Attachments

Attachment 1: Architectural Design Report prepared by FJMT (August 2014)

Gateway | 815 Pacific Highway Chatswood | Planning Proposal

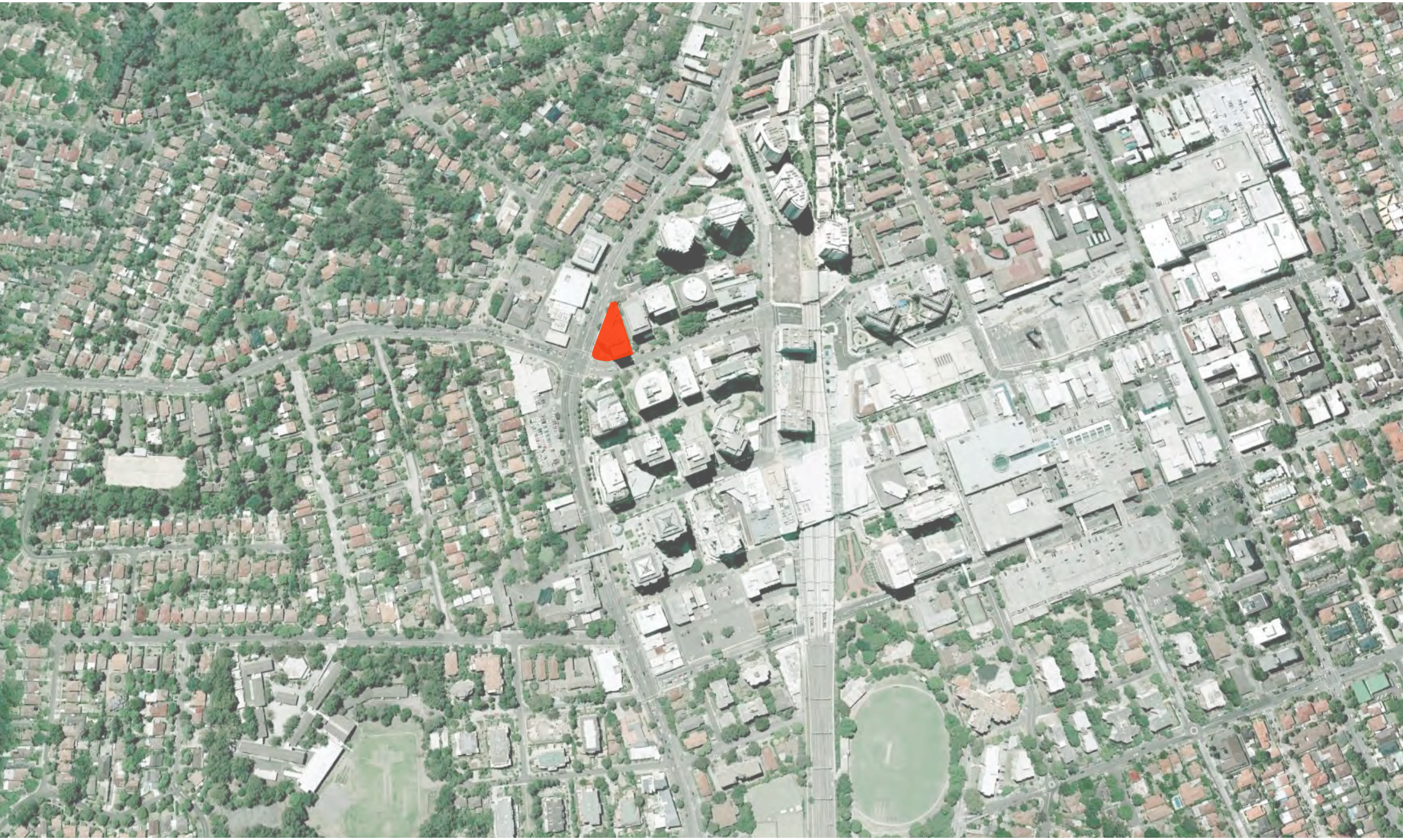
Architectural Design Report & Drawings

AUGUST 2014

Francis-Jones Morehen Thorp fjmt

key site

Key Site



Key Site

- Prominent location on major N-S artery of Pacific Highway
- Link between CBD and the Northern suburbs

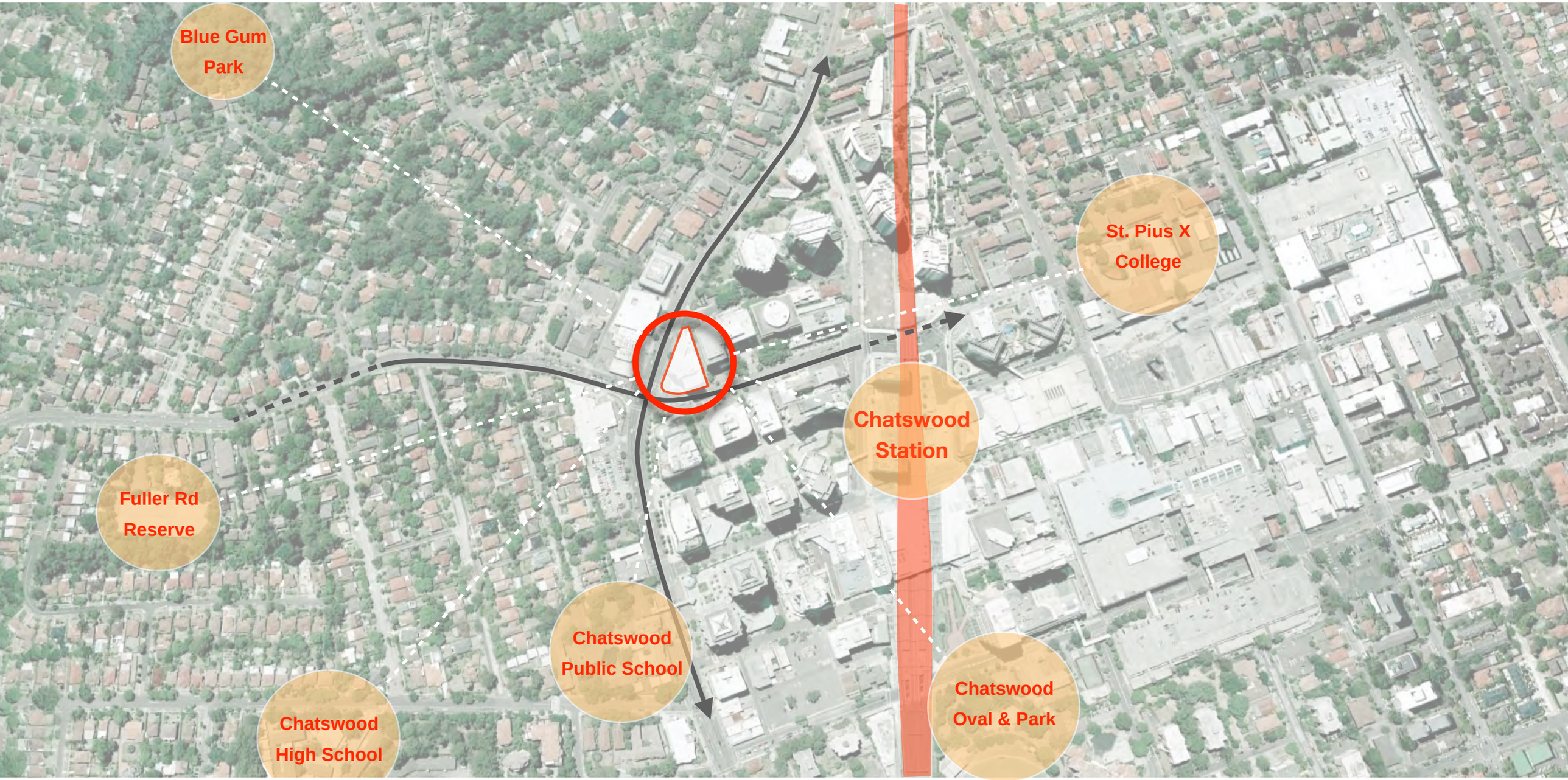
Key Site

- Prominent location on Fullers Rd/Help St as major entry to Chatswood

Key Site

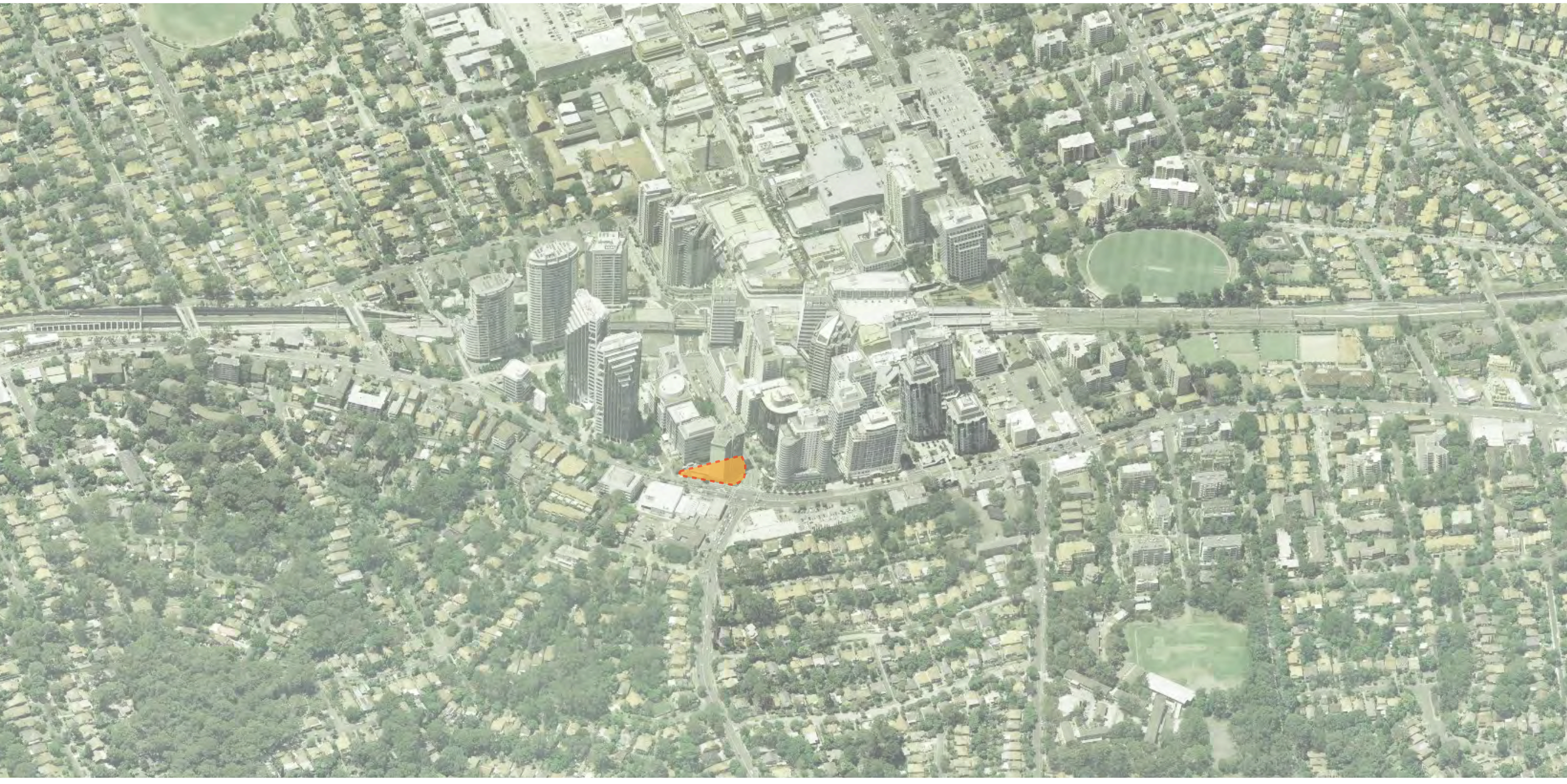
- Proximity to transport interchange
- Proximity to cultural and retail spaces in Chatswood

Key Site



- Proximity to transport interchange
- Proximity to schools & recreational sites in Chatswood

Key Site



- Gateway building requiring Design Excellence

Key Site

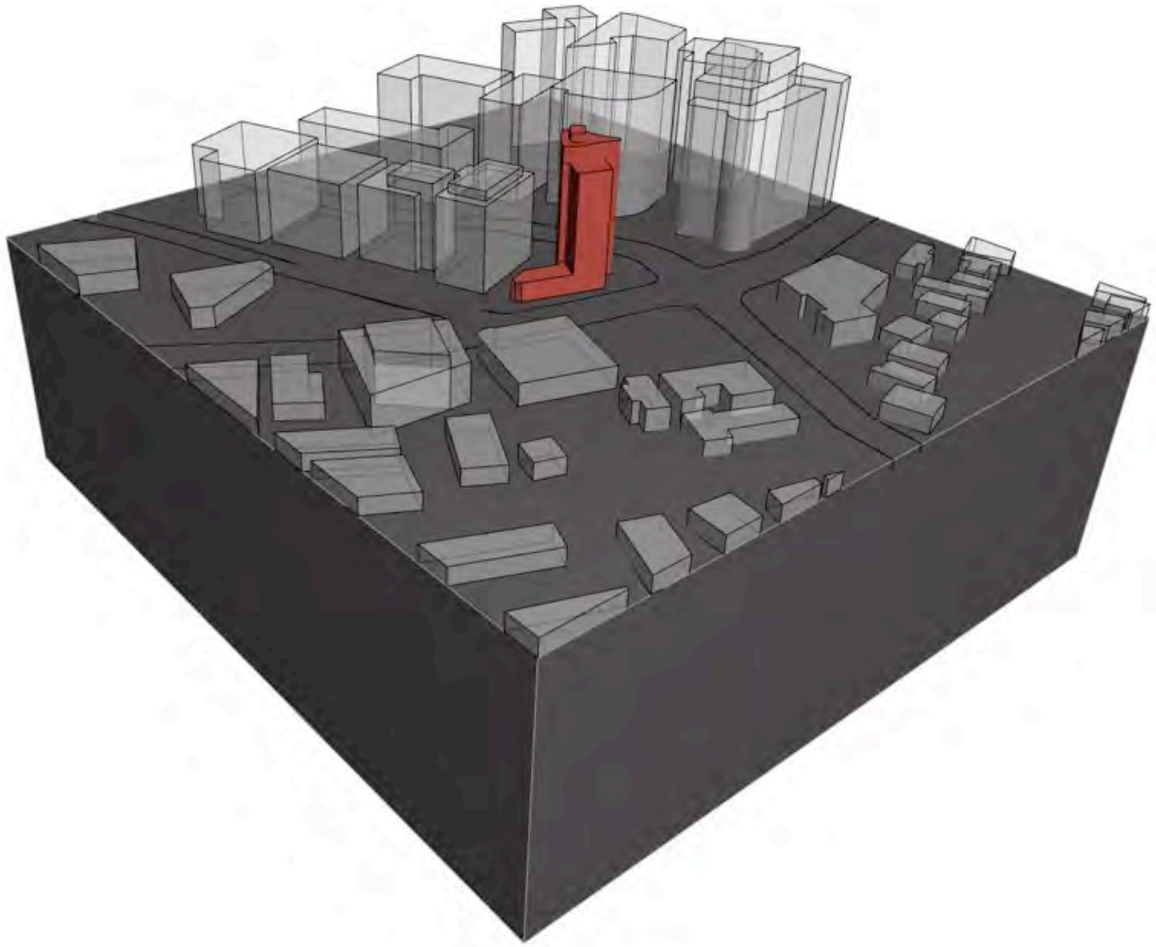
- Gateway building requiring Design Excellence
- Cross Chatswood Connection

employment uses

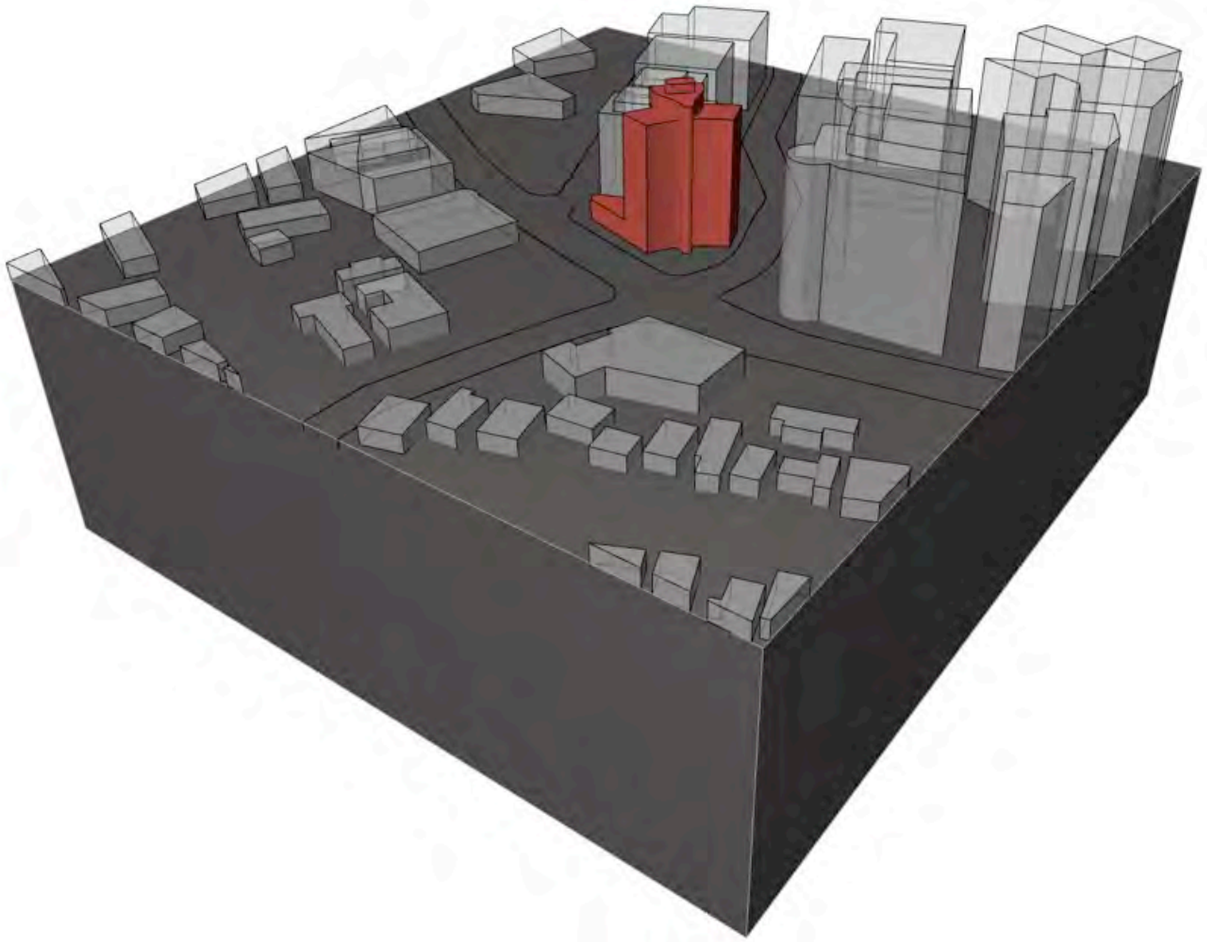
Chatswood City Centre

Existing Building

Aerial Views within existing context



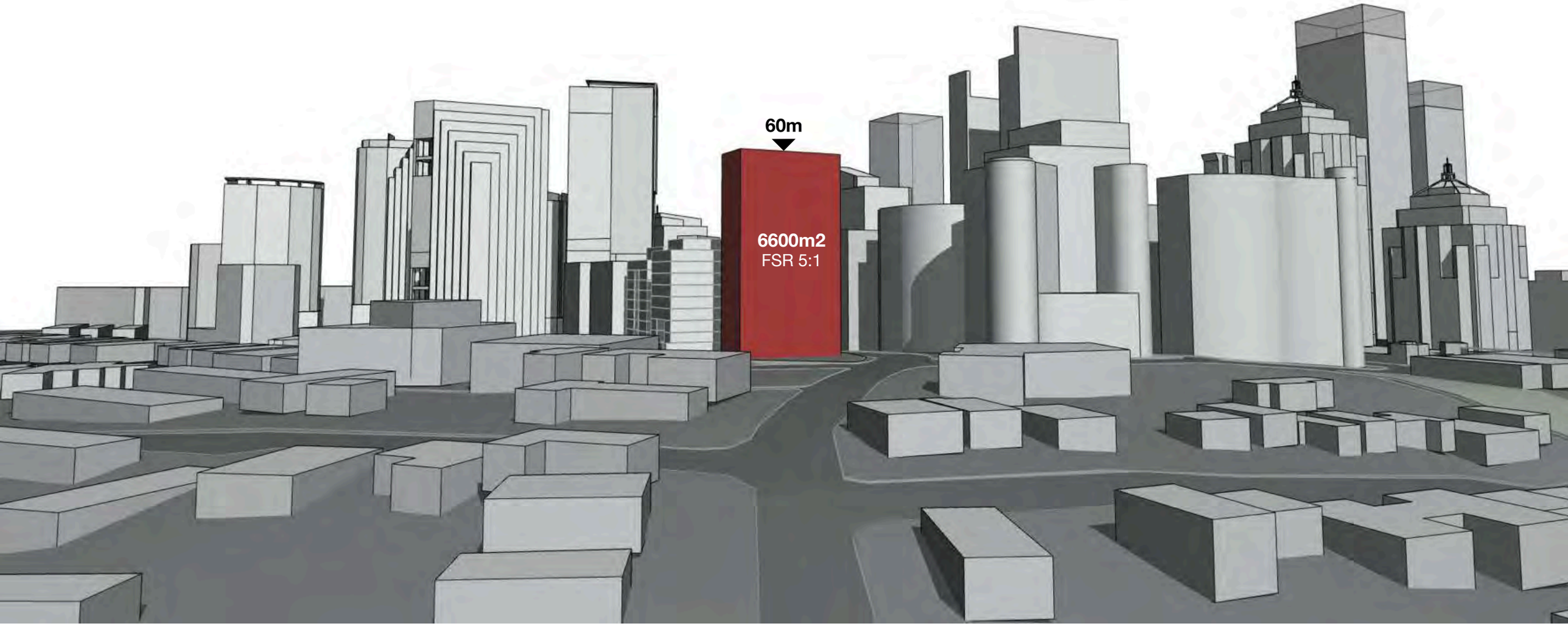
View from West



View from South

Existing Commercial Building with approx 6700m2 NLA including rooftop restaurant

Permissible Massing



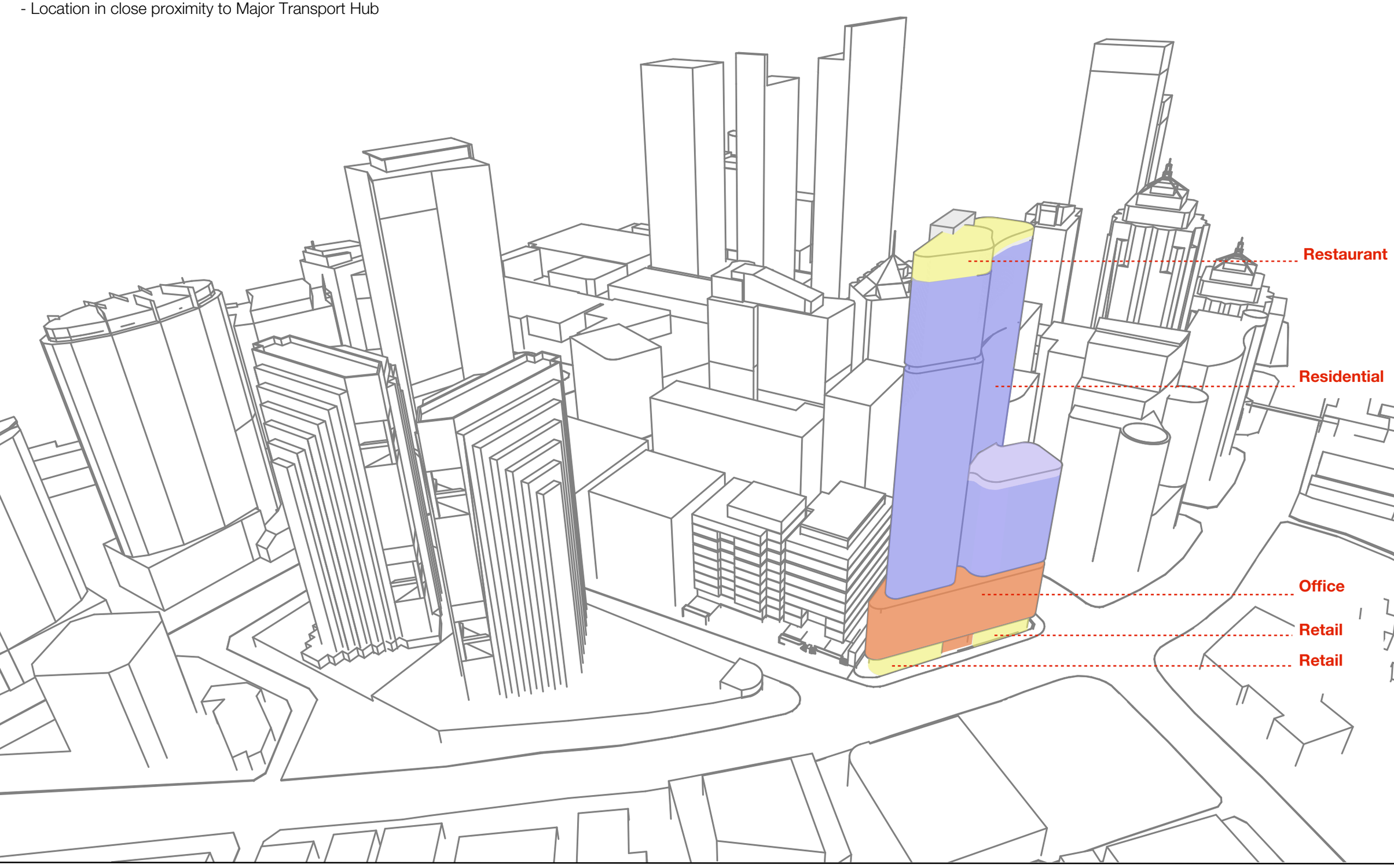
Site Area: 1657m2
Current Permissible FSR: 5:1
Current Maximum Height: 60m

= Approx. 6600m2 GFA available on site

Proposed Massing

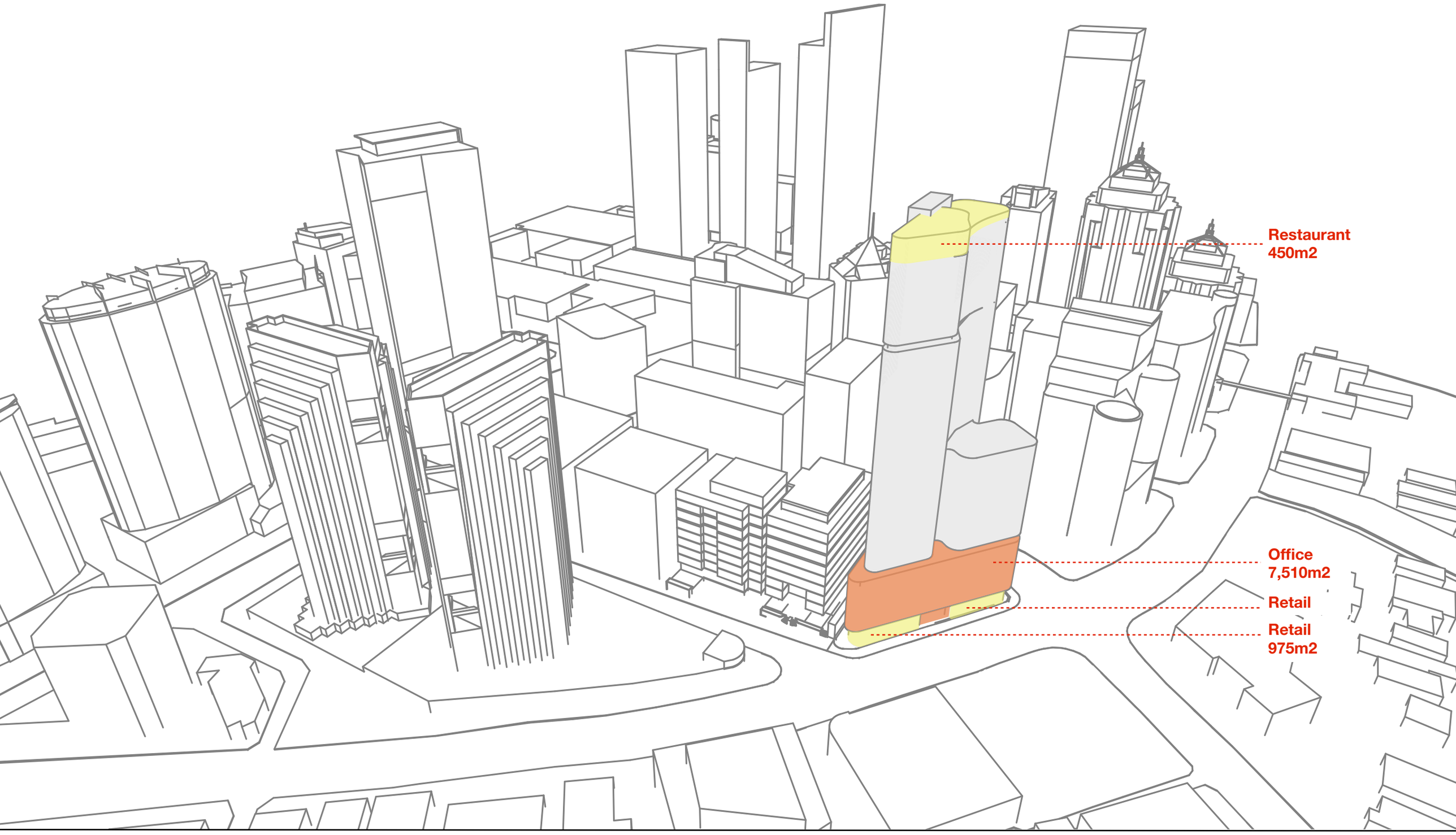
Diversity of Uses - Commercial Office, Retail, Restaurant and Shop Top Housing / Residential

- Vibrant Urban Environment: office, commercial and retail activity throughout the day supplemented with retail restaurant uses in the evening
- Work live opportunities: collaborative environments within both commercial and retail common spaces
- Improved security through Passive Surveillance: a vibrant mix of employees, visitors and residents
- Location in close proximity to Major Transport Hub



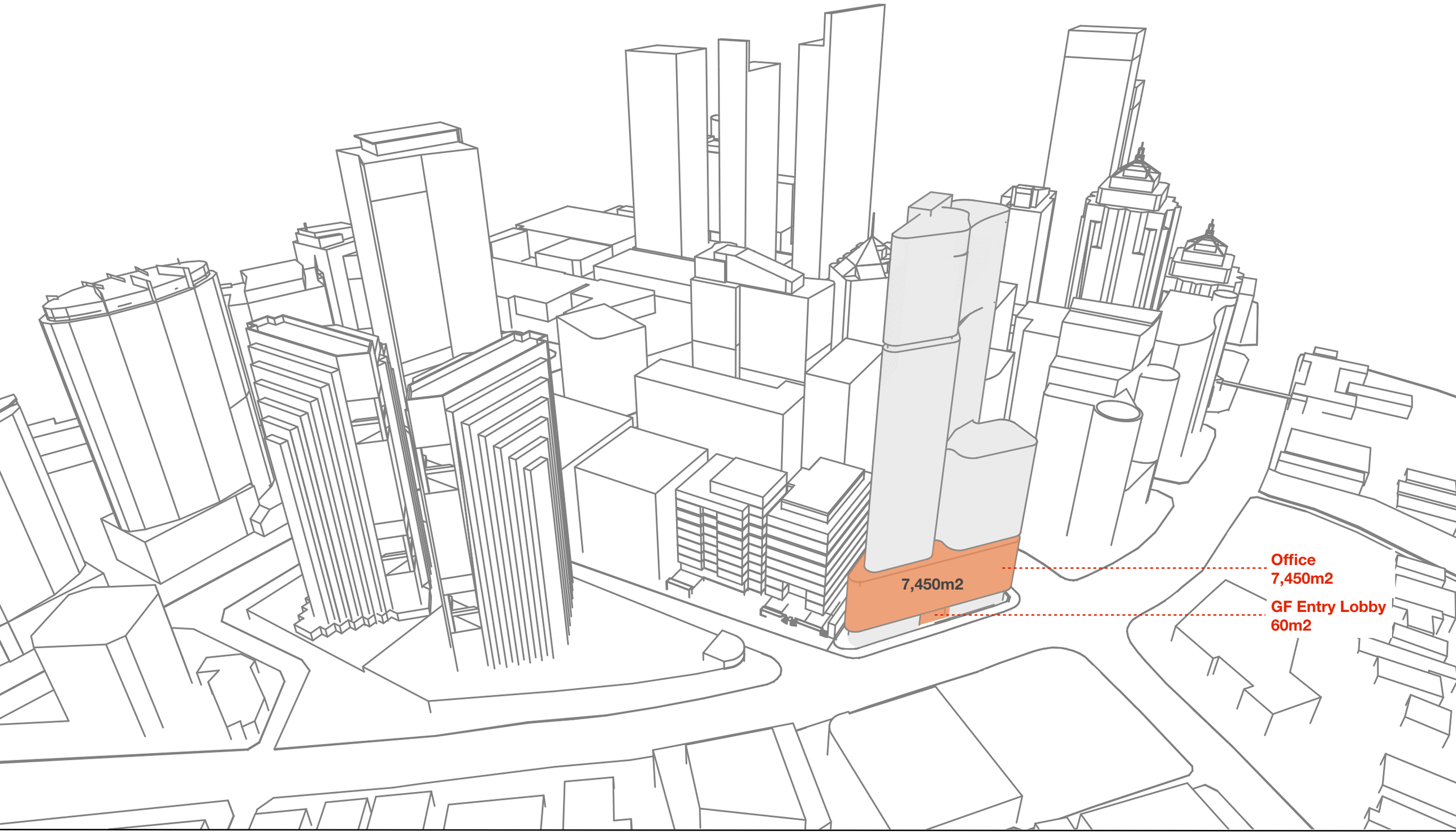
Employment Uses - Commercial & Retail

New Model for Commercial, Retail and Restaurant Development with collaborative spaces
Proposed 8,935m2 Commercial, Retail & Rooftop Restaurant GFA



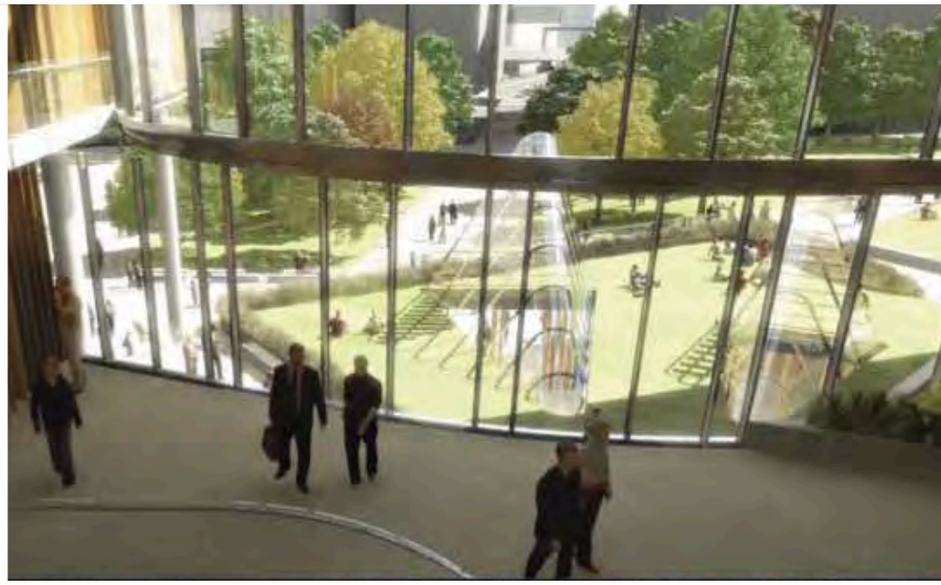
Employment Uses - Commercial Use

Proposed 7,510m2 Commerical Office GFA



Employment Uses - Commercial Use

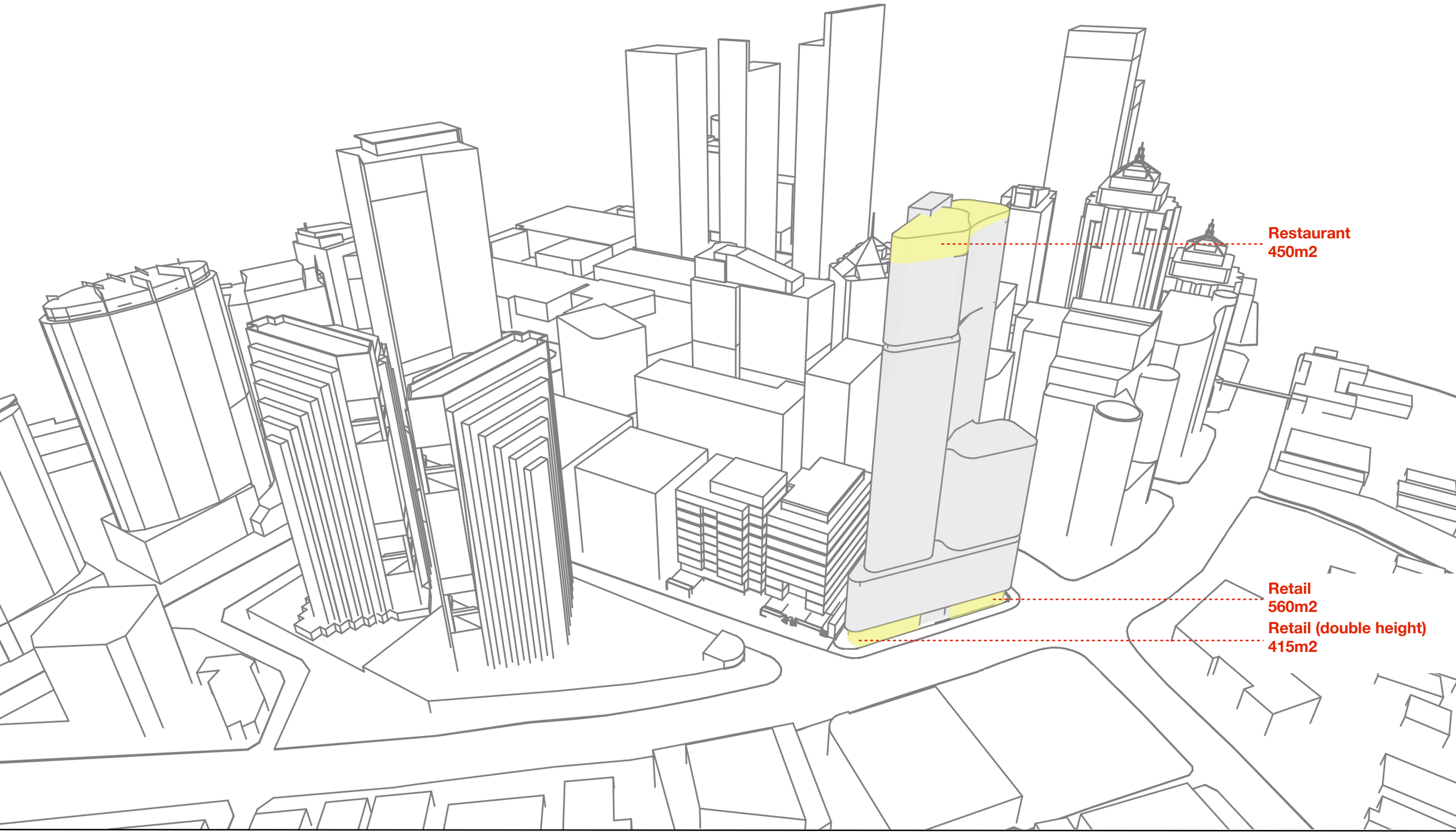
Commercial Podium



- New Model for flexible commercial development
- Hybrid Building with Shared and Community Facilities
- Collaborative Environment for Creative Industries and Start Ups

Employment Uses - Retail & Restaurant

Proposed 975m2 Retail GFA on ground floor lower ground floor
Proposed 450m2 Restaurant/ Public Space GFA on roof top plus large outdoor area
Proposed total 1,425m2 of Retail



Employment Uses - Retail Ground Floor Plane

Active Retail Street Frontages

Active Street Frontages

Active Street Frontages

- Activate Help Street Frontage as per Willoughby LEP 2012
- In addition, activate Pacific Highway with flagship retail

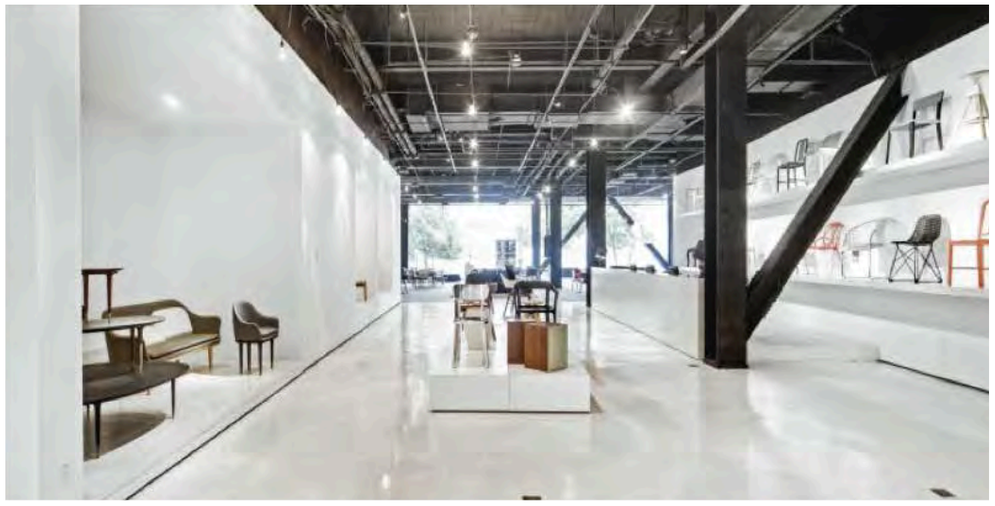
- Extend Activation onto Pacific Highway & McIntosh Street
- Through Site Link added with retail activation and access to rooftop restaurant

Employment Uses - Retail Ground Floor Plane

Active Retail Street Frontages & Through Site Link

Employment Uses - Retail Ground Floor Plane

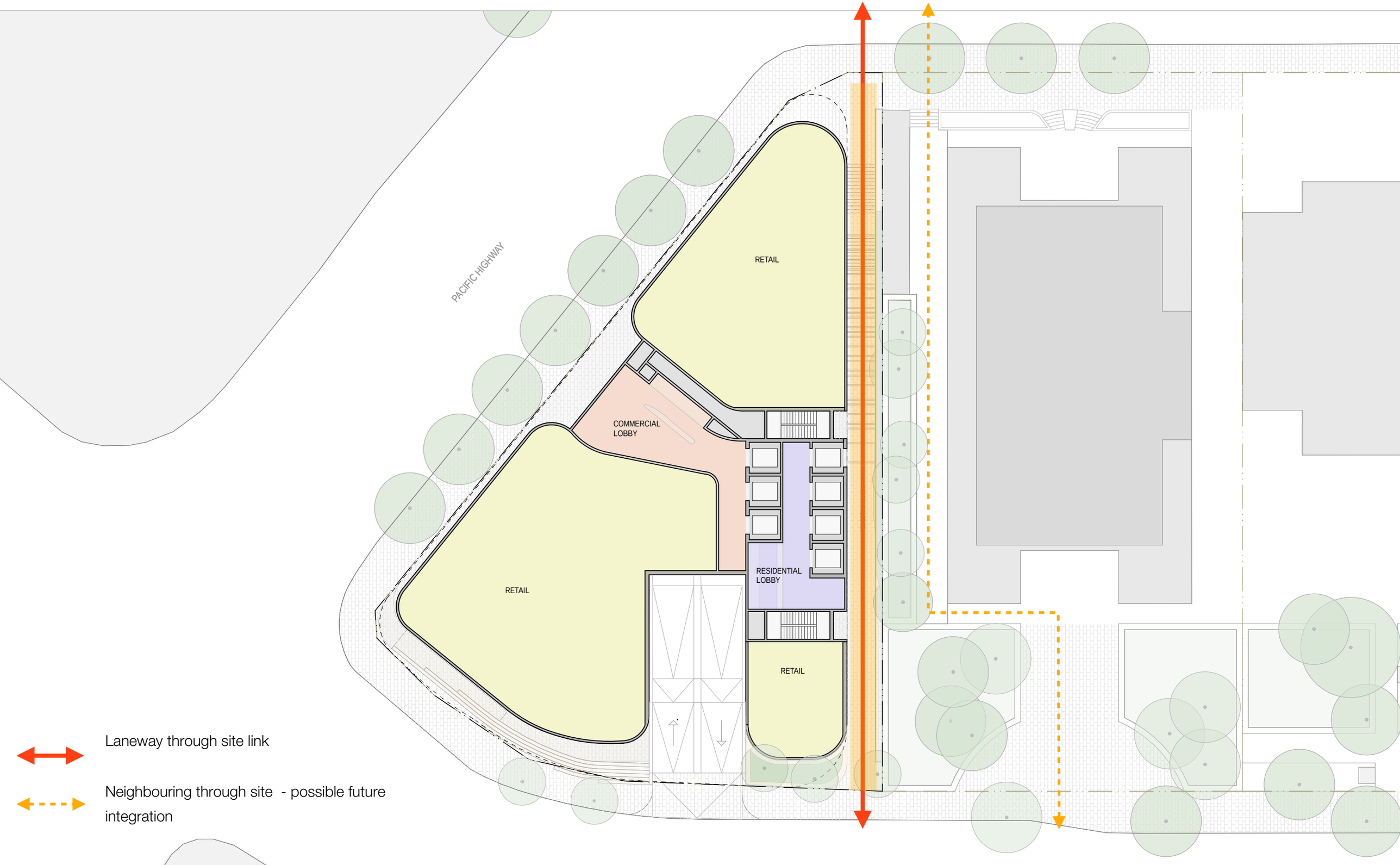
Active Retail Street Frontages - Materiality



- Flagship retail to Pacific Highway and Help Street

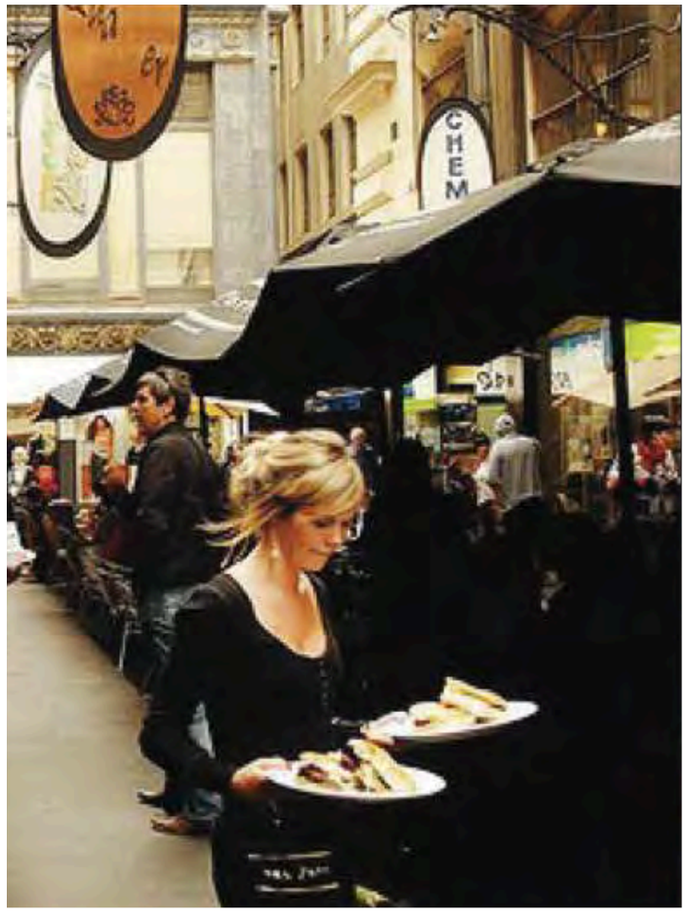
Employment Uses - Retail Ground Floor Plane

Active Retail Through Site Link



Employment Uses - Retail Ground Floor Plane

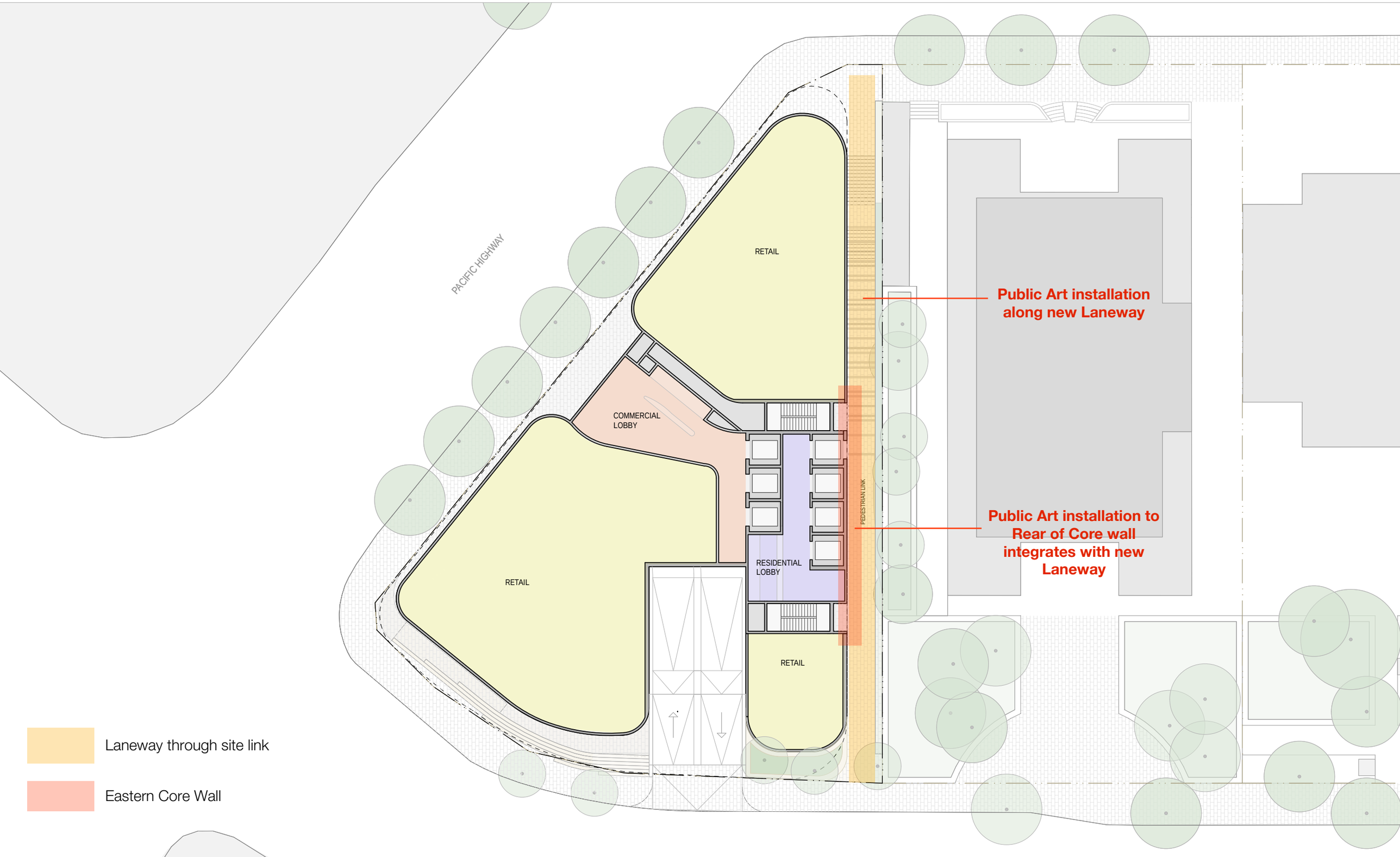
Active Retail Street Frontages - Through Site Link, Laneway Activation



- Small scale retail and cafes activating Through-Site Link

Employment Uses - Retail Ground Floor Plane

Active Retail Through Site Link

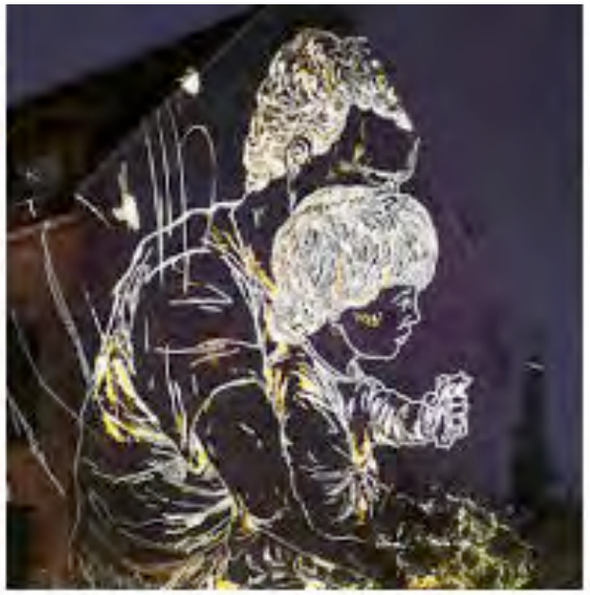


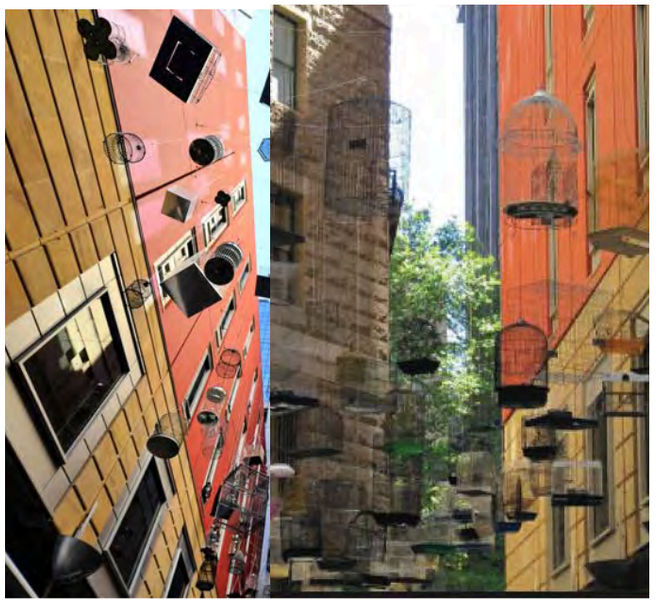
Laneway through site link

Eastern Core Wall

Employment Uses - Retail Ground Floor Plane

Public Art- Through Site Link & Building Core Wall

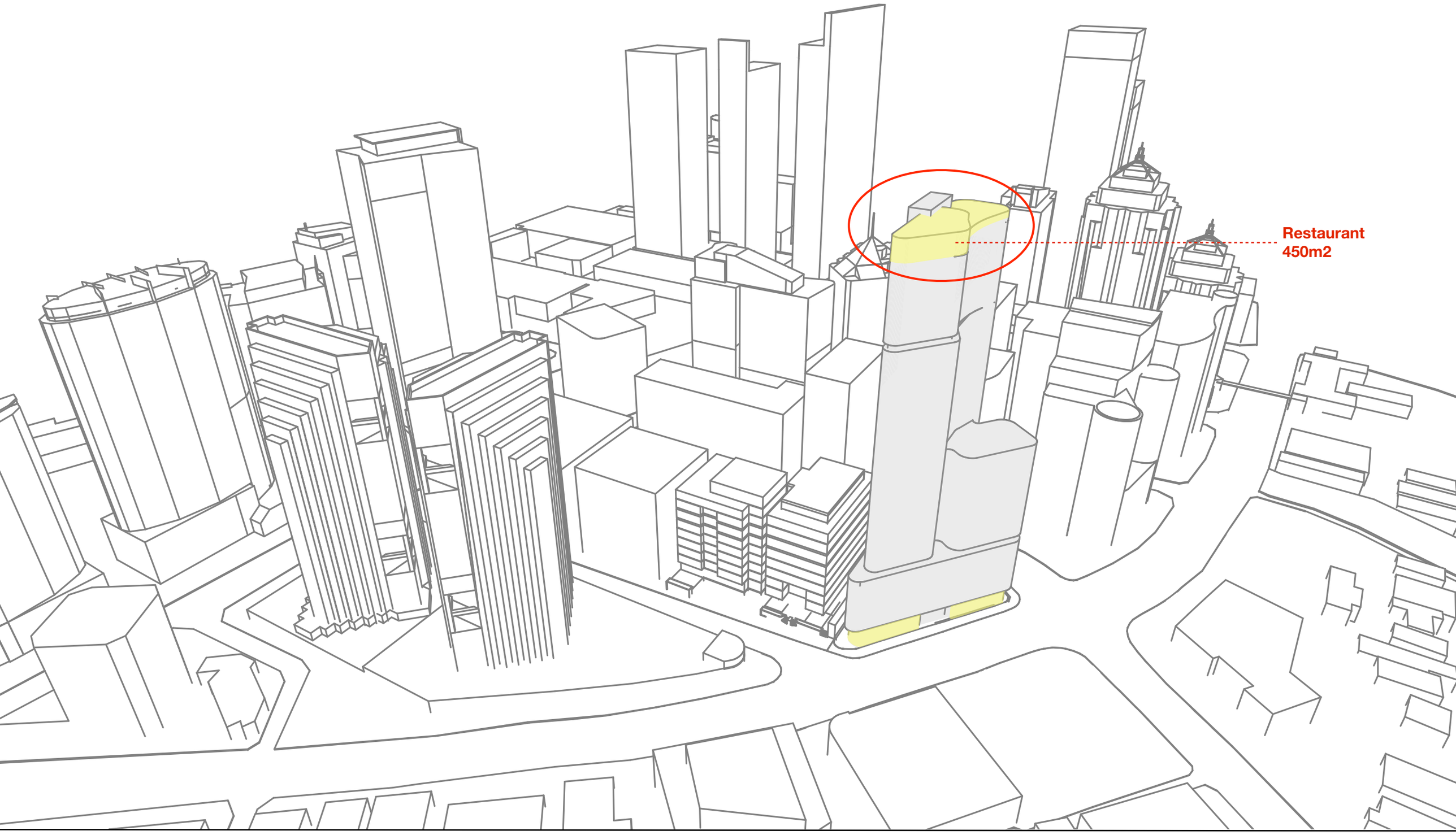





-Art to activate link and building into Chatswood Art Walk

Employment Uses - Restaurant

Iconic Rooftop Restaurant - 450m2 + Outdoor Terrace



Employment Uses - Restaurant

Iconic Rooftop Restaurant- Views

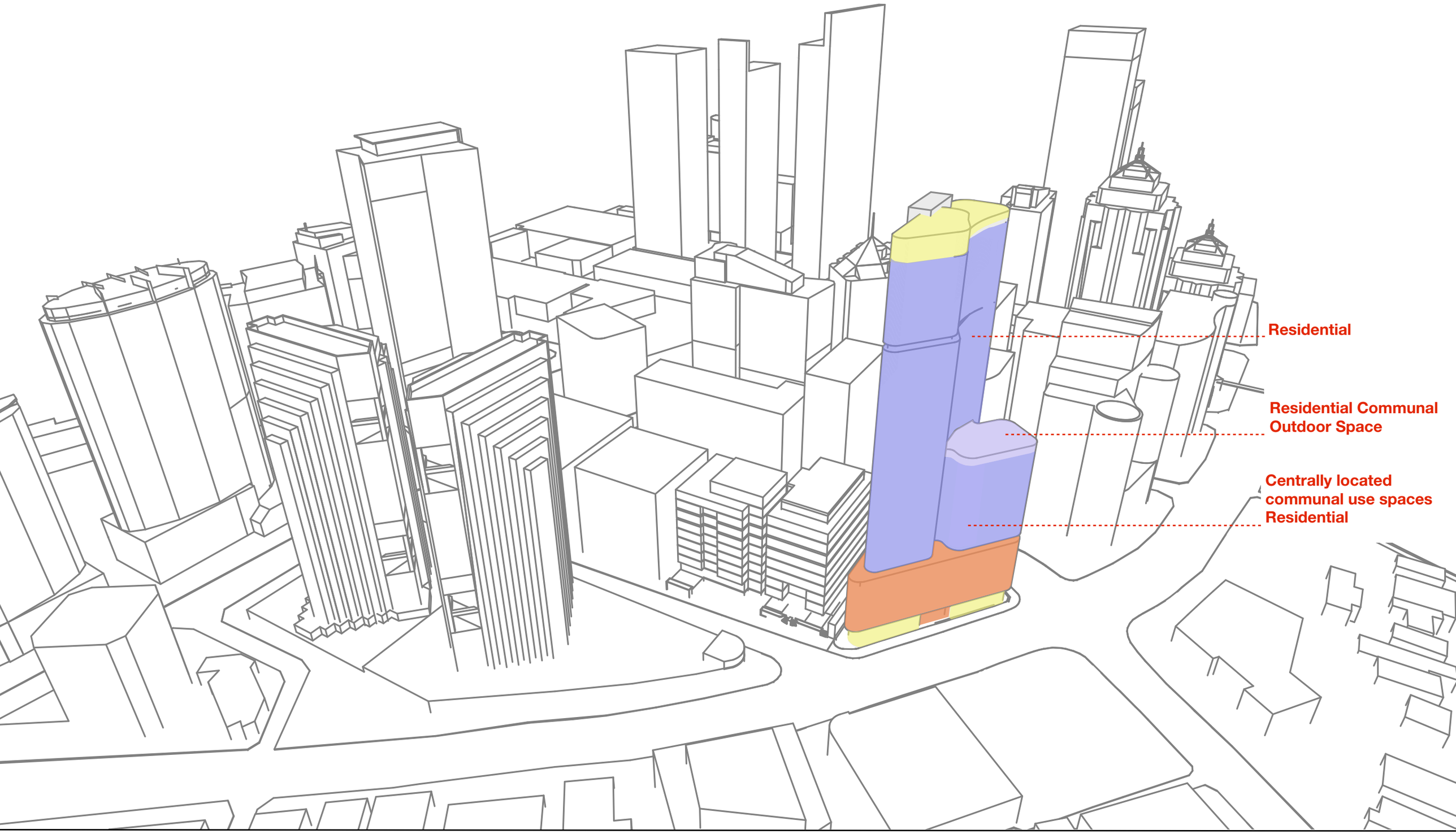
Employment Uses - Restaurant

Iconic Rooftop Restaurant & Terrace - Ambience

housing uses

Housing Uses - Shop Top Housing

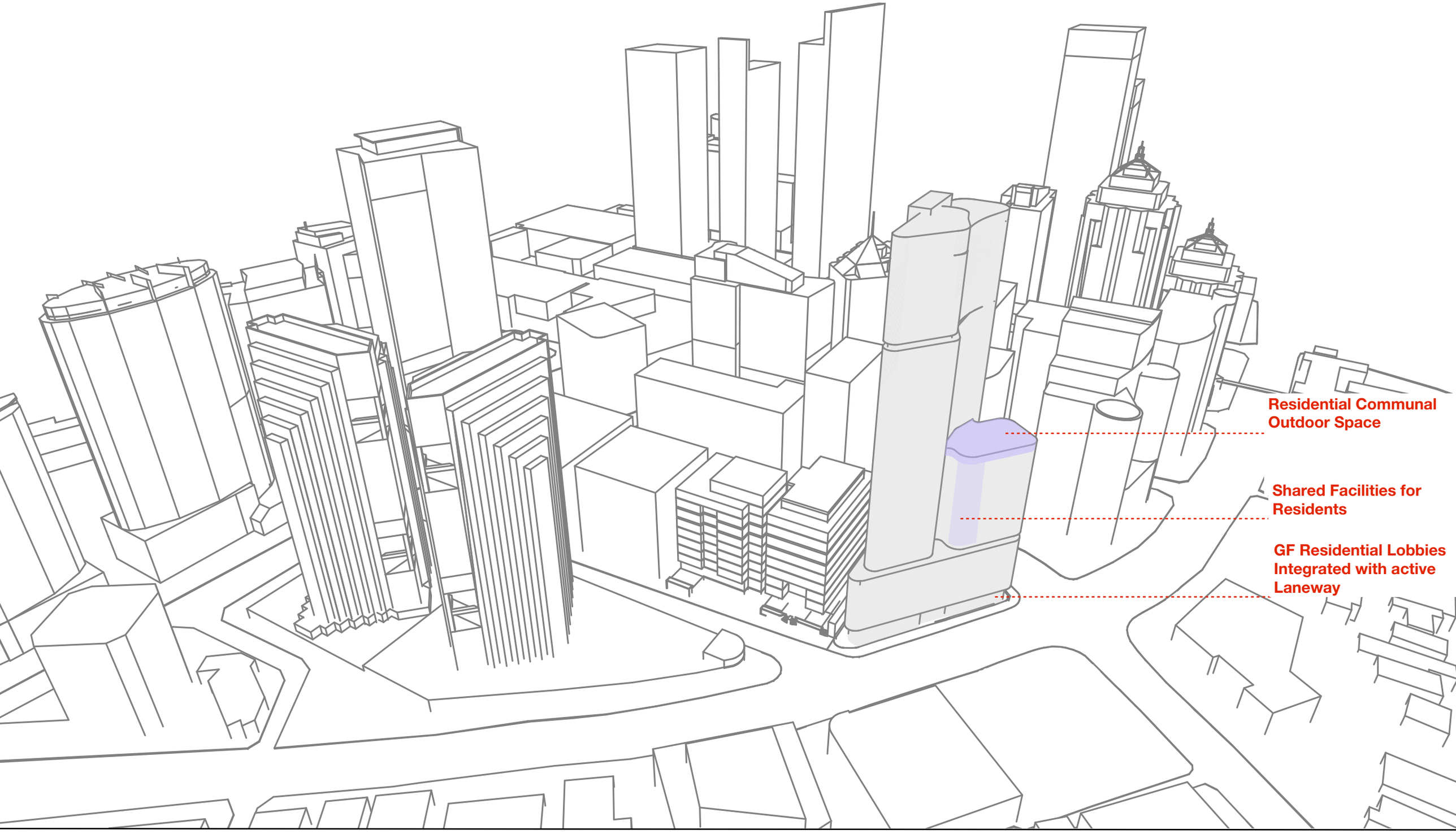
New Model for Community Orientated Residential
Proposed 20,120m2 Residential and Communal Use Facilities



Housing Uses - Residential community spaces

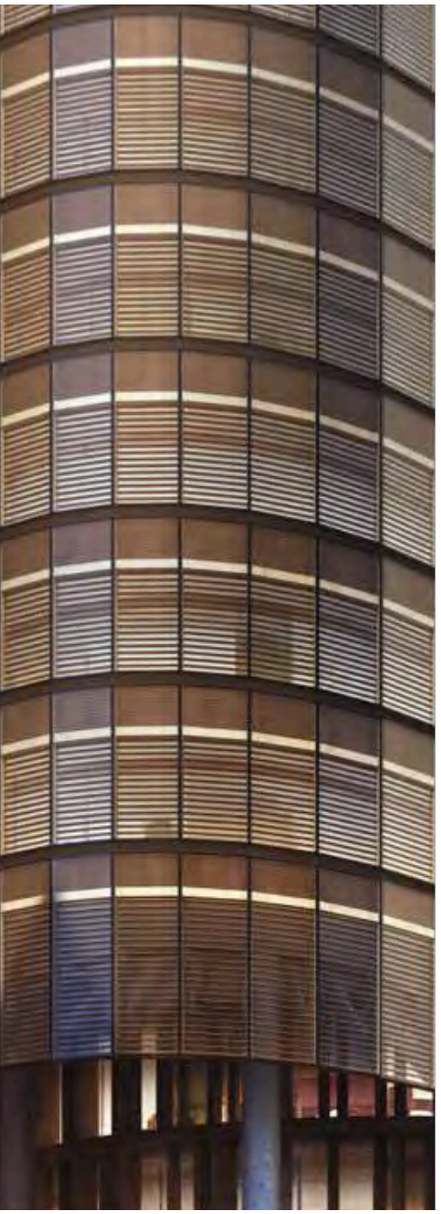
Shared & Community Facilities integrated in Residential

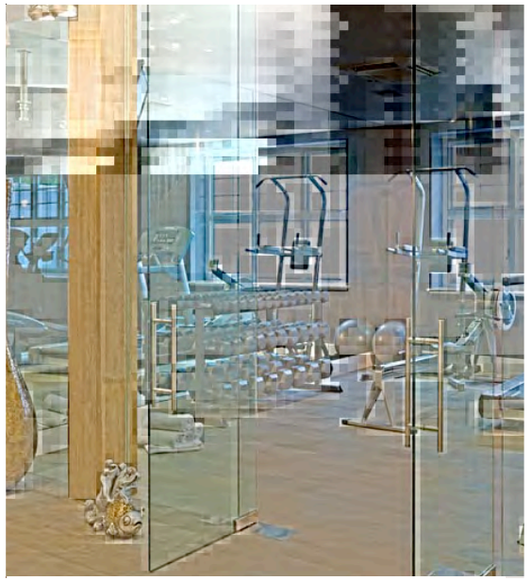
- Community Meeting & Study Rooms
- IT Facilities
- Music Room
- Gym & Fitness
- Outdoor Garden Terrace



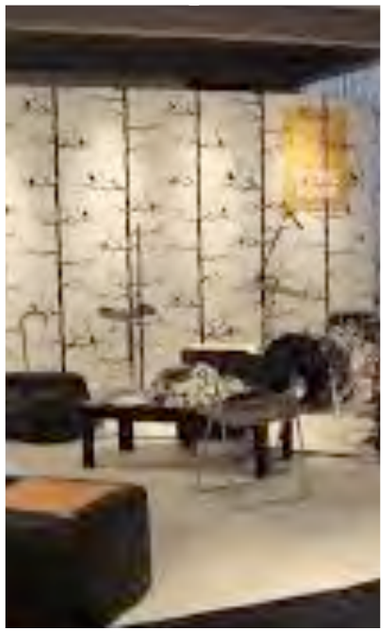
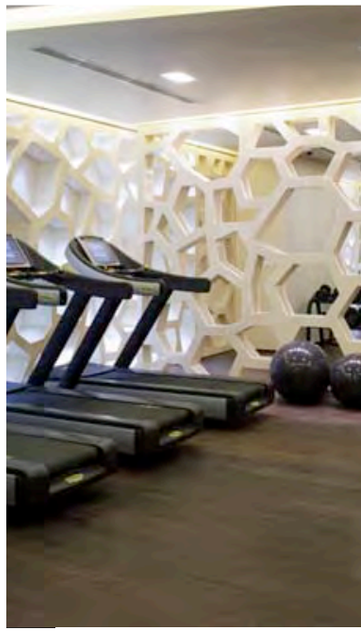
Residential Uses - Residential community spaces

Shared & Community Facilities integrated in Residential







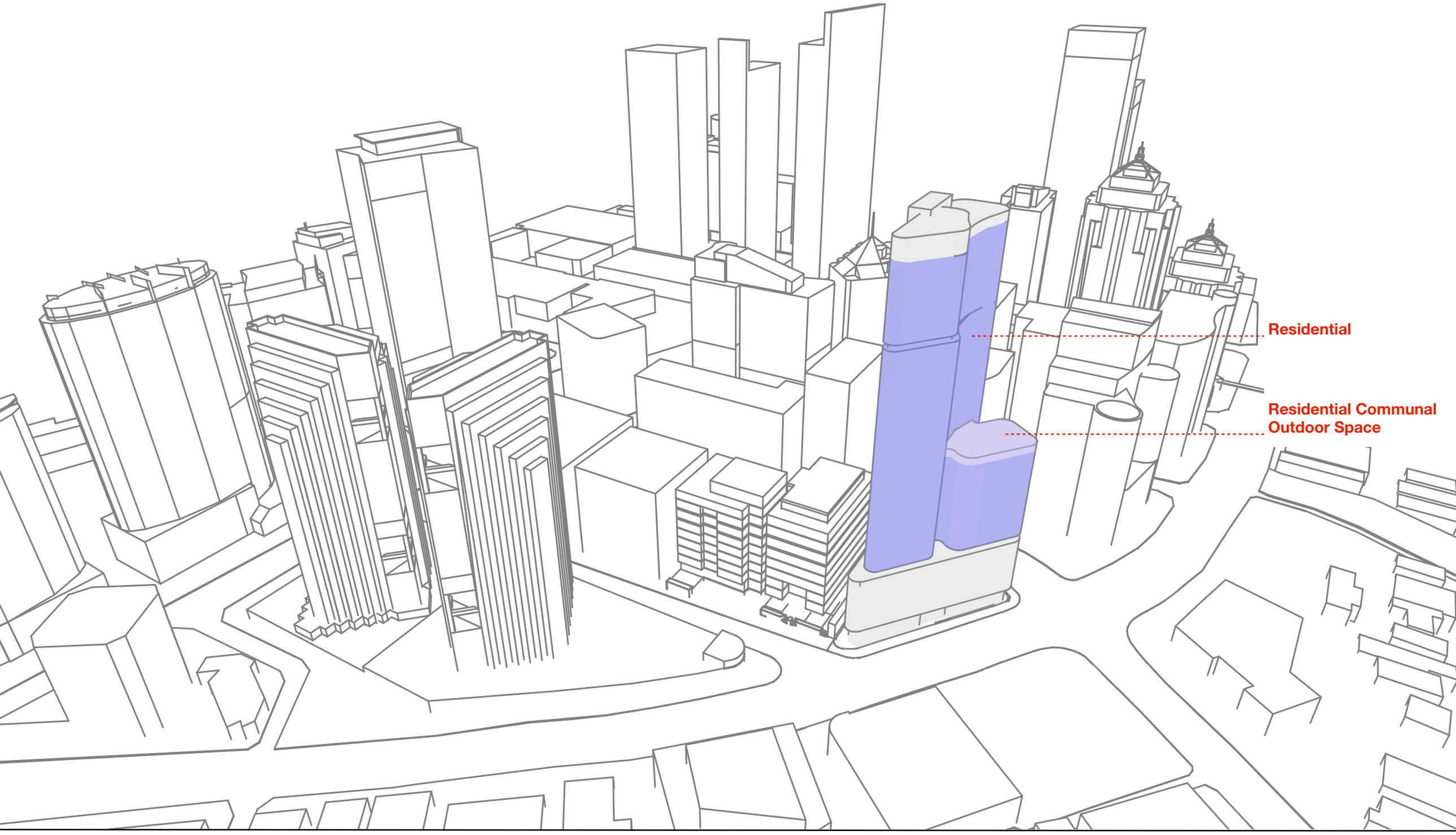



- Creative Hubs & Community Meeting Rooms
- I.T. Facilities
- Communal Facilities - music room, study space, gym

Housing Uses - Shop Top Housing

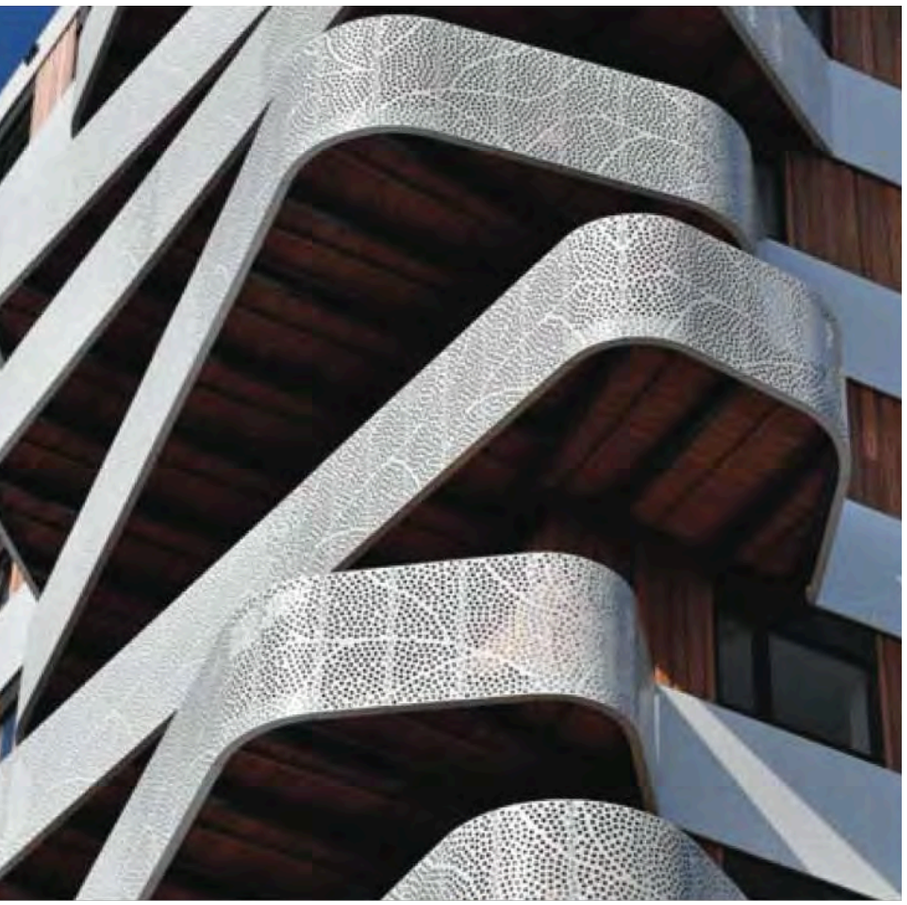
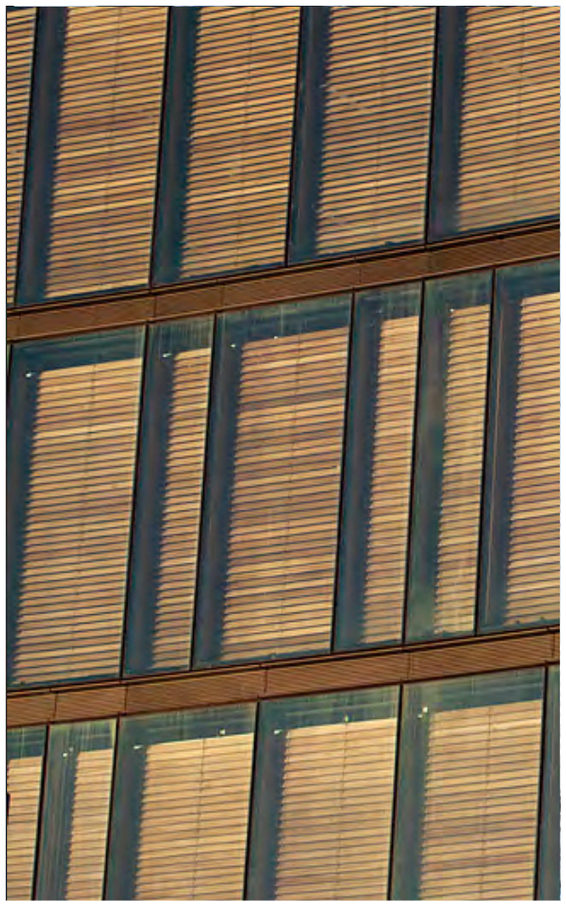
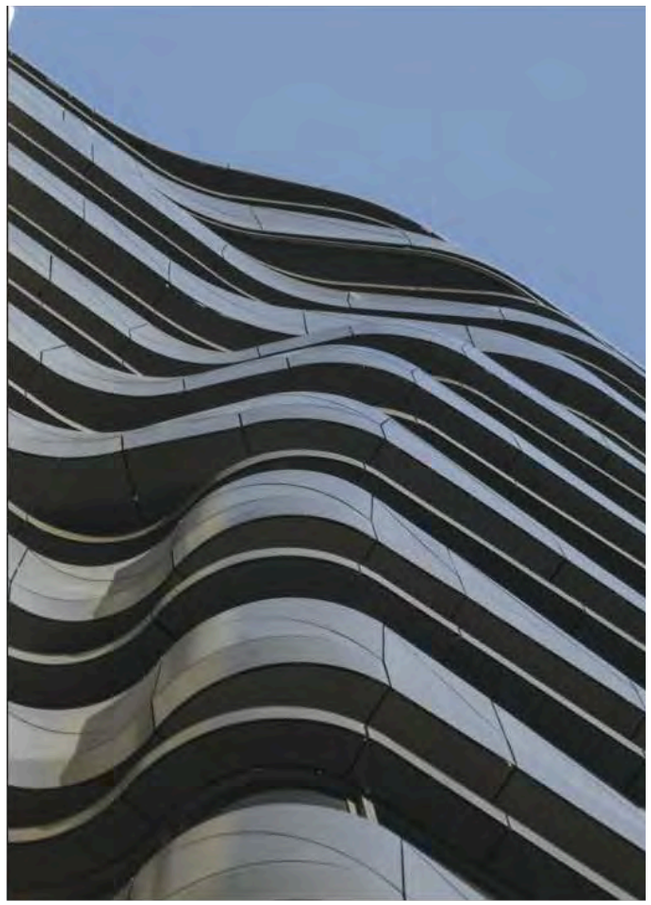
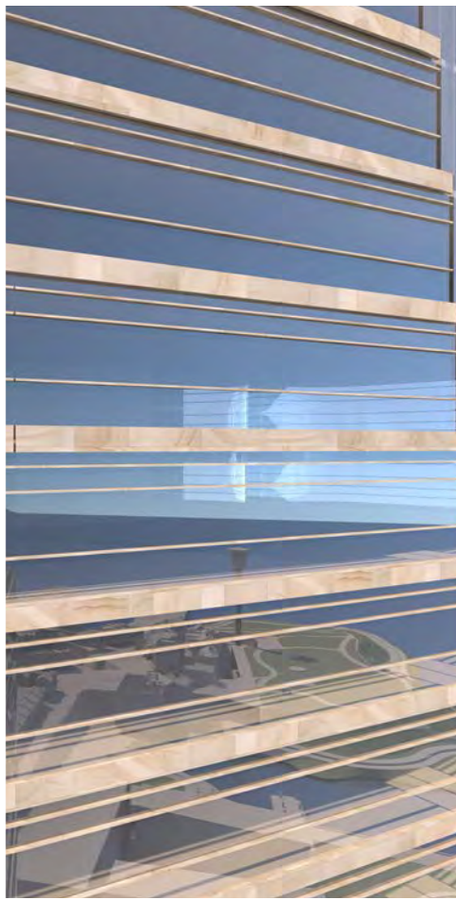
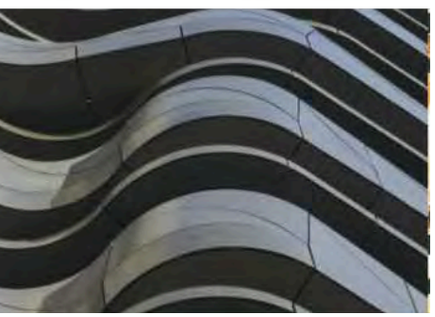
Proposed 20,120m2 Residential GFA

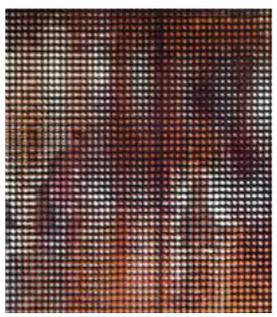
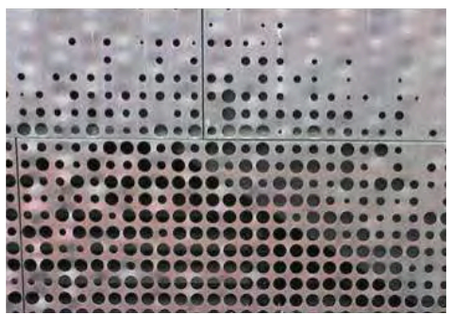
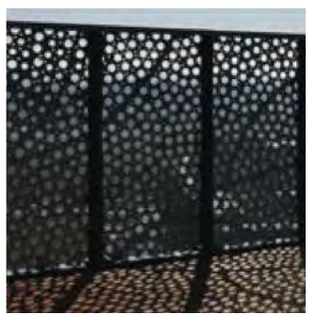
- includes residential community facilities
- includes large sun drenched outdoor terrace garden



Housing Uses - Shop Top Housing

Shop Top Housing / Residential Tower - Character


- Design Excellence: iconic, distinctive

height

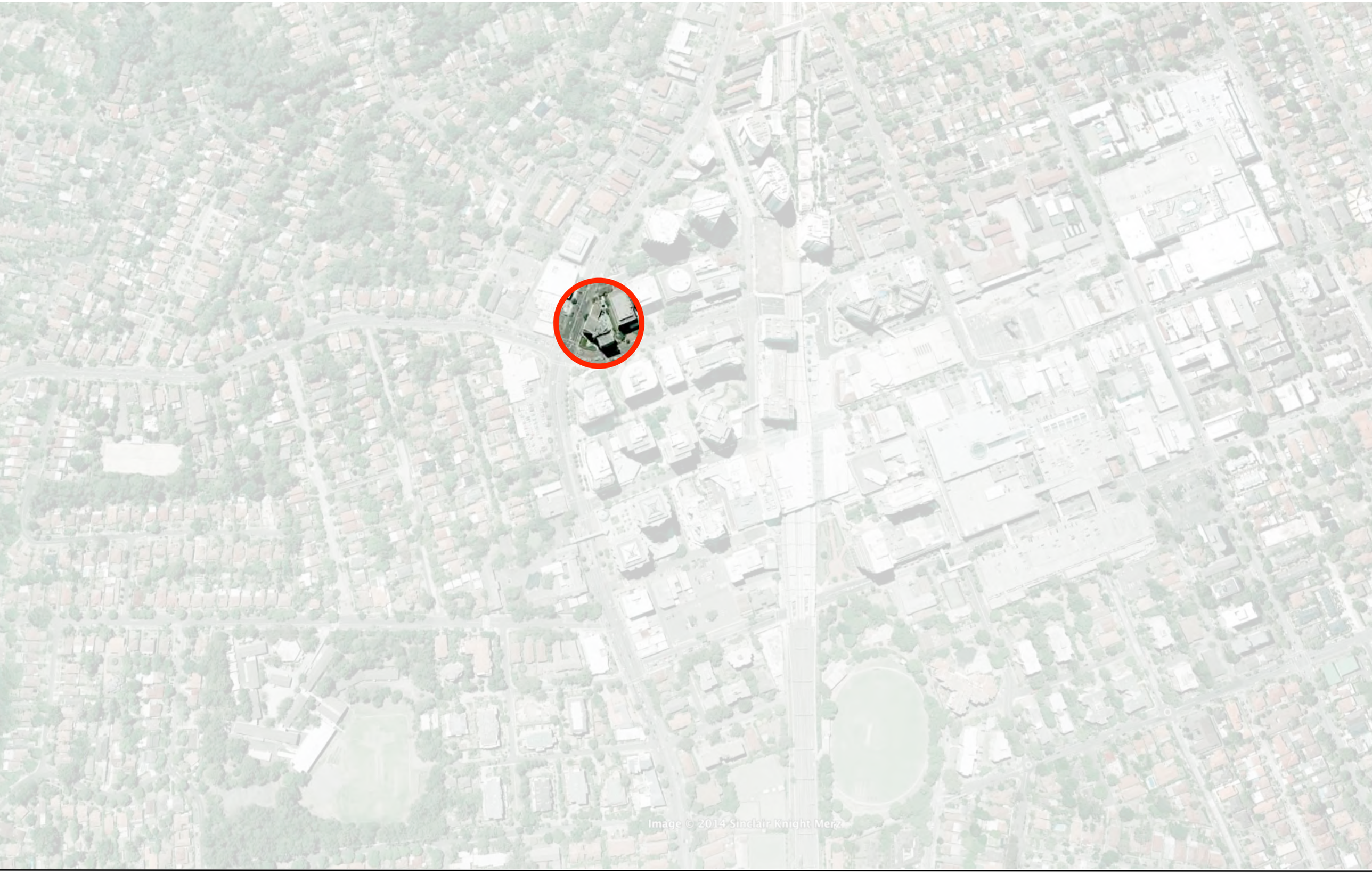
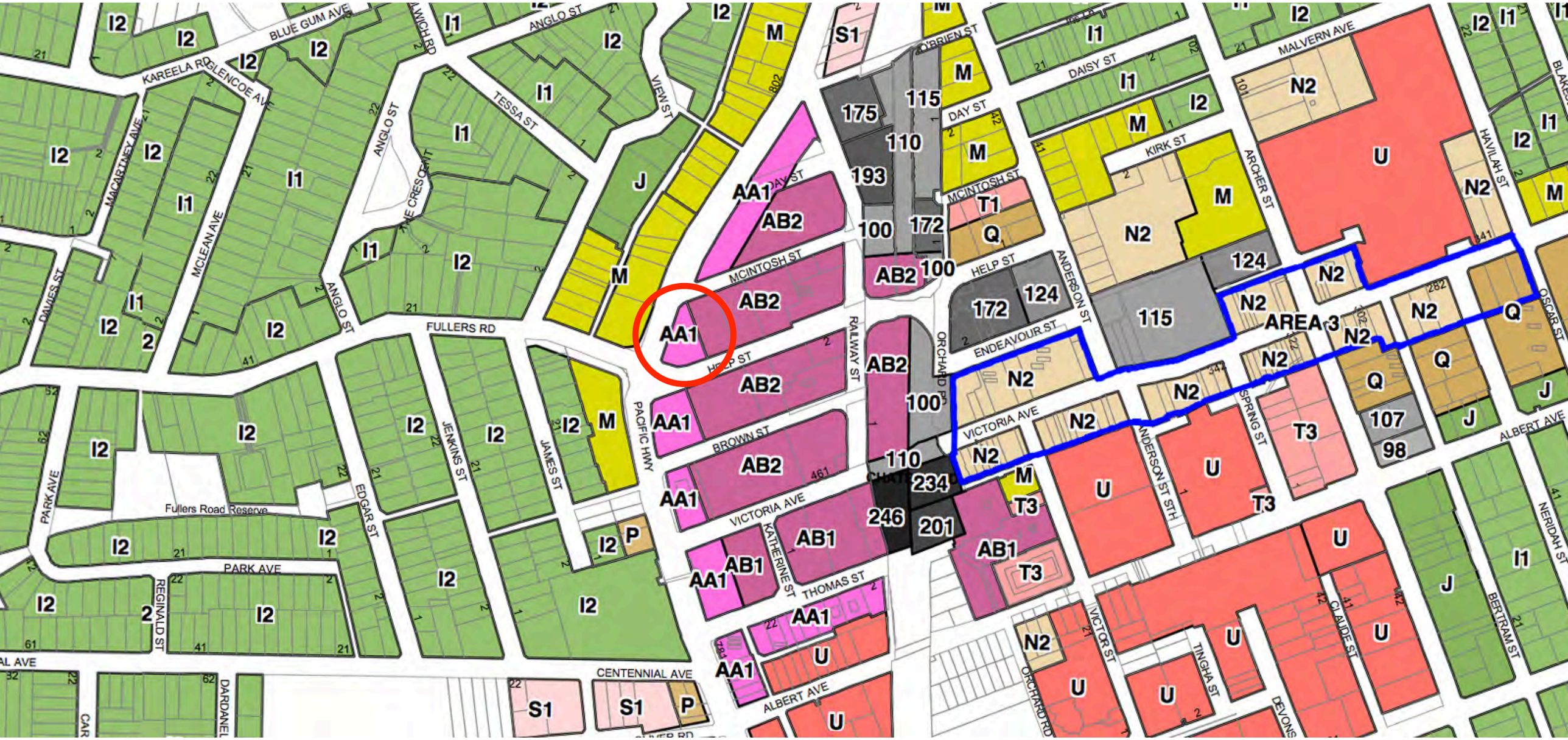



Image © 2014 Sinclair Knight Merz

Height



- Current Height Control in Willoughby Council LEP 2012 - AA1 = 60m

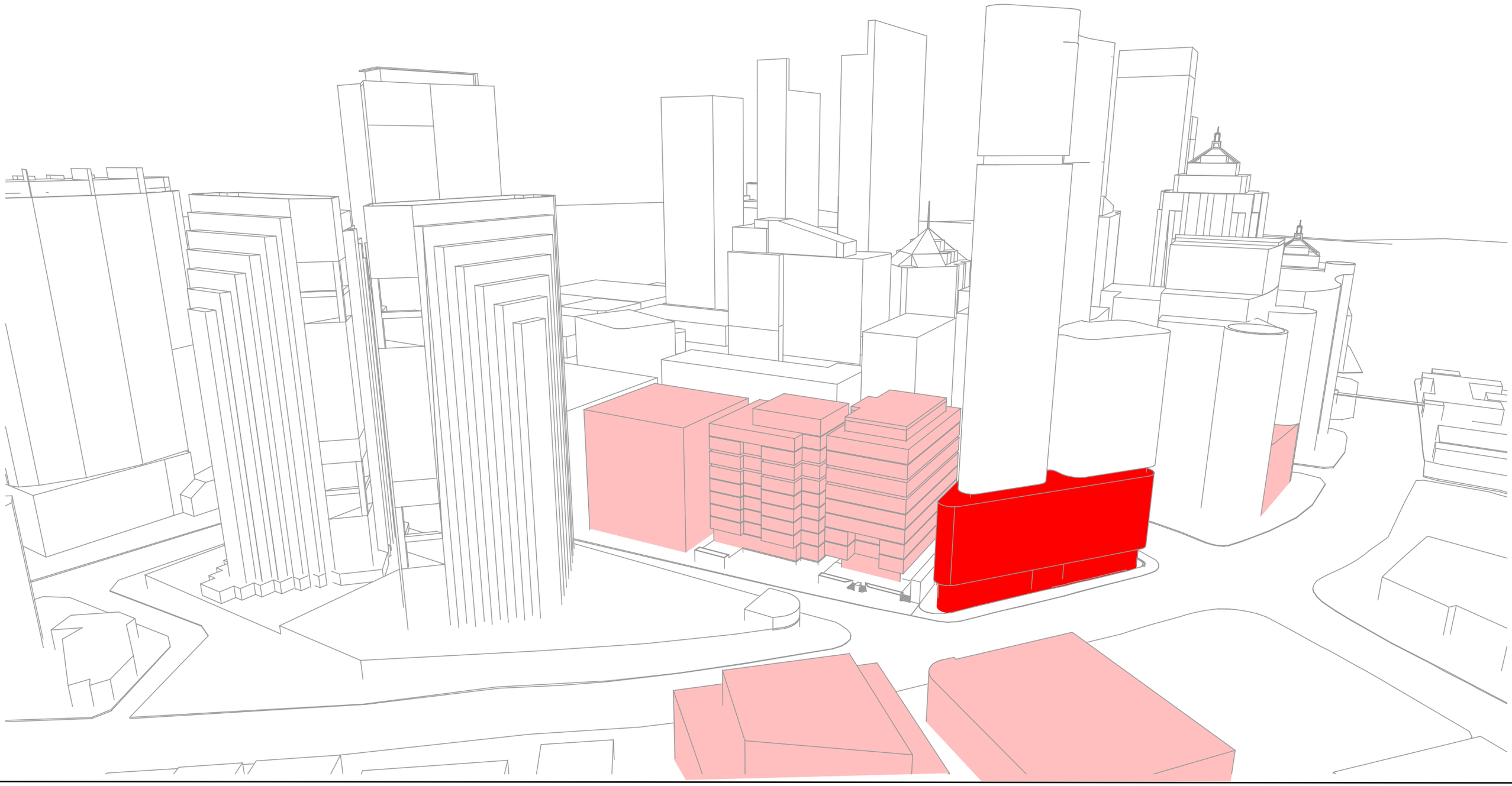
Maximum Building Height (m)

AA1 60

Height

Podium Scale

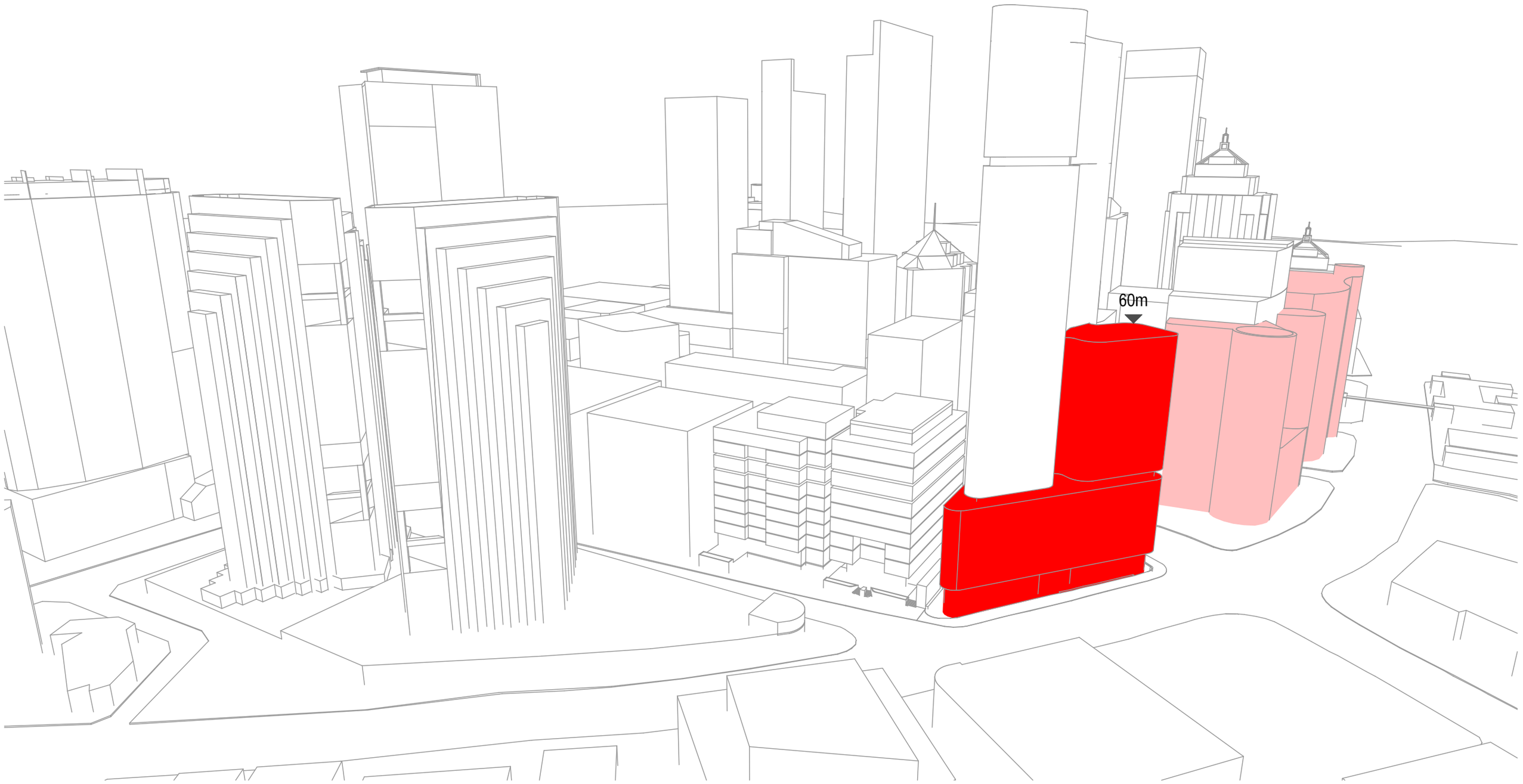
- Podium height relates to adjacent buildings and lower scale development opposite on Pacific Highway



Height

Streetwall Scale along Pacific Highway

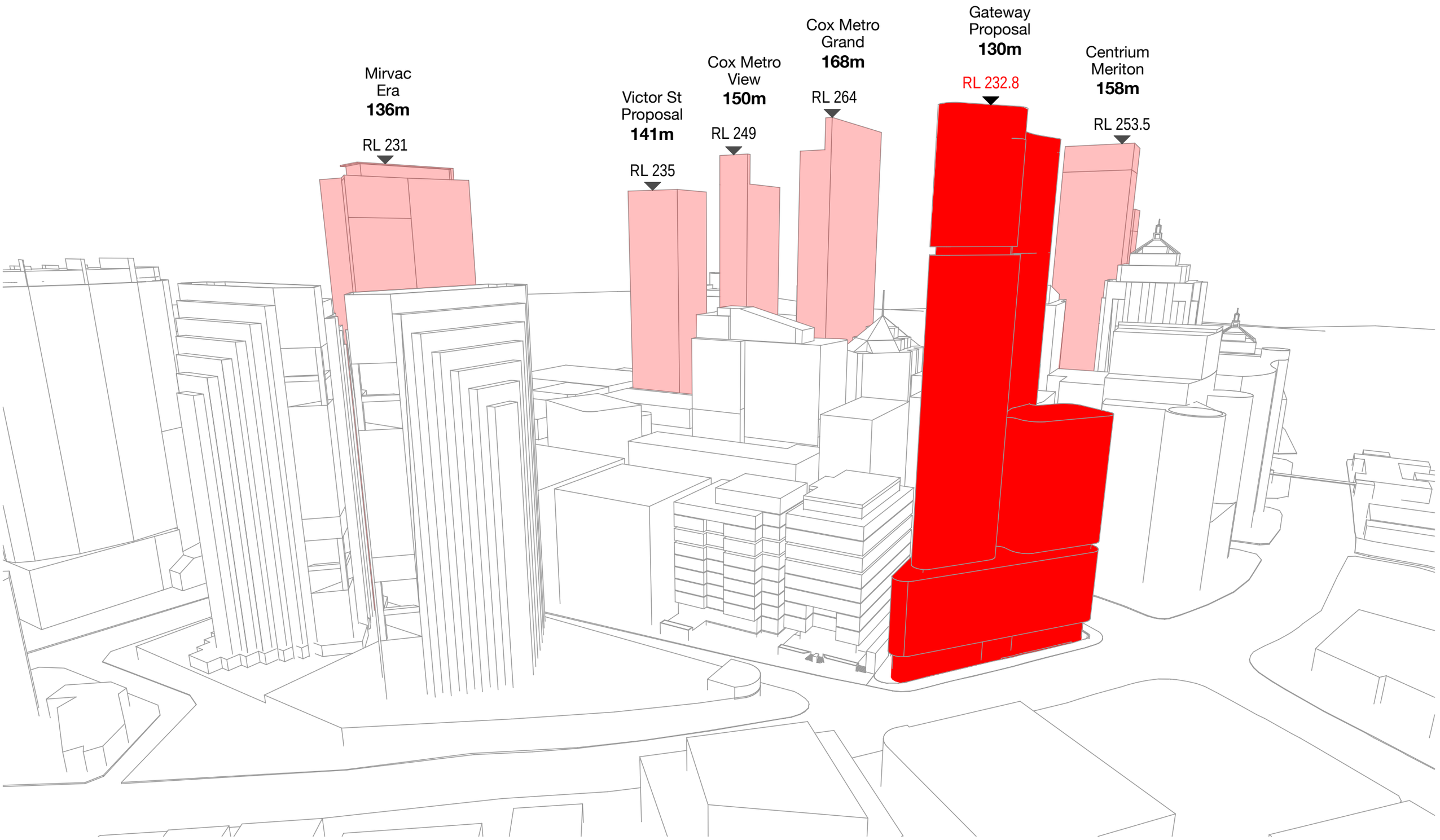
- Lower tower addresses the streetwall height along the Pacific highway created by the neighbouring residential buildings



Height

Tower Forms

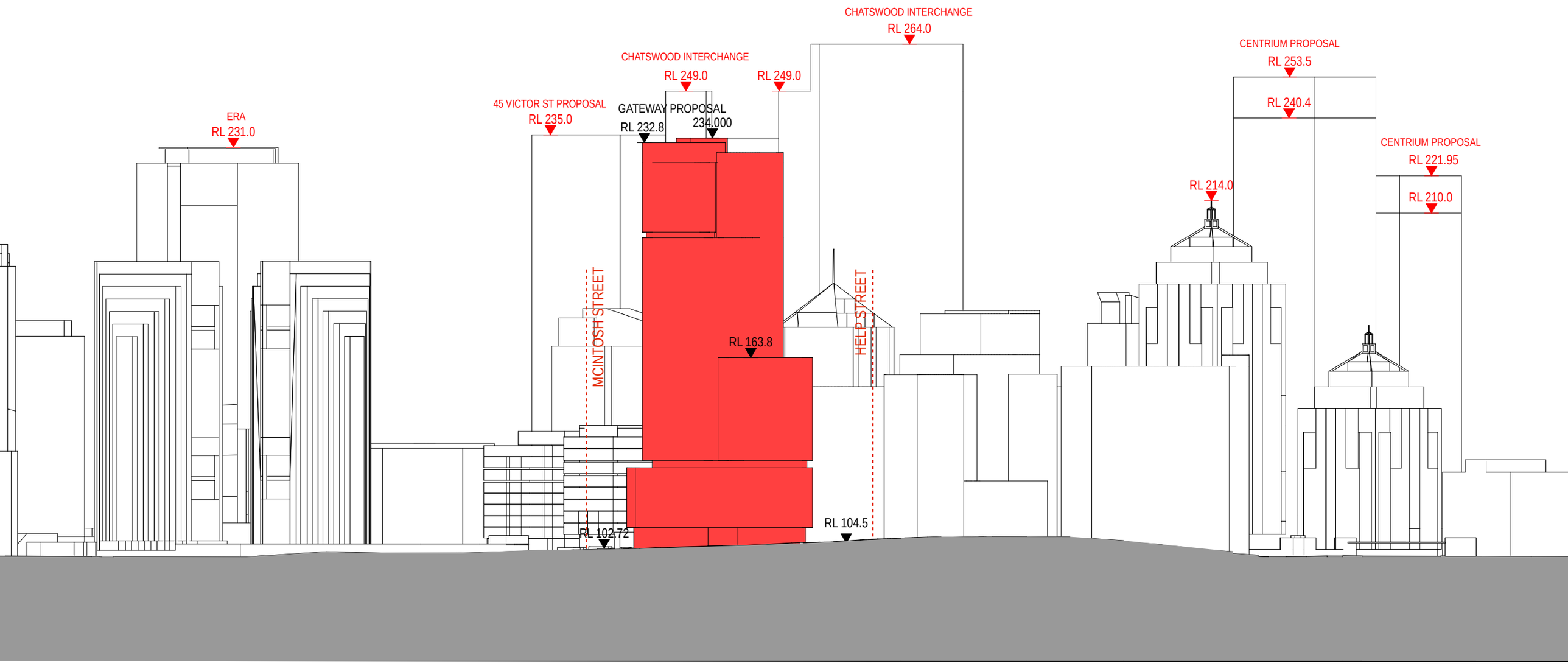
- Overall height relates to the significant towers throughout the Chatswood CBD



Height

Pacific Highway Elevation

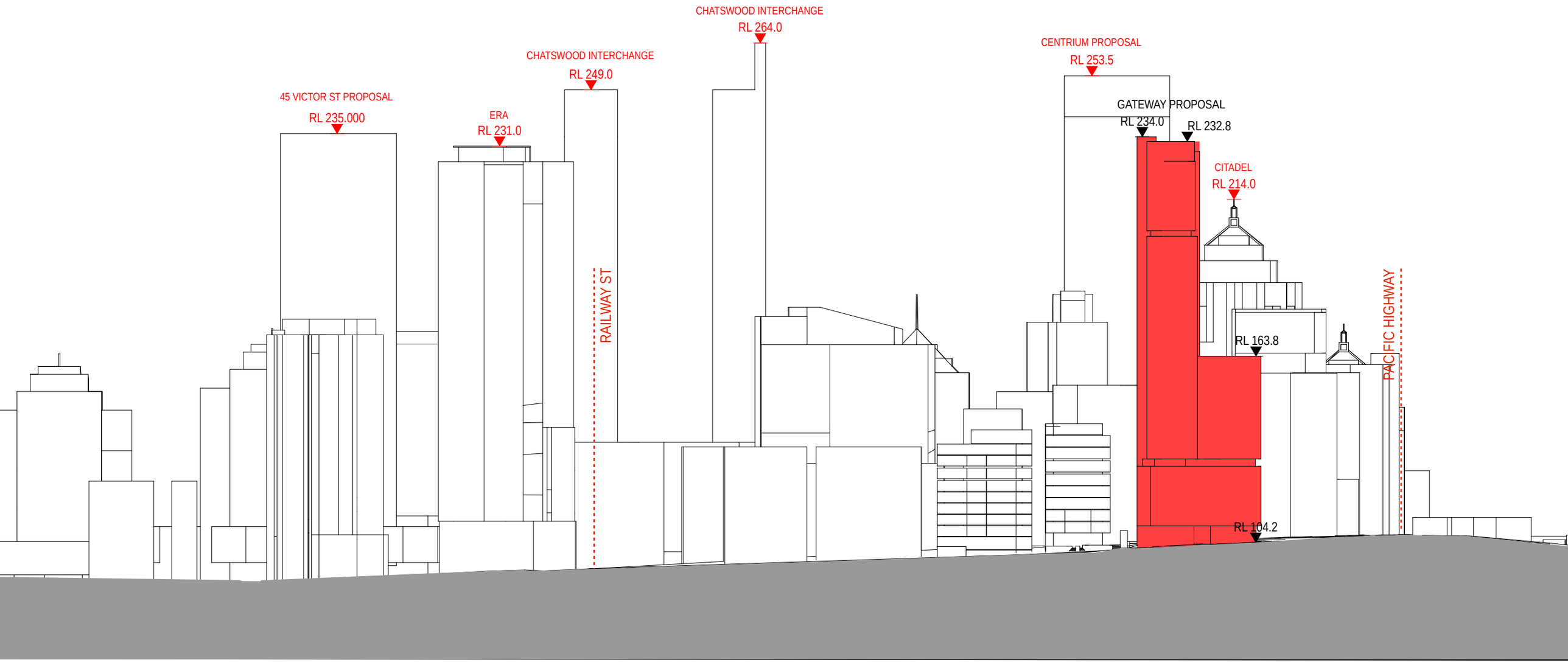
- Relative Building heights showing scale of proposed tower relative to existing and proposed towers in Chatswood CBD
- Height vital to create iconic, gateway building



Height

Cross Section of Chatswood

- Relative Building heights showing scale of proposed tower relative to existing and proposed towers in Chatswood CBD
- Building steps down towards Pacific Highway



indicative design

Indicative Design

Indicative Design

Indicative Design

shadows to school

Shadows to School Site

Chatswood Public School

- **Chatswood Public School Hours**
  - School starts at 8.55 am
  - Recess at 11 am to 11:20 am
  - Lunch at 12.40 pm to 1:40pm
  - School finishes at 3pm

- **Outdoor recreation areas of school to north of site**
  - Hard paved areas in dark red
  - Soft landscape areas in light red

- **Outdoor areas shaded significantly from existing buildings until 11am**

Shadows to School

Chatswood Public School

- **Aerial Photograph**

Shadows to School

Chatswood Public School - 10am June 21st

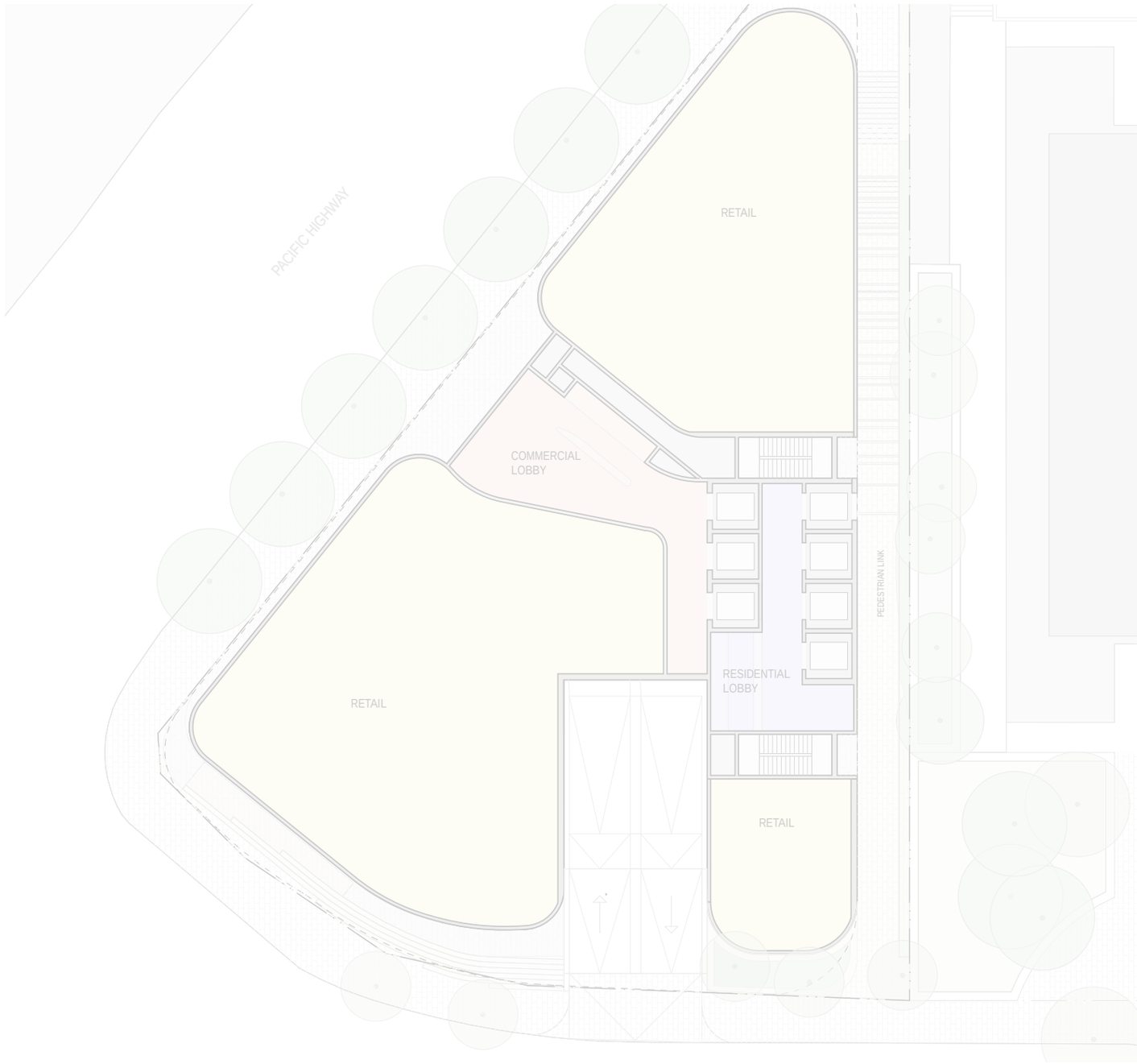
Shadows to School

Chatswood Public School - 10am June 21st

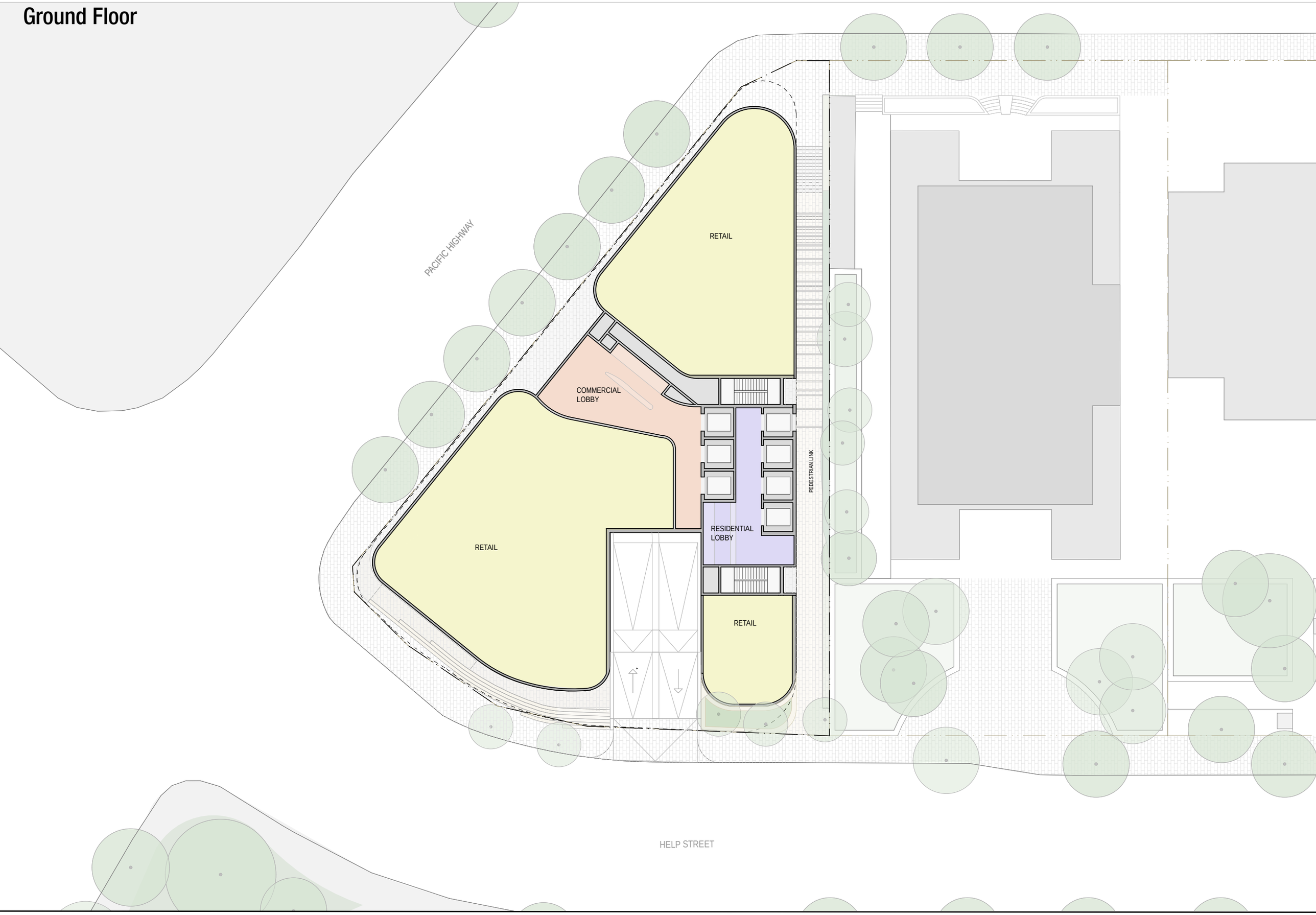
Shadows to School

Chatswood Public School - 10am June 21st

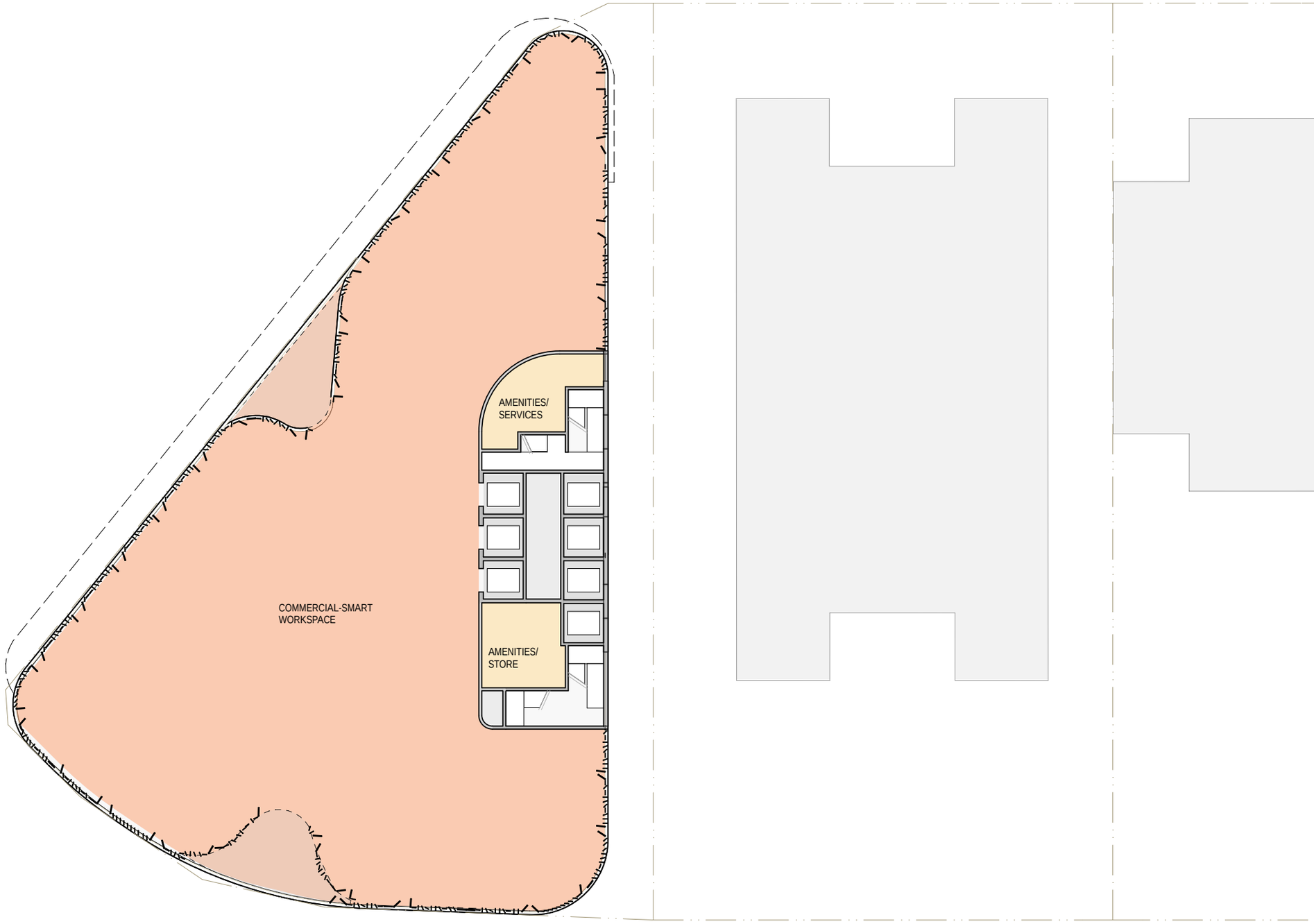
indicative plans & SEPP 65



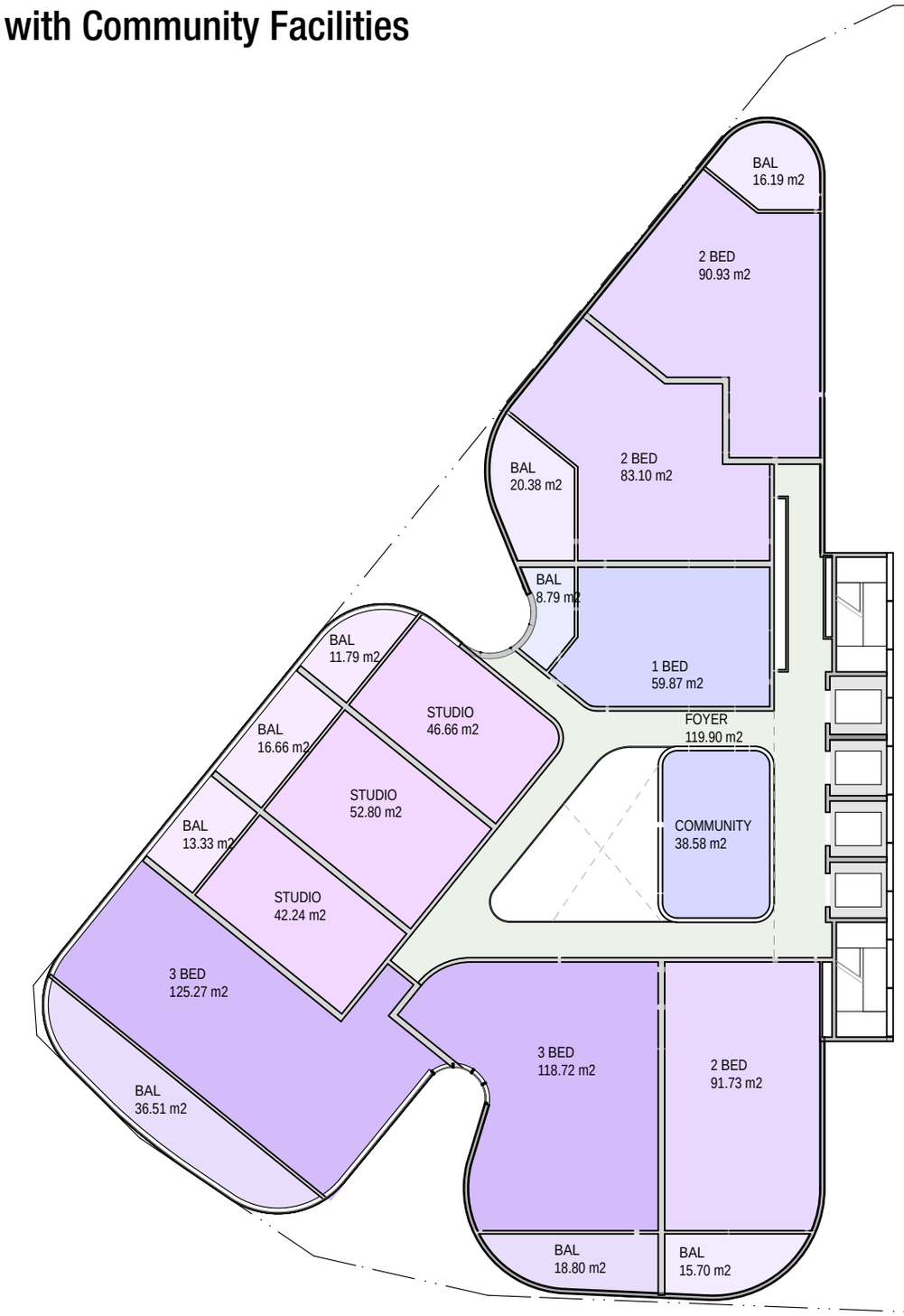
Ground Floor



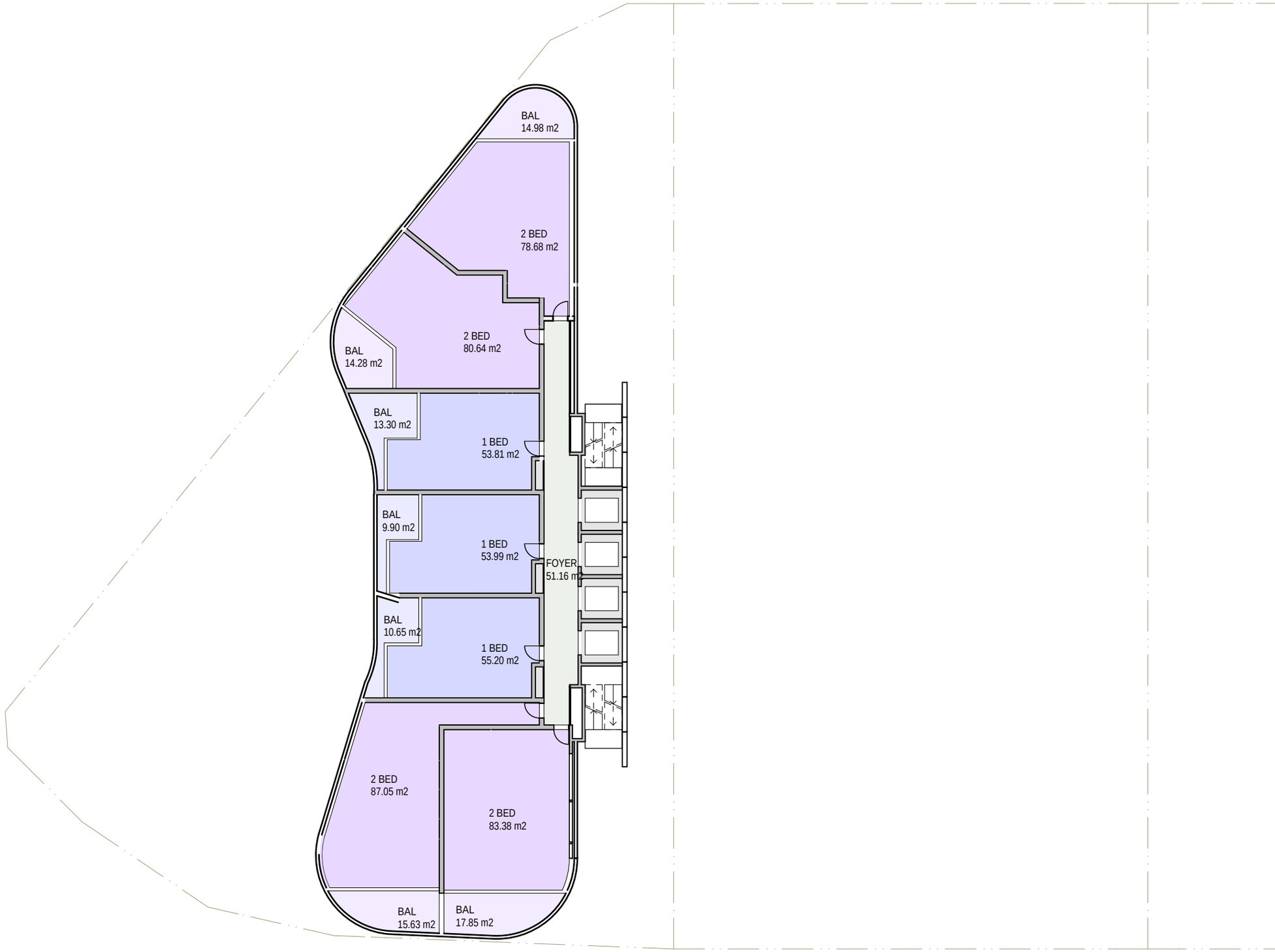
Level 1-5 - Commercial



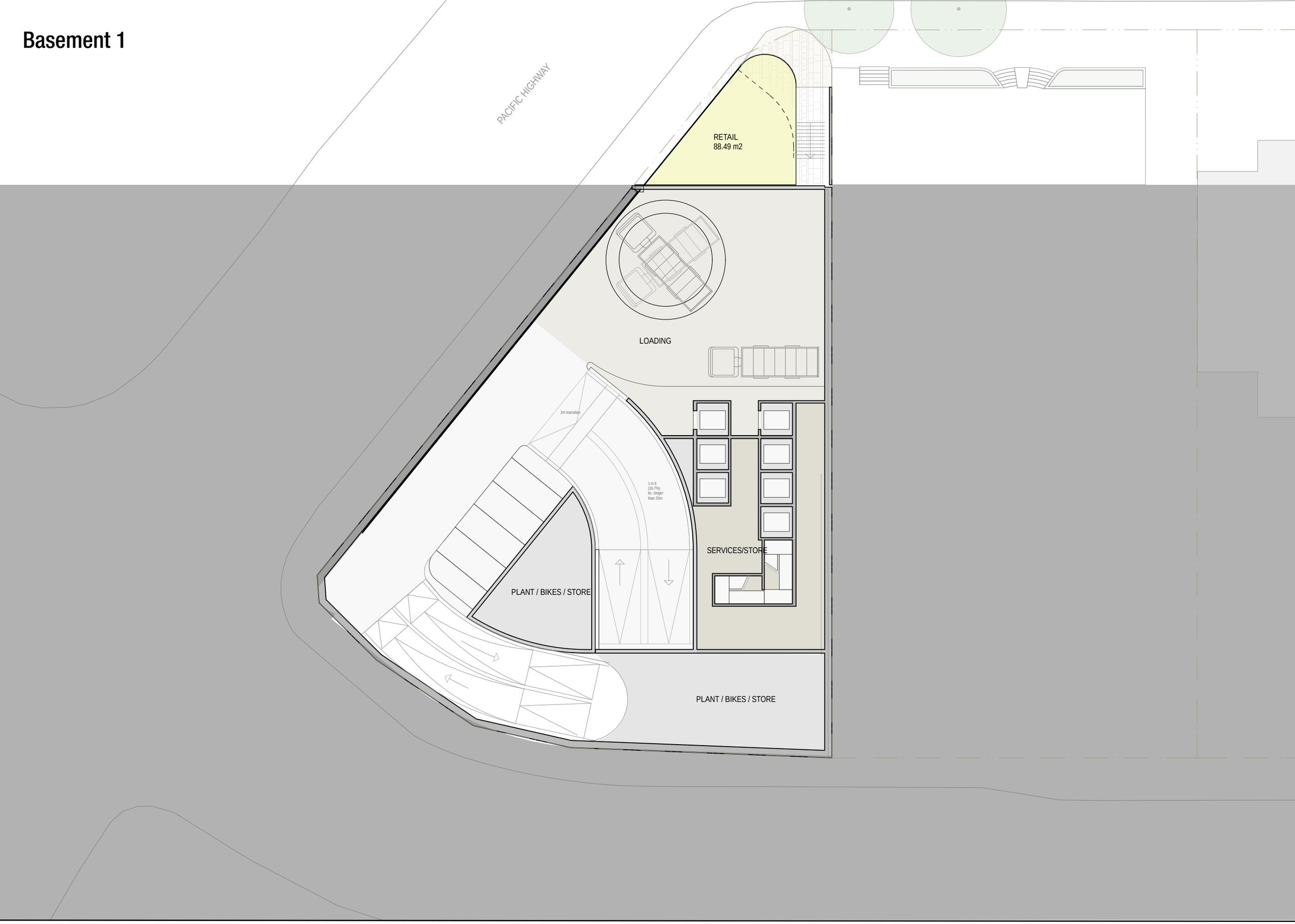
Level 7-16 Tower Apartments - with Community Facilities



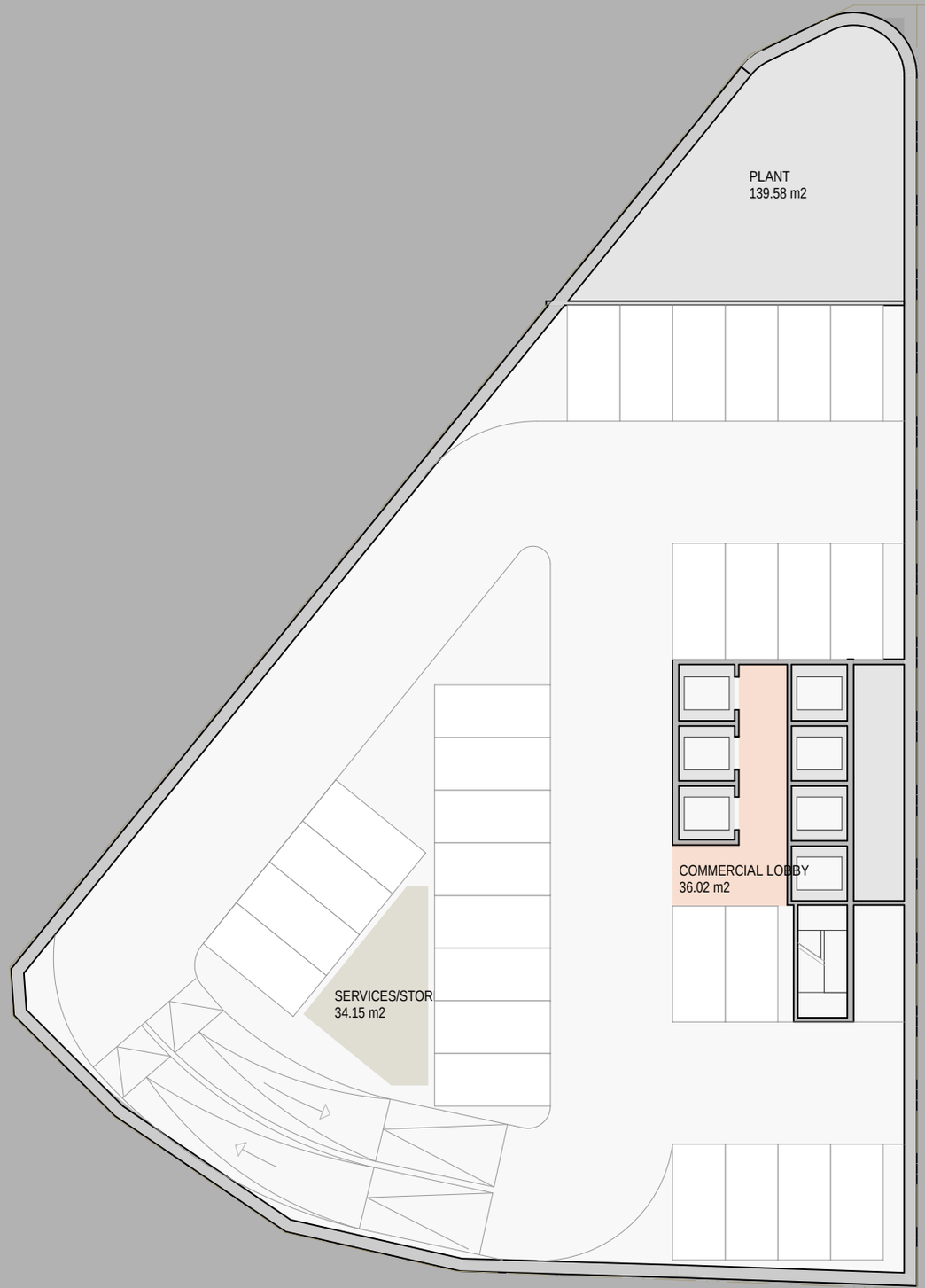
Level 17-33 Tower Apartments



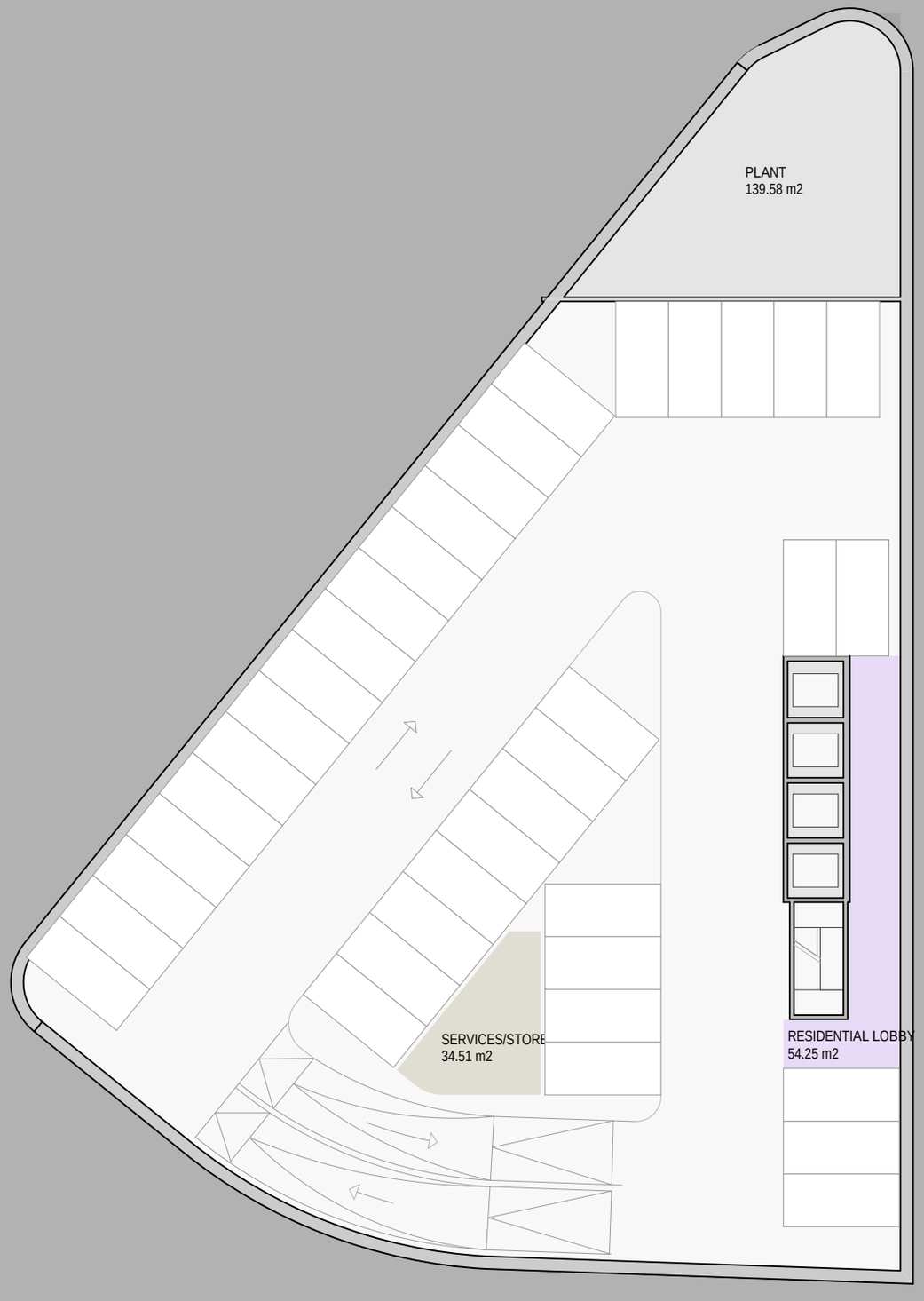
Basement 1


PACIFIC HIGHWAY
RETAIL
88.49 m2
LOADING
2m transition
1 in 6
(16.7%)
bc. longer
than 20m
SERVICES/STORE
PLANT / BIKES / STORE
PLANT / BIKES / STORE

Basement Commercial

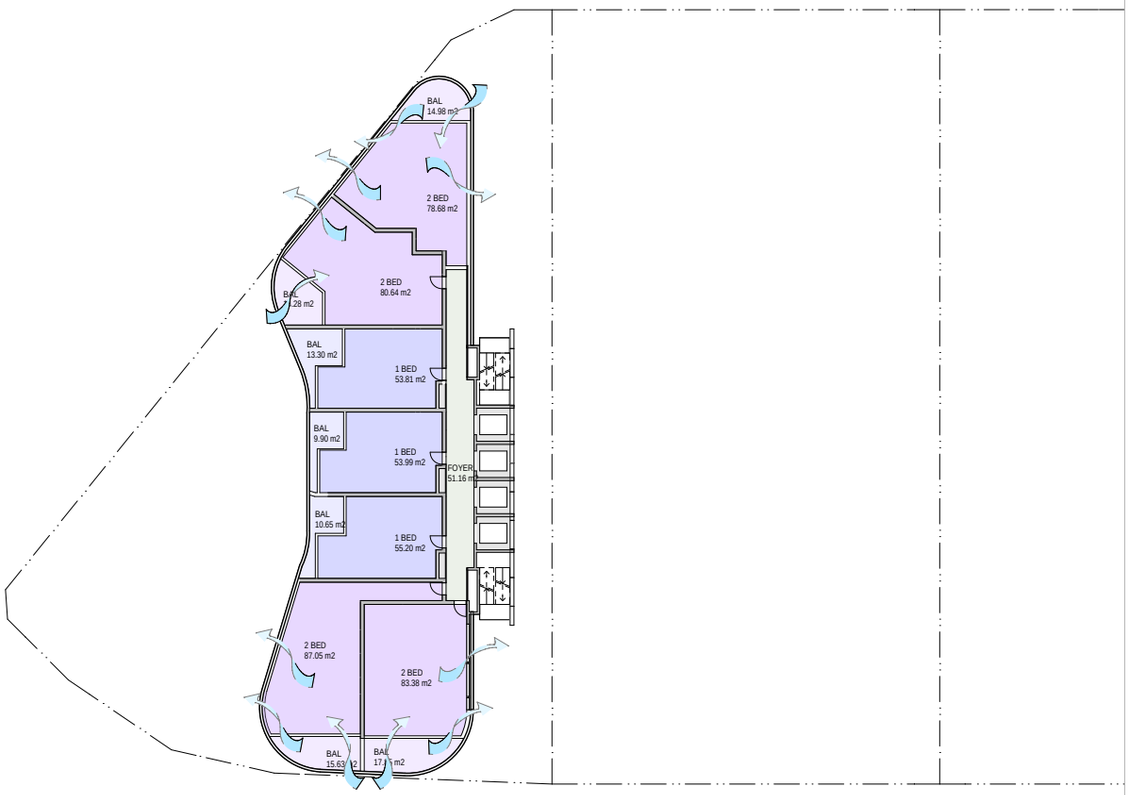


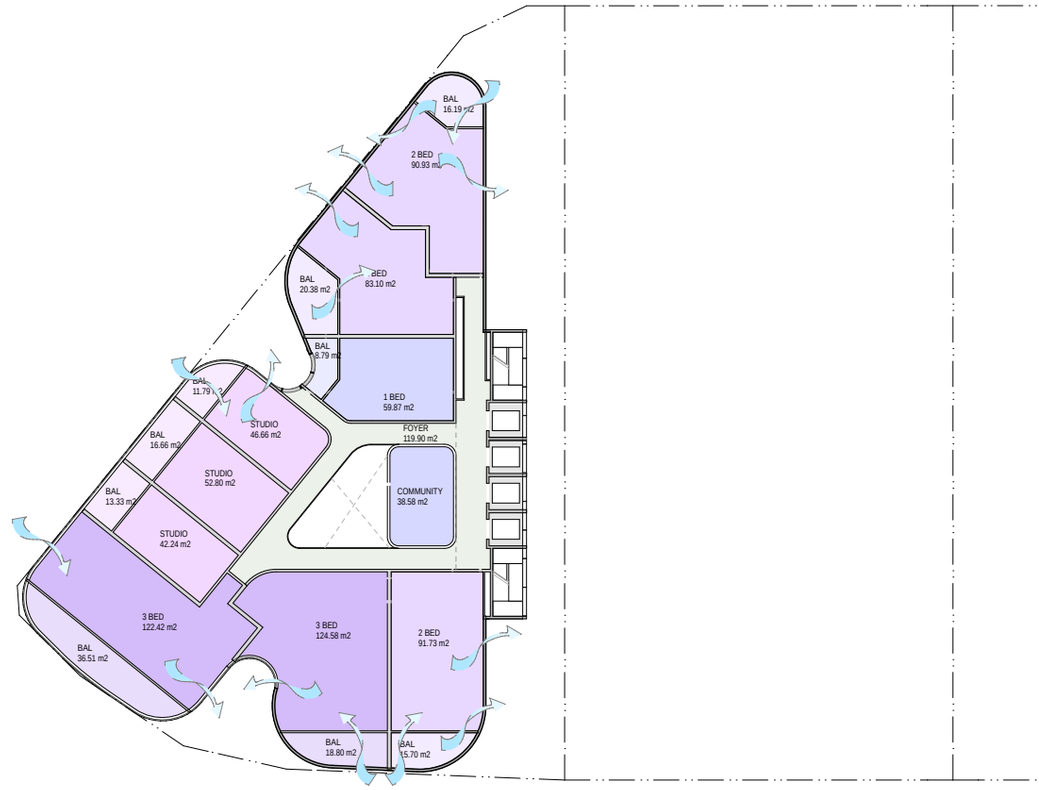
Basement Residential



SEPP 65

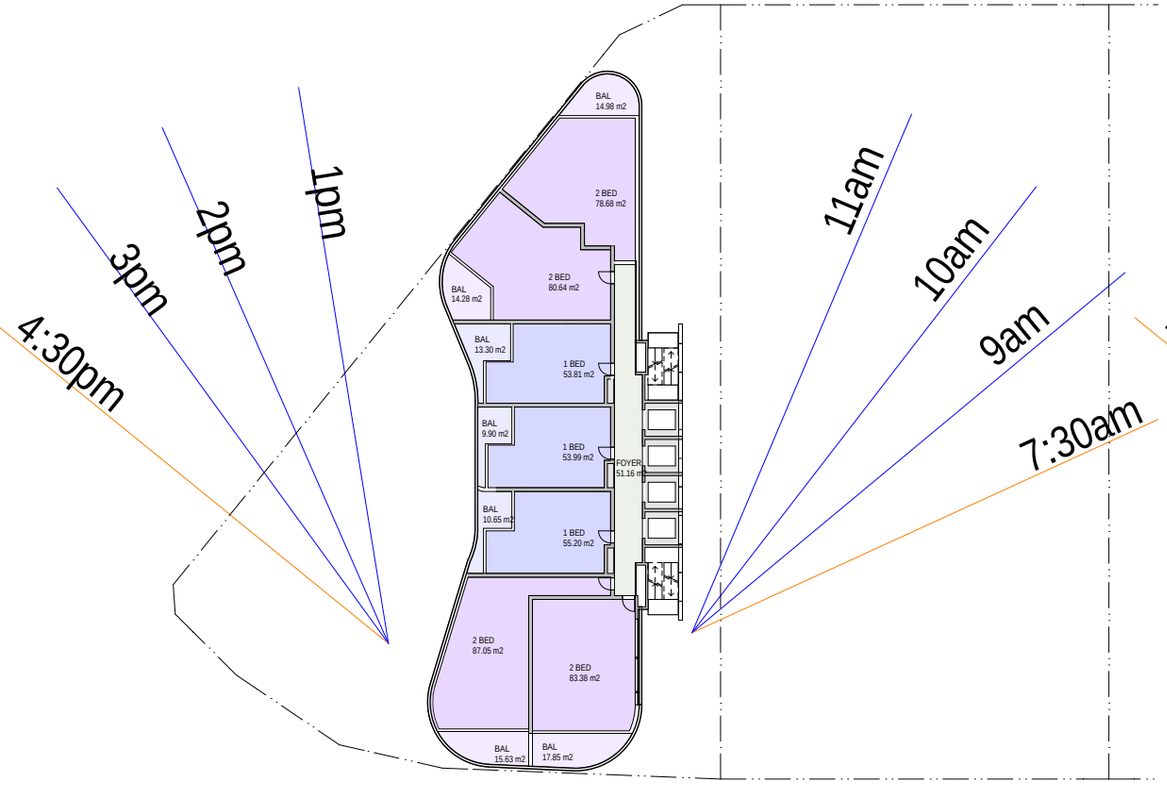
Cross Ventilation Opportunities

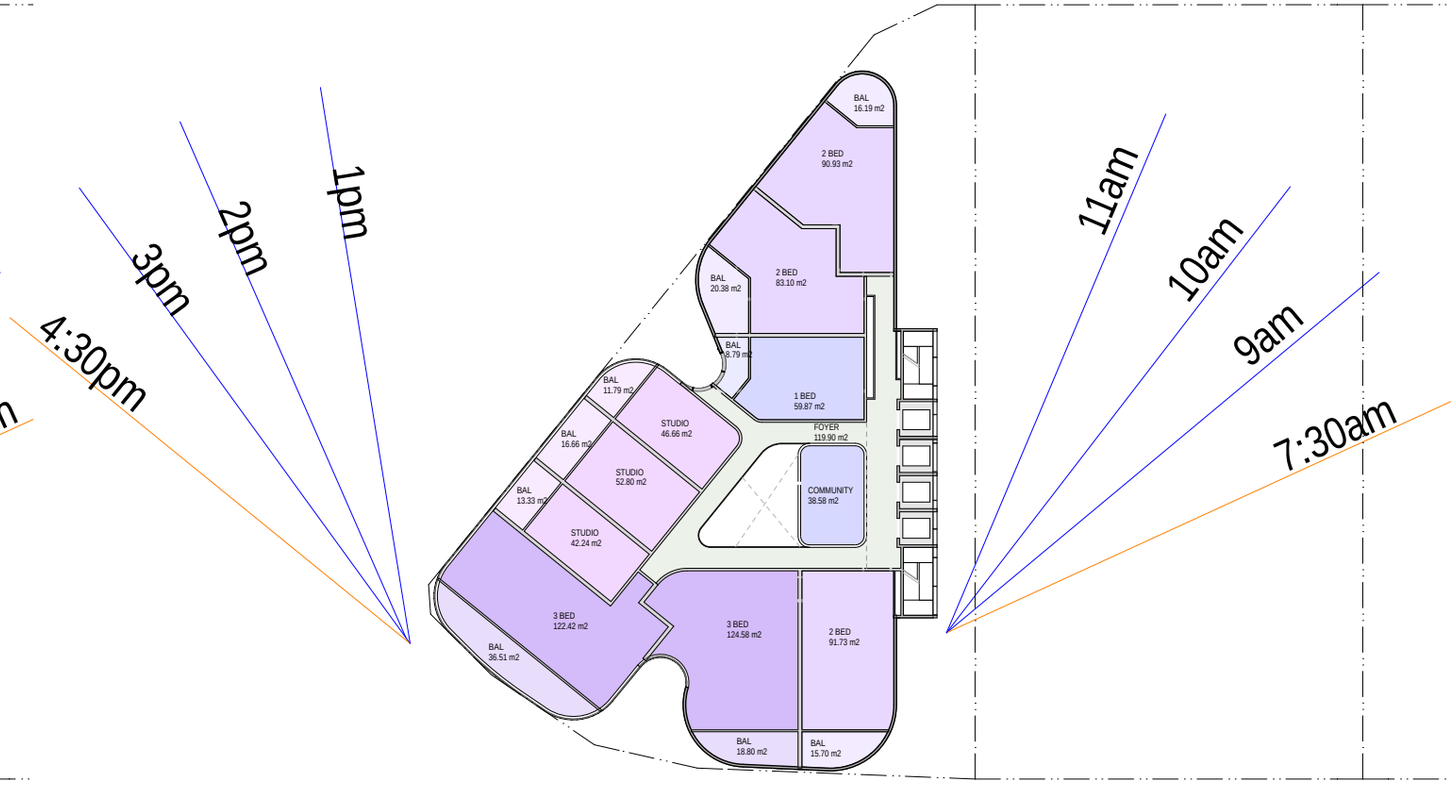




SEPP 65

Winter Solstice Sun Angles





areas

Areas

Site Area		**1,657m2**	
Commercial		**GFA**	**%**
Retail		975m2	3
Commercial Offices		7,510m2	26
Rooftop Restaurant		450m2	1
Total	**Commercial**	**8,935m2**	**31**
Residential			
Residential Apartments		20,120m2	69
FSR	**Residential**		**12:1**
Development Total		**29,135m2**	**100**
TOTAL FSR			**17.5:1**
Parking			**300 spaces**

SEPP 65 Analysis

Number of Apartments	**201**	
Cross Ventilation	**Number**	**%**
Level 7 -16 Mid Tower	60 / 86	70
Level 17 - 33 Tower	82 / 115	71
Total Cross Ventilation	**142**	**70**
3 Hours of Sunlight 9am-3pm		
Level 7 -16 Mid Tower	56 / 86	65
Residential Apartments	72 / 115	62
Total 3+ Hours of Sunlight	**128**	**64**
2 Hours of Sunlight 7:30am-4:30pm		
Level 7 -16 Mid Tower	72 / 86	83
Level 17 - 33 Tower	115 / 115	100
Total 2+ Extended Hours of Sunlight	**187**	**93**

Attachment 2: Economic Assessment prepared by Hill PDA (December 2014)

815 Pacific Highway, Chatswood – Economic Impact Assessment

Prepared for Lindfield Developments Pty Ltd

December 14

HillPDA CONSULTING

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TABLES

FIGURES

EXECUTIVE SUMMARY

HillPDA was commissioned by Lindfield Developments Pty Ltd to undertake an Assessment examining the likely economic impacts of the proposed redevelopment of an existing commercial building located at 815 Pacific Highway, Chatswood (the Subject Site). The Subject Site is 1,700sqm in size and contains a pre-existing commercial building which provides 6,800sqm of commercial floorspace.

The purpose of the Study is to consider the economic benefits of the proposed development in the local area, with particular focus on the employment uses.

It is understood that a Planning Proposal (PP) is currently being prepared to redevelop the Subject Site to a mixed use development with a total Gross Floor Area (GFA) of 29,135sqm comprising the following components:

- Residential comprising a total of 201 units over 20,120sqm (GFA);
- Commercial comprising 7,450sqm GFA, inclusive of restaurant (450sqm GFA);
- Retail comprising 1,565sqm GFA; and
- 349 car spaces.

Contextual Review

State policies give impetus to the need to create housing and employment opportunities. This is evident in the draft Metropolitan Strategy and the Sub Regional Strategy's targets where the population, dwelling and employment objectives target an additional +81,000 persons, +37,000 dwellings and +39,000 jobs by 2031. The advancement of a mixed use development located on the Subject Site is in accordance with these strategies and would address each of these targets by creating employment opportunities and additional dwelling choice for the growing population.

Under the more recent Plan for Growing Sydney (late 2014) Chatswood is identified as a Strategic Centre at the intersection of two urban renewal corridors extending along the railway lines to Epping and Hornsby and that the priority for Chatswood is to "work

with council to provide capacity for additional mixed-use development in Chatswood including offices, retail, services and housing".

Willoughby Council's Chatswood City Centre Vision 2008 defines what Council and the community have identified as the preferred future function, character and form of the City Centre. The proposed development is in accordance with this Vision as the development would:

- Enhance Chatswood's vibrant and multi-functional business district;
- Provide for city living;
- Be a visually interesting building and enhance activity at the street level within this locality;
- Provide a mixed use development that embraces the complement of residential and commercial uses;
- Is a redevelopment of a building that is approaching the end of its economic life cycle;
- Support a Centre of mixed activity and promotes competition / offers variety of goods and services; and
- Promote retail tourism within Chatswood.

Commercial Office Market Review

The Chatswood commercial office market is divided into prime and secondary office space. The prime office space is located in the Chatswood CBD office precinct (the Subject of HillPDA's 2009 Study) between the Pacific Highway and the North Shore rail line. The secondary commercial office space in Chatswood is generally located to the east of the rail line within the B3 Commercial Core zone as well as the B4 Mixed Use zone which is primarily focused along Victoria Avenue, Albert Avenue and Neridah Street.

Current tenants for Prime office space are usually occupied by larger firms such as property development / construction, IT and Government departments and trading enterprises. The secondary office space has a strong local focus, with demand generally driven by smaller commercial services (e.g. accounting practices, medical practices, dental surgeries, chiropractic services and beauty services).

Chatswood has an average net face rent of $455/sqm with incentives of 26% of gross rent being offered. Capital yields are around 8.50%. Over the last couple of decades the commercial market in Chatswood has had it tough. Other areas like Macquarie Park have been the preferred choice for A-grade office occupiers. However there has been recently some renewed interest in Chatswood with Lendlease, Vodaphone and Real Insurance taking up a considerable amount of A-grade space.

Nevertheless the difficulty in Chatswood is making the development of office space feasible. With face rents around $450/sqm, incentives around 25% and yields around 8.5% it's hasn't been viable, and still not viable, to replace old C-grade commercial space with new A-grade space regardless of allowable densities.

Residential Market Overview

The apartment market in Chatswood has performed strongly in recent years and this has been exemplified by low vacancies and growth in the rental market.

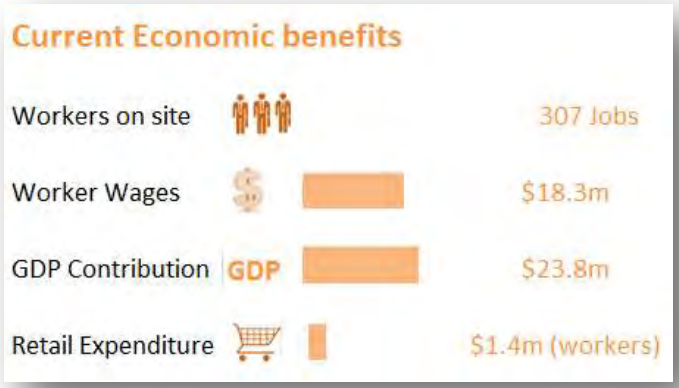
The median apartment price for Chatswood suburb from March 2014 was reported as $731,000. Discussions with selling agents active in Chatswood indicated that the average sale value for new apartments is around $12,000/sqm.

From the comparable information above it can be observed that 1-bedroom residential units in Chatswood would sell in the current market between $600,000 and $770,000. Two bedroom units would sell between $855,000 and $1.6m whilst three bedroom units would sell between $1.5m and $2.1m.

Economic Implications of Retaining the Existing Zoning

The Subject Site currently provides 6,786sqm of commercial office space of which 655sqm or 10% is vacant. Of the 6,131sqm that is occupied HillPDA estimates that 307 persons are potentially employed within the building. Based on this estimate the economic contributions of the building as it stands today is as follows:

- An estimated $18.3m is generated in wages that is contributed into the wider economy;
- $1.4m is potentially directed towards retail goods and services within Chatswood annually; and
- Businesses inside currently contribute $23.8m to Australia's GDP.



Economic Implications of the Planning Proposal

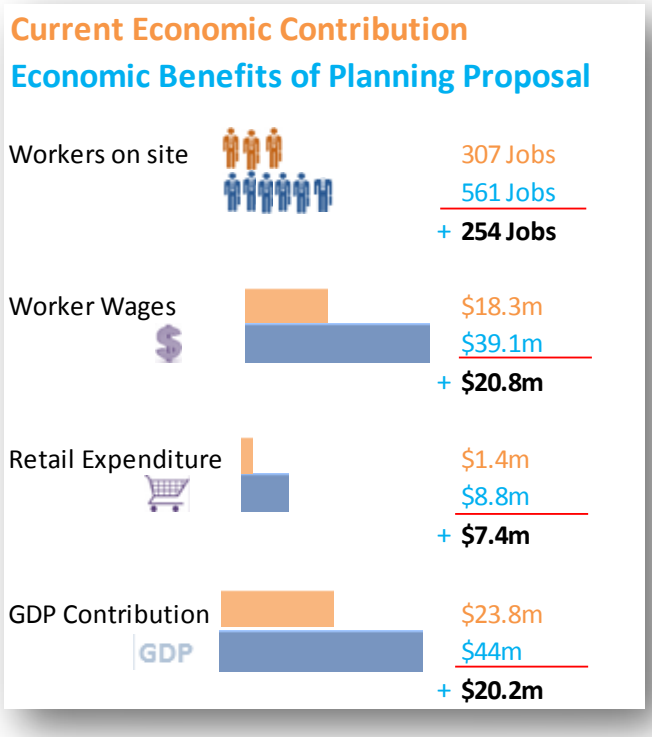
The mixed use development comprising commercial, retail and residential uses would provide economic benefits during and post construction phases. These economic benefits are as follows:

During Construction

- Estimated construction cost of $103.1m;
- Construction would generate a further $136m of activity in production induced effects;
- A further $102m in consumption induced effects;
- Total economic activity of $341m;
- 294 job years generated directly in construction;
- Due to multiplier impacts the proposal is estimated to generate a total of 1,080 job years directly and indirectly; and
- Construction workers are likely to spend $1m in retail goods and services within Chatswood centre during the construction phase.

Post Construction

- The development would facilitate the creation of an estimated 561 jobs, a net increase of +254 jobs;
- Workers located within the Subject Site would generate an estimated $39.1m in salaries annually, a net increase of $20.8m;
- Residents and workers located within the Subject Site would generate $8.8m in retail expenditure annually. Given the retail offer within Chatswood the majority of this would be captured within the centre;
- The proposed development would contribute $44m to Australia's GDP an increase of $20.2m.
- The development of commercial, retail and residential uses on the subject site would improve street activation. The benefits of this activation would be increased security, increased passing traffic for local retailers and increased investment within the area;
- Significant property investment decisions are generally viewed as a strong positive commitment for the local area;
- The direct investment proposed by the development would, through a wide range of economic multipliers as outlined above, support investment in associated industries;



- The proposed development would create additional business opportunities in this locality;
- The development would replace a building that is reaching the end of its functional economic life with a brand new commercial A-grade office building. This would increase worker densities and the amount of commercial floorspace within Chatswood ; and
- The inclusion of the residential component is necessary to ensure development feasibility. Redevelopment for commercial purposed only is highly improbable in the foreseeable future due to a lack of viability.

1 INTRODUCTION

HillPDA was commissioned by Lindfield Developments Pty Ltd to undertake an Assessment (hereafter referred to as 'the Study') examining the likely economic impacts of the proposed redevelopment of an existing commercial building located at 815 Pacific Highway, Chatswood (the Subject Site).

The Subject Site is 1,700sqm in size and contains a pre-existing commercial building which currently provides 6,800sqm of commercial floorspace. The building is understood to be 30 years old and is nearing the end of its functional economic life.

The purpose of the Study is to consider the economic benefits of the proposed development in the local area, with particular focus on the employment uses.

The Proposed Development

It is understood that a Planning Proposal (PP) is currently being prepared to redevelop the Subject Site into a mixed use development with a total Gross Floor Area (GFA) of 29,135sqm comprising the following components:

- Residential comprising a total of 201 units over 20,120sqm (GFA);
- Commercial comprising 7,450sqm GFA;
- Retail comprising 1,565sqm GFA; and
- 349 car spaces.

Study Structure

To meet the requirements of the project brief, the Study is set out in the following manner:

- **Chapter 2**: Undertakes an assessment of the planning and legislative background to the proposed development in relation to issues of economic impact;
- **Chapter 3**: Undertakes market research into the current commercial and residential market within Chatswood;
- **Chapter 4**: Examines the economic implications of retaining the Subject Sites current uses; and

- **Chapter 5**: Examines the economic impact of the proposed development during the construction phase and post construction. Economic benefits such as such as employment generation, increased worker and local resident expenditure, construction multipliers and other economic multipliers are explored.

2 PLANNING FRAMWORK

This Chapter undertakes an appraisal of the planning and legislative context for the proposed rezoning based on State, Metropolitan, Subregional and local planning guidelines. It considers matters relating to the proposed rezoning and development from an economic perspective only.

A Plan for Growing Sydney (2014)

In late 2014 the Government released the "Plan for Growing Sydney" which sets the vision for Sydney to be a strong global city, a great place to live. To achieve this vision, the Government has set down goals that Sydney will be:

- a competitive economy with world-class services and transport;
- a city of housing choice with homes that meet our needs and lifestyles;
- a great place to live with communities that are strong, healthy and well connected; and
- a sustainable and resilient city that protects the natural environment and has a balanced approach to the use of land and resources.

Under the plan Chatswood is identified as a Strategic Centre and is on an urban renewal corridor that extends the length of the railway lines to Hornsby and Epping.

The priority for Chatswood is to "work with council to provide capacity for additional mixed-use development in Chatswood including offices, retail, services and housing".

Draft Metropolitan Plan for Sydney 2031

The DP&E published the draft Metropolitan Strategy for Sydney to 2031 (the draft Strategy) for consultation in March 2013. It seeks to achieve the following outcomes:

- Balanced growth;
- A liveable City;

- Productivity and prosperity;
- Healthy and resilient environment; and
- Accessibility and connectivity.

The draft Strategy seeks to promote and facilitate growth which acknowledges market considerations and which integrates transport, infrastructure and land use. Job growth will thus be concentrated in Metropolitan areas. An additional +625,000 new jobs across Sydney by 2031 is targeted and minimum job targets are set across the Subregions in Sydney to achieve this.

Objective 5 of the draft Strategy seeks to 'deliver new housing to meet Sydney's growth'. As part of this approach the Strategy plans for at least an additional 545,000 dwellings by 2031, with new housing being encouraged in areas with existing and planned infrastructure in infill areas. The objective further states that the supply of housing within established areas would be fast tracked to meet these minimal targets.

Objective 14 of the draft Strategy seeks to 'ensure good stocks of well-located office space'. As part of this approach the Strategy encourages a good supply of office space within Strategic Centres to enable jobs that are in close proximity to housing and improve accessibility to o financial, insurance, legal and other professional services while increasing growth and development within centres.

Objective 15 of the draft Strategy seeks to 'provide for a good supply of retail floorspace'. As part of this process additional capacity for retail floorspace in all centres where retail assessments demonstrate need should be planned for.

The draft Strategy defines the Central Subregion as comprising the LGAs of Ashfield, Botany Bay, Burwood, Canada Bay, Hunter Hill, Lane Cove, Leichhardt, Marrickville, Mosman, North Sydney, Randwick, Ryde, Strathfield, Sydney, Waverly, **Willoughby** and Woollahra. Within this area the Strategy targets an additional +81,000 persons, +37,000 dwellings and +39,000 jobs by 2031.

NSW Draft Centres Policy (2009)

Over the past few years there has been a growing awareness and investigation of barriers to competition in Australia, particularly in

the retail industry. As a result of these investigations the Australian Government directed state governments and planning authorities to review the flexibility of planning regulations and policies regarding retail development. In response the NSW Department of Planning (as was, now the Department of Planning and Environment or DP&E) released the draft Centres Policy in April 2009.

The draft Centres Policy focuses around six key principles. The principles relate to:

1. The need to reinforce the importance of centres and clustering business activities;
2. The need to ensure the planning system is flexible, allows centres to grow and new centres to form;
3. The market is best placed to determine need. The planning system should accommodate this need whilst regulating its location and scale.
4. Councils should zone sufficient land to accommodate demand including larger retail formats;
5. Centres should have a mix of retail types that encourage competition; and
6. Centres should be well designed to encourage people to visit and stay longer.

Whilst the draft Centres Policy indicates that the preferred location for new retail and commercial development is in centres, it recognises that there may be exceptions to this approach.

The draft Policy has been publicly exhibited and the DP&E is currently reviewing submissions. The six key principles are discussed in more detail below.

- **Principle 1: Retail and Commercial Activity should be Located within Centres**

The first principle of the draft Centres Policy reinforces the longstanding strategy to concentrate the predominant share of retail and business floorspace within town centres. The clustering of uses within centres is justified for environmental and economic reasons. By way of example, focusing uses within centres makes efficient use of existing infrastructure, can improve business efficiency and productivity and allow for a range of uses to be provided meeting consumer needs.

- **Principle 2: Centres should be able to Grow and New Centres Form**

The draft Centres Policy identifies that areas experiencing significant increases in population and real income must be dynamic and respond to "prevailing market demands" through the extension of existing centres or the growth of new ones.

- **Principle 3: Market Determines Need for Development, Planning Regulates Location and Scale**

The third principle of the draft Centres Policy identifies that the market is best placed to determine demand for retail and commercial development. Accordingly, the role of the planning system is not to assess the appropriateness of development on the basis of demand, but rather to make an assessment as to the external costs and benefits.

- **Principle 4: Ensuring the Supply of Floorspace Accommodates Market Demand**

The fourth principle of the draft Centres Policy emphasises the importance of competition between retailers. The key intention of this principle is to create better quality, cheaper and more accessible goods for all consumers through enhanced competition. To support opportunities for greater competition, the Draft Policy requires councils to ensure that there is sufficient zoned land to enable additional (and new) large format retailers to enter the NSW retail market.

- **Principle 5: Support a Wide Range of Retail and Commercial Premises and Contribute to a Competitive Retail Market**

Principle 5 of the draft Centres Policy states that, subject to meeting the appropriate location and design criteria, the zoning and development assessment process should not consider impacts between existing and proposed retailers as a planning consideration.

Whilst the Principle seeks to extract the matter of individual business impact from planning assessment (in keeping with the findings of various Land and Environment Cases) the effect of a proposed development to the function and vitality of existing and planned centres will remain as an important local issue.

- **Principle 6: Contributing to the Amenity, Accessibility, Urban Context and Sustainability of Centres**

Principle 6 of the draft Centres Policy highlights the importance of design quality, development layout, connectivity and integration. The Policy recognises that good design supports the vitality and function of a town centre as well as the viability and success of a retail development. Accordingly good quality design is in the interests of planning authorities, retailers and consumer alike.

Draft SEPP (Competition) (2010)


Consultation draft

State Environmental Planning Policy (Competition) 2010

Following a review undertaken by the DP&E and the Better Regulation Office into how economic growth and competition were impacted by the planning system, a new Draft State Environmental Planning Policy (SEPP) has been prepared and was placed on public exhibition in July 2010.

The proposed state-wide planning policy removes artificial barriers on competition between retail businesses. The draft SEPP proposes:

- The commercial viability of a proposed development may not be taken into consideration by a consent authority, usually the local council, when determining development applications;
- The likely impact of a proposed development on the commercial viability of other individual businesses may also not be considered unless the proposed development is likely to have an overall adverse impact on the extent and adequacy of local community services and facilities, taking into account those to be provided by the proposed development itself; and
- Any restrictions in local planning instruments on the number of a particular type of retail store in an area, or the distance between stores of the same type, will have no effect.

Willoughby Local Environmental Plan 2012

The Willoughby Local Environmental Plan 2012 (WLEP 2012) was adopted in early 2013 and provides the statutory framework for all

planning, development and building within Willoughby Local Government Area (LGA).

The Subject Site is currently zoned Commercial Core (B3) the objectives of the zone are to:

- provide a wide range of retail, business, office, entertainment, community and other suitable land uses that serve the needs of the local and wider community;
- encourage appropriate employment opportunities in accessible locations;
- maximise public transport patronage and encourage walking and cycling;
- support the role of St Leonards as a specialised centre providing health, research and education facilities;
- strengthen the role of Chatswood as a major centre for the inner north sub-region and to improve its public domain and pedestrian links; and
- protect and encourage safe and accessible city blocks by providing active land uses on street and pedestrian frontages.

Development permitted with consent that is relevant to this Study includes commercial premises, this includes retail services. Residential development is prohibited under the zone.

The PP seeks the rezoning of the Subject Site to a Mixed Use Zone Commercial Core (B4) the objectives of the zone are to:

- To provide a mixture of compatible land uses;
- To integrate suitable business, office, residential, retail and other development in accessible locations so as to maximise public transport patronage and encourage walking and cycling; and
- To allow for city living on the edges of the city centre of Chatswood which supports public transport use, shopping, business and recreational services that contribute to the vitality of the centre, without undermining its commercial role.

Under the B4 zone all the components of the proposed development (office, retail and residential apartments) are all permissible with development consent.

Chatswood City Centre Plan 2008

The Chatswood City Centre Vision sets out objectives and strategies that are intended to guide planning and land use decisions within Chatswood City Centre over 25 years. The Vision drew from community consultations and planning research to devise objectives and strategies that encompass what Council and the community have identified as the preferred future function, character and form of the City Centre.

Of relevant to this Study the Vision states that the Centre will:

- Be a vibrant and multi-functional business district serving a local and regional role;
- Provide for city living;
- Be characterised by visually interesting buildings and places with a diversity of activity at street level; and
- Be a centre where residential and commercial uses complement each other.

The Vision sets out eight strategies. The following objectives within Strategy 5.4 Economic Prosperity – Economic Capital, are of most relevance to The Study:

- Objective 5.4 (b) - Encourage redevelopment on underutilized or obsolete development sites;
- Objective 5.4 (i) - Support a Centre of mixed activity that promotes competition and offers variety of goods and services; and
- Objective 5.4 (j) - Promote retail tourism in Chatswood.

Summary of Planning Framework

State policies give impetus to the need to create housing and employment opportunities. This is evident in the draft Metropolitan Strategy and the Sub Regional Strategy's targets where the population, dwelling and employment objectives target an additional +81,000 persons, +37,000 dwellings and +39,000 jobs by 2031. The advancement of a mixed use development located on the Subject Site is in accordance with these strategies and would address each of

these targets by creating employment opportunities and additional dwelling mixture choice for the increase in population.

Further state policies aim at providing increased competition between commercial businesses by proposing that the commercial viability of a proposed development or its impacts on surrounding commercial businesses not be taken into consideration by consent authorities when determining a development application.

Willoughby Council's Chatswood City Centre Vision 2008 encompasses what Council and the community have identified as the preferred future function, character and form of the City Centre. The proposed development is in accordance with this Vision as the development would:

- enhance Chatswood's vibrant and multi-functional business district;
- provide for city living;
- be a visually interesting building and enhance activity at the street level within this locality;
- embrace the complement of residential and commercial uses;
- replace a building that is near the end of its economic life;
- support a Centre of mixed activity, promote competition and increase the offer of goods and services; and
- promote retail tourism within Chatswood.

3 COMMERICAL AND RESIDENTIAL MARKET RESEARCH

The following Chapter analyses trends and factors influencing the commercial office and residential markets within Chatswood Major Centre. It also investigates the sale prices and rental values for commercial office and residential units based on detailed discussions with market and industry experts as well as a review of relevant property databases.

Commercial Office Market Review

177 Pacific Highway, North Sydney

The North Shore Office Market

In accordance to the Knight Frank office market report[1], capital being invested in the North Shore office market has remained steady through 2014. The report further states *that at the beginning of 2013, offshore investors and unlisted wholesale funds have accounted for 45% and 36% of total sale respectively*[2].

Our research and Knight Frank's report[3] has shown that there is a consistent demand for Prime grade stock. Knight Frank's office market report[4] indicated that secondary stock has experienced more *demand than prime, mainly due to the yield compression for both primes and secondary with each North Shore region recording approximately 50bps of firming in the 12months to April 2014*[5].

Knight Franks North Shore office report, 2014 identified that St Leonards and Chatswood office markets have found there has been a more *pronounced firming experience in the secondary market. This is due to the competitive pressures from both offshore buyers and investors looking at assets with development potential*.

The development of the commercial tower located at 177 Pacific Highway, North Sydney as well as other developments will not flood the market and increase vacancies as the developments are not due for completion until 2016. Furthermore a few developments will be

[1] Knight Frank Office Market Report – North Shore, November 2014
[2] Ibid
[3] Ibid
[4] Ibid
[5] Ibid

withdrawn and resubmitted for a change of use for redevelopment for example mixed use development.

Although tenant demand seems to be low, it is anticipated that the North Shore market will experience a positive net absorption compared to the markets in 2013. This is said to be due to recent growth in the labour market.

Figure 2 below demonstrates all the North Shore and North Ryde prime and office market indicators.

Figure 1 – North Shore/ North Ryde Commercial Office Market Indicators

Market	Grade	Total Stock (m^2)^	Vacancy Rate (%) ^	Annual Net Absorption (m^2)^	Avg Net Face Rent ($/$m^2$)	Outgoings ($/$m^2$)	Average Incentive (%)	Average Core Market Yield (%)
North Sydney	Prime	222,796	5.1	-816	628	120	27.0*	6.75 - 7.50
North Sydney	Secondary	625,809	12.4	-33,804	504	115	29.6*	8.00 - 8.75
North Sydney	**Total Market**	**848,605**	**10.5**	**-34,620**	**537**	**115**	**28.9***	**6.75 - 8.75**
Crows Nest/St Leonards	Prime	102,699	16.6	-4,811	466	108	29.5*	7.75 - 8.50
Crows Nest/St Leonards	Secondary	254,634	13.3	-13,030	399	97	30.0*	8.50 - 9.00
Crows Nest/St Leonards	**Total Market**	**357,333**	**14.3**	**-17,841**	**418**	**100**	**29.9***	**7.75 - 9.00**
Chatswood	Prime	157,412	15.6	-10,058	429	112	28.5*	8.00 - 8.75
Chatswood	Secondary	123,433	10.8	-2,931	351	95	30.5*	8.75 - 9.50
Chatswood	**Total Market**	**280,845**	**13.5**	**-12,989**	**395**	**105**	**29.4***	**8.00 - 9.50**
North Shore	**Total Market**	**1,486,783**	**12.0**	**-65,450**	**481**	**109**	**29.2***	**6.75 - 9.50**
North Ryde/Macquarie Park	Prime	589,721	8.1	-12,979	340	80	27.5‡	7.50 - 8.00
North Ryde/Macquarie Park	Secondary	264,530	12.5	7,959	283	95	30.0‡	9.00 - 9.50
North Ryde/Macquarie Park	**Total Market**	**854,251**	**9.5**	**-5,020**	**322**	**92**	**28.3‡**	**7.50 - 9.50**
Core Market Yield:	The percentage return/yield analysed when the assessed fully leased net market income is divided by the adopted value/price which has been adjusted to account for property specific issues (i.e. rental reversions, rental downtime for imminent expiries, capital expenditure, current vacancies, incentives, etc).							
Grade:	Prime includes modern and A-Grade stock whilst Secondary includes B, C and D quality Grade.							

Source: Knight Frank Research/PCA ^ as at January 2014 *Incentives on a Gross basis ‡ Incentives are on a Net basis NB. Average data is on a weighted basis: Yield ranges reflect the average lower and average upper yields for a select basket of office assets in each market and Grade

Source: Knight Frank Research June 2014

Chatswood Office Market Overview

The Chatswood commercial office market is divided into prime and secondary office space. The prime office space is located in the Chatswood CBD office precinct (the Subject of HillPDA's 2009 Study) between the Pacific Highway and the North Shore rail line. The secondary commercial office space in Chatswood is generally located to the east of the rail line within the B3 Commercial Core zone as well as the B4 Mixed Use zone which is primarily focused along Victoria Avenue, Albert Avenue and Neridah Street.

Our research has indicated that the current tenants for Prime office space are usually occupied by larger firms such as property development / construction, IT and various Government bodies. The

secondary office space differs notably from the prime office location in that it has a strong local focus, with demand generally driven by smaller commercial services (e.g. accounting practices, medical practices, dental surgeries, chiropractic services and beauty services).

As discussed in HillPDA's 2009 Study the Chatswood prime office precinct has a number of location advantages. Notwithstanding these advantages the office market has taken a tumble in recent years owing to factors such as:

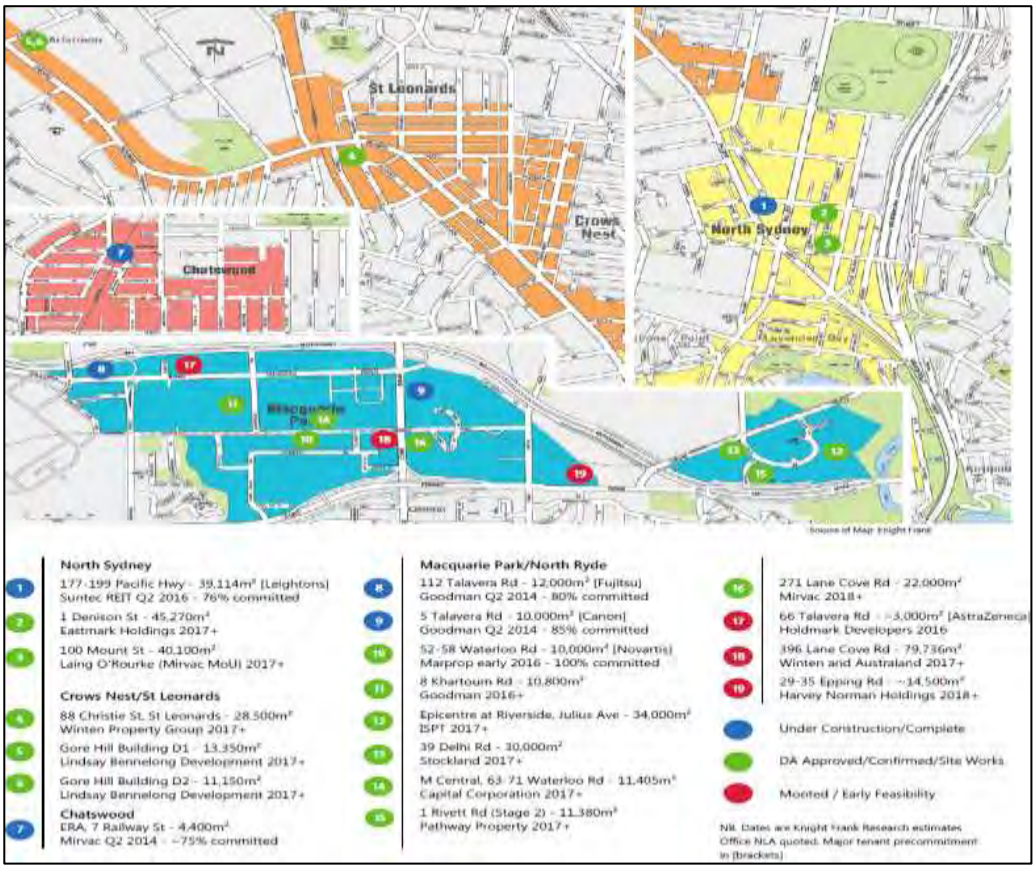
- Changes in the economic climate;
- The nature of building stock; and
- The growing perception of Chatswood as a residential and retail focused centre as opposed to a prestigious office location.

Our research in 2009 found that many tenants seeking new space within the Chatswood prime office precinct were already located within the centre and looking to upgrade. Prospective new tenants were choosing alternative locations over Chatswood such as the North Ryde / Macquarie Business Park owing to their more competitive rates, newer and more efficiently designed buildings with larger floorplates. In comparison the Chatswood office precinct had a growing proportion of ageing stock that was not attractive to new market entrants or redevelopment as end sale values barely covered the cost of construction.

As a result, the Chatswood prime office precinct had seen little redevelopment activity over the past 10 to 15 years. In accordance to the Colliers International market report[6] the new development within Chatswood is replacing secondary office sites into residential buildings. It was further stated that since 1998, Chatswood's office floorspace has decreased by 4.3%, with 7 Railway, Chatswood under construction with a total of 4,400sqm of office supply. There appears to be no other commercial developments in the pipeline.

[6] Collier's International Research and Forecast Report 2014.

Figure 2 – Major Office Development Supply.



Source: Knight Frank office Market Report, June 2014.

Furthermore in the Knight Frank market report[7] since July 2013, the Chatswood office market has experienced an increase from 8.6% to 13.4% in the total vacancy rate.

Figure 1 below demonstrates that Chatswood has an average net face rent of $455/sqm with incentives of 26% of gross rent being offered. Capital yields are shown to be 8.50%.

[7] Knight Frank Office Market Overview June 2014.

Figure 3 – Sydney Metropolitan A Grade Office

MARKET	AVERAGE NET FACE RENTS ($/m² pa)		AVERAGE GROSS INCENTIVES		AVERAGE YIELDS	
	Q3 2013	Q2 2014	Q3 2013	Q2 2014	Q3 2013	Q2 2014
North Sydney	$565	↑	24%	↔	7.50%	↔/↓
St Leonards	$455	↔	28%	↔	8.38%	↔
Chatswood	$455	↔	26%	↔	8.50%	↔
North Ryde	$340	↔	28%*	↔	8.00%	↔
Parramatta	$403	↑	13%	↔/↓	9.00%	↔/↓
Sydney Olympic Park	$373	↔	18%	↔	8.38%	↔/↓
Rhodes	$380	↔	24%	↔	7.75%	↔
Norwest	$330**	↔	29%	↔	8.75%	↔
Sydney CBD Fringe	$538	↑	28%	↑	7.50%	↔/↓
South Sydney	$400	↑	23%	↑	8.18%	↔/↓

Note: Figures represent market averages as at Q3 2013. For more details see the Data Tables.
*Incentive based on net rent **Includes car parking costs at a ratio of 1:25
Source: Colliers International, PCA OMR July 2013Source: Colliers International Research and Forecast Report First Half 2014

Market Evidence

Our research and discussions with agents has identified the following:

- There has been more demand for office space in Chatswood over the last 2 years due to the upgrade and sophistication and with the range of amenities created with the Eat Street development;
- There is a high demand for larger office suites within A Grade buildings but not for secondary or C grade;
- Over the last 18 months Lendlease, Vodaphone and Real Insurance have occupied large A grade floor plates;
- A grade buildings are leased with a few months of being marketed whereas secondary and C- Grade can be vacant between 3-12 months;
- A grade rents range from $420-$450 net;
- A grade outgoings range from $110-$120/sqm;
- Incentives offered range between 15% for suites that are fitted out and between 25-30% for suites that have no fit out provided;
- C grade rents range between $310-$390/sqm ;
- C grade outgoings range between $80-$90/sqm;
- Sale Values for A grade range between $5,000/sqm-$7,500/sqm; and
- A grade yields between 8% - 8.5%.

Commercial Office Sales Evidence

The table below demonstrates the sale values of commercial suites within the Chatswood CBD precinct. It shows that commercial values can range between $3,290/sqm (152sqm) to $7,979/sqm (94sqm). The dollar per square metre sale value depends on the age, condition, location and level of the office suite.

Table 1 – Commercial Sales market evidence 2013-2014

Address	Sale Price	Area	$/sqm	Sold date
47-53 Neridah St	$ 500,000	152	$ 3,290	24-Oct-13
10 Help St	$ 25,060,000	7290	$ 3,438	5-Dec-13
781 Pacific Hwy	$ 290,000	76	$ 3,816	1-Jul-13
1 Katherine St	$ 300,000	77	$3,896	22-Nov-13
5-7 Havilah St	$ 5,000,000	1253	$ 3,990	15-Jul-13
16-18 Malvern Av	$ 685,000	165	$4,152	27-Nov-13
29 Bertram St	$ 140,000	32	$4,375	12-Jun-13
809-811 Pacific Hwy	$ 470,000	106	$ 4,434	19-Jun-13
20-22 Thomas St	$ 290,000	64	$4,531	5-Jun-13
71-73 Archer St	$ 263,000	57	$ 4,614	14-Nov-13
71-73 Archer St	$ 257,000	55	$ 4,673	18-Oct-13
71-73 Archer St	$ 268,000	57	$ 4,702	4-Oct-13
47-53 Neridah St	$ 390,000	82	$ 4,756	1-Jun-13
47-53 Neridah St	$ 387,000	81	$4,778	29-Aug-13
28 Archer St	$ 2,750,000	553	$ 4,973	28-Jun-13
1 Katherine St	$ 315,000	63	$ 5,000	9-Dec-13
1 Katherine St	$ 260,000	52	$5,000	16-Oct-13
29 Bertram St	$ 172,000	32	$ 5,375	12-Feb-14
56 Neridah St	$ 380,000	69	$ 5,507	21-Oct-13
67 Albert Av	$ 85,000,000	15,241	$ 5,577	6-Feb-14
47-53 Neridah St	$ 324,000	58	$ 5,586	9-Aug-13
47-53 Neridah St	$ 515,000	77	$ 6,688.	7-Jun-13
63a Archer St	$ 750,000	94	$ 7,979	18-Dec-13

Source: PIMS Hill PDA research 2014

Commercial Office Rental Evidence

The table below demonstrates the rents achieved for commercial suites within the Chatswood CBD precinct. It shows that commercial gross rents can range between $320/sqm (56sqm) to $568/sqm (300sqm). Whereas commercial office net rents can range between $395/sqm (1,770sqm)-$432/sqm (32sqm).

Table 2 – Commercial Office Rents 2013-2014

Address	Rent	Area	$/sqm	Leased Date
Gross Rents				
813 Pacific Hwy	$ 17,920	56	$ 320	19-Dec-13
7a-9 Help St	$ 232,260	588	$ 395	1-Dec-13
845 Pacific Hwy	$ 93,310	217	$ 430	12-Aug-13
760 Pacific Hwy	$ 153,900	342	$ 450	17-Apr-14
799 Pacific Hwy	$ 285,131	529	$ 539	19-Mar-14
799 Pacific Hwy	$ 170,400	300	$ 568	30-Dec-13
Net Rents				
Address	Rent	Area	$/sqm	Leased Date
1 Spring St	$ 698,929	1,770	$ 395	19-Sep-13
799 Pacific Hwy	$ 208,000	520	$ 400	10-Nov-13
799 Pacific Hwy	$ 89,460	213	$ 420	21-Aug-13
29 Bertram St	$ 13,824	32	$ 432	19-Dec-13

Residential Market Overview

Sydney's Northern Suburbs are accessible via the major roads and rail line that service the area, namely the Pacific Highway and North Shore line. From a residential perspective, the area is widely recognised and valued for its quiet tree-lined, leafy and suburban character as well as a being a major commercial, civic and retail destination. Willoughby LGA has a number of excellent quality public and private schools as well as the Royal North Shore Private and Public Hospitals all of which provide important services for the local community.

Willoughby LGA and the suburb of Chatswood have traditionally been a destination for young families and professional couples. But an increasingly observable trend has related to growing interest from overseas students as well as empty nesters seeking to downsize from the traditional family home into more compact accommodation. Many of these empty nesters desire to remain living in the suburb of Chatswood owing to its proximity to services, transport and family as well as its cluster of cultural and lifestyle facilities.

Reflective of this demand, the suburb of Chatswood (and more specifically the Major Centre and highway corridors) are

characterised by a range of apartments and townhouses (comprising approximately 59% of the dwelling stock[8]). Low density residential houses are more predominate in streets extending away from the core of Chatswood Major Centre (approximately 35% of all housing stock in the Suburb). Approximately 6% of all housing stock in Chatswood relates to semi-detached dwellings. [9]

Furthermore in the suburb of Chatswood approximately 32% of all dwellings are fully owned, 25% of properties are being purchased and 43% are being rented. [10]

Residential Apartment Sales

The apartment market in Chatswood has performed strongly in recent years and this has been exemplified by low vacancies and growth in the rental market. Further analysis reveals that the buyers in one and two bedroom apartments with a large number of apartments selling off the plan for each new development marketed in Chatswood. Agents identified the typical buyers as young professionals, young families and downsizers. Our analysis has also found that the overall prices reflect the proximity of dwellings to Chatswood Major Centre and the services situated in this area.

The median apartment price for Chatswood suburb from March 2014 was reported as $731,000[11]. It is important to note that this classification refers to all strata titled dwellings including units, townhouses, terraces and semi-detached dwellings.

Discussions with selling agents active in Chatswood indicated that the average sale value is approximately $12,000/sqm.

Some additional examples of recent sales activity for selected residential developments are provided below in Chatswood, St Leonard's and North Sydney. These examples have been provided as good comparable to the Subject Site as they are all within the 20-40 Levels region.

[8] Red Square – Neighbourhood Report – Chatswood 2014
[9] Red Square – Neighbourhood Report – Chatswood 2014
[10] Red Square – Neighbourhood Report – Chatswood 2014
[11] Residex Market Report 2014

Development	Sale Price	Unit Type	Comments	
7 Railway Parde Chatswood (Sold 2013-2014)	$599,000-$ 768,000 $10,890/sqm-$ 13, 475/sqm $855,000-$ 1,640,000 $10,688/sqm-$ 17,083/sqm $1,528,000-$ 2,088,000 ($11,070/sqm-$17,1667/sqm) Please note the high $/sqm is due to the higher levels achieving views.	1b units (55sqm-69sqm) 2b units (80sqm-96sqm) 3b units (120sqm-140sqm)	Development Era has been developed by Mirvac. The scheme comprises of 1, 2 and 3 bedrooms over 42 levels.	
436 Victoria Avenue, Chatswood	$625,000-$1,585,000	1bedrooms-3bedrooms	The sold prices are over Dec 2013-March 2014. The development has not completed and therefore does not have a strata plan to view the internal areas.	
Air St Leonards 22 Atchison St, St Leonards (Sold July2013)	$490,000-$495,000 ($12,564/sqm-$12,692/sqm) $556,000-$696,000 ($10,706-$14,038/sqm) $797,000-$1,036,000 ($10,770/sqm-$13,455/sqm)	Studios (39sqm) 1b units (51-52sqm) 2b units 74sqm-77sqm)	The sales values are asking prices from July 2013. The development comprises of studios, one and two bedrooms over 23 levels.	

Source: Hill PDA research 2014

From the comparable information above it can be observed that residential units in Chatswood may be expected to sell in the current market between $600,000 and $770,000. Two bedroom units may be

expected to sell between $855,000 and $1.6m whilst three bedroom units may be expected to sell between $1.5m and $2.1m.

4 ECONOMIC IMPLICATIONS OF RETAINING EXISTING REZONING

The following Chapter undertakes an assessment of the economic contribution the current commercial building located on the Subject Site contributes to the local and wider economy.

Employment Generation

The current commercial building located on the Subject Site provides approximately 6,785sqm of commercial floorspace. Of this 6,130sqm was occupied by 40 tenancies[12]. HillPDA has applied an employment rate to the total occupied commercial floorspace as of April 2014. Using this method HillPDA has estimated that 307 persons are currently employed on the Subject Site.

Table 3 - Current Employment

Land Use	Employment Rate*	Occupied NLA (sqm)**	No. of Workers
Commercial Secondary Office	1 / 20sqm	6,130	307

Sources: *HillPDA
** Kingsmede Property Management

Salaries

IBIS World Industry Report 2011 forecast average employee wages per staff in 2014-15 for general commercial uses would be approximately $59,574 per annum[13]. Based on this annual wage per staff the combined worker salary is estimated to be approximately **$18.3m**.

Table 4 - Estimated Current Salary Contribution

Land Use	Employees	Average Annual Wage 2015/16	Combined Total Wage
Commercial	307	59,574	18,289,218

Source: IBIS World Industry Reports and Hill PDA

[12] Abbreviated tenancy schedule for 815 Pacific Highway, Chatswood April 2014, Kingsmede Property Management
[13] IBS Business Services Australia, +7% has been factored for inflation

Retail Expenditure

Expenditure from Workers

A recent survey conducted by URBIS found that Sydney CBD workers spend an average of $200 a week or $9,200 per annum (based on 46 working weeks) on retail goods and services in the CBD. Chatswood's retail offer is extensive with Westfield, the Mandarin Centre and Chatswood Chase comprising the bulk of retail floorspace. As such the centre would capture the majority of worker weekly retail spending. For the purpose of the assessment HillPDA has applied a more conservative weekly expenditure of $100 per employee per week for the workers on site which equates to an annual spend of $4,600. With 307 workers on site this amounts to **$1.4m** per annum.

Industry Value Add

Value add of an industry refers to the value of outputs less the costs of inputs. It measures the contribution that the industry makes to the country's wealth or gross domestic product (GDP). We estimate the current building to be contributing $23.8m every year based on the following table.

Table 5 - Estimated Industry Value Add

Land Use	Employees	IVA/Worker	Industry Value Add ($m)
Commercial	307	77,430	23.8

Source: IBIS World Industry Reports and Hill PDA

Summary

The Subject Site currently provides 6,786sqm of commercial office space of which 655sqm or 10% is vacant. HillPDA estimates 307 persons are currently working in the building. These workers contribute $23.8m to the economy, attract $18.3m in salaries and spend around $1.4m in retail goods and services in Chatswood every year.

5 ECONOMIC IMPLICATIONS OF PROPOSED DEVELOPMENT

This Chapter examines the economic benefits of the proposal during the construction and post construction phases. Economic benefits such as employment generation, tourism expenditure, increased workers and local resident's expenditure and other economic multipliers are explored.

Construction Economic Benefits

Construction Multiplier Effects

The construction industry is a significant component of the economy accounting for 7.3% of Gross Domestic Product (GDP) and employing almost one million workers across Australia[14]. The industry has strong linkages with other sectors, so its impacts on the economy go further than the direct contribution of construction. Multipliers refer to the level of additional economic activity generated by a source industry.

There are two types of multipliers:

- **Production induced**: which is made up of:
  - first round effect: which is all outputs and employment required to produce the inputs for construction; and
  - an industrial support effect: which is the induced extra output and employment from all industries to support the production of the first round effect; and
- **Consumption induced**: which relates to the demand for additional goods and services due to increased spending by the wage and salary earners across all industries arising from employment.

[14] Source: IBIS World Construction Industry Report 2011

The source of the multipliers adopted in this report is ABS Australian National Accounts: Input-Output Tables 2008-09 (ABS Pub: 5209.0). These tables identify first round effects, industrial support effects and consumption induced multiplier effects at rates of $0.6463, $0.6734 and $0.9891 respectively to every dollar of construction.

HillPDA has estimated the construction cost to be $103.1m. This has been calculated at the following rates:

- $3,000/sqm for the building component (29,135 GFA); and
- $45,000/ car space (349 spaces).

The table below quantifies associated economic multipliers resulting from the construction process.

Table 6 - Construction Multipliers ($m)

	Direct Effects	Production Induced Effects		Consumption Induced Effects	Total
		First Round Effects	Industrial Support Effects		
Output multipliers	1	0.6463	0.6734	0.9891	3.3088
Output ($million)	$103	$66.6	$69.4	$102.0	$341.1

Source: Hill PDA Estimate using data from ABS Australian National Accounts: Input-Output Tables 2008-09 (ABS Pub: 5209.0)

The estimated direct construction costs will generate a further $136m of activity in production induced effects and $102m in consumption induced effects. Total economic activity generated by construction is therefore estimated at $341.1m.

Note that the multiplier effects are national, and not necessarily local. The ABS states that:

"Care is needed in interpreting multiplier effects; their theoretical basis produces estimates which somewhat overstate the actual impacts in terms of output and employment. Nevertheless, the estimates illustrate the high flow-on effects of construction activity to the rest of the economy. Clearly, through its multipliers, construction activity has a high impact on the economy."

In particular the multiplier impacts can leave the impression that resources would not have been used elsewhere in the economy had the development not proceeding. In reality many of these resources

would have been employed elsewhere. It should also be noted, as stated in the NSW Treasury guidelines, that:

"Direct or flow on jobs will not necessarily occur in the immediate vicinity of the project – they may be located in head office of the supplier or in a factory in another region or State that supplies the project"15.

Nevertheless, economic multiplier impacts represent considerable added value to the Australian economy.

Construction Related Employment

It is estimated that the equivalent of 2.85 construction positions over 12 months are created for every one million dollars of construction work undertaken[16]. Based on $103m construction cost 294 job years[17] would be directly generated by the proposed development as shown in the table below.

Table 7 - Construction Employment

	Direct Effects	Production Induced Effects		Consumption Induced Effects	Total
		First Round Effects	Industrial Support Effects		
Multipliers	1	0.64	0.70	1.34	3.68
Employment No. per $million	2.85	1.83	1.98	3.81	10.48
Total job years created	294	189	204	393	1,080

Source: Hill PDA Estimate using data from ABS Australian National Accounts: Input-Output Tables 2008-09 (ABS Pub: 5209.0) adjusted by CPI to 2012.

The ABS Australian National Accounts: Input-Output Tables 2008-09 identified employment multipliers for first round, industrial support and consumption induced effects of 0.64, 0.70 and 1.34 respectively for every job year in direct construction. Including the multiplier impacts the proposed development is estimated to generate a total of 1,080 job years directly and indirectly.

[15] Source: Office of Financial Management Policy & Guidelines Paper: Policy & Guidelines: Guidelines for estimating employment supported by the actions, programs and policies of the NSW Government (TPP 09-7) NSW Treasury
[16] Source: ABS Australian National Accounts: Input-Output Tables 2008-09 (ABS Pub: 5209.0)
[17] Note: One job year equals one full-time job for one full year

Retail Expenditure from Construction Workers

Construction workers on site would generate additional sources of retail expenditure. This would be spent predominately on convenience-related items such as lunches, coffees, snacks and so on. There have been no recent studies into the amount that workers spend on retail items during the working week. Although a recent survey conducted by URBIS found that workers in Sydney CBD on average spent $200 per week on retail items. This average spend encompasses clothing and supermarket purchases. For construction workers HillPDA has applied a more conservative spend of $15 a day or $75 a week for 46 working weeks generated by each worker during the construction period.

We have estimated that:

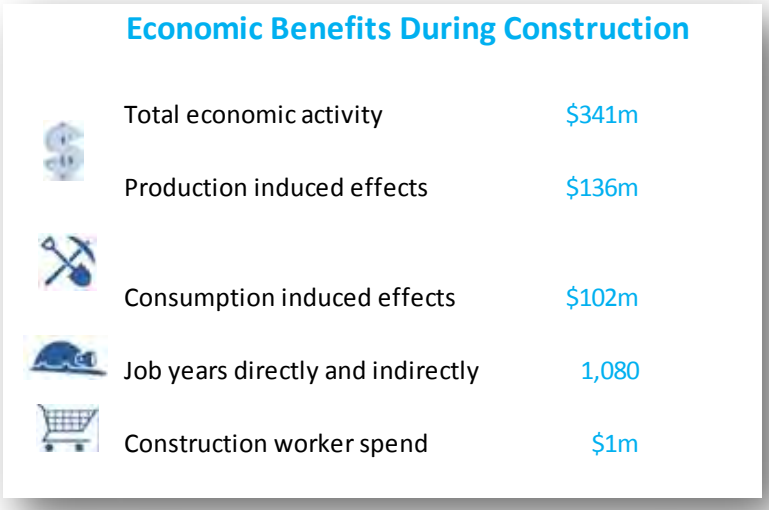
- 294 construction job years would be directly supported on the Subject Site over the course of the development; and
- The workers on site will spend an average of $3,450 per annum within close proximity to their work.

On this basis existing retailers in Chatswood will enjoy $1m revenue from construction workers on site during the period of construction.

Other Construction Impacts

The construction process may lead to short-term negative impacts in the locality such as increased traffic, noise, dust and so on. We have assumed that the development process would take necessary steps to mitigate the extent of these impacts.

Figure 4 - Summary of Economic Benefits During Construction



Source: HillPDA

Post Construction Economic Benefits

Employment Generation

The proposed development would support permanent employment post-construction through the operation of commercial and residential uses within the development. The table below provides an estimate of the number of jobs that would be supported on site.

Table 8 – Estimated Employment Generation

	Land Use	Units	NLA (sqm)	Employment Density	No. of Workers
Current	Commercial		6,131	1 per 20sqm	307
Proposed	Commercial		6,875	1 per 14	491
	Retail*		903	1 per 24	38
	Restaurant**		405	1 per 24	17
	Apartments	201		7.6% of Units#	15
	Total				561

* Assumes 90% of GFA is NLA and allows 10% vacancy
** Assumes 90% of GFA is NLA
Source: ABS Retail Surveys 1990-91 and 1998-99
Source: 7.6% of workers undertake majority of work at home (ABS Locations of Work 2008 Cat 6275.0)

As indicated within the table above the development would facilitate the creation of approximately 561 jobs. This is an additional **+254** jobs than currently estimated to be located on site.

Salaries

Retail Employees

Retail has witnessed a modest rises in wages over the last five years which has been as a result of a higher proportion of persons employed as casual and part-time. This is because of increased operation hours and the perception that retailers should be open on Sundays.

As a result forecast average employee wages per staff in 2015-16 is expected to be approximately $18,788 per annum (retail shops) and

$28,348 per annum (restaurant workers)[18]. Based on this annual wage per staff the combined worker salary is estimated to be approximately $1.2m.

Commercial Employees

HillPDA has not been provided with indicative tenants for the commercial component of the proposed development and has assumed that it would be comprised of Business Services[19]. IBIS World Industry Report 2011 forecast average employee wages per staff in 2015-16 is expected to be approximately $77,295 per annum. Based on this annual wage per staff the combined worker salary is estimated to be approximately $38m.

Table 9 - Estimated Salary Contribution

Land Use	Number of Workers	Average Annual Salary	Total Salary
Retail Restaurant	17	$28,347	$481,915
Retail Consumer Goods	38	$18,787	$713,938
Commercial	491	$77,294	$37,951,783
Total	**546**		**$39,147,636**

Sources:
IBIS World Industry Reports; and
ABS Average Weekly Earnings (Cat 6302).

Total salaries of workers on the site is estimated at around $39.1m. Hence development will increase total salaries by around $20.8m every year. HillPDA would expect that a high proportion of the employees would live within a 30 minute radii of the development and thus a significant proportion of this salary would be reinvested into Chatswood.

[18] BIS Consumer Goods Retail in Australia July 2011, Restaurants in Australia August 2011 - 7% inflation has been factored
[19] This category consists of engineering and design services, scientific services, information technology services, marketing services, legal and accounting services, employment services and a range of administrative support services.

Retail Expenditure

Expenditure from Residents

Retail expenditure generated by residents on site would total $6.5m based on an average of 2.1persons[20] per apartment by 201 apartments and an average spend of $15,400 per capita[21]. Given the retail offer within Chatswood a large proportion of this would be captured within the centre.

Expenditure from Workers

A recent survey conducted by URBIS found that Sydney CBD workers spend an average of $200 a week or $9,200 per annum (based on 46 working weeks) on retail goods and services in the CBD. For centres outside of the CBD average spend is considerably lower due to the lack of retail offer. Chatswood contains a wide range of retail offering from food, bulky goods, department stores and mini majors etc.

For the purpose of the assessment HillPDA has applied a more conservative weekly expenditure of $100 per employee per week for the commercial workers on site and $15 for the retail workers.

As seen in Table 10 the combined total retail spend for the commercial, retail and working resident's component of the Subject Site is an estimated $8.8m and increase of $7.4m. The bulk of this would be captured by retailers in Chatswood.

Table 10 - Estimated Retail Spend of Employees

Expenditure Source	Number of workers	Weekly Retail Spend	Total Retail Spend (per year)
Commercial Workers	513	100	$2,359,800
Retail Workers	65	15	$44,850
Resident Workers	15		$6,500,340
Total	**578**		**$8,796,890**

Source: HillPDA

[20] ABS Census 2011 for Willoughby LGA
[21] Average spend by residents in Waverley LGA (Marketinfo 2012) in $2014.

Industry Value Add of Proposal

Value add of an industry refers to the value of outputs less the costs of inputs. It measures the contribution that the industry makes to the country's wealth or gross domestic product (GDP).

Table 11 - Estimated Industry Value Add of Proposal

Expenditure Source	Number of workers	IVA/Worker	Total IVA ($m)
Commercial Workers	491	79,538	39.1
Retail	38	56,000	2.1
Retail Restaurant	17	99,374	1.7
Home Based Work	15	74,400	1.1
Total	**561**		**44.0**

Source: IBIS World Industry Reports and Hill PDA, assumed impact year of 2015/16

As shown in the above table the proposed development would contribute $44m every year. This is an increase of $20.2m from the base case.

Other Economic Benefits

Street Activation

The development of a mixed use development comprising uses such as accommodation, commercial, retail and residential located on the subject site would create increased pedestrian traffic having the effect of activating the local area which is currently lacking. This street activation would have the benefits of increasing security, increasing trade for retailers through increased passing trade and increase investment within the local area.

Investment Stimulus

Where a significant property investment decision has been made it is generally viewed as a strong positive commitment for the local area. Such an investment can in turn stimulate and attract further investment. The direct investment in the Subject Site would support a wide range of economic multipliers as outlined above which would in turn support investment in associated industries. It would also raise the profile of Chatswood to potential investors.

The provision of high density residential development on the Subject Site would increase the economic benefits of the scheme to surrounding businesses, services and the financial feasibility of public transport. The benefits of residential uses in Willoughby LGA are recognised in planning policy. Additional short term residents within the hotel proportion would create further demand for retail, commercial and transport services increasing the viability of these services.

The proposed development would create additional business opportunities in this locality associated with future residents and the commercial and retail uses on site. It would increase the profile of this area and in so doing increase the financial feasibility of mixed use development, potentially acting as a catalyst on surrounding sites. From an economic perspective this is a good outcome given that it maximises the potential of this edge-of-centre site and creates a greater economic benefit from it.

Replacing Old with New

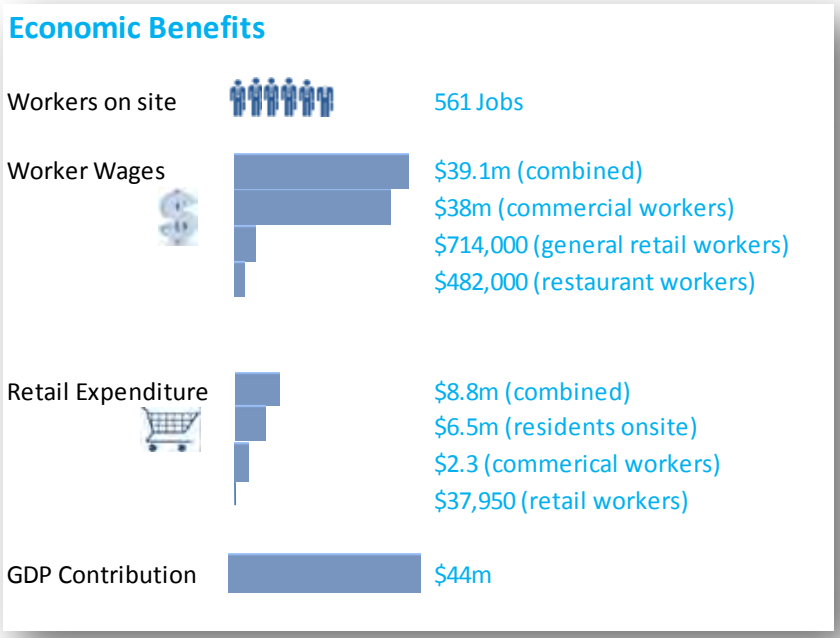
The redevelopment of the Subject Site would replace an existing commercial B grade office building that is reaching the end of its functional economic life with a modern mixed use development that increases the net volume of commercial A grade office floorspace within Chatswood CBD. This commercial A grade office floorspace would be more attractive to potential tenants while increasing worker densities through increased efficiencies.

The inclusion of the residential component is required to ensure that the development is financially feasible. An A-grade office building at any density is not viable on the subject site. The residential component is required to cross-subsidise the commercial space.

Economic Contribution of Proposed Development Summary

The figure below summarises the economic contribution the proposed development would contribute to the local and wider economy.

Figure 5- Summary of Economic Contribution of the Proposed Development



Source: HillPDA

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Report Details

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4. This report and its attached appendices are based on estimates, assumptions and information provided by the Client or sourced and referenced from external sources by Hill PDA. While we endeavour to check these estimates, assumptions and information, no warranty is given in relation to their reliability, feasibility, accuracy or reasonableness. Hill PDA presents these estimates and assumptions as a basis for the Client's interpretation and analysis. With respect to forecasts, Hill PDA does not present them as results that will actually be achieved. Hill PDA relies upon the interpretation of the Client to judge for itself the likelihood of whether these projections can be achieved or not.
5. Due care has been taken to prepare the attached financial models from available information at the time of writing, however no responsibility can be or is accepted for errors or inaccuracies that may have occurred either with the programming or the resultant financial projections and their assumptions.
6. This report does not constitute a valuation of any property or interest in property. In preparing this report Hill PDA has relied upon information concerning the subject property and/or proposed development provided by the Client and Hill PDA has not independently verified this information except where noted in this report.
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   This valuation is prepared on the assumption that the lender or addressee as referred to in this valuation report (and no other) may rely on the valuation for mortgage finance purposes and the lender has complied with its own lending guidelines as well as prudent finance industry lending practices, and has considered all prudent aspects of credit risk for any potential borrower, including the borrower's ability to service and repay any mortgage loan. Further, the valuation is prepared on the assumption that the lender is providing mortgage financing at a conservative and prudent loan to value ratio.

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Attachment 3: Shadow Diagrams prepared by Project Surveyors (July 2014)

9am

1

Solar Study taken on 21st June 2014

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Proposed Building at 130m (RL232.8) No. 815 Pacific Highway, Chatswood

Solar Study 9am

Project number	B1681_03
Date	30/07/2014
Drawn by	AJ
Surveyed by	SD

B1681_03-01

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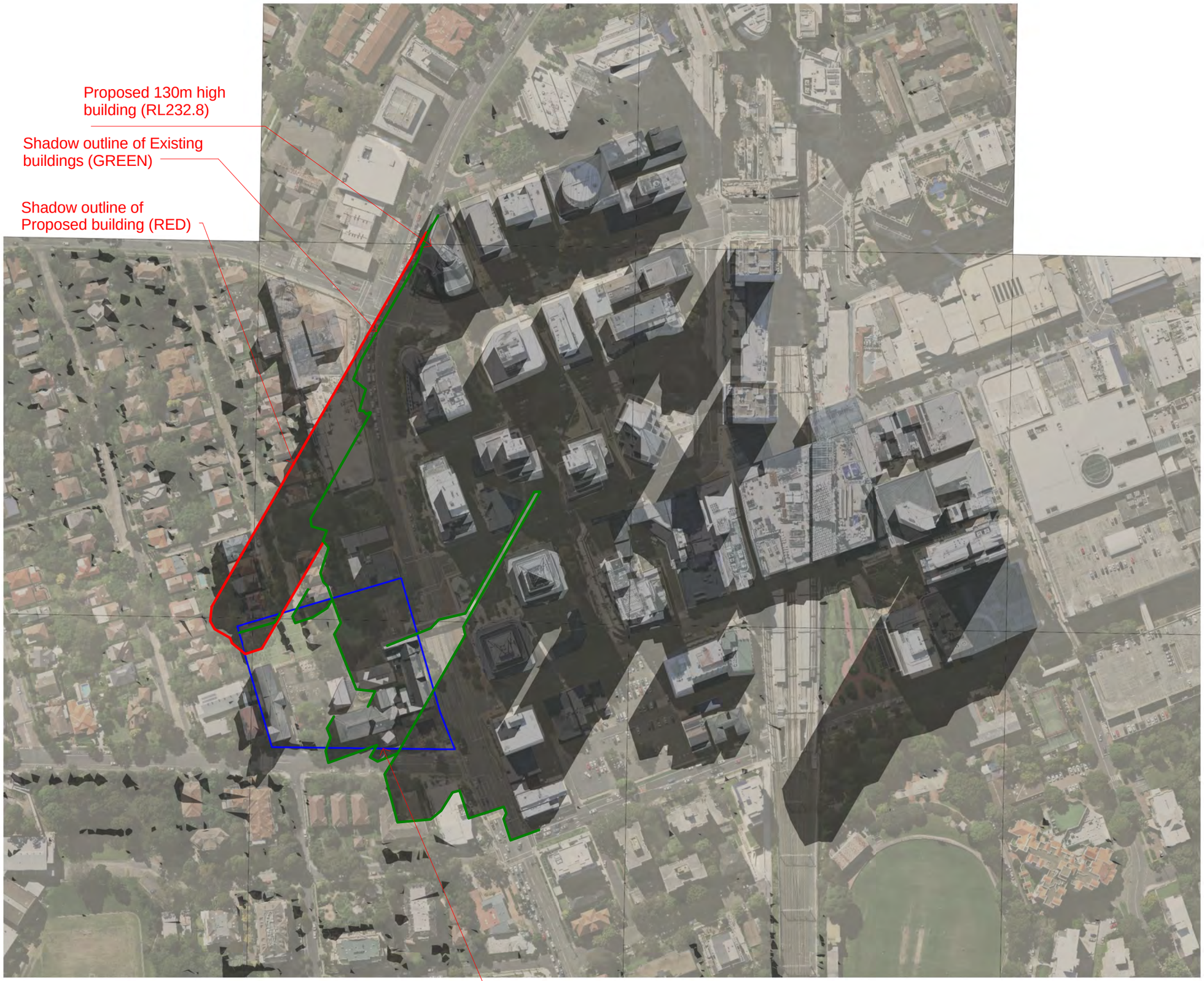

10am

1

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Proposed Building at 130m (RL232.8) No. 815 Pacific Highway, Chatswood

Solar Study 10am

Project number	B1681_03
Date	30/07/2014
Drawn by	AJ
Surveyed by	SD

B1681_03-02

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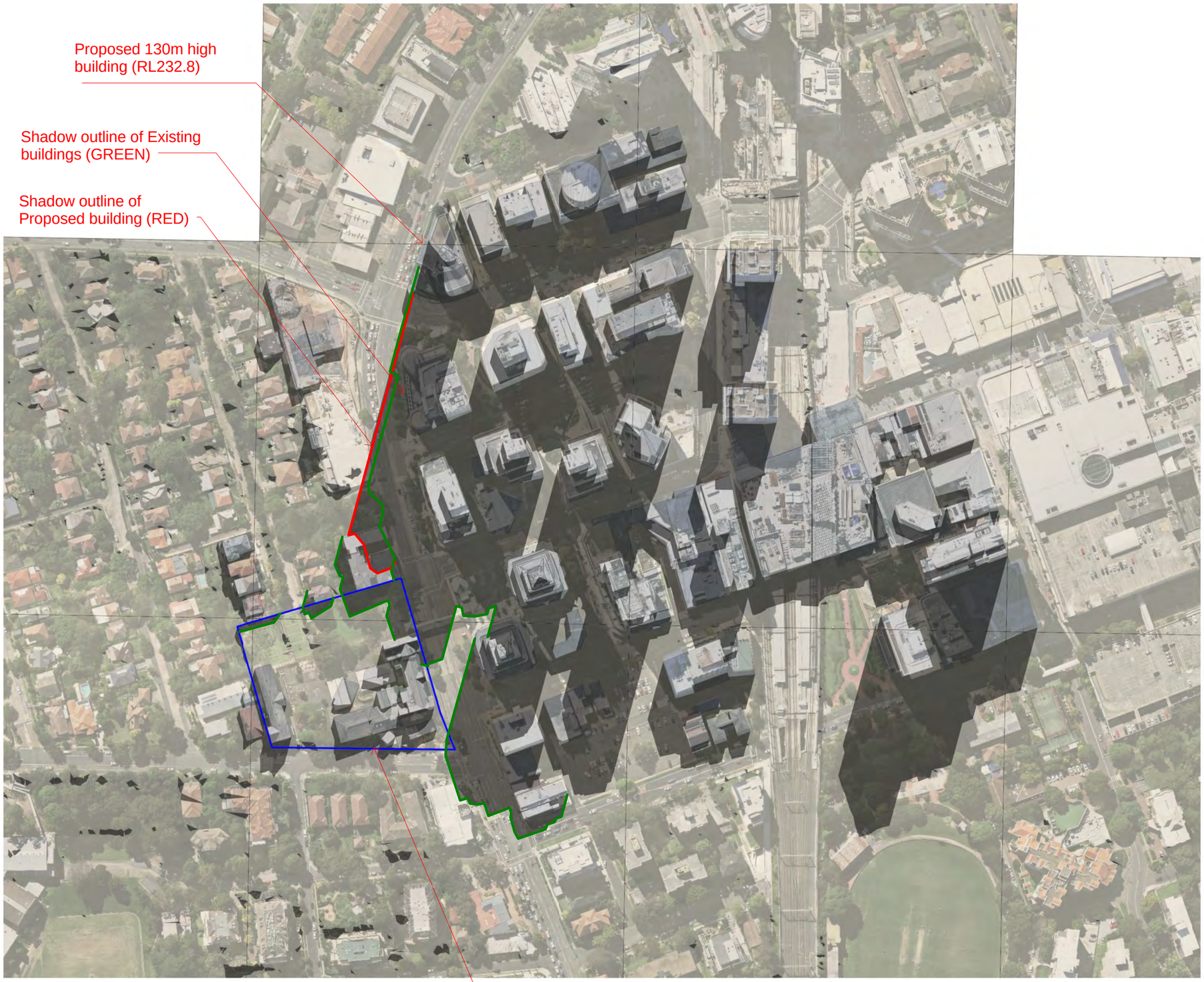

11am

1

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Proposed Building at 130m (RL232.8) No. 815 Pacific Highway, Chatswood

Solar Study 11am

Project number	B1681_03
Date	30/07/2014
Drawn by	AJ
Surveyed by	SD

B1681_03-03

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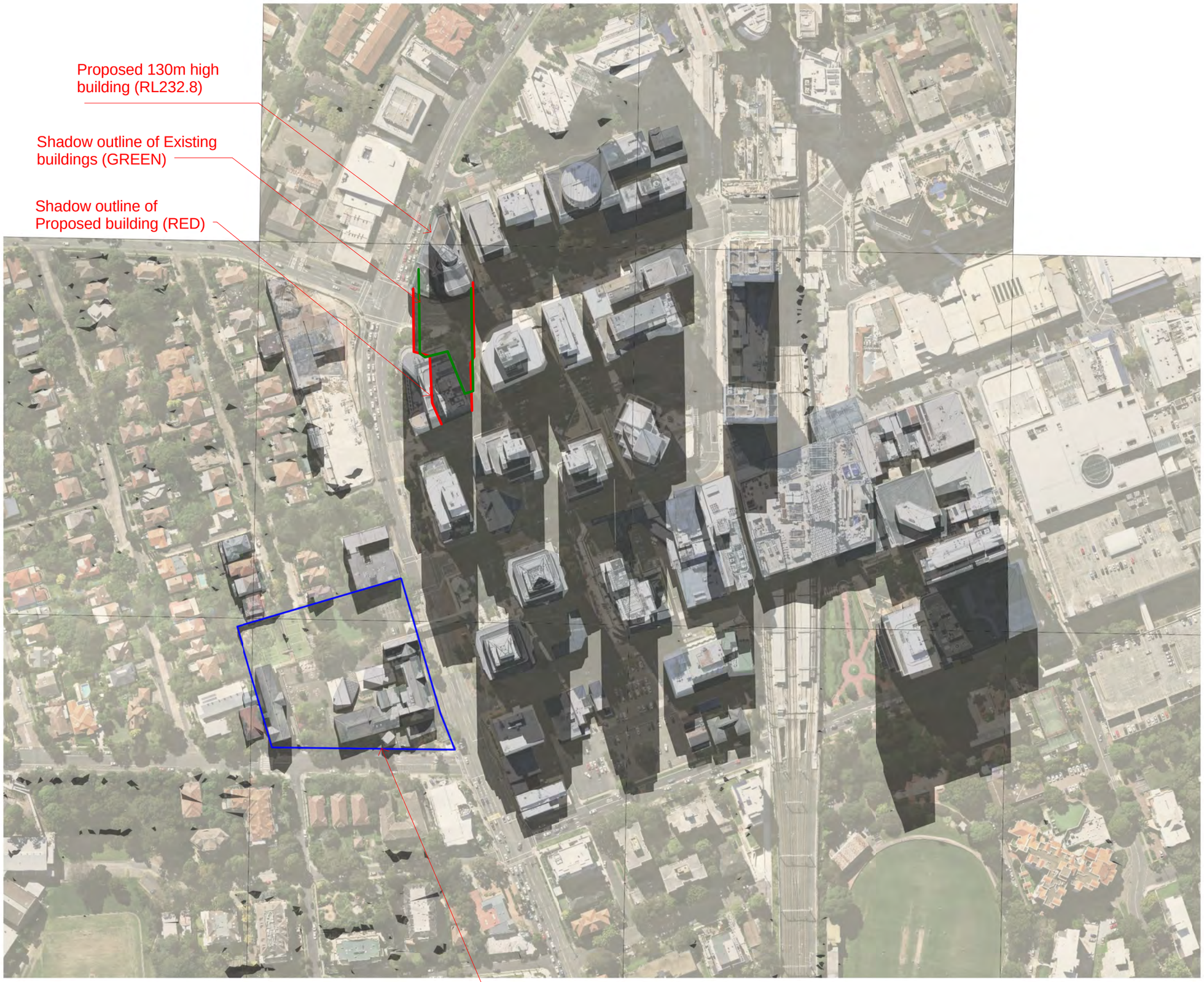

1 **12pm**

Solar Study taken on 21st June 2014

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Proposed Building at 130m (RL232.8) No. 815 Pacific Highway, Chatswood

Solar Study 12pm

Project number	B1681_03
Date	30/07/2014
Drawn by	AJ
Surveyed by	SD

B1681_03-04

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1 **1pm**

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Proposed Building at 130m (RL232.8) No. 815 Pacific Highway, Chatswood

Solar Study 1pm

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Date	30/07/2014
Drawn by	AJ
Surveyed by	SD

B1681_03-05

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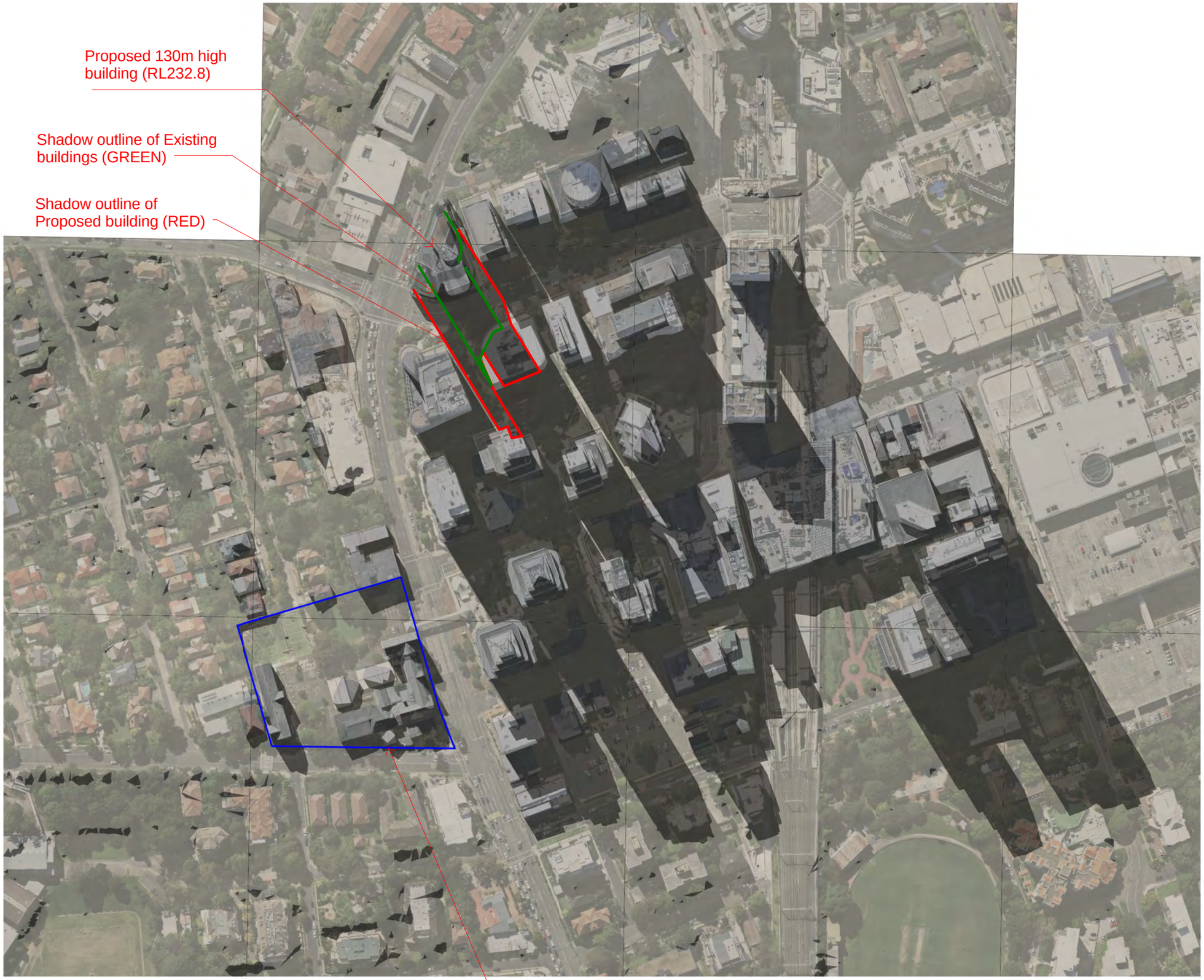

1 **2pm**

Solar Study taken on 21st June 2014

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Proposed Building at 130m (RL232.8) No. 815 Pacific Highway, Chatswood

Solar Study 2pm

Project number	B1681_03
Date	30/07/2014
Drawn by	AJ
Surveyed by	SD

B1681_03-06

Sheet	A3
Scale	1:2500

1 **3pm**

Solar Study taken on 21st June 2014

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Proposed Building at 130m (RL232.8) No. 815 Pacific Highway, Chatswood

Solar Study 3pm

Project number	B1681_03
Date	30/07/2014
Drawn by	AJ
Surveyed by	SD

B1681_03-07

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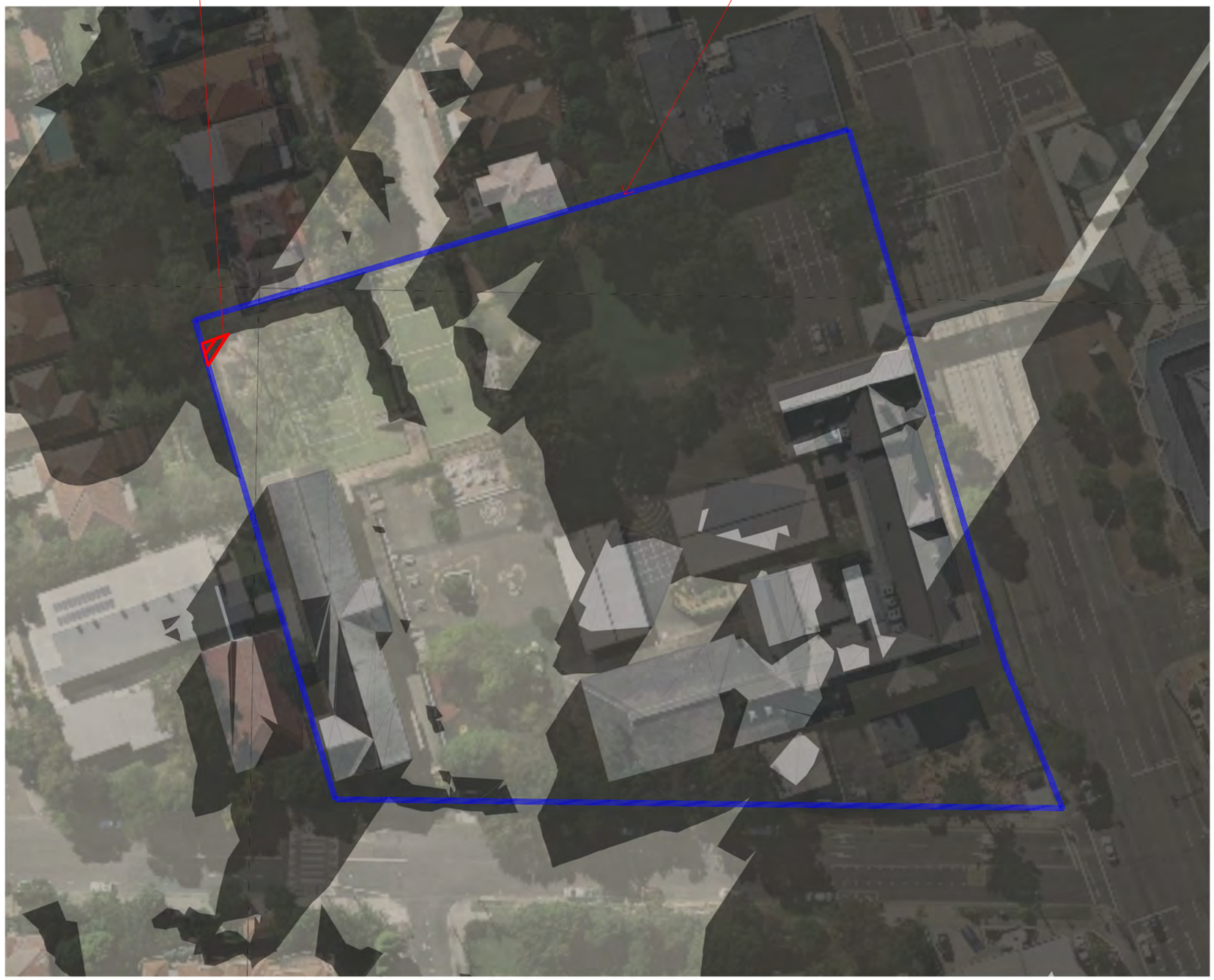

1 **9.45am**

Solar Study taken on 21st June 2014

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Proposed Building at 130m (RL232.8) No. 815 Pacific Highway, Chatswood

Solar Study 9.45am

Project number	B1681_03
Date	30/07/2014
Drawn by	Author
Surveyed by	Checker

B1681_03-08

Sheet	A3
Scale	1:750

1 **10.00am**

Solar Study taken on 21st June 2014

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Proposed Building at 130m (RL232.8) No. 815 Pacific Highway, Chatswood

Solar Study - 10.00am

Project number	B1681_03
Date	30/07/2014
Drawn by	Author
Surveyed by	Checker

B1681_03-09

Sheet	A3
Scale	1:750

Additional Shadow on school from Proposed building.

School Boundary

1 **10.15am**

Solar Study taken on 21st June 2014

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Proposed Building at 130m (RL232.8) No. 815 Pacific Highway, Chatswood

Solar Study - 10.15am

Project number	B1681_03
Date	30/07/2014
Drawn by	Author
Surveyed by	Checker

B1681_03-10

Sheet	A3
Scale	1:750

Additional Shadow on school from Proposed building.

School Boundary

1 **10.30am**

Solar Study taken on 21st June 2014

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Proposed Building at 130m (RL232.8)
No. 815 Pacific Highway, Chatswood

Solar Study - 10.30am

Project number	B1681_03
Date	30/07/2014
Drawn by	Author
Surveyed by	Checker

B1681_03-11

Sheet	A3
Scale	1:750

Attachment 4: Transport Impact Assessment prepared by GTA Consultants (September 2014)

815 Pacific Highway
Chatswood
Planning Proposal
Transport Impact Assessment

transportation planning, design and delivery

1451363000 15/09/14

GTAconsultants

815 Pacific Highway, Chatswood

Planning Proposal

Transport Impact Assessment

Issue: A 15/09/14

Client: Linfield Developments Pty Ltd
Reference: 14S1363000
GTA Consultants Office: NSW

Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
A	15/09/14	Final	Ashish Modessa	Jason Rudd	Jason Rudd	

GTAconsultants
MELBOURNE - SYDNEY - BRISBANE - CANBERRA
ADELAIDE - GOLD COAST - TOWNSVILLE
www.gta.com.au

Table of Contents

1. Introduction

1.1 Background

GTA Consultants (GTA) has been engaged by Linfield Pty Ltd to undertake a traffic and transport assessment of a planning proposal is to be lodged with Willoughby City Council for the site at 815 Pacific Highway, Chatswood.

The planning proposal intends to demolish the existing 13 storey commercial building on the site to constructed a new mixed use building with residential, commercial and retail uses with associated car parking and servicing facilities.

1.2 Purpose of this Report

This report sets out the finding of GTA's assessment of the anticipated transport implications of the planning proposal, including consideration of the following:

i existing traffic and parking conditions surrounding the site
ii suitability of the proposed parking in terms of supply (quantum)
iii service vehicle requirements
iv pedestrian and bicycle requirements
v the traffic generating characteristics of the proposed development
vi the transport impact of the development proposal on the surrounding road network.

1.3 References

In preparing this report, reference has been made to the following:

- inspections of the site and its surrounds
- Willoughby City Council Development Control Plan (DCP) 2006
- Australian Standard/ New Zealand Standard, Parking Facilities, Part 1: Off-Street Car Parking AS/NZS 2890.1:2004
- Australian Standard, Parking Facilities, Part 2: Off-Street Commercial Vehicle Facilities AS 2890.2:2002
- Australian Standard / New Zealand Standard, Parking Facilities, Part 6: Off-Street Parking for People with Disabilities AS/NZS 2890.6:2009
- traffic surveys as referenced in the context of this report
- plans for the proposed development prepared by FJMT Architects
- other documents and data as referenced in this report.

2. Existing Conditions

2.1 Subject Site

The subject site is located at 815 Pacific Highway, Chatswood on the corner of Help Street and Pacific Highway. The site is currently occupied by a 13-level commercial building with retail on the ground floor.

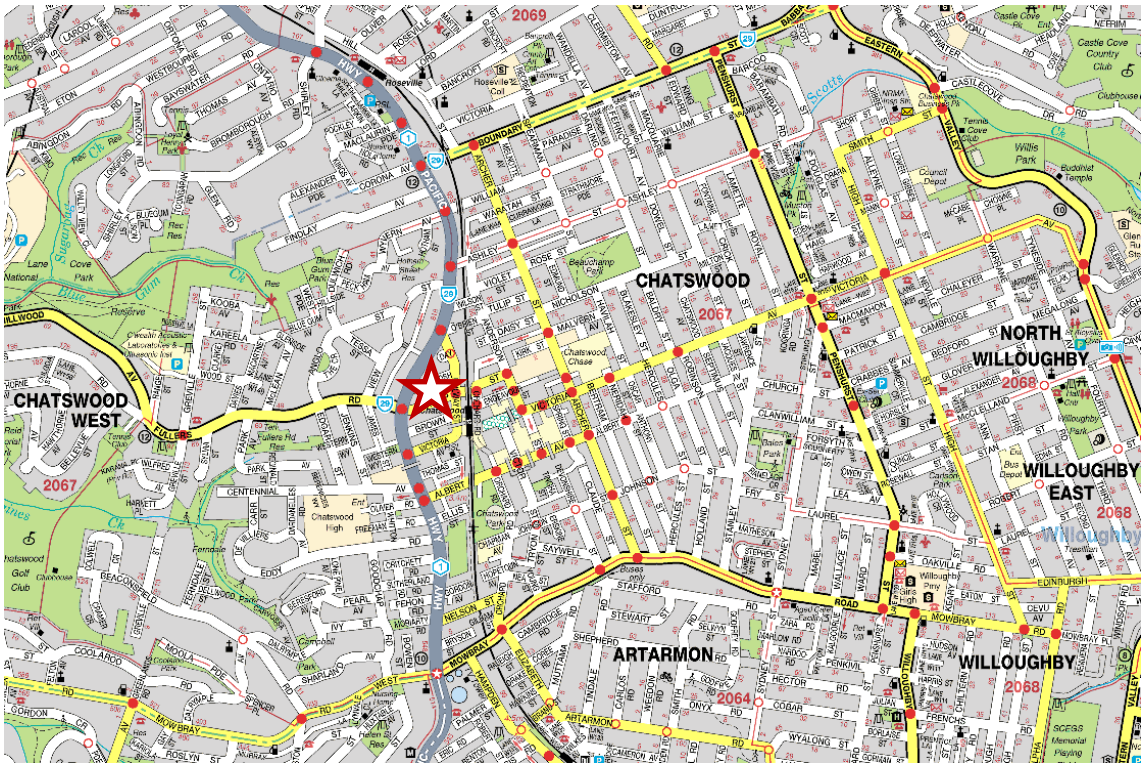
The triangular shaped site has a site area of approximately 1,650m^2 with frontages to the Pacific Highway (approx. 65 metre) and to Help Street (approx. 50 metres).

The site is located within Chatswood CBD with surrounding properties predominantly including commercial and recently constructed (or under construction) residential dominated mixed-use developments.

It is understood that neither the commercial floor area nor ground floor retail area within the building are fully occupied.

The location of the subject site and its surrounding environs is shown in Figure 2.1.

Figure 2.1: Subject Site and Its Environs



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2.2 Road Network

2.2.1 Pacific Highway

Pacific Highway is classified as a State Road (RMS Road No. 1) and is aligned in a north-south direction. It is a two-way road configured with a 6-lane, 21-metre wide carriageway, set within an

approximately 25-metre wide road reserve. At the site the Pacific Highway carries in the order of 52,000 vehicles per day[1] which is consistent with the highway's arterial road function.

Kerbside parking is not permitted along Pacific Highway in the vicinity of the site.

The Pacific Highway at the site is shown in Figure 2.2 and Figure 2.3.

Figure 2.2: Pacific Highway (looking north)

Figure 2.3: Pacific Highway (looking south)

2.2.2 Fullers Road

Fullers Road is classified as a State Road (RMS Road No. 191) and is aligned in an east-west direction. It is a two-way road configured with a 3-lane, 12-metre wide carriageway, set within an approximately 20metre wide road reserve.

Kerbside parking is not permitted along Fullers Road.

Fullers Road is shown in Figure 2.4 and carries approximately 26,000 vehicles per day[1]. This is consistent with its function in the surrounding road network and reflects its importance as a key east – west road link between Chatswood and the Macquarie Park area and M2 Motorway.

2.2.3 Help Street

Help Street is classified as a Local Road and is aligned in an east-west direction. It is a two-way road configured with a 2-lane, plus parking lanes in each direction, 12-metre wide carriageway, set within an approximately 19-metre wide road reserve.

Kerbside parking is permitted subject to 1-hour time restrictions and outside of weekday clearway times, eastbound between 6:30am and 9:30am and westbound between 3:30pm and 6:30pm.

Help Street is shown in Figure 2.5 and carries approximately 9,000 vehicles per day[1]. These daily volumes indicate that Help Street is very much a local link road to and from the Chatswood CBD.

2.2.4 Surrounding Intersections

Key intersections in the vicinity of the site include:

- Pacific Highway/ Fullers Road/ Help Street (signalised)
- Railway Street/ Help Street (signalised)

1 Based on the peak hour traffic counts undertaken by Austraffic Traffic Data on Tuesday 13 May 2014 and assuming a peak-to-daily ratio of 8% for arterial roads and 10% for local roads.

- Pacific Highway / McIntosh Street (priority controlled – left in / left out only at the Highway)

Figure 2.4: Fullers Road (looking west)

Figure 2.5: Help Street (looking east)

2.3 Existing On Site Car Parking and Service Vehicle Arrangements

The existing on site building is serviced by two basement levels of car parking providing 96 car parking spaces. These spaces are allocated to the commercial tenants and are security controlled.

At grade car parking for vehicles is available for the retail uses. These at grade spaces are located adjacent to the service vehicle / loading area which currently occurs in an informal arrangement whereby retail customer vehicles interact with service vehicles in the same at grade area.

The basement parking area has a headroom constraint of 2.0 metres and the at grade parking / loading area a headroom of 2.3 metres. As such the majority of waste collection and servicing currently occurs on street.

The basement parking and at grade parking / service vehicle areas are accessed via separate driveways at Help Street. However these accesses are located adjacent to each other such that the total effective width of the driveway across the footpath is 14 metres. As such pedestrians are currently required to cross 4 vehicle movement paths over a width of 14 metres without refuge.

Full turning movements are permitted to and from the various driveways via Help Street.

Reviews of car parking occupancy, within the current site basement car park around midday indicates that of the 96 spaces available, 75% to 80% were occupied. This is s a reflection upon the current vacancies within the site.

2.4 Existing Traffic Flows

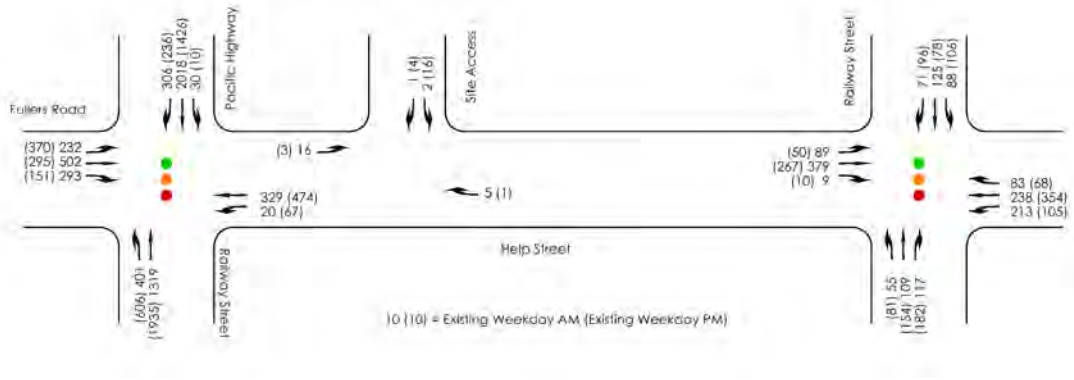
On Tuesday 13 May 2014, traffic movement counts were undertaken at the Help Street intersections with Pacific Highway and Railway Street during the following peak periods:

- 7:30am and 9:30am
- 4:30pm and 6:30pm.

In addition, traffic movement counts were undertaken of existing movements at the subject site access driveway during the peak periods. This was undertaken to obtain an understanding of the current traffic generated by the site.

The overall network peak hours started at 7:30am and 5:00pm during the morning and afternoon peak periods respectively. The traffic volumes during the peak hours, including at the current site access are summarised in Figure 2.6, with full results contained in Appendix A of this report.

Figure 2.6: Existing AM / PM Peak Hour Traffic Volumes



Traffic generated (two-way) by the current site during the morning and after peak periods include:

- 52 vehicles between 7:30am and 9:30am, 28 vehicles in the site peak hour (started at 8:30am)
- 47 vehicles between 5:00pm and 7:00pm, 32 vehicles in the site peak hour (started at 5:30pm).

Based on the surveys it is determined that the current commercial floor space within the building generates the following peak period traffic flows:

- AM Peak : 0.37 vehicle trips / parking space
- PM Peak : 0.43 vehicle trips / parking space.

2.5 Intersection Operation

The operation of the key intersections within the study area have been assessed using SIDRA INTERSECTION[2], a computer based modelling package which calculates intersection performance.

The commonly used measure of intersection performance, as defined by the Roads and Maritime Services, is vehicle delay. SIDRA INTERSECTION determines the average delay that vehicles encounter and provides a measure of the level of service.

Table 2.1 shows the criteria that SIDRA INTERSECTION adopts in assessing the level of service.

[2] Program used under license from Akcelik & Associates Pty Ltd.

Table 2.1: SIDRA INTERSECTION Level of Service Criteria

Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Table 2.2 presents a summary of the existing operation of the intersection, with full results presented in Appendix B of this report.

Table 2.2: Existing Operating Conditions

Intersection	Peak	Leg	Degree of Saturation (DOS)	Average Delay (sec)	Level of Service (LOS)
Pacific Highway/ Fullers Road/ Help Street	AM	Pacific Highway (S)	0.98	31	C
		Help Street (E)	0.98	99	F
		Pacific Highway (N)	0.98	24	B
		Fullers Road (W)	0.91	62	E
		Overall	**0.98**	**38**	**C**
	PM	Pacific Highway (S)	1.08	70	E
		Help Street (E)	1.05	112	F
		Pacific Highway (N)	1.05	20	B
		Fullers Road (W)	1.07	74	F
		Overall	**1.08**	**60**	**E**
Railway Street/ Help Street	AM	Railway Street (S)	0.47	26	B
		Help Street (E)	0.28	6	A
		Railway Street (N)	0.35	21	B
		Help Street (W)	0.47	27	B
		Overall	**0.47**	**19**	**B**
	PM	Railway Street (S)	0.54	21	B
		Help Street (E)	0.33	10	A
		Railway Street (N)	0.36	18	B
		Help Street (W)	0.54	32	C
		Overall	**0.54**	**19**	**B**

On the basis of the above assessment, it is clear that the intersection of Railway Street/ Help Street currently operates well with minimal delays on all approaches.

The intersection of Pacific Highway/ Fullers Road/ Help Street experiences notable delays on all legs. The intersection is approaching capacity in the morning peak period and operating above capacity during the afternoon peak periods.

Observations of traffic conditions along Help Street indicate that during both peak periods, there is notable queuing westbound along Help Street towards Pacific Highway, typically extending past Railway Street. As such, the results of the assessment are in line with the observations.

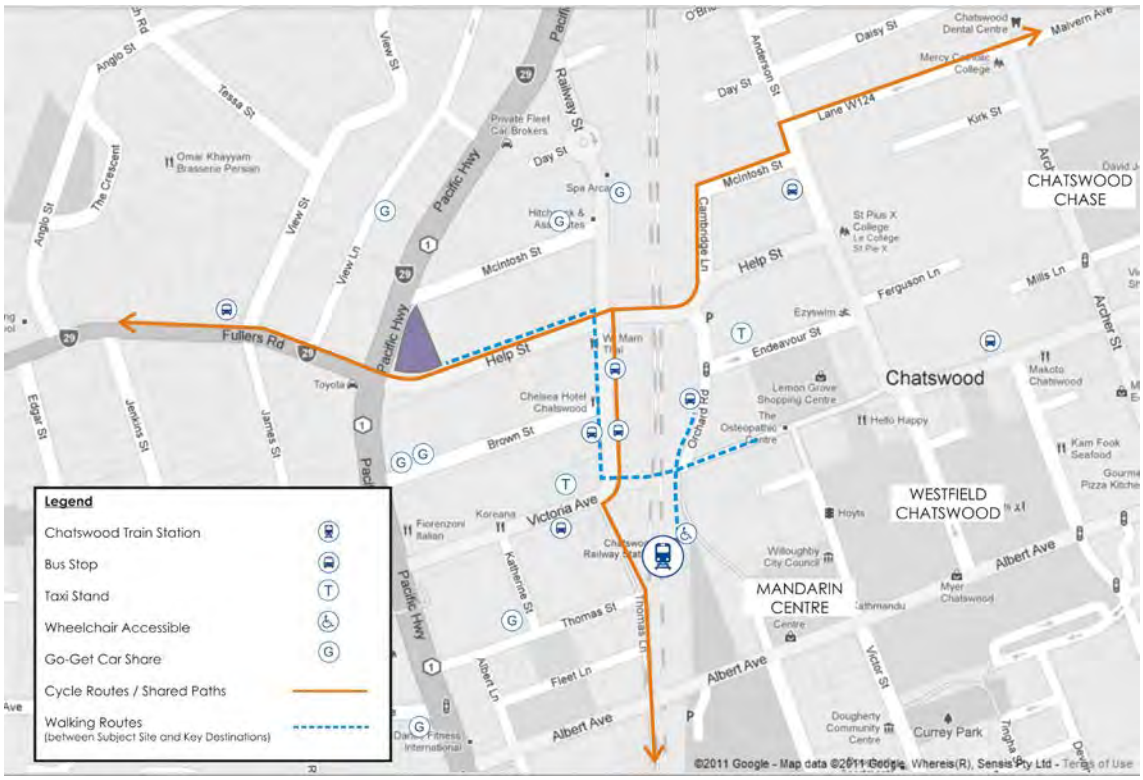
2.6 Pedestrian Infrastructure

Chatswood is a commercial and residential precinct; footpaths, plazas and walkways between buildings provide pedestrian coverage for the area. The whole of the Chatswood CBD is signed and marked as a 40km/h High Pedestrian Activity Area.

Footpaths surrounding the site are wide, good pedestrian access between the side and the Chatswood Transport Interchange (CTI) and the Chatswood retail / CBD precinct.

Figure 2.7 presents an overview of the transport options available and key attractors in the vicinity of the site.

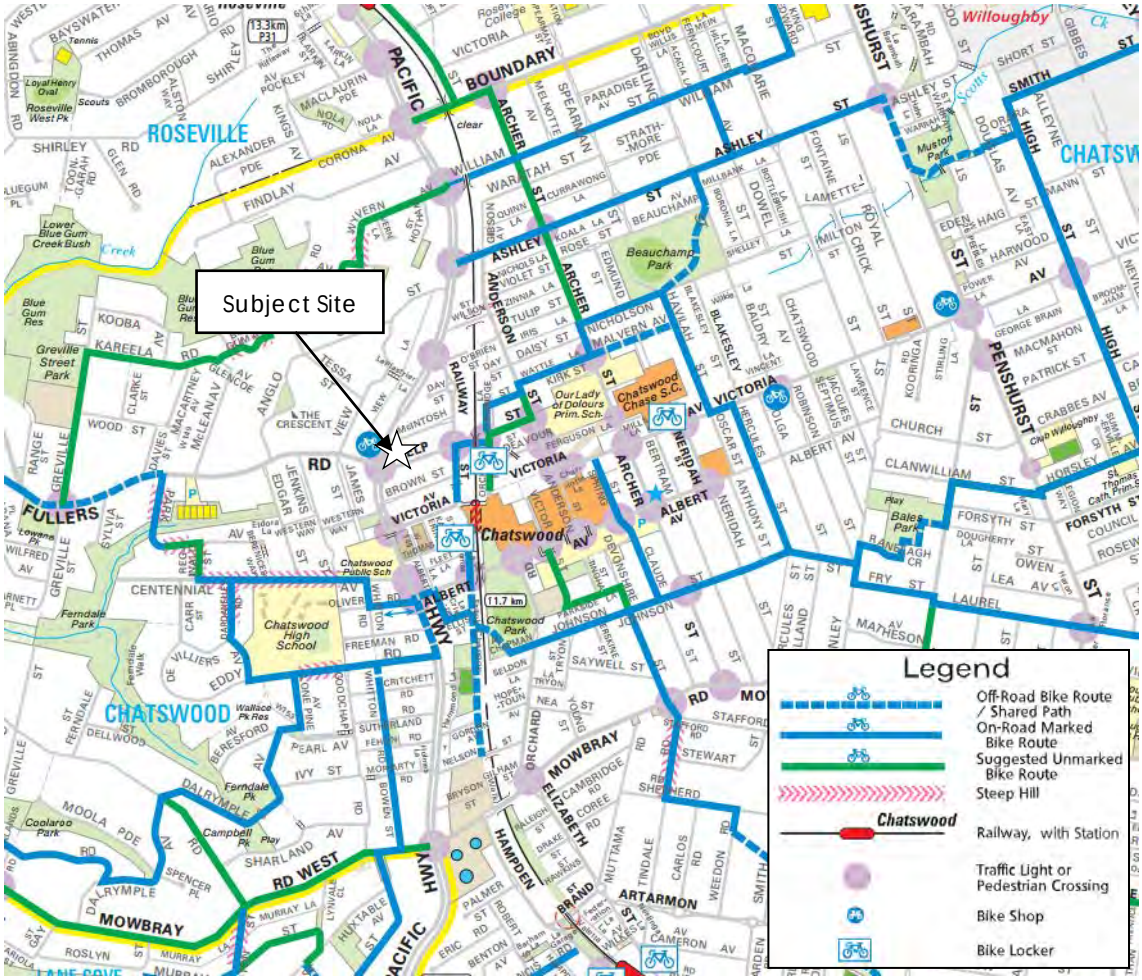
Figure 2.7: Transport Options Surrounding the Subject Site



2.7 Bicycle Infrastructure

The subject site is located close to several established cycle routes. An extract of the Northern Sydney Cycling Map showing cycling infrastructure surrounding the subject site is shown in Figure 2.8.

Figure 2.8: Cycle Infrastructure



Source: Northern Sydney Cycling Map

2.8 Rail Services

Chatswood Railway Station is located at approximately 400 metres (5 minute walk) from the subject site and forms part of the Chatswood Transport Interchange. Chatswood is considered a major node in the Sydney Trains network. The station is serviced by the Northern, Western and North Shore train lines (shown as 'T1' or yellow in Figure 2.9) that provide services to Sydney CBD via North Sydney, Hornsby via Gordon or Epping, Berowra via Gordon and Emu Plains and Richmond via Strathfield.

The rail journey time between Chatswood and Sydney CBD is approximately 20 minutes. A review of the rail service available from Chatswood Station is provided in Table 2.3.

Table 2.3: Chatswood Interchange Rail Services

Route	Route Description	Frequency On/Off peak
Northern Line	Hornsby or Epping to City via Chatswood	15 mins peak/ 15-30 mins off peak
North Shore Line	Berowra to City via Gordon	3-5 mins peak/ 5-10 mins off peak
Western Line	Emu Plains or Richmond to Chatswood via City	10-30 mins peak/ 15-30 mins off peak

Figure 2.9: Sydney Trains Network Map

2.9 Bus Services

Chatswood Transport Interchange also functions as one of the main bus interchanges in the northern suburbs of Sydney. Bus services available in the vicinity of the subject site are summarised in Table 2.4.

The Chatswood Transport Interchange bus stops are shown in Figure 2.10 and Figure 2.11.

Figure 2.10: Railway Parade stops (facing south)

Figure 2.11: Bus Interchange stop (facing north)

Table 2.4: Chatswood Interchange Bus Services

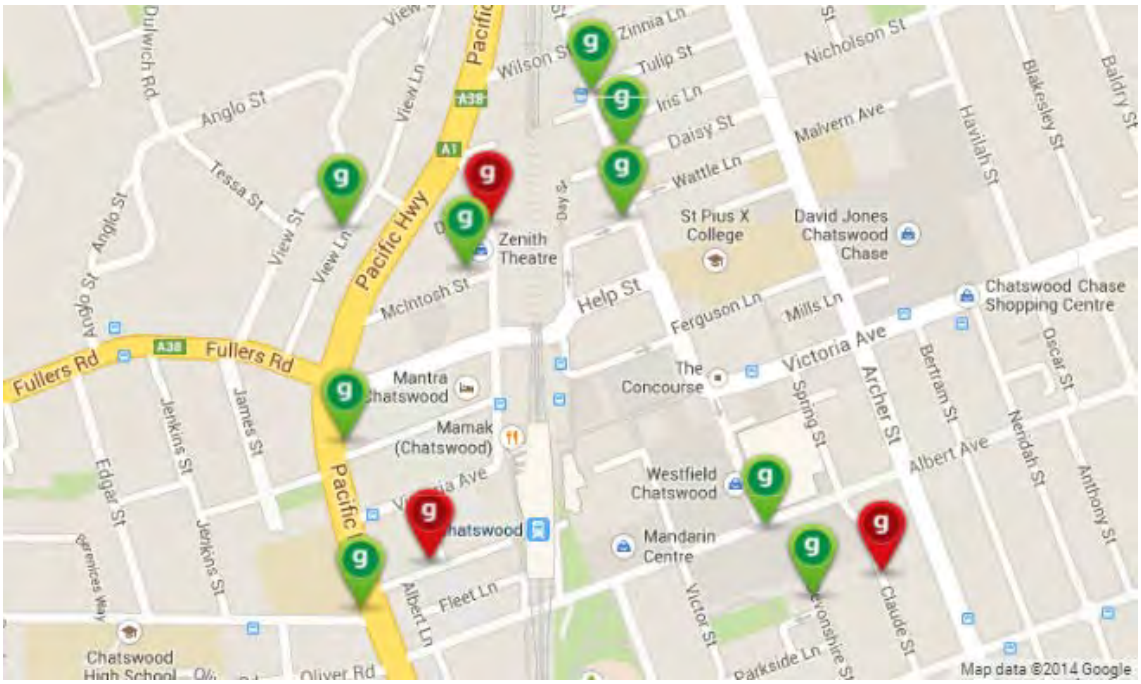
Route #	Route Description	Frequency On/Off peak
136/137	Chatswood to Manly, Dee Why & Mona Vale	15 mins peak/ 30 mins off peak
143/144	Chatswood to Manly	15 mins peak/ 15-20 mins off peak
200	Chatswood to Bondi Junction	15 mins, peak only
255/256	Chatswood to Chatswood West	30 mins, peak only
257/258	Chatswood to Balmoral/ Lane Cove Industrial	30 mins peak and off peak
267	Chatswood to Crows Nest	30 mins peak and off peak
273	Chatswood to City - Wynyard via Willoughby and North Sydney	10 mins peak/ 20-30 mins off peak
277/278/279	Chatswood to Castle Cove/ Killarney Heights/ Frenchs Forest	Hourly peak and off peak/ 20 mins peak only/ 3 services daily
280/281/283	Chatswood to Warringah Mall/ Davidson/ Belrose	15-30 mins peak/ hourly off peak
284	Chatswood to Duffys Forest via Frenchs Forest and Terrey Hills	10-30 mins peak/ hourly off-peak
533/534	Chatswood to Sydney Olympic Park via Mowbray Rd and Ryde	40 mins peak and off peak
536	Gladesville via Lane Cove and Hunters Hill	40 mins peak and off peak
545/550	Chatswood to Parramatta	15 mins peak and off peak
558	Chatswood to Lindfield	Hourly peak and off peak
565	Chatswood to Macquarie University via UTS Ku-ring-gai, Lindfield and West Lindfield	Hourly off peak
627	Chatswood to Castle Hill via Baulkham Hills, M2 Busway and Lane Cove	20 mins peak only (buses only operate to Chatswood in the morning, and to Castle Hill in evening)
M40	Chatswood to Bondi Junction	10 mins peak/ 15 mins off peak
N90	Hornsby to Town Hall via Chatswood	30 mins, night only

The site is also located within close proximity to taxi services with the nearest designated taxi rank located on Victoria Avenue, 350m walk south of the site.

2.10 Local Car Sharing Initiatives

Go-Get car share offer pods throughout Chatswood as shown in Figure 2.12, including seven pods west of the railway line (two on Brown Street) and in the vicinity of the subject site. The service aims to reduce the reliance on use of private motor vehicles. Memberships for the car share service are available for both personal and business use.

Figure 2.12: Go-Get Car Share Pods



Source: Go-Get, accessed 8 September 2014

3. Planning Proposal

3.1 Land Uses

The planning proposal for the site intends to demolish the existing building and construct a new podium and tower accommodating the following uses:

- Commercial floorspace
- Retail floorspace
- Restaurant
- Residential apartments
- Basement car parking to service the above uses
- On site loading dock to service the above uses.

The indicative development schedule is summarised in Table 3.1.

Table 3.1: Development Schedule

Use	Type	No./ Size	Mix
Residential	Studio	16 units	8%
	1 bedroom	49 units	24%
	2 bedroom or 2 bedroom plus study	104 units	52%
	3 bedroom	32 units	16%
	Total	**201 units**	**100%**
Commercial	Commercial	7,450m^2 GFA	
	Retail	785m^2 NLA	
	Restaurant	425m^2 NLA	

3.2 Vehicle Access

A single two-way vehicular driveway is proposed to Help Street, providing access to the basement car park and loading dock.

The location of the proposed driveway will essentially be located at the current driveway location, albeit with a reduced driveway width facilitated by the removal of the existing at grade parking / loading area access.

3.3 Car Parking and Loading Areas

The proposed development will provide in the order of 349 car parking spaces, 265 spaces for residents and visits and 84 spaces for commercial/ retail.

A loading dock (with a turntable) will be provided within the basement car park capable of accommodating one service vehicle (up to 8.8m medium rigid truck) at a time.

The suitability of the car parking and loading provisions are discussed in Section 4 of this report.

3.4 Bicycle Facilities

As this is a planning proposal the indicative layout plans do not contain details of bicycle facilities. Bicycle facilities will be covered in more detail during the Development Application stage.

The recommended bicycle facilities area is discussed in Section 4 of this report.

3.5 Pedestrian Facilities

Pedestrian access to the street front ground floor retail tenancies and commercial uses lobby area would be via either Pacific Highway or Help Street. A new pedestrian link between McIntosh Street and Help Street would provide access to the residential lobby area and other retail tenancies.

4. Parking and Loading Provisions

4.1 Car Parking

The car parking requirements for the proposed development were obtained from the Willoughby City Council's Development Control Plan 2006 Part C – General Development Guidelines.

Based on the preliminary yield schedule, Table 4.1 summarises the car parking requirements for the proposed development.

Table 4.1: DCP Car Parking Requirements

Land Use	Land Use	Size/ Quantity	DCP Parking Rate	DCP Parking Requirement
Residential (Shop Top Housing)	Studio	16 units	0.5 per unit	8 spaces
	1 bedroom	49 units	1 per unit	49 spaces
	2 bedroom	104 units	1 per unit	104 spaces
	3 bedroom	32 units	1 per unit	32 spaces
	Visitors	201 units	1 per 4 units	51 spaces
			Subtotal	**243 spaces**
Commercial Premises in Chatswood	Commercial	6,875m^2 NLA	1 per 200m^2	34 spaces
	Retail	785m^2 NLA	1 per 25m^2	31 spaces
	Restaurant	425m^2 NLA	1 per 75m^2	6 spaces
			Total	**314 spaces**

Note: where the parking spaces required is not a whole number, DCP 2006 states that the number of spaces required is to be rounded down to the nearest whole number.

[1] Based on assumption of 1 staff per 10 rooms.

Based on the DCP car parking requirements, the proposed development is required to provide 314 car parking spaces.

The development proposes a total of 349 car parking spaces and therefore exceeds the Willoughby City Council's car parking requirements.

4.2 Accessible Parking

DCP 2006 provides requirements to the number of adaptable dwellings a development must provide as well as the number of accessible/ adaptable parking spaces to be provided.

In regards to the number of adaptable units required, the DCP indicates for a development greater than 3 storeys, 50% of all dwellings are to be adaptable. An adaptable car space should be provided at one space per four dwellings and no more than one space per dwelling.

For other uses, accessible parking spaces are required to be provided at the greater of:

- 1 accessible spaces; or
- 3% of total car parking spaces.

Based on the DCP, the proposed development is required to provide 2-3 accessible and 25 adaptable car parking spaces. These requirements can be satisfactorily accommodated within the basement parking area of the proposed development.

4.3 Motorcycle Parking

DCP 2006 requires motorcycle parking to be provided at the rate of one space per 25 car parking spaces. Given the car parking provisions proposed, the planning proposal is required to provide 14 motorcycle parking spaces on-site.

4.4 Loading Facilities

The loading requirements for different development types are contained in DCP 2006, noting that residential developments in excess of 12 apartments are to provide for removalist trucks to park, load and unload on-site.

The proposed loading dock, including the provision of a turntable, is designed to cater for up to 8.8m service vehicles and allow them to enter and exit in a forward direction.

4.5 Bicycle Parking

DCP 2006 contains a guide to bicycle parking facilities for different types of developments as summarised in Table 4.2.

Table 4.2: DCP 2006 Bicycle Parking Guide

Description	Suggested Parking Rate		Size/ Quantity	Suggested Parking Provision	
	Bicycle Lockers	Bicycle Spaces		Bicycle Lockers	Bicycle Spaces
Residential	1 per 10 units	1 per 12 units	201 dwellings	20	17
Commercial	1 per 600m^2	1 per 2,500m^2	6,875m^2 NLA	12	3
Retail/ Restaurant	1 per 450m^2	1 per 150m^2	1,210m^2 NLA	3	8
			Total	35	28

Based on the above, DCP 2006 suggests that the planning proposal incorporate 35 bicycle lockers and 28 bicycle spaces.

4.6 Vehicle Access Arrangements

The proposed vehicle access to and from the basement parking and loading dock would continue to be provided via Help Street. It is noted that Help Street is considered to be the only practical frontage from which to provide vehicle access.

The location of the proposed vehicle access is set back on Help Street from the intersection with the Pacific Highway.

The proposed driveway arrangements represent a significant improvement to the existing arrangements due to the reduced width of the driveway and the associated pedestrian crossing of the driveway. The driveway design with compliant grades and sight lines will also significantly improve the vehicle / pedestrian interaction at the driveway compared with the existing conditions.

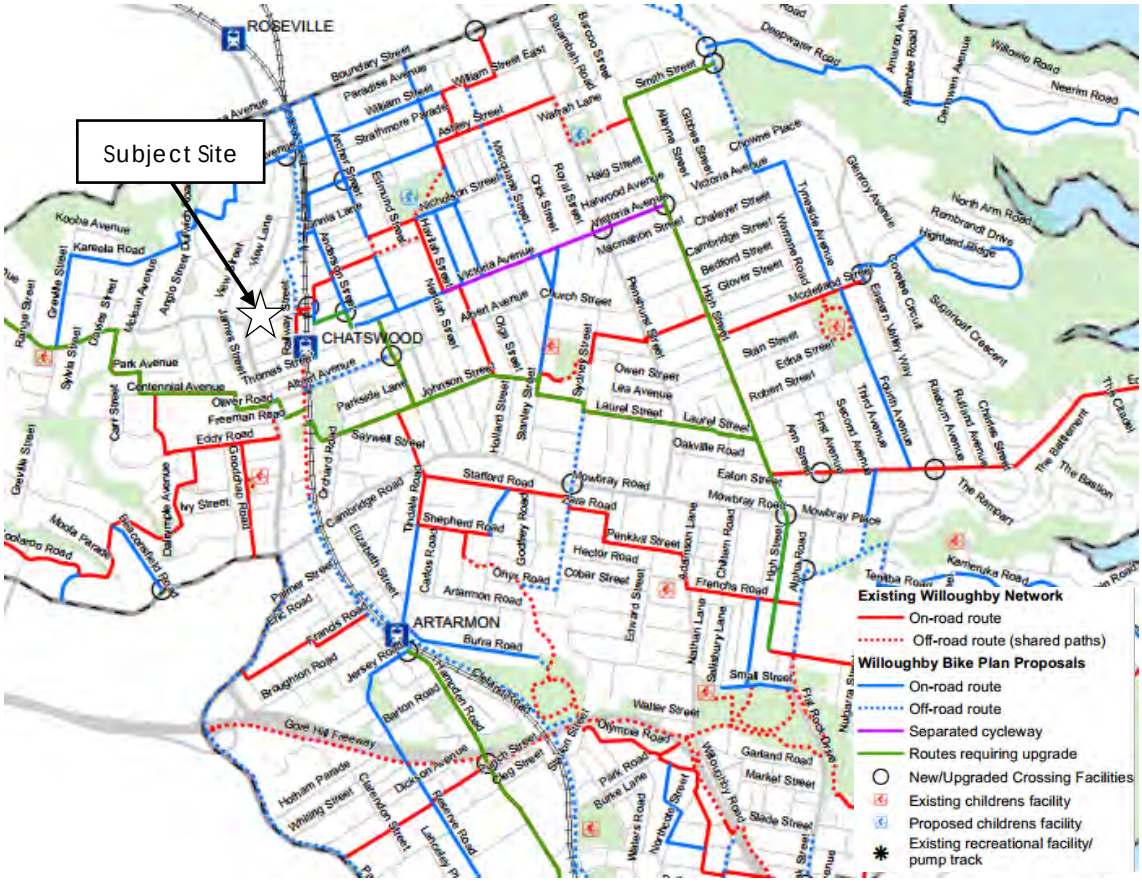
5. Sustainable Transport Infrastructure

This chapter discusses potential for further measures that could encourage alternative means of travel to the private car and encourage the use of more environmentally sustainable forms of travel.

5.1 Cycle Network

Willoughby Bike Plan (2012) proposed new cycle routes to be implemented in Willoughby LGA. These proposed cycle routes will improve cycling accessibility in and around Chatswood CBD and are shown in Figure 5.1.

Figure 5.1: Willoughby Bike Plan Proposed Cycle Routes



Source: Willoughby Bike Plan (2012)

5.2 Bicycle End of Trip Facilities

DCP 2006 contains general requirements for bicycle parking as follows:

i enable wheels and frame to be locked to the device without damaging the bicycle
ii be placed in public view and well lit for security purposes
iii be in a convenient and accessible location outside pedestrian and vehicular movement paths
iv be protected from the weather.

DCP 2006 requires that the design of bicycle parking facilities be in accordance with AS2890.3. It is anticipated that shower and change facilities will be provided within individual commercial tenancies.

Bicycle lockers are intended for use by residents and therefore should be included within the secure areas of the building noting that where security devices are provided for resident car parking, these are acceptable and can replace bike lockers. Bicycle rails are intended for use by visitors/ employees and as such need to be located in publicly accessible areas within close proximity to the site.

5.3 Pedestrian Network

The site is located within a well-connected pedestrian network that provides access to key destinations within Chatswood such as Chatswood Transport Interchange and the retail precinct along Victoria Avenue. Pedestrian paths are provided on both sides of the roads and this area is predominantly a designated 40km/h high pedestrian activity area.

5.4 Public Transport

As discussed previously, the site is easily accessible by public transport with Chatswood Interchange located within 400m. The proximity to public transport will increase the use of public transport by residents and employees and discourage the use of private motor vehicles.

5.5 Local Car Sharing Initiatives

As discussed previously, Go-Get car share offer pods throughout Chatswood with the service aiming to reduce the reliance on use of private motor vehicles. Memberships for the car share service are available for both personal and business use.

6. Traffic Impact Assessment

6.1 Traffic Generation

Traffic generation estimates for the proposed development have been sourced from the RMS Guide to Traffic Generating Developments 2002 and the RMS Technical Direction 2013/04a.

Estimates of peak hour traffic generation resulting from the proposed development are set out in Table 6.1.

Table 6.1: Traffic Generation Estimates

Land Use	Size	Thursday AM		Thursday PM	
		Rate	Trips/ Hr	Rate	Trips/ Hr
Residential	201 units	0.14 trips per unit	28	0.12 trips per unit	24
Commercial	7,450m^2 GFA	0.37trips per parking space	12	0.43 trips per parking space	15
Retail	785m^2 NLA	0.96 trips 100m^2	8	2.66 trips 100m^2	21
Restaurant	425m^2 NLA	-	0	0.5 trips 100m^2	21
Total			48		81

[1] Commercial / Retail traffic generation based on survey of existing site uses.

Table 6.1 indicates that the site would potentially generate 48 vehicle movements in a weekday morning peak hour and 81 vehicle movements in a weekday afternoon peak hour. It is noted that the PM peak includes restaurant uses which, subject to the type of restaurant, is likely to occur later than the PM commuter peak period.

The peak period traffic generation of the proposed development is compared with the existing site uses assuming that the existing uses are fully occupied (see Table 6.2).

Table 6.2: Comparison of Existing and Proposed Site Traffic Generation

	Existing Site Uses (veh/hr)	Proposed Site Uses (veh/hr)
AM Peak Period	36	48
PM Peak Period	41	81

Taking into account the traffic generation potential of the current, the proposed development is anticipated to generate an additional 12 vehicle movements in a weekday morning peak hour and 40 vehicle movements in a weekday afternoon peak hour. This equates to less than one additional vehicle movement a minute.

6.2 Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the:

i configuration of the arterial road network in the immediate vicinity of the site
ii existing operation of intersections providing access between the local and arterial road network
iii distribution of households in the vicinity of the site
iv surrounding employment centres, retail centres and schools in relation to the site

v likely distribution of employee's residences in relation to the site
vi configuration of access points to the site.

Having consideration to the above, for the purposes of estimating vehicle movements, the assumed directional distributions for the residential (including serviced apartments) and commercial (including retail and restaurant) components are presented in Table 6.3.

Table 6.3: Directional Distribution by Land-Use Component

Direction	Residential	Commercial/ Retail
Pacific Highway (North)	5%	40%
Pacific Highway (South)	60%	30%
Fullers Road (West)	35%	30%

In addition, the directional split of traffic (i.e. the ratio between the inbound and outbound traffic movements) has been assumed to be a commercial inbound and residential outbound in the morning peak period and a corresponding reversal in the evening peak.

Based on the above, Figure 6.1 and Figure 6.2 have been prepared to show the estimated marginal increase in turning movements in the vicinity of the subject property following full site development.

Figure 6.1: AM Peak Hour Site Generated Traffic Volumes

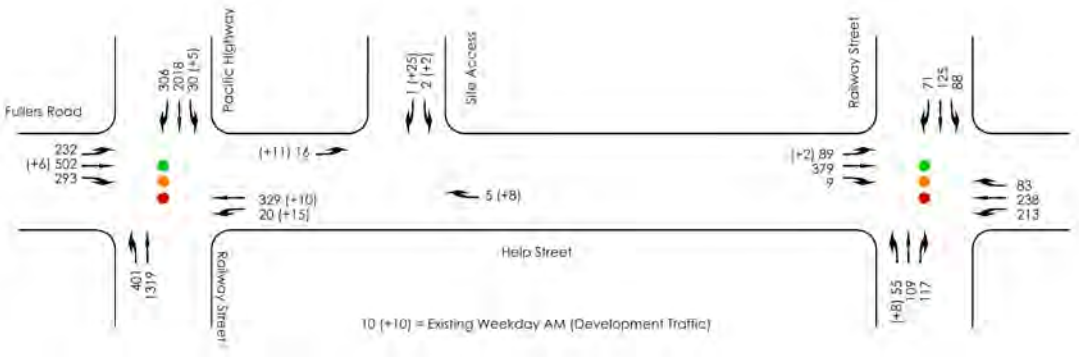
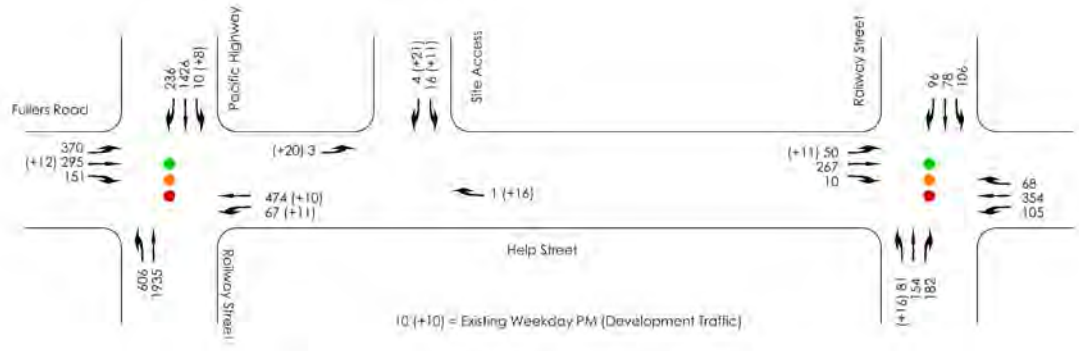


Figure 6.2: PM Peak Hour Site Generated Traffic Volumes



6.3 Traffic Impact

An assessment of the impacts that future traffic would have on the surrounding road network can be made by comparing intersection performance prior to and following full site development assuming planning approvals.

The impact of this additional traffic on the intersections in the vicinity of the site has been assessed using SIDRA INTERSECTION. Table 6.4 presents a summary of the anticipated future operation of the intersections following the development of the site under the proposed planning controls with full results included in Appendix B.

Table 6.4: Future Operating Conditions

Intersection	Peak	Leg	Degree of Saturation (DOS)	Average Delay (sec)	Level of Service (LOS)
Pacific Highway/ Fullers Road/ Help Street	AM	Pacific Highway (S)	0.98	31	C
		Help Street (E)	0.97	95	F
		Pacific Highway (N)	0.98	25	B
		Fullers Road (W)	0.98	69	E
		Overall	**0.98**	**40**	**C**
	PM	Pacific Highway (S)	1.08	70	E
		Help Street (E)	1.07	122	F
		Pacific Highway (N)	1.05	20	B
		Fullers Road (W)	1.07	74	F
		Overall	**1.08**	**61**	**E**
Railway Street/ Help Street	AM	Railway Street (S)	0.47	26	B
		Help Street (E)	0.28	6	A
		Railway Street (N)	0.36	22	B
		Help Street (W)	0.47	27	B
		Overall	**0.47**	**19**	**B**
	PM	Railway Street (S)	0.55	22	B
		Help Street (E)	0.32	9	A
		Railway Street (N)	0.37	19	B
		Help Street (W)	0.54	31	C
		Overall	**0.55**	**19**	**B**

Against existing traffic volumes in the vicinity of the site, the additional traffic generated by the planning proposal could not be expected to compromise the safety or function of the surrounding road network. Overall, the intersections would continue to operate at the same levels of service when compared with existing conditions.

7. Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

i A planning proposal is to be lodged with Willoughby City Council for the land currently occupied at 815 Pacific Highway, Chatswood.

ii The site is located within the Chatswood CBD and has good access to public transport, employment generation land uses and community facilities.

iii The traffic generation of the proposed mixed use development of the site including residential apartments is not expected to have a material impact on the operation of the surrounding road network.

iv Car parking can be provided on site in accordance with DCP requirements.

v The proposed site vehicle access arrangements represent a significant improvement to the existing site arrangements and will through its detailed design alleviate pedestrian / vehicle conflicts at the driveway.

Overall it is concluded that the proposed development of this site can be satisfactorily accommodated within the surrounding road network.

Furthermore, the site's location and proximity to good levels of public transport public renders this site as an appropriate mixed use site with opportunities to achieve Council's broader transport objectives and reduced private vehicle travel.

Appendix A

Appendix A

Survey Results

Intersection of Pacific Highway and Help Street

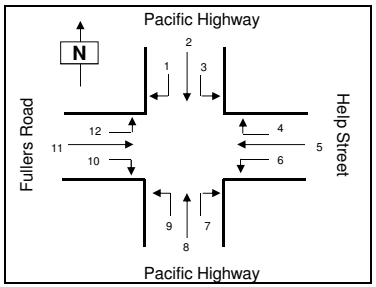
Tuesday, 13 May 2014

Austraffic

Survey Start **7:30 AM 16:30 PM**
Intersection Type Cross Junction
Intersection No. **1**
North Approach **Pacific Highway**
East Approach **Help Street**
South Approach **Pacific Highway**
West Approach **Fullers Road**

Date **13/05/14**

Classfication **Light Heavy**



TIME PERIOD	VEHICLE MOVEMENT																														GRAND TOTAL		
	1			2			3			4			5			6			7			8			9			10			11			12					
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
7:30 - 7:45	97	1	98	476	11	487	3	0	3	0	0	0	68	2	70	8	0	8	0	0	0	367	23	390	67	4	71	78	2	80	113	3	116	61	3	64	1338	49	1387
7:45 - 8:00	12	1	13	521	6	527	8	0	8	0	0	0	89	2	91	4	1	5	0	0	0	360	11	371	108	3	111	79	0	79	135	2	137	47	6	53	1363	32	1395
8:00 - 8:15	74	3	77	450	14	464	14	0	14	0	0	0	88	1	89	3	0	3	0	0	0	234	17	251	90	3	93	68	6	74	125	3	128	69	8	77	1215	55	1270
8:15 - 8:30	111	7	118	528	12	540	5	0	5	0	0	0	78	1	79	3	1	4	0	0	0	298	9	307	121	5	126	57	3	60	117	4	121	33	5	38	1351	47	1398
8:30 - 8:45	81	4	85	465	20	485	2	0	2	0	0	0	64	2	66	6	1	7	0	0	0	254	24	278	95	9	104	66	0	66	110	3	113	55	6	61	1198	69	1267
8:45 - 9:00	81	5	86	459	20	479	7	0	7	0	0	0	73	2	75	6	0	6	0	0	0	265	22	287	99	4	103	67	1	68	83	4	87	54	6	60	1194	64	1258
9:00 - 9:15	49	7	56	480	15	495	5	0	5	0	0	0	68	2	70	3	2	5	0	0	0	284	13	297	89	5	94	66	3	69	97	4	101	52	11	63	1193	62	1255
9:15 - 9:30	86	8	94	477	20	497	9	1	10	0	0	0	83	1	84	8	0	8	0	0	0	278	23	301	94	3	97	52	1	53	90	3	93	45	8	53	1222	68	1290
Σ	591	36	627	3856	118	3974	53	1	54	0	0	0	611	13	624	41	5	46	0	0	0	2340	142	2482	763	36	799	533	16	549	870	26	896	416	53	469	10074	446	10520

TIME PERIOD	VEHICLE MOVEMENT																														GRAND TOTAL		
	1			2			3			4			5			6			7			8			9			10			11			12					
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
16:30 - 16:45	63	9	72	361	10	371	5	0	5	0	0	0	100	4	104	19	1	20	0	0	0	449	12	461	133	1	134	47	1	48	64	4	68	113	1	114	1354	43	1397
16:45 - 17:00	53	10	63	345	5	350	5	0	5	0	0	0	120	1	121	11	0	11	0	0	0	494	10	504	128	4	132	33	1	34	69	1	70	92	0	92	1350	32	1382
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17:30 - 17:45	57	2	59	349	9	358	4	0	4	0	0	0	115	4	119	17	1	18	0	0	0	459	9	468	164	3	167	33	0	33	86	3	89	75	2	77	1359	33	1392
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18:15 - 18:30	51	0	51	288	7	295	1	0	1	0	0	0	106	1	107	8	1	9	0	0	0	466	10	476	136	3	139	37	0	37	74	4	78	86	4	90	1253	30	1283
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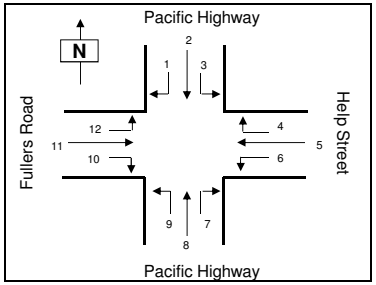
Intersection of Pacific Highway and Help Street

Tuesday, 13 May 2014

Austraffic

Survey Start	**7:30 AM 16:30 PM**
Intersection Type	Cross Junction
Intersection No.	**1**
North Approach	**Pacific Highway**
East Approach	**Help Street**
South Approach	**Pacific Highway**
West Approach	**Fullers Road**
Date	**13/05/14**
Classfication	**Light Heavy**



TIME PERIOD	VEHICLE MOVEMENT																																		
	1			2			3			4			5			6			7			8			9			10			11			12			GRAND TOTAL			
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	
7:30 - 8:30	**294**	**12**	**306**	**1975**	**43**	**2018**	**30**	**0**	**30**	**0**	**0**	**0**	**323**	**6**	**329**	**18**	**2**	**20**	**0**	**0**	**0**	**1259**	**60**	**1319**	**386**	**15**	**401**	**282**	**11**	**293**	**490**	**12**	**502**	**210**	**22**	**232**	**5267**	**183**	**5450**	**Peak**
7:45 - 8:45	278	15	293	1964	52	2016	29	0	29	0	0	0	319	6	325	16	3	19	0	0	0	1146	61	1207	414	20	434	270	9	279	487	12	499	204	25	229	5127	203	5330	
8:00 - 9:00	347	19	366	1902	66	1968	28	0	28	0	0	0	303	6	309	18	2	20	0	0	0	1051	72	1123	405	21	426	258	10	268	435	14	449	211	25	236	4958	235	5193	
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8:30 - 9:30	297	24	321	1881	75	1956	23	1	24	0	0	0	288	7	295	23	3	26	0	0	0	1081	82	1163	377	21	398	251	5	256	380	14	394	206	31	237	4807	263	5070	

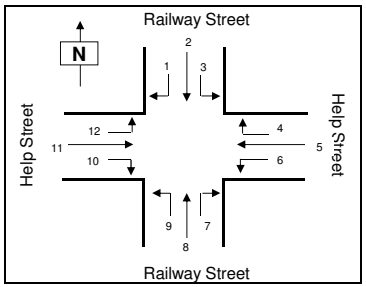
TIME PERIOD	VEHICLE MOVEMENT																																		
	1			2			3			4			5			6			7			8			9			10			11			12			GRAND TOTAL			
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	
16:30 - 17:30	**238**	**25**	**263**	**1388**	**29**	**1417**	**13**	**0**	**13**	**0**	**0**	**0**	**464**	**7**	**471**	**56**	**5**	**61**	**0**	**0**	**0**	**1910**	**35**	**1945**	**552**	**13**	**565**	**162**	**2**	**164**	**255**	**9**	**264**	**404**	**4**	**408**	**5442**	**129**	**5571**	**Peak**
16:45 - 17:45	232	18	250	1376	28	1404	12	0	12	0	0	0	479	7	486	54	5	59	0	0	0	1920	32	1952	583	15	598	148	1	149	277	8	285	366	5	371	5447	119	5566	
17:00 - 18:00	227	9	236	1401	25	1426	10	0	10	0	0	0	467	7	474	62	5	67	0	0	0	1904	31	1935	593	13	606	151	0	151	287	8	295	364	6	370	5466	104	5570	
17:15 - 18:15	203	11	214	1332	28	1360	12	0	12	0	0	0	466	8	474	56	7	63	0	0	0	1899	34	1933	581	11	592	139	0	139	308	9	317	367	5	372	5363	113	5476	
17:30 - 18:30	197	7	204	1283	26	1309	12	0	12	0	0	0	442	8	450	53	5	58	0	0	0	1904	36	1940	565	11	576	140	0	140	320	11	331	344	8	352	5260	112	5372	

Intersection of Help Street and Railway Street

Tuesday, 13 May 2014

Austraffic

Survey Start	7:30	AM	16:30	PM
Intersection Type	Cross Junction			
Intersection No.	2			
North Approach	Railway Street			
East Approach	Help Street			
South Approach	Railway Street			
West Approach	Help Street			
Date	13/05/14			
Classfication	Light	Heavy		



TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
7:30 - 7:45	12	0	12	31	2	33	19	1	20	23	1	24	56	4	60	35	4	39
7:45 - 8:00	21	0	21	27	1	28	18	1	19	19	0	19	66	1	67	41	1	42
8:00 - 8:15	27	1	28	36	4	40	20	0	20	13	0	13	45	0	45	68	2	70
8:15 - 8:30	10	0	10	23	1	24	29	0	29	27	0	27	63	3	66	60	2	62
8:30 - 8:45	9	0	9	29	3	32	29	1	30	12	0	12	60	2	62	62	2	64
8:45 - 9:00	8	0	8	37	1	38	29	0	29	19	0	19	62	1	63	53	1	54
9:00 - 9:15	14	0	14	28	3	31	31	0	31	9	0	9	55	2	57	49	3	52
9:15 - 9:30	14	0	14	18	3	21	39	0	39	10	0	10	58	0	58	36	1	37
Σ	115	1	116	229	18	247	214	3	217	132	1	133	465	13	478	404	16	420

TIME PERIOD	VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
7:30 - 7:45	25	4	29	17	2	19	16	0	16	0	1	1	92	1	93	16	0	16	342	20	362
7:45 - 8:00	21	2	23	27	2	29	13	1	14	0	2	2	98	0	98	23	0	23	374	11	385
8:00 - 8:15	30	2	32	27	1	28	11	0	11	2	2	4	91	1	92	25	0	25	395	13	408
8:15 - 8:30	33	0	33	32	1	33	13	1	14	0	2	2	92	4	96	25	0	25	407	14	421
8:30 - 8:45	28	5	33	28	0	28	7	0	7	0	0	0	90	3	93	11	0	11	365	16	381
8:45 - 9:00	27	4	31	13	1	14	11	2	13	0	2	2	72	3	75	20	0	20	351	15	366
9:00 - 9:15	27	3	30	18	0	18	13	0	13	0	2	2	80	1	81	19	1	20	343	15	358
9:15 - 9:30	32	2	34	16	2	18	17	3	20	0	0	0	70	2	72	25	2	27	335	15	350
Σ	223	22	245	178	9	187	101	7	108	2	11	13	685	15	700	164	3	167	2912	119	3031

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
16:30 - 16:45	19	1	20	13	4	17	19	0	19	13	0	13	77	2	79	22	1	23
16:45 - 17:00	23	0	23	20	4	24	26	0	26	15	0	15	101	1	102	28	4	32
17:00 - 17:15	22	1	23	17	2	19	34	0	34	18	0	18	81	0	81	15	1	16
17:15 - 17:30	25	0	25	19	2	21	17	0	17	16	0	16	107	3	110	27	1	28
17:30 - 17:45	29	0	29	17	2	19	21	0	21	21	0	21	83	3	86	24	1	25
17:45 - 18:00	19	0	19	17	2	19	33	1	34	13	0	13	76	1	77	34	2	36
18:00 - 18:15	24	1	25	12	1	13	27	0	27	8	0	8	77	3	80	27	0	27
18:15 - 18:30	23	0	23	17	2	19	24	0	24	16	0	16	61	2	63	24	1	25
Σ	184	3	187	132	19	151	201	1	202	120	0	120	663	15	678	201	11	212

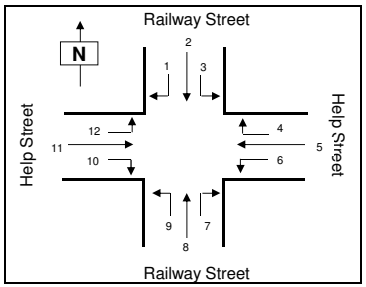
TIME PERIOD	VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
16:30 - 16:45	34	0	34	17	2	19	22	1	23	3	3	6	52	0	52	10	0	10	301	14	315
16:45 - 17:00	28	1	29	30	1	31	11	0	11	1	2	3	66	1	67	8	0	8	357	14	371
17:00 - 17:15	36	0	36	37	1	38	20	1	21	0	2	2	49	0	49	12	0	12	341	8	349
17:15 - 17:30	55	0	55	39	0	39	16	2	18	1	2	3	75	0	75	8	0	8	405	10	415
17:30 - 17:45	40	2	42	33	1	34	18	1	19	1	2	3	68	1	69	18	0	18	373	13	386
17:45 - 18:00	47	2	49	43	0	43	23	0	23	1	1	2	74	0	74	12	0	12	392	9	401
18:00 - 18:15	51	0	51	35	1	36	21	1	22	0	2	2	77	1	78	10	0	10	369	10	379
18:15 - 18:30	46	0	46	36	0	36	36	1	37	2	2	4	65	2	67	13	0	13	363	10	373
Σ	337	5	342	270	6	276	167	7	174	9	16	25	526	5	531	91	0	91	2901	88	2989

Intersection of Help Street and Railway Street

Tuesday, 13 May 2014

Austraffic

Survey Start	**7:30 AM 16:30 PM**
Intersection Type	Cross Junction
Intersection No.	**2**
North Approach	**Railway Street**
East Approach	**Help Street**
South Approach	**Railway Street**
West Approach	**Help Street**
Date	**13/05/14**
Classfication	**Light Heavy**



TIME PERIOD	VEHICLE MOVEMENT																																	
	1			2			3			4			5			6			7			8			9			10			11			12			GRAND TOTAL			
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	
7:30 - 8:30	70	1	71	117	8	125	86	2	88	82	1	83	230	8	238	204	9	213	109	8	117	103	6	109	53	2	55	2	7	9	373	6	379	89	0	89	1518	58	1576	
7:45 - 8:45	**67**	**1**	**68**	**115**	**9**	**124**	**96**	**2**	**98**	**71**	**0**	**71**	**234**	**6**	**240**	**231**	**7**	**238**	**112**	**9**	**121**	**114**	**4**	**118**	**44**	**2**	**46**	**2**	**6**	**8**	**371**	**8**	**379**	**84**	**0**	**84**	**1541**	**54**	**1595**	**Peak**
8:00 - 9:00	54	1	55	125	9	134	107	1	108	71	0	71	230	6	236	243	7	250	118	11	129	100	3	103	42	3	45	2	6	8	345	11	356	81	0	81	1518	58	1576	
8:15 - 9:15	41	0	41	117	8	125	118	1	119	67	0	67	240	8	248	224	8	232	115	12	127	91	2	93	44	3	47	0	6	6	334	11	345	75	1	76	1466	60	1526	
8:30 - 9:30	45	0	45	112	10	122	128	1	129	50	0	50	235	5	240	200	7	207	114	14	128	75	3	78	48	5	53	0	4	4	312	9	321	75	3	78	1394	61	1455	

TIME PERIOD	VEHICLE MOVEMENT																																	
	1			2			3			4			5			6			7			8			9			10			11			12			GRAND TOTAL			
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	
16:30 - 17:30	89	2	91	69	12	81	96	0	96	62	0	62	366	6	372	92	7	99	153	1	154	123	4	127	69	4	73	5	9	14	242	1	243	38	0	38	1404	46	1450	
16:45 - 17:45	99	1	100	73	10	83	98	0	98	70	0	70	372	7	379	94	7	101	159	3	162	139	3	142	65	4	69	3	8	11	258	2	260	46	0	46	1476	45	1521	
17:00 - 18:00	95	1	96	70	8	78	105	1	106	68	0	68	347	7	354	100	5	105	178	4	182	152	2	154	77	4	81	3	7	10	266	1	267	50	0	50	1511	40	1551	
17:15 - 18:15	**97**	**1**	**98**	**65**	**7**	**72**	**98**	**1**	**99**	**58**	**0**	**58**	**343**	**10**	**353**	**112**	**4**	**116**	**193**	**4**	**197**	**150**	**2**	**152**	**78**	**4**	**82**	**3**	**7**	**10**	**294**	**2**	**296**	**48**	**0**	**48**	**1539**	**42**	**1581**	**Peak**
17:30 - 18:30	95	1	96	63	7	70	105	1	106	58	0	58	297	9	306	109	4	113	184	4	188	147	2	149	98	3	101	4	7	11	284	4	288	53	0	53	1497	42	1539	

Appendix B

SIDRA INTERSECTION Results

MOVEMENT SUMMARY

Site: Pacific-Fullers-Help-Ex AM

Pacific Highway - Fullers Road - Help Street
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Pacific Highway											
1	L	422	3.7	0.461	10.1	LOS A	2.7	19.5	0.10	0.67	45.9
2	T	1388	4.5	0.982	37.1	LOS C	55.4	402.6	1.00	1.02	28.3
Approach		1811	4.4	0.982	30.8	LOS C	55.4	402.6	0.79	0.94	31.0
East: Help Street											
4	L	21	10.0	0.124	59.8	LOS E	1.3	9.6	0.85	0.70	19.5
5	T	346	1.8	0.977	101.9	LOS F	32.8	233.4	1.00	1.21	13.2
Approach		367	2.3	0.977	99.5	LOS F	32.8	233.4	0.99	1.18	13.4
North: Pacific Highway											
7	L	32	0.0	0.955	18.5	LOS B	47.8	340.4	0.59	1.04	40.1
8	T	2124	2.1	0.955	11.3	LOS A	47.8	340.9	0.59	0.59	43.8
9	R	322	3.9	0.976	109.5	LOS F	30.6	221.7	1.00	1.07	14.4
Approach		2478	2.3	0.976	24.1	LOS B	47.8	340.9	0.64	0.66	34.9
West: Fullers Road											
10	L	244	9.5	0.549	26.4	LOS B	9.2	69.7	0.56	0.76	31.8
11	T	528	2.4	0.860	59.0	LOS E	38.9	278.0	1.00	0.96	19.8
12	R	308	3.8	0.914	96.3	LOS F	13.0	93.7	1.00	1.00	15.7
Approach		1081	4.4	0.914	62.3	LOS E	38.9	278.0	0.90	0.93	20.0
All Vehicles		5737	3.4	0.982	38.2	LOS C	55.4	402.6	0.76	0.83	27.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	63.5	LOS F	0.2	0.2	0.92	0.92
P3	Across E approach	53	17.3	LOS B	0.1	0.1	0.48	0.48
P5	Across N approach	53	46.4	LOS E	0.2	0.2	0.79	0.79
P7	Across W approach	53	38.2	LOS D	0.2	0.2	0.71	0.71
All Pedestrians		212	41.3	LOS E			0.73	0.73

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Pacific-Fullers-Help-Ex PM

Pacific Highway - Fullers Road - Help Street
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Pacific Highway											
1	L	638	2.1	0.575	9.9	LOS A	5.0	35.9	0.12	0.68	46.0
2	T	2037	1.6	1.082	89.4	LOS F	112.8	800.4	1.00	1.35	16.9
Approach		2675	1.7	1.082	70.4	LOS E	112.8	800.4	0.79	1.19	19.7
East: Help Street											
4	L	71	7.5	0.732	74.4	LOS F	5.0	37.0	0.95	0.87	17.2
5	T	499	1.5	1.046	117.6	LOS F	29.3	207.4	1.00	1.27	12.0
Approach		569	2.2	1.046	112.2	LOS F	29.3	207.4	0.99	1.22	12.5
North: Pacific Highway											
7	L	11	0.0	0.601	9.4	LOS A	6.3	44.7	0.13	1.07	46.8
8	T	1501	1.8	0.601	2.2	LOS A	6.3	44.7	0.13	0.12	55.9
9	R	248	3.8	1.053	126.0	LOS F	25.2	182.5	1.00	1.06	12.9
Approach		1760	2.0	1.053	19.7	LOS B	25.2	182.5	0.25	0.26	38.5
West: Fullers Road											
10	L	389	1.6	0.990	50.9	LOS D	20.7	146.9	1.00	0.87	23.3
11	T	311	2.7	0.640	54.9	LOS D	20.2	144.8	0.95	0.82	20.6
12	R	159	0.0	1.070	170.6	LOS F	18.3	128.2	1.00	1.26	10.2
Approach		859	1.7	1.070	74.5	LOS F	20.7	146.9	0.98	0.92	18.1
All Vehicles		5863	1.9	1.082	59.9	LOS E	112.8	800.4	0.68	0.87	21.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	68.2	LOS F	0.2	0.2	0.95	0.95
P3	Across E approach	53	14.1	LOS B	0.1	0.1	0.43	0.43
P5	Across N approach	53	54.6	LOS E	0.2	0.2	0.85	0.85
P7	Across W approach	53	26.4	LOS C	0.1	0.1	0.59	0.59
All Pedestrians		212	40.8	LOS E			0.71	0.71

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Help-Railway-Ex-AM

Help Street - Railway Street
Signals - Fixed Time Cycle Time = 90 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Street											
1	L	58	3.6	0.280	22.4	LOS B	1.6	11.3	0.65	0.67	27.6
2	T	115	5.5	0.469	24.5	LOS B	8.2	60.5	0.82	0.70	25.7
3	R	123	6.8	0.469	29.1	LOS C	8.2	60.5	0.82	0.80	25.5
Approach		296	5.7	0.469	26.0	LOS B	8.2	60.5	0.79	0.74	26.0
East: Help Street											
4	L	224	4.2	0.269	6.5	LOS A	0.9	6.3	0.09	0.55	35.4
5	T	251	3.4	0.284	2.0	LOS A	1.0	7.1	0.10	0.08	38.3
6	R	87	1.2	0.244	15.4	LOS B	1.5	11.0	0.53	0.66	30.5
Approach		562	3.4	0.284	5.9	LOS A	1.5	11.0	0.16	0.36	35.7
North: Railway Street											
7	L	93	2.3	0.354	15.5	LOS B	2.0	14.1	0.52	0.66	30.5
8	T	132	6.4	0.354	21.8	LOS B	6.6	47.8	0.76	0.64	26.8
9	R	75	1.4	0.354	26.5	LOS B	6.6	47.8	0.76	0.80	26.4
Approach		299	3.9	0.354	21.0	LOS B	6.6	47.8	0.69	0.69	27.7
West: Help Street											
10	L	94	0.0	0.467	30.1	LOS C	10.4	73.2	0.84	0.82	25.2
11	T	399	1.6	0.467	25.9	LOS B	10.4	73.2	0.84	0.71	25.4
12	R	9	77.8	0.467	32.0	LOS C	7.3	53.2	0.84	0.82	25.3
Approach		502	2.7	0.467	26.8	LOS B	10.4	73.2	0.84	0.73	25.4
All Vehicles		1659	3.7	0.469	18.5	LOS B	10.4	73.2	0.57	0.60	28.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	16.8	LOS B	0.1	0.1	0.61	0.61
P3	Across E approach	53	24.9	LOS C	0.1	0.1	0.74	0.74
P5	Across N approach	53	24.9	LOS C	0.1	0.1	0.74	0.74
P7	Across W approach	53	22.8	LOS C	0.1	0.1	0.71	0.71
All Pedestrians		212	22.4	LOS C			0.70	0.70

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Help-Railway-Ex-PM

Help Street - Railway Street
Signals - Fixed Time Cycle Time = 90 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Street											
1	L	85	4.9	0.368	18.3	LOS B	2.0	14.8	0.58	0.67	29.3
2	T	162	1.3	0.539	19.2	LOS B	11.3	80.3	0.77	0.68	27.7
3	R	192	2.2	0.539	23.7	LOS B	11.3	80.3	0.77	0.81	27.4
Approach		439	2.4	0.539	21.0	LOS B	11.3	80.3	0.73	0.73	27.8
East: Help Street											
4	L	111	4.8	0.331	12.1	LOS A	3.1	22.5	0.32	0.68	32.4
5	T	373	2.0	0.331	7.5	LOS A	3.2	23.0	0.32	0.27	34.2
6	R	72	0.0	0.201	18.5	LOS B	1.5	10.5	0.56	0.66	29.1
Approach		555	2.3	0.331	9.9	LOS A	3.2	23.0	0.35	0.40	33.1
North: Railway Street											
7	L	112	0.9	0.361	12.2	LOS A	2.0	14.1	0.44	0.64	32.1
8	T	82	10.3	0.313	18.8	LOS B	5.4	39.5	0.71	0.59	27.9
9	R	101	1.0	0.313	23.5	LOS B	5.4	39.5	0.71	0.78	27.4
Approach		295	3.6	0.361	17.9	LOS B	5.4	39.5	0.60	0.67	29.2
West: Help Street											
10	L	53	0.0	0.543	34.1	LOS C	5.8	40.9	0.86	0.78	24.0
11	T	281	0.4	0.543	31.2	LOS C	7.2	52.1	0.89	0.74	23.8
12	R	11	70.0	0.543	38.1	LOS C	7.2	52.1	0.91	0.82	23.5
Approach		344	2.4	0.543	31.9	LOS C	7.2	52.1	0.89	0.75	23.8
All Vehicles		1633	2.6	0.543	18.9	LOS B	11.3	80.3	0.61	0.61	28.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	21.4	LOS C	0.1	0.1	0.69	0.69
P3	Across E approach	53	20.0	LOS B	0.1	0.1	0.67	0.67
P5	Across N approach	53	30.4	LOS D	0.1	0.1	0.82	0.82
P7	Across W approach	53	18.1	LOS B	0.1	0.1	0.63	0.63
All Pedestrians		212	22.5	LOS C			0.70	0.70

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Pacific-Fullers-Help-Post Dev AM

Pacific Highway - Fullers Road - Help Street
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Pacific Highway											
1	L	422	3.7	0.467	10.2	LOS A	2.7	19.7	0.10	0.67	45.8
2	T	1388	4.5	0.982	37.1	LOS C	55.4	402.6	1.00	1.02	28.3
Approach		1811	4.4	0.982	30.8	LOS C	55.4	402.6	0.79	0.94	31.0
East: Help Street											
4	L	37	5.1	0.207	59.3	LOS E	2.2	16.2	0.86	0.72	19.6
5	T	357	1.8	0.972	99.0	LOS F	33.4	237.5	1.00	1.20	13.4
Approach		394	2.1	0.972	95.3	LOS F	33.4	237.5	0.99	1.15	13.9
North: Pacific Highway											
7	L	37	0.0	0.957	19.0	LOS B	49.3	351.2	0.60	1.04	39.7
8	T	2124	2.1	0.957	11.8	LOS A	49.3	351.7	0.60	0.61	43.3
9	R	322	3.9	0.976	109.5	LOS F	30.6	221.7	1.00	1.07	14.4
Approach		2483	2.3	0.976	24.6	LOS B	49.3	351.7	0.65	0.67	34.6
West: Fullers Road											
10	L	244	9.5	0.549	26.4	LOS B	9.2	69.7	0.56	0.76	31.8
11	T	535	2.4	0.870	60.4	LOS E	40.0	286.0	1.00	0.97	19.5
12	R	308	3.8	0.984	117.3	LOS F	14.5	105.0	1.00	1.10	13.6
Approach		1087	4.4	0.984	68.9	LOS E	40.0	286.0	0.90	0.96	18.8
All Vehicles		5775	3.3	0.984	39.7	LOS C	55.4	402.6	0.77	0.84	26.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	62.6	LOS F	0.2	0.2	0.91	0.91
P3	Across E approach	53	17.3	LOS B	0.1	0.1	0.48	0.48
P5	Across N approach	53	46.4	LOS E	0.2	0.2	0.79	0.79
P7	Across W approach	53	38.2	LOS D	0.2	0.2	0.71	0.71
All Pedestrians		212	41.1	LOS E			0.72	0.72

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Pacific-Fullers-Help-Post Dev PM

Pacific Highway - Fullers Road - Help Street
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Pacific Highway											
1	L	638	2.1	0.575	9.9	LOS A	5.0	35.9	0.12	0.68	46.0
2	T	2037	1.6	1.082	89.4	LOS F	112.8	800.4	1.00	1.35	16.9
Approach		2675	1.7	1.082	70.4	LOS E	112.8	800.4	0.79	1.19	19.7
East: Help Street											
4	L	82	6.4	0.846	83.0	LOS F	6.2	45.9	0.95	0.99	16.1
5	T	509	1.5	1.068	128.3	LOS F	31.5	223.2	1.00	1.33	11.3
Approach		592	2.1	1.068	122.0	LOS F	31.5	223.2	0.99	1.28	11.8
North: Pacific Highway											
7	L	19	0.0	0.604	9.4	LOS A	6.4	45.2	0.13	1.07	46.8
8	T	1501	1.8	0.604	2.2	LOS A	6.4	45.3	0.13	0.12	55.9
9	R	248	3.8	1.053	126.0	LOS F	25.2	182.5	1.00	1.06	12.9
Approach		1768	2.0	1.053	19.7	LOS B	25.2	182.5	0.25	0.26	38.5
West: Fullers Road											
10	L	389	1.6	0.990	50.9	LOS D	20.7	146.9	1.00	0.87	23.3
11	T	323	2.6	0.665	55.3	LOS D	21.2	151.7	0.96	0.83	20.5
12	R	159	0.0	1.070	170.6	LOS F	18.3	128.2	1.00	1.26	10.2
Approach		872	1.7	1.070	74.4	LOS F	21.2	151.7	0.98	0.93	18.1
All Vehicles		5906	1.9	1.082	61.0	LOS E	112.8	800.4	0.68	0.88	21.2

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	68.2	LOS F	0.2	0.2	0.95	0.95
P3	Across E approach	53	14.1	LOS B	0.1	0.1	0.43	0.43
P5	Across N approach	53	54.6	LOS E	0.2	0.2	0.85	0.85
P7	Across W approach	53	26.4	LOS C	0.1	0.1	0.59	0.59
All Pedestrians		212	40.8	LOS E			0.71	0.71

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Help-Railway-Post Dev AM

Help Street - Railway Street
Signals - Fixed Time Cycle Time = 90 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Street											
1	L	66	3.3	0.320	22.5	LOS B	1.8	13.0	0.65	0.68	27.6
2	T	115	5.5	0.471	24.6	LOS B	8.2	60.6	0.82	0.70	25.7
3	R	123	6.8	0.471	29.1	LOS C	8.2	60.6	0.82	0.80	25.5
Approach		304	5.6	0.471	25.9	LOS B	8.2	60.6	0.79	0.74	26.0
East: Help Street											
4	L	224	4.2	0.269	6.5	LOS A	0.9	6.3	0.09	0.55	35.4
5	T	251	3.4	0.284	2.0	LOS A	1.0	7.1	0.10	0.08	38.3
6	R	87	1.2	0.244	15.4	LOS B	1.5	11.0	0.53	0.66	30.5
Approach		562	3.4	0.284	5.9	LOS A	1.5	11.0	0.16	0.36	35.7
North: Railway Street											
7	L	93	2.3	0.354	15.5	LOS B	2.0	14.1	0.52	0.66	30.5
8	T	132	6.4	0.359	22.6	LOS B	6.7	48.5	0.77	0.65	26.5
9	R	75	1.4	0.359	27.3	LOS B	6.7	48.5	0.77	0.80	26.2
Approach		299	3.9	0.359	21.6	LOS B	6.7	48.5	0.69	0.69	27.5
West: Help Street											
10	L	96	0.0	0.469	30.2	LOS C	10.4	73.5	0.84	0.82	25.2
11	T	399	1.6	0.469	25.9	LOS B	10.4	73.5	0.84	0.71	25.4
12	R	9	77.8	0.469	32.0	LOS C	7.3	53.5	0.84	0.82	25.3
Approach		504	2.7	0.469	26.8	LOS B	10.4	73.5	0.84	0.73	25.4
All Vehicles		1669	3.7	0.471	18.7	LOS B	10.4	73.5	0.58	0.60	28.7

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	16.8	LOS B	0.1	0.1	0.61	0.61
P3	Across E approach	53	24.9	LOS C	0.1	0.1	0.74	0.74
P5	Across N approach	53	24.9	LOS C	0.1	0.1	0.74	0.74
P7	Across W approach	53	22.8	LOS C	0.1	0.1	0.71	0.71
All Pedestrians		212	22.4	LOS C			0.70	0.70

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Help-Railway-Post Dev PM

Help Street - Railway Street
Signals - Fixed Time Cycle Time = 90 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Street											
1	L	102	3.8	0.445	19.0	LOS B	2.5	18.1	0.60	0.68	29.0
2	T	162	1.3	0.553	20.0	LOS B	11.6	82.1	0.79	0.69	27.4
3	R	192	2.2	0.553	24.5	LOS B	11.6	82.1	0.79	0.81	27.1
Approach		456	2.2	0.553	21.7	LOS B	11.6	82.1	0.74	0.74	27.6
East: Help Street											
4	L	111	4.8	0.322	11.2	LOS A	2.8	20.2	0.29	0.67	32.8
5	T	373	2.0	0.322	6.7	LOS A	2.9	20.7	0.29	0.24	34.7
6	R	72	0.0	0.198	18.1	LOS B	1.5	10.3	0.56	0.66	29.3
Approach		555	2.3	0.322	9.1	LOS A	2.9	20.7	0.32	0.38	33.5
North: Railway Street											
7	L	112	0.9	0.369	12.6	LOS A	2.1	14.5	0.45	0.64	31.9
8	T	82	10.3	0.325	19.6	LOS B	5.5	40.4	0.72	0.61	27.6
9	R	101	1.0	0.325	24.3	LOS B	5.5	40.4	0.72	0.78	27.1
Approach		295	3.6	0.369	18.6	LOS B	5.5	40.4	0.62	0.68	28.9
West: Help Street											
10	L	64	0.0	0.543	33.3	LOS C	5.8	40.8	0.85	0.78	24.2
11	T	281	0.4	0.543	30.5	LOS C	7.5	54.2	0.89	0.73	24.0
12	R	11	70.0	0.543	37.2	LOS C	7.5	54.2	0.91	0.82	23.7
Approach		356	2.4	0.543	31.2	LOS C	7.5	54.2	0.88	0.74	24.0
All Vehicles		1661	2.5	0.553	18.9	LOS B	11.6	82.1	0.61	0.61	28.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	20.7	LOS C	0.1	0.1	0.68	0.68
P3	Across E approach	53	20.7	LOS C	0.1	0.1	0.68	0.68
P5	Across N approach	53	29.6	LOS C	0.1	0.1	0.81	0.81
P7	Across W approach	53	18.7	LOS B	0.1	0.1	0.64	0.64
All Pedestrians		212	22.4	LOS C			0.70	0.70

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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GTAconsultants

Attachment 5: Survey prepared by Geosurv (December 2013)

True North

Magnetic North

LEGEND:

BENCHMARK	▲
TELSTRA PIT	TEL
LIGHT POLE	LP
POWER POLE	PP
TRAFFIC LIGHT	TL
ELECTRICITY PIT	EPIT
MANHOLE	MH
STOP VALVE	SV / GAS
HYDRANT	HYD
WATER METER	WM
PIT WITH METAL LID	PML
GRATED INLET PIT	GRP
SEWER INSP POINT	SIP

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DIAL1100 BEFORE YOU DIG

NOTES:

1. RELATIONSHIP OF IMPROVEMENTS TO BOUNDARIES IS DIAGRAMMATIC ONLY.

2. BEARINGS AND DISTANCES OF BOUNDARIES ARE BY TITLE AND/OR DEED ONLY.

3. CONSTRUCTION WORKS MUST BE RELATED TO THE BENCHMARK AND NOT LEVELS OF STRUCTURES SHOWN ON THE PLAN.

4. LIMITED BOUNDARY SURVEY MADE. IF CONSTRUCTION OR DESIGN OF ANY NEW STRUCTURE IS INTENDED WITHIN PROXIMITY OF THE BOUNDARIES OR LOCAL GOVERNMENT REQUIREMENTS, A FURTHER SURVEY SHOULD BE REQUESTED TO MARK BOUNDARIES AND/OR DIMENSION WALL TO BOUNDARY DISTANCES.

5. THE TREE TRUNKS SHOWN ARE DIAGRAMMATIC ONLY. THE TRUE TRUNK RADIUS ARE STATED IN THE PLAN. TREE SPREADS & TRUNK RADIUS SHOWN ARE DIAGRAMMATIC ONLY AND TREE HEIGHTS ARE ESTIMATED. IF ANY OF THESE ELEMENTS ARE CRITICAL TO DESIGN (IN PARTICULAR DRIP LINES) MORE SPECIFIC DETAILS SHOULD BE REQUESTED FOR ACCURATE LOCATION.

6. BEARINGS SHOWN RELATE TO DP 547585

7. CONTOURS ARE AT N/A INTERVALS AND ARE APPROXIMATE ONLY. SPOT LEVELS SHOULD BE USED IN REFERENCE TO CONTOUR LEVELS. FEATURES AND LEVELS CRITICAL TO DESIGN SHOULD BE LOCATED BY A MORE ACCURATE SURVEY. ALL SET OUT WITH REGARD TO LEVELS SHOULD REFER TO THE BENCHMARK.

8. NO SERVICES SEARCH HAS BEEN CARRIED OUT FOR THIS SURVEY. SERVICES SHOWN ARE INDICATIVE ONLY. POSITIONS ARE BASED ON SURFACE INDICATORS LOCATED DURING SURVEY. APPROPRIATE DIAL BEFORE YOU DIG SEARCHES SHOULD BE CARRIED OUT PRIOR TO ANY CONSTRUCTION TAKING PLACE. SEE DIAL BEFORE YOU DIG CONTACT INFORMATION ON THIS PLAN.

9. THIS SURVEY IS FOR CONTOUR AND DETAIL PURPOSES ONLY AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.

10. LEVEL 1 WINDOW POSITIONS ARE DIAGRAMMATIC ONLY FOR CLARITY. LOCATION ON PLAN DOES NOT REPRESENT ACTUAL LOCATION.

REV.	DATE	AMENDMENTS

PREPARED BY:

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consulting surveyors, planners & engineers
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PREPARED FOR:

JOE CHIHA

LOT / SECTION:	LGA:
1	WILLOUGHBY

LOCALITY:	DEPOSITED PLAN:
CHATSWOOD	DP 547585
	AREA BY DP: 1657 m²

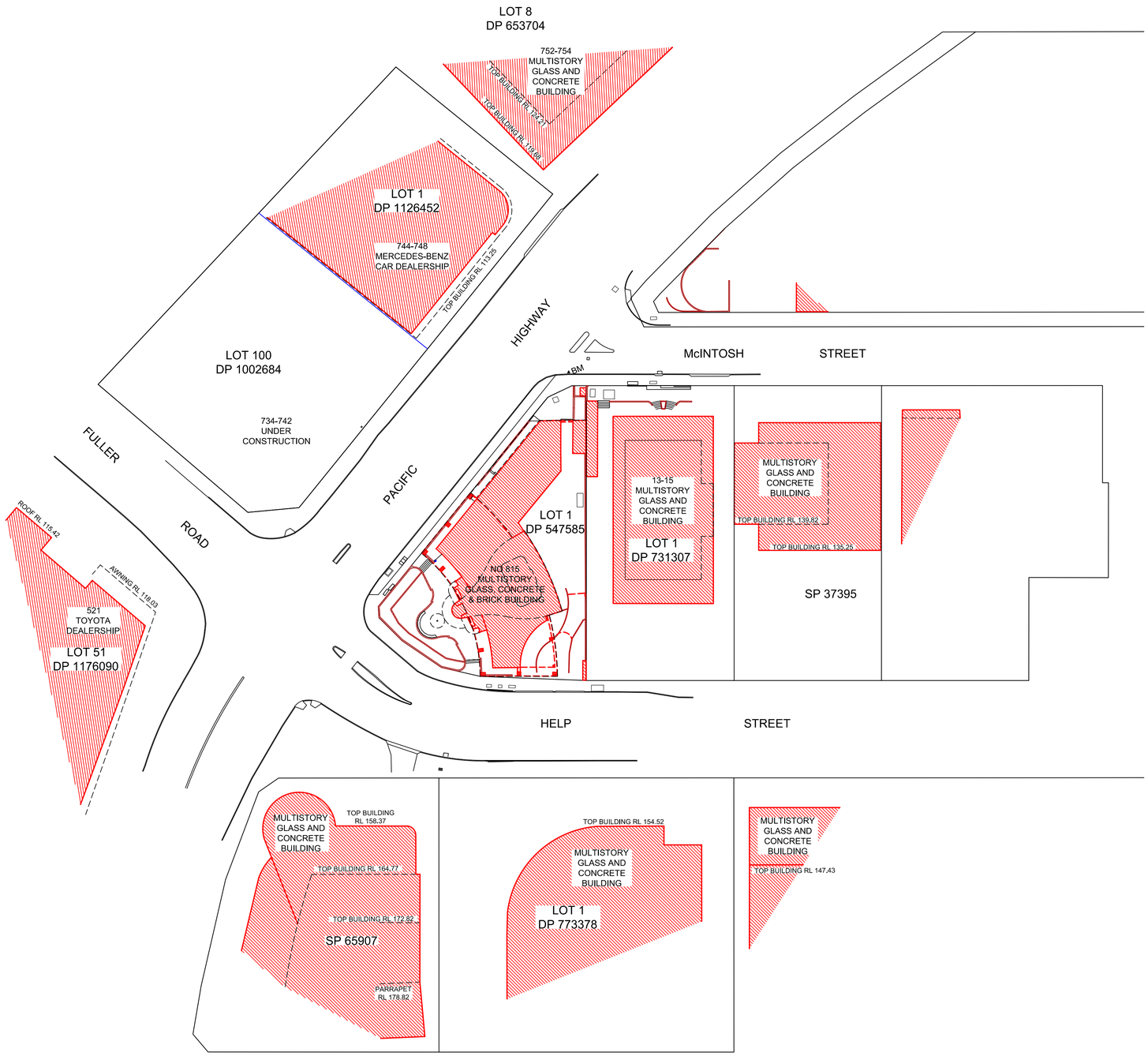
PLAN OF: DETAIL SURVEY OVER

No. 815 PACIFIC HIGHWAY
CHATSWOOD, SYDNEY
DETAIL PLAN

ORIGINAL SIZE: A1

SCALE:	1:150	CO-ORD:	MGA
DATUM:	AHD	ORIG DATUM:	SSM 86211
SURVEY BY:	DLM	DATE OF SURVEY:	13/12/13
DRAWN BY:	EW/DLM	DATE OF PLAN:	17/12/13
CHECKED BY:	MJC	DATE:	20/12/13
APPROVED BY:	MJC	DATE:	20/12/13
PLAN REF:	131215	SHEET:	2 OF 2 SHEETS

Cad File No: ACAD-131215_A_S2.dwg



True North

Magnetic North

LEGEND:

BENCHMARK	▲	
TELSTRA PIT	⊠	TEL
LIGHT POLE	⊠	LP
POWER POLE	◐	PP
TRAFFIC LIGHT	○	TL
ELECTRICITY PIT	⊠	EPIT
MANHOLE	◯	MH
STOP VALVE	⊠	SV / GAS
HYDRANT	◧	HYD
WATER METER	⋈	WM
PIT WITH METAL LID	□	PML
GRATED INLET PIT	■	GRP
SEWER INSP POINT	○	SIP

NOTES:

1. RELATIONSHIP OF IMPROVEMENTS TO BOUNDARIES IS DIAGRAMMATIC ONLY.

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3. CONSTRUCTION WORKS MUST BE RELATED TO THE BENCHMARK AND NOT LEVELS OF STRUCTURES SHOWN ON THE PLAN.

4. LIMITED BOUNDARY SURVEY MADE. IF CONSTRUCTION OR DESIGN OF ANY NEW STRUCTURE IS INTENDED WITHIN PROXIMITY OF THE BOUNDARIES OR LOCAL GOVERNMENT REQUIREMENTS, A FURTHER SURVEY SHOULD BE REQUESTED TO MARK BOUNDARIES AND/OR DIMENSION WALL TO BOUNDARY DISTANCES.

5. THE TREE TRUNKS SHOWN ARE DIAGRAMMATIC ONLY. THE TRUE TRUNK RADIUS ARE STATED IN THE PLAN. TREE SPREADS & TRUNK RADIUS SHOWN ARE DIAGRAMMATIC ONLY AND TREE HEIGHTS ARE ESTIMATED. IF ANY OF THESE ELEMENTS ARE CRITICAL TO DESIGN (IN PARTICULAR DRIP LINES) MORE SPECIFIC DETAILS SHOULD BE REQUESTED FOR ACCURATE LOCATION.

6. BEARINGS SHOWN RELATE TO DP 547585

7. CONTOURS ARE AT N/A INTERVALS AND ARE APPROXIMATE ONLY. SPOT LEVELS SHOULD BE USED IN REFERENCE TO CONTOUR LEVELS. FEATURES AND LEVELS CRITICAL TO DESIGN SHOULD BE LOCATED BY A MORE ACCURATE SURVEY. ALL SET OUT WITH REGARD TO LEVELS SHOULD REFER TO THE BENCHMARK.

8. NO SERVICES SEARCH HAS BEEN CARRIED OUT FOR THIS SURVEY. SERVICES SHOWN ARE INDICATIVE ONLY. POSITIONS ARE BASED ON SURFACE INDICATORS LOCATED DURING SURVEY. APPROPRIATE DIAL BEFORE YOU DIG SEARCHES SHOULD BE CARRIED OUT PRIOR TO ANY CONSTRUCTION TAKING PLACE. SEE DIAL BEFORE YOU DIG CONTACT INFORMATION ON THIS PLAN.

9. THIS SURVEY IS FOR CONTOUR AND DETAIL PURPOSES ONLY AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.

10. LEVEL 1 WINDOW POSITIONS ARE DIAGRAMMATIC ONLY FOR CLARITY. LOCATION ON PLAN DOES NOT REPRESENT ACTUAL LOCATION.

REV.	DATE	AMENDMENTS

PREPARED BY:

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PREPARED FOR:

JOE CHIHA

LOT / SECTION:	LGA:
1	WILLOUGHBY

LOCALITY:	DEPOSITED PLAN:
CHATSWOOD	DP 547585
	AREA BY DP: 1657 m²

PLAN OF: DETAIL SURVEY OVER

No. 815 PACIFIC HIGHWAY
CHATSWOOD, SYDNEY
SITE PLAN

ORIGINAL SIZE: A1

SCALE:	1:500	CO-ORD:	MGA
DATUM:	AHD	ORIG DATUM:	SSM 86211
SURVEY BY:	DLM	DATE OF SURVEY:	13/12/13
DRAWN BY:	EW/DLM	DATE OF PLAN:	17/12/13
CHECKED BY:	MJC	DATE:	20/12/13
APPROVED BY:	MJC	DATE:	20/12/13
PLAN REF:		SHEET:	1 OF 2 SHEETS

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