PLANNING PROPOSAL

14-20 Parkes Street, Harris Park

PARRAMATTA WE'RE BUILDING AUSTRALIA'S NEXT GREAT CITY

Planning Proposal drafts

Proponent versions:

No.	Author	Version
1.	Caladines Town Planning Pty Ltd.	April 2015

Council versions:

No.	Author	Version
1.	Parramatta City Council	February 2016- Council Meeting recommending Gateway Determination
2.	Parramatta City Council	February 2016- Section 56(1) submission to the DP&E

Contents

INTRODUCTION

This planning proposal explains the intended effect of, and justification for, the proposed amendment to *Parramatta Local Environmental Plan 2011*. It has been prepared in accordance with Section 55 of the *Environmental Planning and Assessment Act 1979* and the Department of Planning and Environment guides, 'A Guide to Preparing Local Environment Plans' (April 2013) and 'A Guide to Preparing Planning Proposals' (October 2012).

Background and context

On 21 April 2015, Council received a planning proposal and supporting documentation from Caladines Town Planning Pty Ltd on behalf of Bluesky Parramatta Pty Ltd, affecting land at 14-20 Parkes Street, Harris Park. The site is shown in Figure 1.

The site is located on the north-eastern corner of Parkes and Wigram Street, and backs onto a concrete lined stormwater canal generally known as Clay Cliff Creek. It consists of four (4) allotments including:

- Lot 10 DP12882
- Lot 13 DP1077402
- Lot 14 DP107740
- Lot 2 DP128524

The subject site is approximately 2,800 m² (see Figure 1). Two (2) commercial buildings (5 storeys at 14-18 Parkes Street, and 2 Storeys at 20 Parkes Street) with at grade and basement car parking currently occupy the subject site.

Figure 1 – Subject Site- 14-20 Parkes Street.

Source – Parramatta City Council

View east towards subject site (Corner Parkes and Wigram Street)

View north towards subject site (20 Parkes Street)

The precinct in which the site is located is characterised by a mix of residential, retail and commercial built forms that vary in bulk, scale and building form. Buildings within the immediate vicinity range from two storeys, to approximately 15 storeys. Further to the north along Hassall Street approvals have been issued for buildings up to 40 storeys.

Under *Parramatta Local Environmental Plan 2011* (*PLEP 2011*), the site:

- is zoned B4 Mixed Use (refer to Figure 4.1 in Part 4 – Mapping);
- has a maximum building height of 54 metres (refer to Figure 4.2 in Part 4 – Mapping); and
- has a maximum floor space ratio (FSR) of 4:1 (refer to Figure 4.3 in Part 4 – Mapping).

This planning proposal does not seek to amend the land use zoning.

PART 1 – OBJECTIVES OR INTENDED OUTCOMES

The objective of this planning proposal is to enable the redevelopment of the land at 14-20 Parkes Street, Harris Park in accordance with the current B4 Mixed Use zone for a high density mixed use development, consisting of residential and commercial uses within the Parramatta City Centre.

PART 2 – EXPLANATION OF PROVISIONS

This planning proposal seeks to amend *Parramatta Local Environmental Plan 2011*(*PLEP 2011*) in relation to the height and floor space ratio controls.

In order to achieve the desired objectives the following amendments to the *PLEP 2011* would need to be made:

1. Amend the maximum building height in the **Height of Buildings Map** (Sheet HOB_010) from 54 metres to 122.5 metres (39 Storeys). Refer Figure 4.2.1 in Part 4 of this planning proposal.

2. Amend the maximum FSR in the **Floor Space Ratio Map** (Sheet FSR_010) from 4:1 to a base FSR of 10:1 plus design excellence with an appropriate value sharing mechanism. Refer Figure 4.2.2 in Part 4 of this planning proposal.

Value Sharing/Funding Mechanism

Council resolved to endorse the Planning Proposal at its Meeting on 14 December 2015 subject to an appropriate infrastructure funding mechanism in accordance with that endorsed under the CBD Strategy. Under the CBD Strategy, it is proposed that sites within the CBD may be developed to a FSR greater than that which is currently permitted under the PLEP 2011, only where the developer enters a VPA with Council towards an appropriate level of community infrastructure/public benefit.

It is acknowledged that the Planning Proposal may be finalised and the changes to the PLEP 2011 for the subject site may be notified prior to the implementation of the CBD Strategy. To ensure that the subject site is treated in the same manner as the broader CBD, it is proposed to enter a VPA with the applicant to provide for an appropriate level of value capture from the increase in FSR. Should the developer fail to enter such a VPA, prior to the notification of the PLEP 2011 amendment, a clause under Part 7 will be included as follows:

7.13 Development on land at 14-20 Parkes Street, Harris Park:

(3) The consent authority will only grant consent to development on land to which this clause applies with a maximum floor space ratio greater than 4:1 where the applicant has entered into a Voluntary Planning Agreement with Council for community infrastructure/community benefit to reflect an acceptable level of value capture.

It is noted that design excellence is still applicable under this value sharing mechanism.

Design Excellence

The site is located within the area covered by clause 7.10 of *PLEP 2011* which requires development exceeding a height of 55 metres to undergo an architectural design competition. Proposals that demonstrate design excellence under the clause are able to seek variations to development standards (height and FSR) of up to 15%.

Under clause 7.10, this site may achieve a height of 140.5 metres (including flexibility for flooding features) and FSR of 11.5:1 given the applicant engages in a value sharing mechanism.

The design excellence process along with the accompanying DCP controls will ensure an acceptable urban design and public domain outcome.

2.1 Other relevant matters

Voluntary Planning Agreement

A draft Letter of Offer to enter into a voluntary planning proposal (VPA) was not provided with this planning proposal. However subject to achieving the maximum FSR as explained in *'Part 2 – Value Sharing/Funding Mechanism'* the applicant has shown interest in negotiating a VPA with Council.

2.1.1 Planning Proposal on opposite site

Located opposite the subject site, is a planning proposal for 122 Wigram Street, Harris Park. This planning proposal seeks a maximum building height of 77 metres (23 storeys), and a maximum FSR of 10:1 with an appropriate value sharing/funding mechanism as explained in section 2. The applicant is also intending to rely on the design excellence clause which can deliver up to an additional 15% to the building height and FSR.

At its meeting on 23 November 2015, Council endorsed the proposal so it could be forwarded to the DP&E for gateway consideration.

PART 3 – JUSTIFICATION

3.1 Section A - Need for the planning proposal

3.1.1 Is the Planning Proposal a result of any study or report?

This planning proposal is not the direct result of any strategic study or report, however relates to the Draft Parramatta CBD Planning Framework.

Council at its meeting of 27 April 2015, resolved to adopt the Parramatta CBD Planning Strategy. This strategy aims to set the vision for growth of the Parramatta CBD as Australia's next great city, establish principles and actions to guide a new planning framework for the Parramatta CBD, and provide a clear implementation plan for the delivery of the new planning framework for the Parramatta CBD.

Whilst this strategy is still a work in progress, key details of the Strategy as they currently apply to this site include a potential Floor Space Ratio (FSR) of 10:1 with an appropriate value sharing/funding mechanism) throughout the majority of the City Centre, and a building height that responds to appropriate built forms.

The Framework has informed the indicative scheme presented in the Urban Design Analysis included at **Appendix 1.** The Strategy identifies the opportunity for significant

growth in the Parramatta City Centre and the planning proposal is consistent with the current recommendations of this study.

3.1.2 Is the Planning Proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

A planning proposal seeking to amend *PLEP 2011* is the most effective way of achieving the intended outcome of the development, which is to enable a higher density mixed use residential development on a currently vacant site. The existing height and FSR standards would not permit the form of development envisaged in the planning proposal and would not allow the site to capitalise on its location.

3.2 Section B – Relationship to strategic planning framework

3.2.1 Is the planning proposal consistent with the objectives and actions contained within the applicable regional or sub-regional strategy?

A Plan for Growing Sydney

On 14 December 2014, the NSW Government released '*A Plan for Growing Sydney*' which outlines actions to achieve the Government's vision for Sydney which is a 'strong global city and a great place to live'.

In achieving this vision, A Plan for Growing Sydney has identified 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 the land and resources

Increased levels of growth in employment and residential sectors have been predicted, with an additional 664,000 new dwellings required in Sydney over the next 20 year period to accommodate for population growth. As Sydney's second CBD, Growing greater Parramatta will play a large role in delivering the needs for the growing population. This proposal will contribute to delivering these needs by contributing more diversity in housing choice within a well-connected location.

West Central Subregion Draft Subregional Strategy

Parramatta local government area is part of the West Central Subregion. *A Plan for Growing Sydney* identifies the following priorities for Parramatta and the West Central Subregion that will be relevant to the site and planning proposal:

Greater Parramatta – Sydney's Second CBD

- Recognise and plan Greater Parramatta as a transformational place;
- Plan Greater Parramatta as Sydney's second CBD and Western Sydney's number one location for employment and health and education services, supported by a vibrant mixture of land uses and cultural activity, with the Parramatta River foreshore as a focus for recreational activities;
- provide capacity for long-term employment growth in Greater Parramatta, particularly in its CBD;

- provide capacity for additional mixed-use development in Parramatta CBD and surrounding precincts including offices and retail in Parramatta CBD, health services in Westmead, an education hub around the new University of Western Sydney Campus, a technology and education precinct in Rydalmere, arts and culture in Parramatta, a sports precinct around Parramatta Stadium and housing in all precincts;
- enhance the role of the Parramatta Transport Interchange as the major bus/rail and future light rail interchange of Western Sydney;

This planning proposal is consistent with these priorities as it will:

- Contribute to achieving dwelling and employment targets for Sydney by enabling a residential development containing up to 321 dwellings, with 600 square metres of commercial space on a site located within the Parramatta City Centre that is in close proximity to existing transport infrastructure (including Parramatta Railway Station and bus interchange).

- Providing up to 321 residential dwellings in proximity to employment opportunities within Parramatta in addition to community, retail, and education and health facilities.

- Activate employment uses on the site and revitalise the site within the city centre by enabling a high quality built form outcome that is consistent with the vision for the City Centre.

NSW Long Term Transport Master Plan 2012

The NSW Long Term Transport Master Plan 2012 is an integrated and comprehensive framework aimed at addressing NSW transport challenges over the next 20 years, and indicates support for the Parramatta Light Rail system.

As the site is located within 400 metres of the Parramatta transport interchange, this will allow future occupants and workers to take advantage of existing and potential new transport options. Development located near transit is likely to increase the use of public transport, encouraging non-motorised travel and walkability under the plan.

Development of a high density site will also increase demand for transport services and in the long term improve overall viability.

3.2.2 Is the planning proposal consistent with the local council's Community Strategic Plan or other local strategic plan?

The following strategic planning documents are relevant to the planning proposal.

Parramatta 2038 Community Strategic Plan

Parramatta 2038 is a long term Community Strategic Plan for the City of Parramatta and it links to the long-term future of Sydney. The plan formalises several transformational ideas for the City and the region associated with the economy, environment, connectivity, people and neighbourhoods, culture and sport and leadership and governance.

The planning proposal is considered to meet the strategies and key objectives identified in the plan in helping to build Parramatta's vision as a world-class city. The development will provide a high quality, mixed use residential/commercial development supporting the

city centre and revitalisation of the site. The development will provide increased housing in proximity to transport nodes and contribute towards dwelling targets within Parramatta, as well as provide employment through the proposed commercial use within the city centre.

Parramatta CBD Planning Strategy

On 27 April 2015, Council resolved to adopt the Parramatta CBD Planning Strategy. This strategy aims to set the vision for growth of the Parramatta CBD as Australia's next great city, establish principles and actions to guide a new planning framework for the Parramatta CBD, and provide a clear implementation plan for the delivery of the new planning framework for the Parramatta CBD.

Whilst the Parramatta CBD Planning Strategy is yet to be finalised, it has been used as the overarching strategy informing this planning proposal. As a result, the planning proposal is consistent with the strategy's vision and aligns with the current draft recommended built form controls that have been resolved by Council. This proposal will help to facilitate the vision for growth of the Parramatta CBD by allowing the redevelopment of the site for a mixed use residential and commercial development.

3.2.3 Is the planning proposal consistent with the applicable State Environmental Planning Policies?

The following State Environmental Planning Policies are of relevance to the site.

TABLE 6: RELEVANT STATE ENVIRONMENTAL PLANNING POLICIES

SEPP	Relevance	Consistency	Comments
SEPP 32 Urban Consolidation (Redevelopment of Urban Land)	The land is zoned for urban development under the current Zone B4 Mixed Use.	Yes	The draft Planning Proposal is consistent with the Policy by facilitating additional floor space on an infill site which is currently underutilised and is readily serviced by utilities, and accessible to transport, recreational and commercial land uses.
SEPP 55 Remediation of land	The policy states that land must not be developed if it is unsuitable for a proposed use because it is contaminated.	Yes	Assessment of the site indicates that contamination was not a constraint on the site and is suitable for residential and commercial uses.
SEPP No. 65 – Design Quality of Residential Flat Development	Raises the design quality of residential apartment development across the state through the application of a series of design principles.	Yes	Detailed testing of SEPP 65 Compliance and Apartment Design Guidelines (ADG) was conducted throughout the assessment of the proposal. Detailed compliance with SEPP 65 will be demonstrated at the DA stage.

3.2.4 Is the planning proposal consistent with applicable Ministerial Directions (s.117 directions)

In accordance with Clause 117(2) of the *EP&A Act 1979* the Minister issues directions for the relevant planning authorities to follow when preparing planning proposals for new LEPs. The directions are listed under the following categories:

- Employment and resources
- Environment and heritage
- Housing, infrastructure and urban development
- Hazard and risk
- Regional planning
- Local plan making
- Metropolitan planning

The following directions are considered relevant to the subject Planning Proposal.

Section	Comment	Consistent
1 Employment and resources		
1.1 Business and industrial zones	This planning proposal is consistent with this direction in that: • It does not propose to change the zoning of the site. The proposed mixed use remains consistent with the current zoning of the site. • By increasing the height of buildings and FSR controls of the site, this will facilitate the proposed development and commercial use, which will contribute to employment growth.	Yes
3 Housing, Infrastructure and Urban Development		
3.1 Residential Zones	This planning proposal is consistent with this direction in that it will: • Encourage a variety and choice of housing types by facilitating a mixed use development that will provide 39 storeys of residential development. • Facilitate an increase of residential densities and housing choice in a location that is close to existing infrastructure including public transport, shops, and employment	Yes
3.4 Integrating Land Use and Transport	This planning proposal is consistent with this direction in that it will: • Provide increased dwellings and housing choice in	Yes

	proximity to transport nodes including cycle ways, walking catchments, Parramatta Railway station and Parramatta bus interchange. This will support the viability of existing transport as well as support future transport options. • As the residential development is located near transit, it will increase the use of public transport and reduce motorised travel for people (both those employed within the city centre and residents). • Increased higher density development near transit will place increased demand on the need for more infrastructure including transport. • Provide 600 square metres of commercial/retail space in proximity to transport.	
3.5 Development near licensed aerodromes	This planning proposal is consistent with this direction in that: • The proposed height of 122.5 metres is below the 156 metre Bankstown Airport Obstacle Limitation Service for Parramatta CBD.	Yes
4. Hazard and Risk		
4.1 Acid Sulfate Soils	The site under this planning proposal is affected by Class 4 Acid Sulfate soils. This planning proposal does not seek to amend the acid sulfate provisions under the Parramatta LEP 2011. Any further investigation will be addressed at the development assessment stage.	Yes
4.3 Flood Prone Land	This site is identified as flood prone under the Parramatta LEP 2011. The supporting flood advice indicates that the development of the site is able to be designed consistently with the Floodplain Development Manual 2005 and relevant Council flood planning controls. The planning proposal is also considered to be consistent with the Section 117 Direction 4.3 – Flood Prone Land. Further detailed	Yes

	design features and evacuation measures to respond to the flood affectation can be implemented at the DA stage.	
7. Metropolitan Planning		
7.1 Implementation of a Plan for Growing Sydney	As detailed above in in section 3.2.1, the planning proposal is consistent with the directions, actions and priorities for Parramatta and the West Central Subregion as set out in *A Plan for Growing Sydney.*	Yes

Section C – Environmental, social and economic impact

This section considers the potential environmental, social and economic impacts which may result from the Planning Proposal.

3.3.1 Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected as a result of the proposal?

The supporting studies accompanying this planning proposal indicate that the subject site does not contain any critical habitat, or threatened species, populations or ecological communities, or their habitats will be adversely affected as a result of this proposal.

3.3.2 Are there any other likely environmental effects as a result of the planning proposal and how are they proposed to be managed?

The main potential environmental impacts to be examined in detail with any future development proposal for the site are:

- Urban Design and Built Form
- Flooding
- Traffic and Transport

Urban Design and Built Form

The Urban Design Analysis in Appendix 1 provides an indicative development scheme for the site to reflect the objectives of the planning proposal**.**

The proposed built form has been designed to respond to the local context, and to ensure impacts on amenity are minimised whilst allowing the site to achieve its maximum development potential.

The table below indicates the development concept for the site investigated in the urban design study provided at Appendix 1.

Site	FSR		Height of Buildings	
	Base	With 15% design excellence bonus	Base	With 15% design excellence bonus
14-20 Parkes Street, Harris Park	10:1	11.5:1	122.5 metres	140.5 metres (including flood features)

The built form includes a podium element that includes above ground car parking sleeved with 4 levels of active uses, to lessen its visual impact on the streetscape. The 4 storey height and sleeved car parking will create a street frontage condition that remains consistent with the street and Parramatta DCP 2011 controls.

The design concept indicates an acceptable level of compliance with SEPP 65 Apartment Design Guidelines. The concept demonstrates that the development of this site would not unreasonably compromise the potential future development of adjoining sites. The orientation and width of the tower will assist in providing affected properties with reasonable solar access during the hours of 9am-3pm during mid-winter.

The site is not a heritage item in its own right, however is located in proximity to three (3) heritage items to the north-east of the site at 113-115 Wigram Street and 23-25 Hassall Street (see figure 2), although the visibility from and to the subject site is obscured by a 9 storey mixed use building at 111 Wigram Street. The site is also in proximity to the Harris Park Conservation Area. Whilst this proposal has not been required to provide a supporting heritage study, the built form outcome of the proposed development will need to ensure minimal impacts on scale, views and amenity in relation to heritage items, and the Harris Park Heritage Conservation Area.

More detailed site planning and built form assessments would take place as part of the design excellence competition and development application (DA).

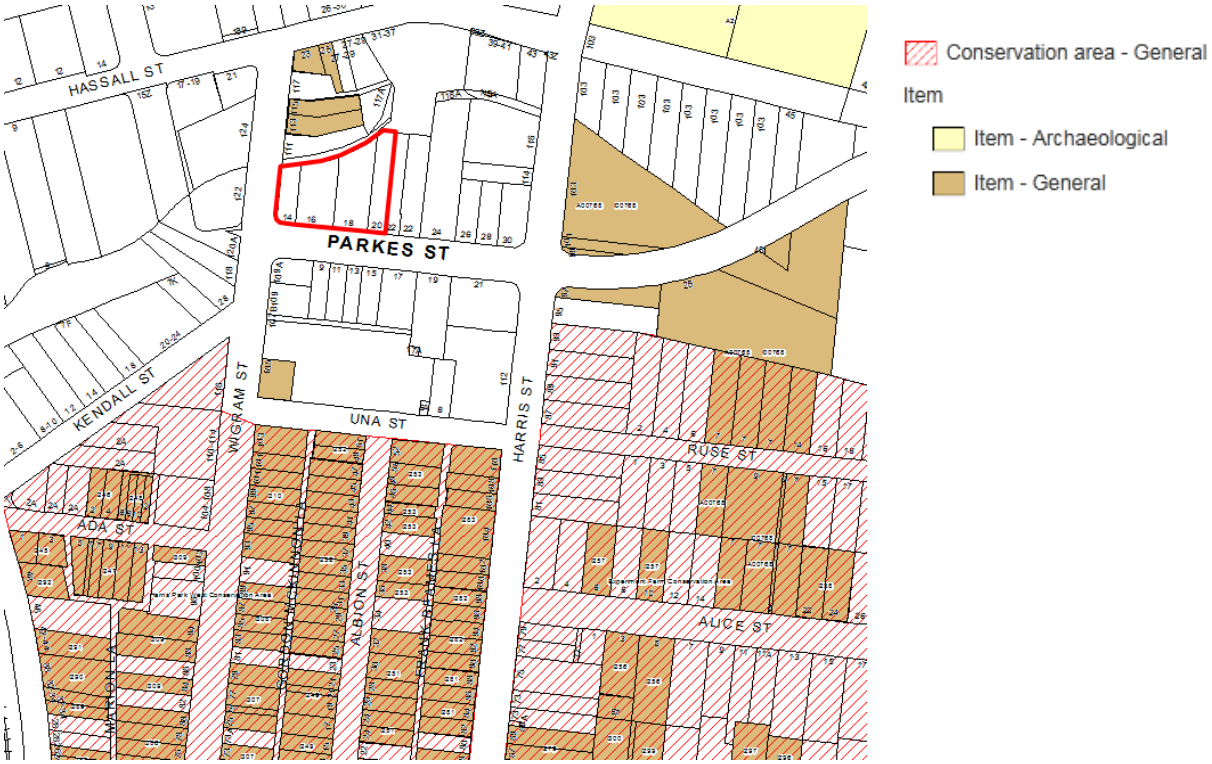


Figure 2 - Subject site in relation to heritage
Source – Parramatta City Council, 2016

Flooding

This site is identified as flood prone under the Parramatta LEP 2011.The Flood Planning Levels (FPL) for the site are:

- RL 8.30m AHD for the 1:100 year flood (as at the intersection of Parkes and Wigram Street)
- RL 9.91m AHD for the PMF

Supporting flooding advice overall indicates that the development of the site is consistent with the controls for residential development affected by flooding, specifically the Environmental Planning and Assessment Act 1979 Section 117 Direction 4.3 Flooding, and is also consistent with the Flood Planning Level for residential development outlined in the Floodplain Development Manual 2005 being the 100 Year ARI (average recurrent interval) flood event. Flooding is addressed in 'Hazard and risk - 4.3 Flood Prone Land', Section 3.2.4.

The proposal is for a 39 storey predominantly residential mixed use building which includes five levels of above ground car parking. The above ground car parking has been included to respond to the flood constraints of the site.

Development of the site is to include screening of raised ground floors accommodating retail and lobby uses, and the activation of their frontages. The provision of a flood refuge area has also been included, and is to be located on the street level towards the lobby. Design features and evacuation measures as part of a future flood evacuation strategy and building management plan will be addressed as part of the design excellence and DA process.

A copy of the flooding assessment can be found in Appendix 2.

Traffic and Transport

A traffic and transport assessment has been prepared by Varga Traffic Planning and can be found at Appendix 3.

Any future development under the provision of the revised planning controls will not result in substantially adverse impacts on traffic and the local road network as the site is located in proximity to transit. Rather, it will promote the use of public transport in a highly accessible location.

The proposed development indicates ingress/egress at the northern end of the Wigram street frontage. Whilst the desired location of the driveway is further north, the study indicates that relocating the driveway further north it will affect the canal and impede on adequately responding to the sites flood affectation. Detailed design concerning this matter will be resolved at DA stage.

3.3.3 How has the planning proposal adequately addressed any social and economic effects?

There is adequate justification for this planning proposal which will facilitate an increase in density and the future development of housing.

The future development will provide approximately 321 dwellings and will likely incorporate a mix of apartment types to respond to the diverse population and contribute to housing choice and affordability. In providing increased dwellings and housing choice

in proximity to transport nodes this will support the viability of existing transport as well as support future transport options. Based on the assumed development outcomes the proposal has the potential to generate jobs during the construction phase.

The provision of 600 square metres of commercial floor space consisting of retail will also generate employment, and contribute to the vitality of Parramatta.

A Voluntary Planning Agreement/contributions framework addressing contributions towards community, recreation and physical services will be developed between the proponent and Council. It is intended that any VPA be exhibited concurrently with the planning proposal in accordance with Council's VPA policy.

Section D – State and Commonwealth Interests

3.3.4 Is there adequate public infrastructure for the planning proposal?

The subject land is located approximately 400 metres from Parramatta Railway Station/Bus terminal, and within 500 metres from services such as Parramatta Westfield. The site is also in walking distance to educational facilities including Arthur Phillip High school and Parramatta Public school.

Civil and utility infrastructure is suitably accessible to service the subject land and support the proposed development. Redevelopment of the subject site and further development within the area can optimise public infrastructure investment.

3.3.5 What are the views of State and Commonwealth public authorities consulted in accordance with the gateway determination?

It is recommended that State and Commonwealth authorities will be consulted in accordance with Section 57 of the *EP&A Act 1979*, following the outcomes of the gateway determination.

PART 4 – MAPPING

This section contains the mapping for this planning proposal in accordance with the DP&E's guidelines on LEPs and Planning Proposals.

4.1 Existing controls

This section contains map extracts from *PLEP 2011* which illustrate the current controls applying to the site.

Figure 4.1 – Existing zoning extracted from the *PLEP 2011* Land Zoning Maps

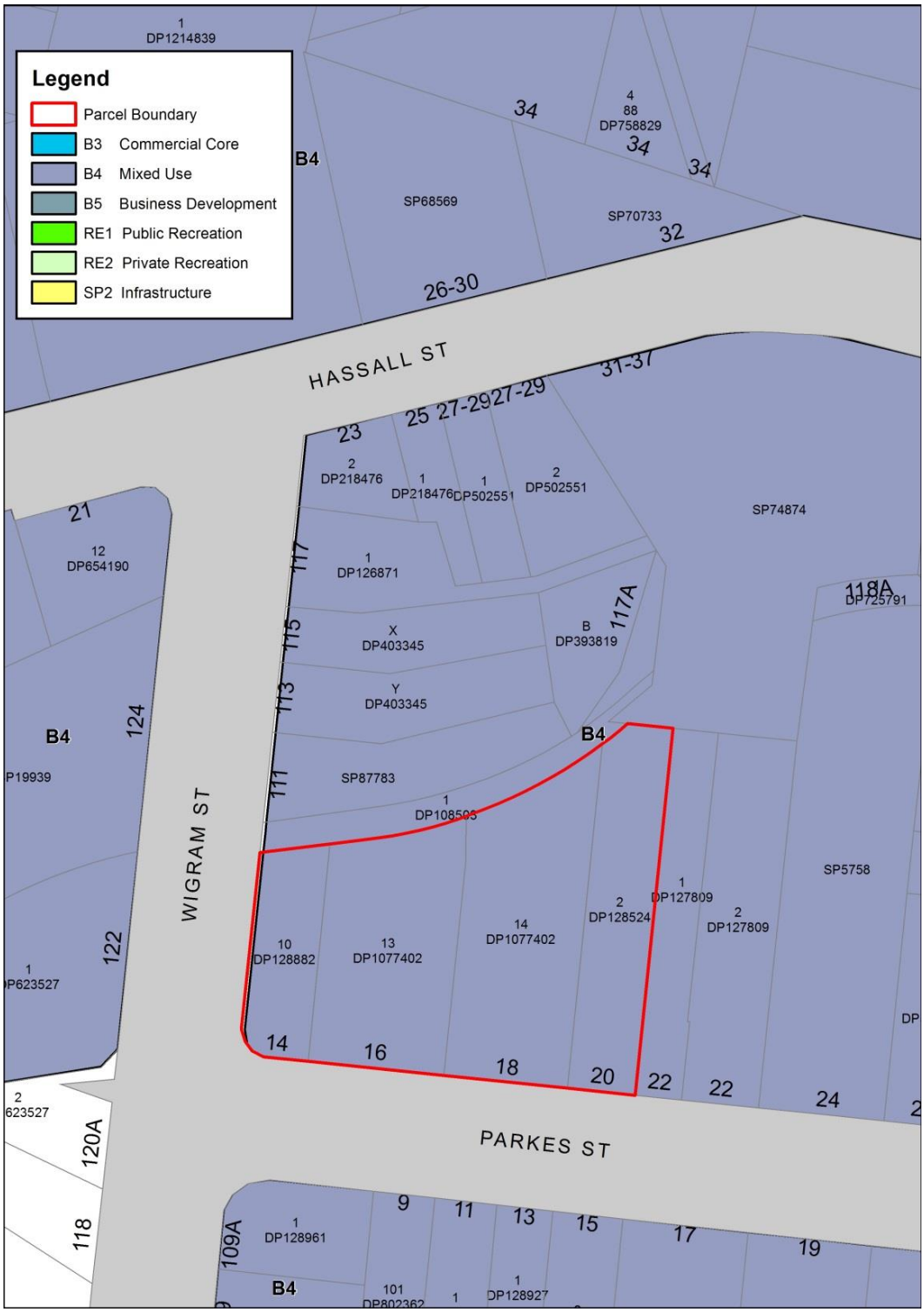


Figure 4.2 – Existing building heights extracted from the *PLEP 2011* Height of Buildings Maps

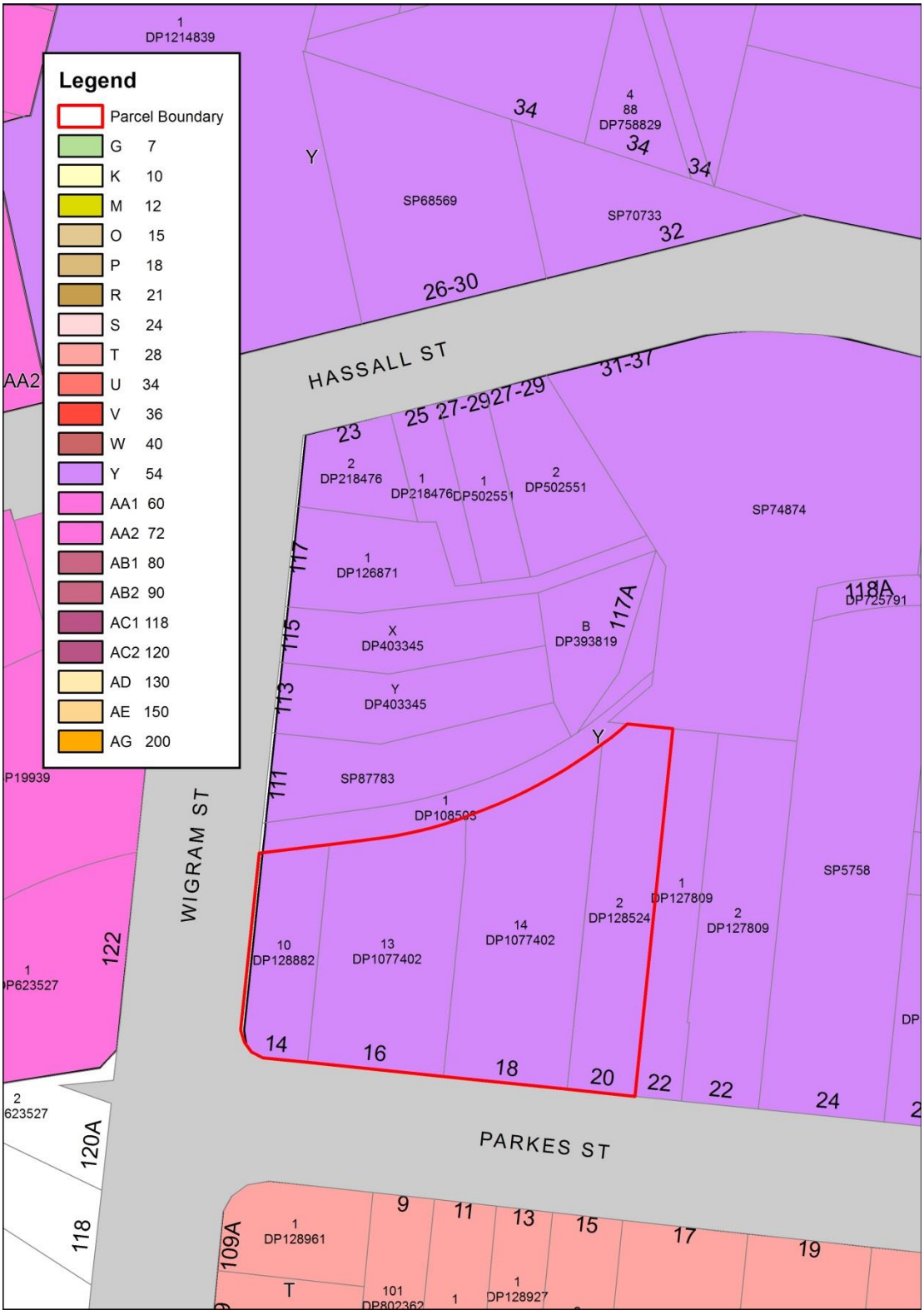
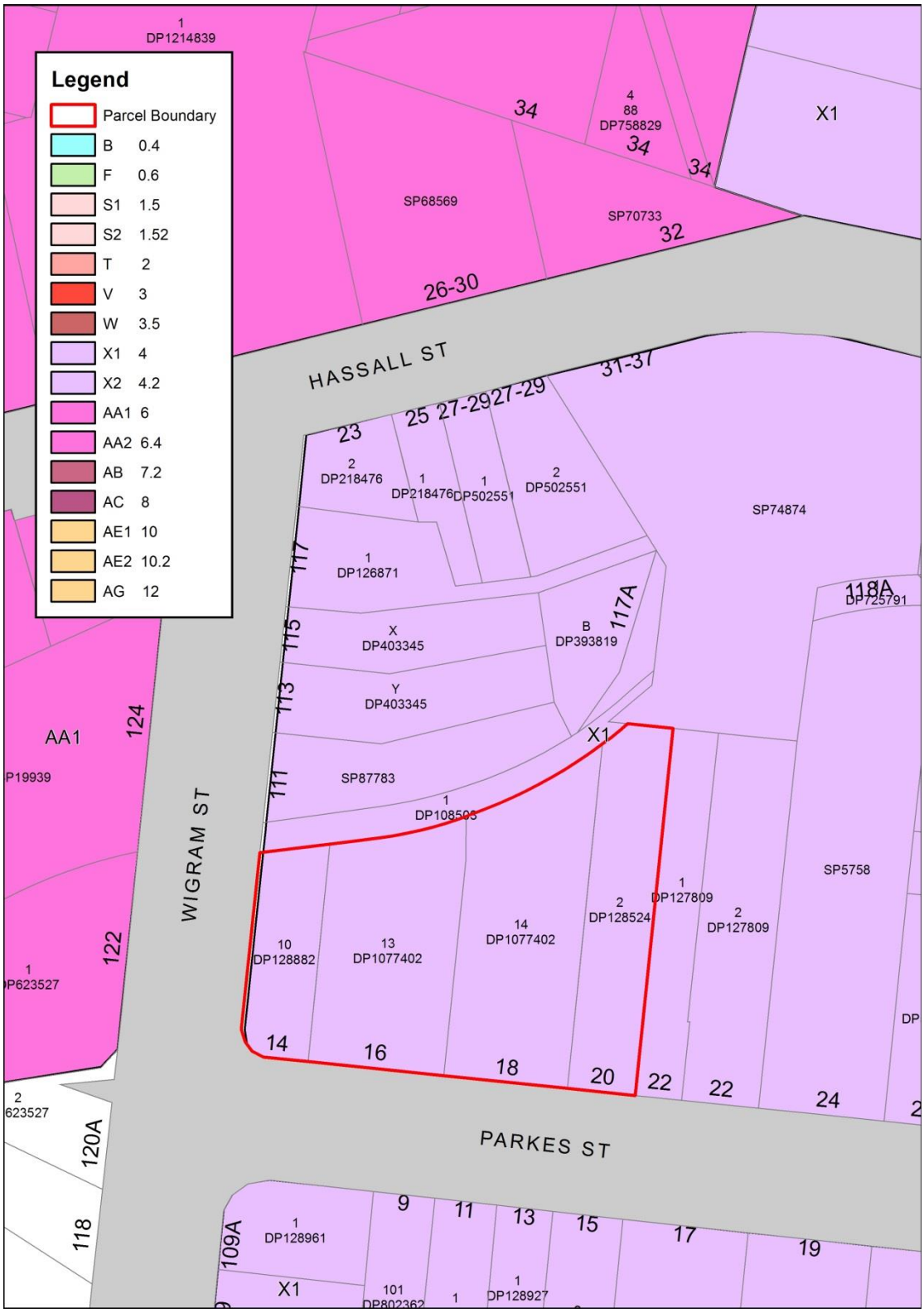


Figure 4.3 – Existing floor space ratio extracted from the *PLEP 2011* Floor Space Ratio Map



4.2 Proposed controls

The figures in this section (Figures 4.2.1 and 4.2.2) illustrate the proposed building height and floor space ratio controls sought by this planning proposal.

Figure 4.2.1 illustrates proposed maximum building height of 122.5 metres for the site. The proposed height excludes the 15% achievable under design excellence (which equates to a total height of 140.5 metres).

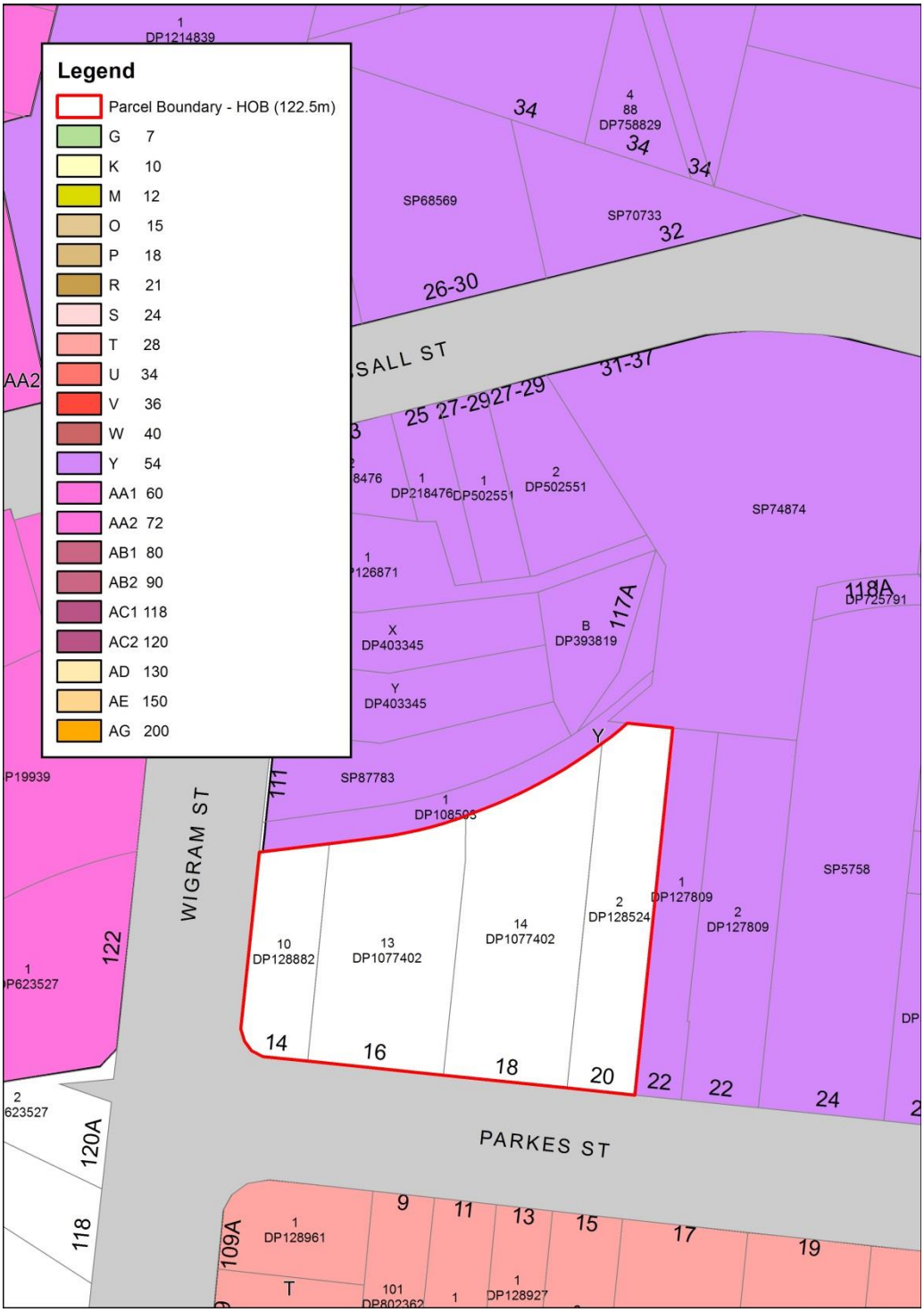
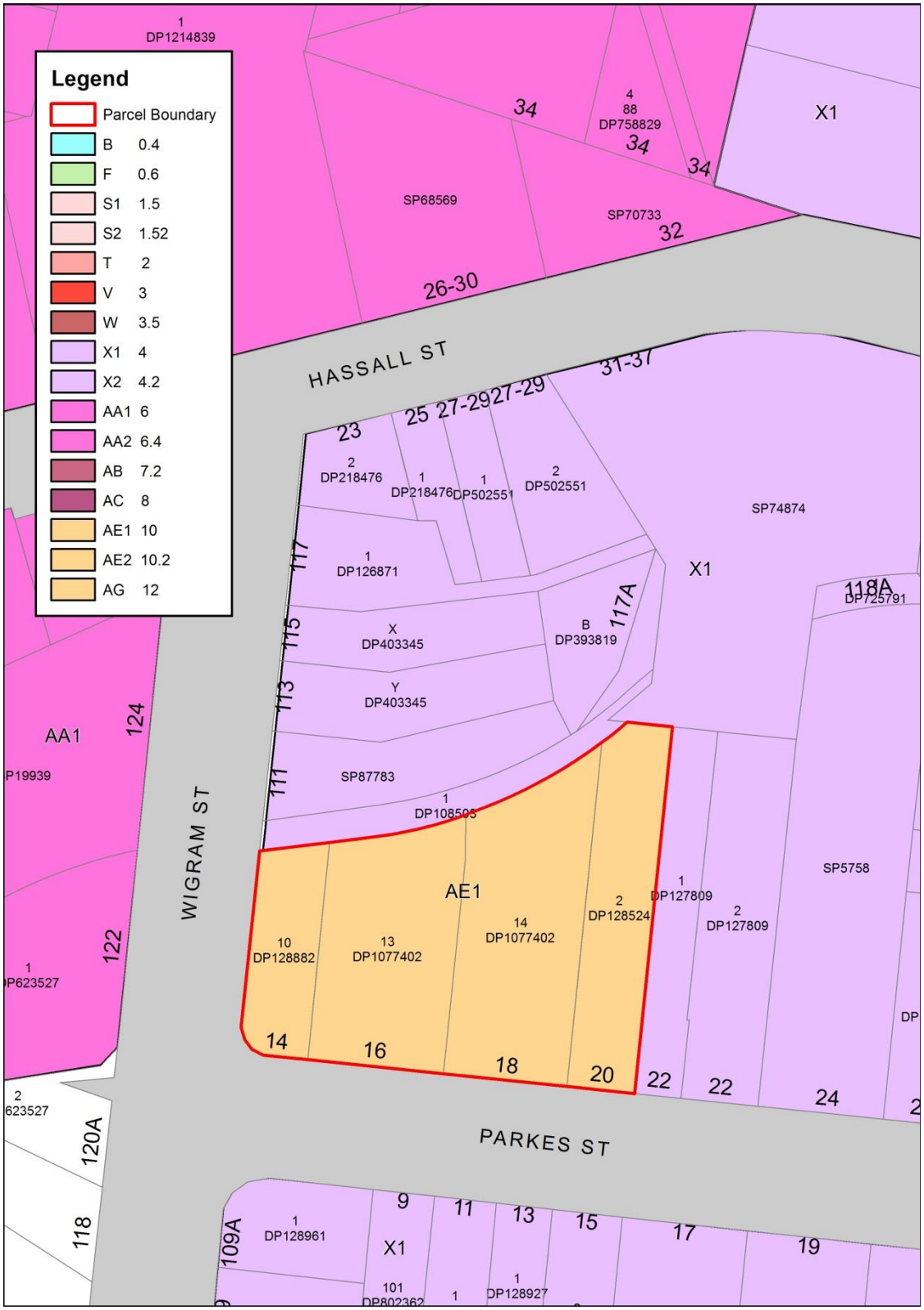


Figure 4.2.2 illustrates the proposed 10:1 FSR for the site. This excludes the 15% achievable under design excellence (which equates to a total FSR of 11.5:1).



PART 5 – COMMUNITY CONSULTATION

In accordance with Section 57(2) of the *EP&A Act 1979*, the Director-General of Planning must approve the form of the planning proposal, as revised to comply with the gateway determination, before community consultation is undertaken.

Public exhibition is likely to include:

- newspaper advertisement;
- display on the Council's web-site; and
- written notification to adjoining landowners.

The gateway determination will specify the level of public consultation that must be undertaken in relation to the planning proposal including those with government agencies.

Pursuant to Section 57(8) of the *EP&A Act 1979* the Responsible Planning Authority must consider any submissions made concerning the proposed instrument and the report of any public hearing.

PART 6 – PROJECT TIMELINE

The detail around the project timeline is expected to be prepared following the referral to the Minister for a Gateway Determination.

The following steps are anticipated:

- Referral to Minister for a Gateway determination (February 2016)
- Issue of Gateway determination (April 2016)
- Commencement and completion dates for public exhibition period and government agency notification (June 2016)
- Consideration of submissions (July 2016)
- Consideration of proposal post exhibition and reporting to Council (August 2016)
- Submission to the Department to finalise the LEP (October 2016)
- Notification of instrument (December 2016)

Appendix 1 – Urban Design Report

architectus™

18 Parkes Street, Urban Design Study

Urban Design Study

For: Chiwayland Australia

c/o Level 1, Suite F, 110 George Street

Parramatta NSW 2150

Date: 2/07/2015

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Contents

Overview

Scope

This report addresses the development potential for 18 Parkes Street, Parramatta.

Key Issues

– Site is flood prone so above ground parking needs to be considered.

– Opportunity to maximise views to River and Parklands.

The Proposal

The proposal outlined in this report is for a 4-storey podium with the following options:

– FSR 4.0:1, 54m height and 17-storey tower (complying with existing controls).

– FSR 6.0:1, 79m height and 25-storey tower.

– FSR 8.0:1, 100m height and 32-storey tower.

– FSR 10.0:1, 122.5m height and 39-storey tower.

– FSR 11.5:1, 141m height and 45-storey tower.

Introduction

Draft Metropolitan Strategy

The Parramatta City Centre is planned as the second largest centre in Sydney after 'Global Sydney' (i.e. Central Sydney and North Sydney) in the Draft Metropolitan Strategy. It is the alternative CBD for Sydney.

Planned growth for metropolitan Sydney comprises:

– 545,000 new houses across Sydney by 2031

– 625,000 new jobs across Sydney by 2031

of which for the West Central and North West sub region targets are:

– 148,000 new houses; and

– 142,000 new jobs

The Parramatta City Centre is the main centre for this growth.

Parramatta as described within the Draft Metropolitan Strategy

Parramatta is Sydney's Premier Regional City and single biggest concentration of employment outside Global Sydney.

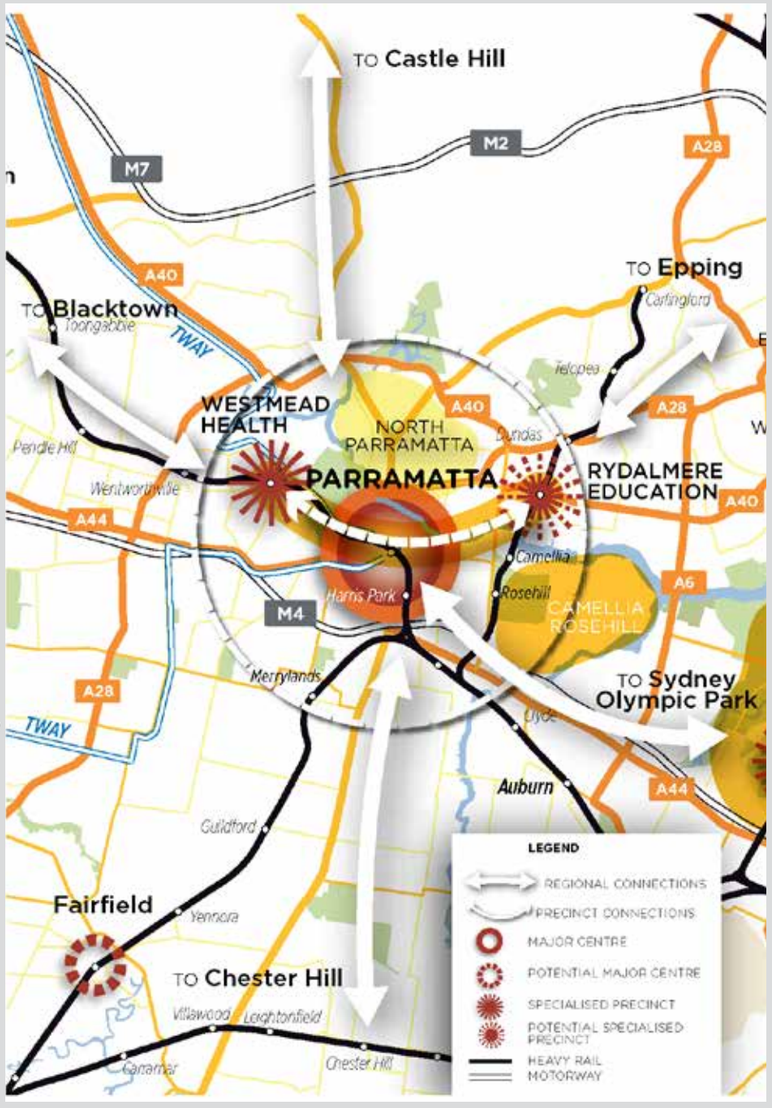
Parramatta is anticipated to be the fastest growing centre outside Global Sydney over the next 20 years.

As Sydney's population grows and changes over the life of this Strategy, more than 50 per cent of Sydneysiders will be residents of Western Sydney and will be serviced by Parramatta.

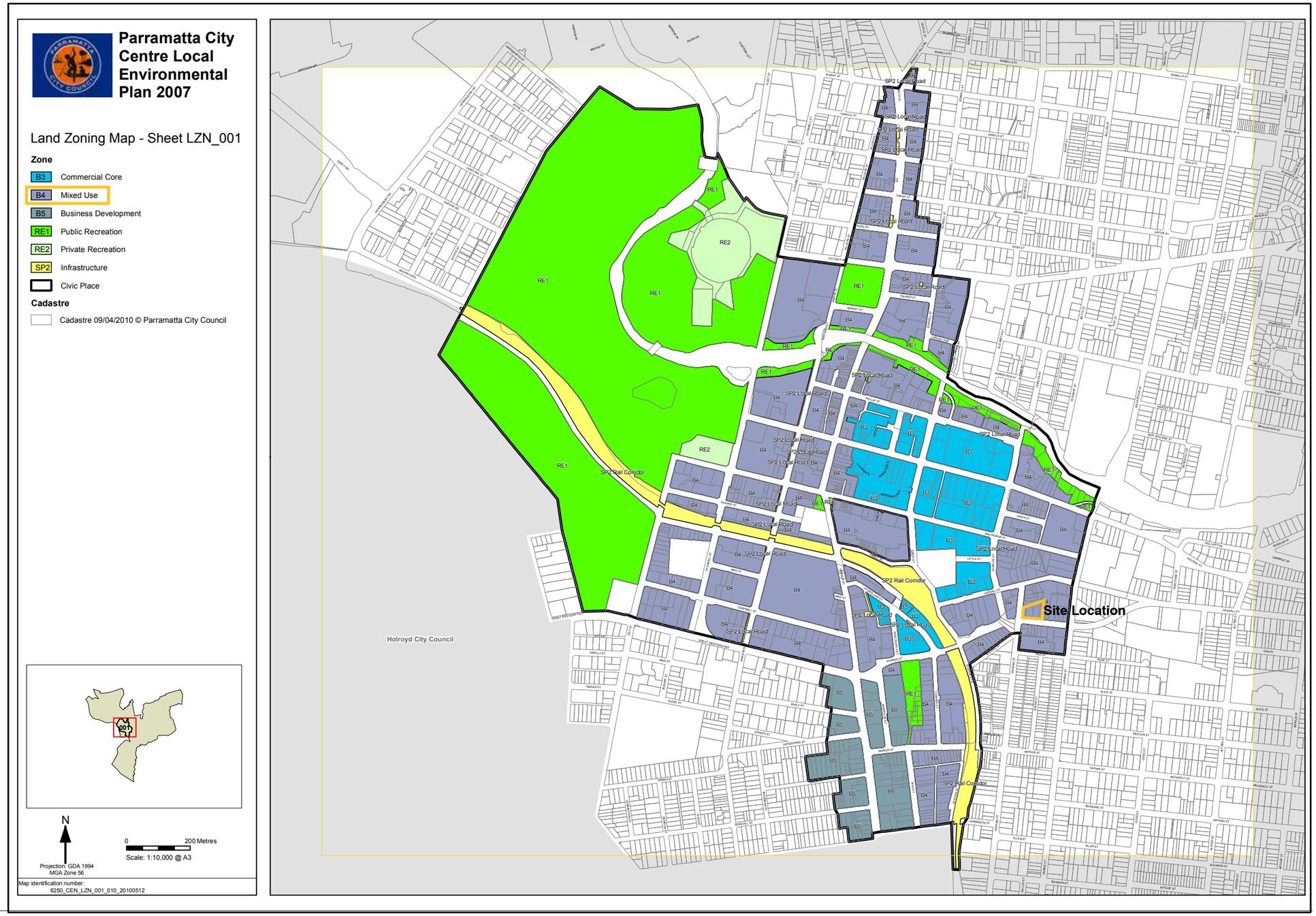
Parramatta is expected to grow beyond its own City Centre boundaries into the surrounding precincts of Westmead, North Parramatta, Harris Park, Rydalmere (including the University of Western Sydney campus) and Rosehill/Camellia.

Priorities for Parramatta

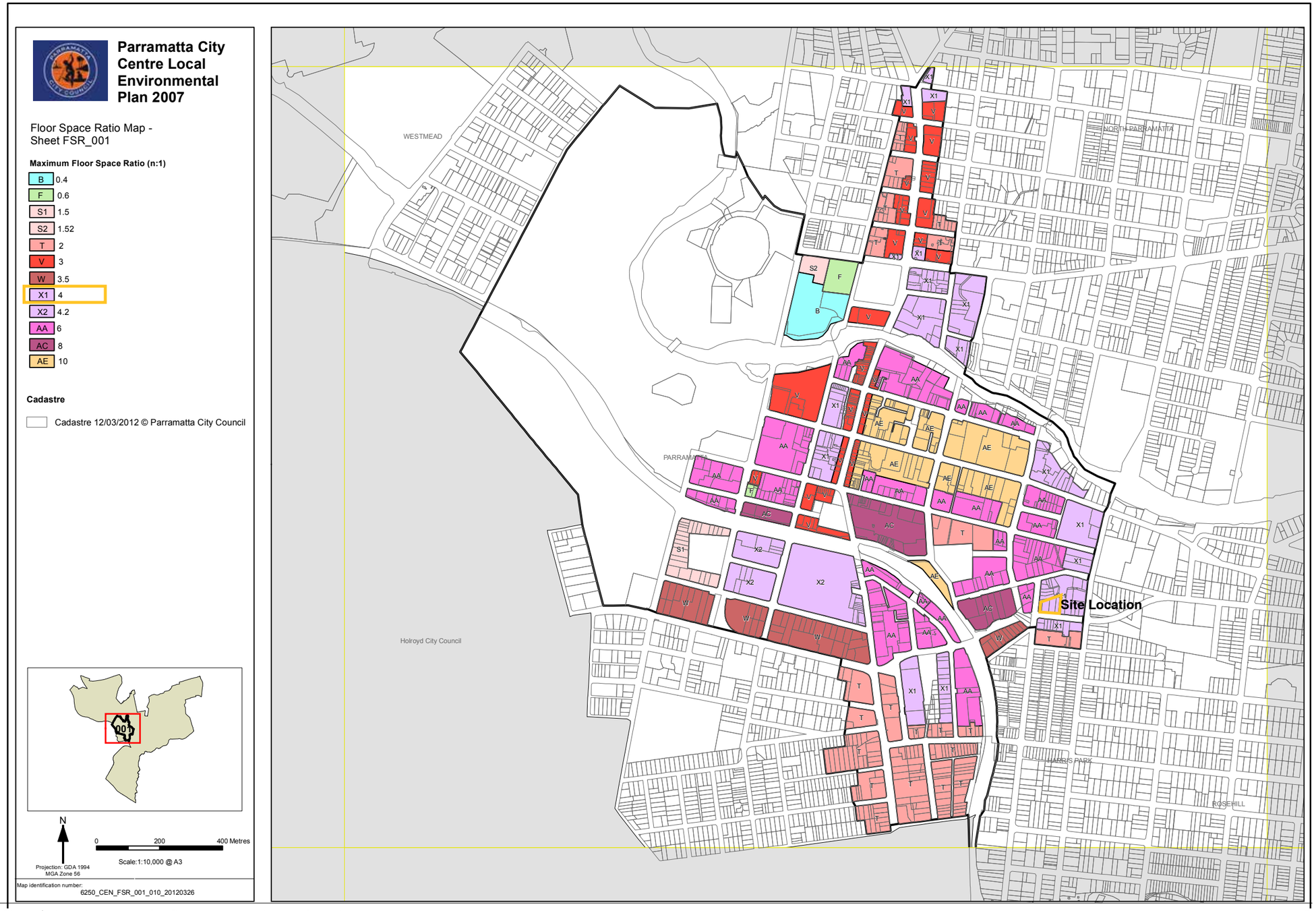
- *create an additional 21,000 new jobs in Parramatta City Centre and support opportunities for economic clustering by extending the commercial core*
- *provide a further 7,000 new jobs at Westmead and capitalise on the employment and research benefits as Sydney's largest health precinct*
- *develop Rydalmere as Western Sydney's premier university precinct*
- *facilitate efficient movement between Westmead and Rydalmere through the Parramatta City Centre*
- *improve transport connections between Parramatta and other Western Sydney centres and employment precincts and investigate long-term opportunities for light rail that would connect to Castle Hill, Chester Hill, Bankstown, Blacktown and Carlingford*
- *plan for efficient connections to and from Parramatta through bus priority systems, an upgraded interchange and planning for rapid transit to Macquarie Park or Epping in line with the Long Term Transport Master Plan*
- *identify, promote and connect the separate precincts that comprise Parramatta City including North Parramatta and Rydalmere, while recognising important local heritage.*



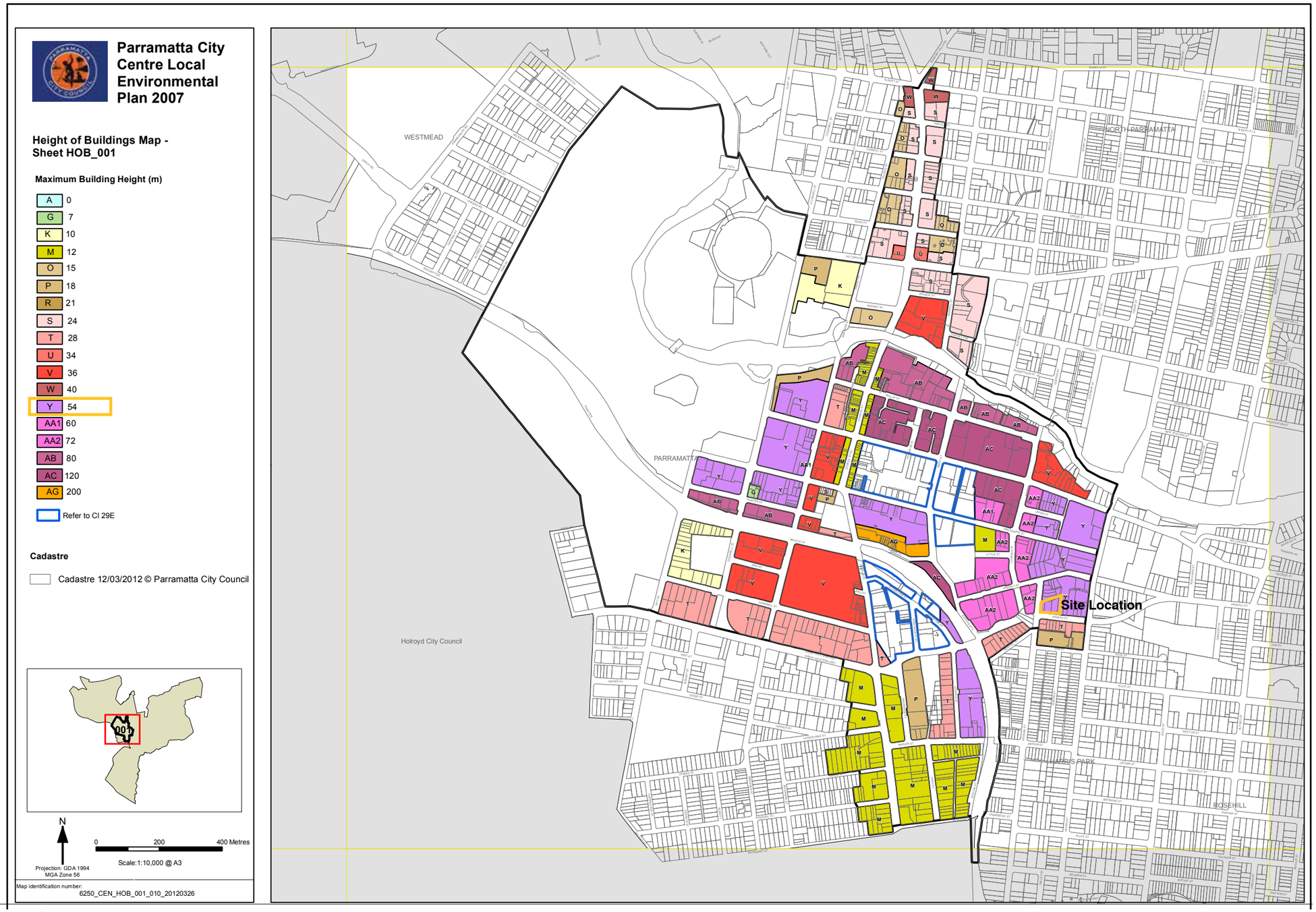
Existing Planning Controls
LEP Land Use Zoning



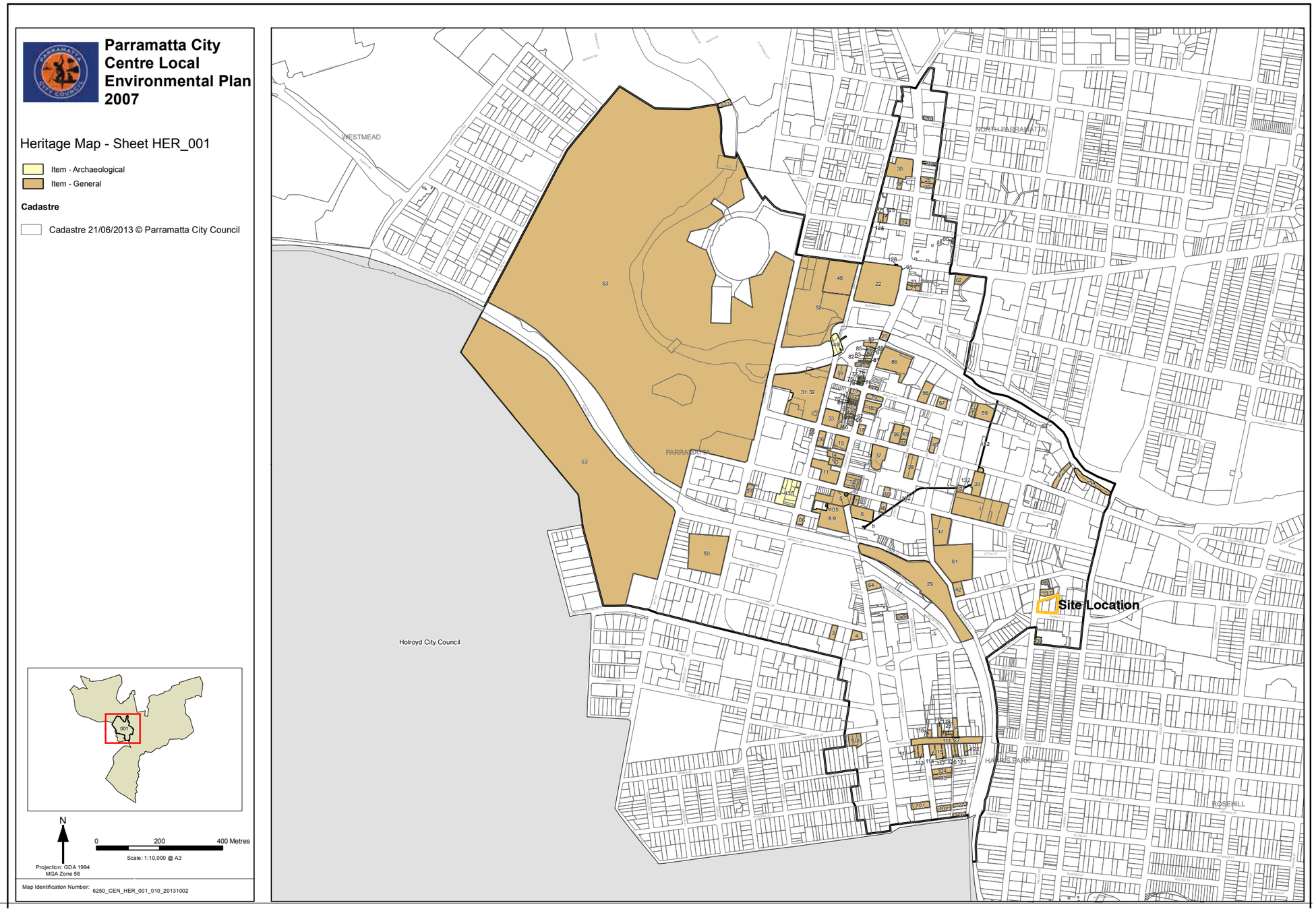
Existing Planning Controls
LEP Floor Space Ratio (FSR)



Existing Planning Controls
LEP Height of Building



Existing Planning Controls
LEP Heritage



Existing Planning Controls
LEP Flood Prone Land

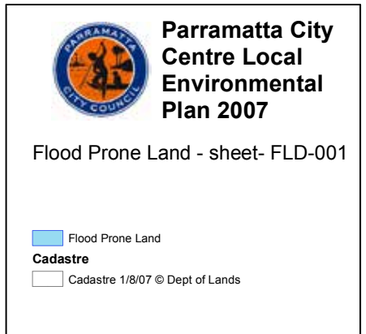
Parramatta City Centre Local Environmental Plan 2007

Flood Prone Land - sheet- FLD-001

Flood Prone Land

Cadastre

Cadastre 1/8/07 © Dept of Lands



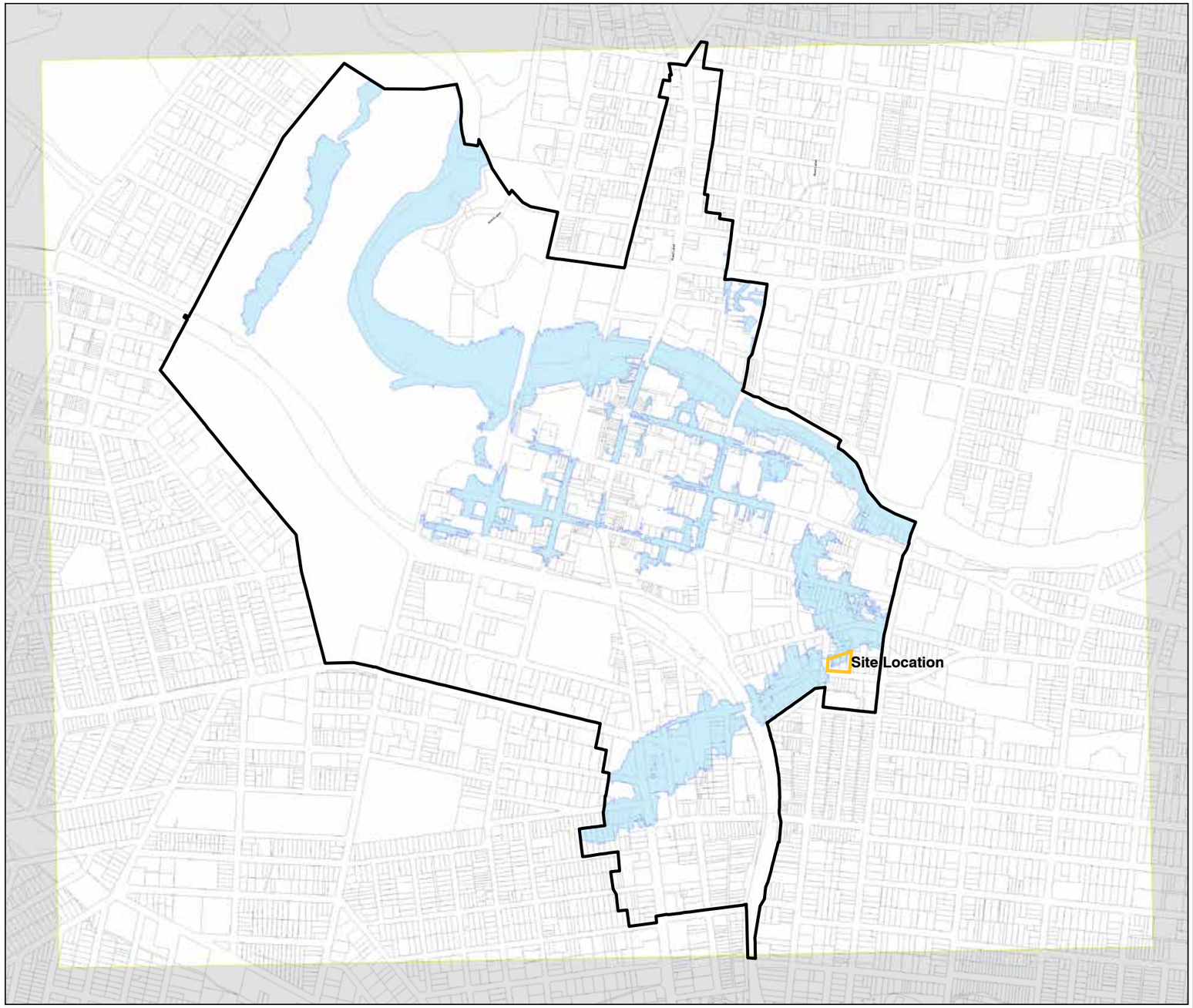
N

0 200 400 Metres

Scale: 1:10,000 @ A3

Projection: GDA 1994
Zone 56

Map identification number:
6250_CEN_FLD_001_010_20071205



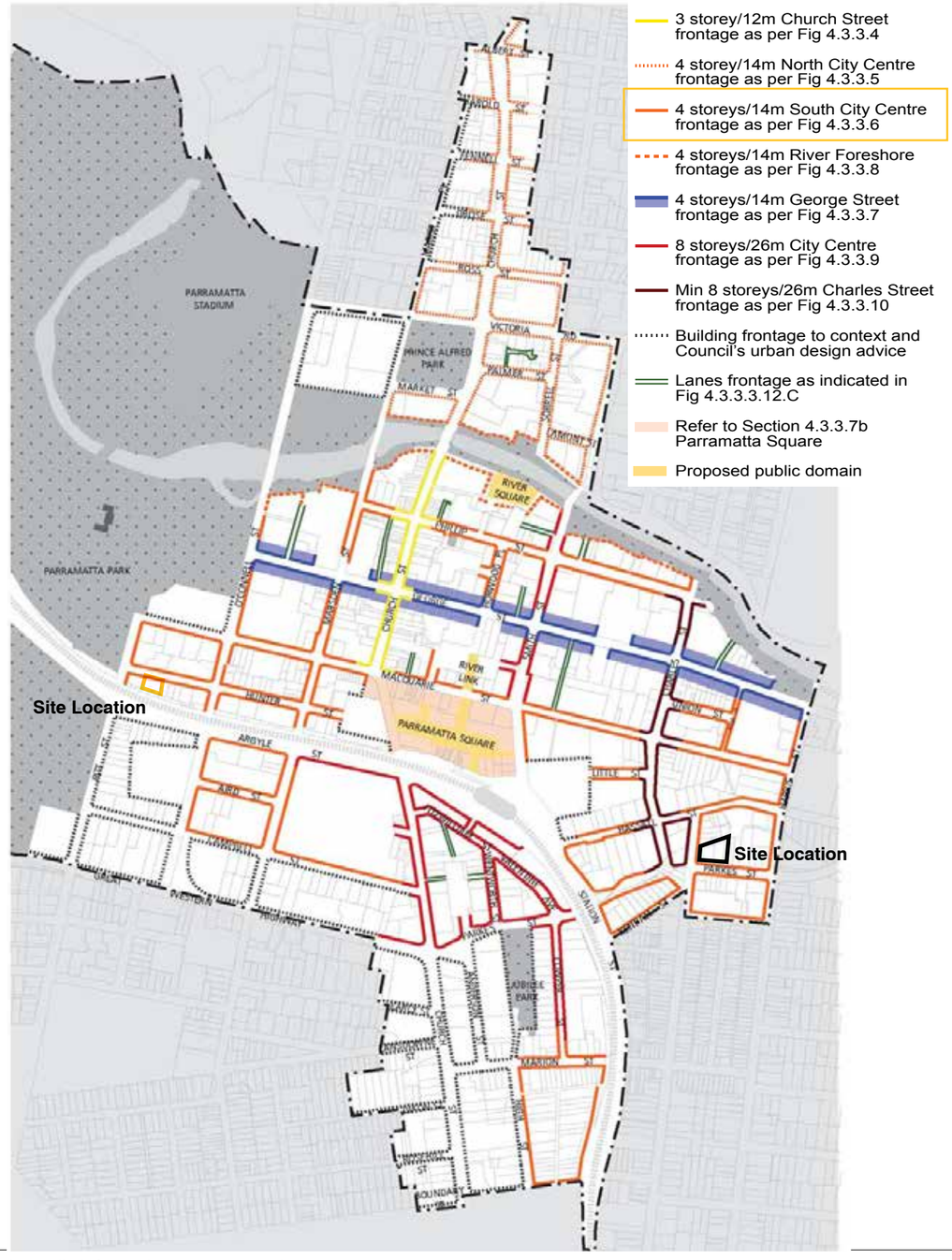
Existing Planning Controls
DCP - Street frontage height

Podium level setbacks

Parramatta DCP requires the following setbacks:

– zero setback for street frontage to 4 storeys / 14m

– zero setback for side and rear boundaries up to the street frontage height



Existing Planning Controls
DCP - tower setbacks and podium car park sleeving

Setbacks

For built form above the 4 storey / 14m street frontage height:

– 6m front setback for buildings above the street frontage height

– 6m side setback for non-residential uses

– 12m side setback for residential uses

Podium car park sleeving

– The Parramatta City Centre DCP requires above ground car parking to the sleeved with retail, commercial or residential development

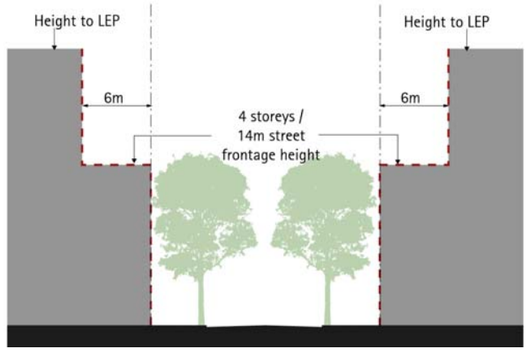
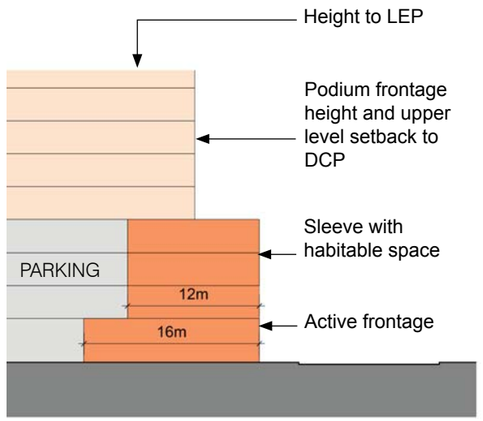
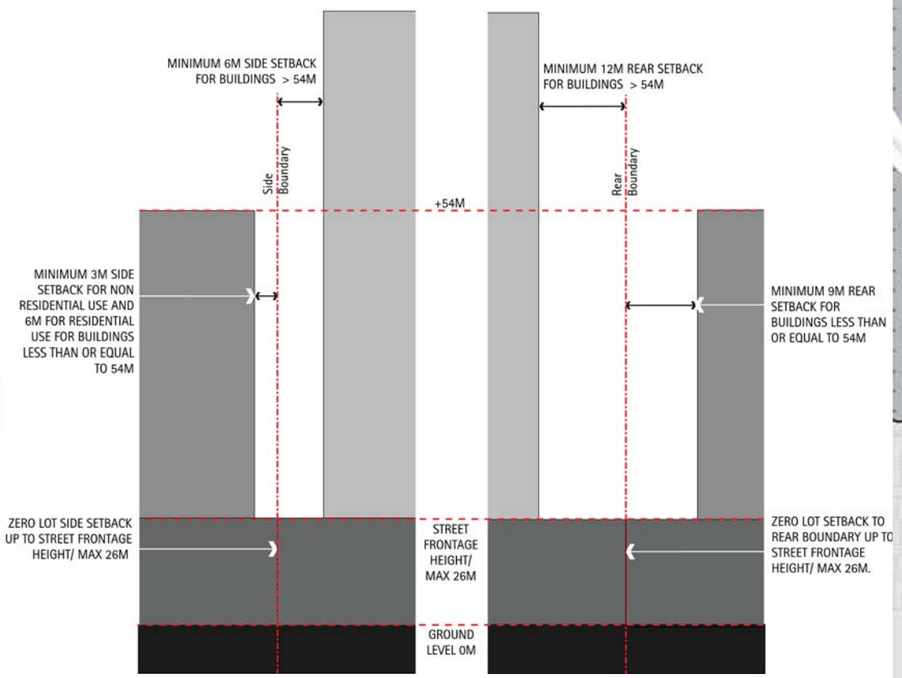
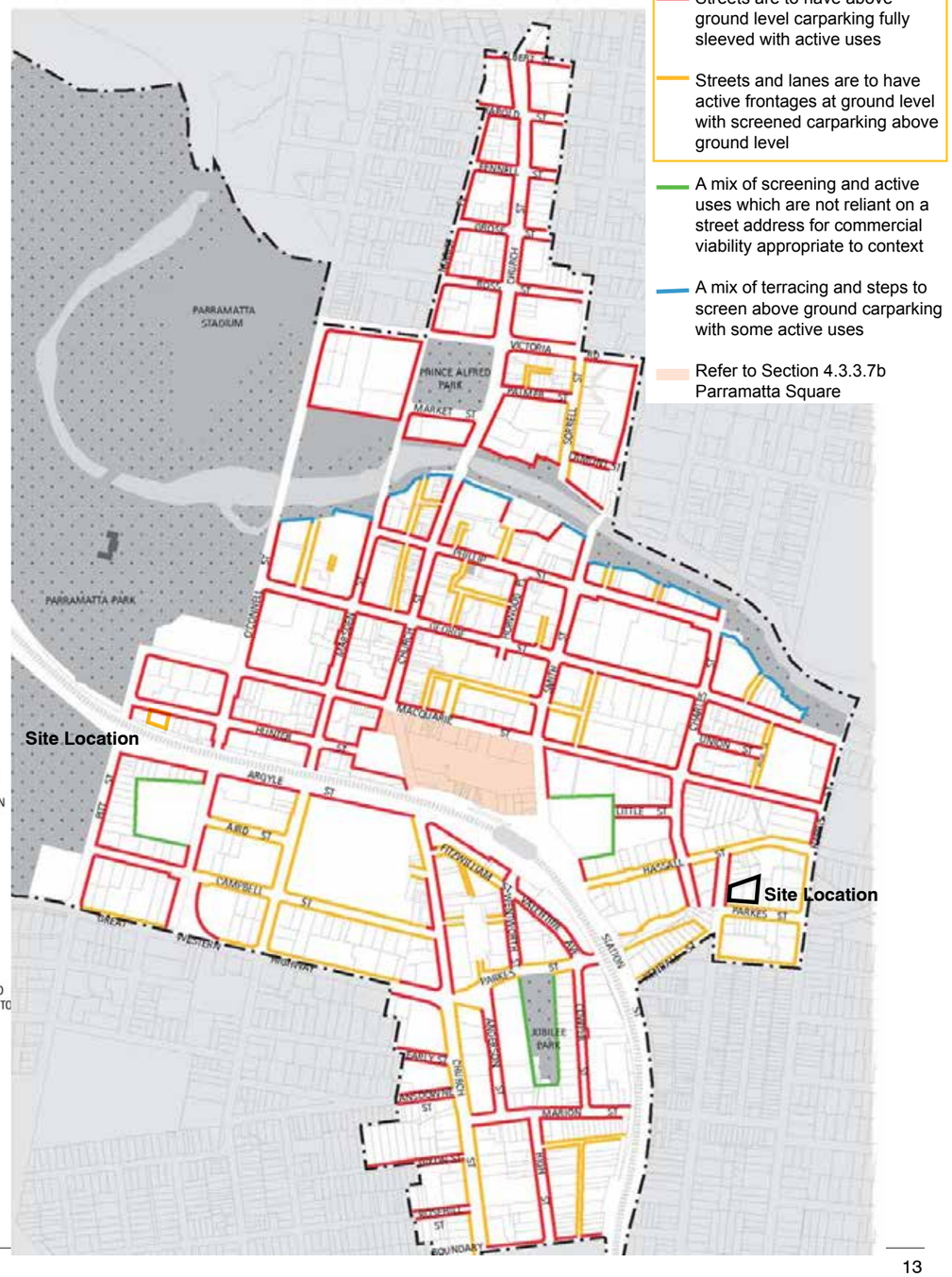


Figure 4.3.3.1.6 City Centre (South)



NOTE: 12m is the maximum desirable depth for residential including a circulation corridor. Commercial uses may be greater than 12m deep.





Context

Site Location

The site is well-located within the Parramatta City Centre, close to transport, jobs, schools, retail and open space.

– within 400m of Parramatta Station.

– within 200m of James Ruse Reserve and parklands.

Parramatta River foreshore.

The subject site facing east on Parkes Street.

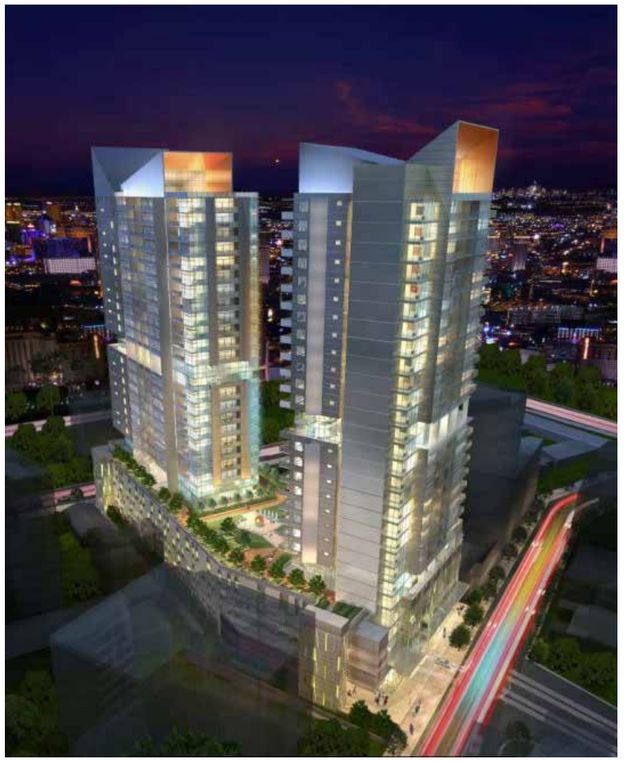
The subject site facing west on Parkes Street.

James Ruse Reserve.

Clay Cliff Creek at James Ruse Reserve.

The subject site from the intersection of Parkes and Wigram Streets.

Planned Development



1. **189 Macquarie Street, Parramatta**
   DA awaiting assessment for mixed use development comprising of two 24 storey residential towers above a 6 storey podium including Council public car park. The scheme provides a height of 91.3m and GFA of 36,000m^2.

2. 113-117A Wigram Street & 23-29 Hassall Street, Parramatta

Approved DA for mixed use development of a 22 storeys in height comprising 156 residential apartments and 7 commercial units over basement car parking. The application includes the retention of the existing heritage items on site for use as commercial premises.

3. 39-43 Hassall Street, Parramatta

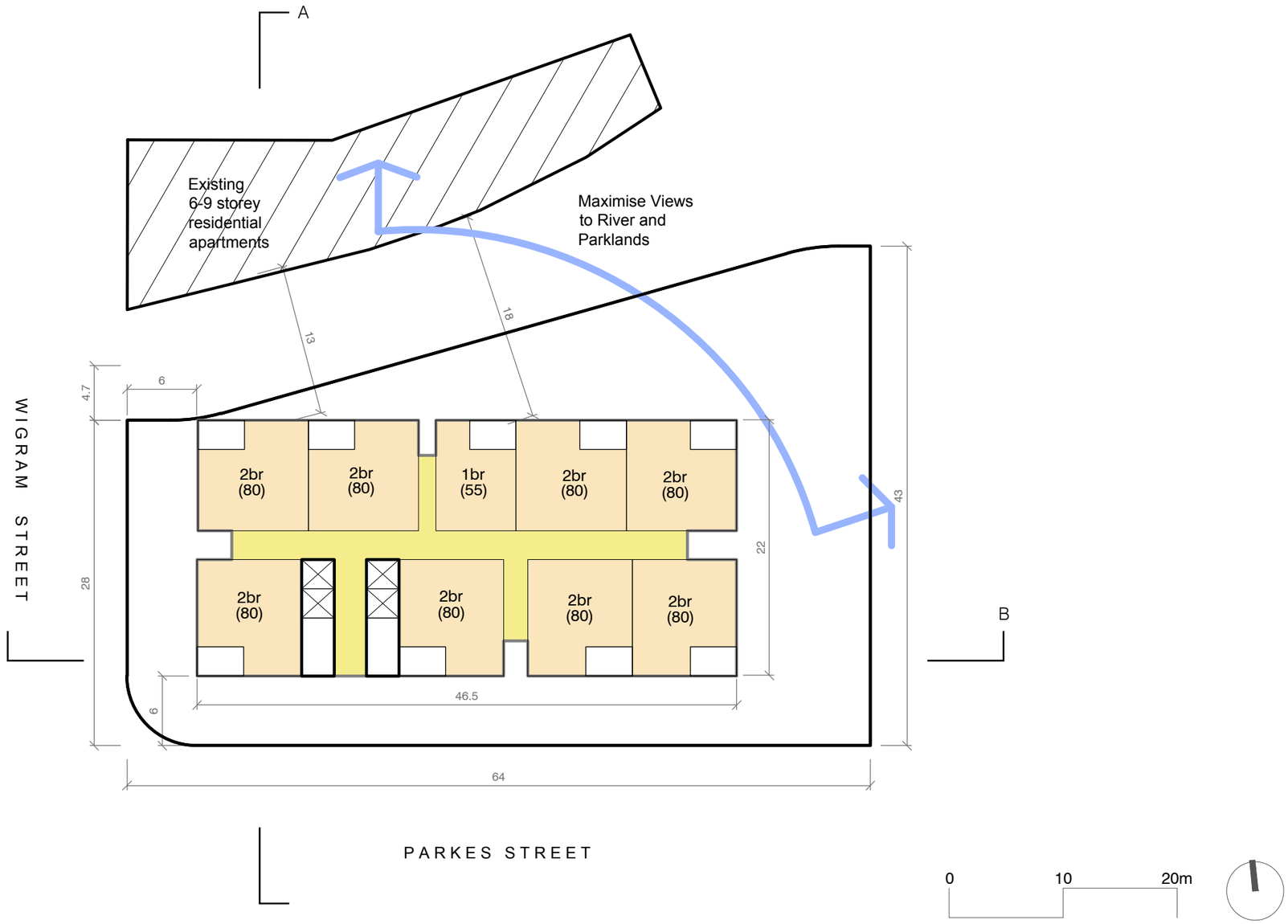
Proposed mixed use retail and residential tower with car park.
No further detail available.

Preliminary Option

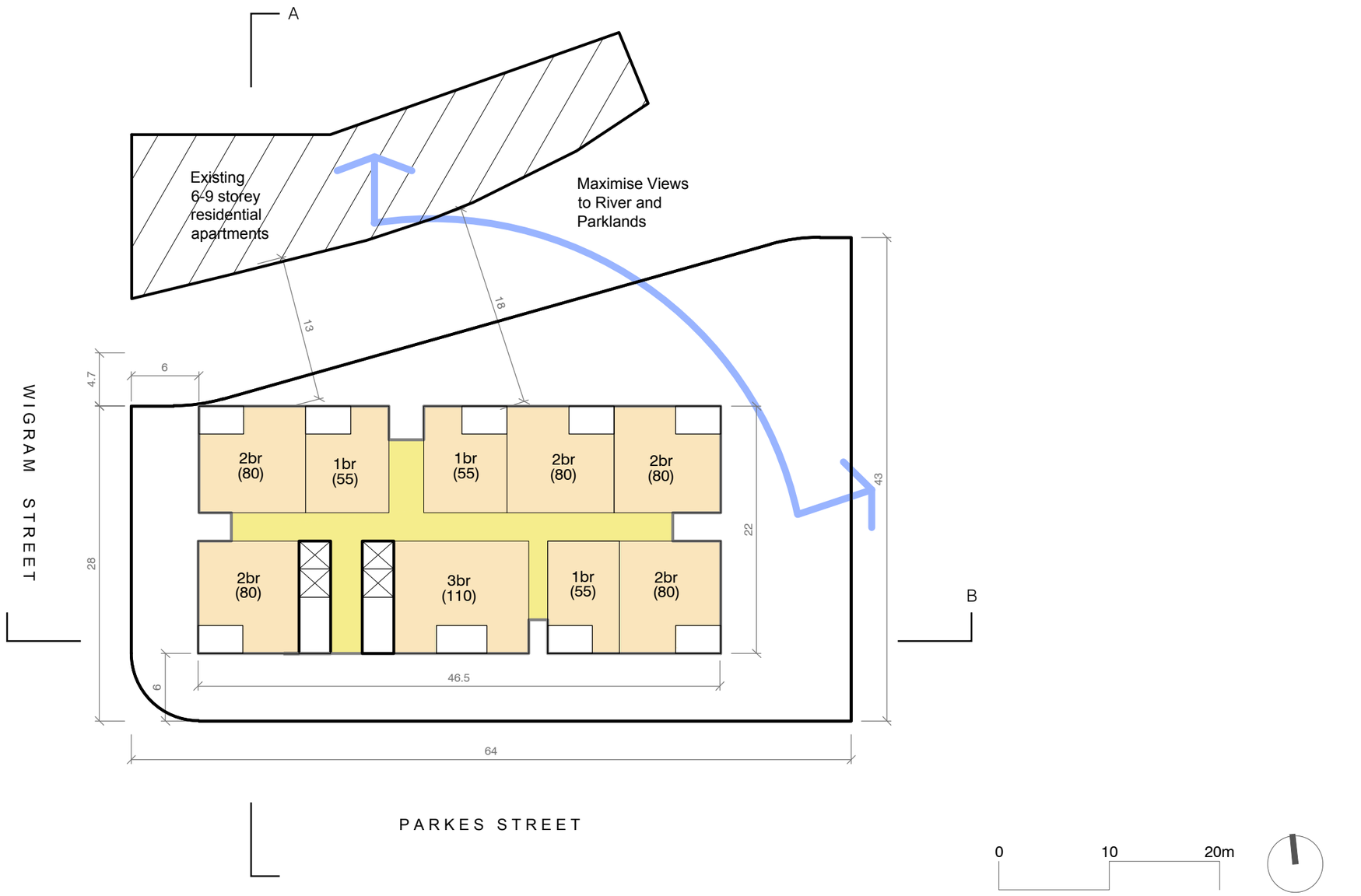
Typical Ground Floor Plan - Level 1

Typical Podium Level Plan - Levels 2 to 4

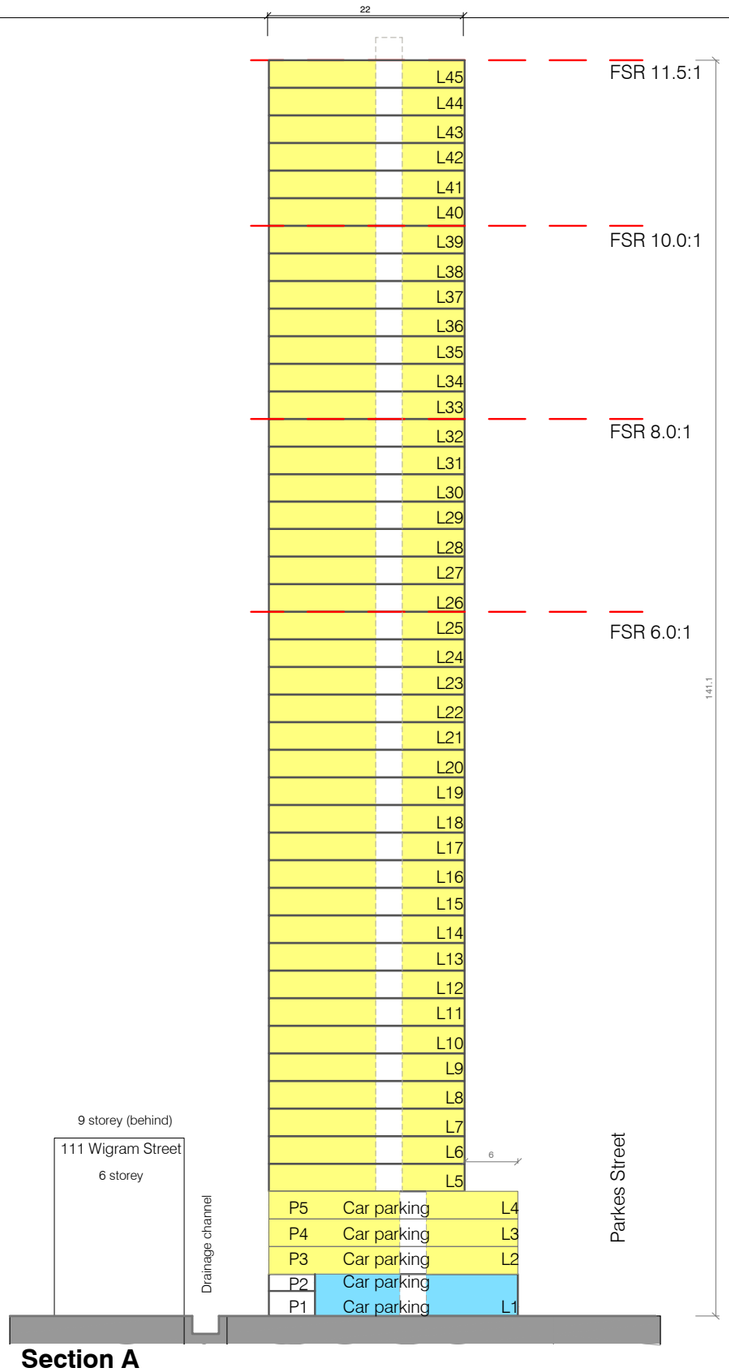
Typical Tower Level Plan - Levels 5 to 8



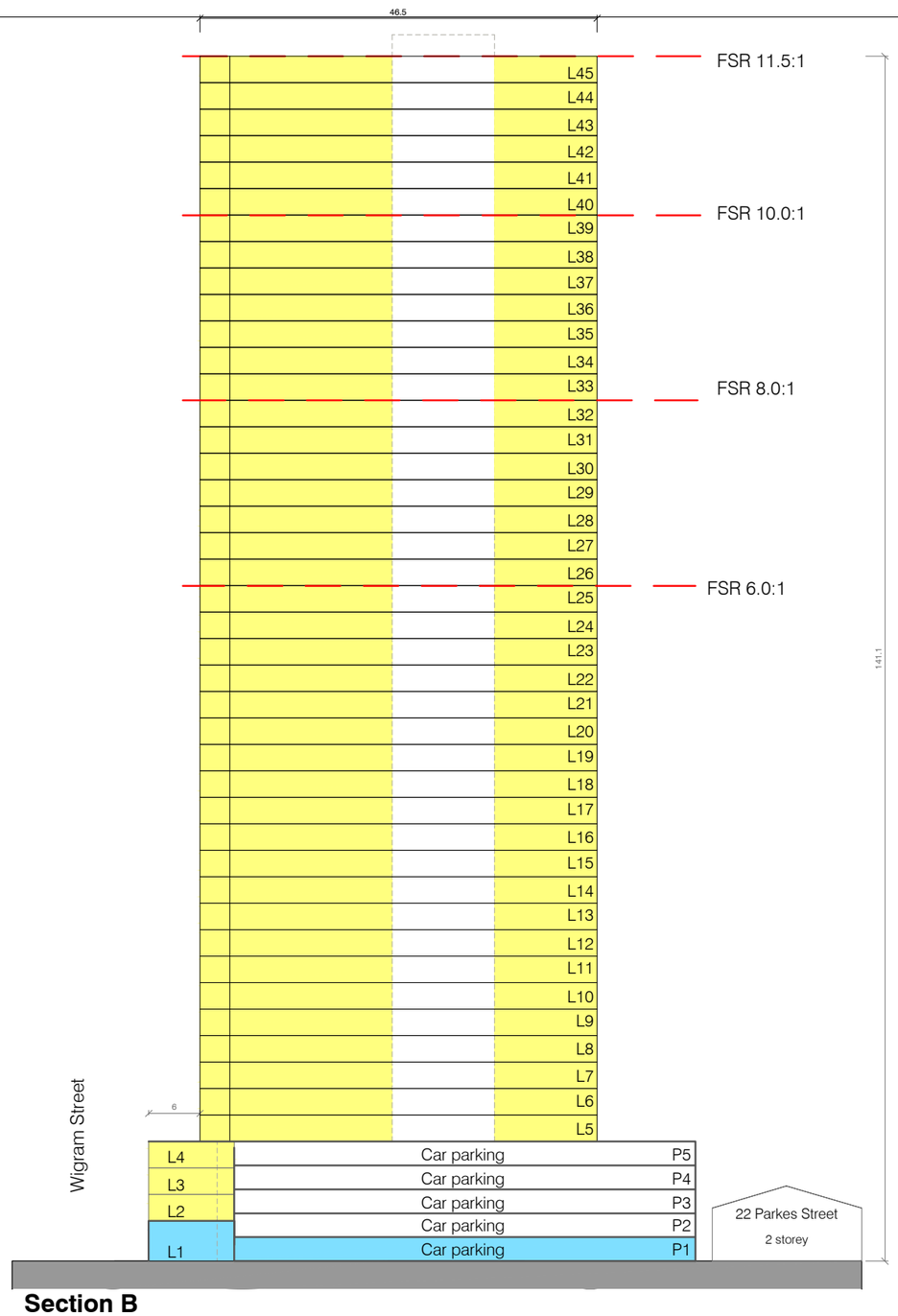
Typical Tower Level Plan - Levels 9 to 45



Typical Sections



Section A



Section B

Proposal Typical Yield and Apartment Mix
FSR 4.0:1, 54m HOB (17 storeys)

		GFA / Floor	GFA
L1 (Ground)	Retail	600	600
L2	Resi	160	160
L3	Resi	160	160
L4	Resi	160	160
Tower (13 Levels)	Resi	767	9,974
GFA			11,054
Site Area			2,830
FSR			4
Total Levels	17		
HOB	54.3		

Unit Total and Mix	1br	2br	3br	Total
Total Units	31	83	9	123
Mix	30%	60%	10%	

Car Parking				
Residential	rate	1.2/ unit		148
Retail	rate	30m²/ space		20
Total Spaces Required				168
Ground	33	x1 level		33
Podium 1	56	x3 levels		168
Total Spaces Provided				201

Proposal Typical Yield and Apartment Mix
FSR 6.0:1, 79m HOB (25 storeys)

		GFA / Floor	GFA
L1 (Ground)	Retail	600	600
L2	Resi	160	160
L3	Resi	160	160
L4	Resi	160	160
Tower (21 Levels)	Resi	767	16,112
GFA			17,192
Site Area			2,830
FSR			6
Total Levels	25		
HOB	79.1		

Unit Total and Mix	1br	2br	3br	Total
Total Units	52	121	16	189
Mix	30%	60%	10%	

Car Parking				
Residential	rate	1.2/ unit		227
Retail	rate	30m²/ space		20
Total Spaces Required				247
Ground	33	x1 level		33
Podium 1	56	x4 levels		224
Total Spaces Provided				257

Proposal Typical Yield and Apartment Mix
FSR 8.0:1, 100m HOB (32 storeys)

		GFA / Floor	GFA
L1 (Ground)	Retail	600	600
L2	Resi	160	160
L3	Resi	160	160
L4	Resi	160	160
Tower (28 Levels)	Resi	767	21,483
GFA			22,563
Site Area			2,830
FSR			8
Total Levels	32		
HOB	100.8		

Unit Total and Mix	1br	2br	3br	Total
Total Units	73	158	24	255
Mix	30%	60%	10%	
Car Parking				
Residential	rate	1.2/ unit		306
Retail	rate	30m²/ space		20
Total Spaces Required				326
Ground	33	x1 level		33
Podium 1	56	x4 levels		224
Total Spaces Provided				257

Proposal Typical Yield and Apartment Mix
FSR 10.0:1, 122.5m (39 storeys)

		GFA / Floor	GFA
L1 (Ground)	Retail	600	600
L2	Resi	160	160
L3	Resi	160	160
L4	Resi	160	160
Tower (35 Levels)	Resi	767	26,854
GFA			27,934
Site Area			2,830
FSR			10
Total Levels	39		
HOB	122.5		

Unit Total and Mix	1br	2br	3br	Total
Total Units	97	193	31	321
Mix	30%	60%	10%	
Car Parking				
Residential	rate	1.2/ unit		385
Retail	rate	30m²/ space		20
Total Spaces Required				405
Ground	33	x1 level		33
Podium 1	56	x4 levels		224
Total Spaces Provided				257

Proposal Typical Yield and Apartment Mix
FSR 11.5:1, 141m (45 storeys)

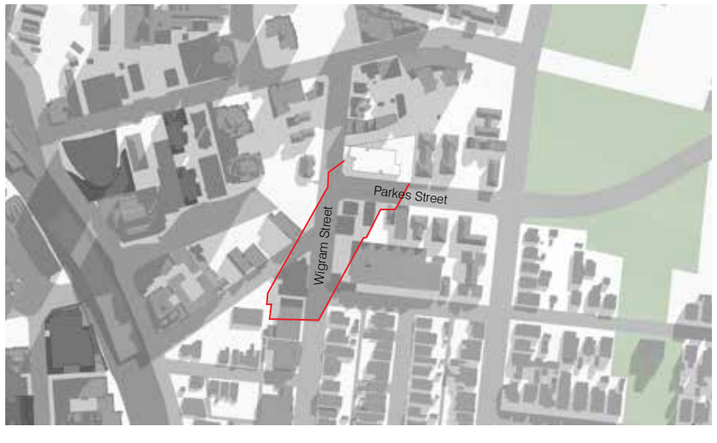
		GFA / Floor	GFA
L1 (Ground)	Retail	600	600
L2	Resi	160	160
L3	Resi	160	160
L4	Resi	160	160
Tower (41 Levels)	Resi	767	31,457
GFA			32,537
Site Area			2,830
FSR			11.5
Total Levels	45		
HOB	141.1		

Unit Total and Mix	1br	2br	3br	Total
Total Units	112	218	36	366
Mix	30%	60%	10%	
Car Parking				
Residential	rate	1.2/ unit		439
Retail	rate	30m²/ space		20
Total Spaces Required				459
Ground	33	x1 level		33
Podium 1	56	x4 levels		224
Total Spaces Provided				257

Mid-winter shadow analysis

FSR 6.0:1

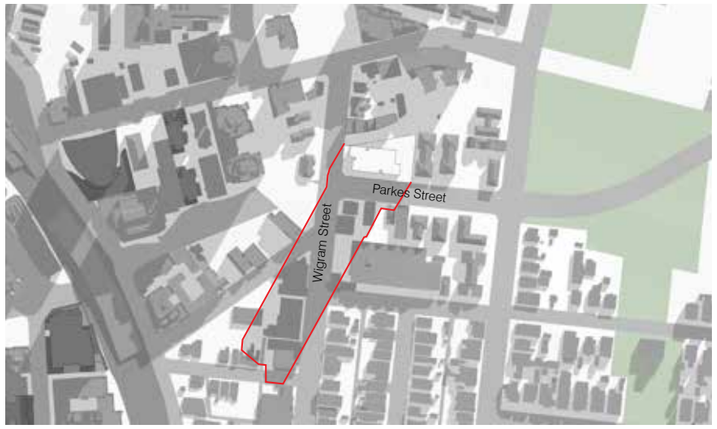
10am



12 noon

2pm

FSR 8.0:1



FSR 10.0:1

10am

12 noon

2pm

FSR 11.5:1

Architectus Group Pty Ltd
ABN 90 131 245 684

Nominated Architect
Managing Director Sydney
Ray Brown
NSWARB 6359

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Appendix 2 – Flood Assessment

Our Ref: 59916045-L01:BCP/bcp
Contact: Dr Brett C. Phillips

17th September 2015

Cardno (NSW/ACT) Pty Ltd
ABN 95 001 145 035

Level 9, The Forum
203 Pacific Highway
St Leonards New South Wales 2065
PO Box 19
St Leonards New South Wales 1590
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Telephone: 02 9496 7700
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Web: www.cardno.com.au

The Manager
Bluesky Parramatta Pty Ltd
Suite 1702, Level 17, 25 Bligh St,
SYDNEY NS 2000

Attention: Mr Tomas Simpson

Dear Tomas,

LOODIN ADVICE OR 1-20 PARES ST PARRAMATTA

In response to your recent reuest, we are pleased to provide flooding advice to address outstanding flooding issues raised by Parramatta City Council in relation to the planning proposal for 14-20 Parkes St, Parramatta.

The Planning Proposal under consideration is given in **Attachment A**.

1. AC ROUND

1.1 Su ect Site

The subject site is 14-20 Parkes St, Parramatta. The extent of the site and its relationship to Clay Cliff Creek are disclosed in igures **1** and **2**.

1.2 Previous Studies

Previous studies which provide flooding information for the subject site are summarised in **Attachment** . A previous study of the subject site and a study of an adjacent site are outlined as follows.

2001 lood Impact Assessment of Development of 1-16 Parkes St Parramatta

In 2001 it was proposed to redevelop the site at 14-16 Parkes Street in Parramatta and to erect a multi-storey building that is compatible with the flood risk on the site. The site is bounded by Parkes Street to the south, Wigram Street to the west, the existing Anglicare office to the east and Clay Cliff Creek to the north.

Parramatta City Council previously adopted the Clay Cliff Creek Catchment Flood Study (Dalland & Lucas, 1992) and Addendum No. 1 (Dalland & Lucas, 1993) and the 5% AEP and 1% AEP flood levels reported therein.

In 1999 a report on flooding issues for 14-18 Parkes Street was prepared by Dalland & Associates, 1999. The development proposal that was assessed in this report was to construct a flood proof Basement Car Park and for the level of the ground floor of the building to be 500 mm above the estimated 1% AEP flood level.

The aim of the study was to estimate the spatial extent and flow patterns through and in the vicinity of 14-16 Parkes Street in both the 20 yr ARI and 100 yr ARI events and to estimate the magnitude and spatial extent of any changes to flood levels and velocities resulting from the re-development of 14-16 Parkes Street. The flood impact assessment was undertaken using a local 2D SMS model of 14-16 Parkes Street and its environs based on the available and collected data including detailed survey.

The development form which was adopted based on the outcomes of the flood assessment was a ground floor elevated 500 mm above the 100 yr ARI flood level supported on a grid of columns. The undercroft area is maintained in a non-vegetated condition to allow the free flow of floodwaters beneath the new building. Along the Wigram Street boundary a bar screen with the maximum allowable clear opening between bars was installed to bar non-authorised access to the undercroft area. The proposed building form on the Parkes Street side prevents any entry to the undercroft area from Parkes Street.

201 lood Impact Assessment 11 -11 igram St and 2 -2 assall St arris Park

A mixed-use development of 113-117 Wigram St and 23-29 Hassall St is proposed comprising retail outlets, residential apartments and a multi-storey underground car park. The subject site is located adjacent to and north of Clay Cliff Creek.

Global Civil had previously prepared and amended flooding assessments for 113-117 Wigram St, Parramatta in response to Council comments.

Cardno was engaged to address the overall conclusions of Council s Peer Reviewer as documented in a Council memorandum dated 21 October 2013.

The study comprised a:

- Review of previous flood studies and available data
- Compilation of site specific data (including proposed development layout)
- Establishment of flood model to represent existing site scenario
- Revision of flood model to represent future site development
- Assessment of resultant flood behaviour and flood risks
- Review of flood emergency planning
- Preparation of an outline of a flood emergency response plan
- Review of compliance with Parramatta City Council development re uirements

It was also noted that the flood impact assessments previously accepted by Council on 111 Wigram St and 122 Wigram St were undertaken using an updated version of the 2007 Clay Cliff Creek **ps mm2D** floodplain model. Accordingly the assessment of the impact or otherwise of development on 113-117 Wigram St and 23-29 Hassall St was undertaken using an updated version of the 2007 Clay Cliff Creek **ps mm2D** floodplain model.

An assessment of flooding in the 100 yr ARI and the PMF event was undertaken.

1. Previous Assessments of Planning Proposals for 1 -20 Parkes St Parramatta

Quantum Engineers have prepared previously five submissions on flooding considerations in relation to the Planning Proposal for 14 20 Parkes St, Parramatta.

The most recent submission dated 27 August 2015 summarise the various submissions as follows:

> ***1st submission*** *dated 15th April 2015 - our submission was based on the flood information provided in the Flood Enquiry Information prepared by Parramatta City Council dated 18th February 2015. This information indicated that the flood level directly impacting the site is a maximum RL8.43m AHD. As such, our proposal was developed on this provided flood level. Council did not provide any additional information besides the Flood Enquiry Information.*
>
> ***2nd submission*** *dated 2nd July 2015 - our submission was produced in direct response to an email from Councils 'Project Officer' Diana Khoury dated 24th June 2015. The Council email outlines various areas which council required additional information. Generally, Councils engineer was requiring expansion on matters relating to the Parramatta LEP & DCP, and further discussion on the hazard categorization. Furthermore, Council requested elaboration on the objectives of S117 Direction.*
>
> *We believe that the responses provided in direct response to Councils dated 24th June 2015, had been satisfied.*
>
> ***3rd submission*** *dated 28th July 2015 - our submission was produced in direct response to an email from Councils 'Project Officer' Diana Khoury dated 16th July 2015*
>
> *Councils' comments were based on previous comments provided by them, but these comments requested '....in more detail'. In addition, Council was now indicating that a substantially higher flood level was to be adopted in our Planning Proposal. Previously we had adopted flood levels according to the Flood Enquiry Information (as provided by Council). The new flood level which was to be adopted was the flood level at the intersection of Parkes Street & Wigram Street. This level is considerably higher. Previously, no mention of this was provided. According to the Flood Enquiry Information, this revised flood level is approximately 1.87m higher (originally RL6.43m AHD and now RL8.30m AHD).*
>
> *To avoid further delays, the client decided to request a meeting with the relative parties at Council to discuss the 'flooding' issues. The meeting took place on 2151 July at 3pm in Councils Chambers.*
>
> *The meeting with Council Engineer (Jim Tsom) and Councils Flood Consultant (Don Still) detailed the reasons for the elevated flood level and also what will be required moving forward. We expressed our urgency to 'close-off' this matter in the next submission. We also expressed our disappointment at not been informed by Council earlier about their thoughts regarding the influence of flooding on this site. Especially since the flood level Council was now requesting is substantially different than the flood level indicated on Councils 'Flood Enquiry' Information, without anything to substantiate the adopted flood level.*
>
> ***4th submission*** *dated 10th August 2015 - our submission was produced in direct response to an email from Councils 'Project Officer' Diana Khoury dated 4th August 2015.*

1. Parramatta City Council Outstanding Flooding Issues of Concern

In an email sent by Parramatta City Council to Allan Caladine (Town Planning Consultant) on 25 August 2015, it was advised that Parramatta City Council's flood engineer has concluded that the applicant's latest flood planning proposal report submission 14-20 Parkes St (dated 10 August 2015) still requires further work.

Our last correspondence regarding flood matters discussed that the revised ground floor parameters at 14-20 Parkes Street were satisfactory, however a number of items relating to the S117 Direction 4.3 were still outstanding. These items included:

(4) A planning proposal must include provisions that give effect to and are consistent with the NSW Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005 (including the Guideline on Development Controls on Low Flood Risk Areas).

There is no concise statement of how the planning proposal satisfies the requirements of the 2005 Floodplain Development Manual.

(6) (a) A planning proposal must not contain provisions that apply to the flood planning areas which: (a) permit development in floodway areas

There is no discussion about "floodway areas" and how they are addressed (and this is important given that Council's hazard mapping shows that much of the site is in a high hydraulic hazard area.

(6) (b) permit development that will result in significant flood impacts to other properties

There is no concise statement regarding how this requirement has been addressed.

(6) (c) permit a significant increase in the development of that land,

The report acknowledges that "there will be an increase in the number of occupants on the premises". However, the report fails to address this matter which relates to any increase in flood-related risk for the extra population intended to now occupy the floodplain. It is considered that this matter can be addressed by providing a clear outline of the within-site works and measures which will address flood-time risk.

(6) (d) are likely to result in a substantially increased requirement for government spending on flood mitigation measures, infrastructure or services

The report simply states that the project "may require additional services and flood management measures. However the increase in provision is considered minimal". This report is considered to be inadequate but the inclusion of how the project will be addressing flood risk should be able to definitely show how there would be no requirement for increased government spending.

Council's flood engineer reviewed the applicants latest flood report, and has clarified that Item 6 (a) and 6 (b) (as noted above) have been satisfactorily addressed and that no further information is required at this stage of the project.

2. O□□ECTIVE

The objective of the study is to address Council□s outstanding flooding issues of concern as documented in its email of 25 August 2015.

□. □LOODIN□ ASSESSMENT

As discussed by Cardno, 2014 in relation to the flood impact assessment for 113-117 Wigram St and 23-29 Hassall St:

In view of the reliance of Council and Council's Peer Reviewer on the flood levels estimated by the 2005 SKM flood study in the vicinity of Wigram St and Hassall St, Harris Park the conditions "on the ground" in Wigram St and the MIKE-11 model configuration were reviewed.

A review of the MIKE-11 model revealed several issues of concern which contribute to the reported flood levels including:

- *The weir flow rating curve was truncated and is not representative of the area available to spill flows from Wigram St back into Clay Cliff Creek;*
- *The adopted link properties downstream of Wigram St was artificially constraining any weir flow notwithstanding the MIKE-11 model estimates that the flood level in Clay Cliff Creek is around 1 m lower than the footpath in Wigram Street and therefore does not drown flows from Wigram St at any time in a 100 yr ARI flood;*
- *The adopted invert level at the northern end of Wigram St of 7.66 m AHD is incorrect. A local crest located just south of the Hassall St intersection at 8.0 m AHD means that Wigram St falls towards the low point in the vicinity of Clay Cliff Creek from both Parkes St.*

Based on this review and testing of modifications to the MIKE-11 model it was concluded that:

- *In the Wigram St/ Hassall St area the adjusted MIKE-11 model gives results which are similar to the flood behaviour estimated in the 2007 Clay Cliff Creek study; and*
- *The 20 yr ARI and 100 yr ARI flood levels adopted by Council to date and resulting flood mapping undertaken by Council in the Wigram St/ Hassall St area are unreliable and that assessments in this area should be based on the Clay Cliff Creek floodplain model first assembled in 2007.*

As discussed in Section 1.2 and Attachment A, the assessment of the impact or otherwise of development on 113-117 Wigram St and 23-29 Hassall St was undertaken using an updated version of the 2007 Clay Cliff Creek □ps□**mm2D** floodplain model.

An assessment of flooding in the 100 yr ARI and the PMF event was undertaken.

This floodplain model covers 14-20 Parkes St, Parramatta.

The estimated 100 yr ARI flood levels and extent and ha□ards under current conditions on 14-20 Parkes St and with current or planned development on 111-117 Wigram St and 23-29 Hassall St are plotted in □**igures** □ and □ respectively.

The estimated PMF flood levels and extent and ha□ards under current conditions on 14-20 Parkes St and with current or planned development on 111-117 Wigram St and 23-29 Hassall St are plotted in □**igures 5** and **6** respectively.

A comparison of the flood levels and plotted in □**igure** □ with Council□s Flood Map (□**igure 1**) disclosed that:

- The 100 yr ARI flood level in Wigram St at Clay Cliff Creek is around 0.4 m lower than reported by Council,
- The 100 yr ARI flood level in Wigram St / Parkes St intersection is also around 0.4 m lower than reported by Council□
- The 2007 Clay Cliff Creek □ps□**mm2D** floodplain model predicts flooding in Parks St which flows towards the Wigram St / Parkes St intersection

□**igure** □ discloses a □one of high ha□ard in a 100 yr ARI flood on Wigram St between Parkes St and Clay Cliff Creek.

A comparison of the flood levels and plotted in Figure 5 with Council□s Flood Map (□**igure 1**) disclosed that:

- The PMF level in Wigram St / Parkes St intersection is also around 0.2 m lower than reported by Council□
- The PMF level in Parkes St east of Wigram St are also around 0.2 m lower than reported by Council□

□**igure 6** discloses a □one of provisional High Ha□ard across the site in a PMF except for the south east corner of the site which is classified as Medium Ha□ard.

□. T□E PLANNIN□ PROPOSAL

The Planning Proposal under consideration is given in **Attachment A**.

Features of the planned development include have responded to date to the 100 yr ARI flood levels adopted by Parramatta City Council at the Wigram St / Parkes St intersection:

- An undercroft area similar to the current undercroft which is maintained in a non-vegetated condition to allow the free flow of floodwaters beneath the new building□
- Along the Wigram Street boundary a bar screen with the maximum allowable clear opening between bars was installed to bar non-authorised access to the undercroft area□

- If needed the inclusion of a grated section of driveway to permit the flow of floodwaters into the undercroft area
- Ground floor level set at 8.82 m AHD
- Proposed ground floor levels for retail outlets and a terrace of 8.82 m AHD which provides 500 mm freeboard above the 100 year ARI flood level adopted by Council at the Wigram St / Parkes St intersection
- Proposed Level 1 floor levels of apartments and car parking which are higher than the PMF level
- A driveway ramp from Wigram St up to a ground floor level of 8.82 m AHD which provides greater than 500 mm freeboard above the 100 year ARI level in Wigram St adopted by Council

The flooding results presented in Figures 3 to 6, which differ from Council's adopted flood levels, could inform refinement of the planning proposal during the DA phase as follows:

- From a flooding and flood risk perspective consideration could be given to relocating the driveway from the northwestern corner of the site to the southeastern corner of the site. The advantages of relocating the driveway would include:
  - Removing vehicular access from a zone of High Hazard in a 100 yr ARI event and relocating it to a zone of Medium Hazard in the PMF
  - Increasing the time that the development could be safely accessed during extreme floods
- The possible lowering of the ground floor level for areas accessed from Wigram St to around 8.4 m AHD
- The possible raising of retail floor levels and any lobby accessed from Parkes St to provide the required freeboard above the 100 yr ARI flood level in Parkes St and/or
- Adoption of walls and/or landscaping to provide the required freeboard above the 100 yr ARI flood level in Parkes St.

5. FLOOD RISKS

The flood risks at and in the vicinity of 14-20 Parkes St, Parramatta are discussed as follows.

5.1 Flood Levels and Hazards

The estimated 100 yr ARI flood levels and extent and hazards under current conditions on 14-20 Parkes St and with current or planned development on 111-117 Wigram St and 23-29 Hassall St are plotted in **Figures** and respectively.

The estimated PMF flood levels and extent and hazards under current conditions on 14-20 Parkes St and with current or planned development on 111-117 Wigram St and 23-29 Hassall St are plotted in **Figures 5** and **6** respectively.

5.2 Flood Risk

The flood risk precincts in the vicinity of the site are plotted in **Figure** . The site includes zones High, Medium and Low Flood Risk precincts.

5. Rate of Rise of Floodwaters

To understand the likely warning times and associated response times during extreme flood events it is necessary to estimate the expected rate of rise of floodwaters. At 14-20 Parkes St, Parramatta the estimated rate of rise of flooding in a PMF event is up to 2.5 m/hr.

It is estimated that inundation of the ground floor from Wigram St would commence in around 40,000 year ARI event.

It is concluded that while both the entry to the car parking levels and the retail outlets facing Wigram St have a freeboard of 500 mm above the 100 year ARI flood level, that this freeboard would be exceeded in a PMF event (within around 20 minutes after the 100 yr ARI flood level is exceeded). The PMF is estimated to reach a level of around 9.4 m AHD. It is estimated that in a 4 hour PMF event that the onset of the inundation of the ground floor by PMF floodwaters would occur around 3 hours after start of the PMP storm.

5. Duration of Inundation

In a 4 hour duration PMP storm the estimated duration of inundation of the Ground Floor is around 1 hour and 30 minutes.

5.5 Shelter in Place

In the case of a 4 hour PMF event it is expected that there would be insufficient time to evacuate any residents and/or visitors from the site once floodwaters start spilling from Clay Cliff Creek and that instead residents and/or visitors should shelter in place.

5.6 Persons at Risk (PAR)

The following assumptions were also made when estimating the Population at Risk (PAR):

- During day-time hours on weekdays:
  - the average number of visitors/customers and retail staff on the Ground Floor was assumed conservatively to be 33 persons
  - the average duration of occupancy of the retail outlets would be 10 hours per day (out of 10 hours)
- During night-time on weekdays:
  - the average number of visitors/customers and retail staff on the Ground Floor was assumed conservatively to be 33 persons
  - the average duration of occupancy of the retail outlets would be 0 hours per night (out of 14 hours)
- During weekends:
  - the average number of visitors/customers and retail staff on the Ground Floor was assumed conservatively to be 33 persons
  - the average duration of occupancy of the retail outlets would be 10 hours per day (out of 24 hours)

The estimated total number of visitors/retail staff **directly** at risk during a PMF is conservatively estimated to be around 14. Any visitors or residents located on Levels 1 or above would be **indirectly** at risk during extreme floods greater than a 100 yr ARI flood up to the PMF

6. EMER□ENCY PLANNIN□

6.1 DISPLANS

The North West Metropolitan District Disaster Plan (DISPLAN) and the Parramatta DISPLN are outlined in Attachment C.

It is noted that a copy of the Parramatta CBD Evacuation Plan is not available in the public domain.

It is noted also that the 2010 Parramatta DISPLAN, states in part that:

i) the intent is to minimi□e the area of the CBD that is evacuated, noting that some emergencies may re□uire the evacuation of some sections or large sections, if not all of the CBD□and
ii) shelter in place is used when it is assessed that for safety of the occupants of a building(s) or for control reasons that it is safer for occupants to remain in the building than to be on the streets.

It is expected that this is also the intent for the all other areas within the LGA outside the CBD.

6.2 Local Plan

The 2010 Parramatta DISPLAN states that there are no sub-plans or supporting plans.

6.□ Si□ing Temporary □lood Refuge

Two primary sources of information were located when considering the si□e of a temporary flood refuge:

- Building Code of Australia (BCA, 2008)[1]
- US Flood Emergency Management Authority (FEMA, 2000)[2].

As outlined above, the Building Code of Australia (2008) stipulates that an area of public assembly such as halls or theatres should have a maximum density of 1 m^2 per person (BCA, 2008). FEMA, 2000 recommends a minimum of 0.45 m^2 per person for tornado shelters.

In the case of the proposed development a conservative maximum density of 2 m^2 per person has been adopted in view of the length of time visitors and/or retail staff may be re□uired to shelter in place.

Based on the estimated number of persons that could be at risk on the Ground Floor the estimated area of refuge re□uired is 28 m^2.

It is expected that this refuge would be easily provided in the proposed car parking levels which are at levels higher than the PMF.

[1] Building Codes of Australia (2008 Edition). *Part D Access and Egress. D1.13 Number of Persons Accommodated*

[2] FEMA (2000) *Design and Construction Guidance for Community Shelters*, Federal Emergency Management Agency, Mitigation Directorate, FEMA361, 1st Ed., July 2000

□. □LOOD EMER□ENCY RESPONSE

As indicated in the 2010 Parramatta DISPLAN, it is expected that Building Owners and Managers (in accordance with existing OH&S re□uirements, the Building Code of Australia and relevant City of Parramatta regulations) are to have a building Emergency Management Plan which complies with the provisions of AS 3745.

□.1 □lood □ arning

Discussions with the NSW SES have previously identified the following status of flood warnings for the Parramatta CBD:

- The Bureau of Meteorology does not prepare flood predictions for the Parramatta River or its tributaries□
- Only a Draft Flood Warning Plan has been prepared to date by the NSW SES. This draft was prepared a number of years ago and while it is planned that it will be updated this does not have a high priority in view of the level of flood protection in the Parramatta CBD that has been achieved by various works undertaken in the upper catchment including the Loyalty Road basin.
- Trigger levels for flood warning have not been identified for the Parramatta CBD.

Other sources of information regarding approaching severe weather conditions which could cause potential flooding at the site including:

- The Bureau of Meteorology through their website (www.bom.gov.au)□
- Observation of local rainfall□
- The local SES (http://parramatta-ses.com)□
- Parramatta City Council Emergency Management Officer□
- Local television stations□and/or
- Local radio stations.

An important indication of likely imminent flood activity would be intense local rainfall and residents, retail workers and visitors should take notice of extreme rainfall warnings issued by the Bureau of Meteorology and disseminated by local media.

□.2 □lood Emergency Detailed Response Plan

The building Emergency Management Plan will contain a Flood Emergency Detailed Response Plan. It is also expected that all wardens trained under the building emergency plan are to be aware of the flood evacuation site, routes to the site and how to liaise with the any building occupants at the site.

The Flood Emergency Detailed Response Plan (FEDRP) for the proposed development would describe:

- Flood behaviour at the site for the 100 yr ARI and Probable Maximum Flood (PMF),
- Flood protection measures, and
- A Flood Emergency Response Plan for the site, including:
  - A Flood Warning System
  - Evacuation strategy, measures, procedures and plan
  - FloodSafe Plans

A Flood Emergency Detailed Response Plan would accompany any DA lodged with Council.

An example Table of Contents for a FEDRP is given in **Attachment D**.

□. PLANNIN□ CONSIDERATIONS

□.1 Parramatta Local Environment Plan 2011

Section 6.3 of the *Parramatta Local Environment Plan (LEP) 2011* outlines the minimum re□uirements for land lower than the Flood Planning Level (FPL) which is defined as land the 100 year AR flood level plus 0.5 metre freeboard. The LEP notes development consent should not be granted unless Council is satisfied the development:

a. is compatible with the flood ha□ard of the land, and
b. is not likely to significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, and
c. incorporates appropriate measures to manage risk to life from flood, and
d. is not likely to significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses, and
e. is not likely to result in unsustainable social and economic costs to the community as a conse□uence of flooding

Ta□le 1 Parramatta City Council □loodplain Matri□

Table 2.7: FLOODPLAIN MATRIX

Planning & Development Controls

Planning Consideration	Flood Risk Precincts (FRP's)																										
	Low Flood Risk									Medium Flood Risk									High Flood Risk								
	Sensitive Uses & Facilities	Critical Uses & Facilities	Subdivision	Filling	Residential*	Commercial & Industrial	Tourist Related Development	Open Space & Non-Urban	Concessional Development	Sensitive Uses & Facilities	Critical Uses & Facilities	Subdivision	Filling	Residential*	Commercial & Industrial	Tourist Related Development	Open Space & Non-Urban	Concessional Development	Sensitive Uses & Facilities	Critical Uses & Facilities	Subdivision	Filling	Residential*	Commercial & Industrial	Tourist Related Development	Open Space & Non-Urban	Concessional Development
Floor Level		3			2, 5	2, 5	2, 5							2, 5	2, 5	2, 5	1, 5	4, 5								1, 5	4, 5
Building Components		2												1	1	1	1	1								1	1
Structural Soundness		2												1	1	1	1	1								1	1
Flood Affectation		2	2	1	2	2	2					1		1	1	1	2	1								1	1
Car Parking & Driveway Access		1, 3, 5, 6			1, 3, 5, 6	1, 3, 5, 6	1, 3, 5, 6	2, 4, 6, 7						1, 3, 5, 6, 7	1, 3, 5, 6, 7	1, 3, 5, 6, 7	2, 4, 6, 7	1, 5								2, 4, 6, 7	1, 5
Evacuation		2, 4, 6	5		3, 4	4	4					5, 3, 4		3, 4, 6	3, 4, 6	3, 4, 6	1, 4	3, 6								1, 4	3, 4 6
Management & Design		2, 3, 4	1									1		2, 3, 4	2, 3, 4	2, 3, 4	2, 3, 4	2, 3, 4								2, 3, 4	2, 3, 4

Not Relevant Unsuitable Land Use * For redevelopment of an existing dwelling refer also to ' Concessional Development' provisions

i. Freeboard equals an additional height of 500mm.

ii. The Parramatta LEP 2011 identifies development permissible with consent in various zones. Notwithstanding, constraints specific to individual sites may preclude Council granting consent for certain forms of development on all or part of a site. The above matrix identifies where flood risks are likely to determine where certain development types will be considered "unsuitable" due to flood related risks.

iii. Filling of the site, where acceptable to Council, may change the FRP considered to determine the controls applied in the circumstances of individual applications.

iv. Any fencing that forms part of a proposed development is subject to the relevant Flood Effects and Structural Soundness planning considerations of the applicable land use category.

v. Development within the floodplain may be subject to Clause 6.7 Foreshore Building Line in the Parramatta LEP 2011.

Floor Level	
1	All floor levels to be equal to or greater than the 20 year Average Recurrence Interval (ARI) flood level plus freeboard
2	Habitable floor levels to be equal to or greater than the 100 year ARI flood level plus freeboard.
3	All floor levels to be equal to or greater than the Probable Maximum Flood (PMF) level plus freeboard
4	Floor levels to be equal to or greater than the 100 year ARI flood level plus freeboard. Where this is not practical due to compatibility with the height of adjacent buildings, or compatibility with the floor level of existing buildings, or the need for access for persons with disabilities, a lower floor level may be considered. In these circumstances, the floor level is to be as high as practical, and, when undertaking alternations or additions, no lower than the existing floor level.
5	A restriction is to be placed on the title of the land, pursuant to S.88B of the Conveyancing Act, where the lowest habitable floor area is elevated more than 1.5m above finished ground level, confirming that the subfloor space is not to be enclosed.
Building Components & Method	
1	All structures to have flood compatible building components below the 100 year ARI flood level plus freeboard.
2	All structures to have flood compatible building components below the PMF.
Structural Soundness	
1	An engineers report is required to certify that the structure can withstand the forces of floodwater, debris and buoyancy up to and including a 100 year ARI flood level plus freeboard.
2	An engineers report is required to certify that the structure can withstand the forces of floodwater, debris and buoyancy up to and including a PMF level.
Flood Affectation	
1	An engineers report is required to certify that the development will not increase flood affectation eleswhere, having regard to: (i) loss of flood storage; (ii) changes in flood levels, flows and velocities caused by alterations to flood flows; and (iii) the cumulate impact of multiple potential developments in the vicinity.
2	The impact of the development on flooding elsewhere to be considered having regard to the three factors listed in consideration 1 above.
Car Parking and Driveway Access	
1	The minimum surface level of open spaces or carports shall be as high as practical, but no lower than 0.1m below the 100 year ARI flood level. In the case of garages, the minimum surface level shall be as high as practical, but no lower than the 100 year ARI flood level.
2	The minimum surface level of open parking spaces or carports shall be as high as practical, but no lower than 0.3m above the 20 year ARI flood level.
3	Garages capable of accommodating more than 3 motor vehicles on land zones for urban purposes, or enclosed car parking, must be protected from inundation by floods equal to or greater than the 100 year ARI flood. Ramp levels to be no lower than 0.5m above the 100 year ARI flood level.
4	The driveway providing access between the road and parking spaces shall be as high as practical and generally rising in the egress direction.
5	The level of the driveway providing access between the road and parking spaces shall be no lower than 0.2m below the 100 year ARI flood level.
6	Enclosed car parking and car parking areas accommodating more than 3 vehicles, with a floor below the 100 year ARI flood level, shall have adequate warning systems, signage, exits and evacuation routes.
7	Restraints or vehicle barriers to be provided to prevent floating vehicles leaving a site during a 100 year ARI flood.
Evacuation	
1	Reliable access for pedestrians required during a 20 year ARI peak flood.
2	Reliable access for pedestrians and vehicles required to a publicly accessible location during the PMF peak flood.
3	Reliable access for pedestrians and vehicles is required from the site to an area of refuge above the PMF level, either on site (eg. second storey) or off site.
4	Applicant is to demonstrate the development is consistent with any relevant flood evacuation strategy or similar plan.
5	Applicant is to demonstrate that evacuation in accordance with the requirements of this DCP is available for the potential development resulting from the subdivision.
6	Adequate flood warning is available to allow safe and orderly evacuation without increased reliance upon SES or other authorised emergency services personnel.
Management and Design	
1	Applicant is to demonstrate that potential development as a consequence of a subdivision proposal can be undertaken in accordance with this the relevant FRMS and FRMP
2	Site Emergency Response Flood plan required where the site is affected by the 100 year ARI flood level, (except for single dwelling-houses).
3	Applicant is to demonstrate that area is available to store goods above the 100 year flood level plus freeboard.
4	No storage of materials below the 100 year ARI flood level.

.2 Parramatta DCP 2011

Section 2 of the Parramatta DCP 2011 describes site planning considerations including design objectives, design principles and design controls. The development is located in Low, Medium and High Risk Flood Risk Precincts (refer **igure**).

While part of the proposed development is located over a High Risk Precinct the risk to retail staff and visitors is mitigated by the provision of accessible car parking levels which are at levels higher than the PMF (refer **Attachment A**). Conse uently the development should be assessed against the planning and development controls that apply to Residential in a Medium Flood Risk Precinct. These controls are identified above in **Ta le 1.**

. RESPONSES TO PARRAMATTA CITY COUNCIL OUTSTANDIN LOODIN ISSUES O CONCERN

Drawing on the preceding assessments and considerations the following responses to Council s outstanding flooding issues of concern are provided:

(4) A planning proposal must include provisions that give effect to and are consistent with the NSW Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005 (including the Guideline on Development Controls on Low Flood Risk Areas).

Flood risk can be defined as being existing, future or residual risk:

- **E isting flood risk** - the existing problem refers to existing buildings and developments on flood prone land. Such buildings and development by virtue of their presence and location are exposed to an existing risk of flooding.
- **uture flood risk** - the future problem refers to buildings and developments that may be built on flood prone land in the future. Such buildings and developments may be exposed to a future flood risk, i.e. a risk would not materialise until the developments occur.
- **Continuing risk of flooding** - the continuing problem refers to the residual risk associated with floods that exceed management measures already in place, i.e. unless a floodplain management measure is designed to withstand the Probable Maximum Flood, it will be exceeded by a sufficiently large flood at some time in the future.

Measures available for the management of flood risk can be categorised according to the way in which the risk is managed. As a result, there are three types of measures for the management of flooding:

- Flood Modification Measures (for the existing risk)
- Property Modification Measures (for the future risk)
- Emergency Response Modification Measures (for the residual risk).

The flood risks on 14-20 Parkes Street are described in Section 5 above.

Existing Flood Risk

The existing flood risk on 14-16 Parkes Street was assessed in 2001 and informed the re-development of this site in 2001-2002. The development form which was adopted to respond to future flood risk was a ground floor elevated 500 mm above the 100 yr ARI flood level supported on a grid of columns. The undercroft area is maintained in a non-vegetated condition to allow the free flow of floodwaters beneath the new building. Along the Wigram Street boundary a bar screen with the maximum allowable clear opening between bars was installed to bar non-authorised access to the undercroft area. The current building form on the Parkes Street side prevents any entry to the undercroft area from Parkes Street.

The Planning Proposal maintains this approach to managing the existing flood risk.

Future Flood Risk

The future flood risk is addressed by the development achieving and/or exceeding the requirements of Council's Floodplain Matrix as given in the Parramatta DCP 2011 (refer Section 7.2) as discussed in Section 4 above ie. by maintaining the approach to the provision of the passage of floodwaters through the site adopted in 2001 and extending this approach to 18-20 Parkes St as needed.

Continuing Flood Risk

The estimated total number of visitors/retail staff **directly** at risk during a PMF is conservatively estimated to be around 14. Any visitors or residents located on Levels 1 or above would be **indirectly** at risk during extreme floods greater than a 100 yr ARI flood up to the PMF.

In the case of a 4 hour PMF event it is expected that there would be insufficient time to evacuate any residents and/or visitors from the site once floodwaters start spilling from Clay Cliff Creek and that instead residents and/or visitors should shelter in place.

Based on the estimated number of persons that could be at risk on the Ground Floor the estimated area of refuge required is 28 m^2. It is expected that this refuge would be easily provided in the proposed car parking levels which are at levels higher than the PMF.

As indicated in the 2010 Parramatta DISPLAN, it is expected that Building Owners and Managers (in accordance with existing OH&S requirements, the Building Code of Australia and relevant City of Parramatta regulations) are to have a building Emergency Management Plan which complies with the provisions of AS 3745.

The building Emergency Management Plan will contain a Flood Emergency Detailed Response Plan. It is also expected that all wardens trained under the building emergency plan are to be aware of the flood evacuation site, routes to the site and how to liaise with the any building occupants at the site.

A Flood Emergency Detailed Response Plan would accompany any DA lodged with Council.

An example Table of Contents for a FEDRP is given in **Attachment D**.

(6) (c) permit a significant increase in the development of that land

The flood risk on the site is addressed by the development achieving and/or exceeding the requirements of Council's Floodplain Matrix as given in the Parramatta DCP 2011 (refer Section 7.2) as discussed in Section 4 above ie. by maintaining the approach to the provision of the passage of floodwaters through the site adopted in 2001 and extending this approach to 18-20 Parkes St as needed.

Notwithstanding the adoption of a form of development which responds to the flood risk it is estimated around 14 visitors/retail staff on the Ground Floor would remain **directly** at risk during a PMF. Any visitors or residents located on Levels 1 or above would be **indirectly** at risk during extreme floods greater than a 100 yr ARI flood up to the PMF.

In the case of a 4 hour PMF event it is expected that there would be insufficient time to evacuate any residents and/or visitors from the site once floodwaters start spilling from Clay Cliff Creek and that instead residents and/or visitors should shelter in place.

Based on the estimated number of persons that could be at risk on the Ground Floor the estimated area of refuge required is 28 m^2. It is expected that this refuge would be easily provided in the proposed car parking levels which are at levels higher than the PMF.

As indicated in the 2010 Parramatta DISPLAN, it is expected that Building Owners and Managers (in accordance with existing OH&S requirements, the Building Code of Australia and relevant City of Parramatta regulations) are to have a building Emergency Management Plan which complies with the provisions of AS 3745.

The building Emergency Management Plan will contain a Flood Emergency Detailed Response Plan. It is also expected that all wardens trained under the building emergency plan are to be aware of the flood evacuation site, routes to the site and how to liaise with the any building occupants at the site.

A Flood Emergency Detailed Response Plan would accompany any DA lodged with Council.

An example Table of Contents for a FEDRP is given in **Attachment D**.

(6) (d) are likely to result in a substantially increased requirement for government spending on flood mitigation measures, infrastructure or services

The existing flood risk on 14-16 Parkes Street was assessed in 2001 and informed the re-development of this site in 2001-2002. The development form which was adopted to respond to the flood risk was a ground floor elevated 500 mm above the 100 yr ARI flood level supported on a grid of columns. The undercroft area is maintained in a non-vegetated condition to allow the free flow of floodwaters beneath the new building. Along the Wigram Street boundary a bar screen with the maximum allowable clear opening between bars was installed to bar non-authorised access to the undercroft area. The current building form on the Parkes Street side prevents any entry to the undercroft area from Parkes Street.

The Planning Proposal maintains this approach for the provision of the passage of floodwaters through the site adopted in 2001 and extending this approach to 18-20 Parkes St as needed. This approach is not reliant on any re□uirement for government spending on mitigation measures or infrastructure.

The Parramatta DCP 2011 also re□uires in part that:

> *Adequate flood warning is available to allow safe and orderly evacuation without increased reliance upon SES or other authorised emergency services personnel.*

In the case of a 4 hour PMF event it is expected that there would be insufficient time to evacuate any residents and/or visitors from the site once floodwaters start spilling from Clay Cliff Creek and that instead residents and/or visitors should shelter in place. It is expected that this refuge would be easily provided in the proposed car parking levels which are at levels higher than the PMF.

The building Emergency Management Plan will contain a Flood Emergency Detailed Response Plan. It is also expected that all wardens trained under the building emergency plan are to be aware of the flood evacuation site, routes to the site and how to liaise with the any building occupants at the site.

A Flood Emergency Detailed Response Plan would accompany any DA lodged with Council.

The implementation of a FEDRP for the development is not reliant on any re□uirement for government spending on services.

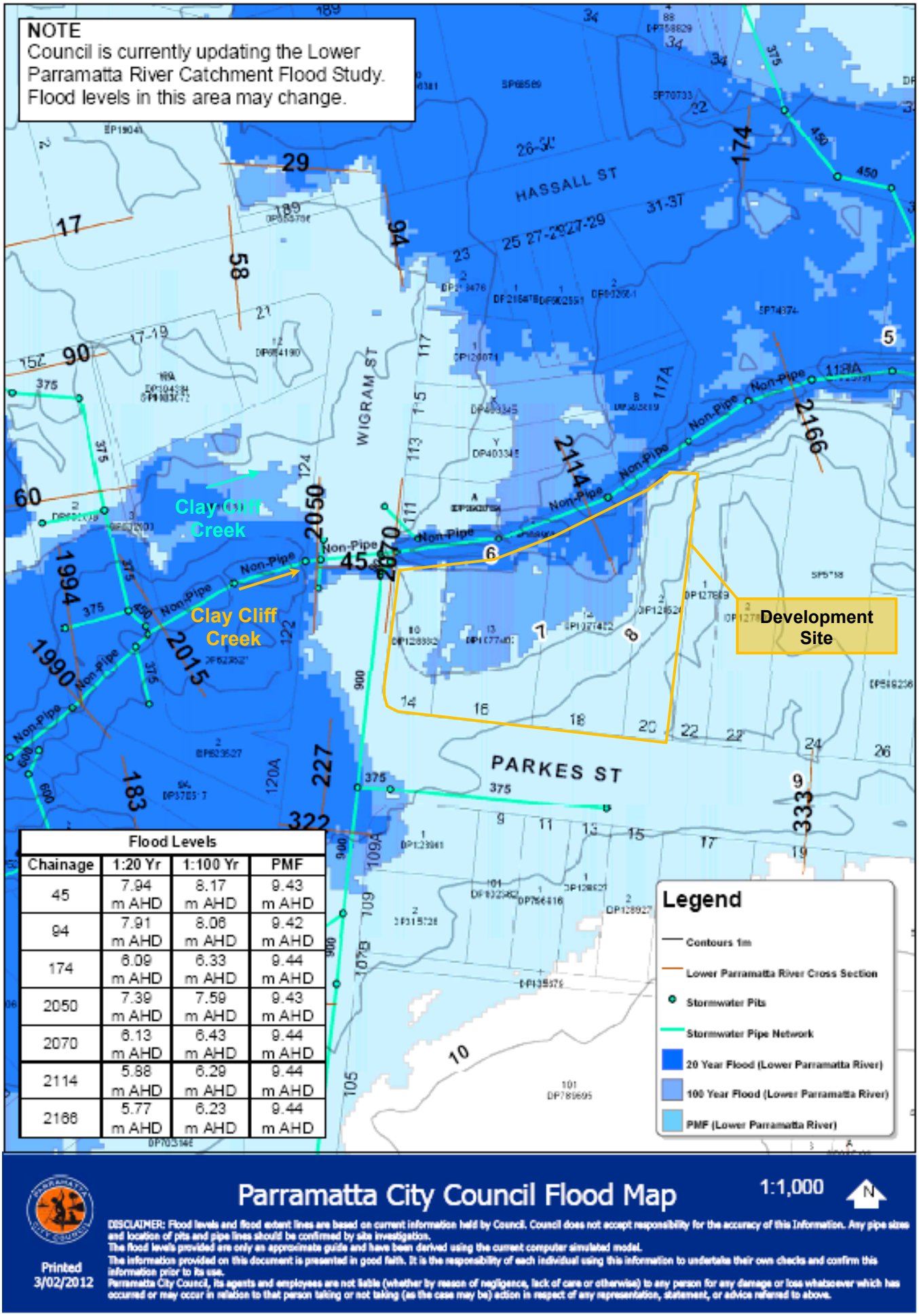
We trust the discussion on flooding and flood risks encountered on 14-20 Parkes Street, the consideration of planning re□uirements, emergency planning and flood emergency response and the discussion of how the Planning Proposal responds to these considerations addresses Council□s outstanding flooding issues of concern.

□ours faithfully

Brett C. Phillips

□ □ □ □ □ □ □ □ □ □ □ □ □ □

Dr Brett C. Phillips
Director, Water Engineering
for **Cardno**



igure 1 Locality Plan (Source: Parramatta City Council Flood Map)

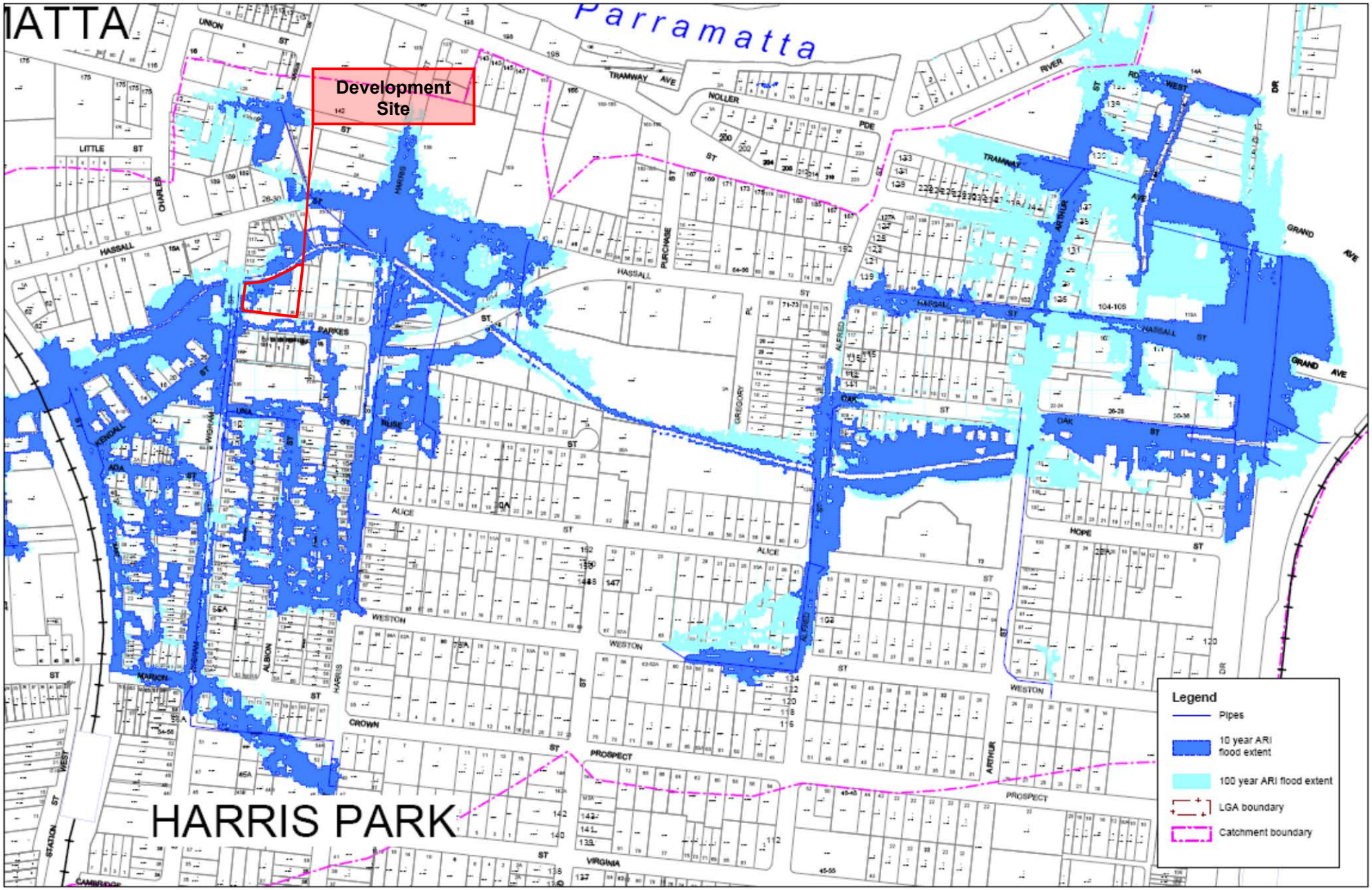
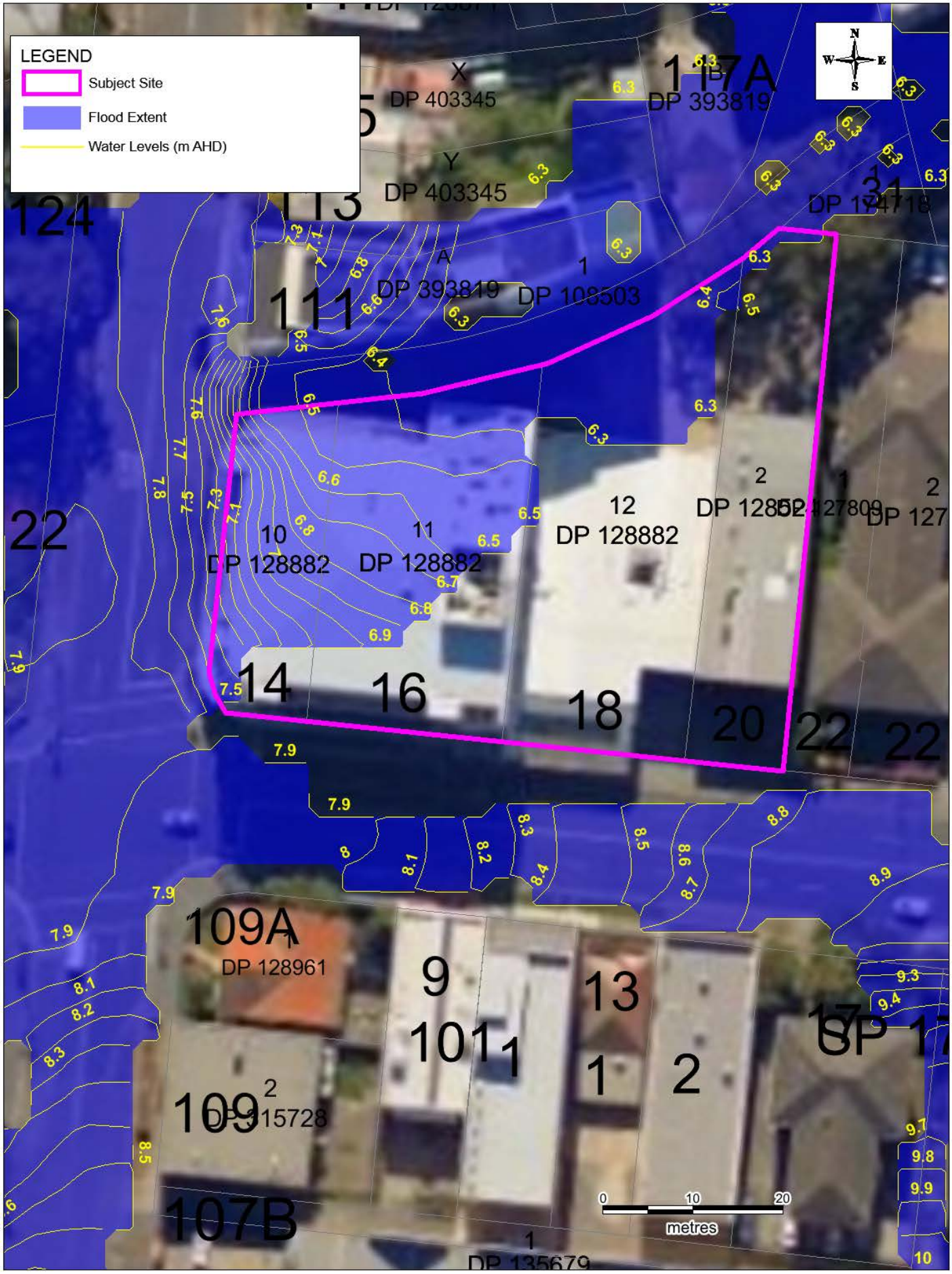
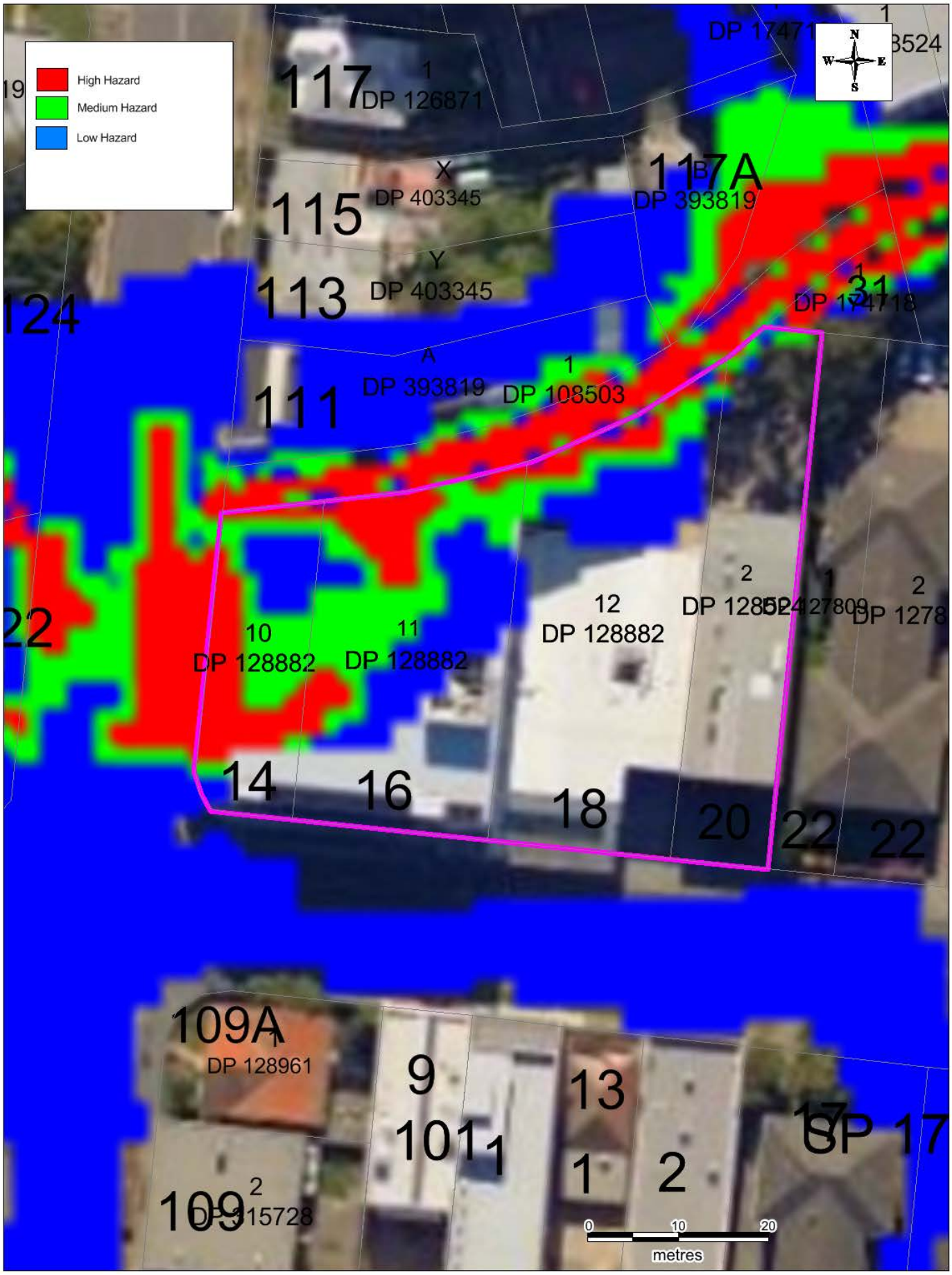


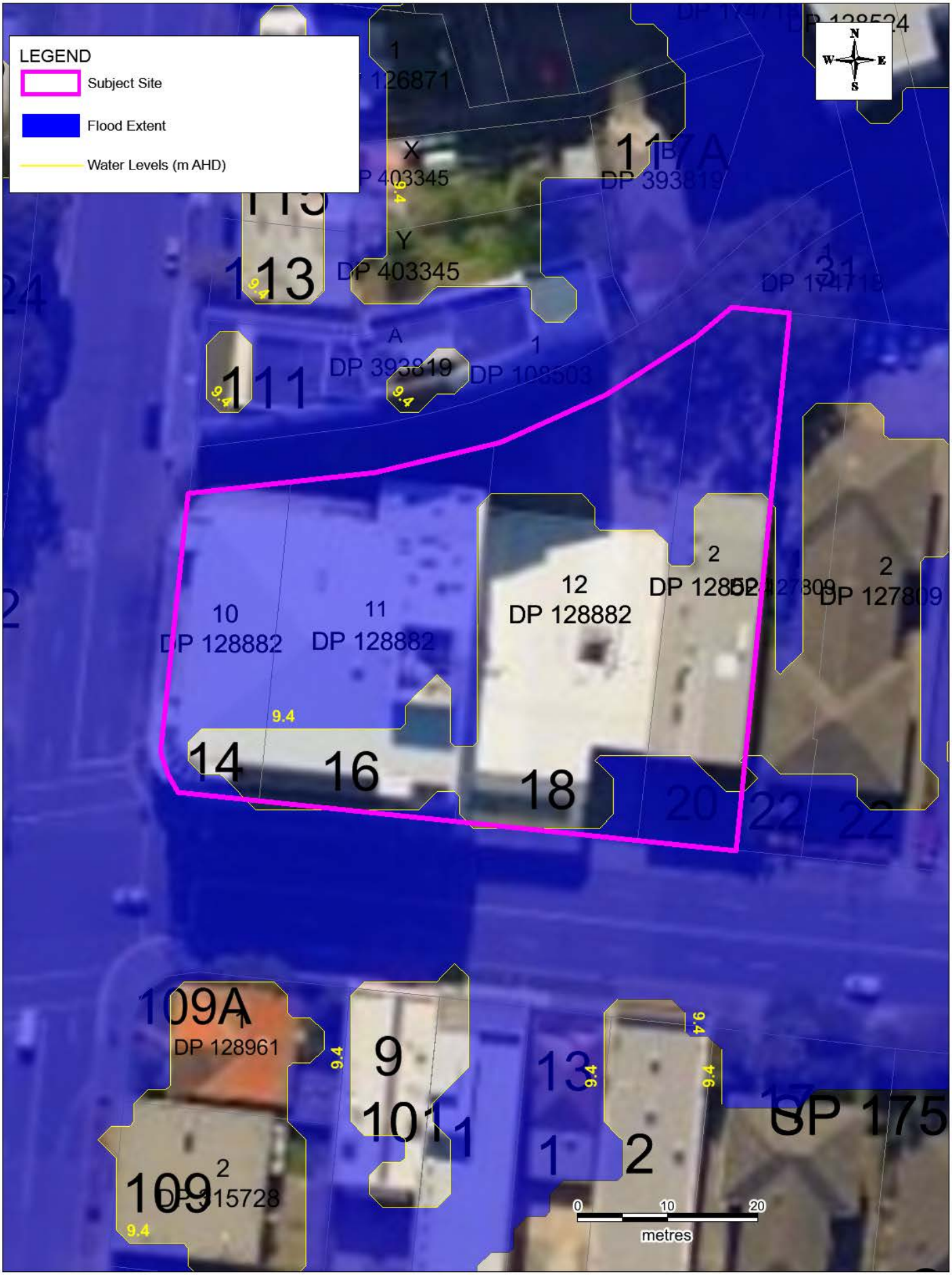
Figure 2 10 yr ARI and 100 yr ARI flood extents Clay Cliff Creek (after Cardno Willing, 2007)



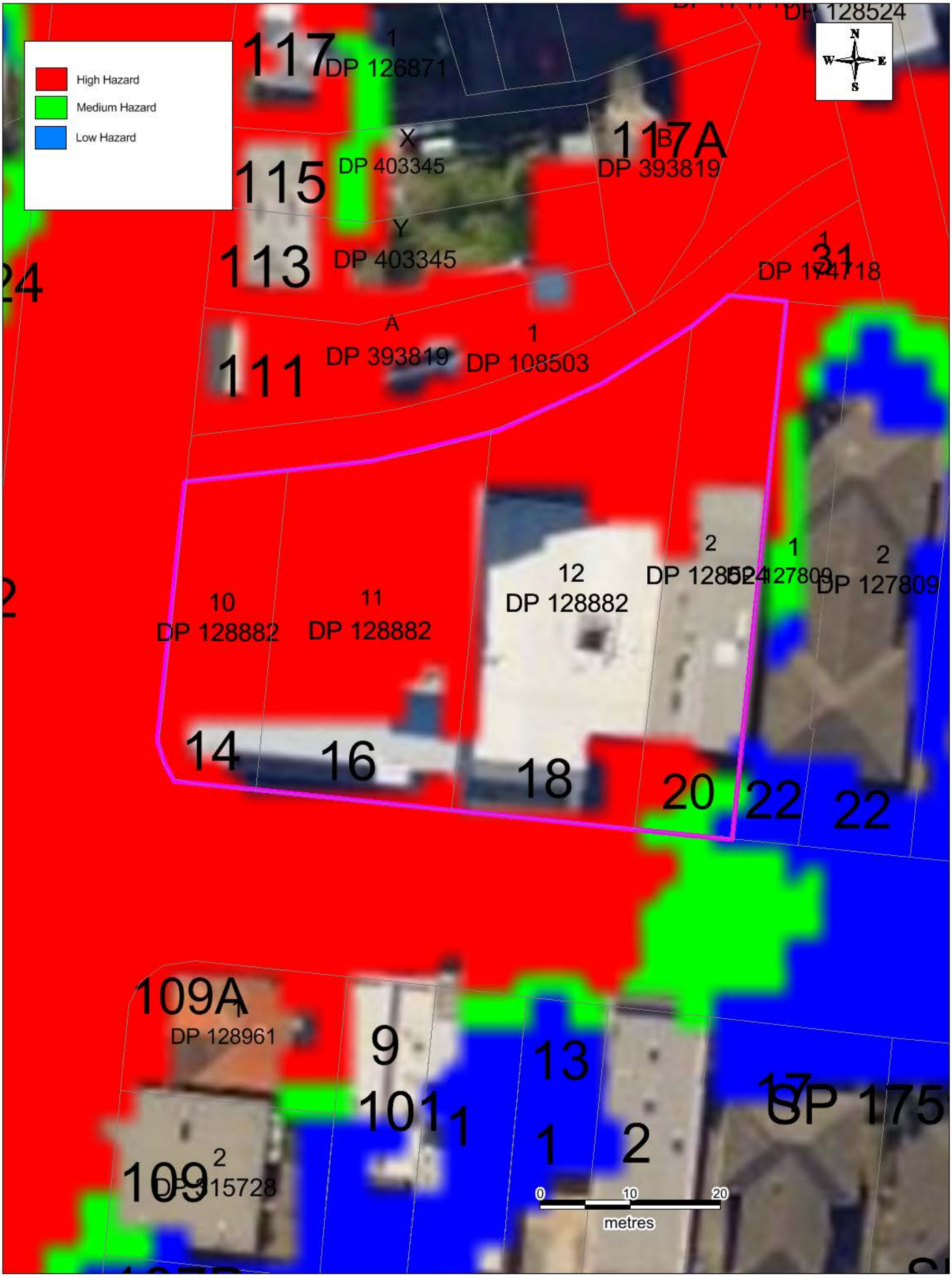
□igure □ 100 yr ARI □lood E□tents and □lood Levels - Current Conditions



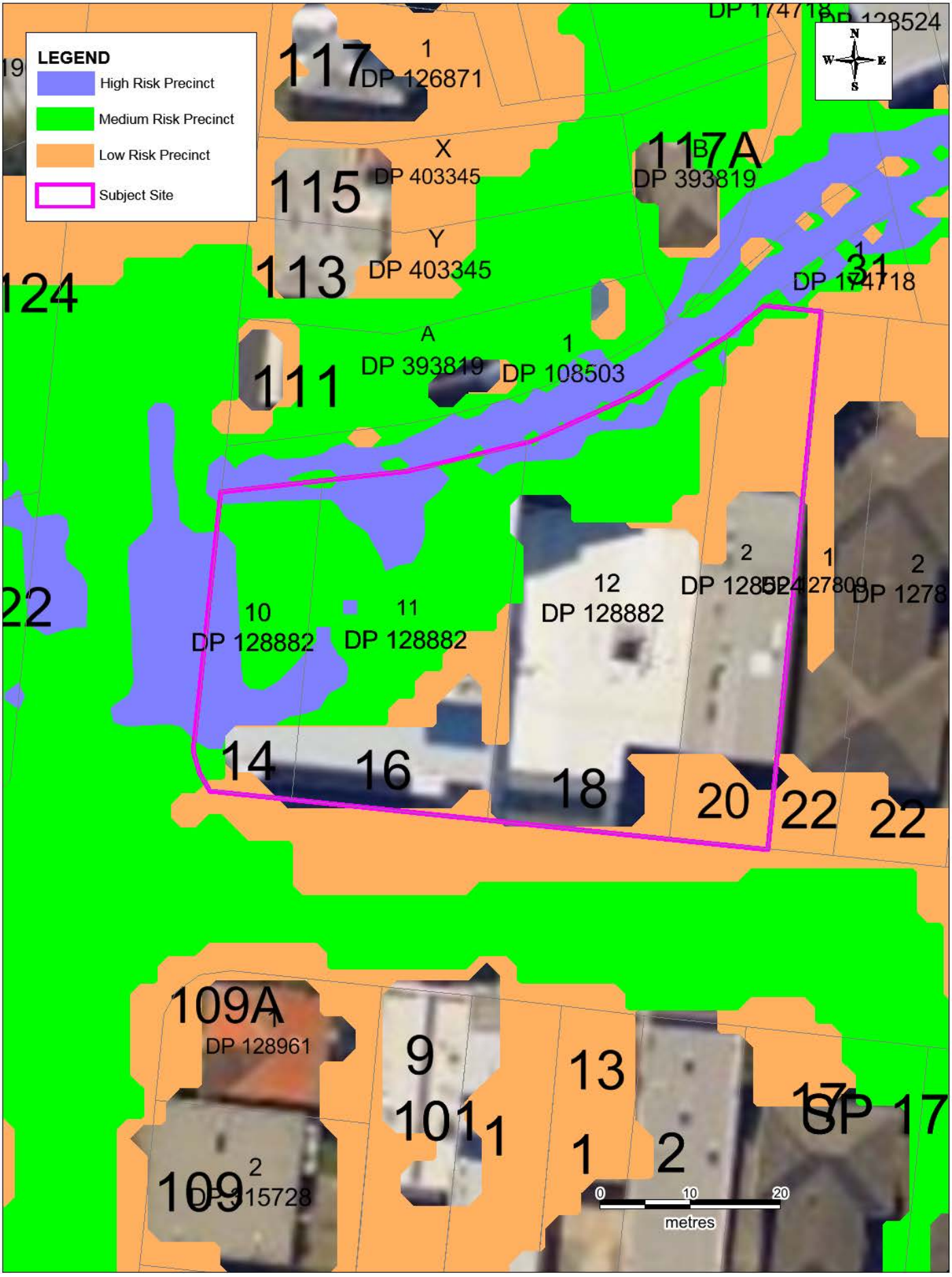
□igure □ 100 yr ARI □lood □a□ards - Current Conditions



□igure 5 PM□ E□tents and □lood Levels - Current Conditions



□igure 6 PM□ □a□ards - Current Conditions



□igure □ □lood Risk Precincts

Attachment □
Previous Studies

□.1 2001 □lood Impact Assessment of Development of 1□-16 Parkes St□Parramatta

In 2001 it was proposed to redevelop the site at 14-16 Parkes Street in Parramatta and to erect a multi-storey building that is compatible with the flood risk on the site. The site is bounded by Parkes Street to the south, Wigram Street to the west, the existing Anglicare office to the east and Clay Cliff Creek to the north.

Parramatta City Council previously adopted the Clay Cliff Creek Catchment Flood Study (Dalland & Lucas, 1992) and Addendum No. 1 (Dalland & Lucas, 1993) and the 5% AEP and 1% AEP flood levels reported therein.

In 1999 a report on flooding issues for 14-18 Parkes Street was prepared by Dalland & Associates, 1999. The development proposal that was assessed in this report was to construct a flood proof Basement Car Park and for the level of the ground floor of the building to be 500 mm above the estimated 1% AEP flood level.

The aim of the study was to estimate the spatial extent and flow patterns through and in the vicinity of 14-16 Parkes Street in both the 5% AEP and 1% AEP events and to estimate the magnitude and spatial extent of any changes to flood levels and velocities resulting from the re-development of 14-16 Parkes Street. The flood impact assessment was undertaken using a local 2D SMS model of 14-16 Parkes Street and its environs based on the available and collected data including detailed survey.

The development form which was adopted based on the outcomes of the flood assessment was a ground floor elevated 500 mm above the 100 yr ARI flood level supported on a grid of columns. The undercroft area is maintained in a non-vegetated condition to allow the free flow of floodwaters beneath the new building. Along the Wigram Street boundary a bar screen with the maximum allowable clear opening between bars was installed to bar non-authorised access to the undercroft area. The proposed building form on the Parkes Street side prevents any entry to the undercroft area from Parkes Street.

□.2 2005 Lo□er Parramatta River □loodplain Study

The Lower Parramatta River Floodplain Risk Management Study/Plan was completed in 2005 in accordance with the provisions of the Floodplain Development Manual applicable at that time. This study included a Flood Study Review which re-assessed flood levels in a number of watercourses and in the tidal section of Parramatta River, between the Charles Street weir and Ryde (road) Bridge. The Flood Study Review provided the base data for the subse□uent Floodplain Risk Management Study.

The study was commissioned by Parramatta City Council to update the previous data on flood levels and extents. PCC was aware that the results predicted in the 1986 study would now be subject to change due to changes in the catchment such as urbanisation and the construction of flood mitigation projects in the upper catchment. It also recognised that the previous flood extent mapping was based on the best information available at the time, but it was of variable reliability and did not provide an assessment of flood ha□ard.

The LPRFS adopted the best current practice to review the flood data which included (S□M, 2005):

- up-to-date catchment hydrology for the Upper Parramatta River Catchment□
- existing/ updated hydrology for the tributaries within the Lower Parramatta River study area□
- Airborne Laser Survey□

- an additional 70 surveyed cross-sections
- the widely used and accepted MI E-11 hydraulic model
- use of GIS to develop digital terrain models
- multiple design storms to generate maximum flood levels and
- appropriate methodology for estimating concurrent flows in tributaries.

Generally, results from the review compared well with previous studies. However, flood levels estimated in the 1986 Lower Parramatta Flood Study prepared by Willing and Partners in the Lower Parramatta River downstream of Subiaco Creek (including the Duck River confluence) were up to 1.2m lower than those derived in the 2005 review. The reasons for this difference as described in the 2005 Flood Study report include:

- revision of the critical duration to 9 hours for the Upper Parramatta River catchment in the 2005 study, due to the inclusion of channel routing and the effect of the Darling Mills Retarding Basin and other flood mitigation works. This leads to an increase in the volume of floodwaters
- more detailed and complete survey data and
- the adoption of an integrated modelling approach and consistent design storms for the main river and tributaries.

It is our understanding that Parramatta City Council adopted the design flood levels from this study for planning purposes in 2005.

Council and Council's Peer Reviewer has relied upon the flood levels estimated by this flood study in the vicinity of Wigram St and Hassall St, Harris Park as contained in Council's Flood Map (refer **Figure 1**).

. 200 Clay Cliff Creek Catchment Master Drainage Plan

A Catchment Master Drainage Plan for the Clay Cliff Creek catchment at Parramatta was prepared in 2007. The aim of the study as set out by Parramatta City Council was to identify overland flow problem areas, locations of surcharge due to insufficient pipe capacity and pit inlet capacity, and localised flooding with areas of improvement. The study aimed also to prepare cost effective options based on cost benefit analysis.

The 2007 study assembled a hydrological model of the Clay Cliff Creek catchment and input local flow hydrographs into an **psmm** 1D/2D floodplain model. The estimated 10 yr ARI and 100 yr ARI flood extents are presented in **Figure 2**.

. 2011 Flood Impact Assessment 111 Wigram St arris Park

Cardno was commissioned by ING Consulting Engineers Pty Ltd to undertake an assessment of the site and the proposed development in relation to flooding. The purpose of the assessment was to ensure that the proposed development does not have an adverse effect on 100 year ARI flood levels upstream and downstream of site and that risk of flooding to the public is acceptable to Parramatta City Council.

Cardno assessed flood behaviour for the 100 year ARI for the existing and proposed conditions. This was undertaken through update of our 2007 **psmm2D** model of the Clay Cliff Creek catchment prepared for the Parramatta City Council.

The assessment concluded that the proposed development does not have an adverse effect on 100 year ARI flood levels upstream and downstream of site and that the flood risk to the public is acceptable to Council.

□.5 2011 □lood Impact Assessment□122 □ igram St□□arris Park

Cardno was commissioned by LJ Hooker Westmead to undertake the flood assessment of the proposed multi- storey mixed-use development at 122 Wigram Street, Harris Park. The purpose of the assessment was to ensure that the proposed development does not have an adverse effect on 100 year ARI flood levels upstream and downstream of site and that risk of flooding to the public is acceptable to Parramatta City Council.

Cardno assessed flood behaviour for the 100 year ARI for the existing and proposed conditions. This was undertaken through update of our 2007 □**ps**□**mm2D** model of the Clay Cliff Creek catchment prepared for the Parramatta City Council.

The assessment concluded that the proposed development would maintain the floodplain of Clay Cliff Creek and would have little impact on flood behaviour being located between the hydraulic controls of Charles and Wigram Street crossings.

□.6 201□ □lood Impact Assessment□11□-11□ □ igram St and 2□-2□ □assall St□□arris Park

A mixed-use development of 113-117 Wigram St and 23-29 Hassall St is proposed comprising retail outlets, residential apartments and a multi-storey underground car park. The subject site is located adjacent to and north of Clay Cliff Creek.

Global Civil had previously prepared and amended flooding assessments for 113-117 Wigram St, Parramatta in response to Council comments.

Cardno was engaged to address the overall conclusions of Council□s Peer Reviewer as documented in a Council memorandum dated 21 October 2013.

The study comprised a:

- Review of previous flood studies and available data
- Compilation of site specific data (including proposed development layout)
- Establishment of flood model to represent existing site scenario
- Revision of flood model to represent future site development
- Assessment of resultant flood behaviour and flood risks
- Review of flood emergency planning
- Preparation of an outline of a flood emergency response plan
- Review of compliance with Parramatta City Council development re□uirements

It was also noted that the flood impact assessments previously accepted by Council on 111 Wigram St and 122 Wigram St were undertaken using an updated version of the 2007 Clay Cliff Creek □**ps**□**mm2D** floodplain model. Accordingly the assessment of the impact or otherwise of development on 113-117 Wigram St and 23-29 Hassall St was undertaken using an updated version of the 2007 Clay Cliff Creek □**ps**□**mm2D** floodplain model.

An assessment of flooding in the 100 yr ARI and the PMF event was undertaken.

Attachment C
DISPLANS

C.1 North □ est Metropolitan District Disaster Plan

On 27th June 2012 the Interim Version of the □North West Metropolitan District Disaster Plan (Displan)□was endorsed by Chairman, State Emergency Management Committee, The Displan was prepared by the North West Metropolitan District Emergency Management Committee in compliance with Section 23 (1) of the State Emergency and Rescue Management Act, 1989, (as amended). The Parramatta LGA is one of the LGAs covered by this plan.

The Plan details emergency preparedness, response and recovery arrangements for the North West Metropolitan Emergency Management District, Local Emergency Management Areas and local government. It recognises that many of the details contained in the plan are similar to those contained in Local Plans and therefore this Plan may be utilised and applied at a local level in conjunction with a Local Displan.

The Plan□s aim is to ensure a controlled response to emergencies by all agencies having responsibilities and functions in emergencies, (Section 12 (2) of the SERM Act), and it reflects and applies in conjunction with arrangements agreed to at State level and detailed in the State Disaster Plan

C.2 Parramatta DISPLAN

The Parramatta Disaster Plan (DISPLAN) released in 2010 details arrangements for preparing for, responding to and recovering from emergencies within the City of Parramatta.

As described in the plan, *it encompasses arrangements for:*

a) Incidents controlled by combat agencies.
b) Emergencies controlled by combat agencies and supported by the Local Emergency Operations Controller.
c) Emergency operations for which there is no combat agency.
d) Circumstances where a combat agency has passed control to the Local Emergency Operations Controller

The area covered by the plan comprises the whole of the City of Parramatta.

The Plan is based upon operation during both normal business hours and outside of normal business hours and takes into consideration special events that may from time to time operate outside and during normal business hours.

Transportation of people will be by either government/private transport or by private vehicle, with numbers and method dependant on circumstances and location of emergency.

Each agency with a statutory role has in place arrangements which detail that agency's response.

Each Emergency Service Organisation and Functional Area has in place an appropriate supporting plan/operational procedures which detail that agency's response.

It is expected that in the Parramatta CBD that Building Owners, Managers and Tenants will be provided with education regarding their responsibilities in both evacuation and general building emergency management. It is accepted that all buildings where required will have in place a practised Emergency Management Plan in line with AS 3745 and as per NSW OH&S Regulation 2001

Section 23 of the DISPLAN discusses evacuation as follows:

23. EVACUATION

a) *The LEOCon, in consultation with the Combat Agency, will determine the need for evacuation.*
b) *Police will control and coordinate the evacuation of persons to the chosen Safe site or marshalling point and supervise disaster victim registration.*
c) *Transport resources will be arranged through and coordinated by the transport functional area coordinator, if private vehicles are not available.*
d) *The LEOCon will determine, in consultation with the Combat Agency, when return of evacuees is possible.*

Concept of Operations

The evacuation process is based on a 5 stage process

i) *Decision to Evacuate*
ii) *Warning*
iii) *Withdrawal*
iv) *Shelter*
v) *Return*

The concept of operations for an emergency in the Parramatta CBD can be summarised as:

Emergency occurs or is imminent in the CBD:

Buildings may/may not begin self evacuation due to the emergency;
Public transport systems are disrupted, resulting in Transport/Traffic plans being enacted to provide an emergency service;
Emergency Service Agencies begin deployment in accordance with normal arrangements;
An area requiring Evacuation is identified;
When deemed safe to do so, "return" advised through Displan arrangements, and may include some caveats;
Throughout, the Emergency Services and Functional Area agencies continue to deal with the particular emergency.

Withdrawal

If there is a decision to evacuate, or a self evacuation commences, there is a need to follow a process to move people to a place of safety while the status of the transport system is assessed and arrangements are made to move people out of the Parramatta CBD.

The withdrawal stage for the CBD is based on the following philosophy.

> *Building to Assembly Area (covered by individual building evacuation plans)*
> *Assembly Area to Safe sites in accordance with the CBD evacuation plan or this plan (based on building location) OR*
> *Safe sites in accordance with the CBD evacuation plan or this plan*

Control Measures

For the purpose of this plan, the Parramatta CBD has been divided into three (3) zones (refer to map on Anexure 2)

- *Ollie Webb Reserve*
- *Macarthur Girls High School*
- *Parramatta Golf Course*

In the event of an emergency which severely disrupts transport and requires an evacuation of an area of the CBD, the control arrangements will recommend business and residents to either:

Stay at Work

This is used for all areas of the CBD (and surrounds) where the public are not directly threatened by the emergency. It may also imply that public transport may be affected and/or may not be available. This message is intended to stop or reduce the incidence of the public rushing to transport sites or exiting by private vehicles, thus allowing time for transport/traffic services to be re-established.

Stay at Work protocols assist in achieving a desired response for business and residents in the areas of the CBD unaffected by the emergency, such as:

> *To carry on normal business;*
> *Advise staff and others on their site, that an emergency has resulted in a disruption to public and private transport, and to allow for communication updates.*

Shelter in Place

This is used when it is assessed that for safety of the occupants of a building(s) or for control reasons, it is safer for occupants to remain in the building than to be on the streets. The time required to Shelter in Place will depend on the nature of the emergency.

CBD Residents/Permanent and Temporary

People who live in the area to be evacuated and those from temporary accommodation (hotels etc), will be directed to an Evacuation Centre (Refer to Parramatta Displan Sections 6.8. 1) and if necessary to temporary accommodation under the control of the Department of Community Services as per DISPLAN arrangements.

Commuters

People who are evacuated to their residence (as per a normal business day) will not receive further specialist management under this Annexure once their journey has concluded.

Evacuate to Safe Sites or Evacuation Centres

This is used as a control measure to identify those areas that require evacuation for safety and/or control reason. It is the intent to minimize the area of the CBD that is evacuated, noting that some emergencies may require the evacuation of some sections or large sections, if not all of the CBD.

People evacuated to Parramatta safe site will be requested to:

> *Remain in position until further information is available, or*
> *Make their way to other parts of the city and delay their journey home, or Make their way to specific transport terminals for movement out of the city, or Identify themselves if they have specific needs or Move to an Evacuation Centre, or Combinations of the above.*

Support will be provided to people in Safe Sites or Evacuation Centres in accordance with this plan.

Return

LEOCON, in consultation with the combat agency and/or Functional Area, if applicable, will allow the area to be reoccupied when it is safe to do so in accordance with this plan

Building Owners and Managers

It is accepted that Building Owners and Managers in accordance with existing OH&S requirements, the Building Code of Australia and relevant City of Parramatta regulations, are to have a building Emergency Management Plan which complies with the provisions of AS 3745.

It is expected that all building Emergency Management Plans are to contain details of the most relevant Parramatta Safety Site. All wardens trained under the building emergency plan are to be aware of the Parramatta Safety Sites, routes to the site and how to liaise with the building occupants at the site.

It is accepted that all building Emergency Management Plans are to contain detail of how the information regarding an evacuation will be disseminated from the Chief Warden to occupants of the building.

It is noted that a copy of the Parramatta CBD Evacuation Plan is not available in the public domain.

It is noted also that the 2010 Parramatta DISPLAN, states in part that:

iii) the intent is to minimi□e the area of the CBD that is evacuated, noting that some emergencies may re□uire the evacuation of some sections or large sections, if not all of the CBD□and
iv) shelter in place is used when it is assessed that for safety of the occupants of a building(s) or for control reasons that it is safer for occupants to remain in the building than to be on the streets.

It is expected that this is also the intent for the all other areas within the LGA outside the CBD.

Attachment D
E□ample □EDRP Ta□le of Contents

APPENDICES

Appendix 3 – Traffic and Transport Assessment

Planning Proposal for a Mixed-Use Development

14-20 Parkes Street, Parramatta

TRAFFIC AND PARKING ASSESSMENT REPORT

27 July 2015

Ref 14872

VARGA TRAFFIC PLANNING Pty Ltd
Transport, Traffic and Parking Consultants

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Ph: 9904 3224 Fax: 9904 3228

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LIST OF ILLUSTRATIONS

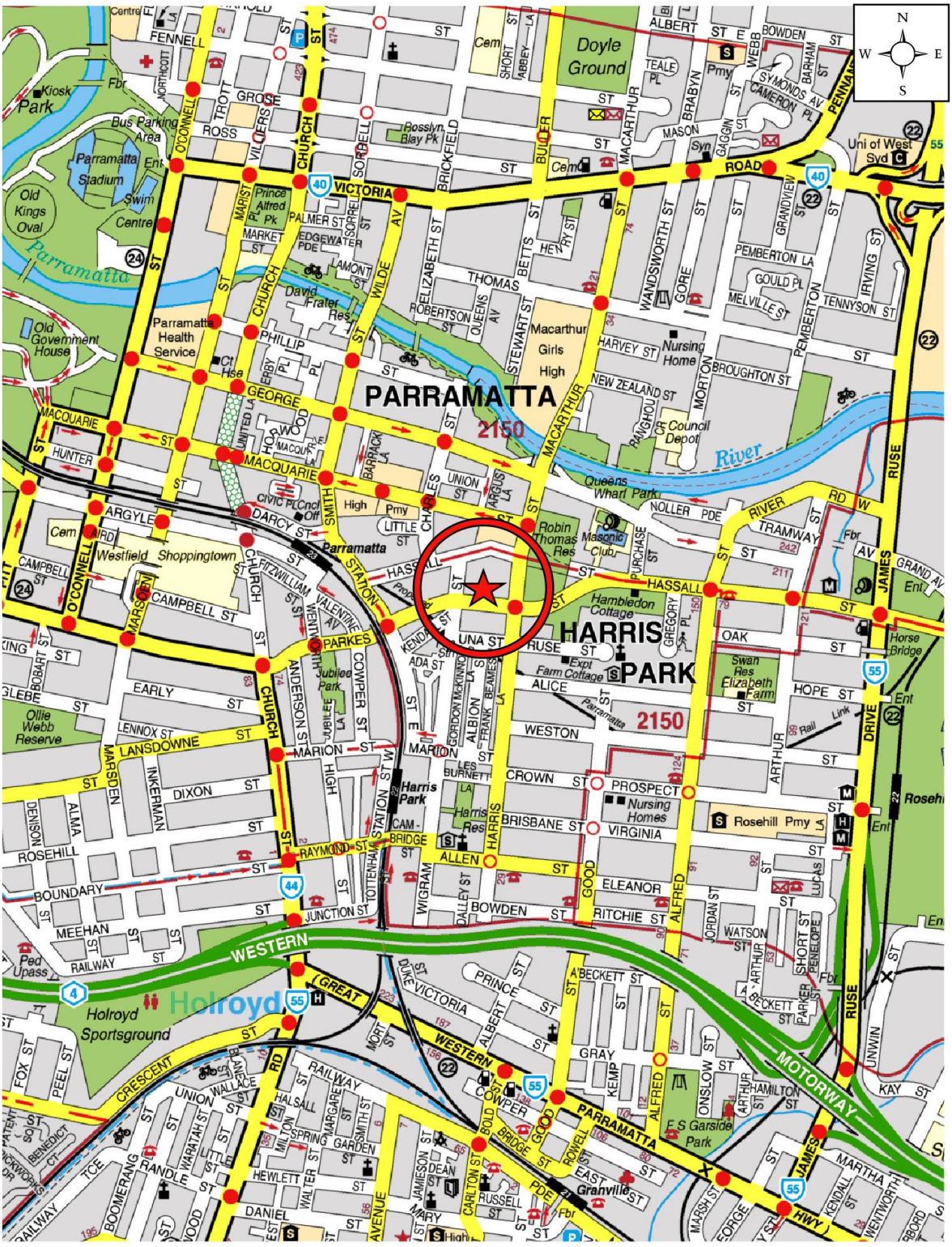
1. INTRODUCTION

This report has been prepared to accompany a planning proposal to Parramatta City Council for a proposed mixed-use high rise mixed-use residential apartment building to be located at 14-20 Parkes Street, Parramatta (Figures 1 and 2).

The planning proposal will involve the demolition of the existing commercial buildings on the site to facilitate the construction of a new mixed-use residential apartment building with a ground floor retail component. Off-street car parking is to be accommodated in a multi-level above ground car park which will ultimately comply with Council's Parking Code requirements.

The purpose of this report is to assess the traffic and parking implications of the planning proposal and to that end this report:

- describes the site and provides details of the planning proposal
- reviews the road network in the vicinity of the site, and the traffic conditions on that road network
- estimates the traffic generation potential of the planning proposal, and assigns that traffic generation to the road network serving the site
- assesses the traffic implications of the planning proposal in terms of road network capacity
- reviews the geometric design features of the proposed car parking facilities for compliance with the relevant codes and standards
- assesses the adequacy and suitability of the quantum of off-street car parking provided on the site.



VARGA TRAFFIC PLANNING Pty Ltd
Transport, Traffic and Parking Consultants

LOCATION
FIGURE 1

VARGA TRAFFIC PLANNING Pty Ltd
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SITE
FIGURE 2

2. PROPOSED DEVELOPMENT

Site

The subject site is located at the north-eastern corner of the Parkes Street and Wigram Street intersection. The site has a street frontage of approximately 60 metres in length to Parkes Street, and approximately 28 metres in length to Wigram Street. The site occupies an area of approximately 2,830m^2.

The subject site is currently occupied by three separate commercial buildings, each with respective vehicular access driveways to Parkes Street. The commercial buildings comprise a mix of two and five-storey buildings, and have a cumulative floor area of approximately 5,900m^2.

Proposed Development

The planning proposal will involve the demolition of the existing buildings on the site to facilitate the construction of a new mixed-use residential apartment building.

The following schemes have been investigated as part of the planning proposal, with varying building heights and unit mix as follows:

Apartment Type	Scheme 1 (15 Storeys)	Scheme 2 (25 Storeys)	Scheme 3 (32 Storeys)	Scheme 4 (39 Storeys)	Scheme 5 (44 Storeys)
1 bedroom	31	52	73	97	112
2 bedrooms	83	121	158	193	218
3 bedrooms	9	16	24	31	36
TOTAL	**123**	**189**	**255**	**321**	**366**

Scheme 1 represents the existing development potential of the site under the current planning controls, whilst Scheme 5 represents the maximum development potential being considered as part of the planning proposal.

A retail component common to all schemes is proposed at Ground Level, with a cumulative floor area of 600m^2.

Off-street car parking is proposed in an above ground multi-level car parking area, and the number of parking spaces to be provided will ultimately comply with Council's requirements. Vehicular access to the car parking facilities is to be provided via an entry/exit driveway located at the northern end of the Wigram Street site frontage.

Loading and servicing for planning proposed is expected to be undertaken by a variety of light commercial vehicles such as white vans, utilities and the like, which are capable of fitting into a conventional parking space. Garbage collection is expected to be undertaken by Council's waste contractor. These arrangements are to be reviewed in detail during the DA stage of the project.

3. TRAFFIC ASSESSMENT

Road Hierarchy

The road hierarchy allocated to the road network in the vicinity of the site by the Roads and Maritime Services is illustrated on Figure 3.

The M4 Motorway is classified by the RMS as a *State Road* and provides the key east-west road link in the area, linking Concord to Emu Plains. It typically carries three traffic lanes in each direction in the vicinity of the site, with opposing traffic flows separated by a central median island. All intersections with the M4 Motorway are grade-separated.

James Ruse Drive is also classified by the RMS as a *State Road* and provides the key north-south road link in the area, linking the Great Western Highway to Windsor Road. It typically carries three traffic lanes in each direction with turning bays provided at key locations.

Parkes Street and Hassall Street (east of Parkes Street) are classified by the RMS as a *Regional Road* which provides the key east-west *collector route* through the area. It typically carries two traffic lanes in each direction in the vicinity of the site, with kerbside parking permitted at selected locations only, outside commuter peak periods.

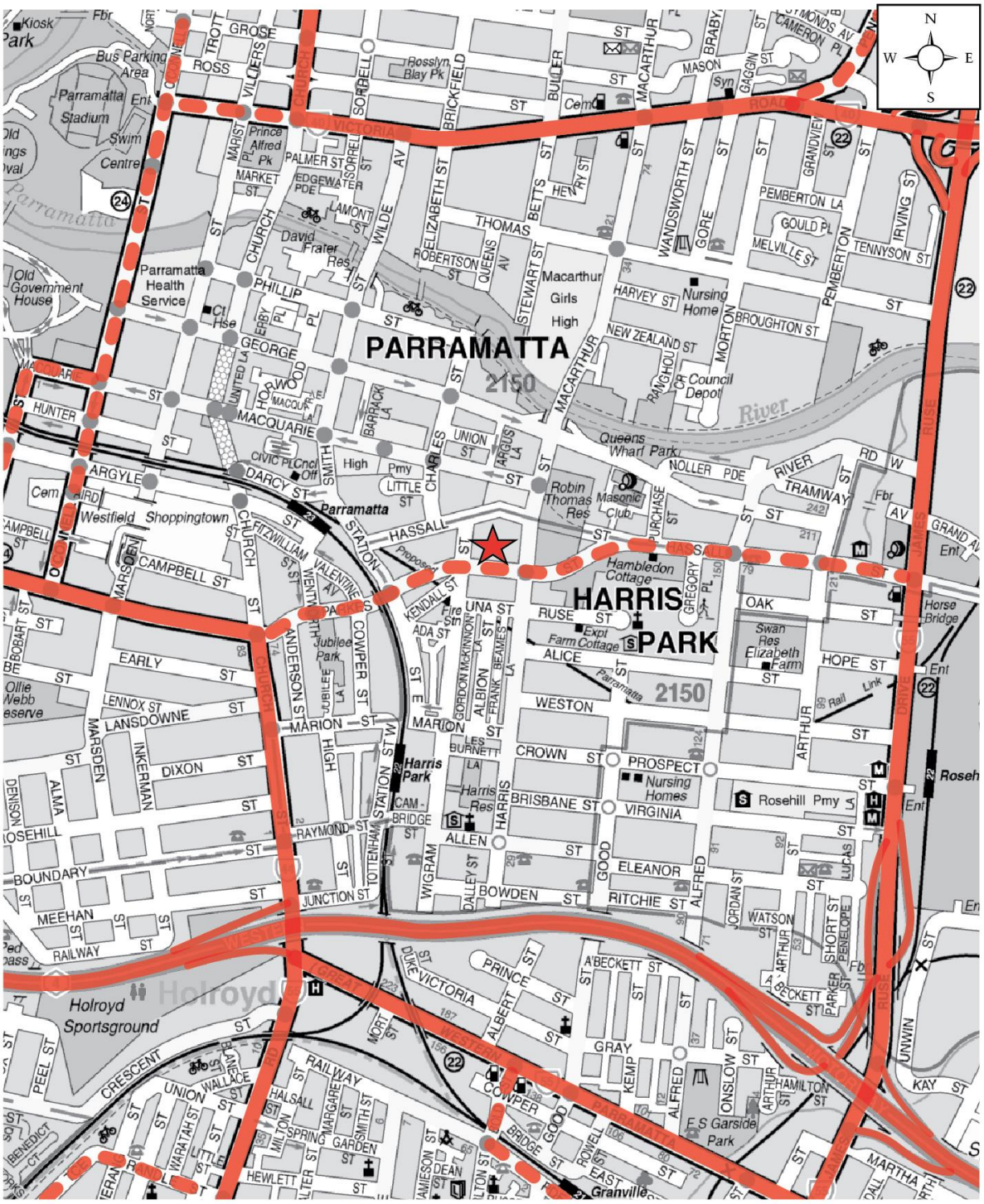
Wigram Street is a local, unclassified road which is primarily used to provide vehicular and pedestrian access to frontage properties. Kerbside parking is generally permitted along both sides of the road.

Existing Traffic Controls

The existing traffic controls which apply to the road network in the vicinity of the site are illustrated on Figure 4. Key features of those traffic controls are:

- a 60 km/h SPEED LIMIT which applies to the Parkes Street and Harris Street (north of Parkes Street)

- a 50 km/h SPEED LIMIT which applies to all other local roads in the area



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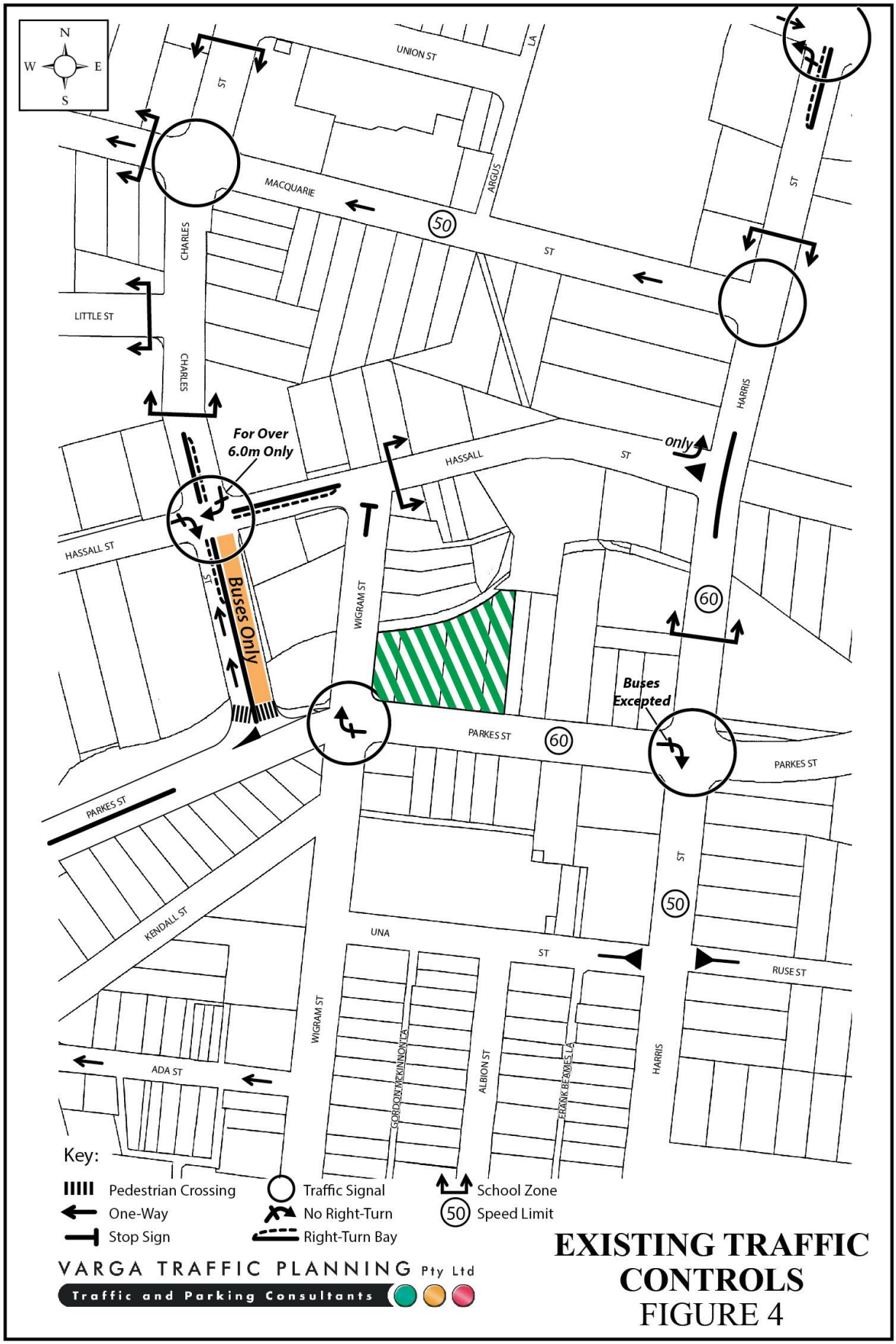
ROAD HIERARCHY
FIGURE 3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One-Way
Stop Sign
Traffic Signal
No Right-Turn
Right-Turn Bay
School Zone
50 Speed Limit
VARGA TRAFFIC PLANNING Pty Ltd
Traffic and Parking Consultants
EXISTING TRAFFIC CONTROLS
FIGURE 4

- TRAFFIC SIGNALS in Parkes Street where it intersects with Wigram Street and also Harris Street

- a NO RIGHT-TURN restriction westbound in Parkes Street into Wigram Street

- a NO RIGHT-TURN restriction eastbound in Parkes Street onto Harris Street.

Sustainable Transport Options

The proposed mixed-use building is located within the boundaries of the Parramatta City Centre where there is an extensive variety of sustainable transport options available such as train, bus, ferry, cycling and walking, as detailed below.

Parramatta Railway Station is located between Station Street and Argyle Street, approximately 400m west from the proposed development (approx. a 5 min walk). The Railway Station is a major railway interchange which services three train lines – The Blue Mountains Line, the Western Line and the Cumberland Line.

The Cumberland Line operates Monday to Friday only and offers two morning services and three afternoon services between Campbelltown and Blacktown. The Blue Mountains Line operates 7 days per week between Lithgow and Central, with generally one service per hour during off-peak periods, increasing to one service every 20-30min during peak periods. The Western Line operates 7 days per week between Emu Plains/Richmond and North Sydney/ North Shore, with generally one service approximately every 15min during off-peak periods, increasing to one service approximately every 5-10min during peak periods.

A major bus interchange is also located at Parramatta Railway Station which, as previously mentioned, is approximately 400m west from the proposed mixed-use development (approx.. a 5 min walk).

In addition to the extensive range of train and bus services available in the Parramatta area, the Parramatta Rivercat Ferry service provides *express-only* services every hour between Circular Quay and Parramatta, 7 days a week. The Parramatta wharf is located at the northern

end of Charles Street, approximately 700m north of the proposed mixed-use building (approx. an 8 min walk).

Existing Traffic Conditions

An indication of the existing traffic conditions on the road network in the vicinity of the site is provided by peak period traffic surveys undertaken as part of this traffic study. The traffic surveys were undertaken in Wigram Street where it intersects with Parkes Street and also with Hassall Street. The results of the traffic surveys are reproduced in full in Appendix A and reveal that:

- two-way traffic flows in Parkes Street are typically in the order of 1,500 vph during peak periods

- two-way traffic flows in Wigram Street in front of the site are typically in the order of 350 vehicles per hour (vph) during peak periods

- two-way traffic flows in Hassall Street is typically less than 400 vph during peak periods.

Projected Traffic Generation

An indication of the traffic generation potential of the planning proposal is provided by reference to the Roads and Maritime Services publication *Guide to Traffic Generating Developments, Section 3 - Landuse Traffic Generation (October 2002).*

The RMS *Guidelines* are based on extensive surveys of a wide range of land uses and nominates the following traffic generation rates which are applicable to the planning proposal:

High Density Residential Flat Buildings in Metropolitan Regional Centres
0.24 peak hour vehicle trips/dwelling

The RMS *Guidelines* also make the following observation in respect of high density residential flat buildings:

> **Definition**
>
> A *high density residential flat building* refers to a building containing 20 or more dwellings. This does not include aged or disabled persons housing. *High density residential flat buildings* are usually more than 5 levels, have basement level car parking and are located in close proximity to public transport services. The building may contain a component of commercial use.
>
> **Factors**
>
> The above rates include visitors, staff, service/delivery and on-street movements such as taxis and pick-up/set-down activities.

The RMS *Guidelines* do not nominate a traffic generation rate for small, local shops, referring only to major regional shopping centres incorporating supermarkets and department stores. For the purpose of this assessment therefore, the traffic generation rate of 2.0 peak hour vehicle trips per $100m^2$ GFA nominated in the RMS *Guidelines* for *commercial premises* has been adopted in respect of the retail component of the planning proposal.

Application of the above traffic generation rates to the residential and retail components of each scheme is summarised in the table below, revealing that:

- under Scheme 1 which represents the existing development potential of the site under current planning controls yields a traffic generation potential of 42 vph

- under Scheme 5 which represents the maximum development potential of the site under the planning proposal yields a traffic generation potential of 100 vph

- the *nett* difference between Scheme 1 and Scheme 5 is 58 vph.

Projected Future Traffic Generation Potential

Landuse	Scheme 1 (15 Storeys)	Scheme 2 (25 Storeys)	Scheme 3 (32 Storeys)	Scheme 4 (39 Storeys)	Scheme 5 (44 Storeys)
Residential	29.5 vph	45.4 vph	61.2 vph	77.0 vph	87.8 vph
Retail	12.0 vph	12.0 vph	12.0 vph	12.0 vph	12.0 vph
TOTAL	**41.5 vph**	**57.4 vph**	**73.2 vph**	**89.0 vph**	**99.8 vph**

The projected future traffic generation potential of the site should however, be offset or *discounted* by the volume of traffic which could reasonably be expected to be generated by the existing commercial uses of the site, in order to determine the *nett increase (or decrease)* in traffic generation potential of the site expected to occur as a consequence of the planning proposal when compared with the previously approved development on the site.

Application of the *commercial premises* traffic generation rate nominated in the RMS *Guidelines* to the existing commercial buildings on the site which have a floor area of approximately 5,900m^2 yields a traffic generation potential of approximately 118 peak hour vehicle trips.

Accordingly, it is clear that *all* of the schemes being considered as part of this planning proposal would result in a *nett reduction* in the traffic generation potential of the site. In particular, it is noted that *Scheme 4* would result in a *nett reduction* in the traffic generation potential of the site of 18 vph as set out in the table below:

Projected Nett Change in Peak Hour Traffic Generation Potential of the Site as a Consequence of the Planning Proposal

Projected Future Traffic Generation Potential (Scheme 4):	99.8 vehicle trips
Less Existing Commercial Buildings Traffic Generation Potential (5900m^2):	-118.0 vehicle trips
NETT CHANGE IN TRAFFIC GENERATION POTENTIAL:	**-18.2 vehicle trips**

For the purposes of this assessment however, it has been assumed that the existing commercial buildings on the site are currently *vacant* and that *all* of the projected future traffic flows of up to 99.8 peak hour vehicle trips will be new or *additional* to the existing traffic flows currently using the adjacent road network.

Traffic Implications - Road Network Capacity

The traffic implications of planning proposals primarily concern the effects that any *additional* traffic flows may have on the operational performance of the nearby road network. Those effects can be assessed using the SIDRA program which is widely used by the RMS and many LGA's for this purpose. Criteria for evaluating the results of SIDRA analysis are reproduced in the following pages.

For the purposes of this assessment, the maximum traffic generation potential of the site under Scheme 4 has been adopted as it represents the maximum development potential of the site being considered as part of this planning proposal.

The detailed SIDRA *movement summaries* results pages are reproduced in full in Appendix B. The results of the SIDRA analysis are summarised in Table 3.1 and 3.2 below, revealing that:

Wigram Street & Parkes Street Intersection

- the intersection currently operates at *Level of Service "B"* under the existing traffic demands with total average vehicle delays in the order of 23.5 seconds/vehicle

- under the projected future Scheme 4 traffic demands expected to be generated by the planning proposal, the intersection will continue to operate at *Level of Service "B",* with increases in average vehicle delays of ***less than*** 3 seconds/vehicle.

Wigram Street & Hassall Street Intersection

- the intersection currently operates at *Level of Service "A"* under the existing traffic demands with total average vehicle delays in the order of 4.6 seconds/vehicle

- under the projected future Scheme 4 traffic demands expected to be generated by the planning proposal, the intersection will continue to operate at *Level of Service "A",* with increases in average vehicle delays of ***less than*** 1 second/vehicle.

In summary, it is clear that the planning proposal will not have any unacceptable traffic implications in terms of road network capacity.

TABLE 3.1 - RESULTS OF SIDRA ANALYSIS OF WIGRAM STREET & PARKES STREET INTERSECTION

Key Indicators		Existing Traffic Demand		Scheme 4 Projected Development Traffic Demand	
		AM	**PM**	**AM**	**PM**
Level of Service		B	B	B	B
Degree of Saturation		0.464	0.397	0.490	0.421
Average Vehicle Delay (secs/veh)					
Wigram Street (south)	L	37.2	33.9	35.0	33.9
	T	38.1	43.3	38.8	43.7
	R	44.3	49.6	47.0	50.6
Parkes Street (east)	L	30.6	25.9	32.9	27.3
	T	25.0	20.3	27.3	21.7
Wigram Street (north)	L	38.7	42.6	36.6	41.0
	T	39.7	43.8	44.3	45.0
	~~R~~	44.3	48.4	48.9	49.5
Parkes Street (west)	L	18.6	15.5	20.4	16.6
	T	13.3	10.2	15.1	11.3
	R	19.5	16.3	21.1	17.3
TOTAL AVERAGE VEHICLE DELAY		**23.5**	**21.1**	**25.6**	**22.3**

WIG_PARX WIG_PARP

TABLE 3.2 - RESULTS OF SIDRA ANALYSIS OF WIGRAM STREET & HASSALL STREET INTERSECTION

Key Indicators		Existing Traffic Demand		Scheme 4 Projected Development Traffic Demand	
		AM	**PM**	**AM**	**PM**
Level of Service		A	A	A	A
Degree of Saturation		0.127	0.120	0.153	0.130
Average Vehicle Delay (secs/veh)					
Wigram Street (south)	L	7.8	7.6	7.8	7.6
	R	7.5	7.5	7.5	7.5
Hassall Street (east)	L	4.6	4.6	4.6	4.6
	T	0.0	0.0	0.0	0.0
Hassall Street (west)	T	0.2	0.1	0.3	0.2
	R	4.8	4.7	4.9	4.8
TOTAL AVERAGE VEHICLE DELAY		**4.4**	**4.6**	**4.7**	**4.7**
		WIG_HASX		WIG_HASP	

Criteria for Interpreting Results of Sidra Analysis

1. Level of Service (LOS)

LOS	Traffic Signals and Roundabouts	Give Way and Stop Signs
'A'	Good operation.	Good operation.
'B'	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
'C'	Satisfactory.	Satisfactory but accident study required.
'D'	Operating near capacity.	Near capacity and accident study required.
'E'	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode.	At capacity and requires other control mode.
'F'	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode.

2. Average Vehicle Delay (AVD)

The AVD provides a measure of the operational performance of an intersection as indicated on the table below which relates AVD to LOS. The AVD's listed in the table should be taken as a guide only as longer delays could be tolerated in some locations (ie inner city conditions) and on some roads (ie minor side street intersecting with a major arterial route).

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
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	Operating near capacity.	Near capacity and accident study required.
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode.	At capacity and requires other control mode.

3. Degree of Saturation (DS)

The DS is another measure of the operational performance of individual intersections.

For intersections controlled by traffic signals[1] both queue length and delay increase rapidly as DS approaches 1, and it is usual to attempt to keep DS to less than 0.9. Values of DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceeds 0.9 queues can be anticipated.

For intersections controlled by a roundabout or GIVE WAY or STOP signs, satisfactory intersection operation is indicated by a DS of 0.8 or less.

[1] *The values of DS for intersections under traffic signal control are only valid for cycle length of 120 secs.*

4. PARKING IMPLICATIONS

Existing Kerbside Parking Restrictions

The existing kerbside parking restrictions which apply to the road network in the vicinity of the site are illustrated on Figure 5 and comprise:

- NO STOPPING/NO PARKING restrictions along both sides of Parkes Street, including along the site frontage
- NO STOPPING restrictions along both sides of Hassall Street
- 4 HOUR PARKING restrictions along both sides of Wigram Street, and various sections along Hassall Street
- BUS ZONES at regular intervals along Parkes Street.

Off-Street Parking Provisions

The *maximum* number of off-street parking spaces which may be provided on the site are specified in *Parramatta City Centre Local Environmental Plan 2007, Section 22C – Car Parking* document in the following terms:

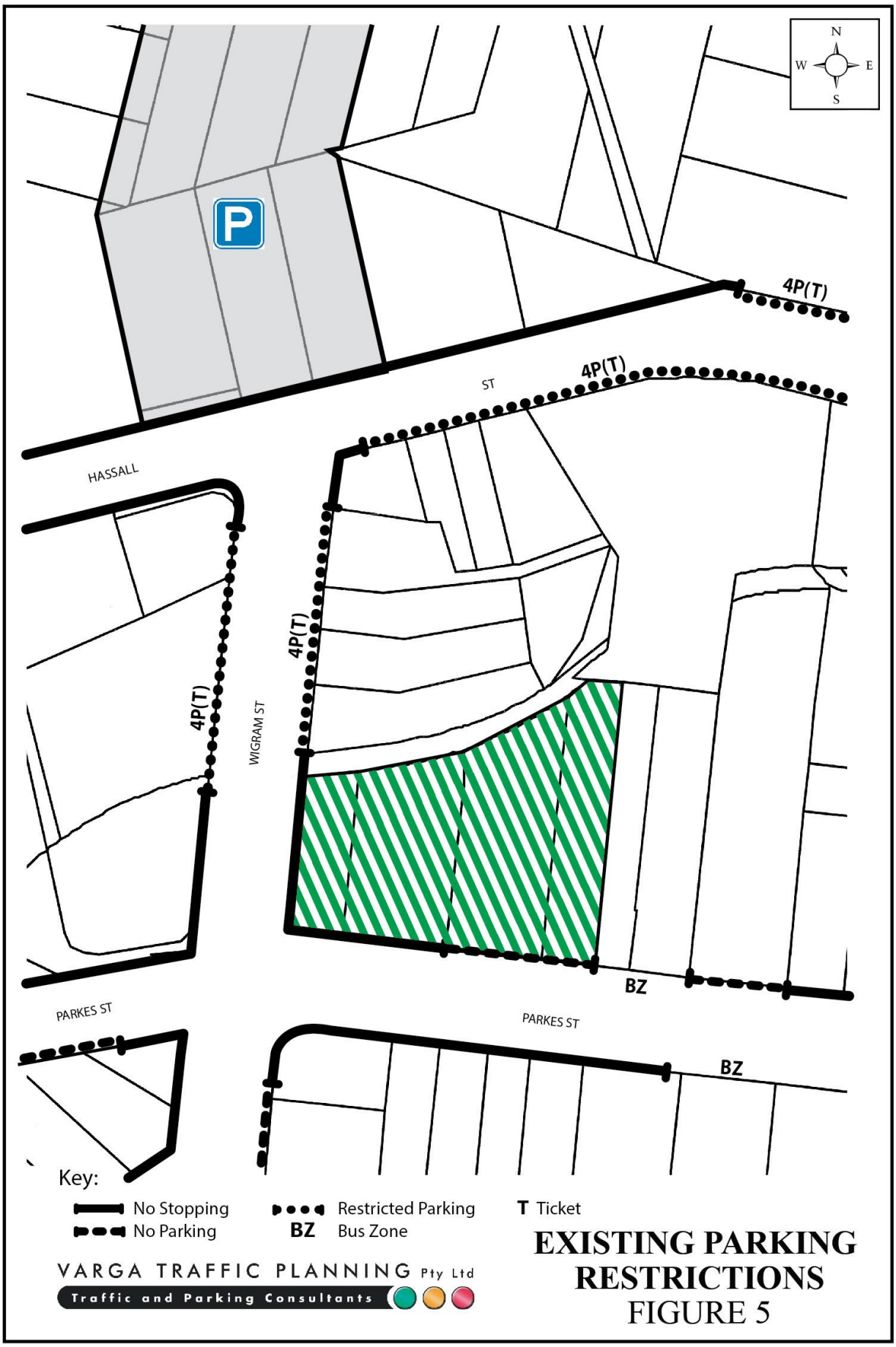
Multi Dwelling Housing (1, 2 and 3 bedrooms)

Residents:	1 space per dwelling
Visitors:	1 space per 5 dwellings

Shops

1 space per 30m² of gross floor area

Application of the above parking requirements to each of the schemes outlined in the development proposal yields a *maximum* off-street parking provision between 168 and 459 parking spaces as set out below:


N
W
E
S
P
4P(T)
4P(T)
ST
HASSALL
4P(T)
4P(T)
WIGRAM ST
BZ
PARKES ST
PARKES ST
BZ
Key:
No Stopping
No Parking
Restricted Parking
BZ Bus Zone
T Ticket
VARGA TRAFFIC PLANNING Pty Ltd
Traffic and Parking Consultants
EXISTING PARKING RESTRICTIONS
FIGURE 5

Maximum Parking Provisions Permitted
On the Site by Parramatta City Centre LEP 2007

Apartment Size	Scheme 1 (15 Storeys)	Scheme 2 (25 Storeys)	Scheme 3 (32 Storeys)	Scheme 4 (39 Storeys)	Scheme 5 (44 Storeys)
Residents	123.0 spaces	189.0 spaces	255.0 spaces	321.0 spaces	366.0 spaces
Visitors	24.6 spaces	37.8 spaces	51.0 spaces	64.2 spaces	73.2 spaces
Retail	20.0 spaces	20.0 spaces	20.0 spaces	20.0 spaces	20.0 spaces
TOTAL	**167.6 spaces**	**246.8 spaces**	**326 spaces**	**405.2 spaces**	**459.2 spaces**

It is envisaged that the amount of car parking to be provided on the site will comply with Council's Parking Code requirements, noting that the Parramatta City Centre LEP 2007 specifies a *maximum* rather than a *minimum* parking requirement.

The geometric design layout of the proposed car parking facilities will be designed to comply with the relevant requirements specified in the Standards Australia publication *Parking Facilities Part 1 - Off-Street Car Parking AS2890.1* in respect of parking bay dimensions, ramp gradients and aisle widths.

In summary, the proposed parking facilities are capable of complying with the relevant requirements specified in both Council's Parking Code as well as the Australian Standards and it is therefore concluded that the proposed development could not be expected to have any unacceptable parking implications.

APPENDIX A

TRAFFIC SURVEY DATA

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : Varga Traffic Planning
Job No/Name : 5450 PARRAMATTA Wigram St Counts
Day/Date : Wednesday 10th December 2014

Lights

	WEST		SOUTH		EAST		
	Hassall St		*Wigram St*		*Hassall St*		
Time Per	T	R	L	R	L	T	TOT
0700 - 0715	18	9	15	7	4	18	71
0715 - 0730	27	12	14	15	5	14	87
0730 - 0745	17	17	20	11	5	22	92
0745 - 0800	14	18	23	19	2	12	88
0800 - 0815	11	42	30	13	5	17	118
0815 - 0830	14	23	26	12	4	19	98
0830 - 0845	22	41	33	14	6	25	141
0845 - 0900	19	48	31	17	6	17	138
Per End	142	210	192	108	37	144	833

Heavies

	WEST		SOUTH		EAST		
	Hassall St		*Wigram St*		*Hassall St*		
Time Per	T	R	L	R	L	T	TOT
0700 - 0715	0	0	0	0	0	0	0
0715 - 0730	0	0	0	0	0	0	0
0730 - 0745	0	0	0	0	0	0	0
0745 - 0800	0	0	0	0	0	1	1
0800 - 0815	0	0	0	0	0	1	1
0815 - 0830	0	0	0	0	0	0	0
0830 - 0845	0	0	0	0	0	0	0
0845 - 0900	0	0	0	0	0	0	0
Per End	0	0	0	0	0	2	2

Combined

	WEST		SOUTH		EAST		
	Hassall St		*Wigram St*		*Hassall St*		
Time Per	T	R	L	R	L	T	TOT
0700 - 0715	18	9	15	7	4	18	71
0715 - 0730	27	12	14	15	5	14	87
0730 - 0745	17	17	20	11	5	22	92
0745 - 0800	14	18	23	19	2	13	89
0800 - 0815	11	42	30	13	5	18	119
0815 - 0830	14	23	26	12	4	19	98
0830 - 0845	22	41	33	14	6	25	141
0845 - 0900	19	48	31	17	6	17	138
Per End	142	210	192	108	37	146	835

Lights

	WEST		SOUTH		EAST		
	Hassall St		*Wigram St*		*Hassall St*		
Peak Per	T	R	L	R	L	T	TOT
0700 - 0800	76	56	72	52	16	66	338
0715 - 0815	69	89	87	58	17	65	385
0730 - 0830	56	100	99	55	16	70	396
0745 - 0845	61	124	112	58	17	73	445
0800 - 0900	66	154	120	56	21	78	495
PEAK HR	66	154	120	56	21	78	495

Heavies

	WEST		SOUTH		EAST		
	Hassall St		*Wigram St*		*Hassall St*		
Peak Per	T	R	L	R	L	T	TOT
0700 - 0800	0	0	0	0	0	1	1
0715 - 0815	0	0	0	0	0	2	2
0730 - 0830	0	0	0	0	0	2	2
0745 - 0845	0	0	0	0	0	2	2
0800 - 0900	0	0	0	0	0	1	1
PEAK HR	0	0	0	0	0	1	1

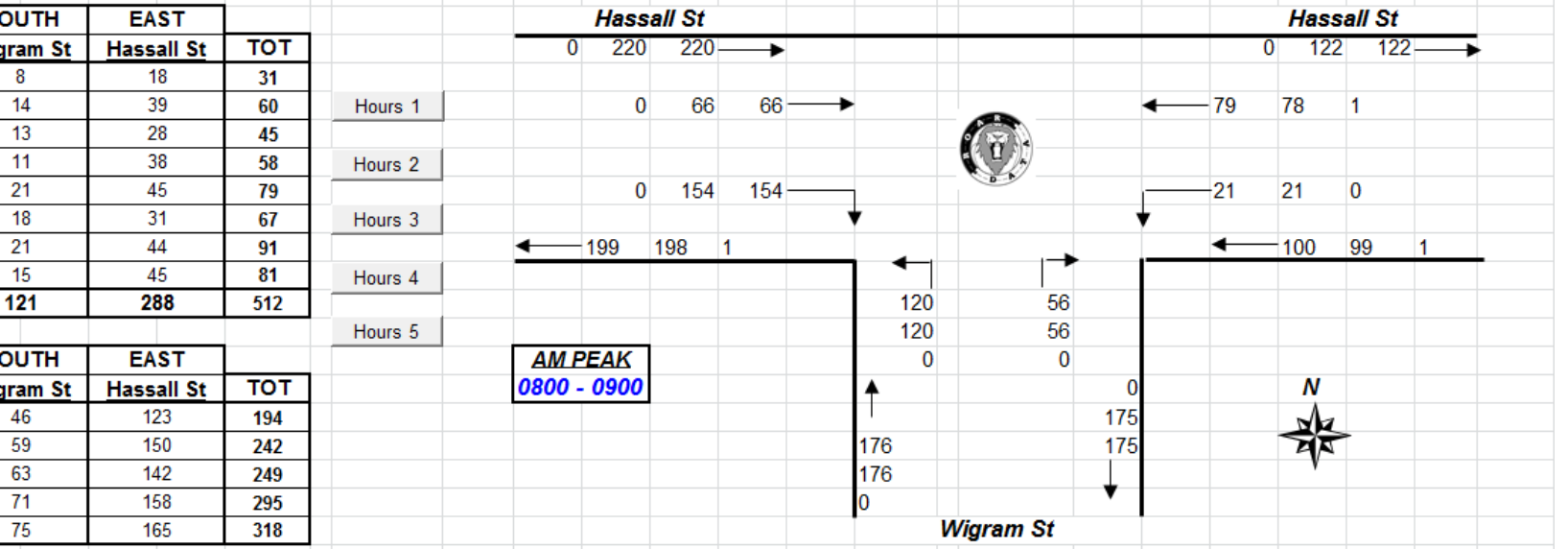
Combined

	WEST		SOUTH		EAST		
	Hassall St		*Wigram St*		*Hassall St*		
Peak Per	T	R	L	R	L	T	TOT
0700 - 0800	76	56	72	52	16	67	339
0715 - 0815	69	89	87	58	17	67	387
0730 - 0830	56	100	99	55	16	72	398
0745 - 0845	61	124	112	58	17	75	447
0800 - 0900	66	154	120	56	21	79	496
PEAK HR	66	154	120	56	21	79	496

Peds

	WEST	SOUTH	EAST	
Time Per	Hassall St	Wigram St	Hassall St	TOT
0700 - 0715	5	8	18	31
0715 - 0730	7	14	39	60
0730 - 0745	4	13	28	45
0745 - 0800	9	11	38	58
0800 - 0815	13	21	45	79
0815 - 0830	18	18	31	67
0830 - 0845	26	21	44	91
0845 - 0900	21	15	45	81
Per End	103	121	288	512

	WEST	SOUTH	EAST	
Peak Per	Hassall St	Wigram St	Hassall St	TOT
0700 - 0800	25	46	123	194
0715 - 0815	33	59	150	242
0730 - 0830	44	63	142	249
0745 - 0845	66	71	158	295
0800 - 0900	78	75	165	318
PEAK HR	78	75	165	318



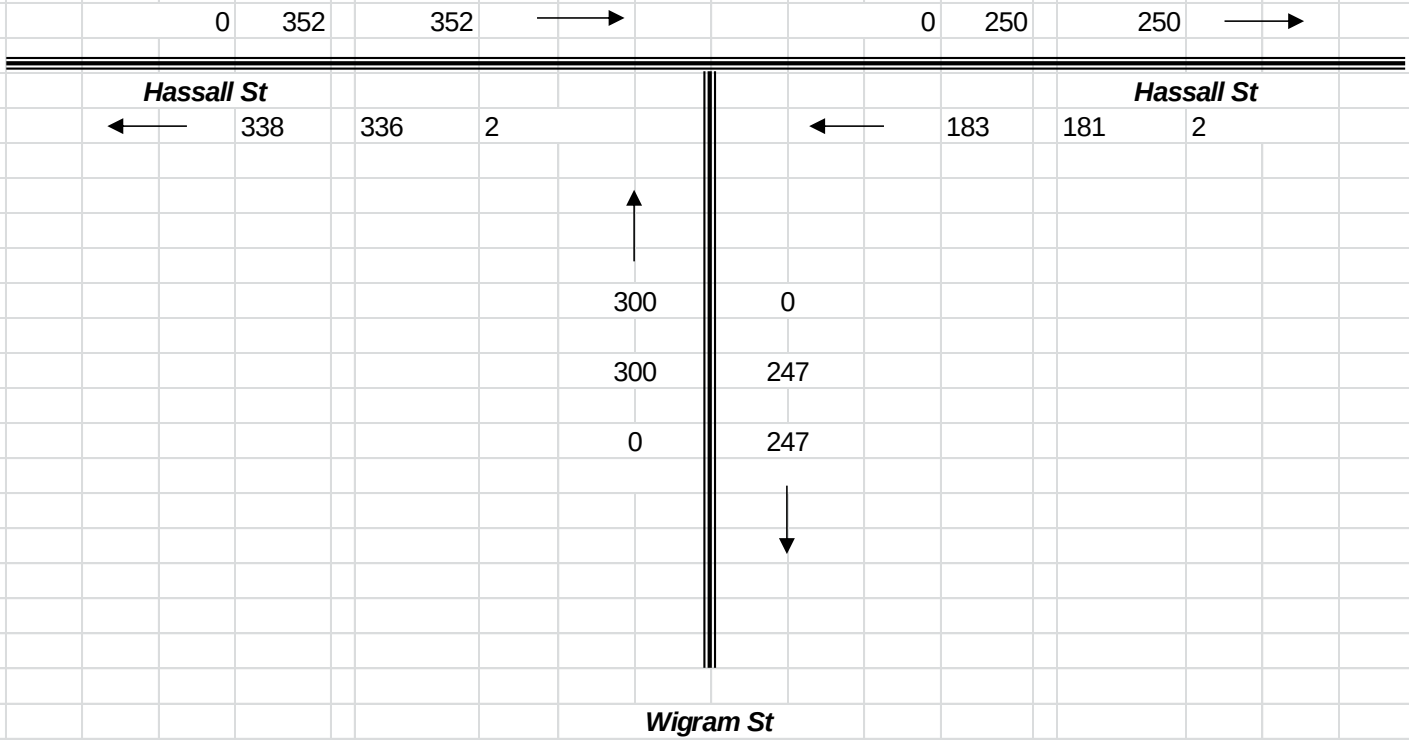
R.O.A.R DATA
Reliable, Original & Authentic Results
Ph.88196847, Fax 88196849, Mob.0418-239019

Client : Varga Traffic Planning
Job No/Name : 5450 PARRAMATTA Wigram St Counts
Day/Date : Wednesday 10th December 2014

TOTAL VOLUMES FOR COUNT PERIOD

AM

N



R.O.A.R DATA
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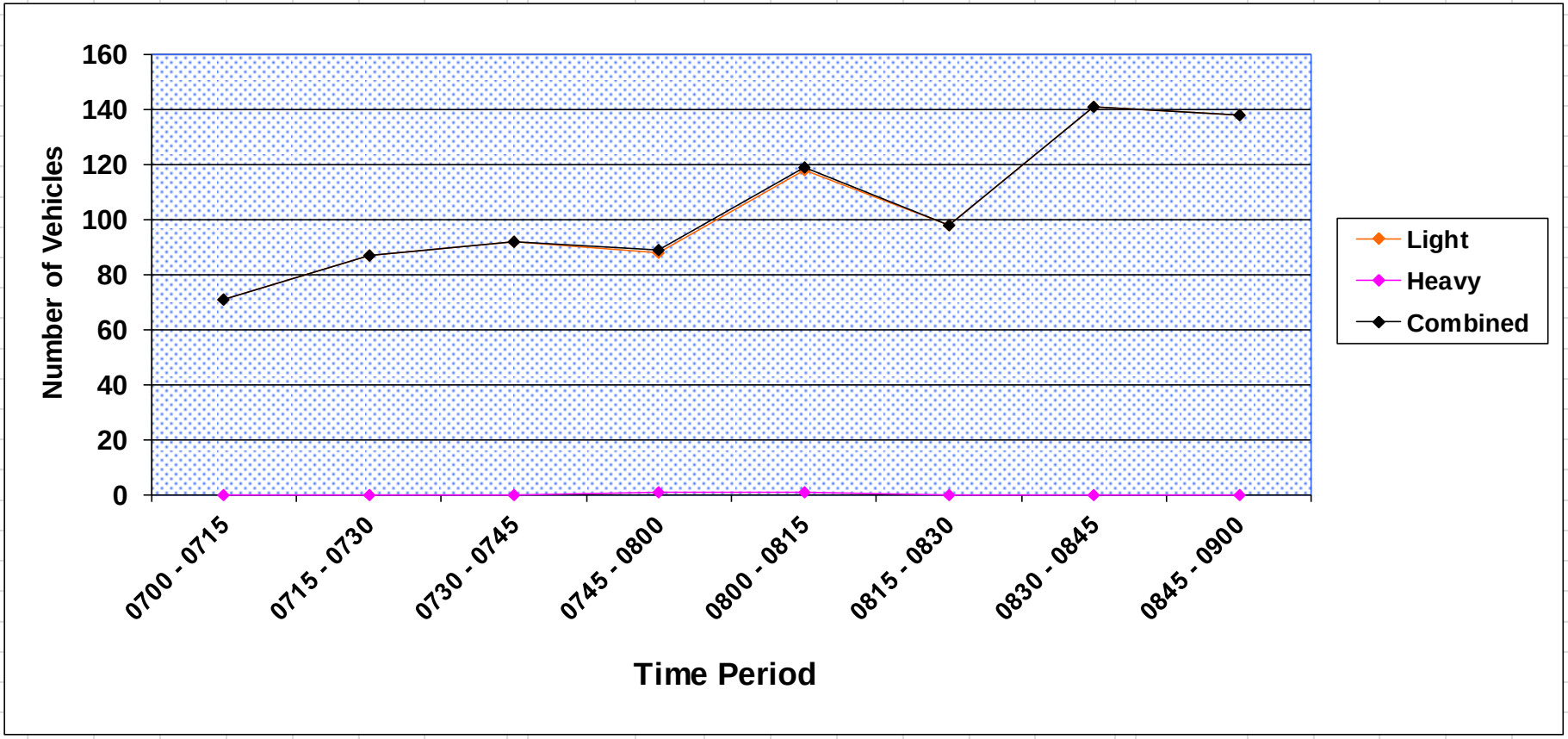
Client	: Varga Traffic Planning
Job No/Name	: 5450 PARRAMATTA Wigram St Counts
Day/Date	: Wednesday 10th December 2014

AM

Hassall St & Wigram St



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Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : Varga Traffic Planning

Job No/Name : 5450 PARRAMATTA Wigram St Counts

Day/Date : Wednesday 10th December 2014

Lights	WEST		SOUTH		EAST		
	Hassall St		*Wigram St*		*Hassall St*		
Time Per	T	R	L	R	L	T	TOT
1600 - 1615	20	52	17	16	2	9	**116**
1615 - 1630	12	35	12	15	3	10	**87**
1630 - 1645	14	57	11	29	7	6	**124**
1645 - 1700	18	38	17	22	3	8	**106**
1700 - 1715	18	63	11	14	6	9	**121**
1715 - 1730	14	40	13	23	3	12	**105**
1730 - 1745	20	36	7	18	7	14	**102**
1745 - 1800	9	30	19	14	8	10	**90**
Per End	**125**	**351**	**107**	**151**	**39**	**78**	**851**

Heavies	WEST		SOUTH		EAST		
	Hassall St		*Wigram St*		*Hassall St*		
Time Per	T	R	L	R	L	T	TOT
1600 - 1615	0	0	0	0	0	0	0
1615 - 1630	0	0	0	0	0	0	0
1630 - 1645	0	0	0	0	0	0	0
1645 - 1700	0	0	0	0	0	0	0
1700 - 1715	0	0	0	0	0	0	0
1715 - 1730	0	0	0	0	0	0	0
1730 - 1745	0	0	0	0	0	0	0
1745 - 1800	0	0	0	0	0	0	0
Per End	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Combined	WEST		SOUTH		EAST		
	Hassall St		*Wigram St*		*Hassall St*		
Time Per	T	R	L	R	L	T	TOT
1600 - 1615	20	52	17	16	2	9	**116**
1615 - 1630	12	35	12	15	3	10	**87**
1630 - 1645	14	57	11	29	7	6	**124**
1645 - 1700	18	38	17	22	3	8	**106**
1700 - 1715	18	63	11	14	6	9	**121**
1715 - 1730	14	40	13	23	3	12	**105**
1730 - 1745	20	36	7	18	7	14	**102**
1745 - 1800	9	30	19	14	8	10	**90**
Per End	**125**	**351**	**107**	**151**	**39**	**78**	**851**

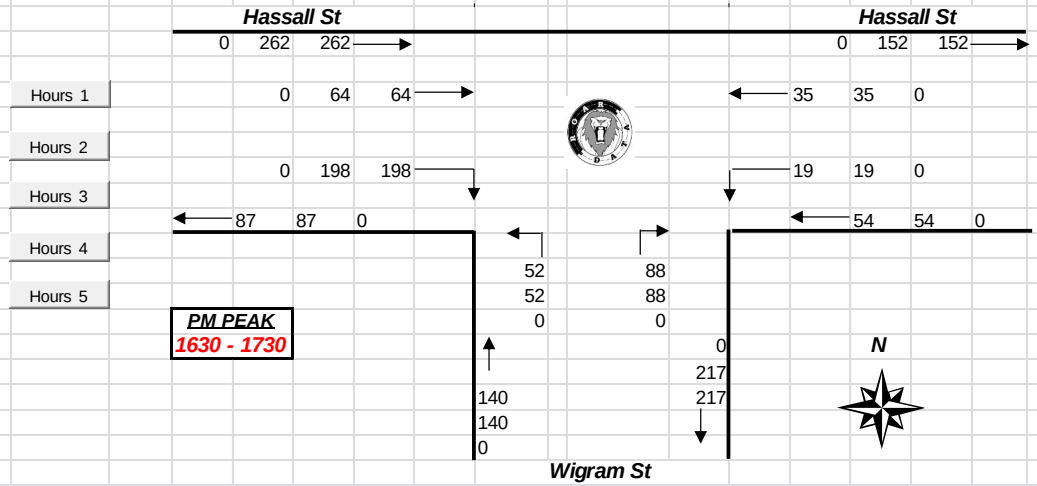
Lights	WEST		SOUTH		EAST		
	Hassall St		*Wigram St*		*Hassall St*		
Peak Per	T	R	L	R	L	T	TOT
1600 - 1700	64	182	57	82	15	33	**433**
1615 - 1715	62	193	51	80	19	33	**438**
1630 - 1730	64	198	52	88	19	35	**456**
1645 - 1745	70	177	48	77	19	43	**434**
1700 - 1800	61	169	50	69	24	45	**418**
PEAK HR	**64**	**198**	**52**	**88**	**19**	**35**	**456**

Heavies	WEST		SOUTH		EAST		
	Hassall St		*Wigram St*		*Hassall St*		
Peak Per	T	R	L	R	L	T	TOT
1600 - 1700	0	0	0	0	0	0	**0**
1615 - 1715	0	0	0	0	0	0	**0**
1630 - 1730	0	0	0	0	0	0	**0**
1645 - 1745	0	0	0	0	0	0	**0**
1700 - 1800	0	0	0	0	0	0	**0**
PEAK HR	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Combined	WEST		SOUTH		EAST		
	Hassall St		*Wigram St*		*Hassall St*		
Peak Per	T	R	L	R	L	T	TOT
1600 - 1700	64	182	57	82	15	33	**433**
1615 - 1715	62	193	51	80	19	33	**438**
1630 - 1730	64	198	52	88	19	35	**456**
1645 - 1745	70	177	48	77	19	43	**434**
1700 - 1800	61	169	50	69	24	45	**418**
PEAK HR	**64**	**198**	**52**	**88**	**19**	**35**	**456**

Peds	WEST	SOUTH	EAST	
Time Per	Hassall St	Wigram St	Hassall St	TOT
1600 - 1615	24	11	9	**44**
1615 - 1630	34	6	4	**44**
1630 - 1645	42	9	19	**70**
1645 - 1700	27	11	9	**47**
1700 - 1715	27	18	8	**53**
1715 - 1730	31	13	10	**54**
1730 - 1745	69	13	8	**90**
1745 - 1800	35	6	11	**52**
Per End	**289**	**87**	**78**	**454**

	WEST	SOUTH	EAST	
Peak Per	Hassall St	Wigram St	Hassall St	TOT
1600 - 1700	127	37	41	**205**
1615 - 1715	130	44	40	**214**
1630 - 1730	127	51	46	**224**
1645 - 1745	154	55	35	**244**
1700 - 1800	162	50	37	**249**
PEAK HR	**127**	**51**	**46**	**224**

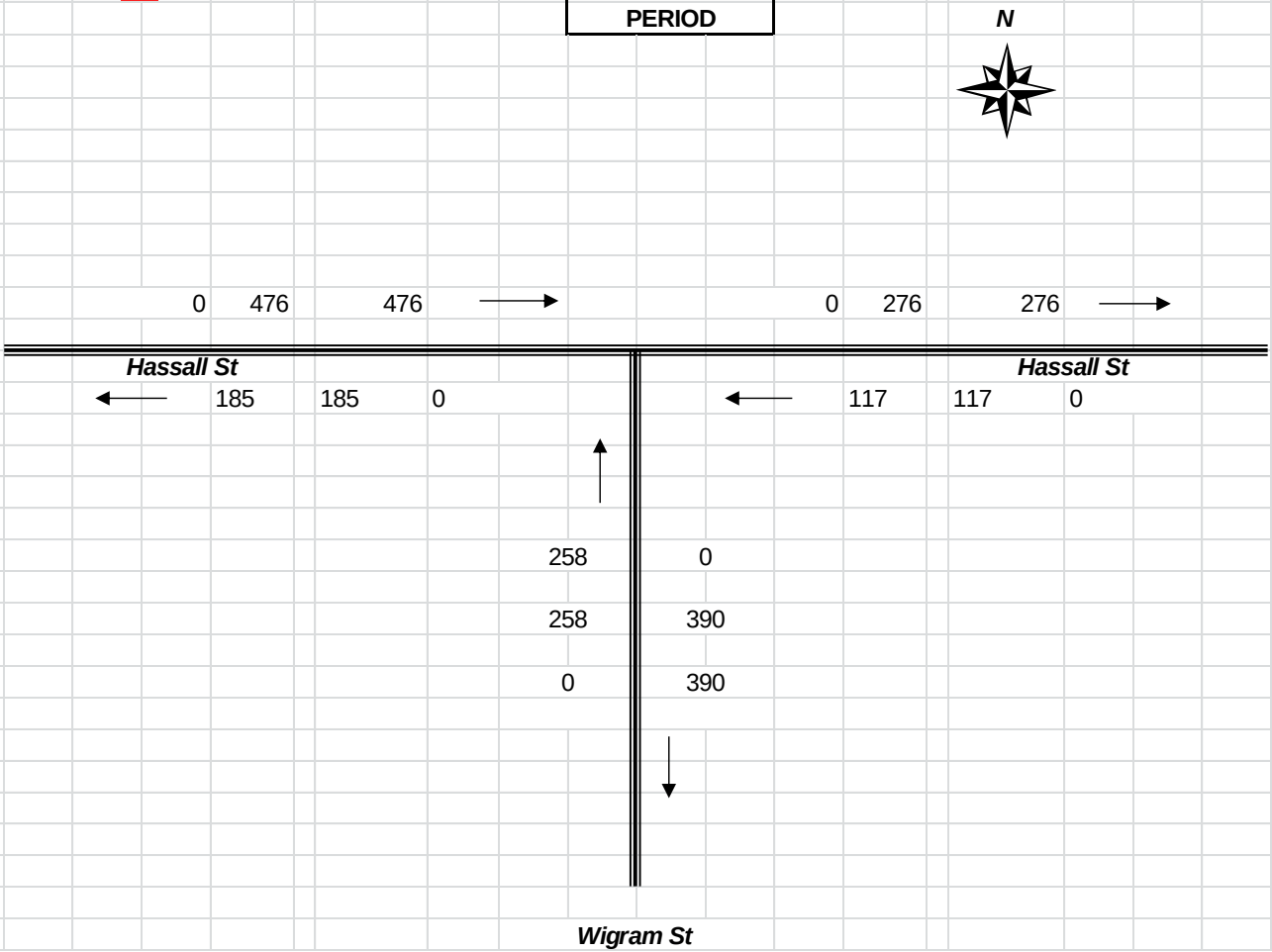


R.O.A.R DATA
Reliable, Original & Authentic Results
Ph.88196847, Fax 88196849, Mob.0418-239019

Client : Varga Traffic Planning
Job No/Name : 5450 PARRAMATTA Wigram St Counts
Day/Date : Wednesday 10th December 2014

PM

TOTAL VOLUMES FOR COUNT PERIOD



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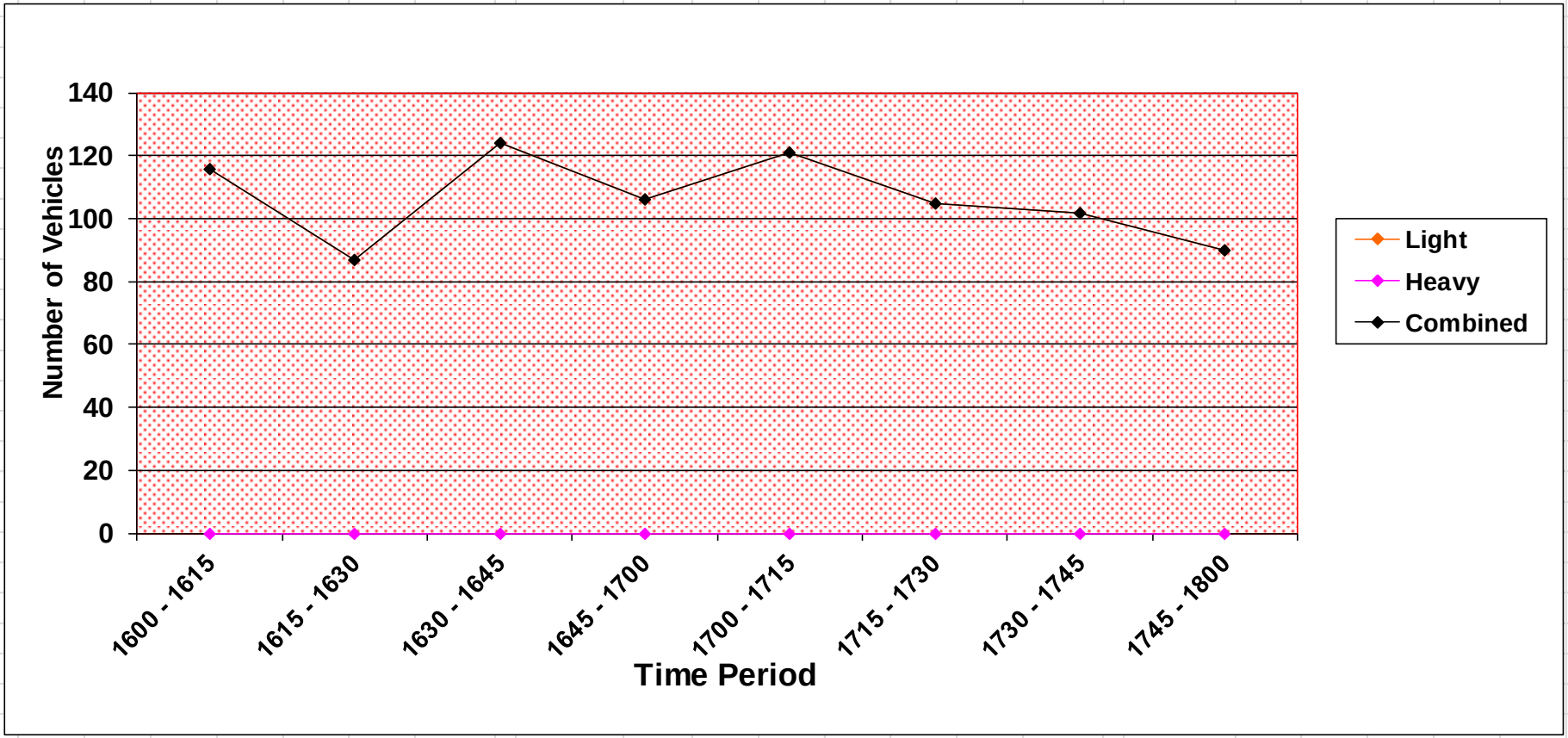
Client	: Varga Traffic Planning
Job No/Name	: 5450 PARRAMATTA Wigram St Counts
Day/Date	: Wednesday 10th December 2014

PM

Hassall St & Wigram St



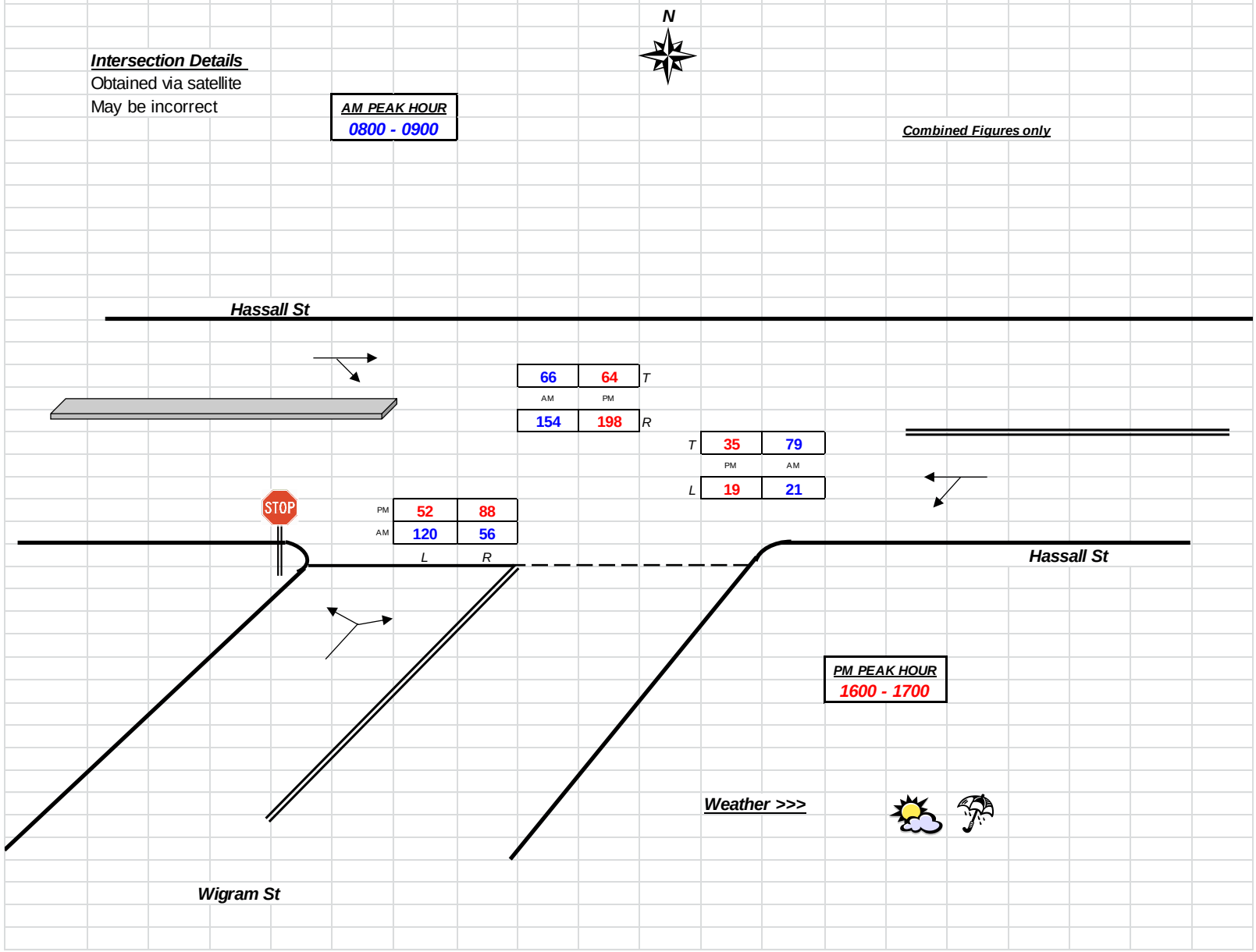
R.O.A.R. DATA
Reliable, Original & Authentic Results
Ph.88196847, Fax 88196849, Mob.0418-239019

Client	: Varga Traffic Planning
Job No/Name	: 5450 PARRAMATTA Wigram St Counts
Day/Date	: Wednesday 10th December 2014

Intersection Details
Obtained via satellite
May be incorrect

AM PEAK HOUR
0800 - 0900

Combined Figures only



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob. 0418 239019

Client : Varga Traffic Planning
Job No/Name : 5450 PARRAMATTA Wigram St Counts
Day/Date : Wednesday 10th December 2014

Lights	NORTH			WEST			SOUTH			EAST			
	Wigram St			*Parkes St*			*Wigram St*			*Parkes St*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	4	5	2	3	201	16	1	14	6	6	111	0	**369**
0715 - 0730	7	4	4	11	189	13	4	18	4	8	112	0	**374**
0730 - 0745	6	9	3	15	179	17	3	16	2	4	140	0	**394**
0745 - 0800	11	16	4	13	195	29	6	47	10	10	150	0	**491**
0800 - 0815	16	14	6	9	181	21	3	31	10	7	176	0	**474**
0815 - 0830	14	26	12	12	148	22	9	56	17	10	176	0	**502**
0830 - 0845	24	15	4	8	154	32	7	38	3	7	194	0	**486**
0845 - 0900	26	22	10	13	136	26	5	34	7	11	188	0	**478**
Period End	**108**	**111**	**45**	**84**	**1383**	**176**	**38**	**254**	**59**	**63**	**1247**	**0**	**3568**

Heavies	NORTH			WEST			SOUTH			EAST			
	Wigram St			*Parkes St*			*Wigram St*			*Parkes St*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	0	0	0	0	5	1	0	0	0	1	6	0	**13**
0715 - 0730	0	0	0	0	5	0	0	0	0	0	8	0	**13**
0730 - 0745	0	0	0	0	5	0	1	0	0	0	4	0	**10**
0745 - 0800	0	0	0	0	7	0	0	0	0	0	10	0	**17**
0800 - 0815	0	0	1	0	7	1	1	0	0	1	7	0	**18**
0815 - 0830	0	0	0	0	5	0	0	0	0	0	10	0	**15**
0830 - 0845	0	0	0	0	7	1	1	0	0	1	7	0	**17**
0845 - 0900	0	0	0	0	3	1	0	0	0	1	11	0	**16**
Period End	**0**	**0**	**1**	**0**	**44**	**4**	**3**	**0**	**0**	**4**	**63**	**0**	**119**

Lights	NORTH			WEST			SOUTH			EAST			
	Wigram St			*Parkes St*			*Wigram St*			*Parkes St*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	28	34	13	42	764	75	14	95	22	28	513	0	**1628**
0715 - 0815	40	43	17	48	744	80	16	112	26	29	578	0	**1733**
0730 - 0830	47	65	25	49	703	89	21	150	39	31	642	0	**1861**
0745 - 0845	65	71	26	42	678	104	25	172	40	34	696	0	**1953**
0800 - 0900	80	77	32	42	619	101	24	159	37	35	734	0	**1940**
PEAK HOUR	**65**	**71**	**26**	**42**	**678**	**104**	**25**	**172**	**40**	**34**	**696**	**0**	**1953**

Heavies	NORTH			WEST			SOUTH			EAST			
	Wigram St			*Parkes St*			*Wigram St*			*Parkes St*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	0	0	0	0	22	1	1	0	0	1	28	0	**53**
0715 - 0815	0	0	1	0	24	1	2	0	0	1	29	0	**58**
0730 - 0830	0	0	1	0	24	1	2	0	0	1	31	0	**60**
0745 - 0845	0	0	1	0	26	2	2	0	0	2	34	0	**67**
0800 - 0900	0	0	1	0	22	3	2	0	0	3	35	0	**66**
PEAK HOUR	**0**	**0**	**1**	**0**	**26**	**2**	**2**	**0**	**0**	**2**	**34**	**0**	**67**

Combined	NORTH			WEST			SOUTH			EAST			
	Wigram St			*Parkes St*			*Wigram St*			*Parkes St*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	4	5	2	3	206	17	1	14	6	7	117	0	**382**
0715 - 0730	7	4	4	11	194	13	4	18	4	8	120	0	**387**
0730 - 0745	6	9	3	15	184	17	4	16	2	4	144	0	**404**
0745 - 0800	11	16	4	13	202	29	6	47	10	10	160	0	**508**
0800 - 0815	16	14	7	9	188	22	4	31	10	8	183	0	**492**
0815 - 0830	14	26	12	12	153	22	9	56	17	10	186	0	**517**
0830 - 0845	24	15	4	8	161	33	8	38	3	8	201	0	**503**
0845 - 0900	26	22	10	13	139	27	5	34	7	12	199	0	**494**
Period End	**108**	**111**	**46**	**84**	**1427**	**180**	**41**	**254**	**59**	**67**	**1310**	**0**	**3687**

Peds	NORTH	WEST	SOUTH	EAST	
	Wigram St	*Parkes St*	*Wigram St*	*Parkes St*	
Time Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
0700 - 0715	1	1	2	7	**11**
0715 - 0730	1	1	4	5	**11**
0730 - 0745	2	8	4	7	**21**
0745 - 0800	3	13	0	10	**26**
0800 - 0815	1	1	1	12	**15**
0815 - 0830	8	18	0	9	**35**
0830 - 0845	4	23	2	12	**41**
0845 - 0900	8	14	6	10	**38**
Period End	**28**	**16**	**19**	**72**	**198**

Combined	NORTH			WEST			SOUTH			EAST			
	Wigram St			*Parkes St*			*Wigram St*			*Parkes St*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	28	34	13	42	786	76	15	95	22	29	541	0	**1681**
0715 - 0815	40	43	18	48	768	81	18	112	26	30	607	0	**1791**
0730 - 0830	47	65	26	49	727	90	23	150	39	32	673	0	**1921**
0745 - 0845	65	71	27	42	704	106	27	172	40	36	730	0	**2020**
0800 - 0900	80	77	33	42	641	104	26	159	37	38	769	0	**2006**
PEAK HOUR	**65**	**71**	**27**	**42**	**704**	**106**	**27**	**172**	**40**	**36**	**730**	**0**	**2020**

Peds	NORTH	WEST	SOUTH	EAST	
	Wigram St	*Parkes St*	*Wigram St*	*Parkes St*	
Peak Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
0700 - 0800	7	23	10	29	**69**
0715 - 0815	7	23	9	34	**73**
0730 - 0830	14	40	5	38	**97**
0745 - 0845	16	55	3	43	**117**
0800 - 0900	21	56	9	43	**129**
PEAK HR	**16**	**55**	**3**	**43**	**117**

R.O.A.R DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob. 0418 239019

Client : Varga Traffic Planning

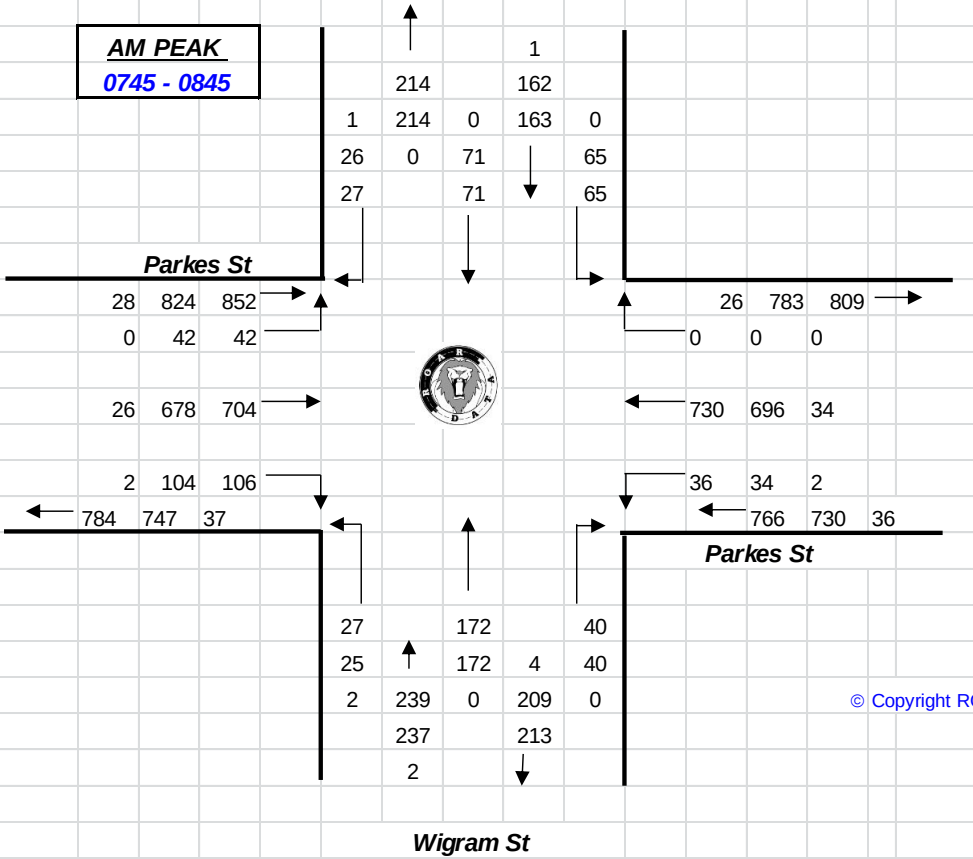
Job No/Name : 5450 PARRAMATTA Wigram St Counts

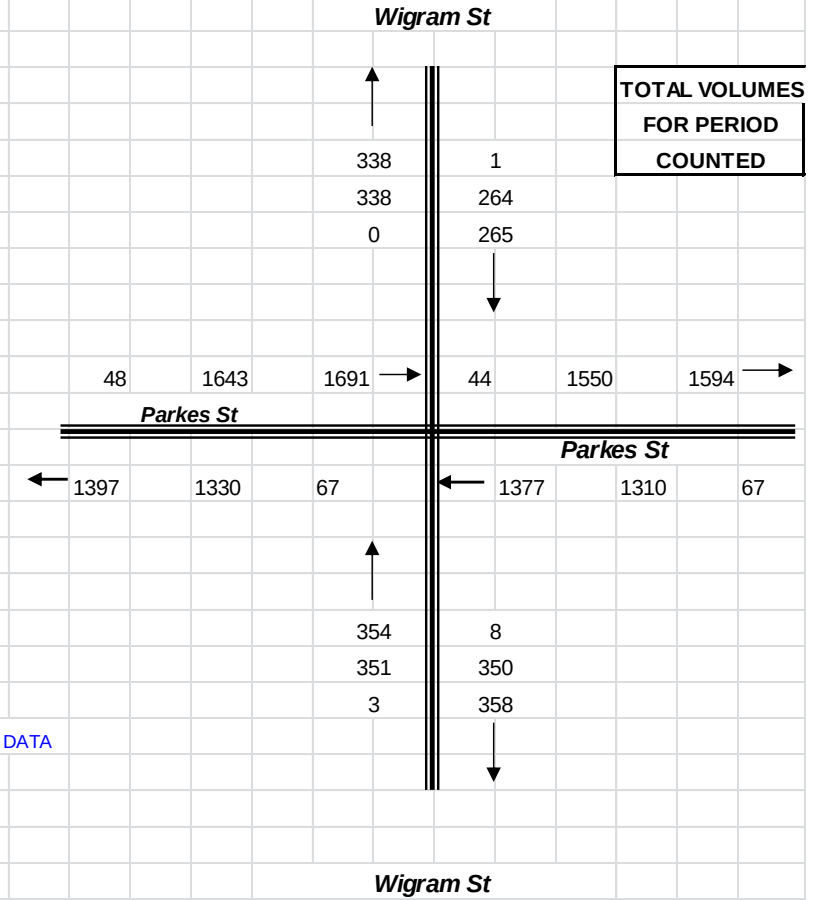
Day/Date : Wednesday 10th December 2014

Hours 1 | Hours 2 | Hours 3 | Hours 4 | Hours 5

AM PEAK

0745 - 0845





TOTAL VOLUMES FOR PERIOD COUNTED

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob. 0418 239019

Client : Varga Traffic Planning
Job No/Name : 5450 PARRAMATTA Wigram St Counts
Day/Date : Wednesday 10th December 2014

Lights

	NORTH			WEST			SOUTH			EAST			
	Wigram St			*Parkes St*			*Wigram St*			*Parkes St*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1615	15	34	12	15	137	24	13	19	16	17	166	0	**468**
1615 - 1630	6	26	7	13	153	24	10	11	11	21	176	0	**458**
1630 - 1645	18	28	6	15	164	26	16	14	10	10	160	0	**467**
1645 - 1700	12	21	10	15	158	29	9	21	7	10	162	0	**454**
1700 - 1715	16	35	14	7	152	27	13	26	6	6	170	0	**472**
1715 - 1730	8	31	10	16	143	26	13	20	12	14	167	0	**460**
1730 - 1745	10	22	7	9	159	32	14	21	8	13	169	0	**464**
1745 - 1800	12	9	5	10	162	37	18	21	10	11	163	0	**458**
Period End	**97**	**206**	**71**	**100**	**1228**	**225**	**106**	**153**	**80**	**102**	**1333**	**0**	**3701**

Heavies

	NORTH			WEST			SOUTH			EAST			
	Wigram St			*Parkes St*			*Wigram St*			*Parkes St*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1615	0	0	0	0	3	0	1	0	1	0	6	0	**11**
1615 - 1630	0	0	0	0	5	1	0	0	0	0	4	0	**10**
1630 - 1645	0	0	0	0	4	0	1	0	0	0	2	0	**7**
1645 - 1700	0	0	0	0	4	1	0	0	0	0	2	0	**7**
1700 - 1715	0	0	0	0	1	0	0	0	0	0	1	0	**2**
1715 - 1730	0	0	0	0	4	1	1	0	0	0	2	0	**8**
1730 - 1745	0	0	0	0	1	0	0	0	0	0	1	0	**2**
1745 - 1800	0	0	0	0	2	1	1	0	0	0	1	0	**5**
Period End	**0**	**0**	**0**	**0**	**24**	**4**	**4**	**0**	**1**	**0**	**19**	**0**	**52**

Lights

	NORTH			WEST			SOUTH			EAST			
	Wigram St			*Parkes St*			*Wigram St*			*Parkes St*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1700	51	109	35	58	612	103	48	65	44	58	664	0	**1847**
1615 - 1715	52	110	37	50	627	106	48	72	34	47	668	0	**1851**
1630 - 1730	54	115	40	53	617	108	51	81	35	40	659	0	**1853**
1645 - 1745	46	109	41	47	612	114	49	88	33	43	668	0	**1850**
1700 - 1800	46	97	36	42	616	122	58	88	36	44	669	0	**1854**
PEAK HOUR	**51**	**109**	**35**	**58**	**612**	**103**	**48**	**65**	**44**	**58**	**664**	**0**	**1847**

Heavies

	NORTH			WEST			SOUTH			EAST			
	Wigram St			*Parkes St*			*Wigram St*			*Parkes St*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1700	0	0	0	0	16	2	2	0	1	0	14	0	**35**
1615 - 1715	0	0	0	0	14	2	1	0	0	0	9	0	**26**
1630 - 1730	0	0	0	0	13	2	2	0	0	0	7	0	**24**
1645 - 1745	0	0	0	0	10	2	1	0	0	0	6	0	**19**
1700 - 1800	0	0	0	0	8	2	2	0	0	0	5	0	**17**
PEAK HOUR	**0**	**0**	**0**	**0**	**16**	**2**	**2**	**0**	**1**	**0**	**14**	**0**	**35**

Combined

	NORTH			WEST			SOUTH			EAST			
	Wigram St			*Parkes St*			*Wigram St*			*Parkes St*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1615	15	34	12	15	140	24	14	19	17	17	172	0	**479**
1615 - 1630	6	26	7	13	158	25	10	11	11	21	180	0	**468**
1630 - 1645	18	28	6	15	168	26	17	14	10	10	162	0	**474**
1645 - 1700	12	21	10	15	162	30	9	21	7	10	164	0	**461**
1700 - 1715	16	35	14	7	153	27	13	26	6	6	171	0	**474**
1715 - 1730	8	31	10	16	147	27	14	20	12	14	169	0	**468**
1730 - 1745	10	22	7	9	160	32	14	21	8	13	170	0	**466**
1745 - 1800	12	9	5	10	164	38	19	21	10	11	164	0	**463**
Period End	**97**	**206**	**71**	**100**	**1252**	**229**	**110**	**153**	**81**	**102**	**1352**	**0**	**3753**

Peds

	NORTH	WEST	SOUTH	EAST	
	Wigram St	*Parkes St*	*Wigram St*	*Parkes St*	
Time Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
1600 - 1615	5	8	1	4	**18**
1615 - 1630	3	18	3	9	**33**
1630 - 1645	3	10	2	8	**23**
1645 - 1700	5	11	6	6	**28**
1700 - 1715	6	9	1	11	**27**
1715 - 1730	4	6	1	5	**16**
1730 - 1745	3	4	4	3	**14**
1745 - 1800	1	3	2	0	**6**
Period End	**30**	**69**	**20**	**46**	**165**

Combined

	NORTH			WEST			SOUTH			EAST			
	Wigram St			*Parkes St*			*Wigram St*			*Parkes St*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1700	51	109	35	58	628	105	50	65	45	58	678	0	**1882**
1615 - 1715	52	110	37	50	641	108	49	72	34	47	677	0	**1877**
1630 - 1730	54	115	40	53	630	110	53	81	35	40	666	0	**1877**
1645 - 1745	46	109	41	47	622	116	50	88	33	43	674	0	**1869**
1700 - 1800	46	97	36	42	624	124	60	88	36	44	674	0	**1871**
PEAK HOUR	**51**	**109**	**35**	**58**	**628**	**105**	**50**	**65**	**45**	**58**	**678**	**0**	**1882**

Peds

	NORTH	WEST	SOUTH	EAST	
	Wigram St	*Parkes St*	*Wigram St*	*Parkes St*	
Peak Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
1600 - 1700	16	47	12	27	**102**
1615 - 1715	17	48	12	34	**111**
1630 - 1730	18	36	10	30	**94**
1645 - 1745	18	30	12	25	**85**
1700 - 1800	14	22	8	19	**63**
PEAK HR	**16**	**47**	**12**	**27**	**102**

R.O.A.R DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob. 0418 239019

Client : Varga Traffic Planning

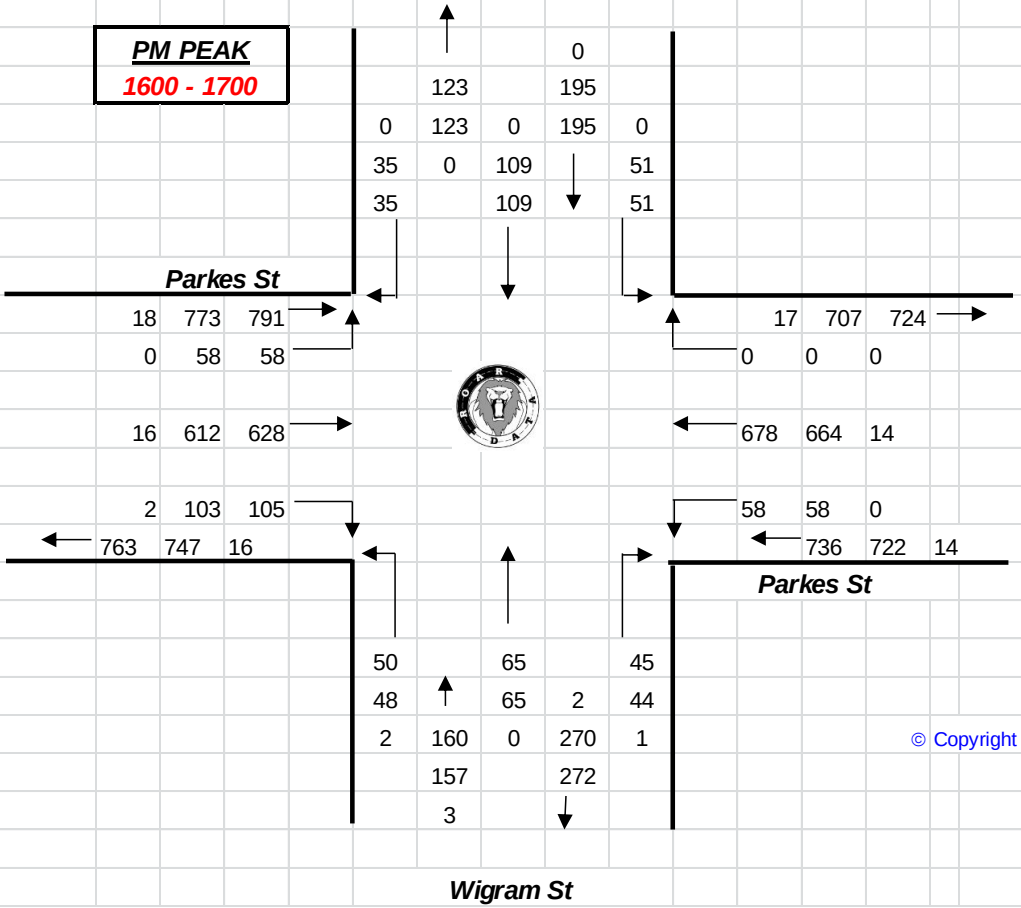
Job No/Name : 5450 PARRAMATTA Wigram St Counts

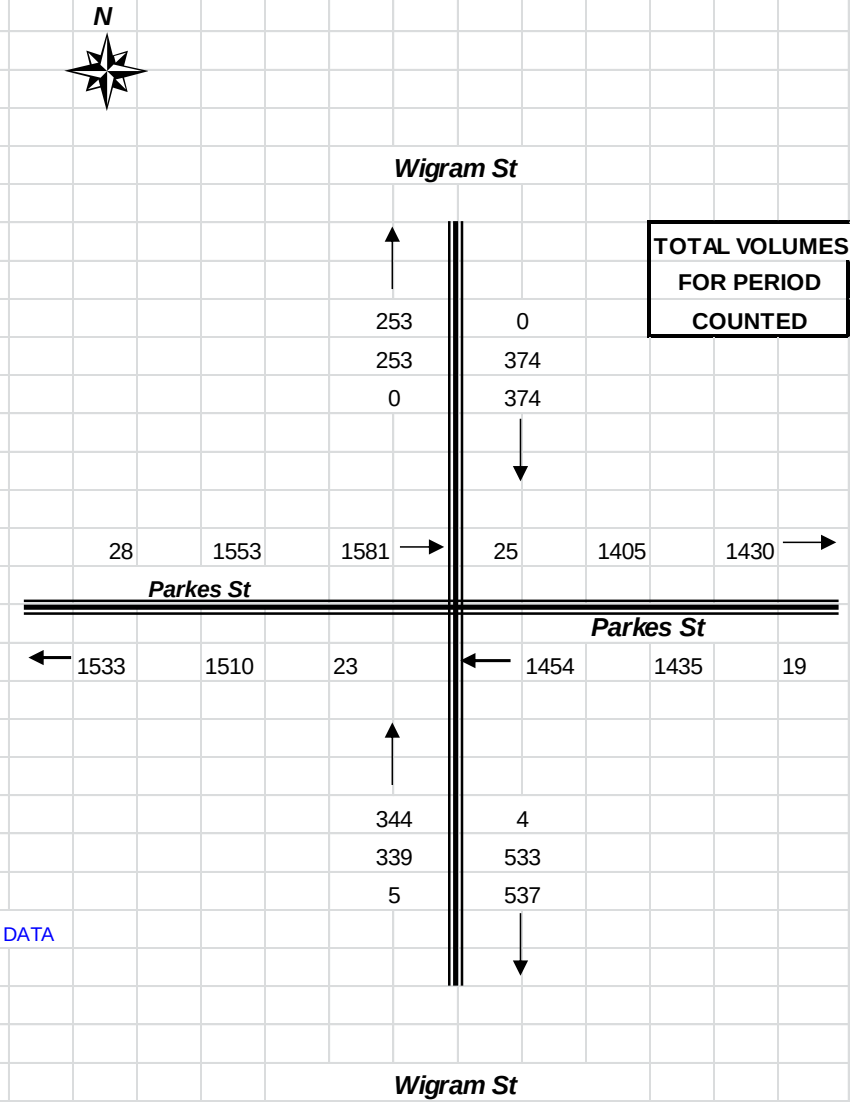
Day/Date : Wednesday 10th December 2014

Hours 1 | Hours 2 | Hours 3 | Hours 4 | Hours 5

PM PEAK

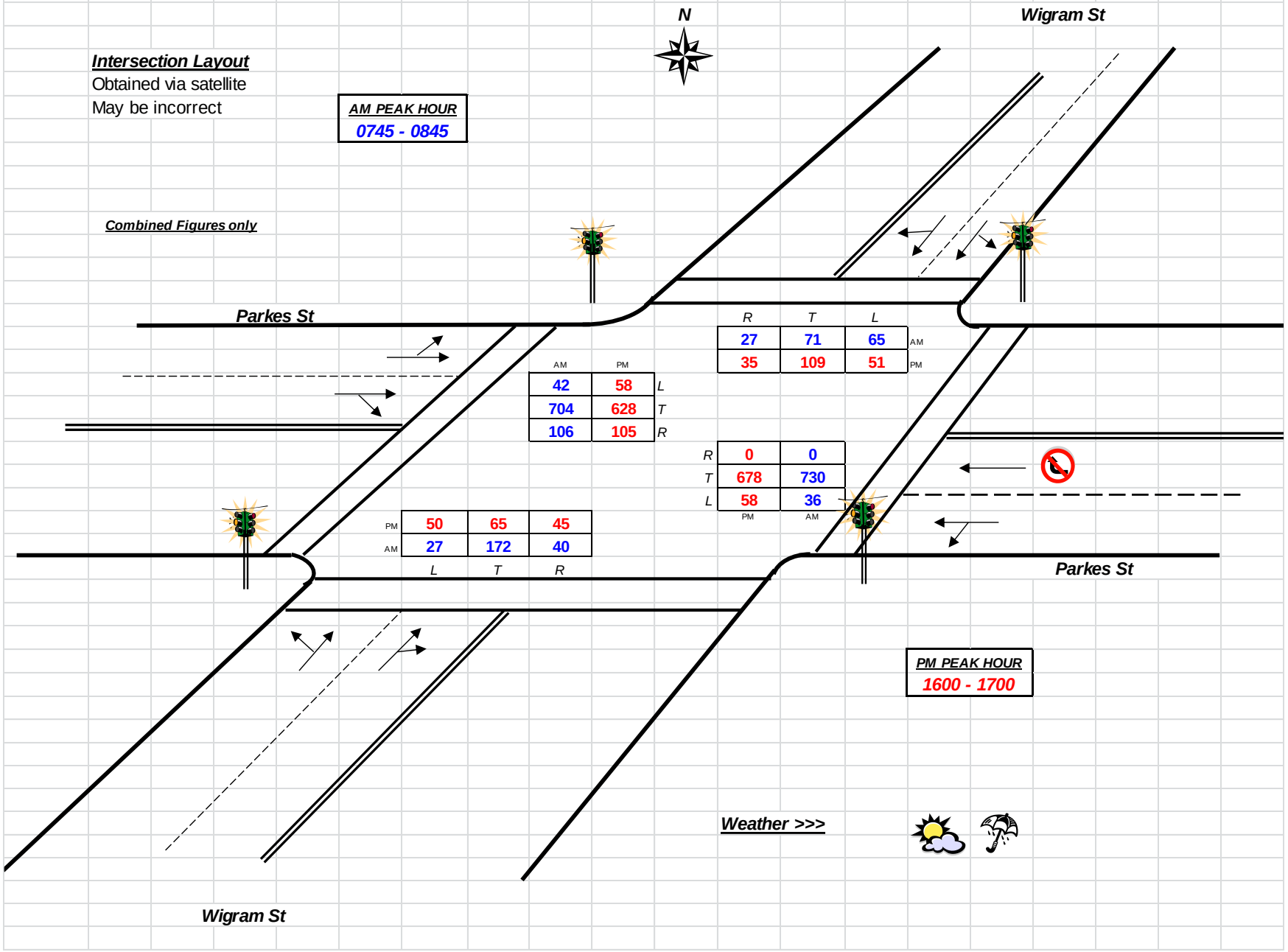
1600 - 1700





R.O.A.R. DATA
Reliable, Original & Authentic Results
Ph.88196847, Fax 88196849, Mob.0418-239019

Client	: Varga Traffic Planning
Job No/Name	: 5450 PARRAMATTA Wigram St Counts
Day/Date	: Wednesday 10th December 2014



APPENDIX B

SIDRA RESULTS

MOVEMENT SUMMARY

Site: Existing AM

Wigram Street & Hassall Street Intersection
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Wigram Street (south)											
1	L2	120	0.0	0.127	7.8	LOS A	0.5	3.2	0.14	0.92	45.0
3	R2	56	0.0	0.127	7.5	LOS A	0.5	3.2	0.14	0.92	44.6
Approach		176	0.0	0.127	7.7	LOS A	0.5	3.2	0.14	0.92	44.9
East: Hassall Street (east)											
4	L2	21	0.0	0.052	4.6	LOS A	0.0	0.0	0.00	0.11	48.9
5	T1	79	1.3	0.052	0.0	LOS A	0.0	0.0	0.00	0.11	49.3
Approach		100	1.0	0.052	1.0	NA	0.0	0.0	0.00	0.11	49.2
West: Hassall Street (west)											
11	T1	66	0.0	0.104	0.2	LOS A	0.5	3.7	0.16	0.37	47.5
12	R2	154	0.0	0.104	4.8	LOS A	0.5	3.7	0.16	0.37	46.6
Approach		220	0.0	0.104	3.4	NA	0.5	3.7	0.16	0.37	46.9
All Vehicles		496	0.2	0.127	4.4	NA	0.5	3.7	0.12	0.52	46.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Existing PM

Wigram Street & Hassall Street Intersection
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Wigram Street (south)											
1	L2	52	0.0	0.097	7.6	LOS A	0.3	2.2	0.08	0.95	45.0
3	R2	88	0.0	0.097	7.5	LOS A	0.3	2.2	0.08	0.95	44.6
Approach		140	0.0	0.097	7.5	LOS A	0.3	2.2	0.08	0.95	44.8
East: Hassall Street (east)											
4	L2	19	0.0	0.028	4.6	LOS A	0.0	0.0	0.00	0.19	48.5
5	T1	35	0.0	0.028	0.0	LOS A	0.0	0.0	0.00	0.19	48.9
Approach		54	0.0	0.028	1.6	NA	0.0	0.0	0.00	0.19	48.8
West: Hassall Street (west)											
11	T1	64	0.0	0.120	0.1	LOS A	0.6	4.5	0.11	0.40	47.5
12	R2	198	0.0	0.120	4.7	LOS A	0.6	4.5	0.11	0.40	46.6
Approach		262	0.0	0.120	3.6	NA	0.6	4.5	0.11	0.40	46.8
All Vehicles		456	0.0	0.120	4.6	NA	0.6	4.5	0.09	0.55	46.4

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Proposed AM

Wigram Street & Hassall Street Intersection
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Wigram Street (south)											
1	L2	138	0.0	0.153	7.8	LOS A	0.6	3.9	0.14	0.93	45.0
3	R2	74	0.0	0.153	7.5	LOS A	0.6	3.9	0.14	0.93	44.6
Approach		212	0.0	0.153	7.7	LOS A	0.6	3.9	0.14	0.93	44.9
East: Hassall Street (east)											
4	L2	35	0.0	0.060	4.6	LOS A	0.0	0.0	0.00	0.17	48.6
5	T1	79	1.3	0.060	0.0	LOS A	0.0	0.0	0.00	0.17	49.0
Approach		114	0.9	0.060	1.4	NA	0.0	0.0	0.00	0.17	48.9
West: Hassall Street (west)											
11	T1	66	0.0	0.108	0.3	LOS A	0.6	3.9	0.17	0.38	47.5
12	R2	160	0.0	0.108	4.9	LOS A	0.6	3.9	0.17	0.38	46.6
Approach		226	0.0	0.108	3.5	NA	0.6	3.9	0.17	0.38	46.8
All Vehicles		552	0.2	0.153	4.7	NA	0.6	3.9	0.13	0.54	46.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Proposed PM

Wigram Street & Hassall Street Intersection
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Wigram Street (south)											
1	L2	58	0.0	0.107	7.6	LOS A	0.3	2.4	0.08	0.96	45.0
3	R2	95	0.0	0.107	7.5	LOS A	0.3	2.4	0.08	0.96	44.6
Approach		153	0.0	0.107	7.5	LOS A	0.3	2.4	0.08	0.96	44.7
East: Hassall Street (east)											
4	L2	56	0.0	0.048	4.6	LOS A	0.0	0.0	0.00	0.33	47.7
5	T1	35	0.0	0.048	0.0	LOS A	0.0	0.0	0.00	0.33	48.1
Approach		91	0.0	0.048	2.8	NA	0.0	0.0	0.00	0.33	47.9
West: Hassall Street (west)											
11	T1	64	0.0	0.130	0.2	LOS A	0.7	4.9	0.16	0.41	47.3
12	R2	216	0.0	0.130	4.8	LOS A	0.7	4.9	0.16	0.41	46.5
Approach		280	0.0	0.130	3.8	NA	0.7	4.9	0.16	0.41	46.7
All Vehicles		524	0.0	0.130	4.7	NA	0.7	4.9	0.11	0.55	46.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Existing AM

Wigram Street & Parkes Street Intersection
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Wigram Street (south)											
1	L2	27	7.4	0.122	37.2	LOS C	2.8	20.3	0.76	0.65	35.3
2	T1	172	0.0	0.456	38.1	LOS C	8.4	58.5	0.85	0.72	32.5
3	R2	40	0.0	0.456	44.3	LOS D	8.4	58.5	0.87	0.74	33.4
Approach		239	0.8	0.456	39.0	LOS C	8.4	58.5	0.84	0.71	33.0
East: Parkes Street (east)											
4	L2	36	5.6	0.459	30.6	LOS C	15.5	112.9	0.75	0.67	39.2
5	T1	730	4.7	0.459	25.0	LOS B	15.6	113.4	0.75	0.66	42.4
Approach		766	4.7	0.459	25.2	LOS B	15.6	113.4	0.75	0.66	42.3
North: Wigram Street (north)											
7	L2	65	0.0	0.124	38.7	LOS C	2.8	19.6	0.78	0.72	34.0
8	T1	71	0.0	0.243	39.7	LOS C	4.6	32.8	0.85	0.70	32.1
9	R2	27	3.7	0.243	44.3	LOS D	4.6	32.8	0.85	0.70	33.3
Approach		163	0.6	0.243	40.0	LOS C	4.6	32.8	0.82	0.71	33.0
West: Parkes Street (west)											
10	L2	42	0.0	0.464	18.6	LOS B	16.8	120.8	0.58	0.54	45.1
11	T1	704	3.7	0.464	13.3	LOS A	16.8	120.8	0.62	0.58	48.7
12	R2	106	1.9	0.464	19.5	LOS B	8.6	61.5	0.71	0.67	43.8
Approach		852	3.3	0.464	14.3	LOS A	16.8	120.8	0.63	0.59	47.8
All Vehicles		2020	3.3	0.464	23.5	LOS B	16.8	120.8	0.71	0.64	42.0

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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	South Full Crossing	3	24.7	LOS C	0.0	0.0	0.64	0.64
P2	East Full Crossing	43	38.5	LOS D	0.1	0.1	0.80	0.80
P3	North Full Crossing	16	13.1	LOS B	0.0	0.0	0.47	0.47
P4	West Full Crossing	55	38.5	LOS D	0.2	0.2	0.80	0.80
All Pedestrians		117	34.7	LOS D			0.75	0.75

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: Existing PM

Wigram Street & Parkes Street Intersection
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Wigram Street (south)											
1	L2	50	4.0	0.095	33.9	LOS C	2.3	16.4	0.72	0.69	35.7
2	T1	65	0.0	0.357	43.3	LOS D	5.3	37.1	0.88	0.74	30.8
3	R2	45	2.2	0.357	49.6	LOS D	5.3	37.1	0.90	0.74	31.5
Approach		160	1.9	0.357	42.1	LOS C	5.3	37.1	0.84	0.73	32.4
East: Parkes Street (east)											
4	L2	58	0.0	0.390	25.9	LOS B	13.3	94.6	0.67	0.62	41.1
5	T1	678	2.1	0.390	20.3	LOS B	13.4	95.4	0.67	0.60	44.8
Approach		736	1.9	0.390	20.8	LOS B	13.4	95.4	0.67	0.60	44.5
North: Wigram Street (north)											
7	L2	51	0.0	0.114	42.6	LOS D	2.3	16.2	0.81	0.72	32.8
8	T1	109	0.0	0.391	43.8	LOS D	7.3	51.1	0.90	0.75	31.0
9	R2	35	0.0	0.391	48.4	LOS D	7.3	51.1	0.90	0.75	32.1
Approach		195	0.0	0.391	44.3	LOS D	7.3	51.1	0.88	0.74	31.6
West: Parkes Street (west)											
10	L2	58	0.0	0.397	15.5	LOS B	13.2	94.4	0.50	0.48	46.7
11	T1	628	2.5	0.397	10.2	LOS A	13.2	94.4	0.53	0.52	50.6
12	R2	105	1.9	0.397	16.3	LOS B	7.2	51.2	0.62	0.61	45.4
Approach		791	2.3	0.397	11.4	LOS A	13.2	94.4	0.54	0.53	49.6
All Vehicles		1882	1.9	0.397	21.1	LOS B	13.4	95.4	0.65	0.60	43.2

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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	South Full Crossing	12	21.0	LOS C	0.0	0.0	0.59	0.59
P2	East Full Crossing	27	42.6	LOS E	0.1	0.1	0.84	0.84
P3	North Full Crossing	16	10.8	LOS B	0.0	0.0	0.43	0.43
P4	West Full Crossing	47	42.6	LOS E	0.1	0.1	0.84	0.84
All Pedestrians		102	35.1	LOS D			0.75	0.75

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: Proposed AM

Wigram Street & Parkes Street Intersection
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Wigram Street (south)											
1	L2	27	7.4	0.131	35.0	LOS C	3.2	22.8	0.74	0.63	36.2
2	T1	172	0.0	0.490	38.8	LOS C	8.1	56.5	0.85	0.71	32.3
3	R2	40	0.0	0.490	47.0	LOS D	8.1	56.5	0.90	0.75	32.5
Approach		239	0.8	0.490	39.8	LOS C	8.1	56.5	0.84	0.71	32.7
East: Parkes Street (east)											
4	L2	36	5.6	0.487	32.9	LOS C	16.2	118.1	0.78	0.70	38.2
5	T1	730	4.7	0.487	27.3	LOS B	16.3	118.7	0.78	0.69	41.3
Approach		766	4.7	0.487	27.6	LOS B	16.3	118.7	0.78	0.69	41.2
North: Wigram Street (north)											
7	L2	84	0.0	0.147	36.6	LOS C	3.5	24.7	0.76	0.73	34.7
8	T1	71	0.0	0.347	44.3	LOS D	5.9	41.5	0.90	0.75	30.7
9	R2	45	2.2	0.347	48.9	LOS D	5.9	41.5	0.90	0.75	31.8
Approach		200	0.5	0.347	42.1	LOS C	5.9	41.5	0.84	0.74	32.5
West: Parkes Street (west)											
10	L2	49	0.0	0.489	20.4	LOS B	18.2	130.9	0.62	0.58	44.0
11	T1	704	3.7	0.489	15.1	LOS B	18.2	130.9	0.66	0.61	47.5
12	R2	106	1.9	0.489	21.1	LOS B	9.1	65.7	0.75	0.69	42.9
Approach		859	3.3	0.489	16.1	LOS B	18.2	130.9	0.67	0.62	46.7
All Vehicles		2064	3.2	0.490	25.6	LOS B	18.2	130.9	0.75	0.67	40.9

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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	South Full Crossing	3	26.7	LOS C	0.0	0.0	0.67	0.67
P2	East Full Crossing	43	36.1	LOS D	0.1	0.1	0.78	0.78
P3	North Full Crossing	16	14.5	LOS B	0.0	0.0	0.49	0.49
P4	West Full Crossing	55	36.1	LOS D	0.1	0.1	0.78	0.78
All Pedestrians		117	32.9	LOS D			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: Proposed PM

Wigram Street & Parkes Street Intersection
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Wigram Street (south)											
1	L2	50	4.0	0.098	33.9	LOS C	2.4	16.9	0.72	0.69	35.8
2	T1	65	0.0	0.366	43.7	LOS D	5.2	36.8	0.88	0.74	30.7
3	R2	45	2.2	0.366	50.6	LOS D	5.2	36.8	0.91	0.75	31.3
Approach		160	1.9	0.366	42.6	LOS D	5.2	36.8	0.84	0.73	32.3
East: Parkes Street (east)											
4	L2	58	0.0	0.404	27.3	LOS B	13.8	97.8	0.70	0.64	40.5
5	T1	678	2.1	0.404	21.7	LOS B	13.8	98.6	0.70	0.62	44.0
Approach		736	1.9	0.404	22.2	LOS B	13.8	98.6	0.70	0.62	43.7
North: Wigram Street (north)											
7	L2	58	0.0	0.121	41.0	LOS C	2.6	18.1	0.80	0.72	33.3
8	T1	109	0.0	0.421	45.0	LOS D	7.8	54.4	0.92	0.76	30.6
9	R2	42	0.0	0.421	49.5	LOS D	7.8	54.4	0.92	0.76	31.8
Approach		209	0.0	0.421	44.8	LOS D	7.8	54.4	0.88	0.75	31.6
West: Parkes Street (west)											
10	L2	76	0.0	0.416	16.6	LOS B	14.3	102.0	0.53	0.51	45.9
11	T1	628	2.5	0.416	11.3	LOS A	14.3	102.0	0.56	0.55	49.8
12	R2	105	1.9	0.416	17.3	LOS B	7.7	55.2	0.64	0.62	44.9
Approach		809	2.2	0.416	12.6	LOS A	14.3	102.0	0.57	0.55	48.7
All Vehicles		1914	1.8	0.421	22.3	LOS B	14.3	102.0	0.67	0.62	42.5

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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

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	South Full Crossing	12	22.2	LOS C	0.0	0.0	0.61	0.61
P2	East Full Crossing	27	40.9	LOS E	0.1	0.1	0.83	0.83
P3	North Full Crossing	16	11.7	LOS B	0.0	0.0	0.44	0.44
P4	West Full Crossing	47	40.9	LOS E	0.1	0.1	0.83	0.83
All Pedestrians		102	34.1	LOS D			0.74	0.74

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.

Prepared by Parramatta City Council