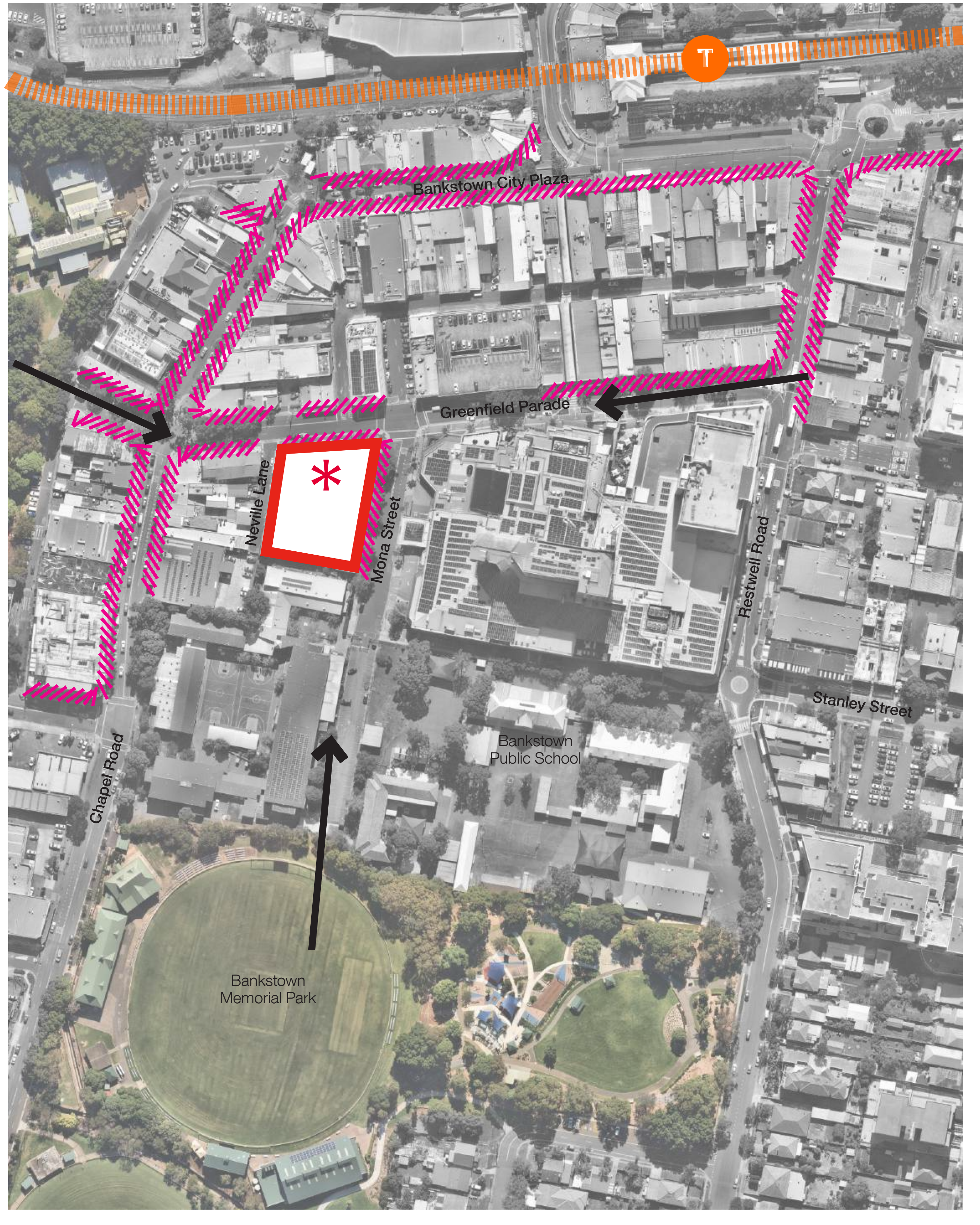
3.2.1 SITE B.1 BANKSTOWN

SITE CONSIDERATIONS

/ Prevailing low-scale streetwall (1-3 storey)
/ Tall buildings to east (10 storey)
/ Visually prominent from key locations including Bankstown Memorial Park, Olympic Parade.
/ Important pedestrian / retail environment, including Chapel Rd to west
/ Potential solar impact to Bankstown Memorial Park south of the site.

Brief / Design parameters

/ Commercial use with target 1500m2 floorplate
/ Ground level retail
/ Sleeved podium parking (adaptable)
/ Height - up to 83m subject to testing
/ Rear lane access (test with and without)

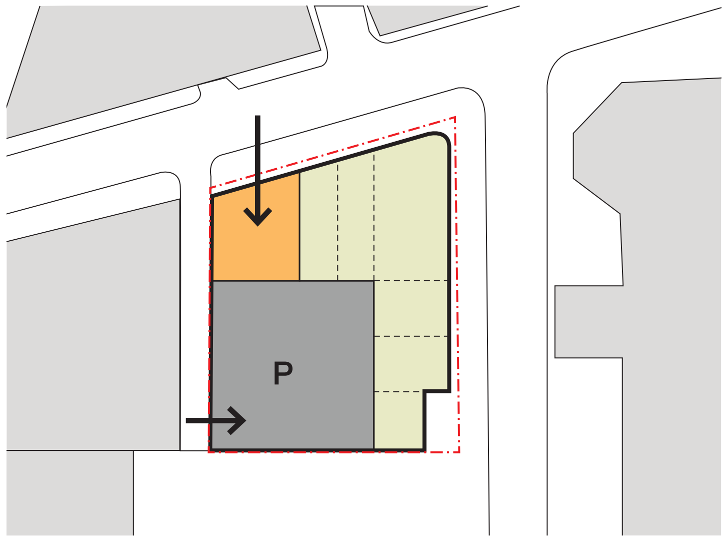



Greenfield Parade East


Greenfield Parade (West)


Mona Street

SITE B.1 APPROACH



STREETSCAPE SCALE AND CHARACTER

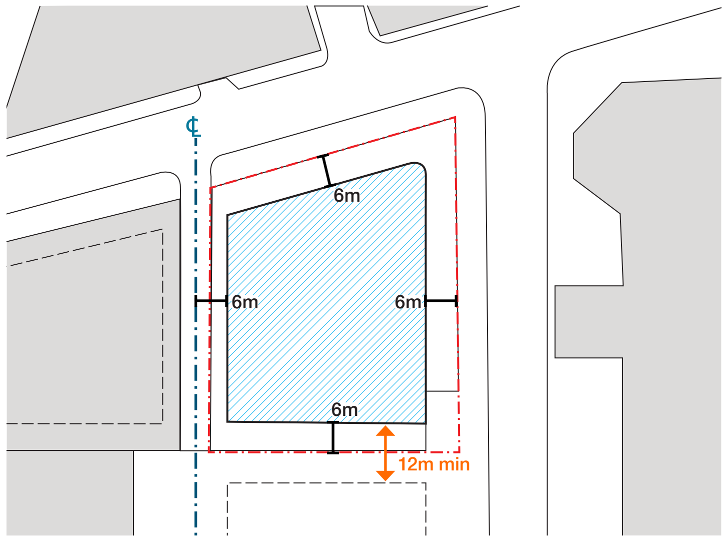
/ Nil setback to street frontages

/ Low-scale podium. 3 storey nom

/ Active frontages to both streets. Prominent commercial entry and fine-grain narrow retail tenancies

/ Awning protection

/ Sleeved parking and services accessed from lane, or secondary street (Mona St).



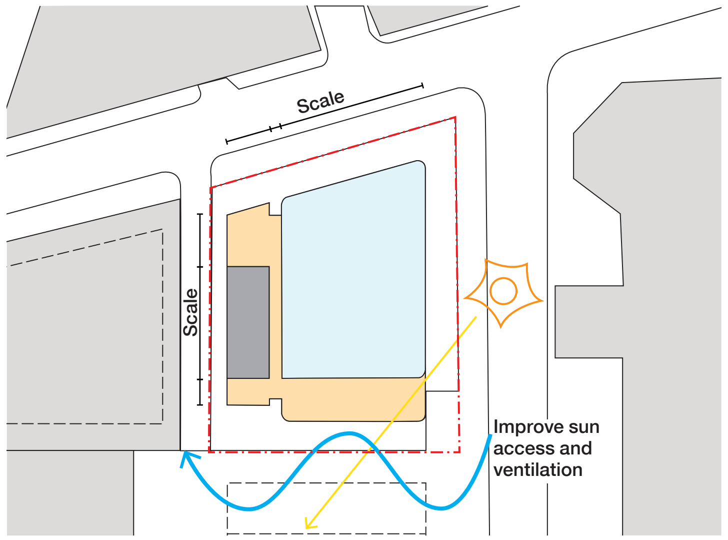
TOWER FORM + SEPARATION

/ Minimum 6m setback from boundaries or centre-line of lane.

/ Achieves minimum 12m separation between towers irrespective of land-use.

/ Additional setbacks for residential uses, in accordance with Apartment Design Guide.

/ Achieves 1500m2 commercial floorplate in accordance with brief.



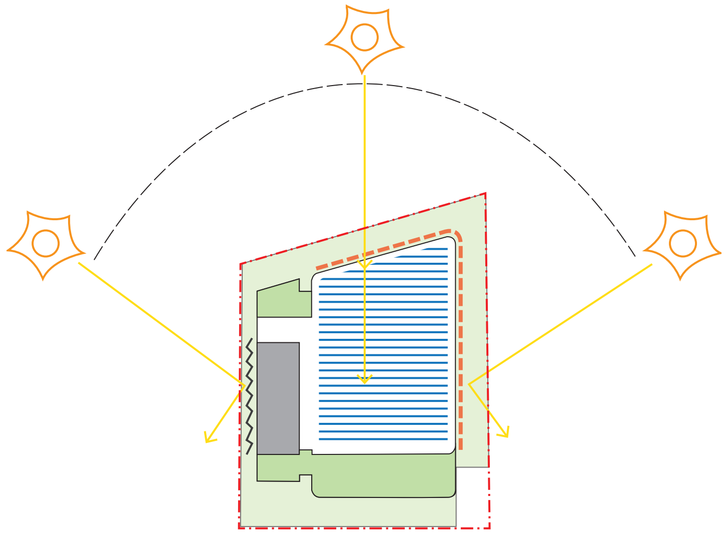
TOWER MODELLING

/ Reduced tower floorplates for upper levels

/ Improves separation between adjoining (future) towers - improved air movement and solar access.

/ Reduces solar impact

/ Articulation of tower form to reduce perceived bulk - expressed side core with winter gardens / breakout / terraces on NW and SW corners.



ENVIRONMENTAL

/ Extensive rooftop solar panels

/ Extensive planting on podium and intermediate terraces.

/ Eccentric core located on west assists to minimise heat load.

/ North and east facades require shading and facades designed to minimise heat ingress.

Retail
Lobby
Landscape
Services / Parking

SITE B.1 SUMMARY

SUMMARY

Three massing options have been tested, starting with a simple extruded typical tower floorplate. Subsequent options introduce additional articulation to improve contextual fit and building separation.

All options achieve a FSR in excess of 10:1.

Site Area:	2849m2
Height:	up to 83m tested
Levels:	21 (plus plant)
Typical floorplates	1100-1500m2 GFA
Typical efficiency	85-87% efficiency (TBC)
Parking	54 spaces / podium level 108 total (2 level podium)

Assumes 3.65m typical commercial floor to floor height, Plant enclosure 5.0m nom. Ground level 4.5m-5.0m (subject to issues including loading, access to plant such as substation etc).

Assumes waste is collected from dedicated collection point within the nominated loading area.

OPTION 01 - MAXIMUM TOWER ENVELOPE

Indicative yield: 33,381 m^2

FSR: 11.8:1

/ Typical tower floorplate (~1500m2) extruded to maximum height

/ Presents as large un-articulated mass with broad east + west frontages.

/ May have adverse shadow impacts to south.

/ Results in GFA in excess of 33,000m2 which may be beyond market demand for a single commercial building in Bankstown.

/ Level 3 podium terrace provides opportunities for planting, including small trees.

/ Recommend additional measures to mitigate bulk.

OPTION 02 - STEPPED FORM

Indicative yield: 30,401 m^2

FSR: 10.6:1

/ Typical tower floorplate (~1500m2) extruded to mid-height relating to other tall buildings in the vicinity.

/ Smaller high-rise floorplate (~1200m2) reduces visual bulk and improves sky-view factor and airflow between buildings.

/ Improve solar access to south.

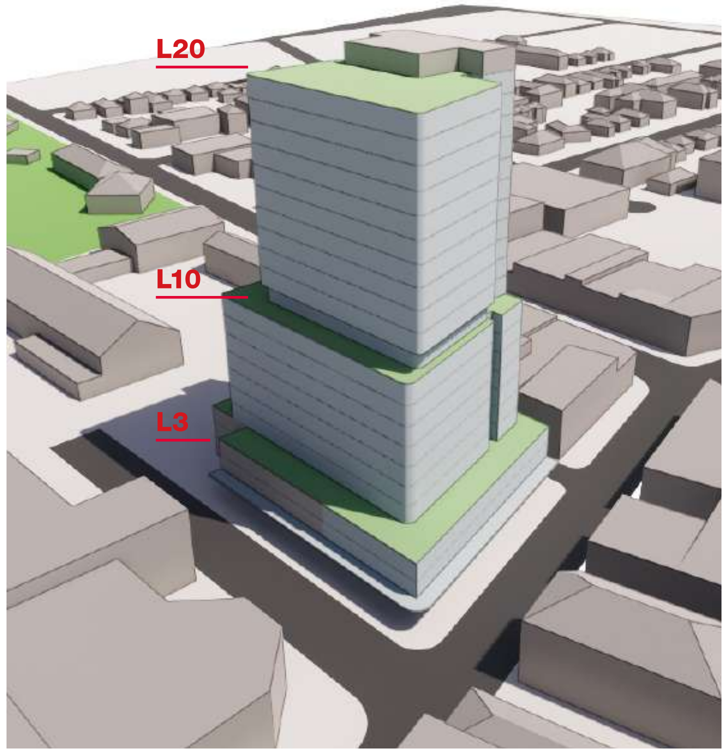
/ Provides opportunities for additional landscape terraces at Level 10.

/ overall massing is considered reasonable

OPTION 03 - ARTICULATED TOWER ENVELOPE

Indicative yield: 29,167 m^2

FSR: 10.2:1



/ Typical tower floorplate (~1500m2) extruded to mid-height relating to other tall buildings in the vicinity.

/ Smaller high-rise floorplate (~1000m2) reduces visual bulk and improves sky-view factor and airflow between buildings.

/ Additional small setbacks and recessed levels to tower reduced apparent scale and provides additional opportunities for additional landscape terraces (Level 10)

/ additional articulation and ability to integrated additional planting is considered positive

SITE B.1 PLAN OPTIONS

Each massing option utilises a side-core floorplate with features including:

/ open floorplate of between 24m and 27m depth provides flexibility for subdivision or single tenant.

/ excellent access to natural light

/ efficient structural solution & rational column grid (12.5m x 9m typical)

/ efficient core utilising scissor stair and consolidated services.

/ floorplate efficiency of approximately 87% typically. Allowance of 230m2 (13%) for core and services.

/ core on west facade assists to mitigate heat load

/ ability to provide windows to lift lobby / toilets

/ opportunities for mixed-mode breakout spaces / wintergardens on the NW + SW corners.

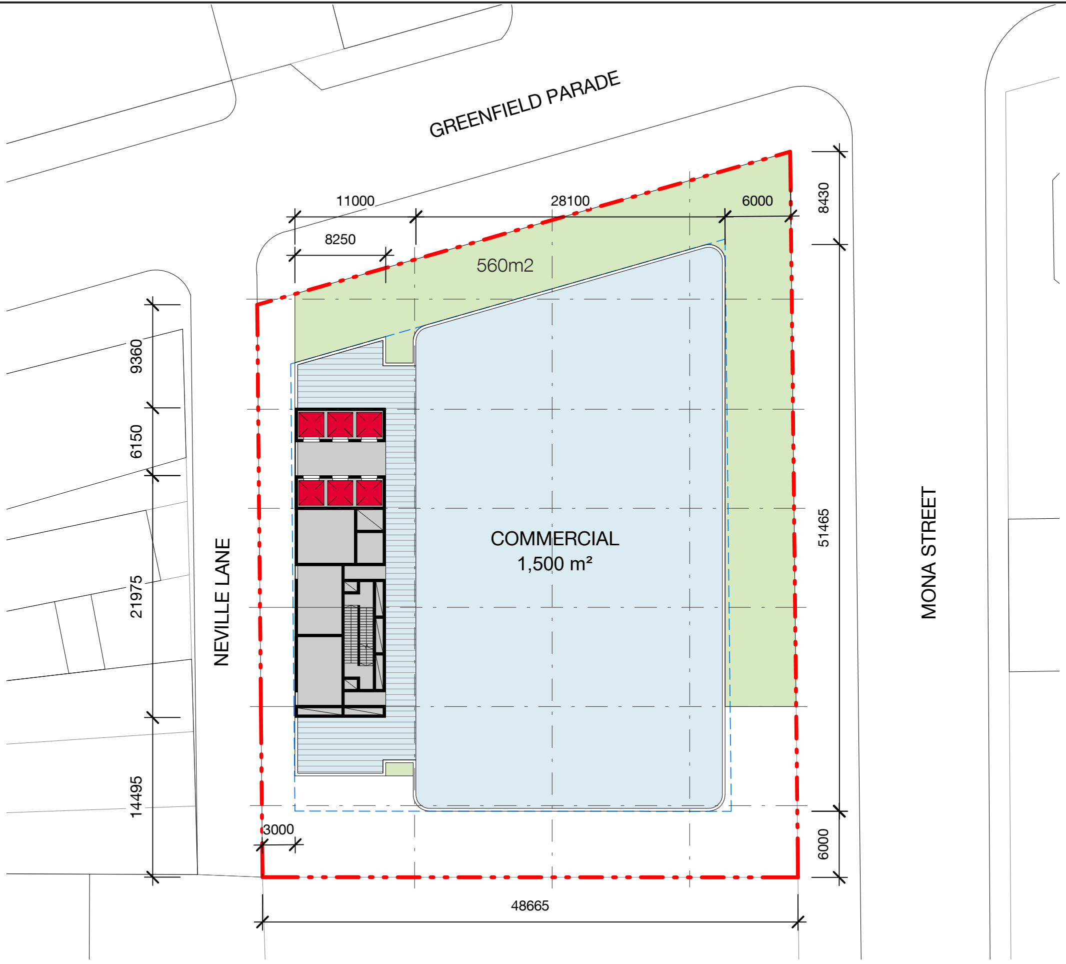
/ 6-8 m deep podium terrace to north and east provides extensive planting opportunities, including small trees. (An increased setback of 8m would support larger treet canopies)

Options 2+3 introduce additional articulation offering:

/ smaller floorplates - 1000-1200m2. Below the nominal target but considered acceptable

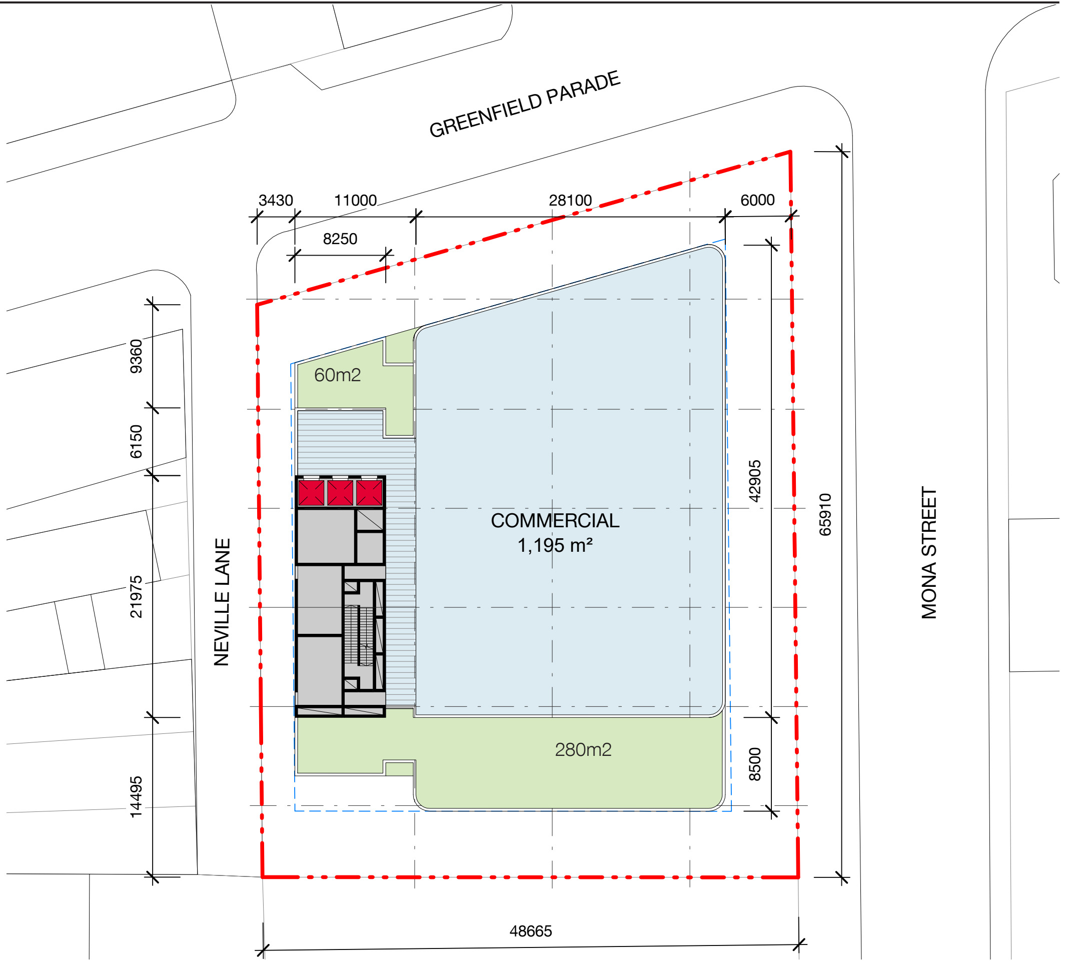
/ reduced floorplate depth of 24m (Option 3), improving daylight penetration.

/ additional terraces / balconies and planting opportunities at podium and upper levels. Level 10 terrace may support tree planting subject to wind conditions



OPTIONS 01 TYPICAL PLAN (LEVEL 3-20

OPTION 02&03 - MID-RISE PLAN (LEVEL 03-09)



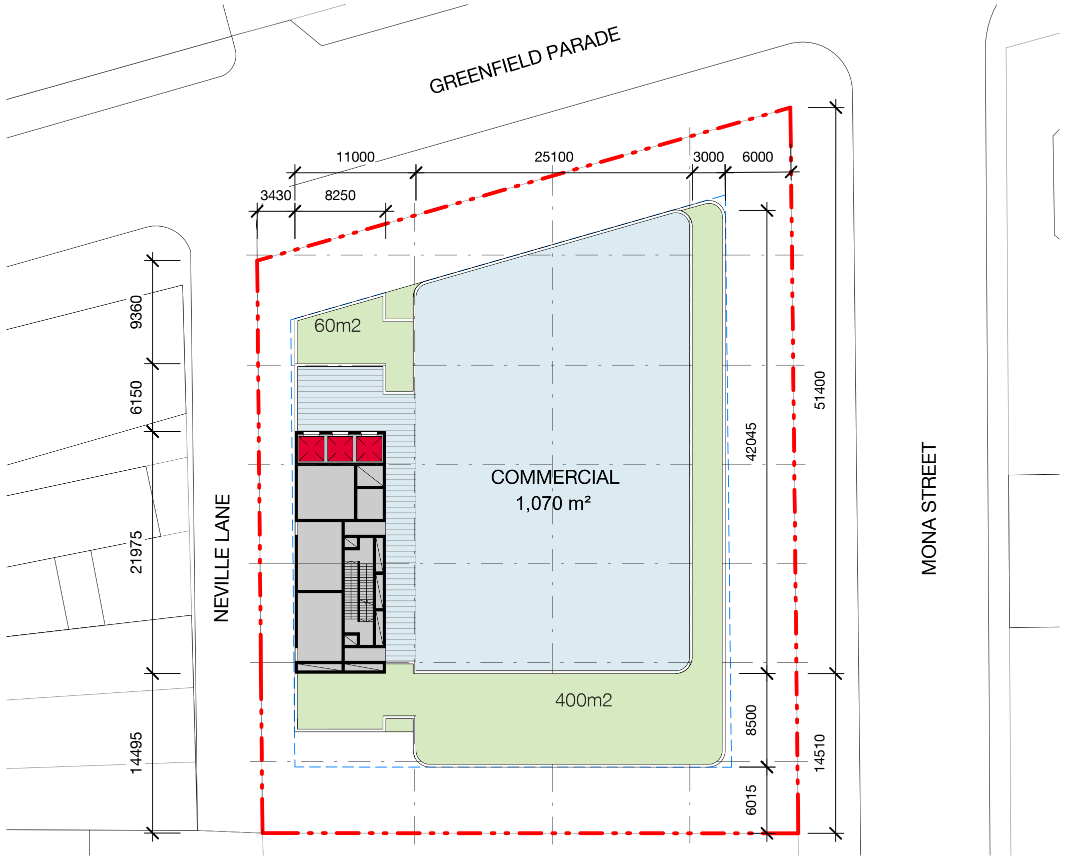
OPTION 02 - STEPPED FORM HIGH-RISE (LEVEL 10-21)

Indicative On-structure planting opportunities.

/ Option 01 Typical floor: 560m2 podium terrace
/ Option 02 High Rise floor: 340m2 terraces
/ Option 03 Articulate High-Rise: 460m2

Cummalitive potential on-structure planting for Option 03 (excluding roof): 1020m2 (35% site area)

Extent of planters subject to structural considerations, wind conditions, functional and user requirements for terraces. North facing podium terrace likely to enjoy favourable solar and wind conditions and sufficient space (8m) to support tree planting (TBC)



OPTION 03 - ARTICULATED TOWER HIGH-RISE (LEVEL 10-21)

BATESSMART.

0 25 50 m

N

SITE B.1 PLAN OPTIONS

LANEWAY + ACCESS OPTIONS

/ Laneway accommodates all vehicle access, fire egress and some servicing.

/ Allows majority of both street frontages to be active uses (retail / commercial lobby). (May require integration of some services)

/ Minimal opportunities for deep soil / planting at ground

/ Similar sites without lanes would require access from secondary street, resulting in reduction of retail GFA and active frontages.

/ Laneway access is considered desirable but not essential.

PODIUM PARKING

/ Partially sleeved parking provides active frontage to primary street.

/ Parking facing secondary street (Mona St) allows natural ventilation of parking levels

/ Parking facade will require high quality facade treatment

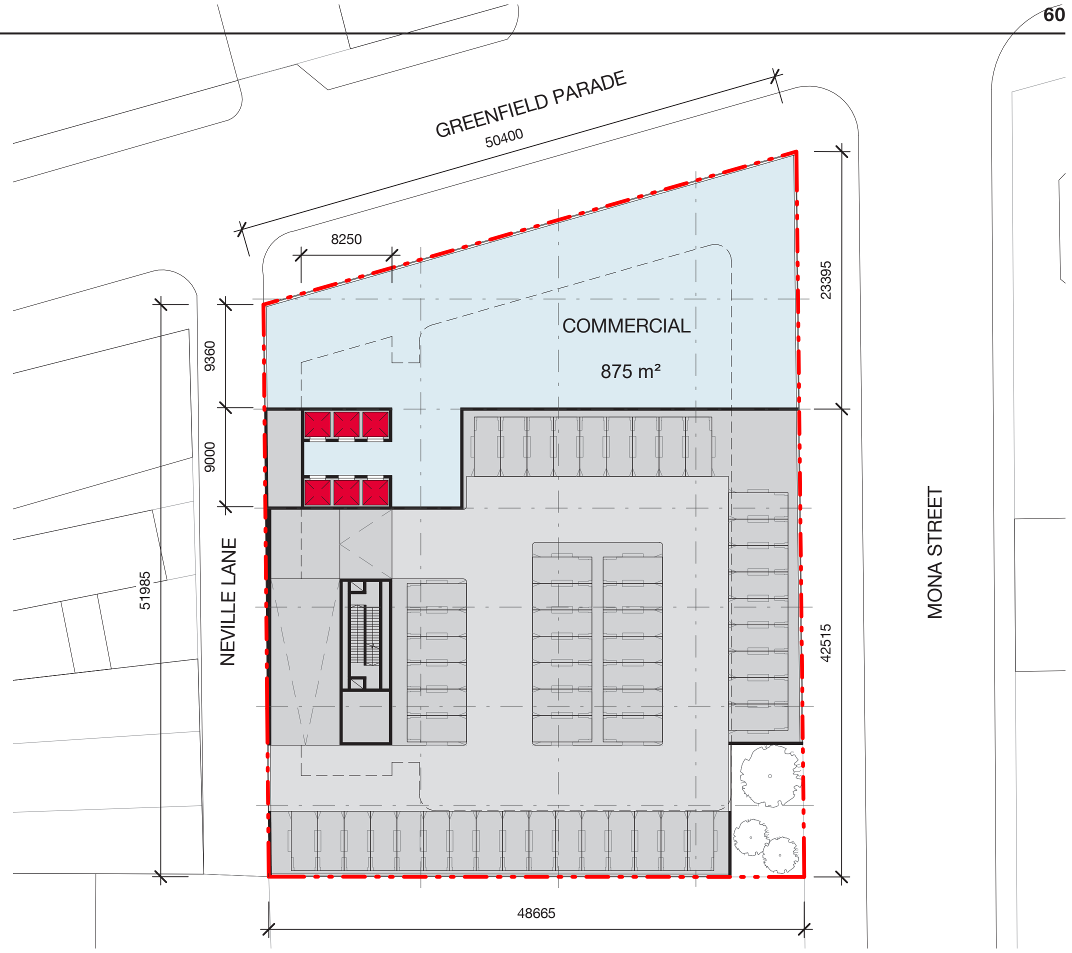
/ Flat slabs and increased floor to floor heights (3.6m min) will allow future adaptation to alternate uses.

/ Potential to adapt full, or part, floor of parking levels.\

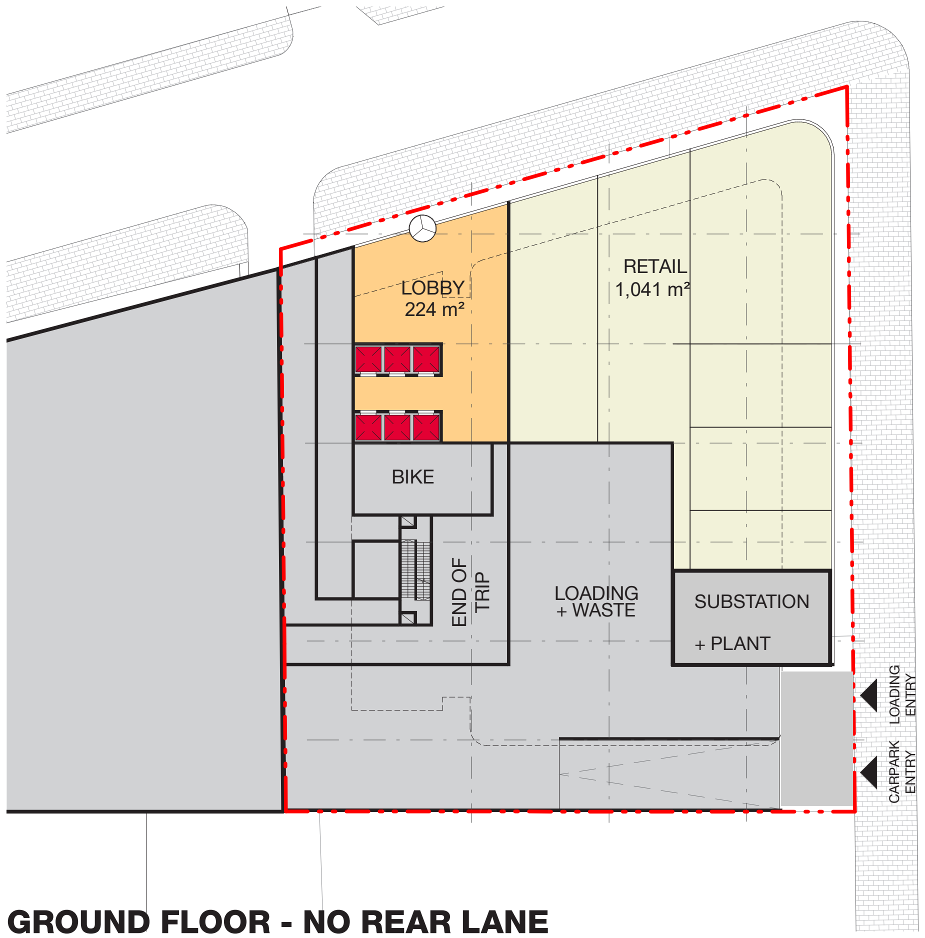
/ 2 levels provides ~108 spaces, below the current parking rates (DCP requires circa 350). May require additional podium height, basement levels, or be part of wider centralised parking strategy for the Bankstown Centre.

/ Recommend that podium parking be designed to allow adaptation.

GROUND FLOOR - REAR LANE ACCESS



PODIUM PARKING - PARTIALLY SLEEVED



GROUND FLOOR - NO REAR LANE

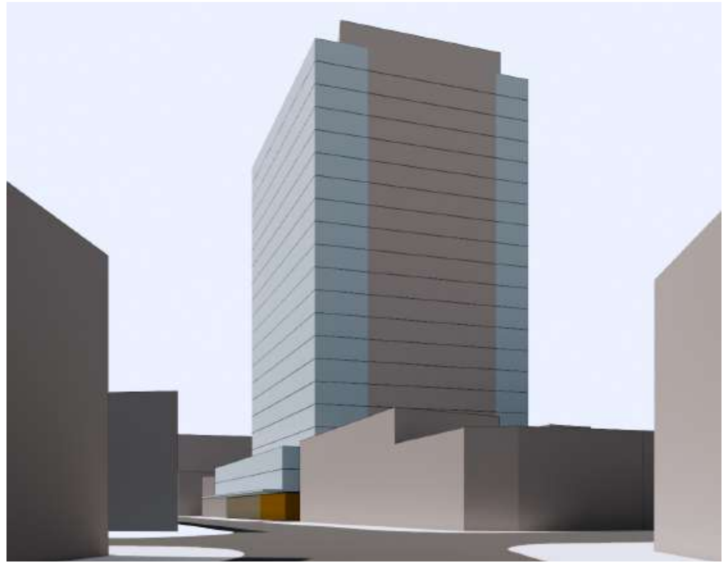
PODIUM PARKING - SLEEVED / FUTURE ADAPTATION OPTION

0 25 50 m

N

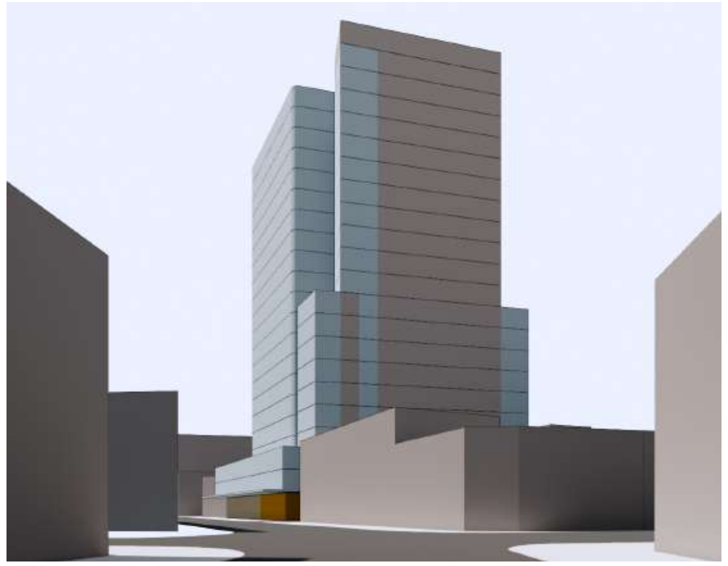
SITE B.1
VIEW ANALYSIS

OLYMPIC PARADE - VIEWING EAST



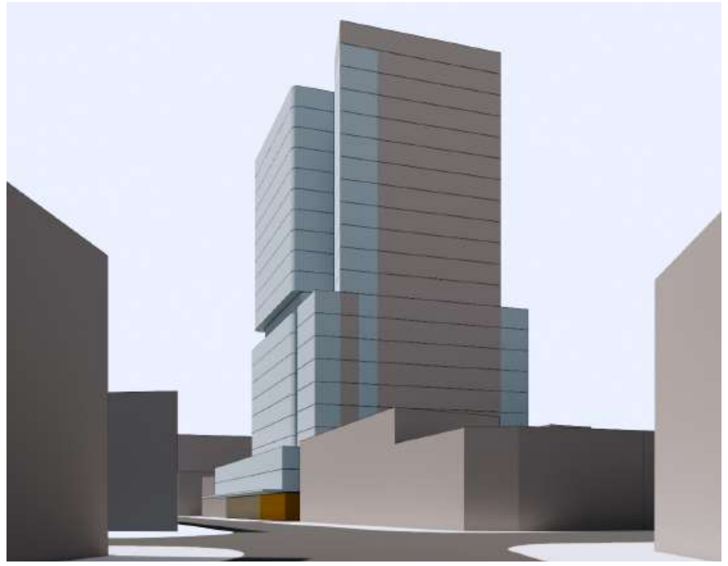
OPTION 01

/ Clear podium relationship
/ Broad west facade with limited articulation



OPTION 02

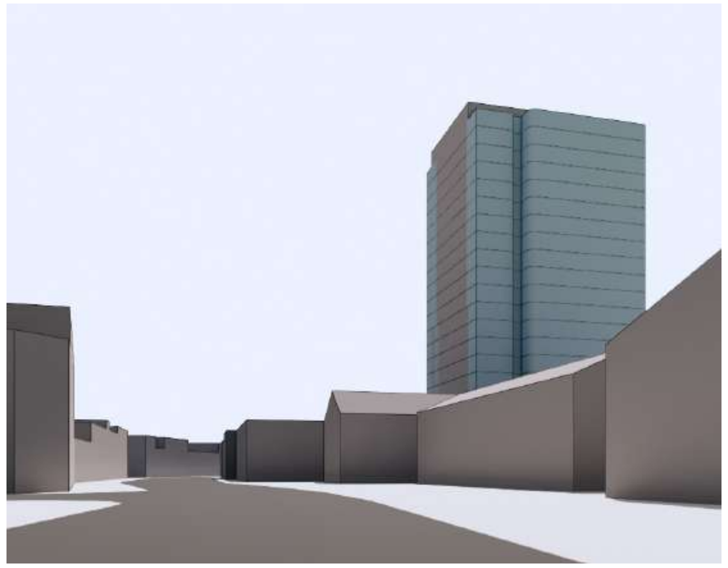
/ Smaller high-rise floorplate results in additional articulation and more slender west facade. Considered positive.



OPTION 03

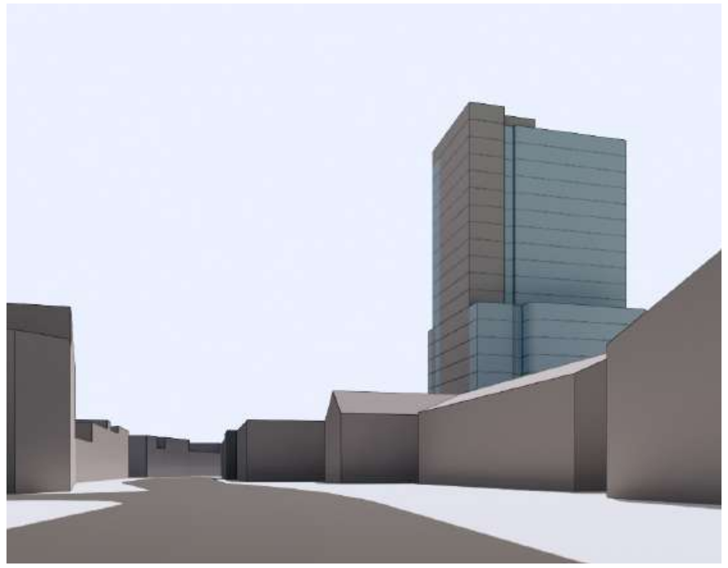
/ Additional tower articulation has negligible benefit from this viewpoint.

CHAPEL ROAD - VIEWING NORTH



OPTION 01

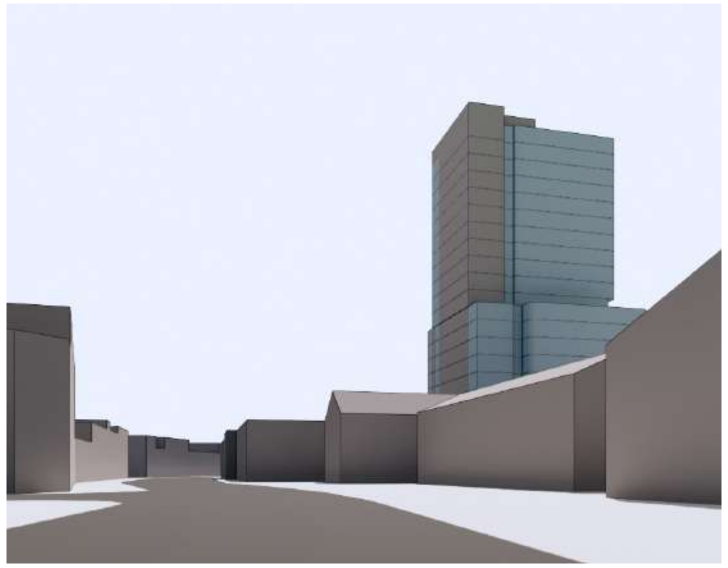
/ Retains the legibility of Chapel Street's low scale
/ South facade is broad and appears bulky



OPTION 02

/ Setback to upper levels reduces apparent bulk

/ Expression of core as a distinct element further reduces apparent bulk and provides visual interest

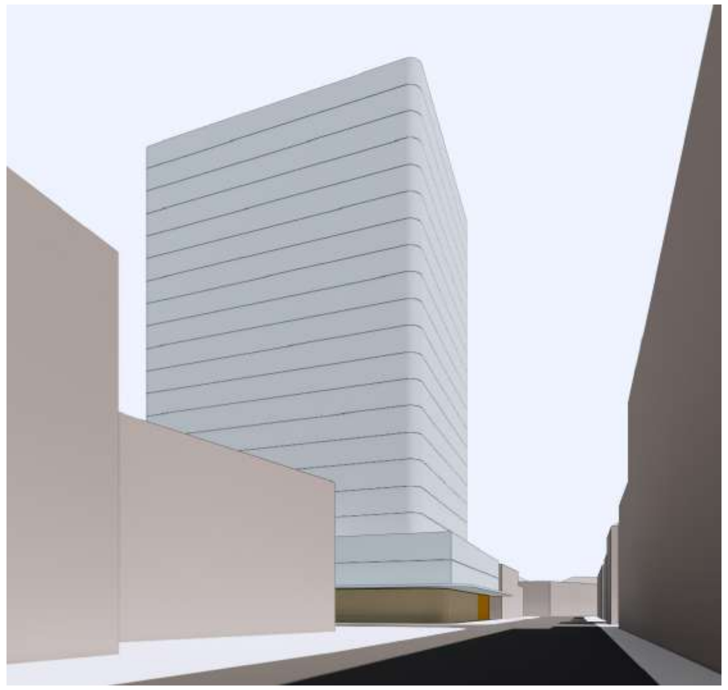


OPTION 03

/ Additional setback to east results in more slender tower. Considered positive.

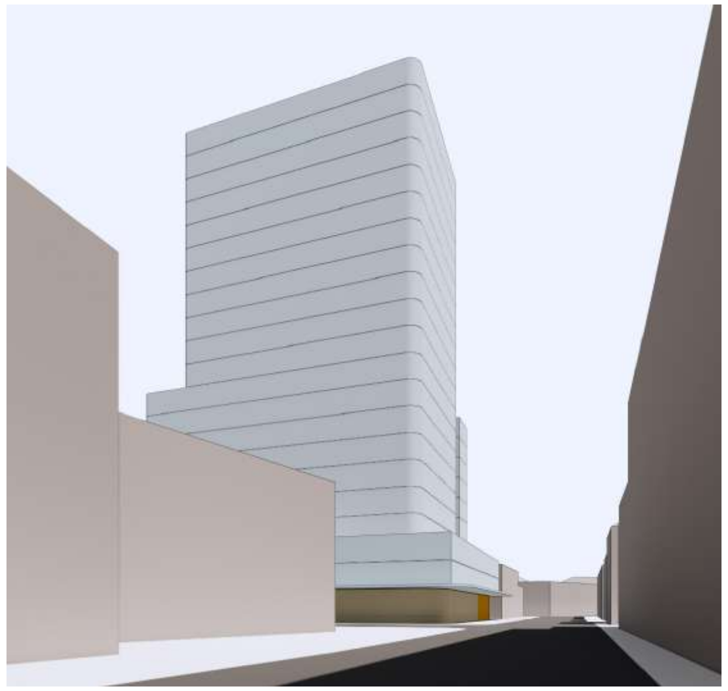
SITE B.1 VIEW ANALYSIS

GREENFIELD PARADE - VIEWING EAST



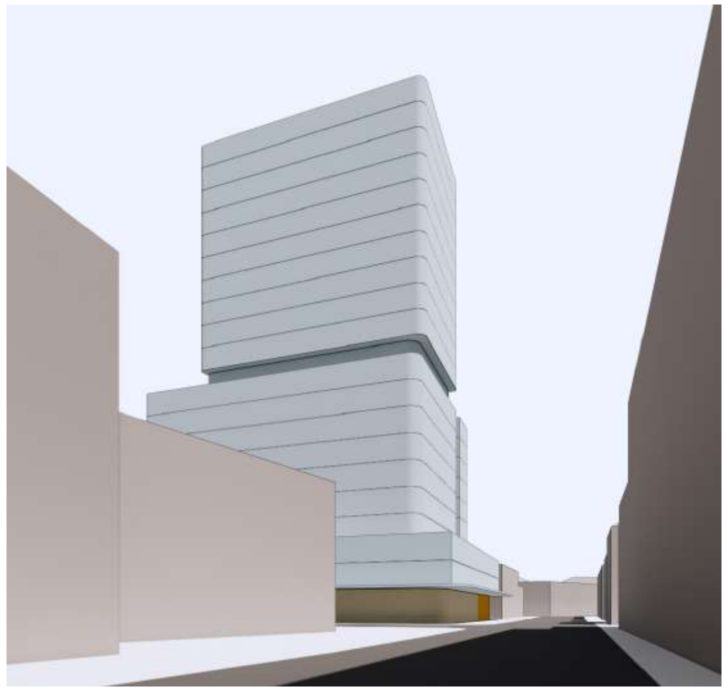
OPTION 01

/ Clear podium relationship to existing streetscape
/ Broad east facade with limited articulation - may be acceptable with facade treatment.



OPTION 02

/ Additional setbacks to south and west result in more slender tower expression. Considered positive.
/ Mid-rise 'shoulder' establishes a relationship with existing buildings of similar scape (circa 10-storey).



OPTION 03

/ Smaller high-rise tower floorplates and additional setbacks further reduce apparent bulk, however partially compromise vertical proportion and perceived slenderness. Considered likely to provide benefits but not essential.

SITE B.1 SOLAR ACCESS

CONSIDERATIONS

Shadow study based on 21 storey building (~83m) with articulated form / reduced high-rise floorplate;

/ Chapel Road overshadowed between 9am and 10am in mid-winter.

/ Bankstown Girls High School overshadowed in part between 9am and 2pm. Solar access to existing sports quadrangle is achieved from approximately midday.

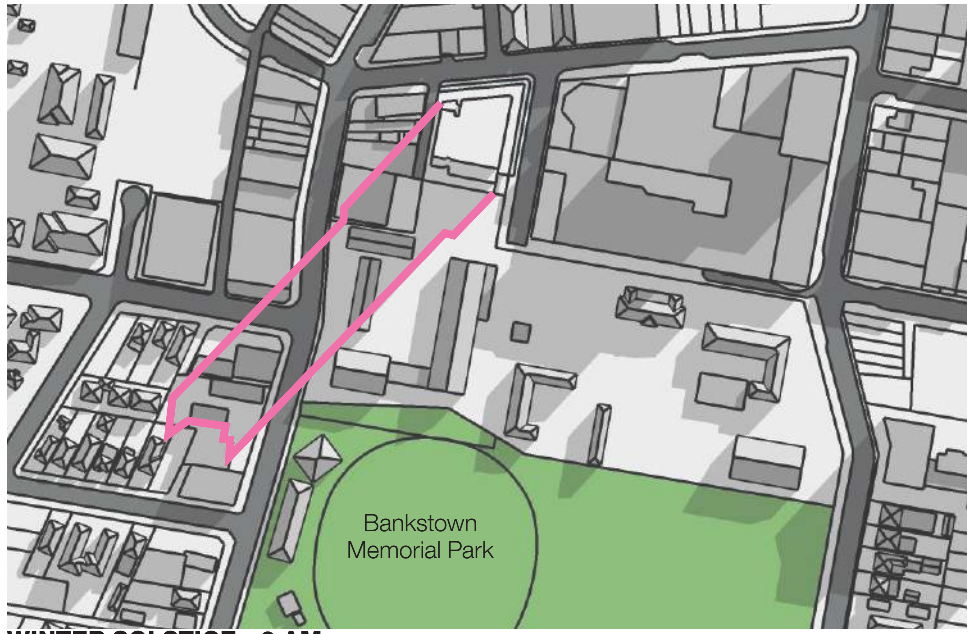
/ Bankstown Public School - overshadowing of outdoor play space from 12pm. Morning sun maintained.

/ All affected properties in the locality are assumed to be nonresidential.

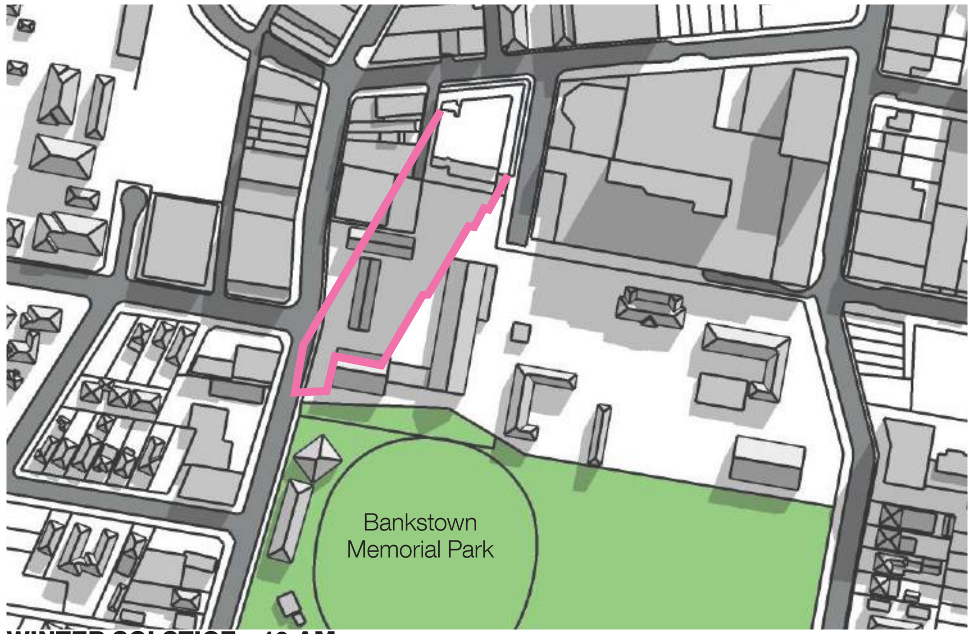
/ Solar access to Bankstown Oval / Memorial Park is maintained. No winter overshadowing.

Insights:

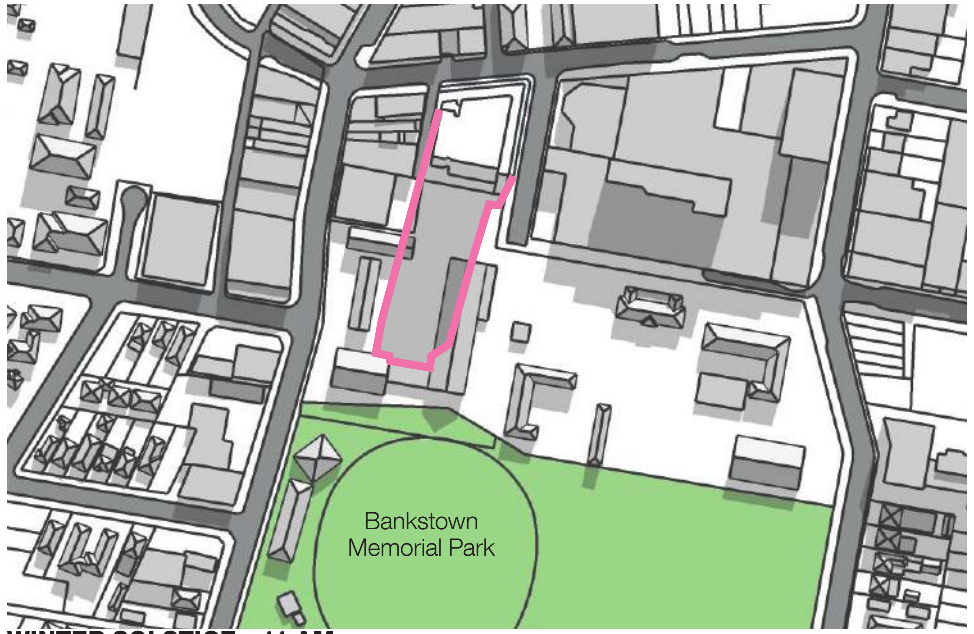
The massing tested preserves full solar access to the key public open space, with moderate impacts to outdoor spaces associated with the schools. Eliminating these impacts would require reduction in building height.



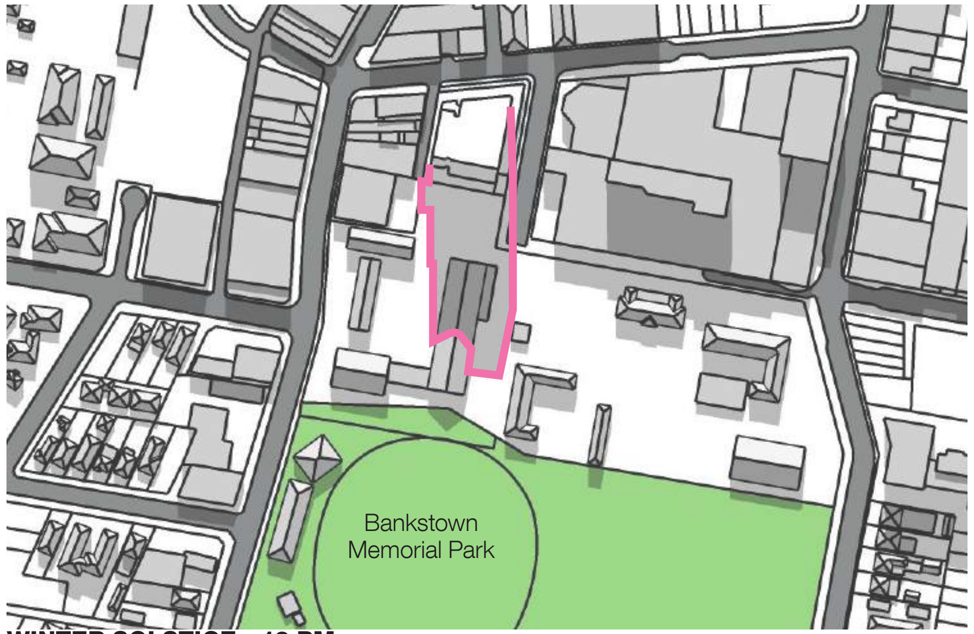
WINTER SOLSTICE - 9 AM



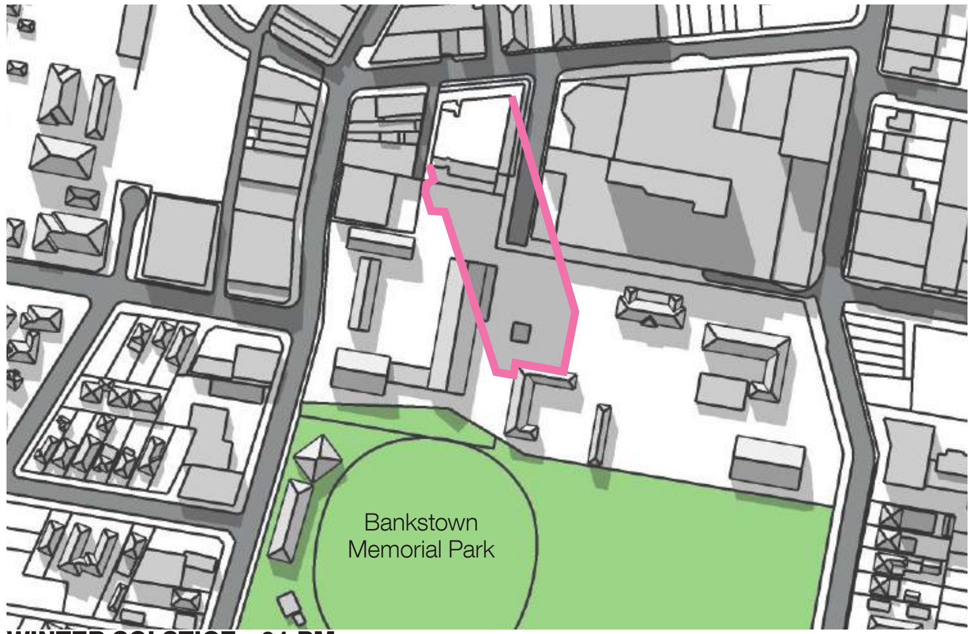
WINTER SOLSTICE - 10 AM



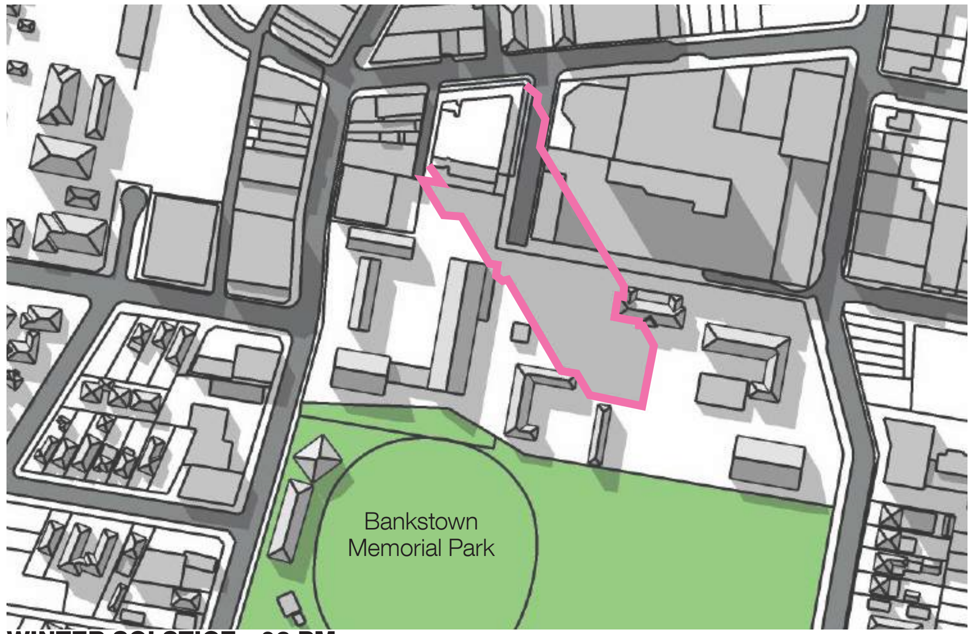
WINTER SOLSTICE - 11 AM



WINTER SOLSTICE - 12 PM



WINTER SOLSTICE - 01 PM



WINTER SOLSTICE - 02 PM

SITE B.1 INSIGHTS

Observations and insights from testing site B.1:

/ It appears that a building of 83m height can provide high quality commercial floorplates and establish a reasonable contextual fit with the locality, noting the predominantly commercial nature of the area.

/ On a site of this size, extruding the full 1500m2 floorplates to full height is unlikely to achieve the objectives relating to sky-view and airflow, identified as important aspects of achieving comfortable conditions. On this basis, further consideration should be given to measures to ensure adequate space between buildings, whilst enabling viable commercial floorplates.

/ The rear-lane is a valuable asset and contributes to a high quality streetscape. Similar corner sites without a lane could achieve an acceptable outcome with careful integration of parking and services.

/ Podium parking can be readily accommodated, subject to a high-quality facade, and adaptability has been demonstrated. However, a modest amount of parking can be achieved without introducing a taller podium streetwall. Podium parking may need to complement basement parking and / or be considered as part of an holistic approach to parking in the Centre.

/ The development achieves significant floorspace that may be beyond the demand for a single commercial development in Bankstown.

/ Competing priorities - including active frontages and commercially viable floorplates (~1500m2) substantially preclude deep soil planting at ground level on a site of this size. However, significant quantum of planting can be provided at podium and terrace levels.

Illustrative concept sketch (Massing Option 3) Site B.1 - Greenfield Parade looking west

Key features:

Maximise roof mounted Photo-voltaics

High quality treatment to roof plant enclosure.

Setback from southern edge to minimise shadow

Moderate amount of glazing and provide sun-shading tailored to specific orientation.

High-rise floorplate - additional minimum 6m setback to south to reduce shadow, improve air-flow, reduce bulk, and provide opportunities for additional planting (including trees)

Articulation to reduced apparent building height, relate to local context, and provide opportunities for planting

Naturally ventilated wintergarden spaces.

Minimum 6m tower setback to increase sky-view factor and provide opportunities for planting. Increased setback of 8m would support larger canopy planting.

3-storey commercial podium - contextual scale. Podium parking sleeved with high-quality facade.

Continuous awning to active retail frontage and commercial lobby. Rear lane allows extensive active frontage. Any services located within the primary frontages should be discretely integrated with high quality finishes.

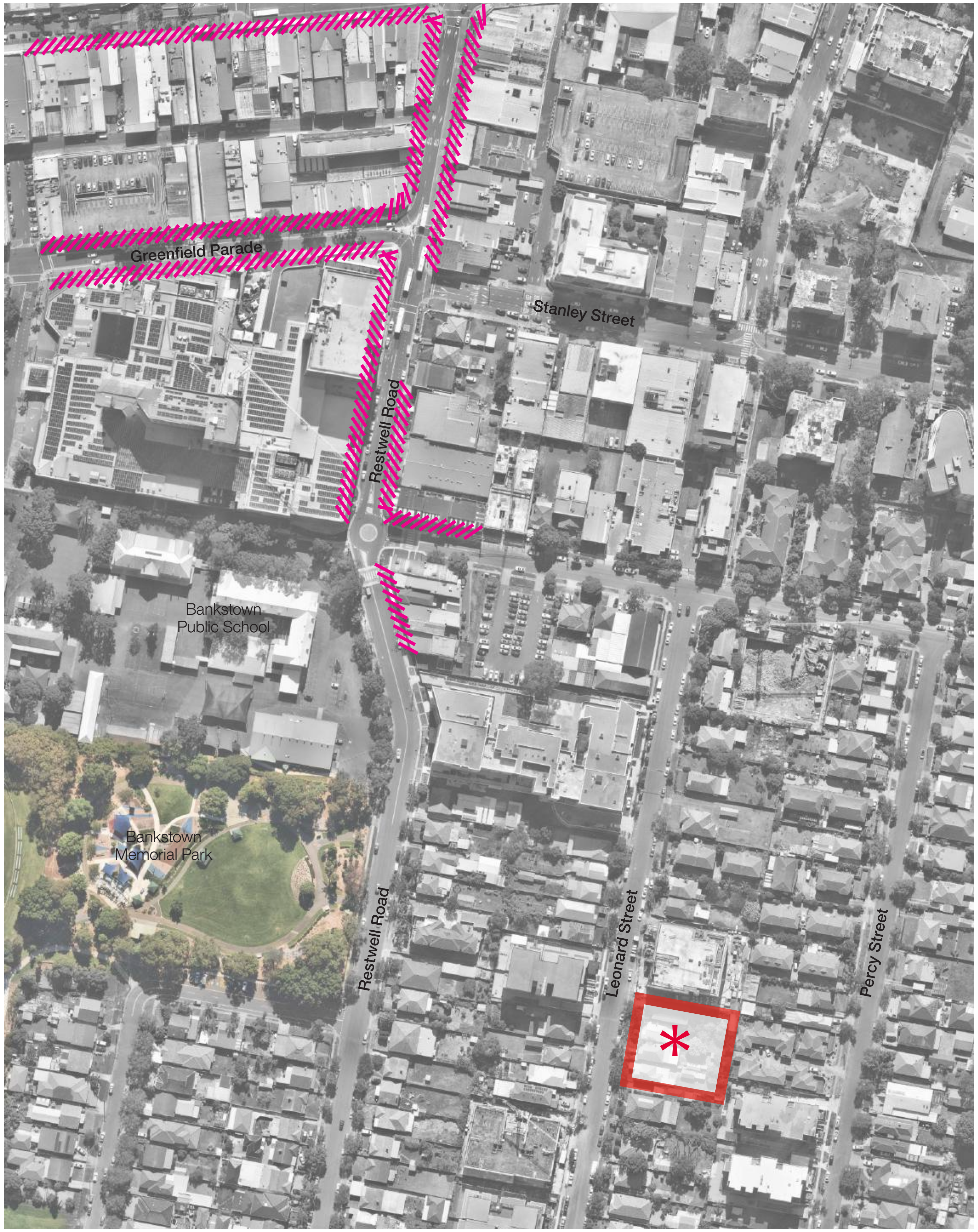
3.2.2
SITE B.2
BANKSTOWN

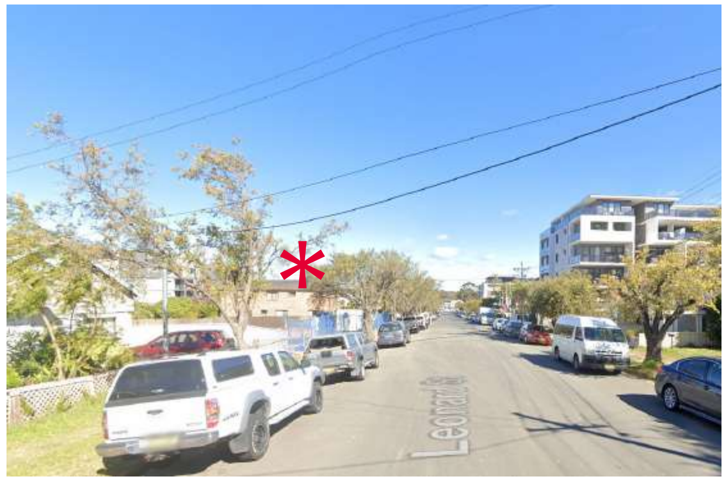
SITE CONSIDERATIONS

/ Predominantly residential streets comprising mid-century detached single-storey dwellings and recent apartment developments of up to six-storey
/ Buildings are setback from the street allowing for a continuous landscaping strip along the road
/ Potential solar impact on adjoining backyards and residential properties

Brief / Design parameters

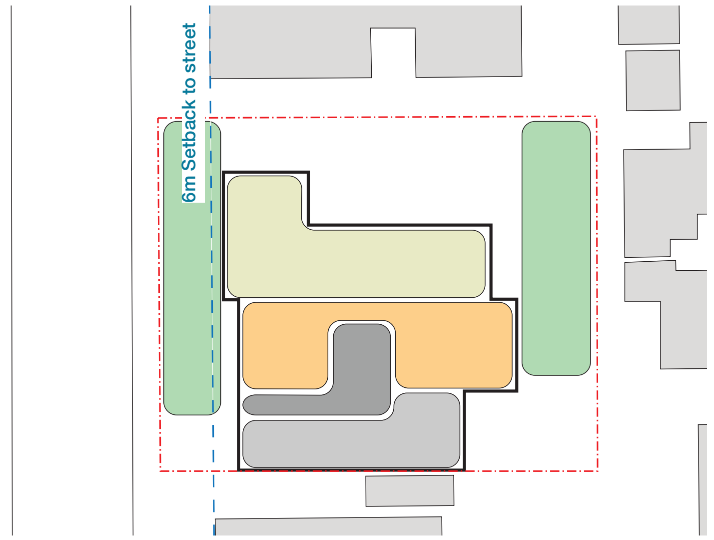
/ Predominantly residential use
/ Flexibility to include hotel / student housing
/ Potential nonresidential use at ground
/ Test implications of rear lane
/ Basement parking
/ Height - subject to testing




Leonard Street North


Leonard Street South

SITE B.2 APPROACH



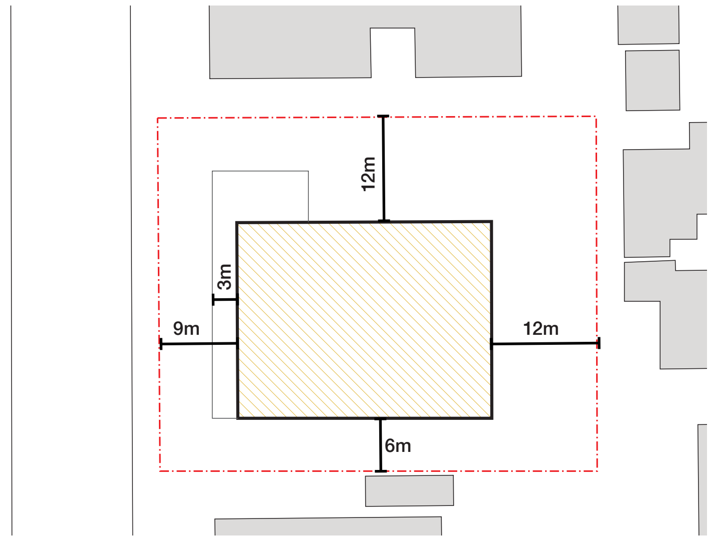
STREETSCAPE SCALE AND CHARACTER

/ 6m setback to street frontage to align with existing context and allow deep soil planting.

/ Low-scale podium of 4 storey nom.

/ Vehicular access along the southern boundary

/ Large deep soil to the front and rear of the property connected by a landscaped path to the north of the building



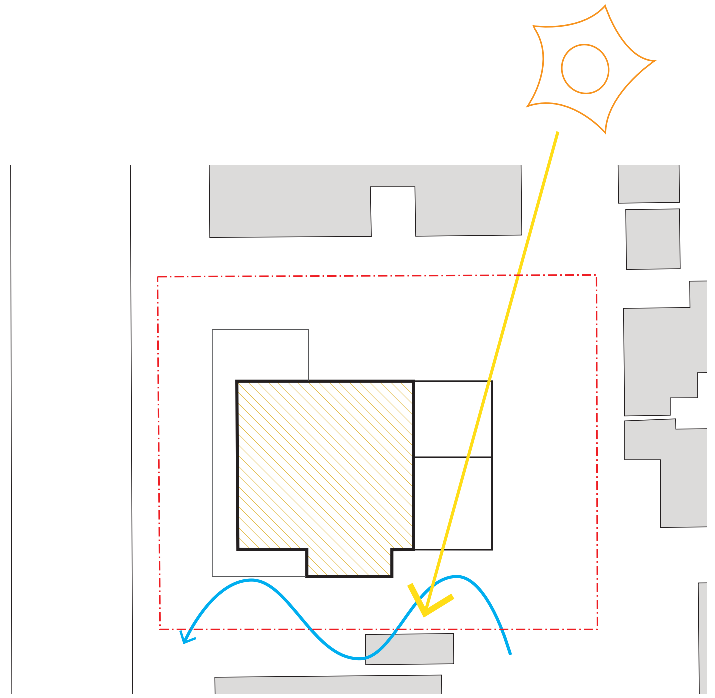
TOWER FORM + SEPARATION

/ 12m setback to the North and east

/ 6m setback to the South (Additional setbacks required for habitable room facing south in accordance with Apartment Design Guide).

/ 3m Setback from podium on street frontage (9m total from street)

/ Achieves 580m² residential floorplate

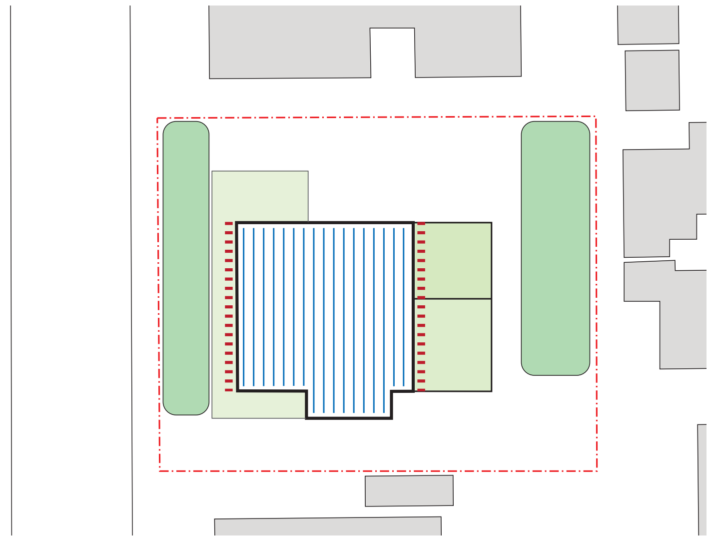


TOWER MODELLING

/ Reduced tower floorplates on the rear side for upper levels

/ Improves solar access and air movement to adjoining buildings and future towers.

/ Reduces overshadowing of adjoining private open spaces.



ENVIRONMENTAL

/ Extensive rooftop solar panels

/ Extensive planting on podium and intermediate terraces.

/ North, east and west facades require shading and facades designed to minimise heat ingress.

/ Consolidated ares of deep soil planting.

Residential
Lobby / Communal
Landscape
Services / Parking

SITE B.2 SUMMARY

SUMMARY

Three massing options have been tested with heights ranging from 15-24 storeys.

Site Area:	2,025m²
Height:	up to 80m tested
Levels:	15-24 (plus plant)
Typical efficiency	80% efficiency (TBC)
Nominal yield	75-120 dwellings
Parking	32 spaces / basement level
Deep Soil	530 m² (26%)

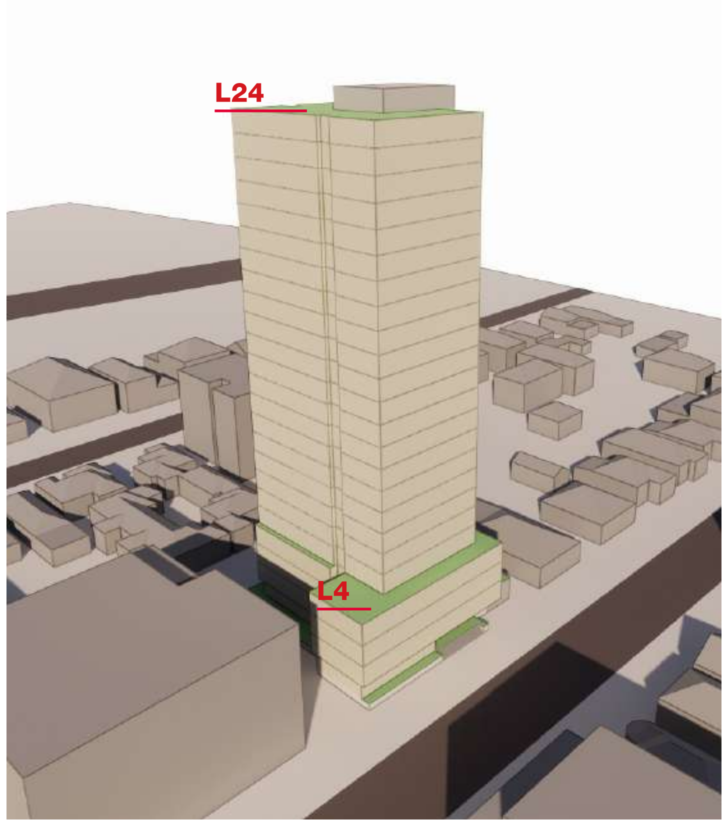
Assumes 3.1m typical residential floor to floor height, Plant enclosure 5.0m nom. Ground level 4.5m

Assumes waste is collected from dedicated collection point within the nominated loading area.

OPTION 01 - MAXIMUM TOWER ENVELOPE UP TO 80M

Indicative yield: 11,626 m²

FSR: 5.7:1



/ Typical tower floorplate (~460 m²) extruded to maximum height

/ Major visual impact due to building scale

/ Significant shadow impacts to south - however predominant east-west orientation of future apartment developments means solar access requirements may be able to be met.

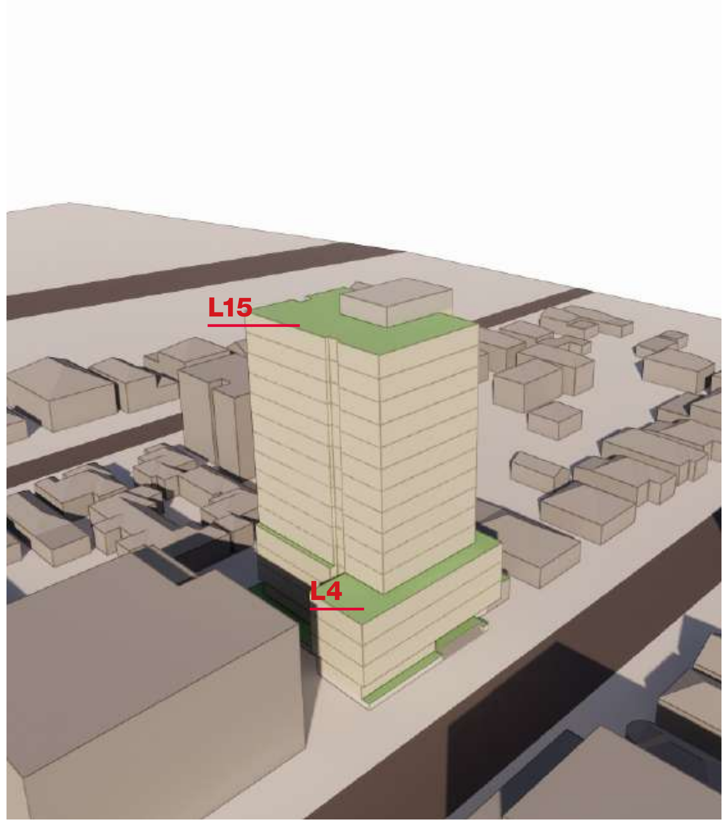
/ Achieves FSR of 5.7:1 (full residential) with circa 120 apartments and requiring approximately 4 basement levels for parking (at 1 car/du).

/ Compatibility of this height in this location requires further study as part of the masterplan. Recommend additional measures to reduce overshadowing.

OPTION 02 - MAXIMUM TOWER ENVELOPE UP TO 50M

Indicative yield: 7,914 m²

FSR: 3.9:1



/ Typical tower floorplate (~460 m²) extruded to a maximum height of 50m (15 storeys)

/ Reduces overshadowing and improves likelihood of future adjacent develops achieving solar access requirements.

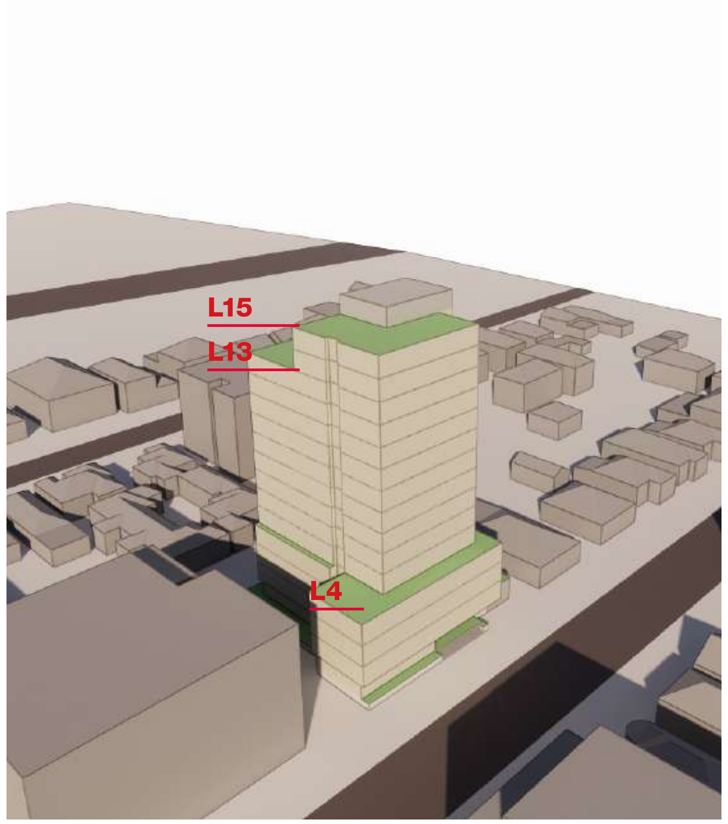
/ Achieves FSR of 3.9:1 with circa 75 apartments and requiring approximately 2.5 basement levels.

/ Lower scale is considered an improvement.

OPTION 03 - STEPPED FORM

Indicative yield: 7,420 m²

FSR: 3.7:1



/ Typical tower floorplate (~460 m²) up to level 12

/ Stepped from to the rear to improve solar access to adjoining backyards.

/ Similar outcome to Option 2 with minor improvements to performance and appearance. Benefits from additional roof terrace planting opportunity.

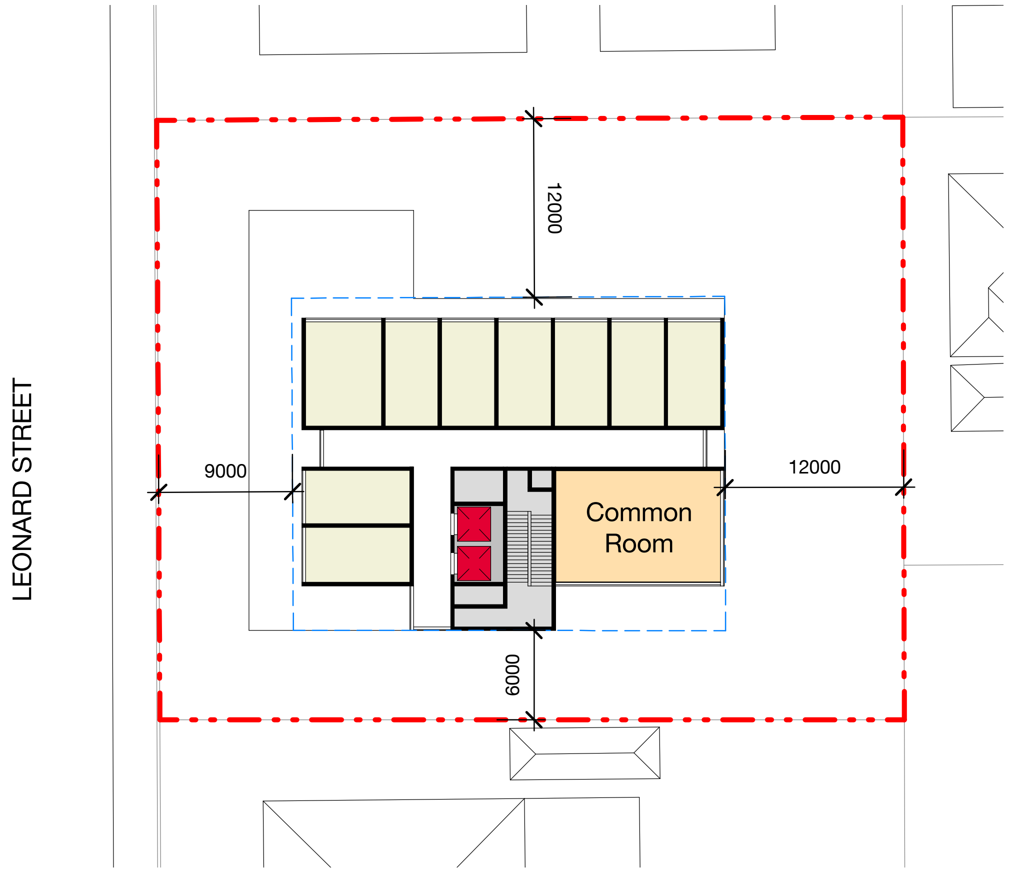
SITE B.2 PLAN OPTIONS

The tower floorplate has been designed to provide:
/ adequate separation between future adjacent towers;
/ ability to achieve ADG separation requirements
/ all apartments on typical levels to receive min 2hours sun
/ predominantly corner apartments with cross ventilation (~80% of units).
/ flexibility to achieve different unit mixes (ie 2x2B become 1x3B + 1x1B).
/ natural light and ventilation to lobby + stair

Flexibility for alternative uses:
/ The tower floorplate can readily accommodate alternative uses such as hotel or student housing. Different operator requirements and standard room sizes may result in a small reduction in floorplate as demonstrated in the student accommodation floorplan.

/ Integrating multiple uses within a single development at this scale is likely to be problematic, principally as separate lift access will be generally expected for most mixed-use combinations. This will result in an enlarged core / reduced efficiency in what is already a relatively small floorplate. Some uses may be compatible - such as market housing with serviced apartments or student housing - however other uses such as commercial (including hotel) are likely to be more feasible as standalone developments.

RESIDENTIAL - TYPICAL FLOOR (L4-12)



STUDENT ACCOMMODATION - TYPICAL FLOOR

RESIDENTIAL - UPPER FLOOR (L13-14)

BATESSMART™

0 25 50 m
N

Indicative On-structure planting opportunities.

/ Level 4 Podium terrace: 150m2
/ Level 13 Communal terrace: 210m2

Cummalitive potential on-structure planting for Option 03 (excluding roof): 360m2 (17% site area)

Extent of planters subject to structural considerations, wind conditions, functional and user requirements for terraces. North facing tower terrace likely to enjoy favourable solar and wind conditions and sufficient space (11m) to support tree planting (TBC)

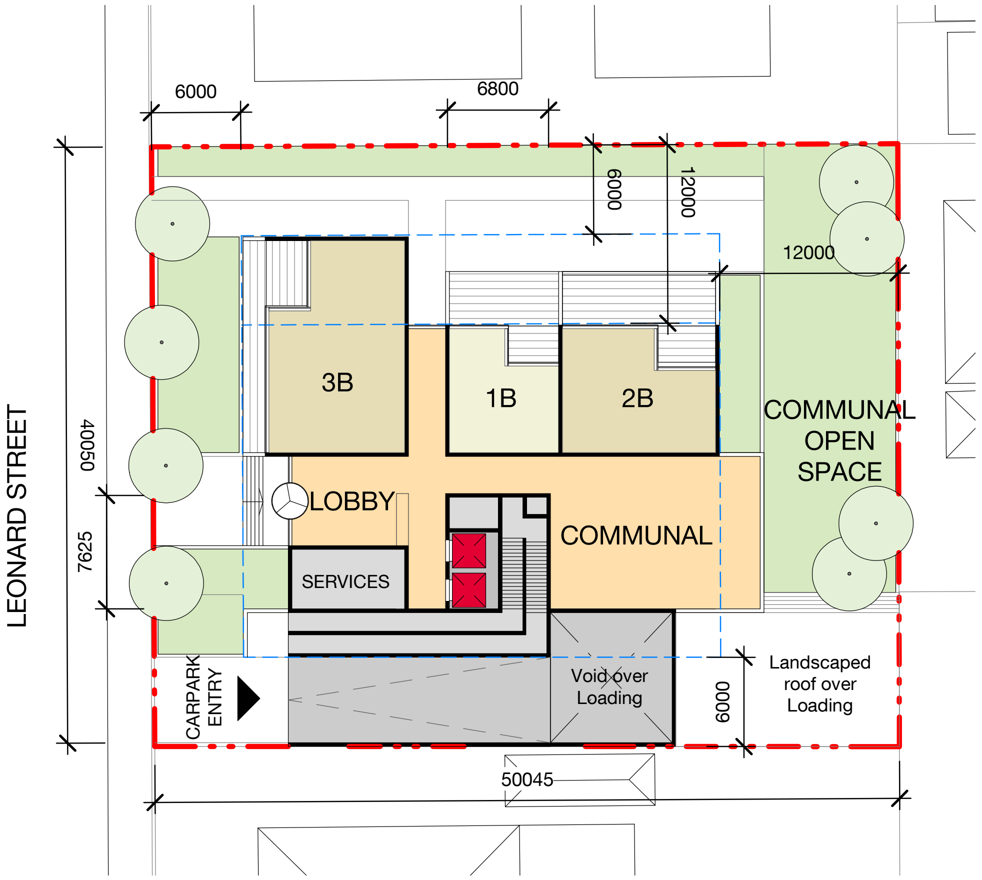
SITE B.2 PLAN OPTIONS

Ground level:

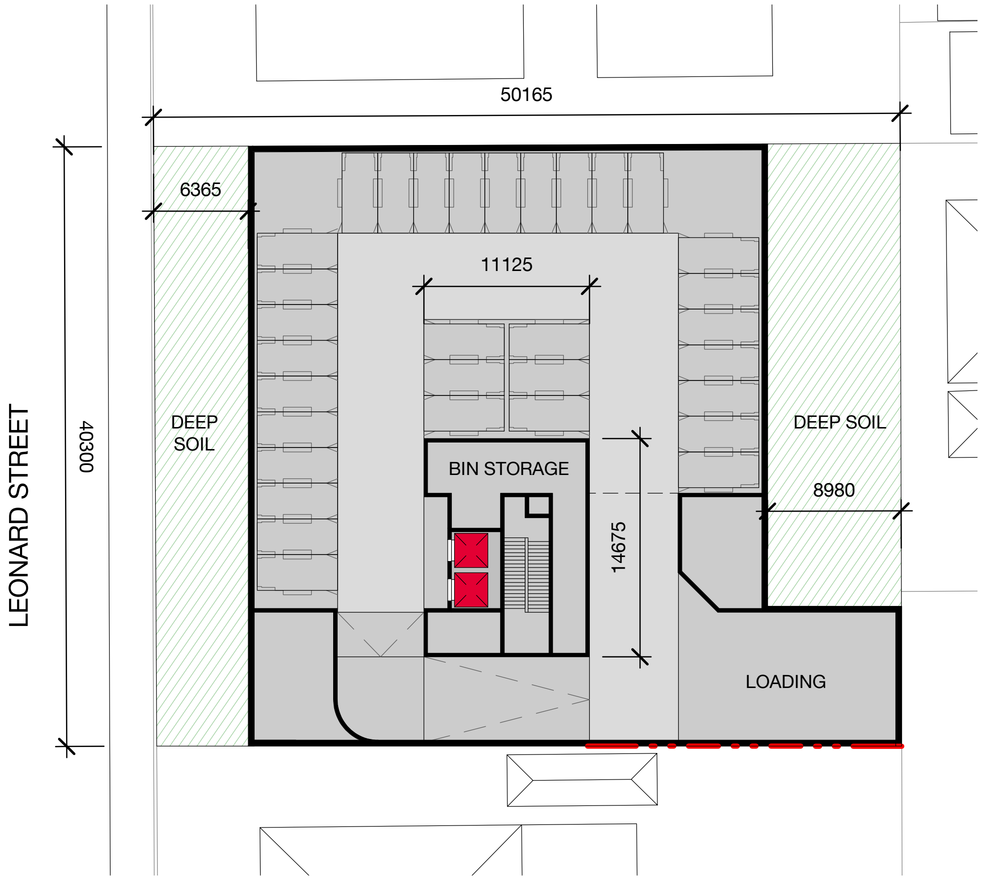
/ Generous landscape setback (6m) consistent with prevailing alignment of Leonard Street
/ Ground level dwellings with private courtyard gardens
/ Internal and external communal facilities
/ Clear + visible building lobby
/ Egress stairs discretely integrated into facade
/ Carpark entry - setback behind building facade.

Basement parking:

/ includes loading and waste
/ allows extensive deep soil zones front and rear

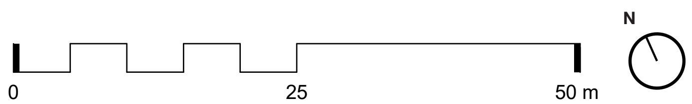


RESIDENTIAL - GROUND FLOOR



RESIDENTIAL - BASEMENT

BATESSMART.



Alternative access: Rear lane scenario:

Sites with rear lane access could utilise a similar approach, noting the following differences and considerations:

/ potential to provide loading and waste at ground level accessed from lane, allowing reduced excavation depth, however this may result in a reduction of available deep soil (or reallocation to the front of the property. Additional communal open space could be provided at podium or roof level to compensate for the impact at ground level.

/ improved street frontage presentation by removing vehicle crossover.

/ whilst the rear lane access may support reduced frontage, any minimum lot size or dimensions must have regard to tower floorplate sizes, separation requirements, and the resultant viability. In this situation it appears that minimum frontage is determined more by buliding seperation and solar access than vehicle access.

/ A narrower frontage could be contemplated if a continuous streetwall was seen as desirable. That would require dwellings to be oriented east west and built to the north and south boundaries. In that situation, and with rear access, you could contemplate much narrower sites (potentially below 20m).

SITE B.2 SOLAR STUDIES

VIEWS FROM THE SUN DURING WINTER SOLSTICE

OPTION 01 - MAXIMUM TOWER ENVELOPE UP TO 80M

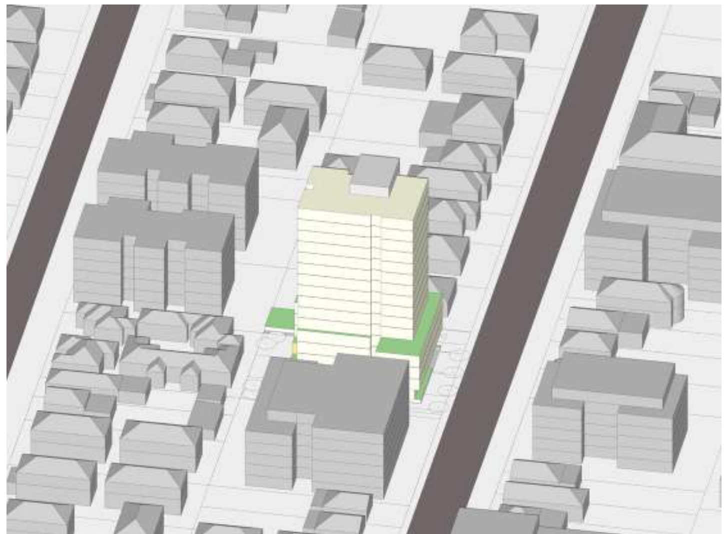
10 AM

12 PM

2 PM

OPTION 02 - MAXIMUM TOWER ENVELOPE UP TO 50M

10 AM



12 PM

2 PM

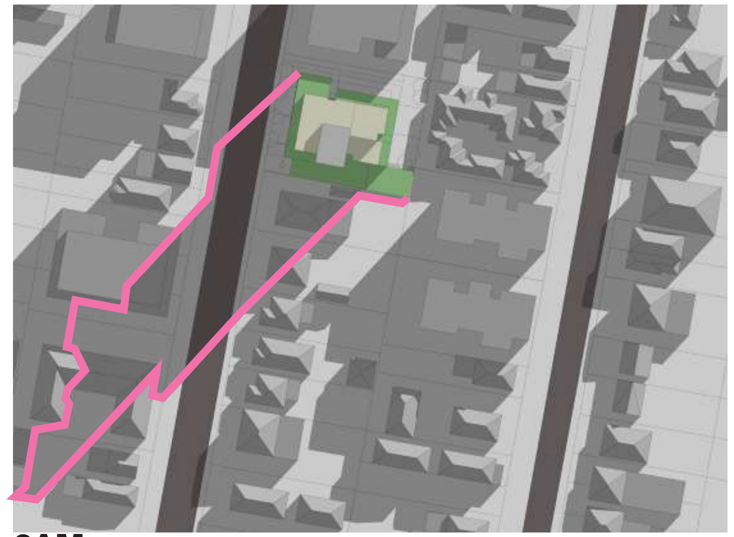
OPTION 03 - STEPPED FORM

10 AM

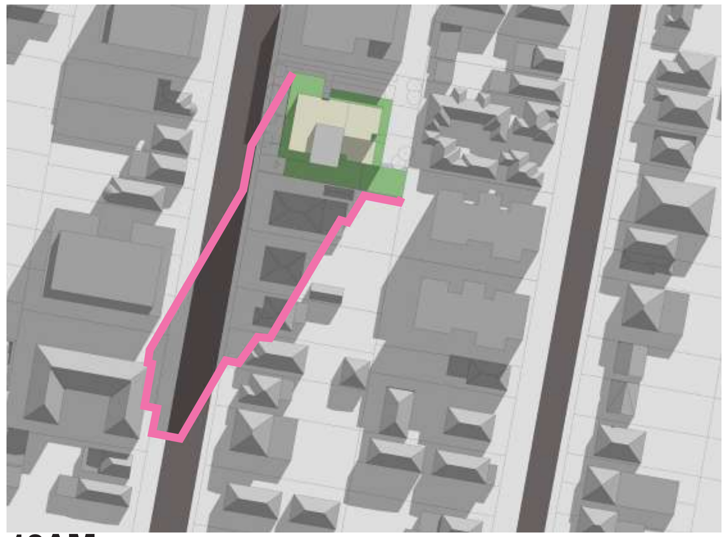
12 PM

2 PM

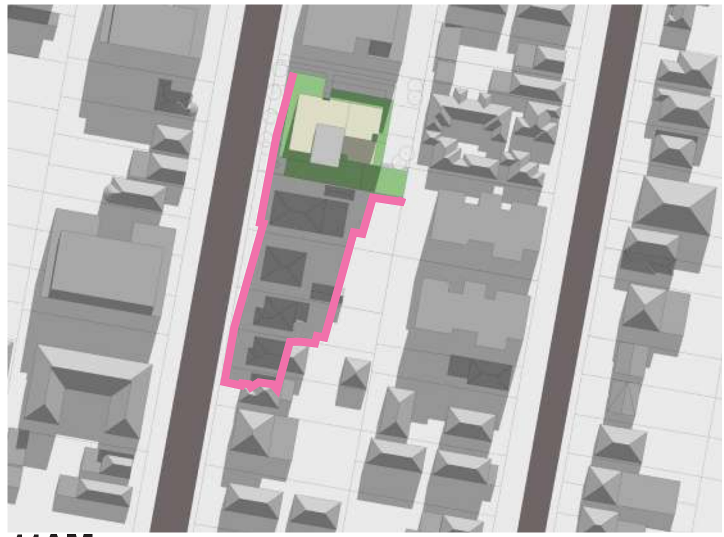
SITE B.2 SOLAR ACCESS



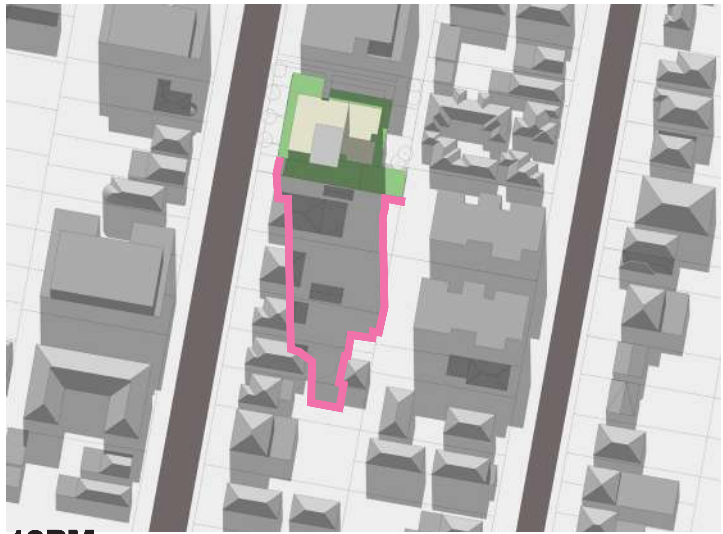
9AM



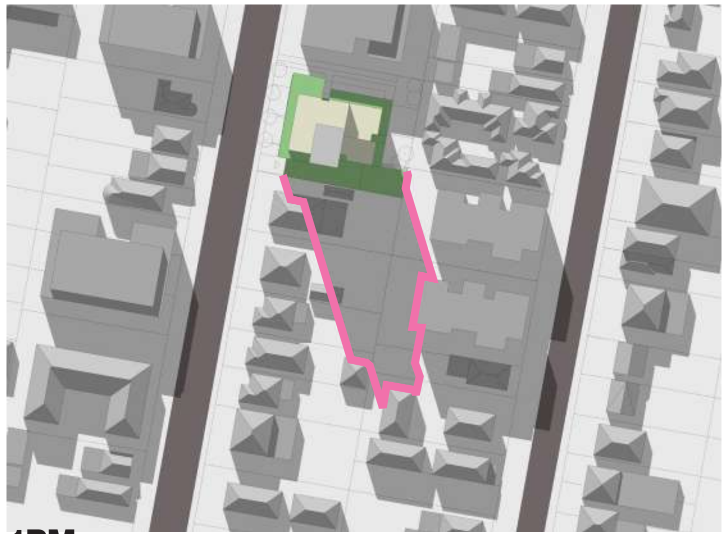
10AM



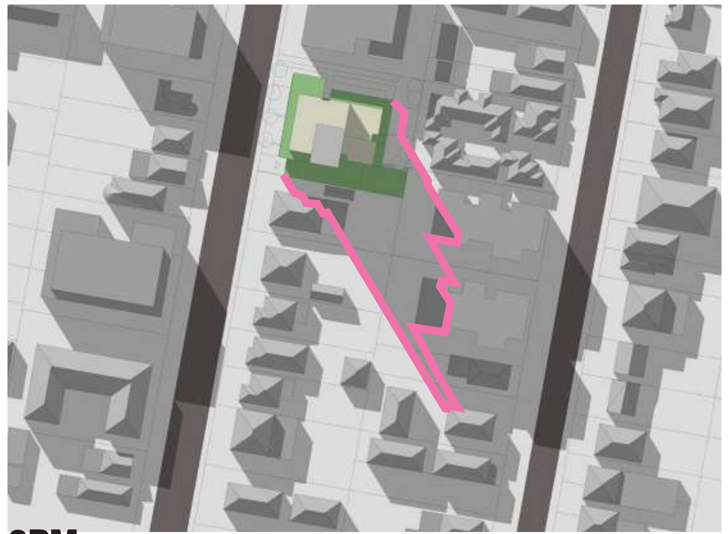
11AM



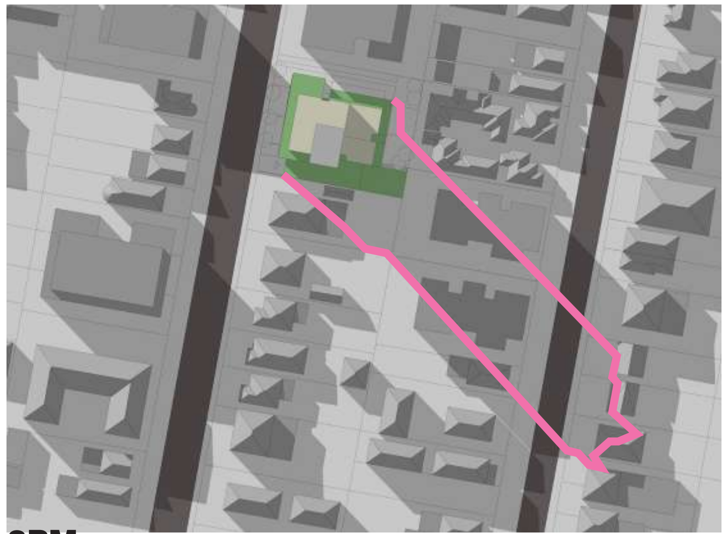
12PM



1PM



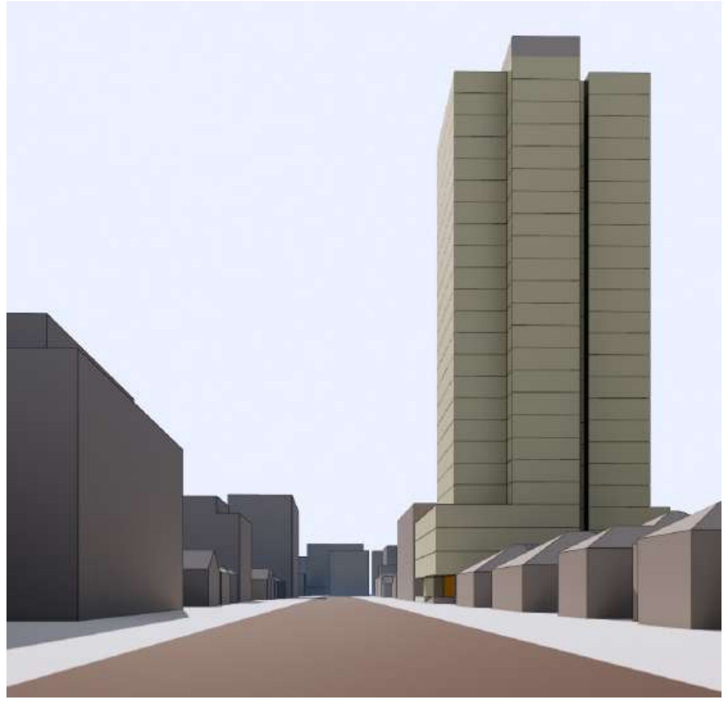
2PM



3PM

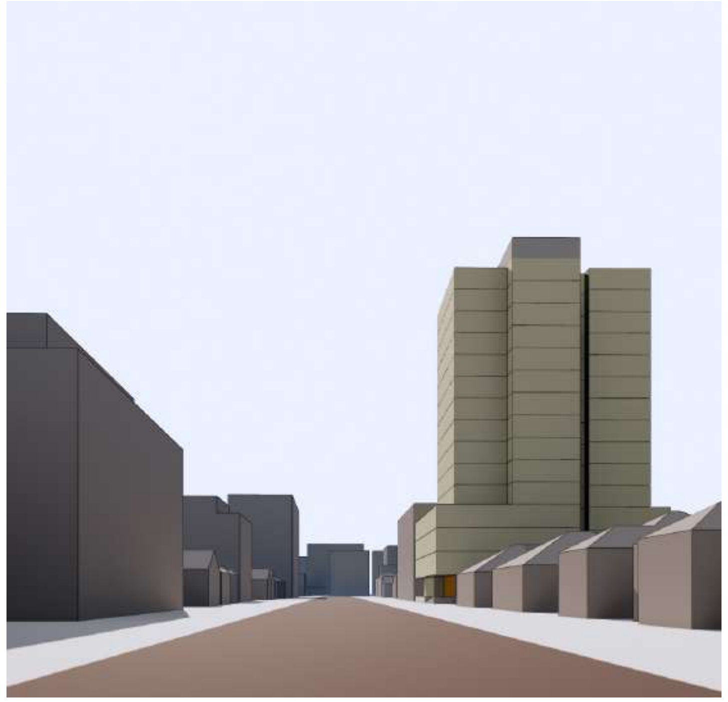
SITE B.2 VIEW ANALYSIS

LEONARD STREET - VIEW NORTH



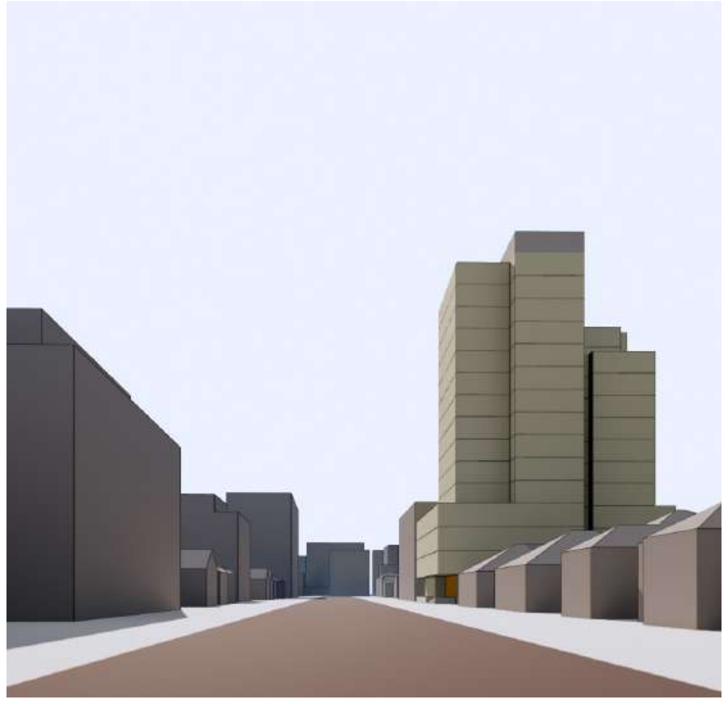
OPTION 01

/ Low scale podium relates to existing detached housing and recent apartment developments.
/ Slender tower form with vertical articulation.



OPTION 02

/ Reduced tower height is more consistent with the prevailing scale of the locality



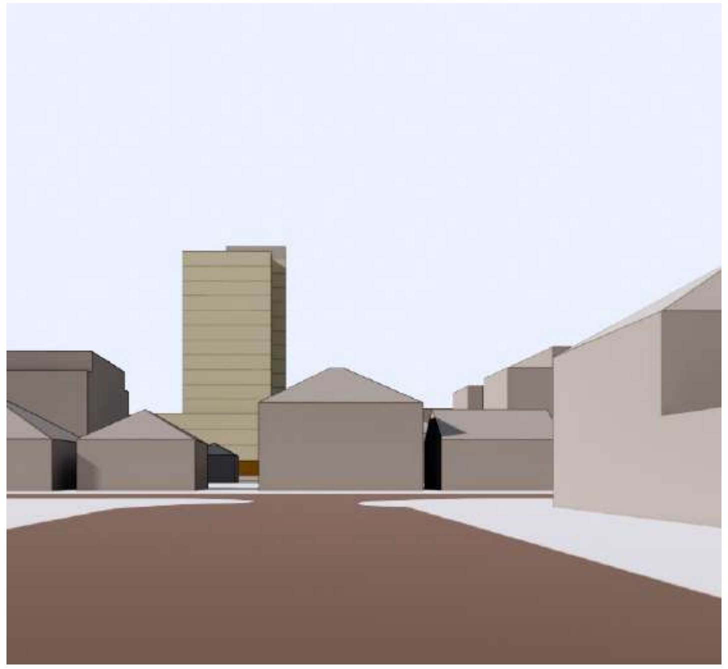
OPTION 03

/ Stepped tower form further improves relationship with existing context and provides more slender tower expression with improved solar access.

ROSS STREET - VIEW EAST

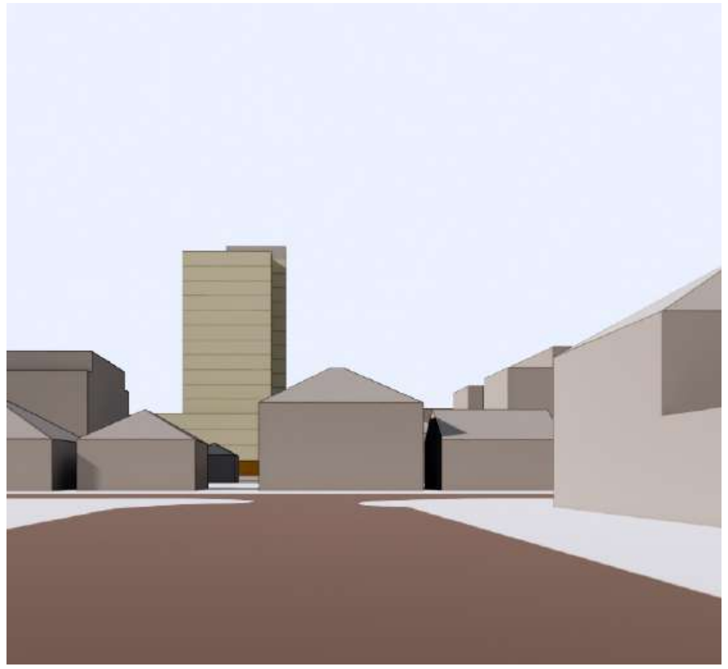
OPTION 01

/ Slender tower form but considerable variance with existing context.



OPTION 02

/ Lower scale appears less conspicuous



OPTION 03

/ As per option 02

SITE B.2 INSIGHTS

Observations and insights from testing site B.2:

/ It appears that a site of this scale and dimensions (circa 2000m2, 40m frontage) can support a tall residential building of circa 50m height.

/ Testing of development at 80m height reveals some potential challenges, principally relating to solar access / overshadowing of adjoining properties. Development at this height may be acceptable but is likely to dictate apartments that rely solely on east or west orientation, resulting in sub-optimal energy performance.

/ The use of a low-scale podium with 6m landscape setback appears to allow a tall building to integrate with the changing locality, effectively mediating between detached dwellings and recent apartment development.

/ The resultant tower form enables an efficient core supporting high amenity apartments - with majority received excellent solar access and cross ventilation.

/ The study demonstrates a level of flexibility to accommodate different uses, including apartments, student accommodation / hotel, and ancillary commercial uses. However - the combination of such uses in a single building will result in additional circulation and servicing and is likely to add complexity and reduce efficiency to a point that it is considered undesirable. Mixed-use program can be better delivered in seperate towers as part of an integrated development on larger sites

/ The study demonstrates the ability to provide significant deep soil planting (circa 25% site area) However, development economics are likely to place pressure on this, with proponents seeking larger basement levels to reduce excavation depth and cost.

Sketch - Massing Option 3

Key features:

Generous setbacks result in compact and slender tower form

Maximise roof mounted Photo-voltaics

Expressive roof form.

Corner balconies providing shade to dual aspect apartments and assisting with cross ventilation.

Communal open-space with landscape provided at mid-rise level, sheltered from prevailing cold winds. Allowance of over 200m2 and 11m width capable of accommodating tree planting.

Predominantly north facing apartments, however achieving ADG solar access requirements requires some apartments to rely on east / west orientation. Shading treatment will be required.

Four-storey podium with generous landscaped terrace.

Discrete vehicle access

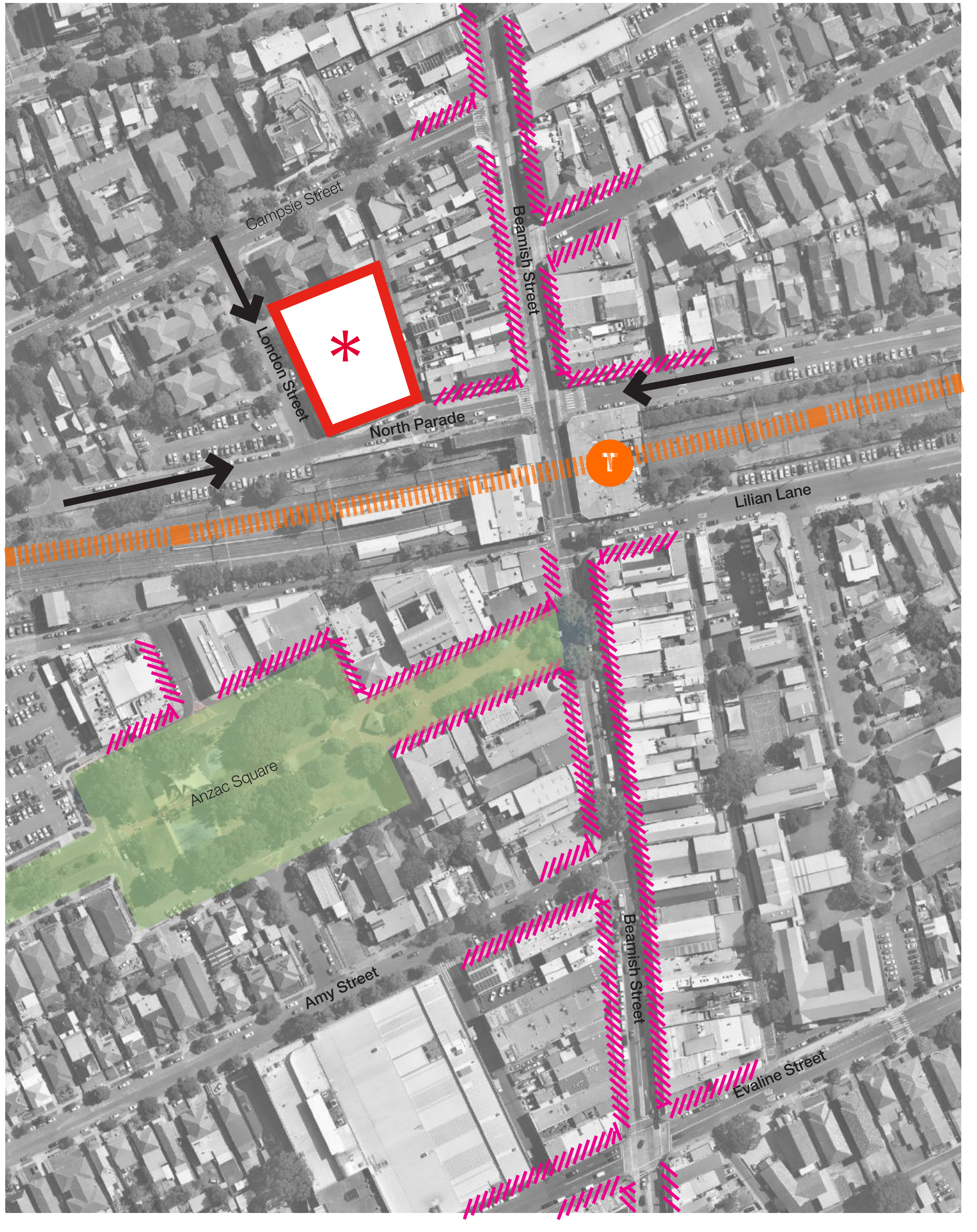
Clear and legible residential lobby

Ground level residences or commercial uses where appropriate.

6m setback providing generous deep soil zone.

Illustrative concept sketch. Site B.2 - Leonard Sreet looking south

3.2.3 SITE C.1 CAMPSIE



North Parade - North

London Street

North Parade - South

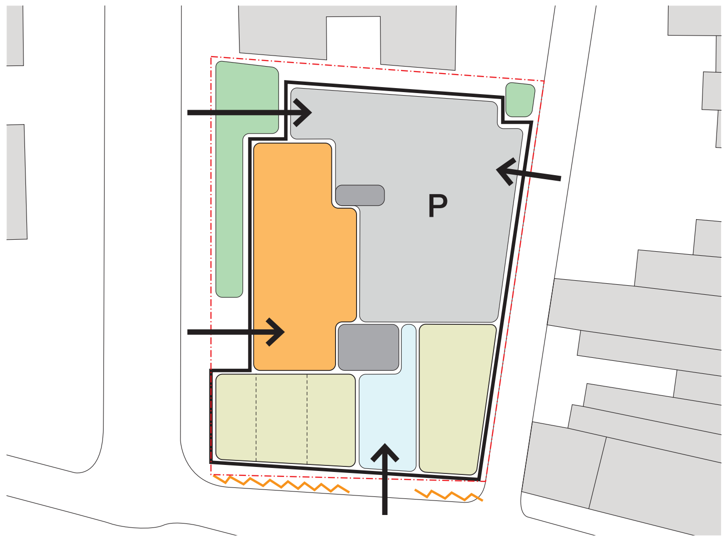
SITE CONSIDERATIONS

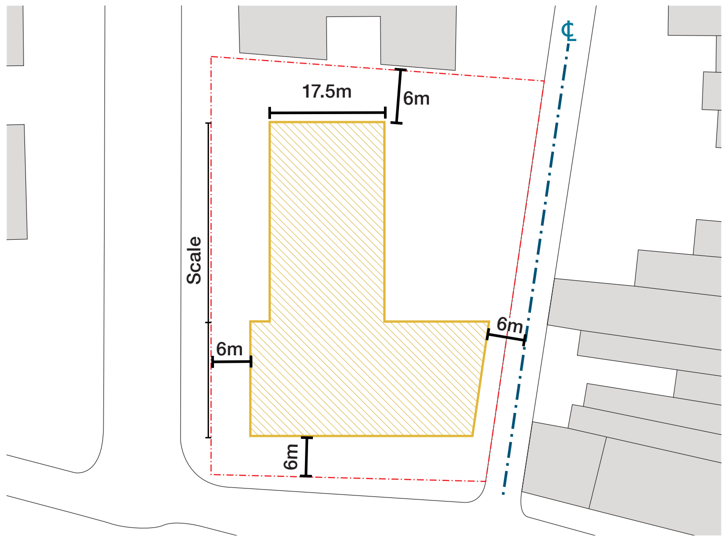
/ Prevailing low-scale streetwall (1-3 storey)
/ Residential Building close to North Boundary
/ Visually prominent from key locations including Beamish Street and Anzac Square
/ Important pedestrian / retail environment along Beamish Street
/ Potential solar impact to Anzac Square
/ Close proximity to Metro Station

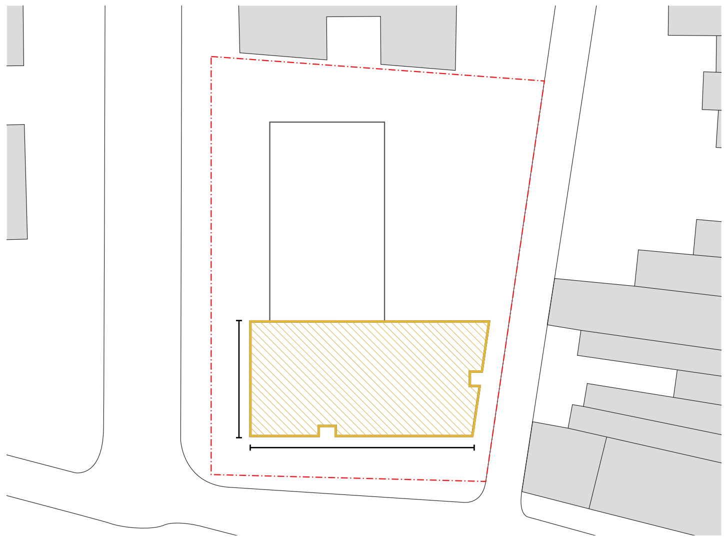
Brief / Design parameters

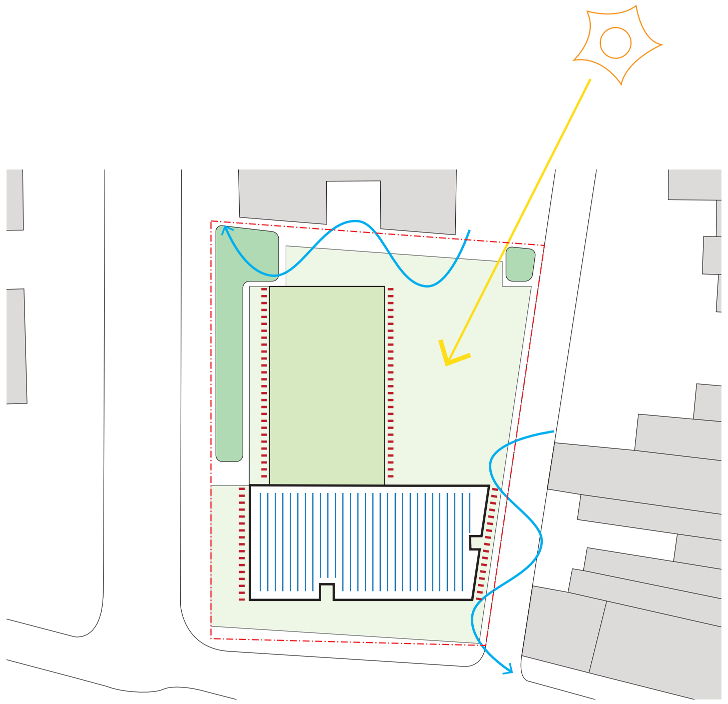
/ Student accommodation
/ Commercial podium with sleeved parking
/ Ground level retail
/ Rear lane access (test with and without)
/ Height of 15 storeys (~50m)

SITE C.1 APPROACH









STREETSCAPE SCALE AND CHARACTER

/ Nil setback to street frontage along Northern Parade

/ 6m setback to London Street

/ Low-scale podium. 3 storey nom

/ Active frontages and commercial lobby acknowledging Northern Parade commercial character.

/ Student accommodation lobby located on residential London street.

/ Sleeved parking and services accessed from lane, or secondary street (Dispensary Lane).

Commercial lobby

Retail

Other active frontage (student housing amenities)

Landscape

Services / Parking

TOWER FORM + SEPARATION

/ Minimum 6m setback from boundaries or centre-line of lane.

/ Achieves minimum 12m separation between towers irrespective of land-use.

/ Additional setbacks for residential uses, in accordance with Apartment Design Guide.

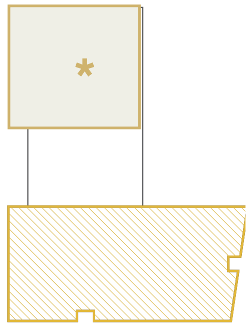
/ Achieves 900m² typical floorplate

TOWER MODELLING

/ Reduced tower floorplate responding to the lower building scale to the North

/ Tall floorplate facing the station and city centre

/ Reduce perceived bulk



* Potential smaller second tower element to north of site. Would require additional lift core and be subject to relevant separation requirements.

ENVIRONMENTAL

/ Extensive rooftop solar panels

/ Extensive planting on podium and intermediate terraces with excellent solar access.

/ North, east and west facades require shading and facades designed to minimise heat ingress.

SITE C.1 SUMMARY

SUMMARY

Three massing options have been tested with heights ranging from 15-20 storeys.

Site Area:	2,908 m²
Height:	50 - 65m tested
Levels:	15 (plus plant)
Typical floorplates	485-900 m² GFA
Typical efficiency	80% efficiency (TBC)
Parking	38 spaces / podium level 76 total (2 level podium)
Deep Soil :	272 m² (9%) plus on-structure

Assumes 3.1m typical residential floor to floor height, Plant enclosure 5.0m nom. Ground level 4.5m. Commercial levels 3.65m.

Assumes waste is collected from dedicated collection point within the nominated loading area.

OPTION 01 - MAXIMUM TOWER ENVELOPE

Indicative yield: 13,645 m²

FSR: 4.7:1

/ Three storey commercial podium

/ Typical tower floorplate (~900 m²) extruded to 15-storey height.

/ Presents as large un-articulated mass with broad east + west frontages.

/ Recommend additional measures to mitigate bulk.

OPTION 02 - STEPPED FORM

Indicative yield: 9,967 m²

FSR: 3.4:1

/ Reduced typical tower floorplate (~650 m²) extruded to 15-storey height.

/ Additional setback to east to improve building separation.

/ Reduced floorplate and bulk improves skyline by providing a smoother transition between low rise buildings on the North and taller building around the city centre / Station

/ considered acceptable but reveals that there may be potential to accommodate additional height (tested in Option 3).

OPTION 03 - ADDITIONAL HEIGHT

Indicative yield: 13,141 m²

FSR: 4.5:1

/ 20 storey high tower

/ Smaller high-rise floorplate (~480 m²) reduces visual bulk and improves sky-view factor and airflow between buildings.

/ Stepped form towards the south improves skyline by providing a smoother transition between low rise buildings on the North and taller building around the city centre / Station

/ Achieves similar FSR to option 01 but demonstrates the potential benefit of taller but smaller tower forms.

SITE C.1 SUMMARY

Tower plan studies:

OPTION 1:

/ Efficient floorplan of 900m2

/ Floorplate depths accommodate single, double, or group dwellings (student accommodation).

/ natural light and ventilation to corridors.

/ north facing podium garden

OPTION 2:

/ Relatively efficient floorplan of ~650m2

/ enlarged podium garden

OPTION 3:

/ Efficient but compact floorplate of ~480m2

/ Additional intermediate communal terrace if used in conjunction with Option 1 for lower levels.

SUMMARY

/ Each floorplate is considered acceptable and could be used in various combinations.

/ Common rooms are likely to be provided only on some floors.

/ NE and NW orientation should support good amenity but will require sunshading

OPTION 1 TYPICAL PLAN (L3)

OPTION 3 - TYPICAL PLAN (L8-19)

OPTION 02 - TYPICAL PLAN (L3-8)

Indicative On-structure planting opportunities.

/ Option 01: Level 3 Podium terrace: 1200m2

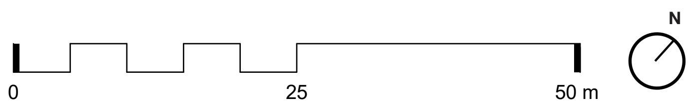
/ Option 02 Level 3 Podium Terrace: 1500m2

/ Option 03 Level 8 Roof Terrace: 510m2

Cummalitive potential on-structure planting for Option 03 (excluding L20 roof): 1710m2 (58% site area)

Extent of planters subject to structural considerations, wind conditions, functional and user requirements for terraces. North facing podium and tower terraces likely to enjoy favourable solar and wind conditions and sufficient space to support tree planting (TBC)

BATESSMART.



SITE C.1 SUMMARY

Ground level:

/ Nil setback to North Parade with commercial lobby and retial uses. 6m setback along London Street, including deep soil planting.

/ Vehicle access from London St and/or Lane. / Plant, loading, waste etc concealed at ground level.

/ Student housing entry and communal amenities at ground level to activate London Street.

Podium parking:

/ Two levels of podium parking provided. Relatively efficient but modest parking numbers achieved. Additional parking and efficiency would be achieved by omitting the commercial space.

/ Low parking numbers may be acceptable for student housing with small amount of commercial and retail use and proximity to station. Otherwise, likely to require some basement parking.

/ Ramp location allows conversion of some or all of podium level to additional commercial uses.

Alternative street access scenarios:

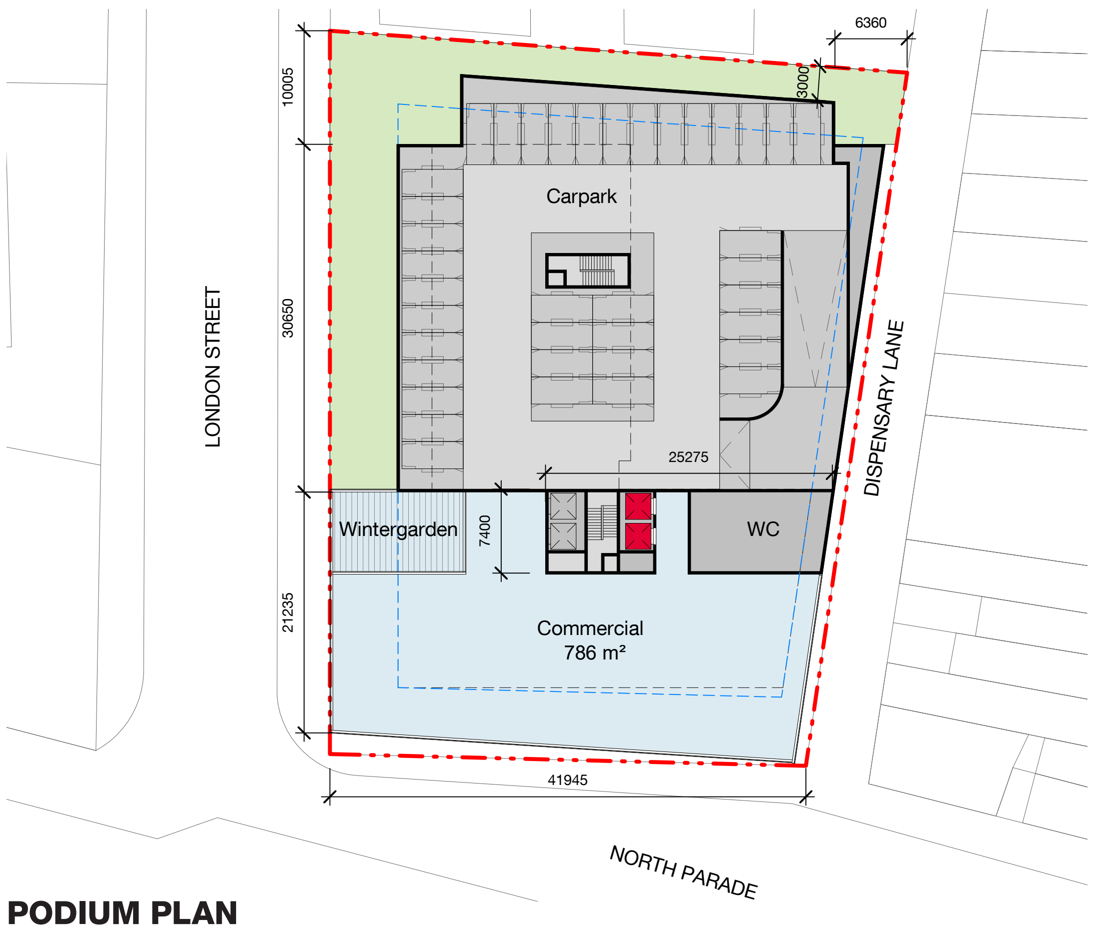
/ No laneway: utilise a combined vehicle and service access from London Street, retaining extent of active frontages.

/ Single street frontage: A similar development outcome could be achieved with a single street frontage, noting the following:

- compromised street frontage including reduced retail etc.

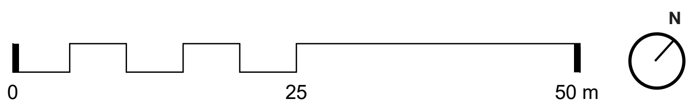
- building separation - student housing is not required to meet ADG and therefore current configuration would be achievable.

GROUND FLOOR PLAN



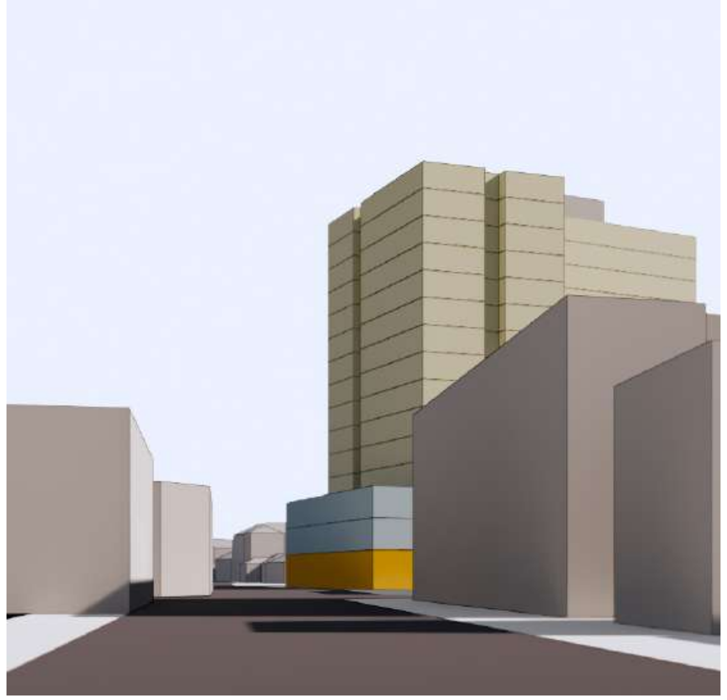
PODIUM PLAN

BATESSMART



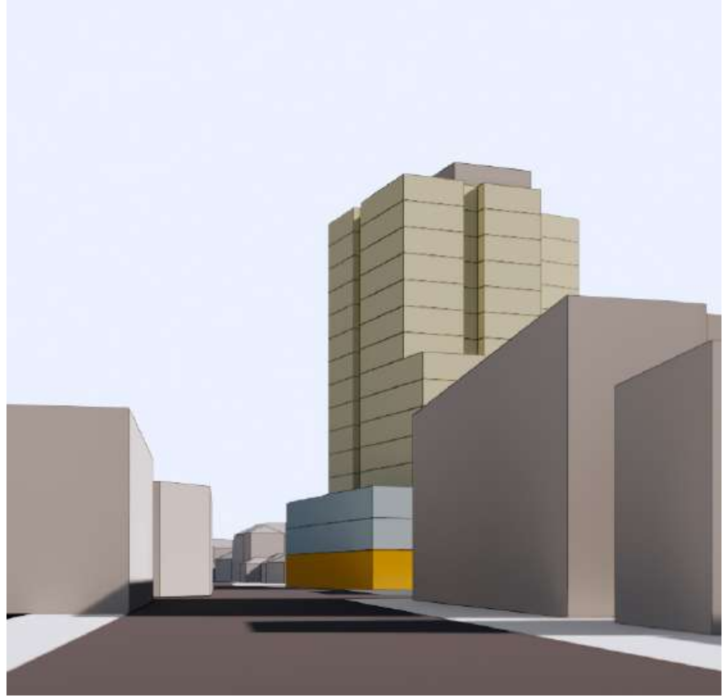
SITE C.1 VIEW ANALYSIS

NORTH PARADE - VIEW WEST



OPTION 01 - 15 STOREY

/ Low scale podium with active frontages is compatible with Beamish Street context
/ Consistent 15 storey scale appears broad and bulky



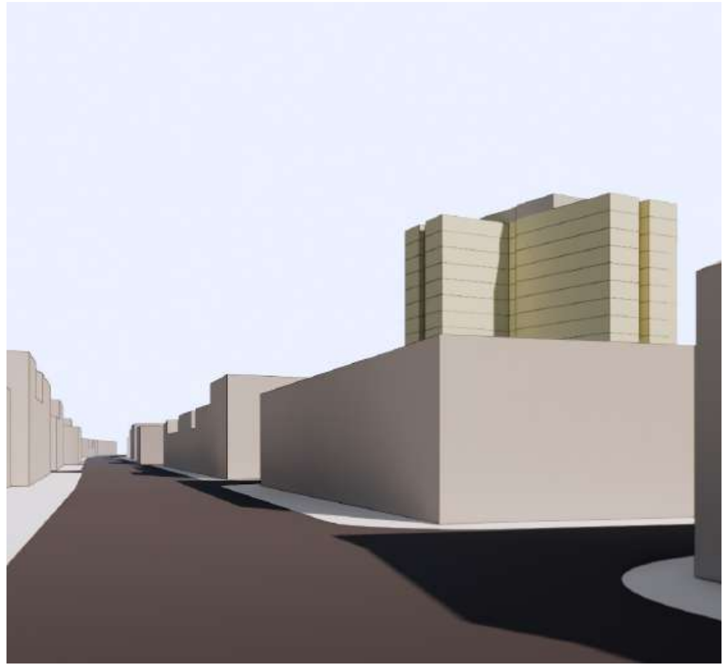
OPTION 02 - 15 STOREY

/ Reduced floorplate and additional setback reduces visual bulk.

OPTION 03 - 20 STOREY

/ Compact floorplate and articulation result in slender form with generous space around tower.

BEAMISH STREET - VIEW NORTH



OPTION 01 - 15 STOREY

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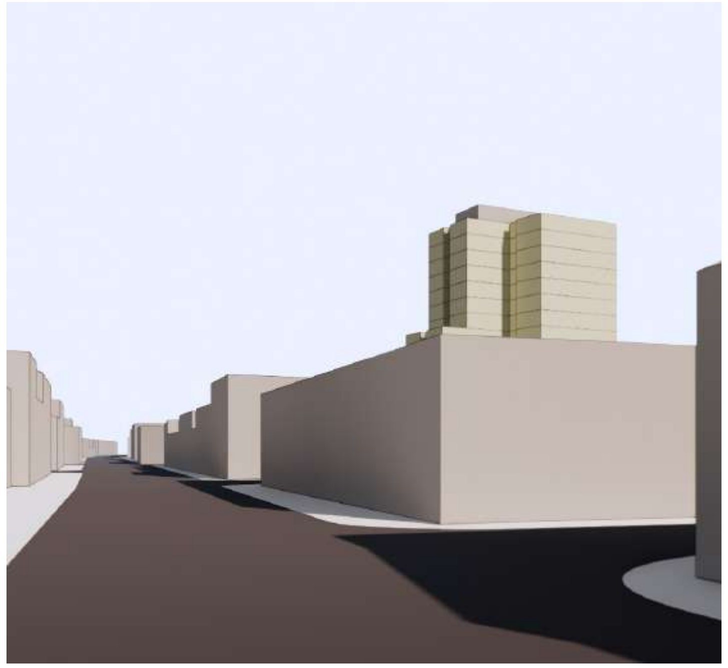
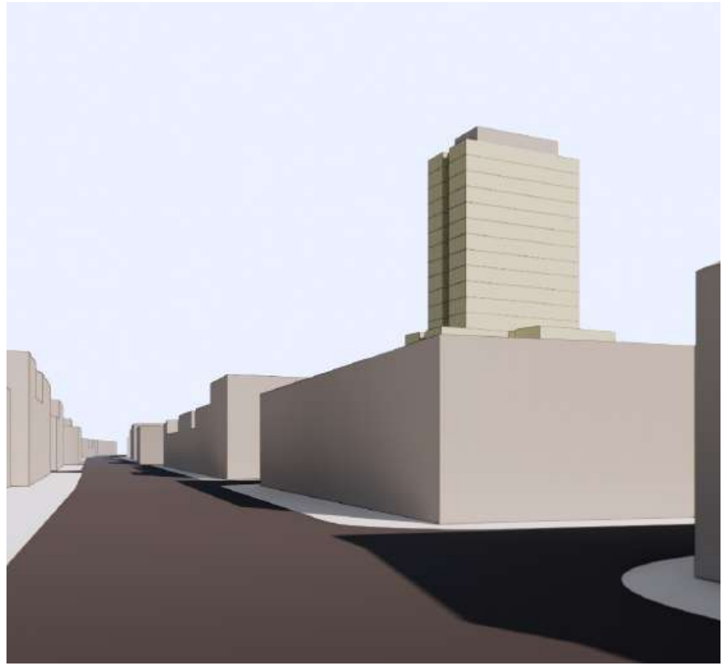


OPTION 02 - 15 STOREY

/ Reduced floorplate and additional setback reduces visual bulk.
/ Character of Beamish St not adversely affected

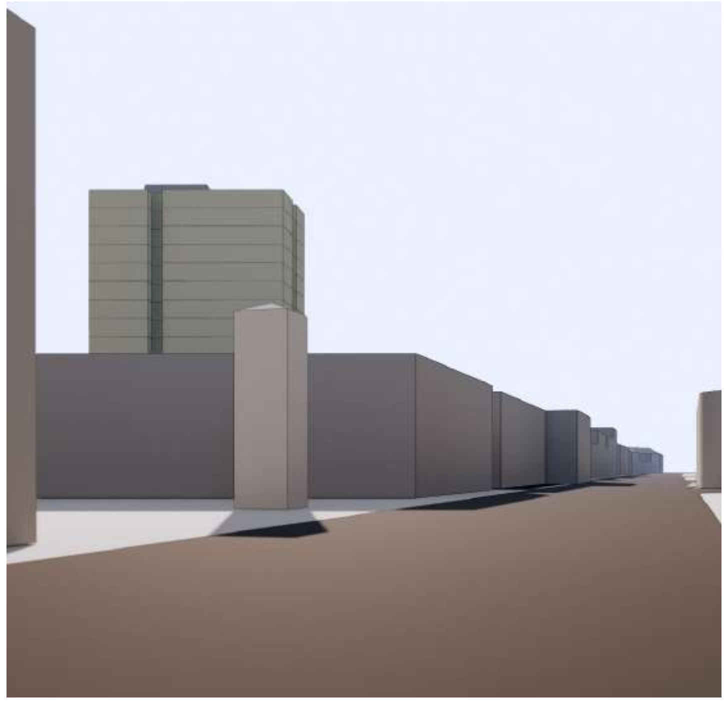


OPTION 03 - 20 STOREY

/ Compact floorplate and articulation result in slender form with generous space around tower.
/ Character of Beamish St not adversely affected

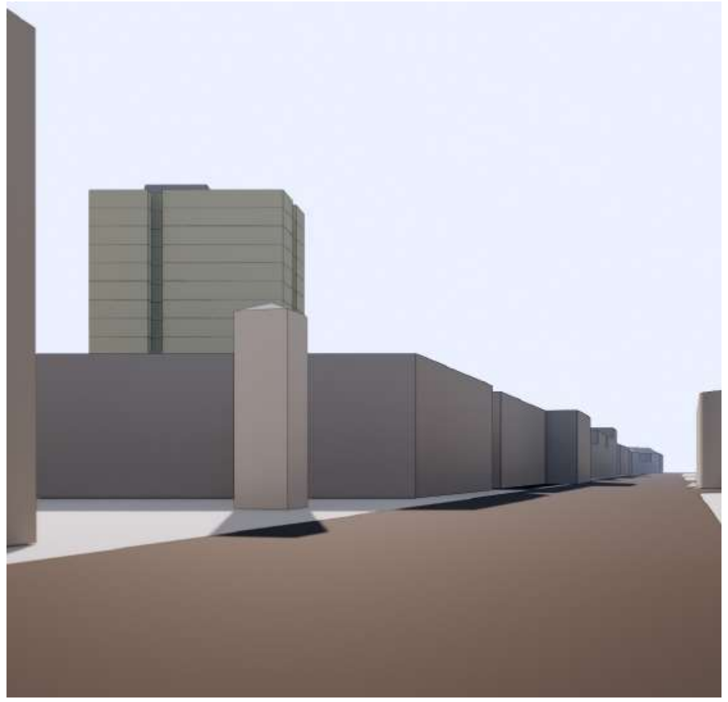
SITE C.1
VIEW ANALYSIS

ANZAC SQUARE / BEAMISH STREET



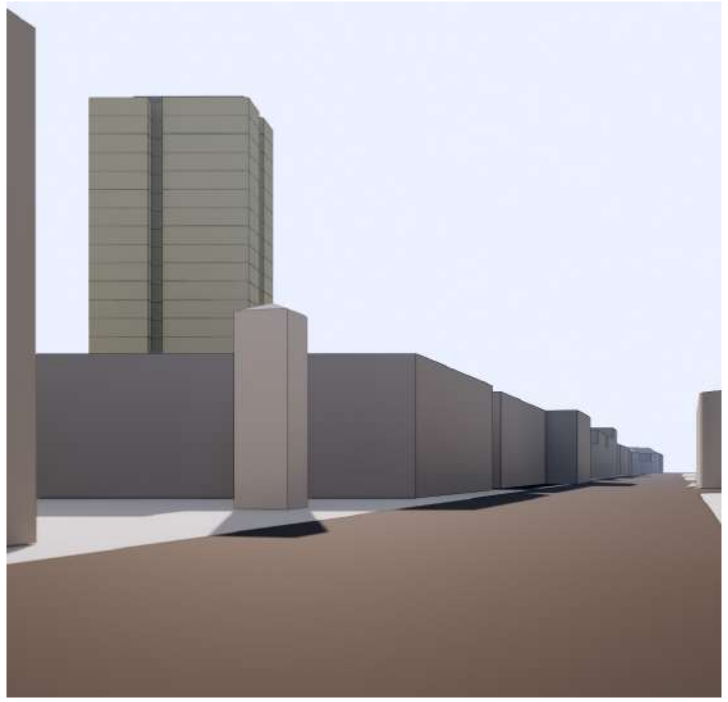
OPTION 01 - 15 STOREY

/ Consistent 15 storey scale appears broad and bulky



OPTION 02 - 15 STOREY

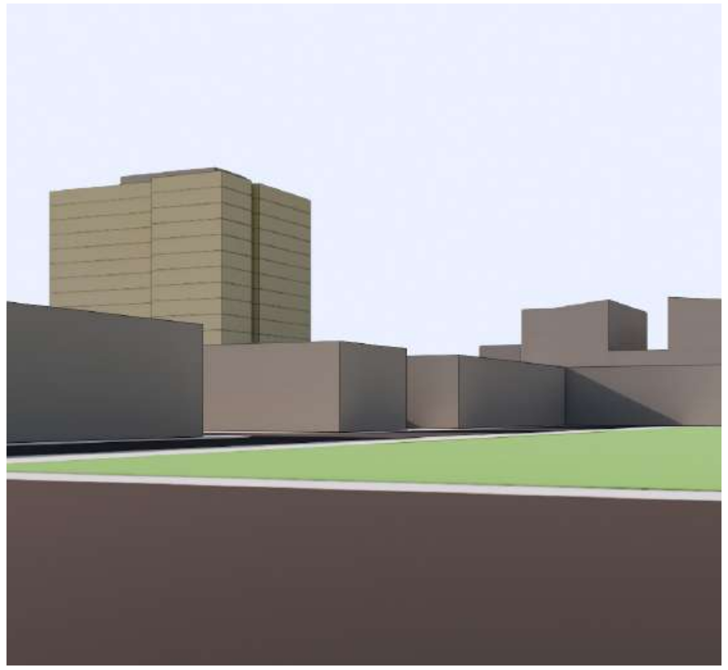
/ Consistent 15 storey scale appears broad and bulky



OPTION 03 - 20 STOREY

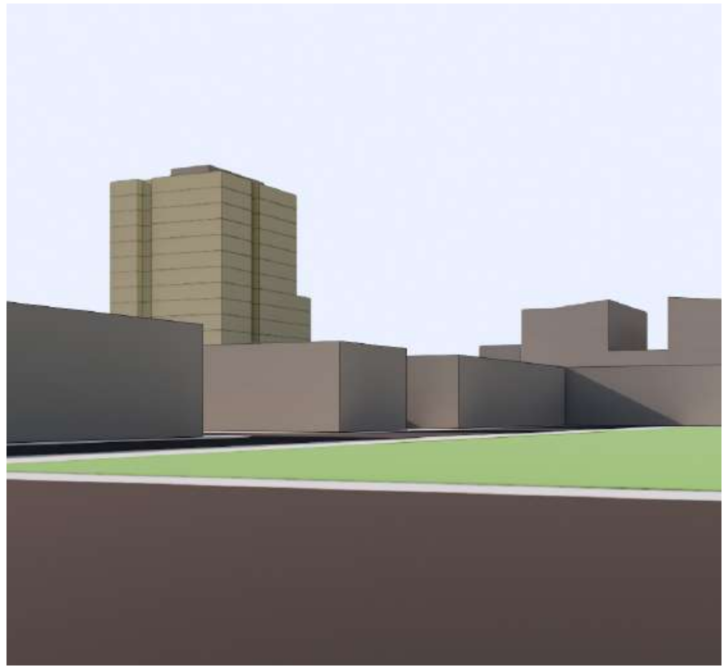
/ Compact floorplate and articulation result in slender form with generous space around tower.

ANZAC SQUARE - VIEW NORTH



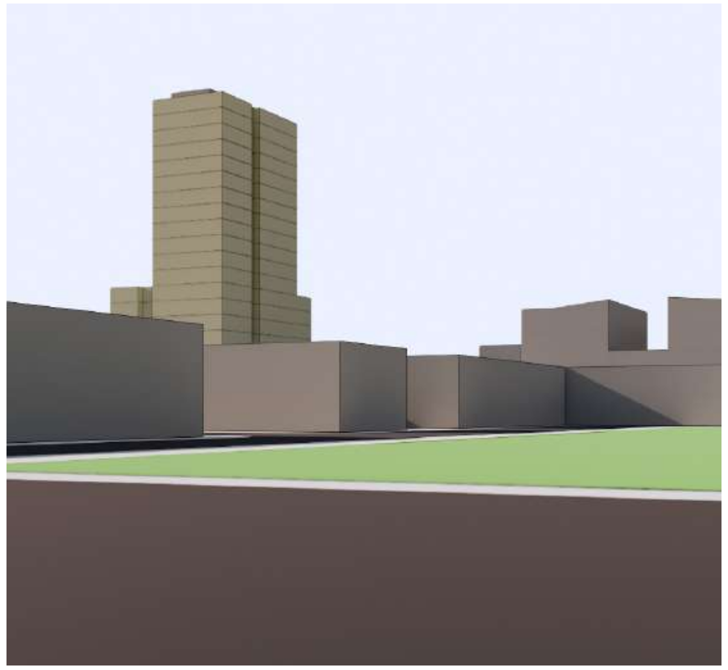
OPTION 01 - 15 STOREY

/ Consistent 15 storey scale appears broad and bulky



OPTION 02 - 15 STOREY

/ Reduced floorplate and additional setback reduces visual bulk.



OPTION 03 - 20 STOREY

/ Compact floorplate and articulation result in slender form with generous space around tower.

SITE C.1 SOLAR ACCESS

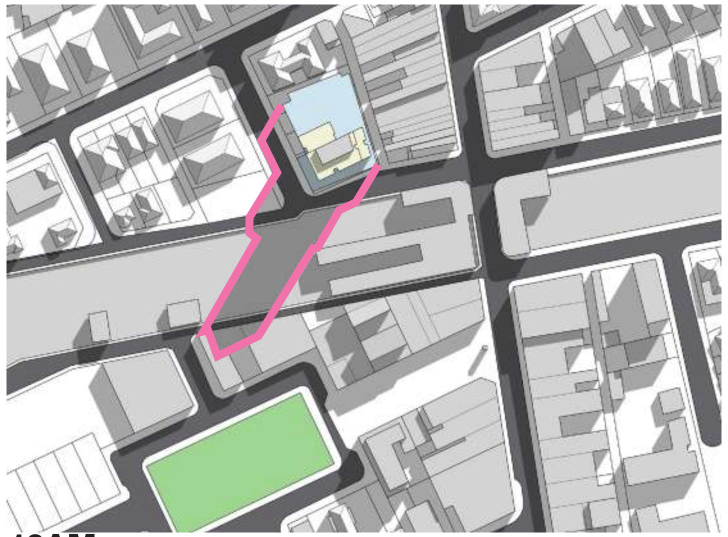
Shadow study based on Option 3, 20 storey building

Insights:

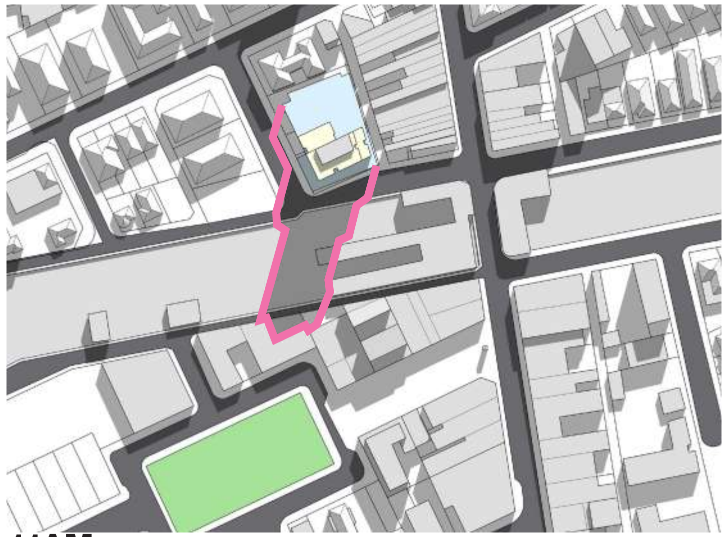
/ No overshadowing impact of Anzac Square, 9-3pm

/ Minor shadow impact on Anzac Mall from 2pm

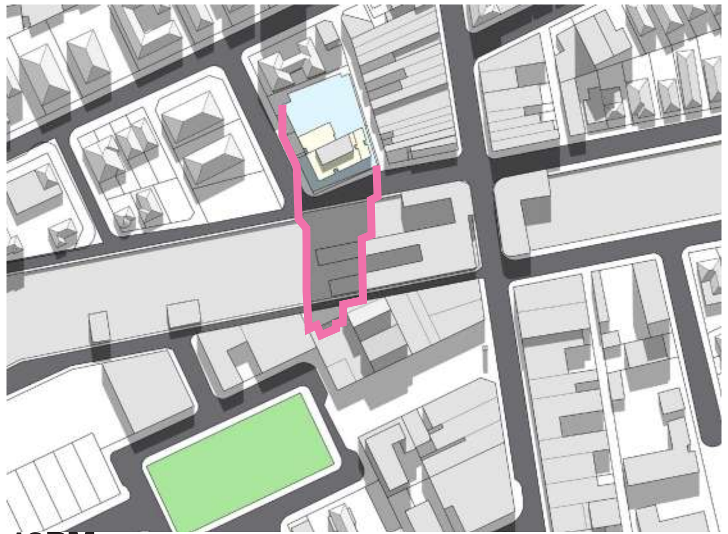
9AM



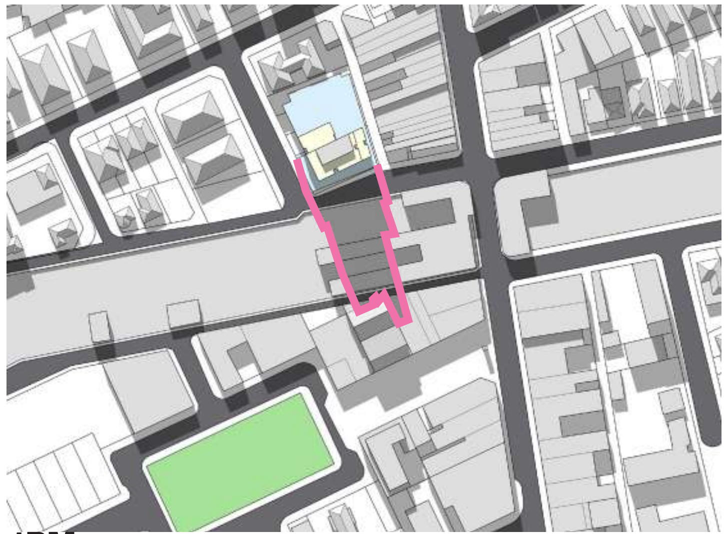
10AM



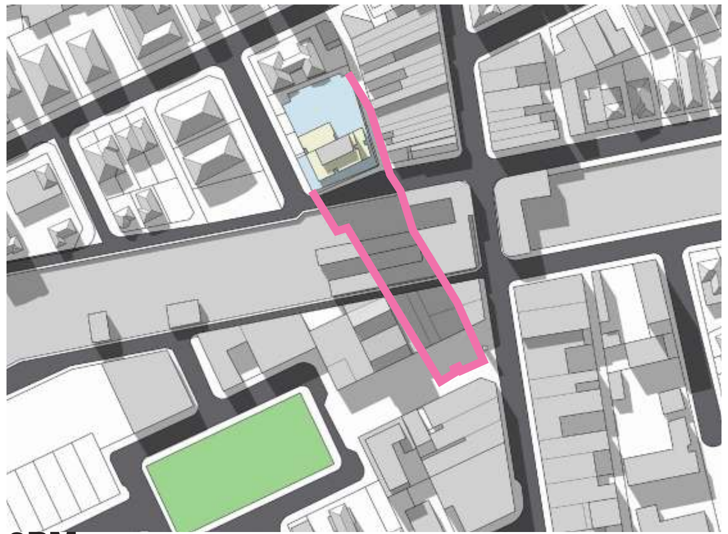
11AM



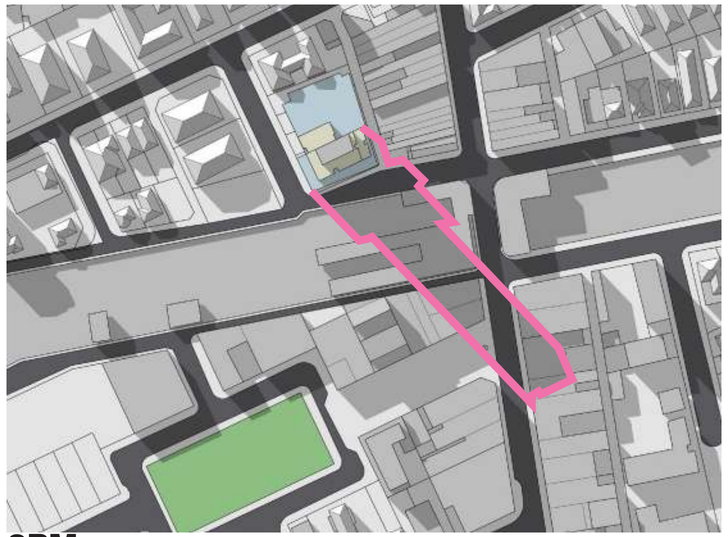
12PM



1PM



2PM



3PM

SITE C.1 INSIGHTS

Observations and insights from testing site C.1:

/ The study demonstrates that a tall building of 15 storeys can be comfortably accommodated without adverse impacts on the public domain.

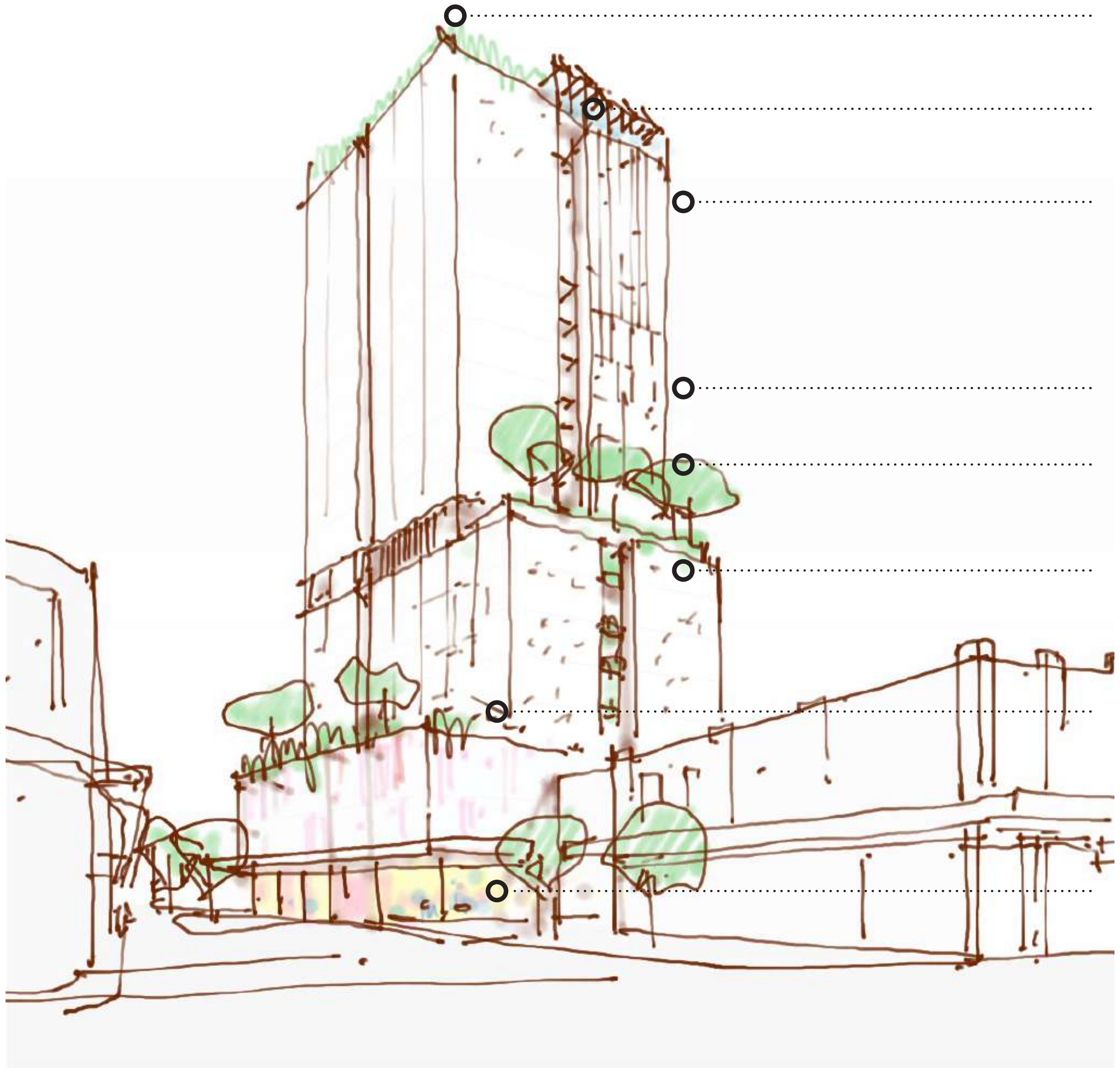
/ Judgements regarding whether this scale of development relate comfortably to the character of Campsie are beyond this study, however the massing strategy and significant setback from Beamish Street appear to enable a satisfactory outcome.

/ Whilst not subject to ADG requirements, the site testing demonstrates that similar separation can be readily achieved.

/ The site benefits from multiple street frontages. This is considered a desirable feature but not essential to support development of this scale (based on the land-uses tested).

/ Testing of a 20-storey option highlights the interplay between building height and bulk. It demonstrates that a taller and more slender tower at a similar FSR can provide benefits including improved separation and air-flow and reduced perception of bulk, without detrimental overshadowing.

/ Alternate approaches, such as utilising two separate tower forms, may be also provide an appropriate response to the site and allow incorporation of mixed use program in stand-alone buildings.



Sketch - Massing Option 3

Key features:

Generous setbacks result in compact and slender tower form. Taller and smaller floorplate appears less bulky than lower and larger floorplate.

Roof mounted Photo-voltaics combined with landscaped communal terrace

North-east + north-west orientations will enable good amenity but glazing will require external shading - horizontal and vertical projections or other operable solutions.

Natural light and ventilation to lobbies

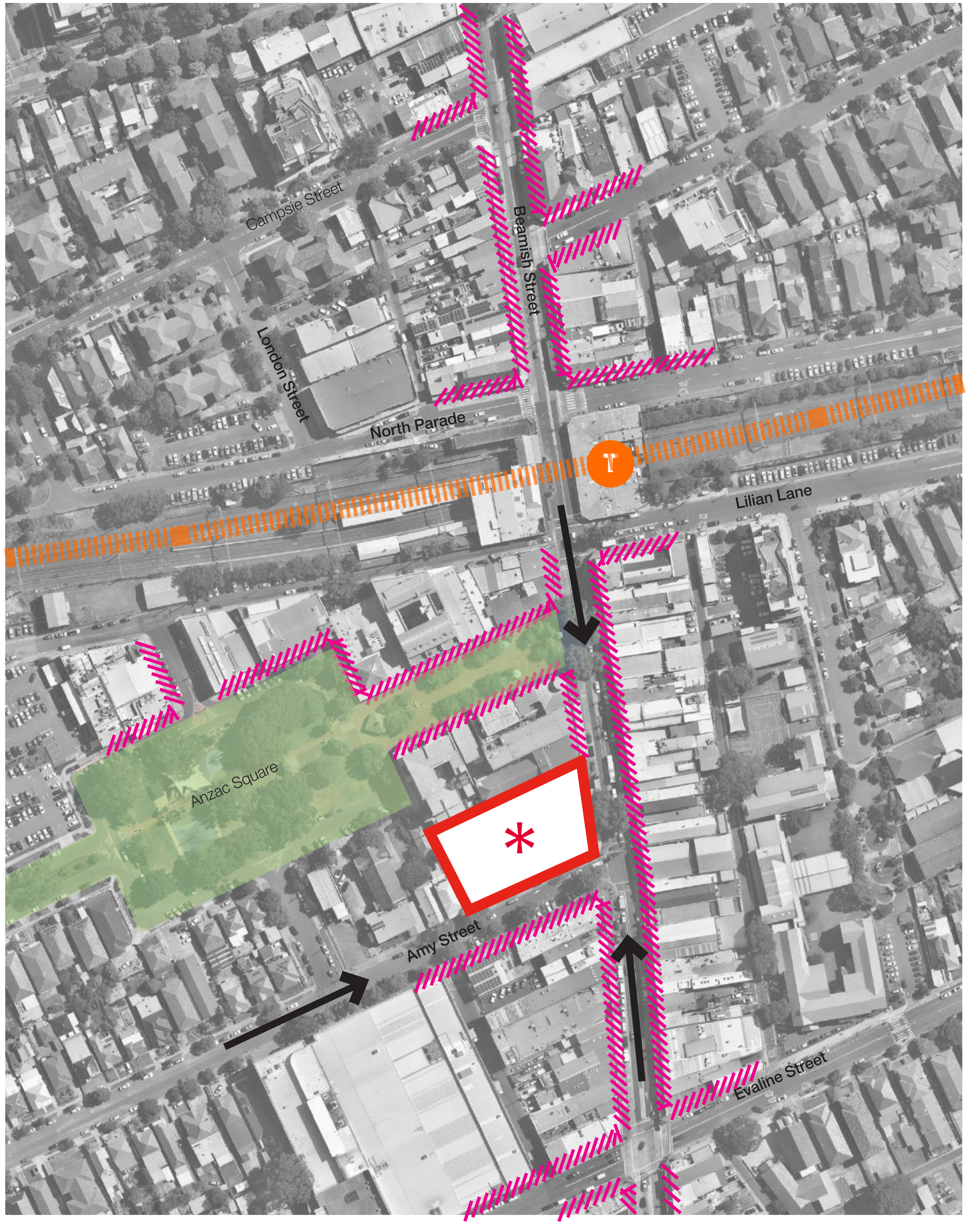
Additional 6-8m setback above 25m height - improved tower separation and landscape opportunity.

Articulation of form provides intermediate scale to relate to other development in the locality (~6-8 storey scale)

3-storey podium relates to prevailing low-scale context of Beamish Street. 6m setback to increase sky-view factor and enable landscaped podium

Two-levels of commercial space plus ground-level retail provides commercial FSR of approximately 0.75:1 and active frontage to North Parade.

3.2.4 SITE C.2 CAMPSIE



Beamish Street - North

Beamish Street - South

North Parade - South

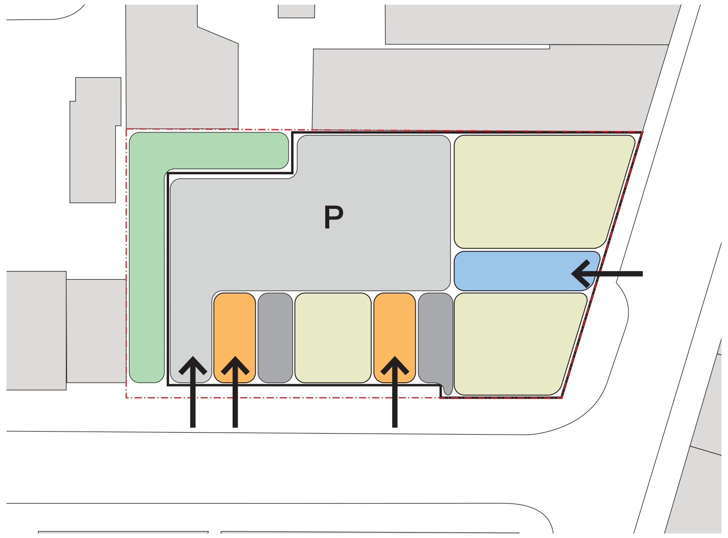
SITE CONSIDERATIONS

/ Prevailing low-scale streetwall (1-3 storey)
/ Visually prominent from key locations including Beamish Street and Anzac Square
/ Important pedestrian / retail environment along Beamish Street
/ Potential solar impact on existing dwellings along Amy Street and any future development.

Brief / Design parameters

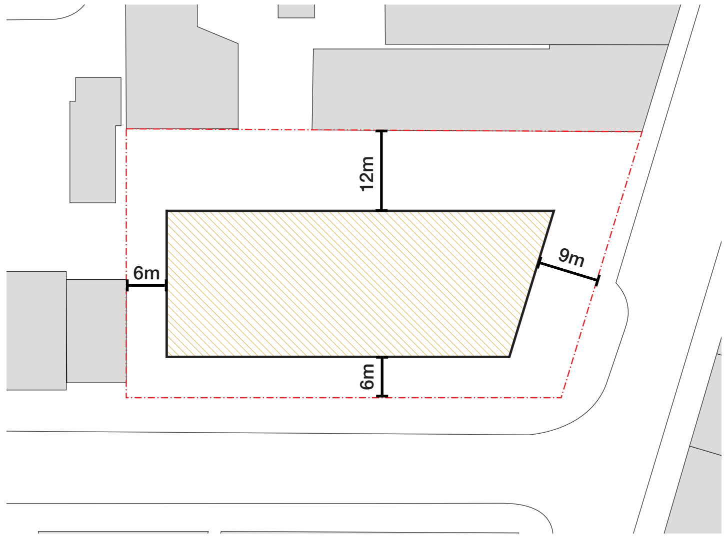
/ Residential Use
/ Commercial podium
/ Ground level retail
/ Basement parking
/ Height of 50m (15 storeys)

SITE C.2 CAMPSIE



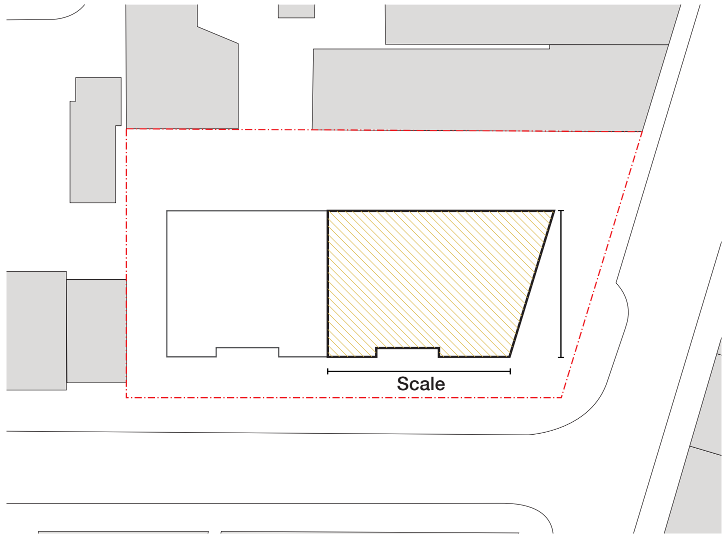
STREETSCAPE SCALE AND CHARACTER

/ Nil setback to street frontage along Beamish Street
/ 3m setback to Amy Street
/ Low-scale podium. 3 storey nom
/ Active frontages and commercial lobby acknowledging Beamish Street commercial character.
/ Residential lobby and vehicular entry located along Amy Street.
/ Basement parking



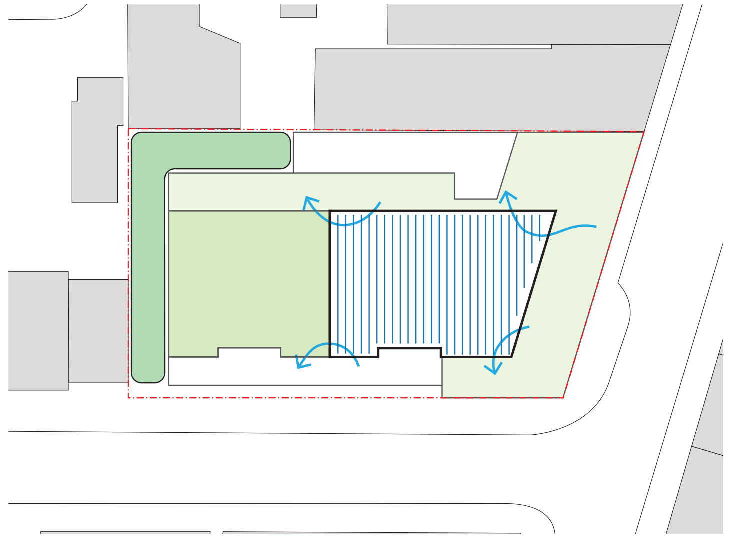
TOWER FORM + SEPARATION

/ Minimum 6m to the South and West boundaries.
/ 12m setback to the North
/ 9m setback to Beamish street
/ Additional setbacks for residential uses, in accordance with Apartment Design Guide.
/ Achieves 900m^2 residential floorplate



TOWER MODELLING

/ Reduced tower floorplate to reduce shadow impact.
/ Reduces building bulk



ENVIRONMENTAL

/ Extensive rooftop solar panels
/ Extensive planting on podium and intermediate terraces
/ North, east and west facades require shading and facades designed to minimise heat ingress.
/ Deep soil provided to side boundary

Retail
Residential Lobby
Commercial Lobby
Landscape
Services / Parking

SITE C.2 CAMPSIE

SUMMARY

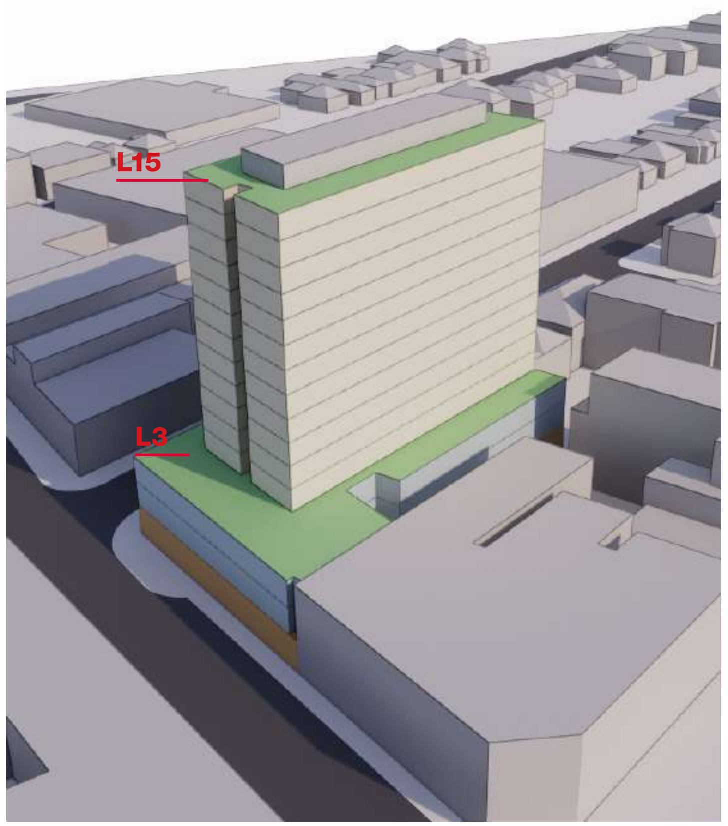
Three massing options, each at 15 storey height, have been tested.

Site Area:	2754m²
Height:	up to 50m tested
Levels:	15 (plus plant)
Typical efficiency	80% efficiency (TBC)
Parking	60-70 spaces / basement level
Deep Soil	279 m² (10%) plus on-structure

OPTION 01 - MAXIMUM TOWER ENVELOPE

Indicative yield: 15,846 m²

FSR: 5.8:1



/ Typical tower floorplate (~900 m²) extruded to maximum height

/ Presents as large un-articulated mass with broad North + South frontages.

/ May have adverse shadow impacts to south.

/ Utilised dual-core to meet cross-ventilation requirements

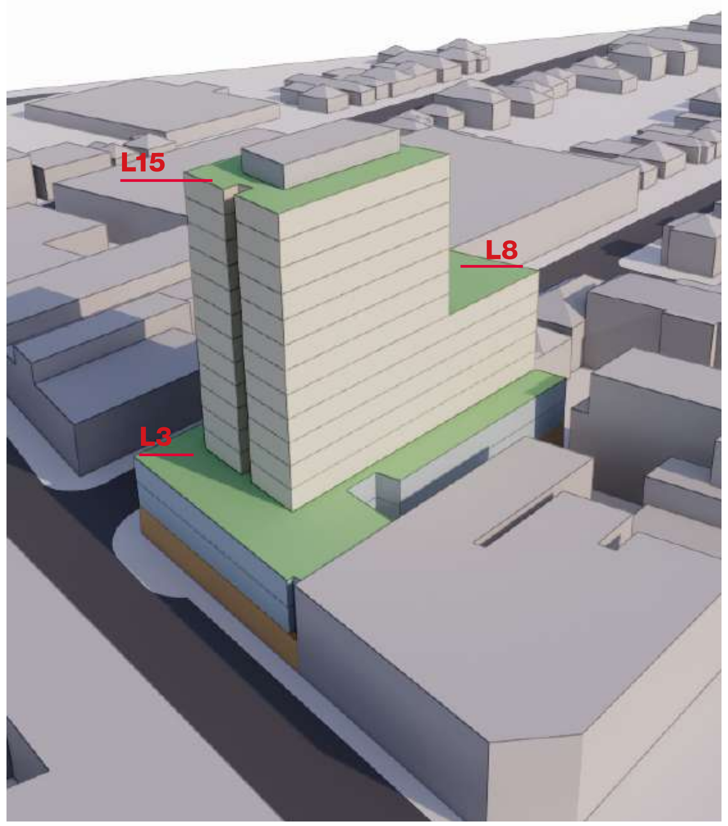
/ Vertical articulation to east facade is sympathetic to the fine-grain character of Beamish Street and Campsie.

/ Recommend additional measures to mitigate bulk.

OPTION 02 - STEPPED FORM

Indicative yield: 12,723 m²

FSR: 4.6:1



/ Typical tower floorplate (~900 m²) extruded to mid-height (8 Storey)

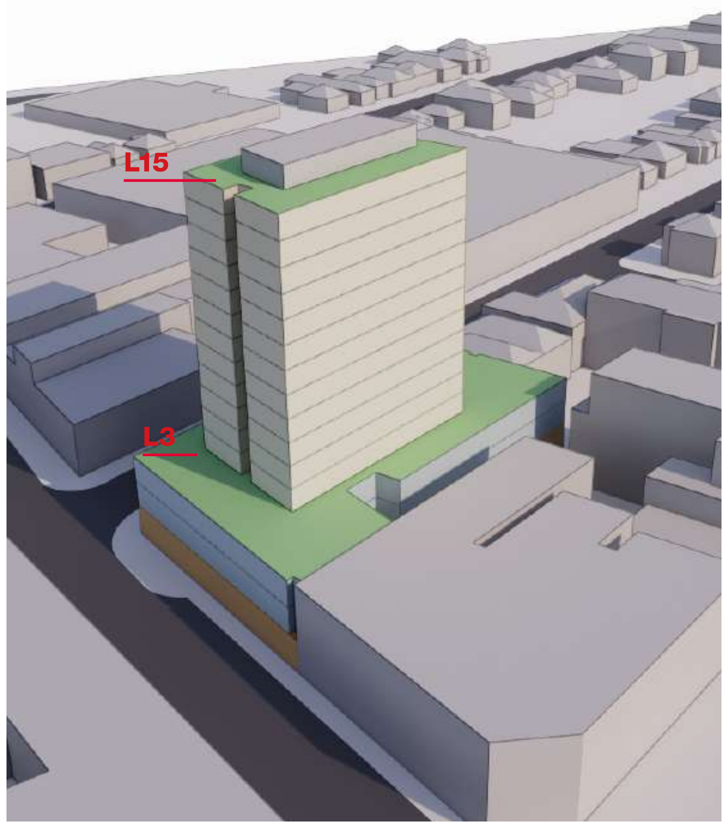
/ Smaller high-rise floorplate (~500 m²) reduces visual bulk and improves sky-view factor and airflow between buildings.

/ Considered an acceptable outcome, however reliance on dual core for lower levels is not commercially favourable.

OPTION 03 - REDUCED FLOORPLATE

Indicative yield: 11,582 m²

FSR: 4.2:1



/ Smaller tower floorplate (~570 m²) reduces visual bulk and improves sky-view factor and airflow between buildings.

/ Typical tower form is efficient and provides high amenity

/ Considered an acceptable outcome allowing efficient development of good quality apartments and generous building separation.

SITE C.2 CAMPSIE

Tower plan studies:

OPTION 1:

/ Dual core typical floors allows excellent amenity, including 100% solar access and majority cross ventilated apartments.

/ Approx 108 apartments

OPTION 2:

/ Reduced floorplate to upper levels with single core servicing typically 5 units.

/ Access to communal roof terrace

/ Tower floorplate of ~500m2 is relatively compact and somewhat inefficient

/ Approx 80 apartments

OPTION 3:

/ Utilises a single core to service a slightly larger floorplate than option 2, improving efficiency

/ Excellent residential amenity with >80% receiving solar access and >65% cross ventilated.

/ Daylight, natural ventilation and views to lift lobby.

/ Approx 72 apartments

OPTION 01 TYPICAL FLOOR PLAN (L3-14)

OPTION 02 TYPICAL PLAN (L3-L7)

OPTIONS 03 - TYPICAL FLOOR PLAN (L3-14)

OPTION 02 - UPPER FLOOR PLAN (L8-14)

Indicative On-structure planting opportunities.

/ Option 01: Level 3 Podium terrace: 740m2

/ Option 02 Level 8 Roof Terrace: 330m2

/ Option 03 Level 3 Podium Terrace: 1150m2

Cummalitive potential on-structure planting for Option 03 (excluding L14 roof): 1150m2 (41% site area)

Extent of planters subject to structural considerations, wind conditions, functional and user requirements for terraces. North and east facing podium and tower terraces likely to enjoy favourable solar and wind conditions and sufficient space to support tree planting (TBC)

3.2.4 SITE C.2 CAMPSIE

GROUND FLOOR

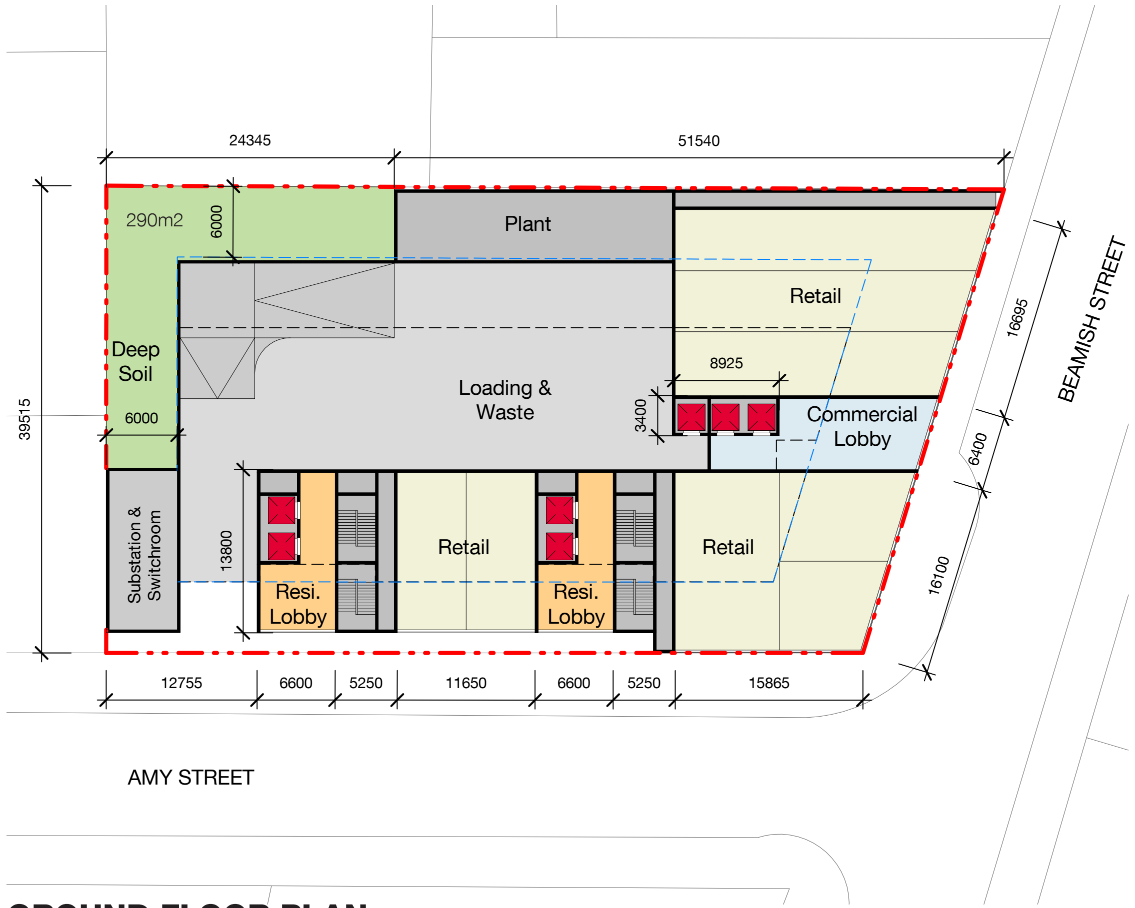
/ Nil setback to Beamish Street with small-format retail frontages and commercial lobby.
/ Residential lobbies and secondary retail tenancies to Amy Street. Commercial lobby could equally be located along this secondary frontage.
/ Egress stairs, vehicle access and services located on secondary street frontage.
/ Deep soil planting to south-west boundary, provides buffer to adjoining property.

PODIUM PLAN

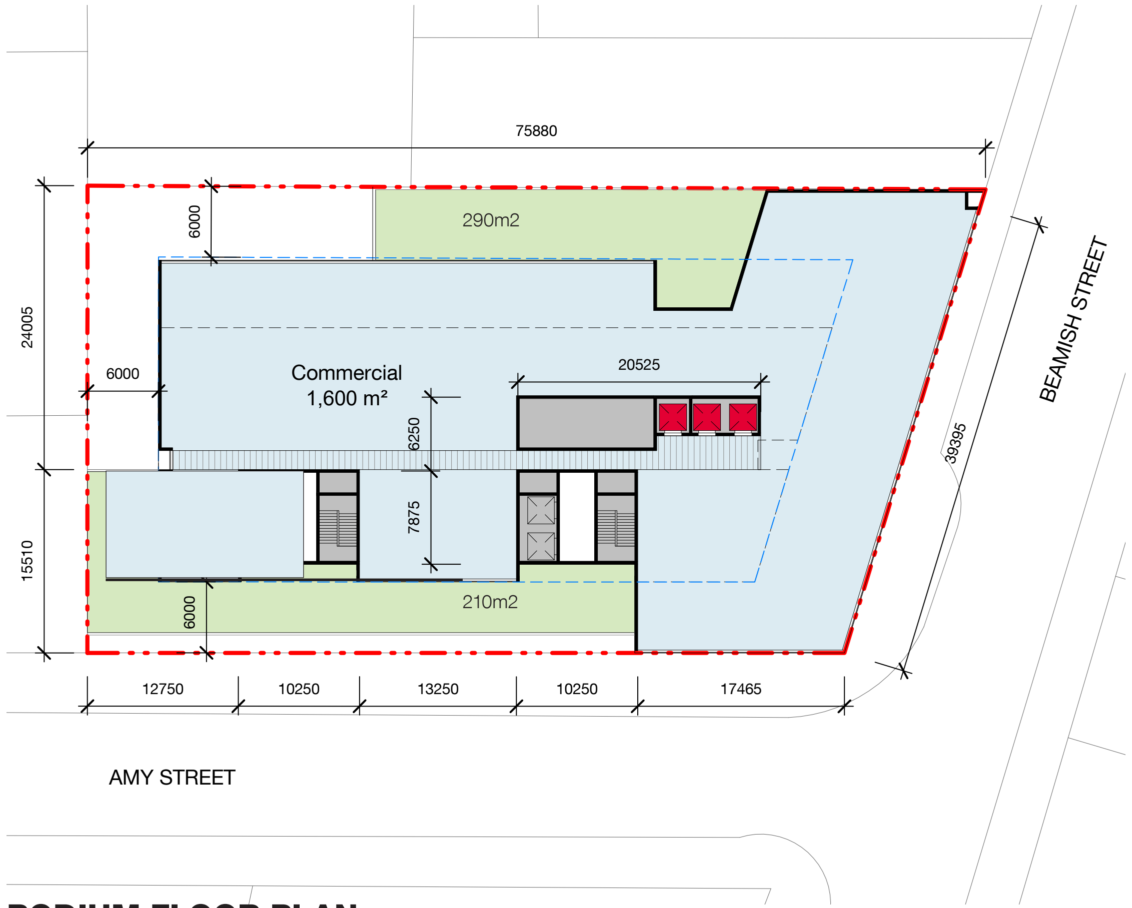
/ Two levels of open plan commercial space providing circa 3200m2.
/ efficient floorplates with good natural light and flexibility for subdivision
/ Total nonresidential FSR (podium + ground) of approximately 1:1
/ landscaped podium terraces / balconies

BASEMENT PARKING

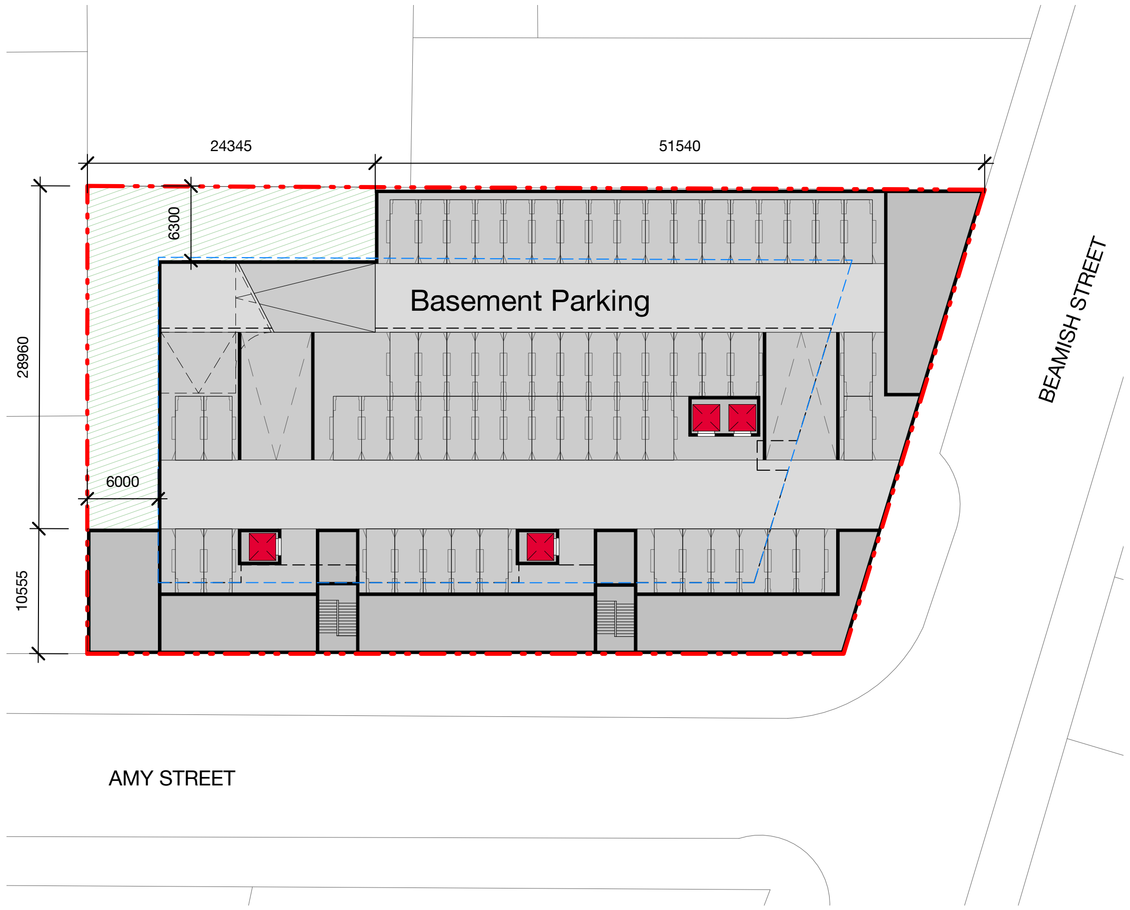
/ 60 cars spaces at Level B1
/ ~70 spaces for typical levels
/ Additional space available for residential storage/ plant / water storage.

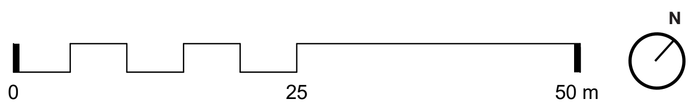


GROUND FLOOR PLAN



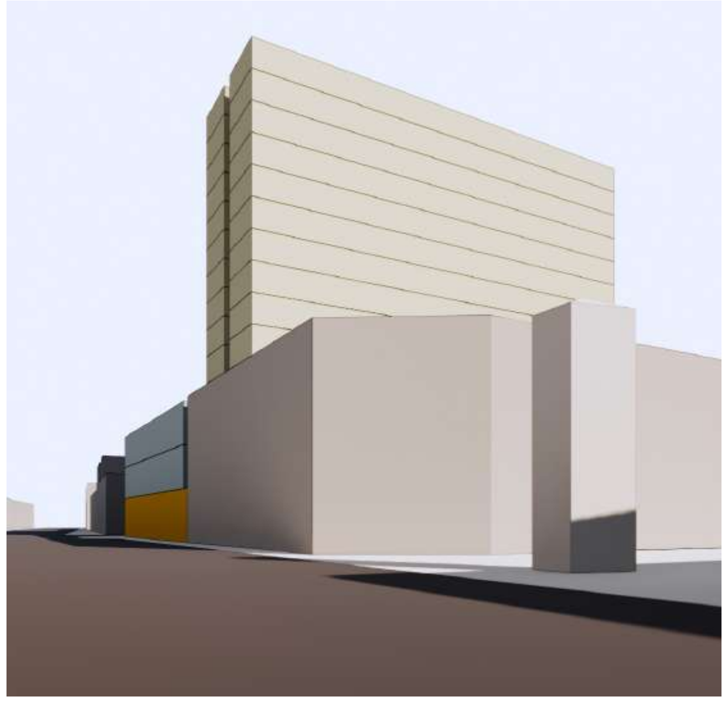
PODIUM FLOOR PLAN





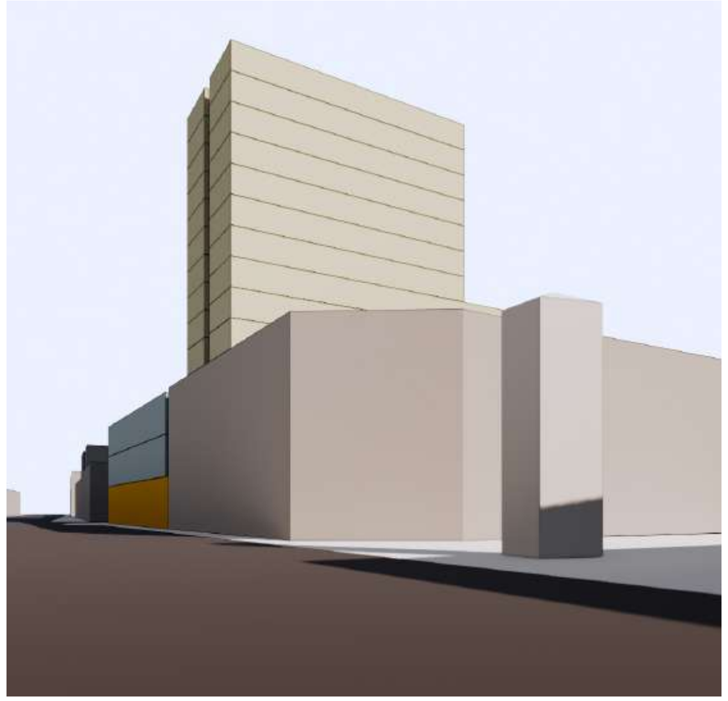
SITE C.2 VIEW ANALYSIS

ANZAC MALL / BEAMISH STREET



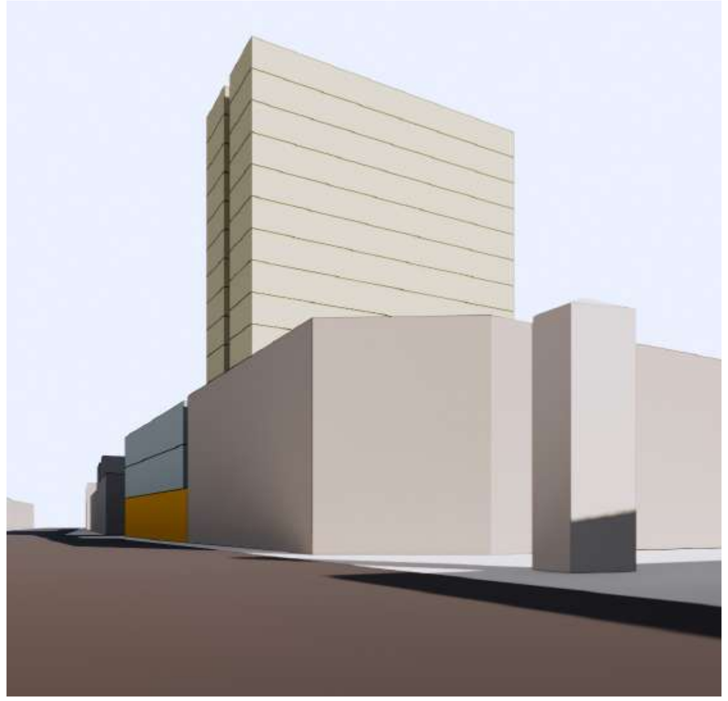
OPTION 01

/ Low podium & active frontages to Beamish Street
/ 9m setback to tower
/ Broad un-articulated tower form appears bulky



OPTION 02

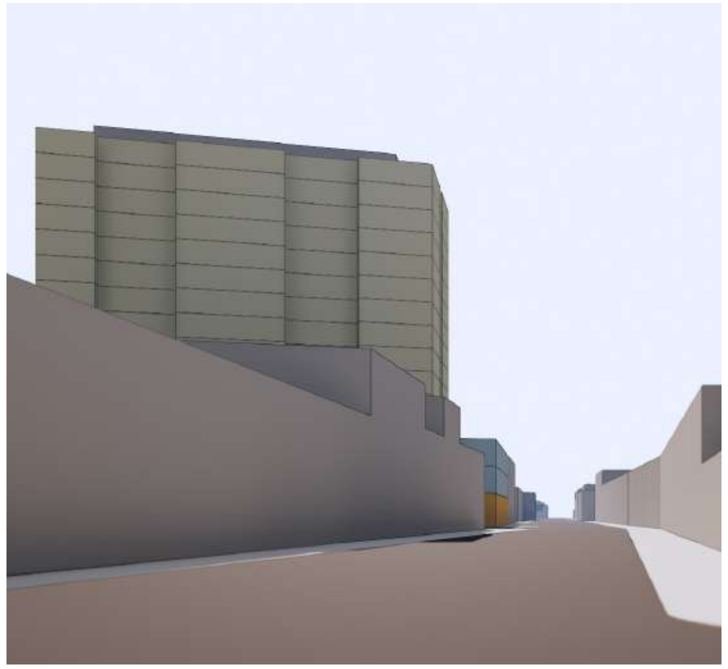
/ Reduced tower floorplate reduces apparent bulk
/ 8-storey element not perceived



OPTION 03

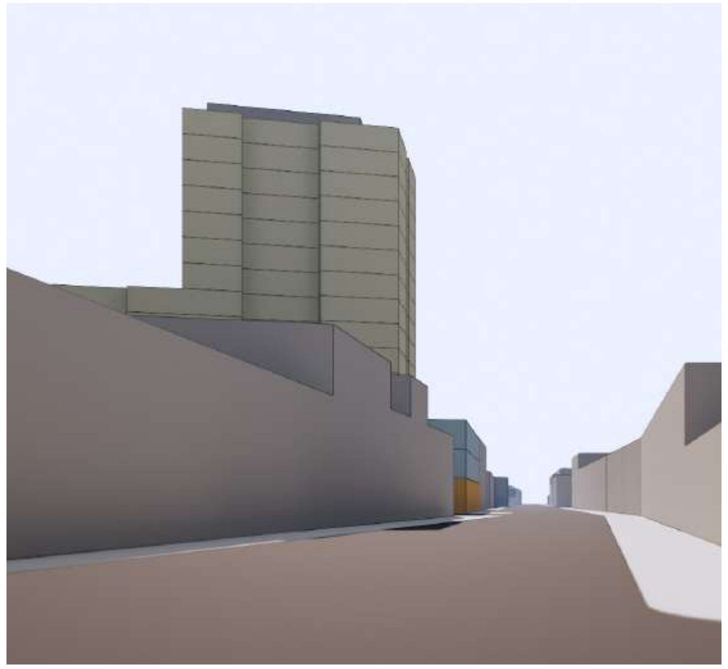
/ Tower bulk similar to Option 2

BEAMISH STREET (VIEW NORTH)



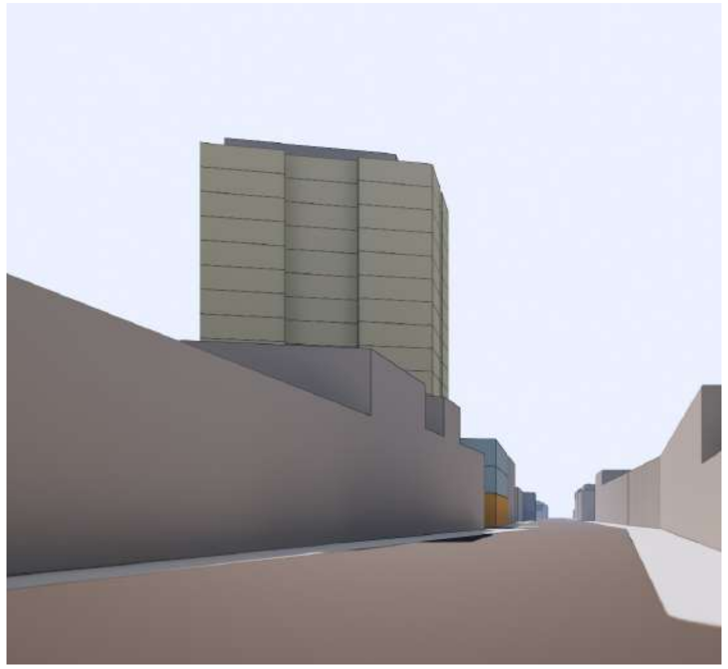
OPTION 01

/ Broad un-articulated tower form appears bulky



OPTION 02

/ Reduced tower floorplate reduces apparent bulk
/ 8-storey element not perceived



OPTION 03

/ Tower bulk similar to Option 2
/ Expression of core provides articulation and further reduces apparent bulk.

SITE C.2
VIEW ANALYSIS

ANZAC SQUARE - VIEW NORTH-EAST

OPTION 01

/ Broad un-articulated tower form appears bulky

OPTION 02

/ Reduced tower floorplate reduces apparent bulk
/ 8-storey element quite visible

OPTION 03

/ Tower bulk similar to Option 2 but removal of 8-storey element provides more space and reduces visual bulk.

SITE C.2 SOLAR ACCESS

Shadow study based on Option 3, 15 storey building

Insights:

/ Three storey podium has minimal shadow impact to south

/ slender tower form of Option 2/3 impacts properties on Amy Street between 9 and 1pm.

/ Solar access maintained to Beamish Street footpath (east) until approximately 2pm.

/ Property on the corner of Amy St and Beamish Street is most effected. Any future residential development of this site is likely to be able to achieve solar access due to NE orientation.

9AM

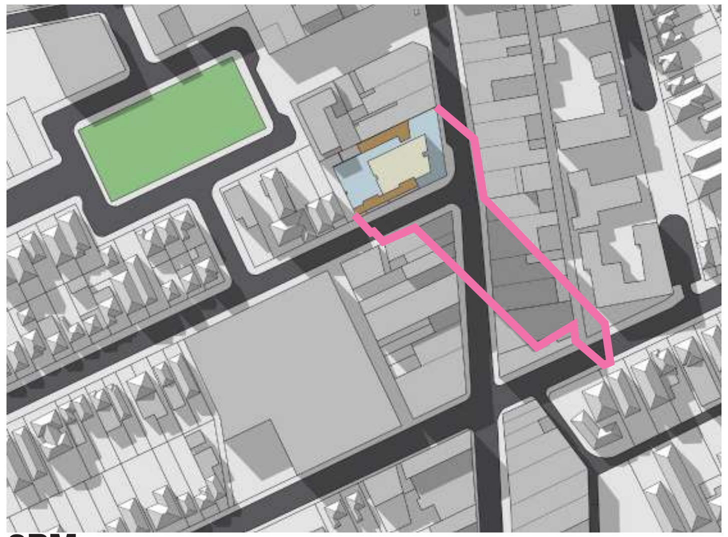
10AM

11AM

12PM

1PM

2PM



3PM

SITE C.2 INSIGHTS

Observations and insights from testing site C.1:

/ The study demonstrates that a tall building of 15 storeys can be comfortably accommodated without adverse impacts on the public domain.

/ Judgements regarding whether this scale of development relate comfortably to the character of Campsie are beyond this study, however the massing strategy and significant setback from Beamish Street appear to enable a satisfactory outcome.

/ The long east-west orientation of the site could result in very broad building, inconsistent with the small scale and fine-grain character of the area. The smaller tower footprint of Massing Option 3 reduces the apparent bulk and prominence of the tower form.

/ The introduction of vertical articulation - such as that indicated on the north-east facade - establishes a moer sympathetic relationship to the vertical proportions and fine-grain character of Beamish Street and Campsie.

/ The primary character of Beamish Street can be maintained through measures including provision of a generous tower setback (9m) and podium that respects the prevailing scale and alignments of the existing buildings.

/ The secondary street frontage accommodates services and access, ensuring extensive active frontage.

Sketch - Massing Option 3

Key features:

Roof mounted Photo-voltaics

Vertical articulation to east facade is sympathetic to the fine-grain character of Beamish Street and Campsie.

Potential additional articulation of building form to provide private or communal open space and assist to reduce apparent bulk of tower form.

Extensive mature tree canopy in Beamish Street substantially reduces the visibility of setback tower forms.

9m tower setback reduces prominence of the tower, retains low-scale character of Beamish Street, and provides opportunities for tree planting.

3-storey podium relates to prevailing low-scale context of Beamish Street.

Dual street frontage ensures active frontages to Beamish Street and corner.

3.2 RECOMMENDATIONS

—

This section makes recommendations regarding development standards for tall buildings to inform Council's LEP and DCP

—

3.2.1 ACHIEVING DESIGN QUALITY IN TALL BUILDINGS

Building 'tall' comes with responsibility.

Without care and a commitment to quality, poorly designed tall buildings can detrimentally impact the character and amenity of a place, and have a signficant environmental impacts.

Conversely, good design can produce tall buildings that deliver social, environmental, and civic generosity.

Achieving designquality in tall buildings invariably requires the combination of capable design professionals, progressive proponents, and supportive authorities, each with a commitment to quality.

Prescribed minimum standards are a useful tool but tend to prevent poor outcomes rather than promote exceptional ones. As such, these recommendations extend to include guidance around how to define and evaluate design quality.

The key recommendation arising from this study is to establish a precondition for any tall building in Bankstown and Campsie a requirement to meet three requisite conditions:

1. Demonstration of design excellence

2. High levels of environmental sustainability

3. Provision of social benefit

The recommendations are structured as follows:

Objectives

/ promoting design excellence and sustainability in tall buildings

Principles

/ aligned to each discrete Objective;

Design Guidance

/ guidance on design excellence process + policy

/ design guidance on techniques or standards required to meet the principles and objectives.

Notes

/ additional information regarding the rationale or application in Bankstown + Campsie.

STRUCTURE OF RECOMMENDATIONS

OBJECTIVES
Seven objectives promoting design excellence and sustainability in tall buildings at Bankstown and Campsie

PRINCIPLES
Principles in support of each objective

DESIGN GUIDANCE
Recommended approaches or standards relating to aspects of tall building design

NOTES
Comments explaining justification or application, including contextual considerations for Bankstown and Campsie

process

1. Design Excellence
- 1.1 Design policy alignment
- 1.2 Support innovation
- 1.3 Implement design quality
- 1.4 Incentives

POLICY + PROCESS
- / Design Excellence definition
- / Design excellence processes
- / Incentives

outcomes

2. Climate Resilience
- 2.1 Minimise reliance on energy for operations
- 2.2 Reduce heat loads
- 2.3 Resilient green infrastructure

3. Energy + Water efficiency
- 3.1 Efficiency and passive systems
- 3.2 High performance envelopes
- 3.3 Water capture and reuse

4. Resource Optimisation
- 4.1 Flexibility and adaptability
- 4.2 Responsible material use
- 4.3 Durability + longevity

5. Context + Liveability
- 5.1 Neighbourhood character
- 5.2 Streetscape interface
- 5.3 Amenity provisions

6. Comfortable Microclimates
- 6.1 Air circulation
- 6.2 Mitigate wind impacts
- 6.3 Solar access

7. Diverse Typologies
- 7.1 DIverse and relevant housing types
- 7.2 Market alignment
- 7.3 Adaptable parking solutions

BUILT FORM
- / Streetwall height
- / Setbacks
- / Building separation
- / Floorplate sizes

FACADES
- / Shading
- / Fenestration
- / Materials

INTEGRATION
- / Access + Parking
- / Energy
- / HVAC
- / Water

AMENITY
- / Green infrastructure
- / Solar
- / Ventilation
- / Communal uses

OBJECTIVES + PRINCIPLES

Objectives and Principles have been further refined. Some items have been reallocated as Design Guidance.

OBJECTIVES

OB1. DESIGN EXCELLENCE

Exemplary processes to support and enable design excellence in tall buildings.

OB2. CLIMATE RESILIENCE

Buildings that are resilient to the impacts of climate change and natural hazards.

OB3. ENERGY + WATER EFFICIENCY

Buildings are designed for optimal performance, to secure affordable and low carbon energy use, and integrate WSUD for user and ecological benefit

PRINCIPLES

P1.1 Align policy with GANSW Better Placed design objectives to promote consistent vision for design quality and framework for evaluation.

P1.2 Complement prescriptive controls with processes that promote and enable innovation and design excellence.

P1.3 Utilise planning mechanisms that enable design quality to be managed throughout the lifecycle of approvals and construction.

P1.4 Consider alignment between design excellence provisions or incentives and any sustainability bonus schemes contemplated.

P2.1 Design tall buildings to minimise use and reliance on energy for building operations, including heating and cooling.

P2.2 Design facades to manage and reduce heat loads in case of extreme weather events, through the use of operable windows, cross ventilation, external shading, and proportion of glazing.

P2.3 Maximise the integration of green infrastructure resilient to increased heat, reduced rainfall, and adverse wind conditions.

P3.1 Maximise energy efficiency of buildings. Design for effective natural ventilation and efficient heating, ventilation, and air-conditioning (HVAC) systems

P3.2 Design high-performance envelopes with good insulation, shading and appropriate building separation.

P3.3 Maximise onsite water capture + re-use in all new buildings.

OBJECTIVES

OB4. **RESOURCE OPTIMISATION**

Promote a whole of life approach to maximise resource use, recovery and reuse.

OB5. **CONTEXTUAL, LIVEABLE + ATTRACTIVE PLACES**

Tall buildings that are contextual, liveable and attractive, with human scale urban environments at street level.

OB6. **COMFORTABLE MICROCLIMATES**

Tall buildings provide for comfortable micro climates and limit undesirable impacts on surrounding urban amenity.

OB7. **DIVERSE TYPOLOGIES**

Tall buildings providing diverse housing and work environments for the changing demographics.

PRINCIPLES

P4.1 Encourage 'long-life loose-fit' buildings with inherent flexibility for future adaptation.

P4.2 Promote responsible material use, with efficient buildings optimised to minimise material use and maximise potential for material recovery.

P4.3 Use low-carbon, durable, low maintenance materials.

P5.1 Ensure tall buildings reinforce that desired character of streets and neighbourhoods, with particular consideration of matters such as- streetwall height, tower setbacks and building separation, locations for active street frontages and integration of street trees.

P5.2 Pay particular attention to the quality of lower levels of buildings - providing a human scale to those frontages that are experienced up close.

P5.3 Promote generous provision of elements that contribute to comfort and liveability, including open space, landscape, communal amenities such as opportunities for pets, recreation, and food production.

P6.1 Ensure tall buildings enable air circulation and cross ventilation. Elements such as winter gardens should not compromise air flow.

P6.2 Establish built-form parameters to allow air-flow between buildings whilst mitigating negative wind conditions on the adjacent streets, public domain and neighbouring buildings.

P6.3 Ensure excellent solar access to residential properties and important public places such as parks.

7.1 Consider mechanisms for promoting a wide range of residential buildings aligned with the forecast demographic profiles for Bankstown and Campsie. Ensure built-form controls support a wide range of housing typologies.

7.2 Ensure planning policy and controls align with market expectations to enable the realisation of relevant commercial typologies.

7.3 Promote parking solutions - including above ground - that enable adaptation to other productive uses.

POLICY + PROCESS

RELEVANT PRINCIPLES:

1.1 / 1.2 / 1.3 / 1.4

ITEM	DESIGN GUIDANCE	NOTES
DESIGN EXCELLENCE DEFINITION	Utilise a design excellence provision in the LEP to define the desired design quality required for tall buidings. Ensure alignment with the objectives and principles of this study and the objectives of 'Better Placed - an integrated design policy for the built environment in NSW'.	Refer to GANSW Better Placed
	Consider developing place-specific guide notes / policy describing relevant indicators or attributes to assist to evaluate consistency of a proposal against the LEP Design Excellence definition.	Refer to GANSW Evaluating Good Design
DESIGN EXCELLENCE PROCESSES	Mandate that all tall buildings (above a defined height threshold) undergo a design excellence process in the form of either: / Design Review / Competitive Design process In accordance with clear policy for each alternate process.	Recommended height thresholds for design excellence process: Campsie - all buildings exceeding 25m Bankstown - all buildings exceeding 35m
	Implement and ustilise a Design Review Panel program, including: / clear terms of reference, including Design Excellence definition and evaluation policy / appropriate expertise, comprised of a diverse range of qualified design professionals with relevant experience in tall buiding typologies, sustainability, landscape. / clear governance framework definining expectations regarding timing, frequence and format of reviews and feedback. / a requirement that the Design Review Panel validate consistency with the design excellence LEP provision as a prerequisite for approval.	Refer to the NSW State Design Review Panel for example Terms of Reference.
	Implement and utiilise a Competitive Design Process for tall buildings on key sites; / develop or adopt a clear competitive design process policy, in general alignment with GANSW Design Excellence Competition Guidelines (Draft 2018); / nominate key sites for their scale, prominence, and / or potential impact or contribution to the public domain or important character areas. / require that the competition jury validate consistency with the design excellence LEP provision as a prerequisite for approval.	Developments undertaken by Government agencies such as Transport, Health, or Education are likely to be required to undergo State Design Review Panel and may have Government procurement process obligations that render competitive processes unsuitable. Liaise with GANSW and responsible agencies accordingly.
	Manage design quality through the life-cycle of a project approval and delivery by: / requiring the Design Review Panel or Competition Jury review any amendments to approvals to ensure consistency with the design intent and / or that design excellence is retained. / require that the winning design architect in any competitive design process be appointed to lead the design through subsequent phases, including construction documentation.	
INCENTIVES	Introduce incentives associated with tall building development to: / compensate for additional time or costs associated with competitive design processes, and /or; / promote the delivery of specific sustainability intitatives or ratings, or provision of social infrastructure	
	Relevant and effective incentives could relate to additional height or FSR, or flexibility regarding parking / or land-use requirements.	

BUILT FORM

RELEVANT PRINCIPLES:

3.1 / 3.2 / 4.1 / 5.1 / 5.2 / 5.3 / 6.2 / 6.3 / 7.2

ITEM	DESIGN GUIDANCE	NOTES
STREETWALL	Tall buildings should generally utilise a lower scape podium. Podia form and scale should: / respond to a clearly defined desired future character for the street or locality; / relate to the estbalished context, including any prevailing alignments or heights in streets where the existing character is deemed important; / ensure good solar access to parks and public domain such as footpaths where outdoor dining is contemplated. / generally be in the order of 2-5 storeys high	Examples include mixed use streets such as Beamish Street Campsie or Chapel Road environs in Bankstown.
	Streetwall heights should generally adhere to a maximum street wall-to-width ratio of 1:1.	A 1:1 affords a good sky-view factor, allowing light and air to the public domain. A taller enclosures - beyond 2:1 - are likely to induce negative wind canyon effects.
SETBACKS	Provide setbacks to built form above streetwall height: / 6m to primary and secondary streets generally / 8m to streets identified by Council as having important low-scale character or to priority areas for tree planting on podia.	Recommend Council Masterplan and subsequent controls clearly identify which streets are priorities for either character or podium tree canopy and therefore application of 8m setback. An increased setback of ~8m in areas such as Beamish Street Campsie will assist to maintain existing character and minimise visual impact of tower forms.
	Podium setbacks: / Streets with a retail focus should generally adhere to Nil setback / Residential streets - provide 3-6m landscaped setback	Some residential localities may have existing established setbacks in excess of 6m which should be considered.
	To ensure adequate air movement between buildings, provide separation between tower forms, including: / 12m between multiple towers on a single site; / 6m setback from side or rear boundaries; / 6m setback from centre of any street or lane; / Provide an additional 6m separation for any floorspace above an effective height of 50m.	ADG requirements, and / or street setback considerations may necessitate additional separation.
	Apartment developments should meet or exceed minimum separation requirements of the Apartment Design Guide (ADG / Objective 3F Visual Privacy)	Other techniques such as screening can provide effective visual privacy, however adhering to spatial separation should be prioritised. Localised exceptions should be considered where they allow improved qualitative outcomes such as better integration of landscape.
	Other housing types - such as student accommodation - should seek to meet the building separation requirements of the ADG.	
	Limit tower floorplates for any levels above 25m effective height to: / maximum 800m2 GFA for residential, student accommodation, hotel; / maximum 1500m2 GFA for commercial	Will assist to manage visual bulk and maintain good microclimates. Proposed limits reflect reasonable commercial assumptions for similar developments.

BUILT FORM

RELEVANT PRINCIPLES:

3.1 / 3.2 / 4.1 / 5.1 / 5.2 / 5.3 / 6.2 / 6.3 / 7.2

ITEM	DESIGN GUIDANCE	NOTES
SITE AREA	Tall buildings can be successfully developed on small sites but can present challenges relating to viability, building separation, and integration of access + services in street frontages. To promote better outcomes, consider: / utliising minimum site areas, relative to proposed FSR and heights; / requiring a minimum street frontage of circa 30m, / utilising design excellence processes to allow innovative approaches to small site development.	A site area of 1500m2 is considered a reasonable and reliable threshold to accommodate a tall building with high quality street presentation and good performance. Minimum frontage considerations are often related to ensuring access and services can be successfully integrated, especially in single aspect sites. Dual aspect sites can enable good street presentation and active frontages on narrow sites, however the analysis undertaken in this study, and the associated specialist studies (including Sustainability report) highlight that providing adequate separation between buildings is essential to meeting Council's design and sustainability objectives. Intensive development of small (narrow) sites would likely result in small floorplates with dubious development viability and / or be unable to meet the recommended seperation and landscape integration measures set out in this guidance. On this basis, we recommend Council retain minimimum site area and frontage provisions irrespective of dual access.

FACADES

RELEVANT PRINCIPLES:

2.1 / 2.2 / 3.1 / 3.2 / 4.2 / 4.3 / 5.1 / 5.2 / 6.1

ITEM	DESIGN GUIDANCE	NOTES
FENESTRATION	Moderate the extent of glazing in tall buildings. / consider limiting the cumulative total of window-to-wall ratios in commercial buildings to below 50%. (maximum 50% glazed). Facades with more favourable orientations and / or external shading may support more extensive glazing.	Contemporary commercial buildings in Sydney tend to provide excessive glazing, imposing significant heat load on the building. Research suggests that a Window to Wall ratio of nominally 50% is optimal for this climate and assists to minimise heat egress whilst allowing daylight penetration
	Minimise glazing to western facades.	
	Utilise window types, configurations, and placements, that enable sufficient open area to provide effective natural ventilation. Potential approaches include: / placing windows adjacent balconies, / utilising louvers or banks of awnings, / sliding doors with open juliet balconies, / casement windows to catch prevailing breezes.	Safety requirements such as restricted openings can compromise ventilation.
	Avoid heavily tinted or reflective glazing	Both contribute to urban heat island effect. Reflective glazing can cause glare and contribute to incidents of bird-strike in tall buildings.
	Wintergardens should be designed so as to not compromise the effective natural ventilation of a dwelling.	
SHADING	Minimise exposure to high solar heat loads through careful positioning, shape and configuration of buildings. Techniques include: / west facing facades - avoid long facades and minimise extent of glazing. / articulating building form to self-shade; or / utilise an eccentric core to minimise heat ingress to habitable spaces;	Readily achieved in commercial buildings, however apartment buildings often require east+west orientation to achieve minimum solar access requirements.
	Provide effective shading to facades to minimises heat penetration into the building: / external sunshades that prevent solar ingress during times of high heat load; / operable blinds integrated within multi-layered glazing systems; / complementary use of internal blinds to assist with heat and glare control.	The principal aim of shading is to reduce heat penetration into the building, better achieved via external or integral shading systems than internal blinds.
	Utilise planting to provide supplementary shading. / canopy trees and pergolas can provide effective shading at lower levels / podia / climbing vines on trellis systems can provide effective shading to facades,	Landscape strategies require ongoing maintenance to ensure effectiveness

FACADES

RELEVANT PRINCIPLES:

2.1 / 2.2 / 3.1 / 3.2 / 4.2 / 4.3 / 5.1 / 5.2 / 6.1

ITEM	DESIGN GUIDANCE	NOTES
MATERIALS	Promote the use of facade materials and expression that respond to local character / New development in established areas should respond to the prevailing local built form characteristics (where they are regarded by Council as important), including materials, textures and colours. / Reinforce distinct & authentic local characteristics, referencing local heritage and local materials where applicable. / Create or contribute to a distinctive, defined urban character in the local area. / Ensure facades contribute to an appropriate scale, rhythm, and proportion that relates to the street, including the prevailing fine-grain vertical proportions of high streets. / Use high quality materials and careful detailing of elements to ensure human scale and interest at the street level. / Extend the key materials utilised on the principal street frontage to side frontages.	Express clear character statements in masterplans and DCPs to promote place-specific approaches to tall building design in Bankstown and Campsie. Approvals processes, including assessment of modifications, need to carefully monitor specifications to ensure any substitutions are consistent with the design intent and performance standards inherent in the initial approval.
	Utilise facade materials and configurations that are durable and require minimal ongoing mainentance: / generally with integral finishes rather than painted or applied finishes; / limit the use of painted surfaces to areas readily accessed for reapplication and maintenance; / utilise natural mineral paints to provide durable coatings with long lifespans and limited maintenance requiremens / detail facades and building elements to shed water and minimise staining of surfaces.	These are key considerations to ensure the ongoing appearance and performance of buildings.
	Utilise facade materials and configurations that: / minimise waste during installation and allow recycling or reuse in the future. / contribute to effective thermal insulation / utilise recycled elements or content and minimise emboddied carbon and cement content. / are produced locally to minimise embodied carbon associated with transport	
	Utilise high-albedo materials for roofs and horizontal surfaces but avoid reflective facades.	Assists to mitigate heat island effect.

INTEGRATION

RELEVANT PRINCIPLES:

2.1 / 2.2 / 2.3 / 3.1 / 3.3 / 4.1 / 4.2 / 4.3 / 5.2 / 7.3

ITEM	DESIGN GUIDANCE	NOTES
ACCESS + PARKING	Proritise vehicle access to sites from rear lanes or secondary street frontages.	Consider minimum lot frontage controls for sites with a single street frontage to moderate impact of vehicle crossovers.
	Integrate loading / waste / service vehicle access in discrete locations to reduce visibility from primary street frontages.	
	Podium parking should allow future adaptation. Approaches include: / flat-slab structures with sufficient floor-to-floor heights (>3.6m nom). / ramp + circulation systems designed to enable part-floor conversions; / unitised structural systems that enable demountability - ie. removal of every second carpark floor to create additional volume.	
	Screen above-ground parking with high-quality facade treatments that allow natural ventilation but minimise visibility of cars. Potential approaches include: / masonry or metal screens and / or trellis planting (vines or similar).	
ENERGY	Promote all-electric buildings to reduce carbon emissions and reliance on fossil fuels.	
	Maximise rooftop Photo-voltaic installations on all tall buildings. / promote installations in conjunction with green-roof	Consider mandating minimum requirements. Cooling effect of green roof improves PV efficiency.
WATER	Capture and reuse rainwater in all tall buildings. / provide on-site storage tanks / provide dual-plumbing to enable rainwater use and connection to any future district recycled water schems.	
	Utilise green infrastructure - including green roofs, deep soil, rain gardens - to allow stormwater infiltration and minimise discharge from site.	
WASTE	Waste management in tall buildings should / enable effective disposal and collection of waste and promote recycling; / provide convenience and amenity for occupants; / occur on-site and not adversly impact the public domain.	
	Specific waste management strategies for tall buildings in Bankstown and Campsie: / Provide a waste chute system for general waste leading to a central waste storage and collection point on-site. / Provide sufficient clearance height (min4.5m) for HRV to access the collection point (including basement) / Provide temporary bin holding area if the truck is not able to park adjacent the collection point (within 5m of the bin storage area). / locate collectoin points so they do not interfere with car parking, vehicle manoeuvring areas or pedestrian areas. / Locate recycling bins (in cupboard or room) on each level to promote recycling and avoid comingling with general waste. Bin size will be generated by number of occupants / dwellings. / Provide service lift access to enable a caretaker to empty the bins. / For mixed-use developments the waste collection area for residential and retail/ commercial should be separated from each other.	Summarised from advice provided by Council staff.
	Consider integrating bio-digester or compost systems to reduce volume of greenwaste.	The efficacy of site-by-site systems should be considered against precinct based, or Council wide, systems.

INTEGRATION

RELEVANT PRINCIPLES:

2.1 / 2.2 / 2.3 / 3.1 / 3.3 / 4.1 / 4.2 / 4.3 / 5.2 / 7.3

ITEM	DESIGN GUIDANCE	NOTES
SERVICES	Core and structural systems should enable efficient distribution of services throughout the building, and allow access for maintenance and future adaptation.	
	Core size will be influenced by factors including building height, floorplate size, use, and quality requirements. As a general guide, applicable for buildings of circa 20 storeys with floorplates of 800m2 nom residential, or 1500m2 commercial, the core will equate to approximately 15% of the floor area.	Efficiency will diminish with significantly smaller floorplates and / or taller buildings.
	Ground level services should be integrated into the building design discretely to provide high quality and attractive frontages. / avoid or minimise the extent of services located in street frontages identified as being important active frontages; / where permissible (subject to requirements of Code or relevant Authority), locate services in back or house areas, or basements, to minimise impact on street frontage. / coordinate the design of access doors, enclosures, or ventilation grills, to present as components of an integrated facade design. Consistent materials or colours can assit to diminish the prominence of services elements. / consider integrating exhaust or air-intake louvers at high-level above shopfronts / in some situations, exposing services such as hydrant boosters, can contribute to the visual interest at ground level. / A a general rule of thumb, 6-10m of ground level frontage is likely to be required to accommodate services, or access to services, including: - substation 4-5m width - fire hydrant booster 2-3m - gas meter room 1-2m (not required in all-electric building as recommended) - other items, such as switchrooms, fire control rooms, tanks etc, are generally able to be located within the building and accessed from fire egress corridors, lobbies, or common areas.	Recommend that Council's masterplan and / or DCP identify priority active street frontages that require particular care. When carefully considered and well executed, integration of services does not compromise the streetscape and need not be deemed a material constraint on lot sizes.
	Locate air-conditioning heat-rejection units at or near the top of tall bulidings, and: / prohibit locating units at or below podium levels or residential balconies	Heat rejection is a significant contributor to urban-heat island effect. The impact is diminished where heat can readily dissipate.

AMENITY

RELEVANT PRINCIPLES:

2.1 / 2.2 / 3.2 / 3.3 / 5.1 / 5.3 / 6.1 / 6.3

ITEM	DESIGN GUIDANCE	NOTES
GREEN INFRASTRUCTURE	All tall building should integrate green infrastructure, including the following potential approaches: / Deep soil planting; / Extensive roof planting (<200mm depth) / Intensive roof gardens (200-1500mm depth) on podiums etc. / Greenwall systems / trellised planting. Provision of canopy trees at ground or podium should be prioritised.	Whilst deep soil planting affords dual benefits of allowing ground-water replenisment and supporting canopy trees, some circumstancse warrant consideration of alteratives in leiu. Considerations such as provision of active retail frontages, or commercial expectations regarding floorplate sizes, may compromise the ability to effectively integrated deep soil. In these situations, a combination of other green infrastructure should be utilised.
	All planting should be supported by adequate planting conditions, maintenance regimes and covenants, to ensure ongoing viability.	
SOLAR	Design residential tall buildings to achieve or exceed the winter solar access requirements of the Apartment Design Guide, and; / combine with passive strategies such as exposed themal mass within dwellings to provide thermal stability and passive heating. / utlise performance glazing - such insulated glazing units - to provide high levels of daylight whilst minimising heat transfer, with additional benefit of acoustic attenuation.	
	Design commercial tall buildings to prioritise good daylight access but minimise solar heat load. / Shallow floorplates and glazing to south facade is favourable for providing excellent natural daylight without adverse heat loads associated with other orientations. / Winter sun to breakout spaces / wintergardens can be favourable if coupled with natural, or mixed-mode, ventilation systems. The winter sun can provide beneficial passive heating to such spaces.	
	Articulation of tower forms, through setbacks, or stepping forms, can improve solar access to adjoining properties. All tall buildings should be designed to preserve excellent solar access to existing parks and other important public places.	Define key public places and solar access requirements in Council Masterplan and DCP
VENTILATION	Optimise natural ventilation in apartment buildings: / Meet or exceed the natural ventilation requirements in the ADG; / Promote predominanlty dual orientation dwellings, / wintergardens to retain permanently openings to allow unubstructed airflow.	Dual orientation apartments will be more readily achieved with moderate floorplate sizes to achieve predominantly corner dwellings.
	Optimise ventilation in non- residential buildings: / Incorporate mixed-mode HVAC systems allowing natural ventilation in favourable conditions; / Promote the integration of naturally ventilated spaces such as breakout space, meeting rooms, circulation areas. / Utilise atria or thermal chimneys to exhaust hot air from habitable spaces. / Utilise Economy-Cycle HVAC to provide high rates of fresh-air.	Non-residential buildings typically consume significant amounts of energy through cooling. Energy savings - and improvements to indoor air quality - can be achieved through systems that reduce the cooling demand. Building Management and HVAC Systems that provide an Economy Cycle allow 100% fresh air supply where external ambient conditions are lower than indoor air temperature. This can significantly reduce energy consumption.
	Given the affect of local conditions, including adjoining buildings, require all proposed tall buildings undertake a wind assessment.	

AMENITY

RELEVANT PRINCIPLES:

2.1 / 2.2 / 3.2 / 3.3 / 5.1 / 5.3 / 6.1 / 6.3

ITEM	DESIGN GUIDANCE	NOTES
LIGHTING	Artificial lighting contributes significantly to the energy consumption of a tall building (particularly a commercial building). / Natural daylighting can reduce energy consumption and improve occupant comfort. Effectiveness of daylight penetration into a space is influenced by numerous inter-related factors including: floorplate depth, ceiling height, window height and placement, visable light transmittance of glazing, shading devices, and occupant behaviour. / Effective daylight penetration is generally limited to a ratio of 2.5:1 (floorplate depth relative to window height). with optimal daylight generally within 6m from glazing and generally ineffective beyond 10-12m in conventional commercial environments. / Night-time illumination of extensively glazed office buildings can contribute to bird-strike. Extensive areas of blank glazed facades should be avoided. / Artificial lighting provides opportunities for integrated public art highlighting architectural elements including roof features, feature planting, and public domain. External lighting should contribute to safety in the public domain or communal areas and avoid providing unwanted light-spill into residential dwellings.	/ Achieving good natural daylight (and reducing reliance on artificial lighting) requires an integrated design approach addressing myriad considerations. However, establishing shallow floorplates provides a reliable foundation for achieving good outcomes. A range of techniques - including limited floorplate depth, articulated forms, atria, or eccentric cores - can assist to maximise the proportion of floorspace benefitting from effective natural light. Potential for Council to identify lighting of tall buildings as part of public art strategies for the Centres.