Traffic Impact Assessment

Planning Proposal
55 Kirby Street, Rydalmere

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Contents

1. Introduction

TRAFFIX has been commissioned by Fife Capital to assess the impacts associated with a Planning Proposal relating to redevelopment of the subject site at 55 - 59 Kirby Street, Rydalmere for a mixed use development. The site comprises two lots (Lot 20, 59 Kirby and Lot 21, 55-57 Kirby) with a total area of 50,740m^2. The Planning Proposal would seek to redevelop the current industrial use to enable the development of the site predominantly comprising of high density residential flat buildings with auxiliary commercial uses. The development is to yield some 1,032 apartments along with a minimum of 1,883 car parking spaces.

The site is situated within the Parramatta Council Local Government Area (LGA) and has been assessed under that Council's controls.

In this regard, we have reviewed all relevant documentation provided to us and undertaken detailed site investigations. This report therefore examines the likely traffic and parking impacts of the proposed concept design.

It has been concluded that the planning proposal is supportable on traffic planning grounds at this initial assessment stage with the results of our assessment summarised in the following sections:

- Section 2: Describes the site and its location
- Section 3: Documents existing traffic conditions
- Section 4: Describes the proposed development
- Section 5: Assesses the parking requirements
- Section 6: Assesses traffic impacts
- Section 7: Discusses access and internal design aspects
- Section 8: Discusses sustainable transport options
- Section 9: Presents the overall study conclusions.

2. Location and Site

The subject site is located on the eastern side of Kirby Street and is bound by Siverwater Road to the east, Subiaco Creek to the south and Upjohn Park to the north. It comprises two separate lots as follows:

- 55-57 Kirby Street Lot 21 in DP855339 containing approximately 24,457m^2 Gross Floor Area (GFA)
- 59 Kirby Street Lot 20 in DP855339 approximately 8,500m^2 building floor area assumed

Both lots are currently zoned General Industrial (IN1) under the Parramatta Local Environmental Plan 2011. Surrounding land uses are predominantly General Residential (R1).

The site lies within The City of Parramatta Council LGA and is subject to this council's relevant controls.

All vehicular access to the site is provided from Kirby Street. The northern access to 59 Kirby Street is shared with that of the access to the Upjohn Park car park. This shared access road forms a roundabout controlled intersection with Kirby Street at the northwest corner of the site. Access to 55-57 Kirby Street is provided via a separate access approximately 30 metres to the north of a bridge over Subiaco Creek near the centre of the overall site area. Access to 55-57 Kirby Street is currently permitted by up to 19 metre semi-trailers, however the hours of access are limited to between 7.00am – 5.00pm.

A Location Plan is presented in **Figure 1** and a site plan is presented in **Figure 2**. Reference should also be made to the Photographic Record presented in **Appendix A**, which provides an appreciation of the general character of roads and other key attributes in proximity to site.

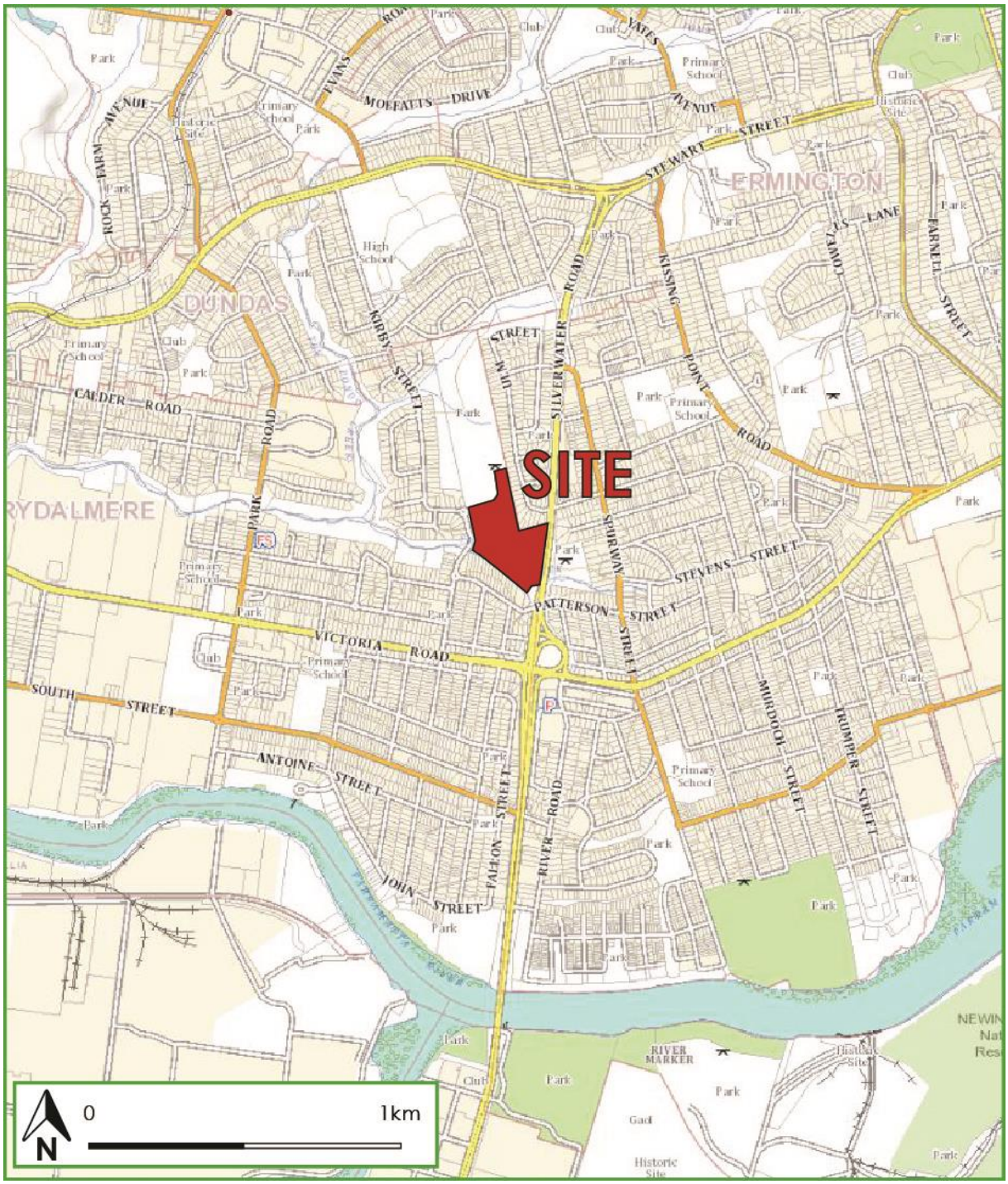

Figure 1: Location Plan

Figure 2: Site Plan

3. Existing Traffic Conditions

3.1 Road Network

The road hierarchy in the vicinity of the site is shown in **Figure 3** with the following roads in close proximity to the site of particular interest:

- Victoria Road: an RMS State Road (MR 165) that traverses in an east-west direction between City West Link in the east and O'Connell Street in the west. It carries in the order of 60,000vpd and is subject to 60km/hr speed zoning. Immediately south of the site, it carries two through lanes of traffic and a single designated Bus Lane in both directions, within a divided carriageway of width 18 metres.
- Silverwater Road: an RMS State Road (MR 190) that traverses in a north-south direction between Stuart Road in the north and Parramatta Road in the south. It carries in the order of 60,000vpd and is subject to 80km/hr speed zoning. It carries two through lanes of traffic in both directions, within a divided carriageway of width 18.5 metres.
- Kissing Point Road: an RMS State Road that traverses in an east-west direction between James Ruse Drive in the west and a collector Kissing Point Road in the east. It carries in the order of 85,000vpd and is subject to 70km/hr speed zoning. It carries three through lanes of traffic in both directions, within a divided carriageway of width 25.0 metres.
- Kirby Street a local road which runs in a north-south direction to the west of the site. It provides a connection between Gladys Street to the south and Kissing Point Road to the north, and generally has a one-lane, two-way cross-section with kerbside parking in selected locations along its length. Kirby Street is posted at 50km/hr in the vicinity of the site and provides unrestricted parking along the majority of its length.

It can be seen from **Figure 3** that the site is conveniently located with respect to the arterial and local road systems serving the region. It is therefore able to effectively distribute traffic onto the wider road network, minimising traffic impacts.

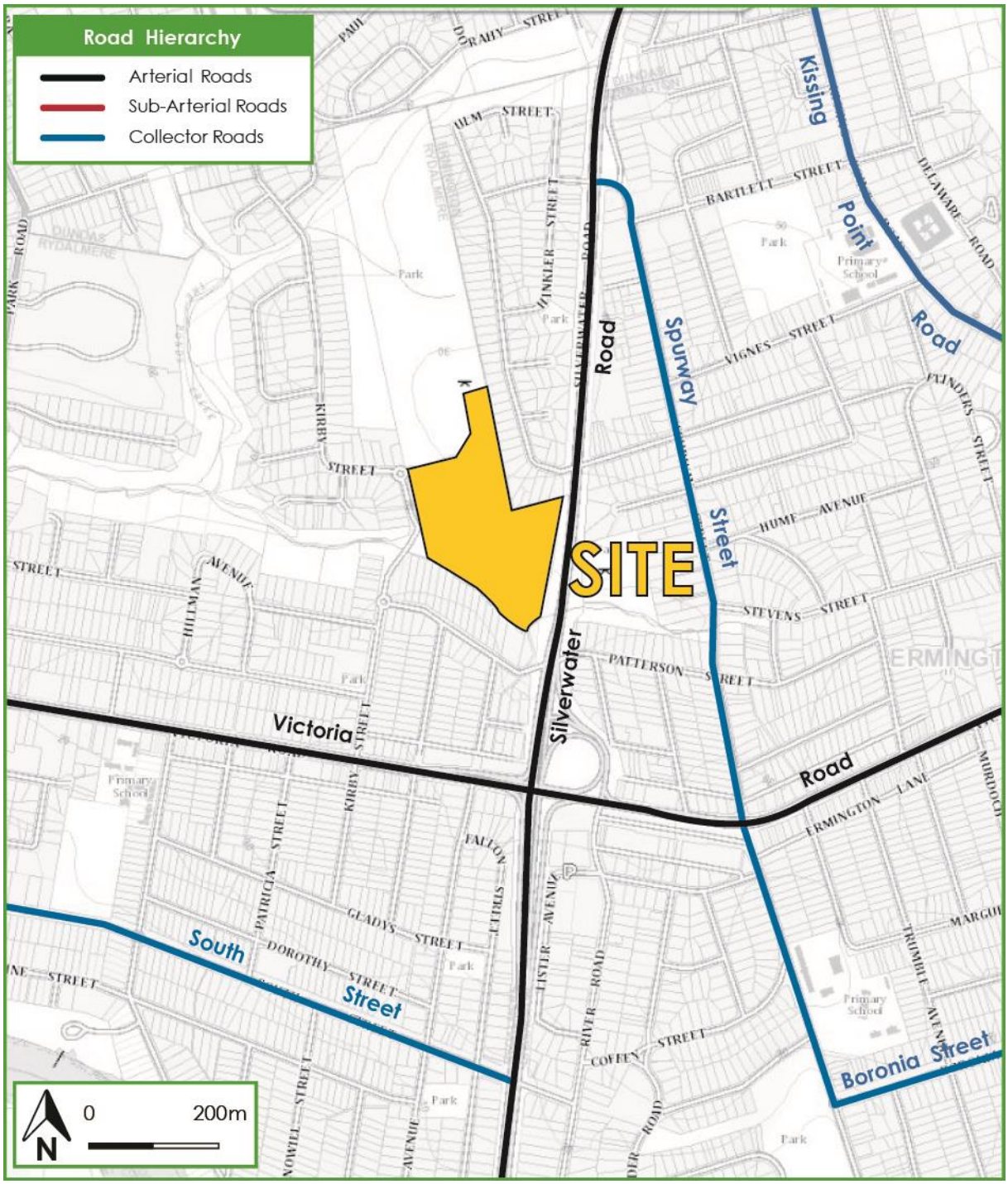

Figure 3: Road Hierarchy

3.2 Key Intersections

The key intersections in the vicinity of the site are shown below where an understanding of the existing road geometry and alignment is provided:

Figure 4: Intersection of Victoria Road and Kirby Street

It can be seen from **Figure 4** that Kirby Street, intersects with Victoria Road forming a four way intersection. The intersection is controlled by a 'Stop' control on the Kirby Street southbound approach with a 'Give Way' priority control on the northbound approach. No right turns are permitted from Kirby Street to Victoria Road on both approaches, as such it is assumed existing traffic wishing to travel westbound from Kirby Street utilises the intersection of Victoria Road / Park Road to the west. In addition, no right turn is permitted from Victoria Road eastbound into Kirby Street southbound.

Footpaths are provided along both sides of Victoria Road, however only the western verge of the north arm of Kirby Street provides a footpath for these side roads.

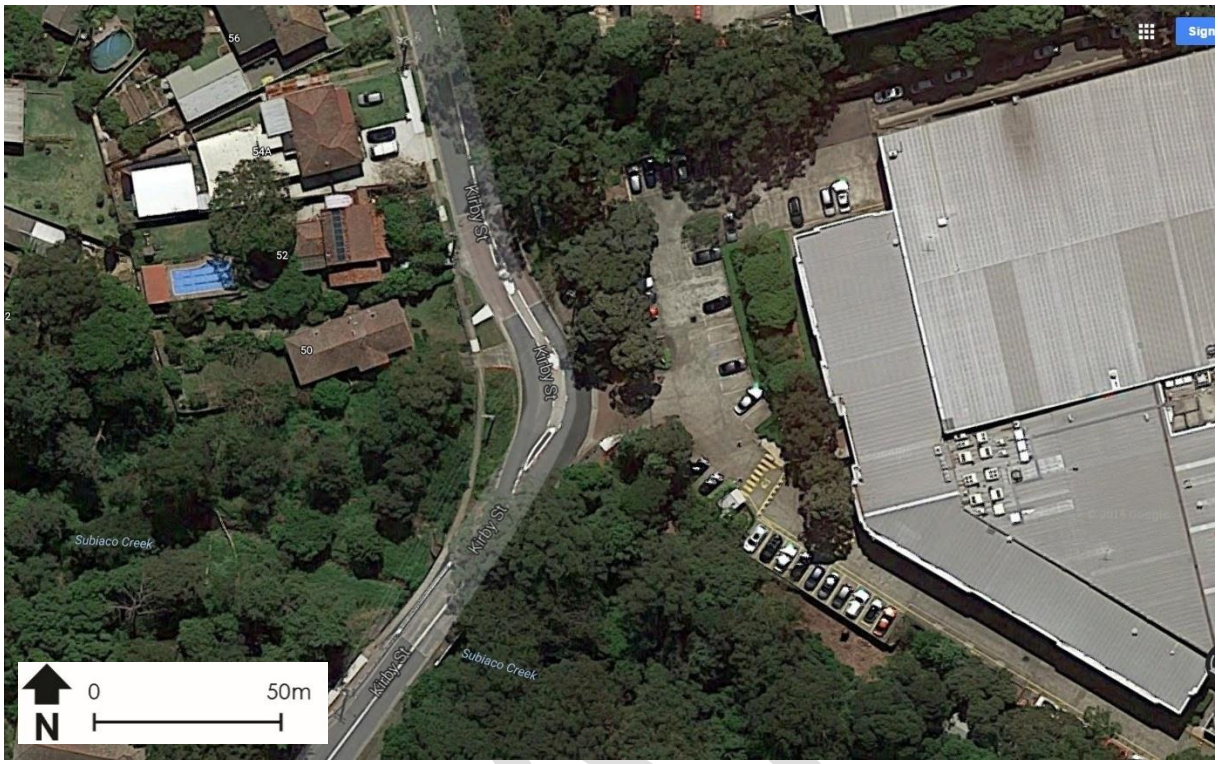

Figure 5: Intersection of Kirby Street and Number 55 Access

It can be seen from **Figure 5** that Kirby Street forms a T-junction with a "Give Way" control on the second site access in the west of the subject development. A series of centre islands (chicanes) are provided in the proximity of the subject development on Kirby Street to reduce the speed of traffic and to negotiate the lateral displacement of the path. Speed limits of 25 km/hour and 10 km/hour are signposted in the vicinity of the site before reaching these traffic calming measures. In addition, kerbside footpaths are provided on both sides of the street.

Figure 6: intersection of Kirby Street and Homart Access (Roundabout)

It can be seen from **Figure 6** that Kirby Street forms a roundabout with Homart Access. Pedestrian footways are provided on all approaches. No on-street parking is permitted on either side of Kirby Street from this intersection to the intersection with Patterson Street to the south. The east arm of the roundabout provides an existing site access and an access to the neighbouring park.

An on-road bicycle route is annotated on Kirby Street, adjacent to the site, which is classified as a 'moderate difficulty' route under the state government guidelines.

Figure 7: Intersection of Kissing Point Road and Kirby Street

It can be seen from **Figure 7** that Kissing Point Road intersects with Kirby Street forming a signalised T-intersection. Kerbside footpaths are provided on all approaches of the intersection with pedestrian crossing facilities provided on all arms.

3.3 Public and Active Transport

The existing bus services that operate in the locality are shown in **Figure 7**. A number of bus services operate in the locality, with bus stops located approximately 400 metres from the site on Victoria Road to the south and Spurway Street to the east and is also within 800 metres east of bus stops located on Park Road to the west of the site. Typically, services operate with a frequency of approximately 10-20 minutes during peak periods and depending on routes.

Dundas and Rydalmere railway stations are located approximately 1.8-2.0 kilometres to the west of the site, respectively.

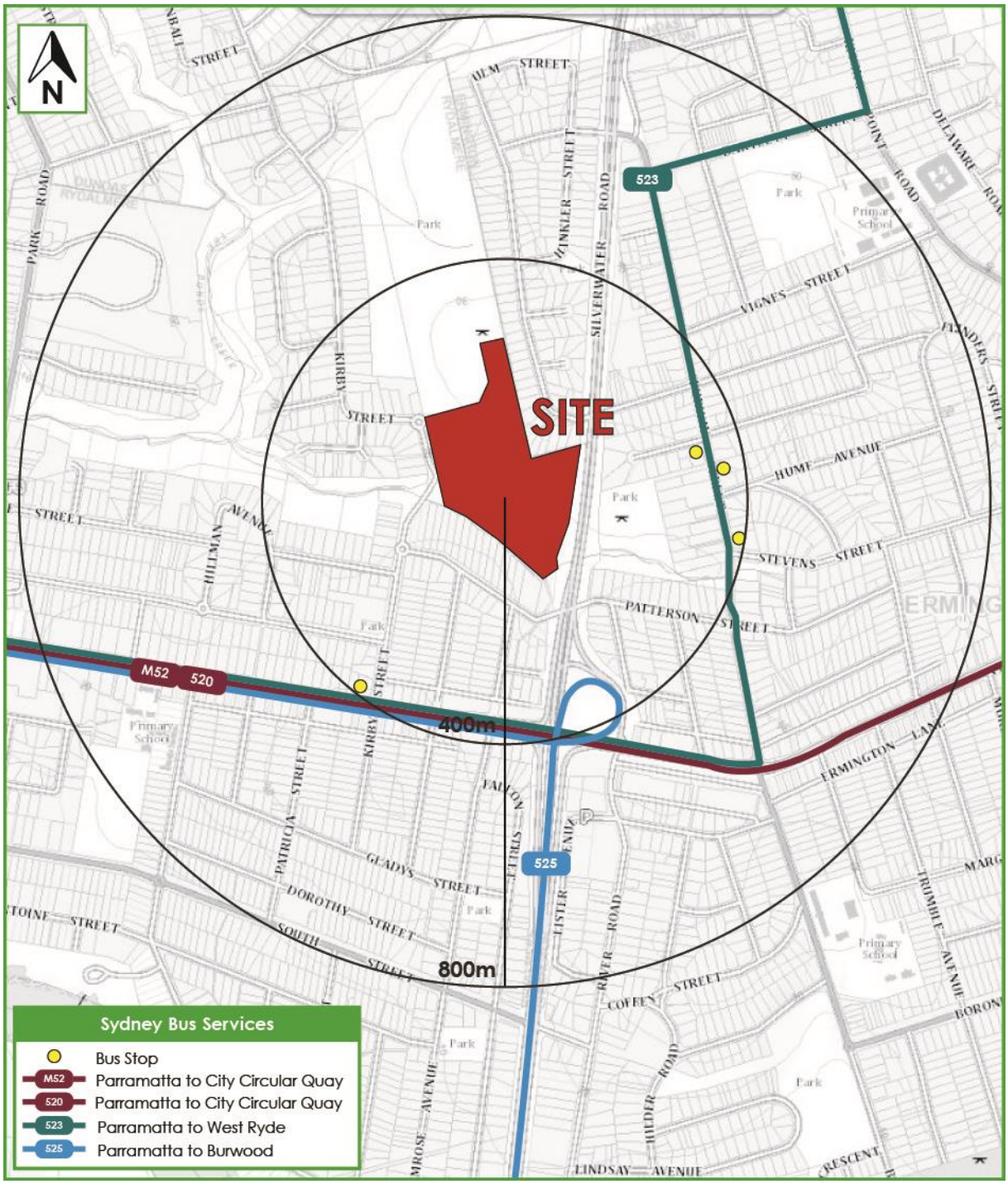

Figure 7: Public Transport

3.4 Existing Site Generation

The existing buildings on-site have a combined floor area of approximately 32,950m^2. Adoption of the RMS *Guide to Traffic Generating Developments* rate of 0.5 peak hourly vehicle trip per 100m^2 for an industrial warehouse use results in traffic volume of 165 vehicles per hour during the AM and PM peak periods associated with the current use.

However, on-site observations indicate that the actual peak hourly traffic volumes may be lower and in the order of 82 vehicles per hour for the AM peak (48 veh/hr associated with 55-57 Kirby Street and 34 veh/hr associated with 59 Kirby Street) and 48 vehicles per hour for the PM peak (38 veh/hr associated with 55-57 Kirby Street and 10 veh/hr associated with 59 Kirby Street) in raw vehicle numbers.

It is however important to consider the heavy vehicle distribution of the existing industrial site. Site observations indicate approximately 20% of vehicle traffic relates to truck vehicles including Heavy Rigid Vehicles (HRVs) carrying deliveries to and from the industrial site. During the peak period this results in 10-18 heavy truck movements on the network peak hour.

As such, the subject site generates a moderate volume of traffic in the network peak period including bringing a significant volume of heavy vehicle movements through a predominantly residential area.

The results of this surveyed assessment will be utilised to derive the expected net change in traffic generation for the subject site following full development of the proposal.

4. Description of Proposed Development

This Planning Proposal seeks to redevelop the existing industrial site for a mixed use purpose. A detailed description of the proposal is provided in the Planning Proposal prepared separately.

For the purpose of this assessment, the development relating to the proposed application, for which approval is now sought, is summarised in **Table 1** below.

Table 1: Summary of Future Development

Land Use	Approximate Yield
High Density Residential	1,020 units
Low Density Residential	12 dwellings
Retail (Convenience Stores)	240 m^2
Café	80 m^2
Function Centre	1,396 m^2
Fitness Centre	1,945 m^2

The traffic and parking impacts arising from the development are discussed below. Reference should also be made to the concept design plans submitted separately which are presented at a reduced scale in **Appendix B**.

5. Parking Requirements

5.1 Parking Controls

Provision C.32 of Part3 from the *Parramatta Development Control Plan 2011 (DCP)* requires car parking for the respective uses of the proposed development to be provided in accordance with the parking rates shown listed in **Table 2**.

Table 2: Minimum Residential Parking Requirements

Type	No / GFA	DCP Minimum Parking Rate	Minimum spaces required	Spaces Proposed
Residential[1]				
Studio	98	0.6 spaces per studio apartment	59	1,470
1 Bedroom	214	1 space per 1 bedroom unit	214	
2 Bedroom	554	1.25 spaces per 2 bedroom unit	693	
3 Bedroom	166	1.5 spaces per 3 bedroom unit	249	
visitor	1,020	0.25 spaces per dwelling for visitor parking	255	
Dwelling House	12	2 space per dwelling	24	24
Non-Residential				
Retail	240	1 space per 30 m^2 GFA	8	8
Café	80	0-100m^2: 1 space per 30 m^2 GFA 100+ m^2: greater of 15 spaces per 100 m^2 or 1 space per 3 seats	3	3
Function Centre	1,396	20 spaces per 100m^2 GFA	280	280
Gym	1,945	5 spaces per 100m^2 GFA	98	98
		Total	**1,883**	**1,883**

1 Residential flat buildings, Multi dwelling housing or the residential component of Mixed Use development (not within 400 metres walking distance of a transit way bus stop with a service frequency of an average of 10 minutes or less during the morning peak hour (7am-9am) in either direction, or of a railway station)

It can be seen from **Table 2** that the proposed development is required to provide a minimum of 1,883 car parking spaces. In response, the development anticipates a total of 1,883 parking spaces

including 1,470 residential parking spaces and 413 visitor parking spaces. This provision is meeting the requirements of the Council's DCP and is considered acceptable.

Compliance with relevant car parking controls will be confirmed as part of any subsequent development application(s), following approval of this application. However, it is noteworthy that the subject site presents no obvious constraints and the requisite parking can be provided generally within basement levels.

5.2 Adaptable Parking Controls

Provision P.2 of Part 3 from Council's DCP requires each adaptable dwelling within a residential development to be allocated at least one accessible parking space. Furthermore, Provision P.2 also requires 10% of the residential component of the development to be designated as adaptable units.

The above requirements equate to a minimum requirement for 102 adaptable dwellings for the 1,020 units proposed.

In response, the development shall propose 102 accessible parking spaces in compliance with the minimum requirement of one (1) accessible parking space per accessible unit.

In addition, Provision C.13 of Part 3 from Council's DCP requires the number of accessible car parking spaces to be provided as prescribed in Table D3.5 of the Building Code of Australia as shown in the following:

- For developments with up to 1000 car parking spaces: one (1) space for every 50 car parking spaces or part thereof; and
- For each 100 car parking spaces or part thereof in excess of 1000 car parking spaces: 1 space.

The above requirements equate to a minimum requirement for 29 spaces for the development to be provided. This provision shall be confirmed at the detailed design stage of any subsequent Development Application.

5.3 Bicycle Parking Controls

Provision C.3 of Part 3 from the DCP requires bicycle parking spaces for the respective uses of the development to be provided in the rate of 1 bicycle space per 2 dwellings. Adoption of this rate to 1,020 proposed units would result in a requirement of 510 bicycle parking spaces for residential use.

Additional Bicycle parking is recommended for the commercial visitors. The provision of bicycle parking shall be confirmed at a subsequent Development Application (DA) stage with the proposal to comply with the requirements of Council's DCP.

5.4 Waste Management and Loading Bay Controls

Provision p.4 section 3.3.7 of Part 3 from the DCP stipulates that separate waste storage areas must be provided for residential and business uses in mixed use developments. In addition, 1 loading bay per 400 m^2 of gross floor area is required to be provided for retail premises.

The design of loading and servicing bays shall be developed at DA stage however preliminary assessment has been undertaken using a 9.25m waste removal truck to assess the access and circulation arrangements of the proposed concept design. This assessment has been presented in **Appendix C** for reference. Garbage collection is to be undertaken from on-street within the private network of roads to be developed.

This assessment also demonstrates access by an 8.8m Medium Rigid Vehicle (MRV), considered to be representative of a typical furniture removal or delivery truck.

6. Traffic Impacts

6.1 Trip Generation

The impacts of the proposed development on the external road network have been assessed having regard for the proposed number of units and associated commercial uses.

Residential Generation

For the residential units, an account has been made for the fact that the site is not located within close proximity to extensive public transport and rail services, however, it is categorized as a high density development with greater than six storeys and almost exclusively residential in nature.

Therefore, in order to ensure a conservative outcome, the average traffic generation rates for a High Density Residential Flat Building provided in the RMS Technical Direction (TDT 2013/04a) have been doubled, bringing them into line with the surveyed rates for a development located in a regional area, outside of metropolitan Sydney. In this regard, the following traffic generation rates have been adopted for the purposes of this assessment:

- 0.4 vehicle trips per unit for AM Peak
- 0.3 vehicle trips per unit for PM Peak

Moreover, the RMS Technical Direction TDT 2013/04 provides trip rates for low-density residential dwellings 0.95 vehicle trips per dwelling in Sydney area during the morning peak hour and 0.95 vehicle trips per dwelling during the evening peak hour.

These residential trips have been split 80:20 for arrivals and departures giving the following expected generation:

- 419 vehicle trips per unit for AM Peak (84 in 355 out)
- 318 vehicle trips per unit for PM Peak (255 in and 63 out)

Non Residential Generation

Retail

The RMS Guide to Traffic Generating Developments provides traffic generation rates for secondary retail developments, which it defines as retail stores tending not to be the primary attractor to the

development and thus are applicable to the retail component of the development. It recommends a maximum peak hour trip generation rate of 4.6 vehicle trips per 100m^2 GFLA of retail space, occurring during the PM peak period on Thursdays. Whilst no rates are provided for AM peak hourly traffic generation, a rate of 0.92 vehicle trip per 100m^2 (20% of the PM peak traffic generation rate) has been adopted for the AM peak period, assumed to represent staff arrivals. Application of the above rates to the 240m^2 retail component of the development results in the following traffic generation (split 50:50 between arrivals and departures in the PM period):

- 2 vehicle trips per hour during the AM peak period (2 in, 0 out); and
- 11 vehicle trips per hour during the PM peak period (5 in, 6 out).

Cafe and Function Centre

The RMS Guide provides traffic generation rates for restaurants at 1 vehicle trip per 20m^2 of GFA. No rates are provided for the AM peak hourly traffic generation; hence, a rate of 1 vehicle trip per 100m^2 (20% of the PM peak traffic generation rate, representing staff arrivals) has been adopted for the AM peak period. Application of this trip rate to the proposed 80m^2 café will result in 4 and 1 trips in the PM and AM peak hour respectively as follows:

- 1 vehicle trips per hour during the AM peak period (1 in, 0 out); and
- 4 vehicle trips per hour during the PM peak period (2 in, 2 out).

The RMS guide does not indicate a traffic generation rate related to a function centre use. Therefore, the expected traffic generation rate proposed for the function centre has been considered similar to the restaurant generation rates. Application of these assumed rates to the 1,396m^2 function centre proposed within the development results in the following traffic generation:

- 14 vehicle trips per hour during the AM peak period (7 in, 7 out); and
- 70 vehicle trips per hour during the PM peak period (35 in, 35 out).

Fitness Centre

For the purpose of planning proposal assessment, the fitness centre located within a sub-regional area would attract a rate of 9 trips per 100m^2 GFA during the evening peak period according to the RMS

Guide, resulting in 175 vehicle per hour (87 in and 88 out). However, with the fitness centre being located within the predominantly residential precinct, it is considered this will not be a 'destination' centre, but rather a local fitness centre serving the development, with a higher proportion of 'walk up' trips from the local residents within the precinct.

On this basis the traffic generation associated with this use that is expected to pass through the key intersections situated on Victoria Road and Kissing Point Road identified in **Section 3.2** will be a fraction of the total patronage expected for the centre. In order to account for this effect, a trip rate of 4.5 trips per 100m^2 has been adopted for the proposed GFA of 1,945m^2. This results in an expected PM vehicle generation of about 88 vehicles per hour (44 in and 44 out) on the wider network.

As with the retail use, no rates for the AM period are provided, as such the AM generation has been assumed as 20% of the PM generation for the purposes of this assessment resulting in 18 vehicles (9 in and 9 out) from the wider network.

6.2 Combined Traffic Generation

Having regard for the trip generation rates for the above uses, the mixed use development is expected to generate the vehicle trips during peak periods as shown in the following **Table 3:**

Table 3: Proposed Traffic Generation Summary

Type			No / GFA	Generation Rate		Generation		In	Out	In	Out
				AM	PM	AM	PM	AM		PM	
Development	Residential	High Density	1,020	0.4 vehicle trips per unit	0.3 vehicle trips per unit	408	306	82	326	245	61
		Low Density	12	0.95 vehicle trips per dwelling	0.99 vehicle trips per dwelling	11	12	2	9	10	2
	Sub Total					**419**	**318**	**84**	**335**	**255**	**63**
	Non- residential	Retail	240	0.92 vehicle trips per 100m^2 GFA	4.6 vehicle trips per 100m^2 GFA	2	11	2	0	5	6
		Café	80	1 vehicle trip per 100m^2 GFA	1 vehicle trip per 20m^2 GFA	1	4	1	0	2	2
		Function Centre	1,396	1 vehicle trip per 100m^2 GFA	1 vehicle trip per 20m^2 GFA	14	70	7	7	35	35
		Fitness Centre	1,945	0.9 trip per 100m^2 GFA	4.5 trip per 100m^2 GFA	18	88	9	9	44	44
	Sub Total					**35**	**173**	**19**	**16**	**86**	**87**
Total						**454**	**491**	**103**	**351**	**341**	**150**

6.3 Net Traffic Impact

The traffic generation of the proposed scheme must also take into account the reduction traffic relating to the existing uses of the site as identified in **Section 3.4**. For the purposes of the modelling assessment, the existing heavy vehicle volumes have been modelled as representing two passenger car units (PCUs), in line with RMS Modelling Guidelines. When this existing traffic generation is deducted the net traffic impact of the proposal is predicted to be as follows:

- 356 vehicles per hour during the morning peak hour (19 in 337 out); and
- 433 vehicles per hour during the evening peak hour (339 in 104 out).

This generation represents an addition of approximately 6-7 vehicles per minute either arriving or departing site during the network peak periods.

6.4 Traffic Distribution

In order to estimate the expected distribution of traffic from the subject development an interrogation of the journey to work data supplied by the NSW Government Bureau of Transport Statistics has been undertaken. The surveys of residents who drive to their destination of work from/to within the zone TZ1114 indicate the following distribution for the subject intersections:

- 50% depart site to the south-east via Kirby Street to Victoria Road eastbound;
- 21% depart site to the south-west via Kirby Street to Victoria Road westbound;
- 20% depart site to the north-east via Kirby Street to Kissing Point Road eastbound; and
- 9% depart site to the north-west via Kirby Street to Kissing Point Road westbound;

In order to assess the impact of this planning proposal, the net traffic generation predicted in **Section 6.3** has been applied to the survey results.

SIDRA modelling has been undertaken of the critical AM and PM peak periods at the key intersections identified in **Section 3.1** to assess the expected impacts.

6.5 Peak Period Intersection Performance

To enable the assessment traffic count surveys were undertaken of the most critical intersections immediately surrounding the site as identified in **Section 3.2**, being the intersections of Victoria Road/

Kirby Street, Kirby Street/ Number 55 Access, Kirby Street/ Homart Access and Kissing Point Road/ Kirby Street. These were undertaken on a typical weekday between the 7-9AM and 4:30-6:30PM network peak periods on Monday 22nd August 2016.

In addition, the intersection of Victoria Road / Park Road to the south-west of site has been modelled in the critical AM peak period as this intersection is expected to be utilised in the AM peak by a significant volume of vehicles undertaking a right turn onto Victoria Road to travel westbound. In the PM peak this intersection will be bypassed with returning vehicles making the left turn at Kirby Street to return to site.

The results of these surveys were analysed using the SIDRA computer program to determine their performance characteristics under existing traffic conditions. The SIDRA model produces a range of outputs, the most useful of which are the Degree of Saturation (DOS) and Average Vehicle Delay per vehicle (AVD). The AVD is in turn related to a level of service (LOS) criteria. These performance measures can be interpreted using the following explanations:

DOS - the DOS is a measure of the operational performance of individual intersections. As both queue length and delay increase rapidly as DOS approaches 1, it is usual to attempt to keep DOS to less than 0.9. When DOS exceeds 0.9 residual queues can be anticipated, as occurs at many major intersections throughout the metropolitan area during peak periods. For intersections controlled by roundabout or give way/stop control, satisfactory intersection operation is generally indicated by a DOS of 0.8 or less.

AVD - the AVD for individual intersections provides a measure of the operational performance of an intersection. In general, levels of acceptability of AVD for individual intersections depend on the time of day (motorists generally accept higher delays during peak commuter periods) and the road system being modelled (motorists are more likely to accept longer delays on side streets than on the main road system).

LOS - this is a comparative measure which provides an indication of the operating performance of an intersection as shown below:

Table 4: Intersection Performance Indicators

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
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

In order to undertake a comparison between the existing 'base case' and the 'proposed' traffic scenarios the net traffic generation predicted in **Section 6.3** has been distributed onto the key intersections. This distribution is in accordance with the NSW Bureau of Transport Statistics Journey to Work data identified in **Section 6.4** and the distribution patterns identified in the traffic surveys. A summary of the modelled results are provided below. Reference should also be made to the SIDRA outputs provided in **Appendix D** which provide detailed results for individual lanes and approaches.

Table 5: Intersection Performance: AM and PM Peak Hour

Intersection Description	Control Type	Model	Period	Degree of Saturation	Intersection Delay	Level of Service
Kirby Street / 55 access Lane	Give Way*	AM	Existing	0.008	7.5	A
			Proposed	0.326	8.3	A
		PM	Existing	0.027	6.3	A
			Proposed	0.091	8.0	A
Kirby Street / Homart Access	Roundabout*	AM	Existing	0.212	6.7	A
			Proposed	0.006	8.2	A
		PM	Existing	0.112	5.4	A
			Proposed	0.108	7.8	A
Kissing Point Road / Kirby Street	Signals	AM	Existing	0.716	25.4	B
			Proposed	0.796	30.7	C
		PM	Existing	0.603	12.8	A
			Proposed	0.691	17.1	B
Park Road / Victoria Road	Signals	AM	Existing	0.738	19.6	B
			Proposed	0.760	29.3	B
Kirby Street / Victoria Road	Give Way / Stop*	AM	Existing	2.332	1354.5	F
			Proposed	5.496	4321.2	F
		PM	Existing	10.872	9090.4	F
			Proposed	19.767	17071.8	F

*For priority controlled intersections the movement with the largest delay is presented.

It can be seen from **Table 5** that the access driveway and the roundabout immediately adjacent to the site, being Kirby Street / Number 55 Site Access and Kirby Street / 'Homart' Access, both operate satisfactorily, with acceptable delays and spare capacity under the existing 'base case' scenario.

Under the 'proposed' scenario, with the addition of the expected development traffic in both the AM and the PM peak periods, these intersections maintain a good level of service with significant spare capacity resulting in a negligible change to the overall results for degree of saturation and intersection delay.

Furthermore, it can be seen that the intersection of Kissing Point Road / Kirby Street to the north of the site records a minimal change to intersection delay in the AM peak and PM peak, presenting an acceptable level of service of 'C' and 'B' in the AM and PM peaks respectively.

In addition, the intersection of Park Road / Victoria Road has been modelled to assess the impact of the increased volume of departing vehicles using the Park Road intersection to turn right onto Victoria Road in the AM Peak period. It can be seen that this intersection continues to operate satisfactorily with this

addition of right turning vehicles (it is noted the PM period records a negligible increase in vehicles undertaking this manoeuvre).

However, it can be seen that the intersection of Kirby Street / Victoria Road is currently failing, largely as a result of traffic from the west bound approach of Victoria Road attempting to turn right into Kirby Street northbound. The increased traffic volumes associated with the development are only expected to exacerbate this problem.

In order to devise a workable solution for this intersection the signalisation of the intersection has been proposed. Pedestrian crossings have been proposed for all approaches in accordance with RMS requirements whilst the existing banned right turn movements have been retained for the future scenario, ensuring a similar distribution of traffic. The results of this proposed solution can be seen in **Table 6**:

Table 6: Signalisation of Kirby Street / Victoria Road: AM and PM Peak Hour

Intersection Description	Control Type	Model	Period	Degree of Saturation	Intersection Delay	Level of Service
Kirby Street / Victoria Road	Give Way*	AM	Existing	2.332	1354.5	F
	Signals		Future	0.859	21.0	B
	Give Way*	PM	Existing	10.872	9090.4	F
	Signals		Future	0.914	21.8	B

*For priority controlled intersection the movement with the largest delay is presented

It can be seen that the signalisation of the intersection of Kirby Street and Victoria Road results in significant improvements to the operation of this intersection with the degree of saturation and intersection delays recording acceptable values. Overall the operation of this intersection would improve from a level of service F to a level of service of B in the AM and PM peak periods.

As such the signalisation of this intersection is recommended for adoption to support the subject planning proposal.

7. Access & Internal Design Aspects

Vehicular access, internal roads and car parking of any future development will be designed to comply with the Australian Standard requirements of *AS2890.1 (2004) Part 1: Off-street car parking, AS2890.2 (2002) Part 2: Off-street commercial vehicle facilities* and *AS2890.6 (2009) Part 6: Off-street parking for people with disabilities.*

Compliance with relevant controls will be confirmed as part of any subsequent development application(s), following approval of this application. Council will be invited to impose a standard condition of consent requiring compliance with AS2890.1, AS2890.2 and AS2890.6 on any future development application.

7.1 Vehicle Accesses

All vehicles are to enter and exit site in a forward direction, including potential service and emergency vehicles. The proposed local road network is to form a priority controlled T-Intersection with Kirby Street in the location of the existing site access.

The design of the access requirements is to be further detailed during subsequent development applications following a successful approval of the subject planning proposal.

In this regard the proposed access arrangements are considered supportable at this planning proposal stage.

8. Sustainable transport

A comprehensive Travel Access Guide (TAG) is considered to be the most effective travel planning measure to encourage travel by alternative means other than private car. A Travel Access Guide can be developed to distribute to residents, staff and visitors to the subject site. The TAG provides relevant transport and access information for the site.

It is also recommended the site provide dedicated spaces for car share schemes. A car share scheme can reduce the reliance on private vehicle use, reducing potential parking congestion at the subject site.

In addition, the development is to provide bicycle parking within the site for staff and visitors in order to encourage additional cycle trips and to provide safe storage and comfort in the knowledge that secure bike parking is available.

In summery the TAG information that would be provided to residents and visitors includes:

- Local bus facilities and network maps;
- Local cycle route maps
- Local walking route maps
- Information regarding Car Share and Ride Share arrangements
- Cycle initiatives

9. Conclusions

In summary:

- A residential development such as that proposed under the subject concept plan is considered appropriate on this site given its location, surrounded by other lots zoned for residential development.
- The concept design shall meet the car parking requirements of Parramatta LEP 2011, an assessment of the parking requirements indicate a minimum of 1,883 spaces will be required. On-site parking is to be provided generally within basement levels.
- The detailed design of internal roads, access driveways and basement parking is to be assessed during subsequent development applications following a successful planning proposal application.
- The proposed change from an industrial use to a predominantly residential use shall significantly reduce the volume of heavy vehicles using Kirby Street, improving the amenity for local residents.
- With an expected net increase in generation of 356-433 vehicles in the peak hour period, split between arrivals and departures, it is expected this generation will have a moderate impact on the operation of the surrounding network in the vicinity of site. It has been identified that the intersection of Kirby Street and Victoria Road would require upgrading to a signalised intersection to support the expected future traffic volumes of the concept proposal.
- It is recommended the future development be supported with a Green Travel Plan to encourage sustainable transport modes such as active transport and car share programs, reducing the reliance of residents on private vehicle use in line with State and Local Government objectives.

It is therefore concluded that the planning proposal is supportable on traffic planning grounds with the aforementioned intersection improvements incorporated.

Appendix A

Photographic Record

Appendix B

Reduced Plans

Appendix C

Swept Path Assessment

Appendix D-1

SIDRA Outputs - Existing

Appendix D-2

SIDRA Outputs - Future