GTAconsultants

137-151 Anzac Parade, Kensington
Planning Proposal
Transport Impact Assessment

Client // Toga Addison Pty Ltd
Office // NSW
Reference // 16S1308000
Date // 18/12/15

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Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
A	16/12/15	Final	Lucas Stewart	Rhys Hazell	Brett Maynard	
B	18/12/15	Minor consistency updates	Lucas Stewart	Rhys Hazell	Brett Maynard	

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1. Introduction

1.1 Background

It is understood that a planning proposal is to be lodged with Randwick City Council for the rezoning of land located at 137-151 Anzac Parade, Kensington. The planning proposal seeks to amend the current planning controls to permit a 24-storey development on the subject site.

The planning proposal is for a mixed use development comprising 312 residential apartments and 919sq.m of ground level retail/ commercial floor area.

Toga Kensington Pty Ltd engaged GTA Consultants in November 2015 to complete a transport impact assessment as part of the planning proposal.

1.2 Purpose of this Report

This report sets out an assessment of the anticipated transport implications of the proposed development, including consideration of the following:

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

1.3 References

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

- an inspection of the site and its surrounds completed by GTA on 18 November 2015
- Randwick Comprehensive Development Control Plan (RDCP) 2013
- Australian Standard/ New Zealand Standard, Parking Facilities, Part 1: Off-Street Car Parking AS/NZS 2890.1:2004
- Australian Standard, Parking Facilities, Part 2: Off-Street Commercial Vehicle Facilities AS 2890.2:2002
- Australian Standard/ New Zealand Standard, Parking Facilities, Part 6: Off-Street Parking for People with Disabilities AS/NZS 2890.6:2009
- SCATS traffic volume data obtained from RMS as referenced in the context of this report
- plans for the proposal prepared by Kann Finch, dated 26 November 2015
- other documents and data as referenced in this report.

2. Existing Conditions

The subject site is located at 137-151 Anzac Parade, Kensington and is approximately 5km southeast of the Sydney CBD. The site of 3,937sq.m has an 85m eastern frontage to Anzac Parade. The site currently has a land use classification of *Local Centre* and is occupied by a number of commercial and retail tenancies.

The surrounding properties predominantly include a mix of commercial and retail uses fronting Anzac Parade, with residential properties located to the west of the site along Todman Avenue and other local streets.

It is noted that the Anzac Parade precinct in Kensington is expected to experience a reasonable amount of redevelopment in the coming years, with the subject site representing one of a number of development proposals in the area, including but not limited to the following:

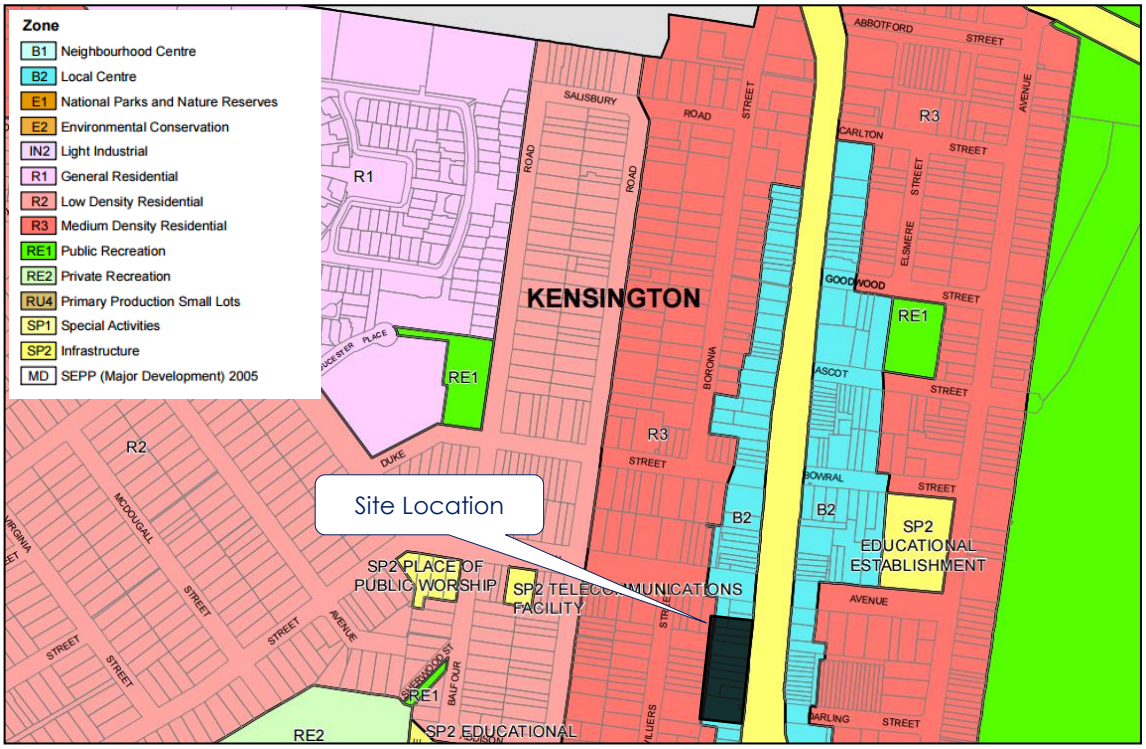
- 111-125 Anzac Parade (25 storey mixed-use development)
- 153-157 Anzac Parade (7 storey mixed-use development).

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

Figure 2.1: Subject Site and Its Environs

Source: Sydway

Figure 2.2: Land Zoning Map



Source: Randwick Local Environment Plan 2012

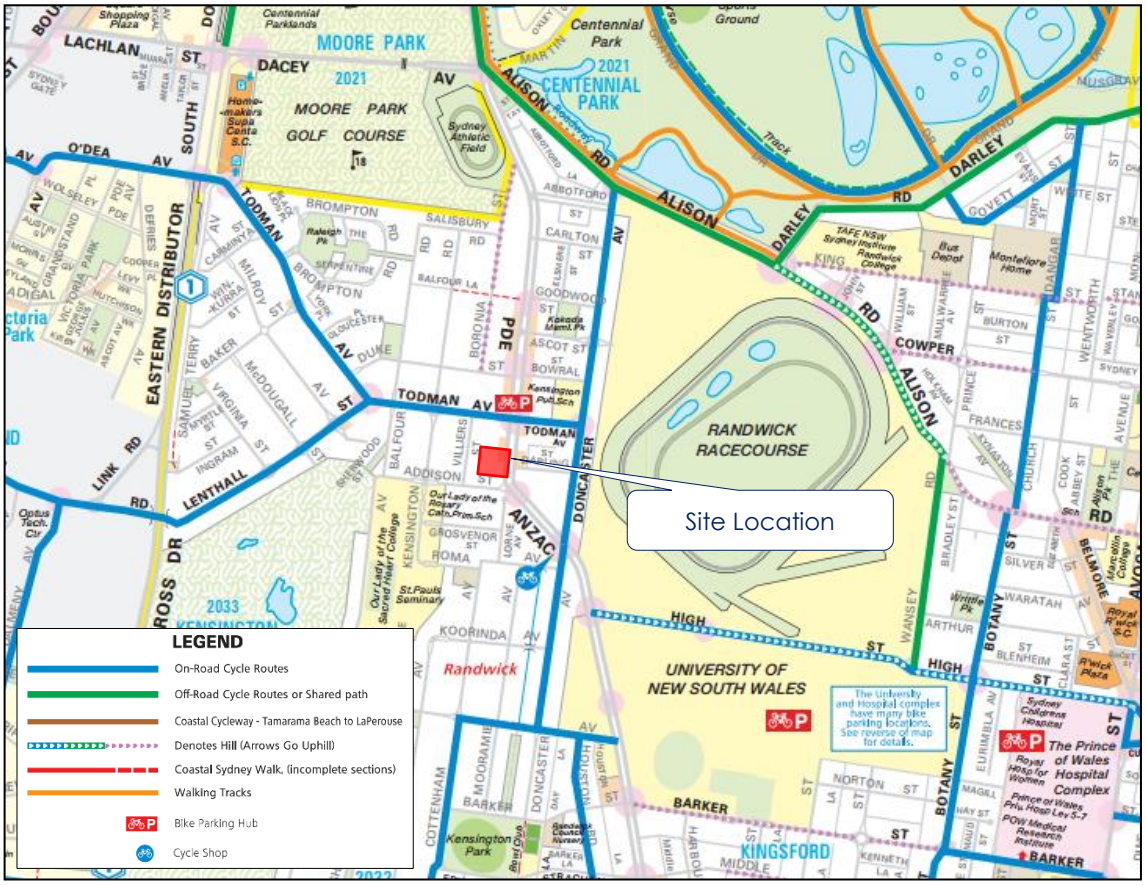
2.1 Walking and Cycling Infrastructure

There are well developed local and broader regional walking and cycling facilities surrounding the subject site. Pedestrian footpaths are provided on both sides of Anzac Parade, as well as Todman Avenue and the majority of all other roads in the vicinity of the site, providing good connectivity to nearby land uses and public transport hubs. Pedestrian crossings are provided on the western, northern and eastern legs of the Anzac Parade/ Todman Avenue signalised intersection, as well as at a mid-block signalised pedestrian crossing on Anzac Parade immediately south of Addison Street (south of the site).

On-road cycle routes are provided on Todman Avenue to the north, as well as Doncaster Avenue east of the site. These routes connect to off-road routes to the north, which in-turn provide good connectivity to the Sydney CBD.

Bicycle parking facilities are also provided on the eastern side of Anzac Parade, north of Todman Avenue. These routes and facilities are shown in Council's cycling map; as extract of which is reproduced in Figure 2.3.

Figure 2.3: Randwick City Council Cycle Map



Source: Randwick City Council

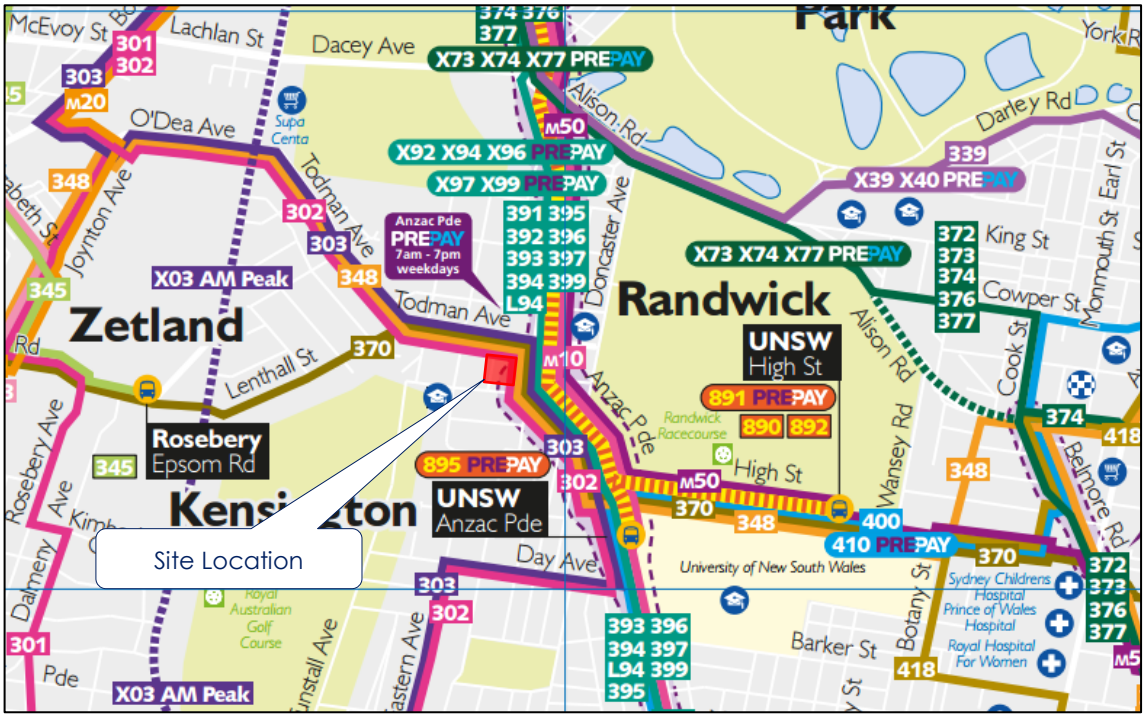
2.2 Public Transport

2.2.1 Existing Public Transport

The site is well served by public transport facilities, with a large number of bus routes operating along key roads, especially Anzac Parade along the eastern boundary of the site. The closest bus stops are located on Anzac Parade some 100m north of the site (for the inbound direction) and immediately south of the site on the eastern side of Anzac Parade (for the outbound direction).

The Sydney Buses routes operating along the nearby corridors are shown in Figure 2.4.

Figure 2.4: Sydney Buses Services



Source: Sydney Buses region guide for Eastern Region

2.2.2 CBD and South East Light Rail

Site Context

In addition to the existing public transport services, it is important to note that the future CBD and South East Light Rail (CSELR) will travel along Anzac Parade and directly past the site. The nearest CSELR stop is proposed on Anzac Parade immediately north of Todman Avenue and directly adjacent to the site's eastern boundary.

Early construction works in the CBD have begun on the CSELR and is expected to be operational by 2019. On completion, it will provide a direct light rail link between Sydney's inner southern suburbs, University of New South Wales (UNSW) hospital precincts and several other key destinations.

The planned CSELR stops will be key transport hubs along the route, and with high frequency services expected, particularly during the weekday peak commute times, they will be highly utilised with a high level of activation. The planned development in the Anzac Parade/ Todman Avenue precinct is expected to leverage the impending arrival of the CSELR, creating a residential and retail/ commercial precinct centred on the CSELR stop. As such, the subject site's location in close proximity to the CSELR stop is ideal for the promotion of sustainable transport accessibility to/ from any potential development on the site.

Capacity

The original CBD and South East Light Rail (CSELR) project was approved in June 2014. The EIS submitted with the project proposed light rail vehicles (LRVs) of approximately 45 metres in length with a capacity of approximately 300 people. The approved service frequency (the time interval or distance between two LRVs) for the 45 metre vehicles was initially 3 minutes within the CBD, and 6 minutes on each branch line during the peak period (between 7.30am and 9.30am and

between 5.00pm and 7.00pm). The EIS noted the potential for a future frequency increase to 2 minutes in the CBD and 4 minutes on the branch lines to accommodate growth.

As detailed further in the Planning Proposal (JBA, December 2015), the Todman Avenue stop has significant excess light rail vehicle capacity (over 5,000 passengers) to accommodate patronage growth, with transport modelling undertaken for the CSELR understood to account for the significant future development intensification considered by the Randwick Urban Activation Precinct Studies.

Modification 1 to the CSELR planning approval (February 2015) noted that benefits had been identified in providing additional up-front capacity and future-proofing the proposed light rail network, with an alternative operating scenario is proposed as part of the initial construction of the project.

The modified approval provides larger LRVs approximately 67 metres in length allowing for an increased vehicle capacity of approximately 466 people per LRV. Due to the increased capacity in each LRV, the modified project proposed to reduce the frequency of services (from that originally approved) to 4 minutes in the CBD and 8 minutes on each of the branch lines between 7.00am and 7.00pm in the opening year (with future capacity for approximately 3 minutes in the CBD and 6 minutes on each branch line in response to additional patronage demand, where necessary).

In these future operations (which the modification report suggests is at least 10 years after opening) during the peak hour there is potential to increase capacity to enable the movement of up to 8,620 passengers per hour in each direction (18.5 LRVs per hour each carrying up to 466 passengers). This capacity does not include special events which would provide up to 10,800 passengers per hour. The capacity would also increase if headways were reduced to the 3 minutes in the CBD and 6 minutes on each branch line noted above. The modification report noted that this provides for significant 'future proofing' against patronage growth and/or expansion of the network.

Population Growth

The capacity provided on the CSELR network caters for the existing population as well as significant population growth resulting from development along the light rail corridor consistent with the draft UAP structure plan for the Randwick precinct (Urban Growth, 2013).

Whilst the development of the Randwick UAP is outside the scope of the CSELR proposal, the future development of the Randwick UAP would increase travel demand as a result of the proposed development within this area. While still in the early stages of planning, the NSW Government has recognised that the construction of the CSELR proposal in the precinct would provide a catalyst for urban renewal and consolidation. The delivery of a high-capacity and reliable mode of transport through the area would support the additional social and community infrastructure being delivered through the UAP program.

The patronage forecasts conducted for the CSELR proposal provide for projected population growth in the South East suburbs consistent with the Draft Metropolitan Strategy. If the Randwick UAP is adopted by the NSW Government, the CSELR proposal has sufficient capacity to cater for the increased patronage arising from this UAP.

This demonstrates that the growth in population contemplated by the increased density proposed under the UAP was accommodated in the capacity projections for the CSELR. This is particularly the case as capacity increased as a result of the subsequent modification to the CSELR project (see above).

2.3 Road Network

2.3.1 Adjoining Roads

Anzac Parade

Anzac Parade is a classified State Road and is aligned in a north-south direction. It is a two-way road configured with a 4-lane, 31m wide divided carriageway (inclusive of the median), set within a 40m wide road reserve. Kerbside parking is permitted outside of bus lane/ clearway times.

Anzac Parade is shown in Figure 2.5 to Figure 2.8, and carries approximately 30,000 vehicles per day[1].

Figure 2.5: Anzac Parade (looking south)

Figure 2.6: Anzac Parade (proximate to site) looking north

Figure 2.7: Anzac Parade (proximate to site) looking south

Todman Avenue

Todman Avenue is classified as a Regional Road and is aligned in an east-west direction. It is a two-way road configured with a 4-lane, 22m wide carriageway, set within a 30m wide road reserve. Kerbside parking is permitted, subject to time restrictions.

1 Based on the SCATS data obtained from RMS in 2012 (applying a 2% p.a. growth rate to determine 2015 volumes) and assuming a peak-to-daily ratio of 8% for arterial roads and 10% for local roads.

Todman Avenue is shown in Figure 2.8 and Figure 2.9, and carries approximately 17,000 vehicles per day[1].

Figure 2.8: Todman Avenue looking west (away from Anzac Parade)

Figure 2.9: Todman Avenue looking east (toward Anzac Parade)

2.3.2 Surrounding Intersections

The key intersection in the vicinity of the site is the Anzac Parade/ Todman Avenue signalised intersection, located some 80m the north of the site.

2.4 Traffic Volumes

GTA Consultants obtained SCATS data for the Anzac Parade/ Todman Avenue signalised intersection from November 2012. The data identified the following weekday peak periods:

- 8:00am to 9:00am
- 5:00pm to 6:00pm.

In order to conservatively estimate current year traffic volumes, a 2% compound annual growth rate has been applied to the SCATS data. The AM and PM peak hour traffic volumes are summarised in Figure 2.10 and Figure 2.11 respectively.

Figure 2.10: Weekday AM Peak Hour Traffic Volumes (growth adjusted for 2015)

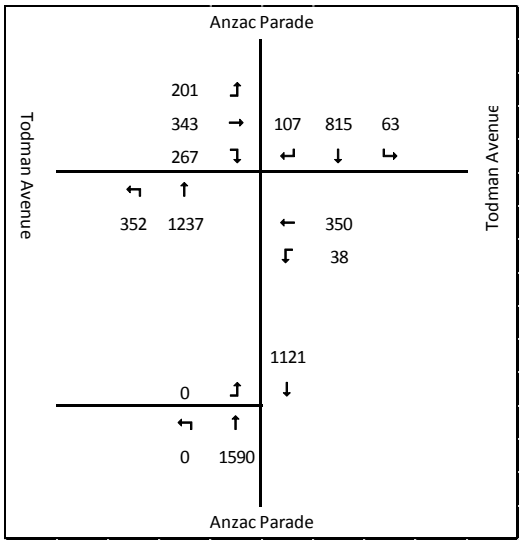
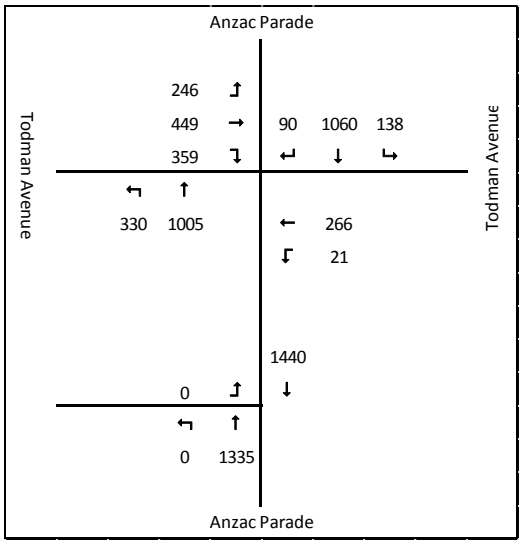


Figure 2.11: Weekday PM Peak Hour Traffic Volumes (growth adjusted for 2015)



2.5 Intersection Operation

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

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

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

Table 2.1: SIDRA INTERSECTION Level of Service Criteria

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

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

Table 2.2: 2015 Intersection Operating Conditions

Intersection	Peak	Leg	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Anzac Parade/ Todman Avenue	AM	South	0.95	47	369	D
		East	0.91	63	87	E
		North	0.93	21	92	B
		West	0.89	48	156	D
	PM	South	0.88	34	233	C
		East	0.91	60	59	E
		North	0.83	22	135	B
		West	0.88	41	174	C

On the basis of the above assessment, the intersection of Anzac Parade/ Todman Avenue currently experiences queuing and delay, particularly for the southern Anzac Parade approach and the western Todman Avenue approach during both the AM and PM peak periods. This is consistent with feedback received from RMS, where the right turn from Todman Avenue (west) into Anzac Parade was noted as a critical movement.

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

2.6 Car Parking

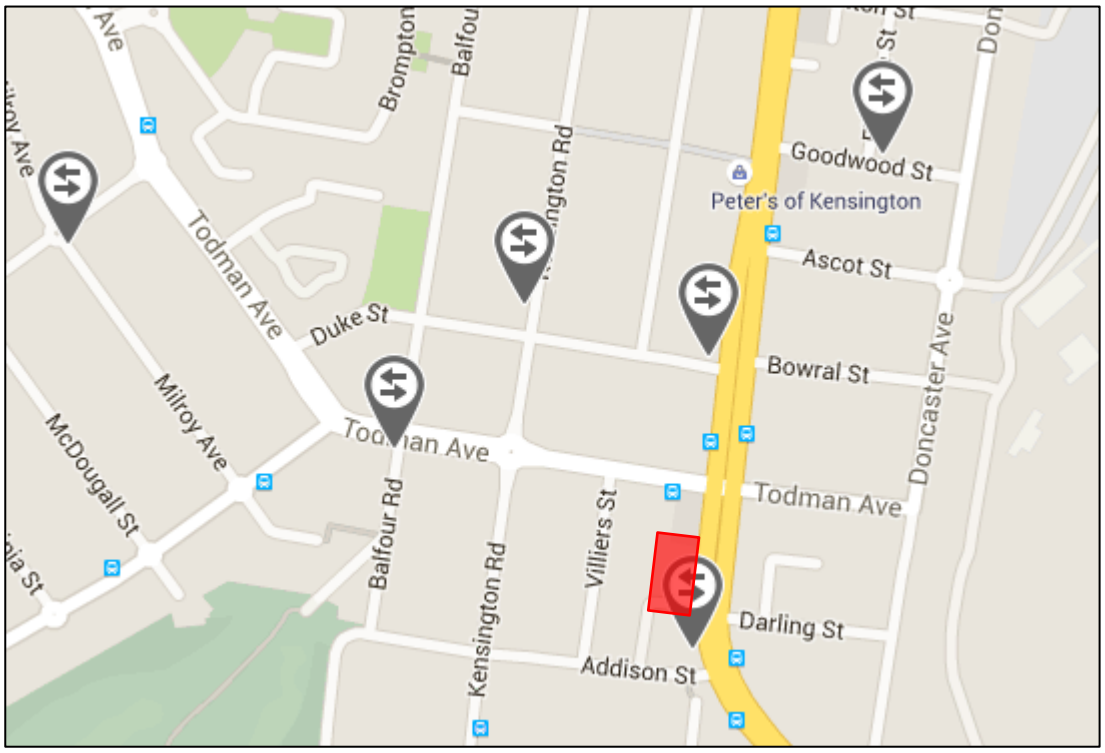
Car parking is currently accommodated at various locations within the existing land uses on the subject site.

On-street parking is permitted on both sides of Todman Avenue and is subject to 2P time restrictions on weekdays. Parking is also permitted in the kerbside lane along Anzac Parade, subject to a 30 minute restriction and outside the AM and PM bus lane time periods. The bus lane periods apply for the northbound lane between 6:00am and 10:00am, and between 3:00pm and 7:00pm for the southbound lane.

2.6.1 Local Car Share Facilities

Several Go Get car sharing pods are located within close proximity of the site. These are primarily along Anzac Parade with some other local area pods both north and west of the site, as shown in Figure 2.12.

Figure 2.12: Go Get Car Share Locations



3. Development Proposal

3.1 Land Uses

The proposal includes the construction of two towers with 312 residential apartments and 919sq.m of ground floor retail commercial floor space, as detailed in Table 3.1.

Table 3.1: Development Schedule

Use	Dwelling Type	Size / Number
Residential	1 bedroom	138 apartments
	2 bedroom	166 apartments
	3 bedroom	8 apartments
	Total	**312 apartments**
Commercial	-	919sq.m

As noted earlier, the proposal is one of many similar development proposals planned for the area in close proximity to the future CSELR stop on Anzac Parade at Todman Avenue.

3.2 Vehicle Access

Vehicular access is proposed via the existing single crossover to Anzac Parade along the southern boundary to meet Anzac Parade in the south-west corner of the site, allowing for left-in and left-out movements. This location is considered the most appropriate given that the site does not have a frontage to any street other than Anzac Parade.

Any opportunity to incorporate a short left turn lane into the site would be investigated during detailed design, along with appropriate entry geometry that facilitates a suitable vehicle entry speed, to minimise potential rear-end crashes without compromising pedestrian safety.

3.3 Car Parking

On-site basement car parking is to be provided, with this parking to be for use by residents, their visitors and the proposed commercial uses. The preliminary car park layout plans indicate that some 79 spaces can be provided at the first basement level with the remaining levels each likely to accommodate approximately 95 parking spaces.

Further detail on the car parking requirements for the proposal is provided in Section 4 of this report.

3.4 Pedestrian Facilities

Pedestrian access is to be directly provided to Anzac Parade by way of a central entrance to an internal lobby area. This lobby area would provide access to the lift core and on to the residential apartments, while the proposed ground floor commercial tenancies will also front Anzac Parade.

3.5 Bicycle Facilities

The proposal includes provision of storage for the residential apartments within the basement parking levels and/ or within each residential apartment. It is expected that these facilities will be

adequate to accommodate bicycle parking requirements, with further details of this provision to be provided at the DA stage. Further visitor bicycle parking would be provided on the ground level.

Further details of the bicycle parking and end-of-trip facility requirements are provided in Section 5 of this report.

3.6 Loading Areas

A dedicated loading area for residential and commercial use is proposed at the base of the entry ramp to the B1 parking level, suitable for accommodating up to two service vehicles.

Further detail on the loading requirements for the proposal is provided in Section 6 of this report.

4. Car Parking

4.1 Car Parking Requirements

The car parking requirements for different development types are set out in Randwick City Council's *Development Control Plan Part B* (RDCP). A review of the car parking rates and the floor area schedule results in a RDCP parking requirement for the proposed development as summarised in Table 4.1.

Table 4.1: RDCP Car Parking Requirements

Description	Use	Size / Number	DCP Parking Rate	DCP Parking Requirement
1 Bedroom	Residential (Multi-Dwelling Housing)	138	1 space/ 1-bed	138 spaces
2 Bedroom		166	1.2 spaces/ 2-bed	199 spaces
3 Bedroom		8	1.5 spaces/ 3-bed	12 spaces
Visitor		312	1 visitor space/ 4 dwellings	78 spaces
Residential Total				**427 spaces**
Shop Tenancies	Business and Retail	919sq.m	1 space per 40sq.m GFA	23 spaces
Total				**450 spaces**

Based on the above, the RDCP requires that the proposal provide 427 car parking spaces for the residential uses and 23 spaces for the retail tenancies, for a total provision of 450 car parking spaces.

4.2 Council Exceptions to Parking Rates

The RDCP notes that the car parking provision rates specified are greater than those of comparable Councils in adjoining areas. The RDCP contains a list of controls against which an exception to Council's parking rates may be tested and which any variations must address. These include the following (as taken from the RDCP):

i The type and scale of the development and its potential impact on local traffic and parking conditions.
ii Survey of parking provision in comparable recent developments.
iii Existing parking facilities already provided prior to further development.
iv Site and building constraints.
v Heritage and urban design considerations including significant streetscape elements such as sandstone retaining walls, significant mature trees etc.
vi On-street and public parking in the area, as well as proximity and access to public transport.
vii Location of local services, employment, retail and recreational facilities.
viii Safety of vehicles, pedestrians and cyclists.
ix Provision of any integrated, sustainable transport options on-site.

The RDCP also aims to support the integration of land use and transport, and promote sustainable transport, public transport use, walking and cycling. Its specific objectives in this regard are as follows:

i To promote sustainable transport options for development, particularly along transport corridors, in commercial centres and strategic/ key sites.
ii To manage the provision of car parking within the broader transport network.
iii To support integrated transport and land use options which can demonstrate shared and effective car parking provision with car share facilities, motorbikes/ scooters, bikes and links to public transport.
iv To ensure car parking facilities, service and delivery areas and access are designed to enhance streetscape character and protect pedestrian amenity and safety.

The abovementioned considerations relevant to the planning proposal are discussed below.

4.2.1 Type and Scale of Development

The proposed development incorporates some 312 residential apartments as well as retail tenancies. With the full provision of car parking in accordance with the RDCP rates, this proposal has the potential to be a significant traffic generator in what is already a heavily congested area and adjacent to a key public transport corridor.

A reduction in car parking provision would be reasonably expected to also result in a reduction in traffic generated by the proposal, as a number of residents would not have access to a private vehicle when they otherwise would have. These trips would instead be accommodated by other travel modes (i.e. public transport, walking, cycling) instead of generating additional vehicle trips on the road network.

4.2.2 Available On-Street Parking

As noted in Section 2.6, short-term on-street parking is available in close proximity to the site on Todman Avenue and Anzac Parade (outside bus lane clearway times). These vacancies within on-street parking could accommodate short-term trips to the development such as customers to the proposed retail tenancies. The potential use of on-street car parking spaces for short-stay trips such as customers to the proposed retail tenancies is typical for sites within local centres such as the subject site.

4.2.3 Public Transport Availability

It is also noted that the site is well located with respect to existing public transport services, and is only a short (20-30 minute) bus trip from Sydney's CBD. In addition, the CSELR will provide a future stop nearby which is expected to be operational by 2019. The existing bus and future light rail stops are located on Anzac Parade in close proximity.

As such, the site is considered to be extremely well located with respect to existing and future public transport services, and a suitable location in which a reduction to the RDCP car parking rates could be considered.

4.2.4 Promotion of Sustainable Transport along Transport Corridors and in Key Centres

The site fronts a major regional transport corridor (Anzac Parade) which is currently served by a large number of bus routes. In addition, the future CSELR will also be constructed along the

Anzac Parade corridor with a station approximately 120m to the north, further increasing and improving public transport accessibility to the site. The site is located within a local centre as per the Randwick LEP, which will ultimately form an integrated hub centred around the future light rail station.

As such, the subject site is considered an ideal location in which sustainable transport options could be further promoted, in-line with the objectives of the RDCP.

4.3 Other Considerations

4.3.1 Other DCP Parking Rates (Retail/ Commercial)

The RDCP car parking rates are considered somewhat excessive compared to DCPs of adjacent LGAs for sites in similarly accessible locations. Comparable LGAs have generally implemented maximum car parking rates in order to reduce traffic congestion and parking demand and contribute to an overall shift in transport mode.

It is evident that if the proposed development was located in a different LGA with similar attributes to Randwick (and specifically Kensington), the proposal would be subject to a lower car parking requirement. Indeed, a number of adjacent LGAs would apply a maximum car parking rate rather than minimum, effectively restricting the number of car parking spaces that could be provided.

Given the application of maximum rates in similarly located areas, this is considered reasonable for the proposal on the subject site. As such, a maximum rate of 1 space per 40sq.m of retail/ commercial space is recommended, consistent with the RDCP rate for such land uses but in-line with standard practice of other LGAs in Sydney for sites with similar levels of accessibility. Applied to the proposed 919sq.m of retail/ commercial GFA, this would result in an acceptable parking provision of 0 to 23 spaces for this development component.

4.3.2 RMS Guide (Residential)

The *Guide to Traffic Generating Developments* (RMS, October 2002) recommends a minimum number of parking spaces for high density residential flat buildings in a Metropolitan Regional Centre and a Metropolitan Sub Regional Centre.

The RMS defines a Metropolitan Regional Centre (Central Business District) as an area that provides high levels of local employment as well as access to rail and bus services as presumably opposed to a Metropolitan Sub Regional Area which would have higher parking demands due to its lower accessibility.

It is considered that the subject site may be more aligned to being located in a Metropolitan Sub Regional area given it is located within close proximity to existing bus services and future CSELR.

Using the RMS parking provision rates, Table 4.2 presents the car parking requirements for the proposal.

Table 4.2: Residential Parking Demands

Type	Number of Dwellings	Car Parking Rate	Car Parking Demand
1 bedroom	138 dwellings	0.6 spaces per dwelling	82.8 spaces
2 bedroom	166 dwellings	0.9 spaces per dwelling	149.4 spaces
3 bedroom	8 dwellings	1.4 spaces per dwelling	11.2 spaces
Total Residents			**243 spaces**
Visitor	312 dwellings	1 space per 7 dwellings[1]	45 spaces
Total			**288 spaces**

[1] The lower parking rate of 1 space per 7 dwellings has been adopted for the visitor component and recognises the site's location and future public transport expansion

Table 4.2 indicates the proposal generates a residential car parking demand of 288 spaces, including 243 resident spaces and 45 visitor spaces based on RMS requirements. Given the site's location with respect to public transport and accessibility of services, these rates are considered appropriate for a proposal of this type in this location.

As noted above, it is also considered appropriate that residential visitor spaces be provided at the Metropolitan Regional Centre rate (i.e. 1 space per 7 apartments), which still represents a significant visitor parking provision.

Several similar Council DCPs also specify that on-site car share spaces may be provided In lieu of resident car parking spaces. The applicable rate is commonly 1 space per 3 spaces. The on-site car share spaces are typically dedicated to commercial car share operators and must be accessible to the general public i.e. generally not located behind a security door unless access can be provided to users.

4.4 Recommended Parking Supply

On the basis of the above, Table 4.3 has been prepared to present a summary of the recommended car parking provisions for the proposal.

Table 4.3: Recommended Parking Provision

Use	Size	Source	Car Parking Supply
Residential	312 dwellings	RMS Guide 2002	243 spaces
Resident Visitor			45 spaces
Commercial	919sq.m	RDCP 2013 (applied as maximum)	0-23 spaces
Total			**288-311 spaces**

Table 4.3 indicates that a parking provision of between 288 and 311 spaces would be considered adequate for the proposal having regard to the site's location. It is therefore recommended that a provision within this range be provided within no more than four levels of basement car parking.

4.5 Motorcycle Parking

The RDCP requires that 5% of all car parking be provided for motorcycles. Given the recommended parking provision detailed above, this would equate to a provision of 14-16 motorcycle spaces. These spaces would likely be able to be accommodated within the basement car parking areas.

5. Sustainable Transport Infrastructure

5.1 Bicycle End-of-Trip Facilities

RDCP contains requirements for the provision of bicycle parking facilities for the proposed land uses as detailed in Table 5.1.

Table 5.1: RDCP Bicycle Parking Requirements

Description	Bicycle Parking Rate		Size/ Number	Bicycle Parking Provision	
	Resident/ Employee	Visitor/ Customer		Resident/ Employee	Visitor/ Customer
Residential	1 space/ 2 apartments	1 space/ 10 apartments	312 apartments	156 spaces	31 spaces
Retail/ Commercial	1 space/ 10 parking spaces		0-23 parking spaces*	0-2 spaces	

* refer to Section 4.3.1 discussion of maximum parking rates

Based on the above, the RDCP requires that the planning proposal incorporate 156 bicycle parking spaces for residents (i.e. secure parking), 31 bicycle parking spaces for visitors (i.e. publicly available parking), and 0-2 bicycle parking for the proposed retail tenancies.

The resident spaces could be accommodated as bicycle racks within a secure cage facility to improve space efficiency and usage, as well as making a provision for employees of the retail tenancies in the event that supply exceeds demand. Likewise, the visitor bicycle racks could also accommodate customer demand generated in the event that they are not fully utilised by visitors to the residences.

5.2 Pedestrian Network

As noted in Section 2.1, the proposal will incorporate a primary pedestrian access point to Anzac Parade. The proposed retail tenancies are also expected to provide direct pedestrian access to the Anzac Parade footpaths, thus further activating the area more broadly.

5.3 Public Transport

The site is well located with respect to existing and future public transport stops and services, being located within a short walking distance of high quality existing and future public transport nodes. The proximity to public transport is expected to increase the use of public transport by residents and employees, and thus discourage the use of private cars.

The design development of the proposal is to be mindful of the proximity to these public transport stops and incorporate design elements to ensure direct, safe and efficient pedestrian access.

The key light rail capacity statistics identified in Section 2.2.2, together with the potential for future increases in service frequency in response to demand, clearly indicates that appropriate light rail network capacity has been planned for the corridor, supporting development of the scale proposed, both on the site and elsewhere in the local area.

6. Loading Facilities

6.1 Loading Requirements

Given the provision of retail/ commercial uses and the proposed number of residential apartments, the RDCP requires a loading bay be provided. This loading bay is proposed at the base of the ramp to B1 with direct access via the crossover from Anzac Parade.

The proposed loading bay would ensure access to the retail/ commercial tenancies is provided via internal corridors for day-to-day deliveries together with accommodating removalist trucks. It is recommended that both residential and retail waste bin rooms are also located within close proximity to the loading area to allow garbage trucks easy access for garbage collection purposes.

The concept design plans include capacity for two service vehicles, however detailed swept path assessment would be completed during design development at the DA stage to ensure the layout is both compliant with AS 2890.2:2002 and is practical, having consideration for the anticipated volumes.

7. Traffic Impact Assessment

7.1 Traffic Generation

7.1.1 Design Rates

Traffic generation estimates for the proposal have been sourced from the *Guide to Traffic Generating Developments* (RMS, 2002) and RMS *Technical Direction TDT 2013/ 04 Guide to Traffic Generating Developments Updated traffic surveys (TDT 2013/ 04)*.

TDT 2013/ 04 provides updated rates for high density residential flat dwellings (2012 surveys) that are close to public transport services, greater than six storeys and almost exclusively residential in nature. TDT 2013/ 04 indicates an average AM peak hour trip generation for Sydney of 0.19 trips per apartment. PM peak hour rates are slightly lower at 0.15 trips/ hour. Given the proposed development rises to 24-storeys, is close to high frequency public transport services (now and in the future) and mostly comprises residential apartments, these rates are considered accurate and have been adopted as part of this assessment.

Estimates of peak hour and daily traffic volumes associated with the proposal are set out in Table 7.1

Table 7.1: Traffic Generation Estimates

Land Use	Period	Traffic Generation Rates		Vehicle Movements	
		Peak Hour	Daily	Peak Hour	Daily
High Density Residential Flat Dwellings (312 apartments)	AM Peak	0.19 vehicle trips/ apartment	1.52 vehicle trips/ apartment	59 vehicle trips/ hr	474 vehicle trips/ day
	PM Peak	0.15 vehicle trips/ apartment		47 vehicle trips/ hr	

Given the reduction in parking provision for the retail/ commercial uses, it is expected that traffic generation associated with the use would be minimal. Instead, associated trips would be expected to be via public transport, walking and cycling (noting the local catchment typical for many such retail tenancies). Vehicle trips would also likely be part of a linked trip, with these vehicles either diverted or already on the broader road network surrounding the site and thus presents a nominal traffic related impact. Residents of the development would also make use of the retail/ commercial uses.

Notwithstanding this and for the purposes of this assessment, an additional 10 vehicle trips (5 in and 5 out) have been assumed to be generated by the retail/ commercial uses.

Based on the above, the proposal is expected to generate the following:

- Typical AM peak period: 69 vehicle movements per hour
- Typical PM peak period: 57 vehicle movements per hour.

It is noted that the above assessment makes no account of existing traffic generation of the land uses within the development site and is therefore considered a conservative approach.

7.2 Distribution and Assignment

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

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

In this regard, it is noted that the limitations on the proposed access to allow left-in and left-out vehicle movements only will impact the distribution and assignment of traffic entering and exiting the development site. Traffic accessing the site from the north will largely be dispersed across the adjacent streets (i.e. Todman Avenue, Kensington Road, Doncaster Avenue and Addison Street) so as to be able to approach the site from the south to enter the driveway. Likewise, traffic departing the site towards the south will be required to utilise the local and other regional roads in close proximity (i.e. Todman Avenue, Doncaster Avenue and Alison Road). As such, the impact of traffic generated by the proposal on the adjacent road network and intersection of Anzac Parade/ Todman Avenue is expected to be minimal, and largely limited to specific movements only.

Having consideration for the above, for the purposes of estimating vehicle movements, the following directional distributions have been assumed at the Anzac Parade/ Todman Avenue intersection:

- Inbound
  - 25% of traffic turns right into Todman from the north approach
  - 25% of traffic travels straight through from the east approach
  - 50% of traffic travels from the west or south and does not impact the intersection.
- Outbound
  - 50% of traffic turns left at Todman Avenue from the south approach
  - 50% of traffic travels straight along Anzac Parade.

In addition, the directional splits of traffic (i.e. the ratio between the inbound and outbound traffic movements) have been assumed as follows:

- AM Peak Period
  - Residential 20% in/ 80% out
  - Commercial 50% in/ 50% out
- PM Peak Period
  - Residential 60% in/ 40% out
  - Commercial 50% in/ 50% out.

Based on the above, Figure 7.1 and Figure 7.2 have been prepared to show the estimated marginal increase in turning movements in the vicinity of the subject property following full site development.

Figure 7.1: AM Peak Hour Site Generated Traffic Volumes

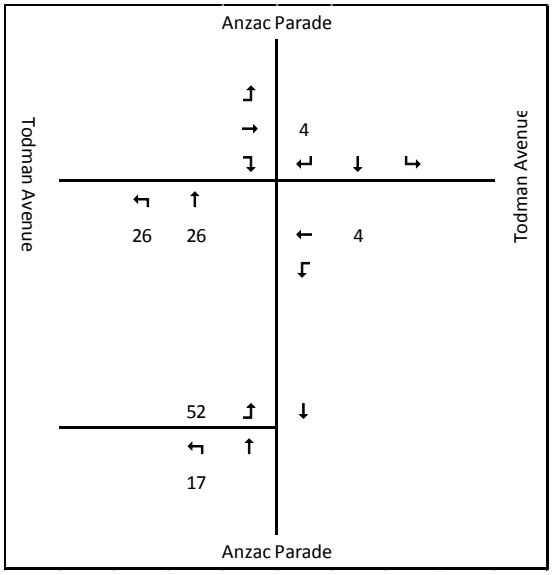
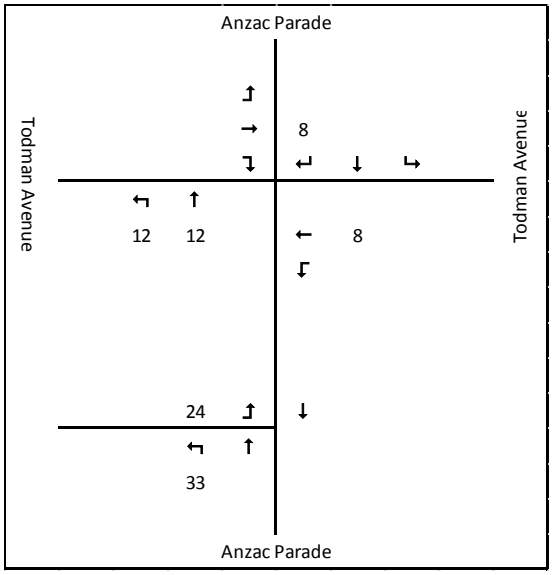


Figure 7.2: PM Peak Hour Site Generated Traffic Volumes



7.3 Additional Background Traffic

7.3.1 111-125 Anzac Parade Development Proposal

In addition to the proposal being considered as part of this assessment, consideration has also been given to another development proposal on land located at 111-125 Anzac Parade (northwest corner of the Todman Avenue intersection). This proposal is for a mixed use building incorporating some 231 residential apartments and 1,119sq.m of retail/ commercial floor space.

Reference has been made to GTA's Transport Impact Assessment report for this adjacent development proposal, which indicates that it is expected to generate some 54 and 45 vehicle movements during the weekday AM and PM peak hours respectively. As such, in order to complete a sufficiently thorough assessment of traffic impacts, these additional traffic movements (and associated traffic distributions as documented in GTA's report) have also been considered as additional background traffic in the following analysis.

7.4 Traffic Impact

The anticipated impacts of the proposal on the Anzac Parade/ Todman Avenue signalised intersection have been assessed using SIDRA INTERSECTION 6.1 (SIDRA). The anticipated operations of this intersection following development are summarised in Table 7.2.

Table 7.2: Expected Post-Development Operating Conditions

Intersection	Peak	Leg	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Anzac Parade / Todman Avenue	AM	South	0.97	56	417	D
		East	0.93	65	91	E
		North	0.89	20	90	B
		West	0.96	62	194	E
	PM	South	0.90	38	260	C
		East	0.89	60	63	E
		North	0.88	23	142	B
		West	0.90	44	189	D

The SIDRA analysis indicates the following:

- The queues on the southern approach extend back past the proposed site access location, both with and without development traffic.
- During the AM peak, the additional development traffic results in the anticipated queue lengthening by approximately 19m (3 vehicles) from background levels.
- During the PM peak, queues and delays experience minor increases as a result of development traffic.

Based upon the above findings, and when compared with existing traffic volumes in the vicinity of the site, the additional traffic generated by the proposal could not be expected to compromise the safety or function of the surrounding road network.

8. Conclusion

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

i The proposal generates a RDCP parking requirement of 450 spaces.

ii It is recommended that between 288 and 311 car parking spaces be provided within the basement car parking levels. This accords with relevant RMS Guidelines and broader RDCP objectives of integrating land use and transport, and promoting sustainable transport behaviour on major transport corridors.

iii A review of the concept design plans indicates that on-site parking and the proposed access driveway are generally in accordance with the relevant Australian Standards, noting that design detail will be progressed as part of the DA process.

iv The provision of two loading bays is appropriate having regard for the proposed uses. The loading facilities will be further assessed as part of the DA and will be designed to accommodate manoeuvring of the largest design vehicle required to access the site.

v The proposal generates a requirement for provision of 156 resident, 31 visitor and up to 2 commercial bicycle parking spaces.

vi The provision of bicycle facilities will be further detailed during the DA, but is expected to be capable of accommodating the required bicycle parking.

vii The site is expected to generate up to 69 and 57 vehicle movements during the weekday AM and PM peak hours respectively.

viii The impacts of traffic generated by the proposal (as well as the nearby development site at 111-125 Anzac Parade) are considered relatively minor with respect to existing road network operations and are not expected to compromise the safety or function of the road network.

ix The intersection of Anzac Parade/ Todman Avenue experiences queuing and delay for some approaches during peak periods both under current conditions and in the future. The proposal does not significantly impact the overall intersection operation.

x The initially available CBD and South East Light Rail patronage capacity, together with the potential for future increases in service frequency in response to demand, clearly indicates that appropriate light rail network capacity has been planned for the corridor, supporting development of the scale proposed, both on the site and elsewhere in the local area.

Appendix A

SIDRA Intersection Results

MOVEMENT SUMMARY

Site: 2015 AM Base

Anzac Parade / Todman Avenue
Signals - Fixed Time Isolated Cycle Time = 105 seconds (Optimum Cycle Time - Minimum Delay)

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: Anzac Parade (S)											
1	L2	371	5.0	0.319	14.3	LOS A	8.3	60.5	0.48	0.72	47.4
2	T1	1302	5.0	0.946	56.5	LOS E	50.6	369.1	0.94	1.13	31.2
Approach		1673	5.0	0.946	47.2	LOS D	50.6	369.1	0.84	1.04	33.7
East: Todman Avenue (E)											
4	L2	40	5.0	0.195	52.4	LOS D	1.9	14.0	0.94	0.73	31.7
5	T1	368	5.0	0.911	64.1	LOS E	11.9	87.2	1.00	1.06	29.4
Approach		408	5.0	0.911	62.9	LOS E	11.9	87.2	0.99	1.02	29.6
North: Anzac Parade (N)											
7	L2	66	5.0	0.067	17.1	LOS B	1.5	11.3	0.49	0.68	45.7
8	T1	858	5.0	0.413	14.5	LOS A	12.6	92.2	0.62	0.55	48.5
9	R2	113	5.0	0.932	75.6	LOS F	7.0	51.5	1.00	1.05	26.5
Approach		1037	5.0	0.932	21.3	LOS B	12.6	92.2	0.65	0.61	44.4
West: Todman Avenue (W)											
10	L2	212	5.0	0.258	24.3	LOS B	6.6	48.2	0.65	0.75	42.0
11	T1	361	5.0	0.886	49.4	LOS D	21.4	156.4	0.95	1.02	33.1
12	R2	281	5.0	0.886	63.4	LOS E	21.4	156.4	1.00	0.99	29.2
Approach		854	5.0	0.886	47.8	LOS D	21.4	156.4	0.89	0.94	33.4
All Vehicles		3972	5.0	0.946	42.2	LOS C	50.6	369.1	0.82	0.90	35.3

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
P2	East Full Crossing	53	17.8	LOS B	0.1	0.1	0.58	0.58
P3	North Full Crossing	53	41.3	LOS E	0.1	0.1	0.89	0.89
P4	West Full Crossing	53	26.1	LOS C	0.1	0.1	0.71	0.71
All Pedestrians		158	28.4	LOS C			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.

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MOVEMENT SUMMARY

Site: 2015 PM Base

Anzac Parade / Todman Avenue
Signals - Fixed Time Isolated Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

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: Anzac Parade (S)											
1	L2	347	5.0	0.292	12.7	LOS A	6.6	48.4	0.45	0.71	48.4
2	T1	1058	5.0	0.884	41.3	LOS C	32.0	233.4	0.95	1.02	35.8
Approach		1405	5.0	0.884	34.2	LOS C	32.0	233.4	0.83	0.94	38.3
East: Todman Avenue (E)											
4	L2	22	5.0	0.146	51.1	LOS D	1.0	7.3	0.96	0.71	32.1
5	T1	280	5.0	0.911	60.2	LOS E	8.0	58.7	1.00	1.04	30.3
Approach		302	5.0	0.911	59.5	LOS E	8.0	58.7	1.00	1.02	30.4
North: Anzac Parade (N)											
7	L2	145	5.0	0.164	19.6	LOS B	3.7	26.7	0.58	0.72	44.3
8	T1	1116	5.0	0.662	18.4	LOS B	18.5	135.4	0.77	0.69	46.1
9	R2	95	5.0	0.828	61.0	LOS E	5.0	36.2	1.00	0.92	29.6
Approach		1356	5.0	0.828	21.5	LOS B	18.5	135.4	0.77	0.71	44.2
West: Todman Avenue (W)											
10	L2	259	5.0	0.286	20.1	LOS B	6.9	50.2	0.62	0.75	44.1
11	T1	473	5.0	0.880	40.4	LOS C	23.8	173.7	0.91	0.98	36.1
12	R2	378	5.0	0.880	54.6	LOS D	23.8	173.7	1.00	0.99	31.3
Approach		1109	5.0	0.880	40.5	LOS C	23.8	173.7	0.87	0.93	35.8
All Vehicles		4173	5.0	0.911	33.6	LOS C	32.0	233.4	0.83	0.87	38.5

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.

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
P2	East Full Crossing	53	20.3	LOS C	0.1	0.1	0.65	0.65
P3	North Full Crossing	53	35.5	LOS D	0.1	0.1	0.87	0.87
P4	West Full Crossing	53	28.9	LOS C	0.1	0.1	0.78	0.78
All Pedestrians		158	28.2	LOS C			0.77	0.77

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

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MOVEMENT SUMMARY

Site: 2015 AM Post Dev

Anzac Parade / Todman Avenue
Signals - Fixed Time Isolated Cycle Time = 105 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: Anzac Parade (S)											
1	L2	401	5.0	0.350	15.0	LOS B	9.4	68.8	0.50	0.73	47.0
2	T1	1331	5.0	0.973	68.3	LOS E	57.2	417.3	0.94	1.21	28.3
Approach		1732	5.0	0.973	56.0	LOS D	57.2	417.3	0.84	1.10	31.2
East: Todman Avenue (E)											
4	L2	40	5.0	0.195	52.4	LOS D	1.9	14.0	0.94	0.73	31.7
5	T1	375	5.0	0.926	66.8	LOS E	12.5	90.9	1.00	1.08	28.7
Approach		415	5.0	0.926	65.4	LOS E	12.5	90.9	0.99	1.05	29.0
North: Anzac Parade (N)											
7	L2	66	5.0	0.066	16.6	LOS B	1.5	11.0	0.48	0.68	46.0
8	T1	858	5.0	0.405	13.8	LOS A	12.3	90.0	0.61	0.54	48.9
9	R2	122	5.0	0.885	68.9	LOS E	7.2	52.8	1.00	0.99	27.9
Approach		1046	5.0	0.885	20.4	LOS B	12.3	90.0	0.65	0.60	44.8
West: Todman Avenue (W)											
10	L2	224	5.0	0.274	24.5	LOS B	7.1	51.5	0.66	0.75	41.9
11	T1	365	5.0	0.960	70.8	LOS F	26.5	193.5	0.98	1.20	27.8
12	R2	291	5.0	0.960	80.5	LOS F	26.5	193.5	1.00	1.11	25.7
Approach		880	5.0	0.960	62.2	LOS E	26.5	193.5	0.90	1.06	29.5
All Vehicles		4073	5.0	0.973	49.1	LOS D	57.2	417.3	0.82	0.96	33.1

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
P2	East Full Crossing	53	17.2	LOS B	0.1	0.1	0.57	0.57
P3	North Full Crossing	53	42.2	LOS E	0.1	0.1	0.90	0.90
P4	West Full Crossing	53	26.1	LOS C	0.1	0.1	0.71	0.71
All Pedestrians		158	28.5	LOS C			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.

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MOVEMENT SUMMARY

Site: 2015 PM Post Dev

Anzac Parade / Todman Avenue
Signals - Fixed Time Isolated Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

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: Anzac Parade (S)											
1	L2	365	5.0	0.309	13.3	LOS A	7.5	54.7	0.46	0.71	48.0
2	T1	1071	5.0	0.902	46.1	LOS D	35.6	260.0	0.95	1.05	34.2
Approach		1436	5.0	0.902	37.8	LOS C	35.6	260.0	0.83	0.96	36.9
East: Todman Avenue (E)											
4	L2	22	5.0	0.137	52.6	LOS D	1.0	7.6	0.95	0.71	31.7
5	T1	292	5.0	0.890	60.0	LOS E	8.6	62.6	1.00	1.01	30.3
Approach		314	5.0	0.890	59.5	LOS E	8.6	62.6	1.00	0.99	30.4
North: Anzac Parade (N)											
7	L2	145	5.0	0.162	20.0	LOS B	3.8	27.8	0.58	0.72	44.1
8	T1	1116	5.0	0.664	19.0	LOS B	19.5	142.1	0.76	0.68	45.8
9	R2	112	5.0	0.880	66.2	LOS E	6.3	46.0	1.00	0.98	28.4
Approach		1373	5.0	0.880	22.9	LOS B	19.5	142.1	0.76	0.71	43.5
West: Todman Avenue (W)											
10	L2	265	5.0	0.290	20.6	LOS B	7.4	53.8	0.61	0.75	43.8
11	T1	475	5.0	0.899	45.4	LOS D	26.0	189.4	0.91	1.02	34.4
12	R2	382	5.0	0.899	59.7	LOS E	26.0	189.4	1.00	1.00	30.0
Approach		1122	5.0	0.899	44.4	LOS D	26.0	189.4	0.87	0.95	34.4
All Vehicles		4244	5.0	0.902	36.3	LOS C	35.6	260.0	0.83	0.88	37.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model 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
P2	East Full Crossing	53	20.5	LOS C	0.1	0.1	0.64	0.64
P3	North Full Crossing	53	36.2	LOS D	0.1	0.1	0.85	0.85
P4	West Full Crossing	53	29.7	LOS C	0.1	0.1	0.77	0.77
All Pedestrians		158	28.8	LOS C			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.

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