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Payce
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Melrose Park Planning Proposal

Traffic and Transport Study

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Client: Payce

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Reviewed by Marcel Cruz

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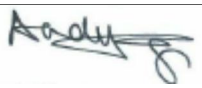
F	10-Feb-2016	Updated Final Report	Andy Yung Associate Director, Transport Advisory	

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Executive Summary

AECOM has been engaged by Payce to determine the feasibility of rezoning a parcel of industrial land in Melrose Park to a mixed use residential development. Melrose Park is located half-way between Parramatta, Macquarie Park and Sydney Olympic Park, three of Sydney's major employment centres and surrounded by major road and transport infrastructure such as Victoria Road (A40), Silverwater Road (A6), Lane Cove Road / Homebush Bay Drive (A3), the Northern Rail Line (T1) and ferry services along Parramatta River.

Proposed development

The proposed development is for an integrated mixed use development which will include residential, commercial and retail land uses. The Melrose Park Project proposes to provide a number of land uses (refer to Figure 2) as follows over a 10-15 year project horizon:

- 5,200 high density residential apartments (including 150 affordable dwellings)
- 8,100m^2 GFA of retail
- 15,000m^2 GFA of commercial
- 1,500 m^2 GFA of child care
- 2,500 m^2 GFA of community facilities (including a multi-purpose centre, amphitheatre etc.)

Proposed accesses

Victoria Road provides the main road access to the site at Melrose Park. Currently, this is primarily via the signalised intersection with Wharf Road and Marsden Road, on the eastern edge of the site. To the west of the site, Hughes Avenue provides an alternative means of access to the proposed development. Traffic approaching the site from the west has the option of turning right at existing signals at Trumper Street and using nearby local streets that connect to the site.

The development to the north of the Payce site at 657-661 Victoria Road and 4-6 Wharf Road will provide additional accesses to Victoria Road, including a southern fourth leg to the existing signals at Kissing Point Road. Through connections between the two sites can be achieved, which integrate both development proposals and enable enhanced transport connections between Victoria Road and Parramatta River

Proposed trip generation

The proposed development is expected to generate just over 1,400 trips in the AM and PM peak hours respectively. Intersection performance analysis has been undertaken at key intersections in the vicinity of the site with development traffic present on the road network in order to understand the impact of development on the local road network.

It is also expected that there will be a reduction of truck movements that currently service the industrial areas on the surrounding road network.

Proposed intersection upgrades

To accommodate the subject development traffic, the following intersection improvements are proposed in order to ensure the satisfactory operation of the road network surrounding the site:

- Victoria Road / Wharf Road
    - Changing of lane allocation on the Wharf Road approach (from the concept design plans presented in the 657-661 Victoria Road and 4-6 Wharf Road development DA with no physical infrastructure changes). It is proposed a dedicated dual right turn lane is provided on the Wharf Road approach with a short through and a short left turn lane.
- Victoria Road / Kissing Point Road
    - Upgrade intersection with additional approach to the site and extension of turning lanes on Victoria Road (to be undertaken as part of the Development Application for the 657-661 Victoria Road and 4-6 Wharf Road site). It is also proposed a dual eastbound right turn lane (short lane) is provided which is consistent with the JBA concept design.

In addition to the planned transport improvements, there is consideration by Roads and Maritime Services to upgrade Victoria Road between Wharf Road and Hughes Avenue with new bus lanes on Victoria Road to fill in the gaps between Hughes Avenue and Wharf Road.

Proposed active and public transport initiatives

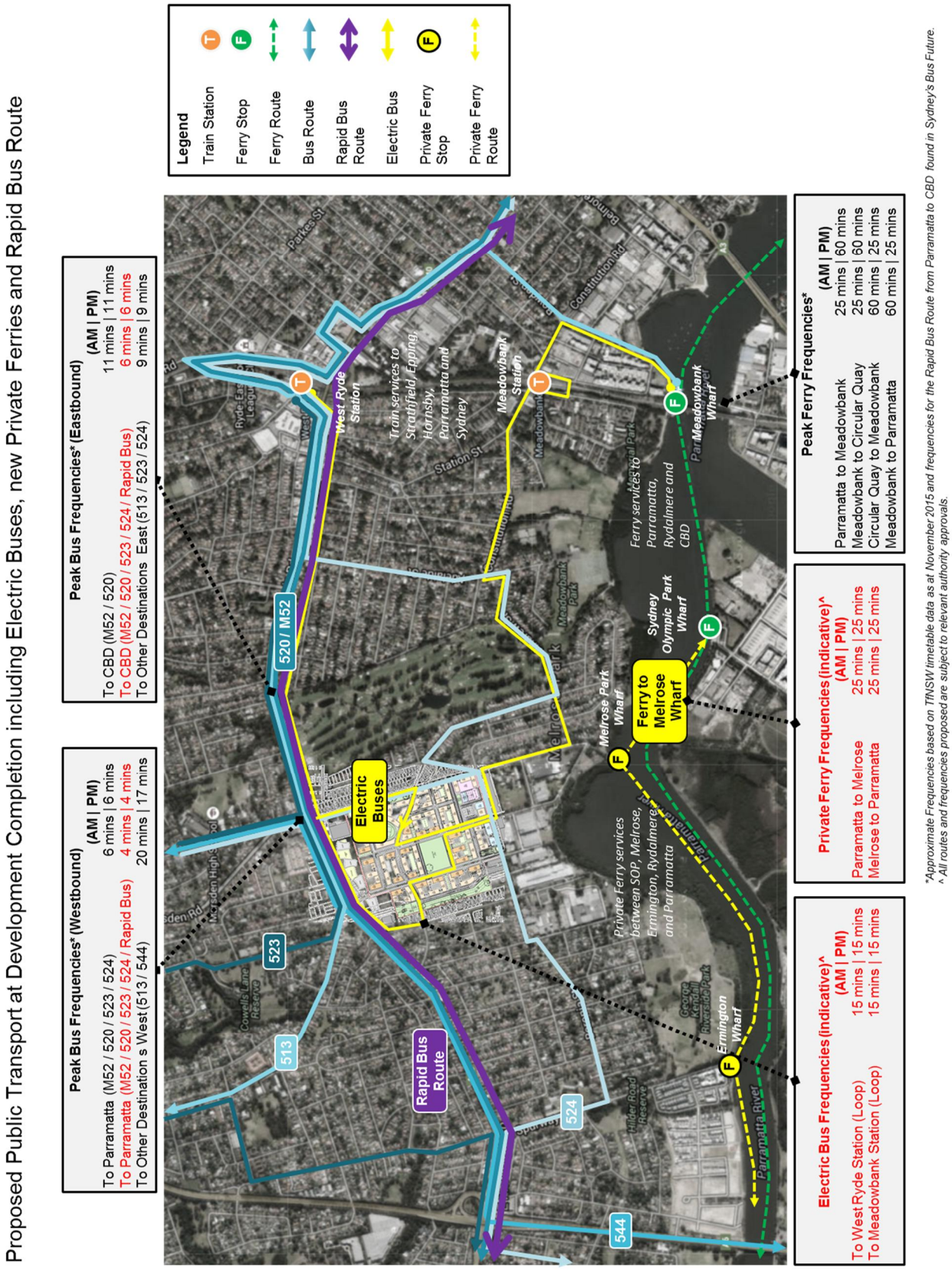
To accommodate the proposed new development traffic and to encourage changes in travel patterns, a package of infrastructure and travel behaviour change initiatives need to be considered, including intersection upgrades, public and active transport provisions and other initiatives (eg. demand management, parking strategy).

Expanding the capacity of the Victoria Road corridor will rely on improving bus priority and efficiency in the short term, and deploying higher capacity road-based transit in the longer term. Our review of existing NSW Government documents indicated a number of opportunities have been identified that would improve the network capacity and connectivity to support future population and employment growth of this site including:

- Sydney's Bus Future has identified a rapid bus route between Parramatta and the CBD via Ryde along the Victoria Road corridor:
    - Extra services planned through corridor with 40 extra rapid bus services per weekday are proposed in the Victoria Road corridor (with over 200 extra services per week in addition to the existing 2,000 services provided on Victoria Road at Melrose Park on a weekly basis)
    - Bus priority schemes on Victoria Road and extended bus lane operating hours
    - Reduced the number of stops along the corridor and therefore reduced travel time from Parramatta to CBD
    - Interchange facilities at Top Ryde for connections to Burwood, Hurstville, Macquarie Park
    - Bus Rapid Transit / Light Rail along length of corridor to be investigated
- Planned increased service frequency on the local rail network as part of Sydney's Rail Future
- Sydney's Ferry Future will provide customers with more frequent services, better connections and improved wharves to improve accessibility.
- A number of strategic transit network corridors are to be considered for bus rapid transit or light rail including the investigation of a Western Sydney Light Rail network which is focused on the Parramatta CBD and connecting with Castle Hill, Bankstown, Macquarie Park and Rhodes via Sydney Olympic Park. TfNSW is working with Parramatta City Council to complete a Western Sydney Light Rail Feasibility Study. The Sydney Olympic Park / Rhodes line will benefit Melrose Park if a public / active transport bridge is constructed to connect Melrose Park with Wentworth Point and Sydney Olympic Park.

Other potential initiatives that have been considered by the proposed development to encourage change in travel patterns and behaviour as well as to reduce car dependency include:

- New and improved connections to local and regional cycleways on Hope Street, Cobham Avenue which extends to Marsden Road.
- Upgrade of a Parramatta River Foreshore pedestrian and cycleway connection to Parramatta.
- Provision of neighbourhood bicycles to be used by residents for exercise, travel to train stations and the like.
- Additional bike parking facilities within the development and at nearby train and ferry interchanges, where possible.
- New active and public transport bridge crossing of the Parramatta River between Melrose Park and Sydney Olympic Park and Rhodes (via Homebush Bridge).
- New local electric bus services from Melrose Park to surrounding key transport interchanges such as West Ryde / Meadowbank Stations, Meadowbank Ferry Wharf or Top Ryde Shopping Centre (to be funded by the developer for local residents).
- New ferry wharf at Melrose Park to provide shuttle ferry services between Melrose Park and Sydney Olympic Park and Parramatta via Ermington and Rydalmere (to be funded by the developer for local residents).
- Car sharing scheme and parking policy changes / initiatives to reduce dependency on car use.
- TravelSmart – involving a range of information and education initiatives.
- Advertising in building lifts the timing of next bus departure as well as public transport timetables.


Proposed Public Transport at Development Completion including Electric Buses, new Private Ferries and Rapid Bus Route
Peak Bus Frequencies* (Westbound)
(AM | PM)
To Parramatta (M52 / 520 / 523 / 524) 6 mins | 6 mins
To Parramatta (M52 / 520 / 523 / 524 / Rapid Bus) 4 mins | 4 mins
To Other Destination s West (513 / 544) 20 mins | 17 mins
Peak Bus Frequencies* (Eastbound)
(AM | PM)
To CBD (M52 / 520) 11 mins | 11 mins
To CBD (M52 / 520 / 523 / 524 / Rapid Bus) 6 mins | 6 mins
To Other Destinations East (513 / 523 / 524) 9 mins | 9 mins
Legend
Train Station
Ferry Stop
Ferry Route
Bus Route
Rapid Bus Route
Electric Bus
Private Ferry Stop
Private Ferry Route
Electric Buses
Rapid Bus Route
Ferry to Melrose Wharf
West Ryde Station
Meadowbank Station
Train services to Strathfield, Epping, Hornsby, Parramatta and Sydney
Ferry services to Parramatta, Rydalmere and CBD
Private Ferry services between SOP, Melrose, Ermington, Rydalmere and Parramatta
Melrose Park Wharf
Sydney Olympic Park Wharf
Meadowbank Wharf
Ermington Wharf
Parramatta River
513
523
520 / M52
524
544
Peak Ferry Frequencies*
(AM | PM)
Parramatta to Meadowbank 25 mins | 60 mins
Meadowbank to Circular Quay 25 mins | 60 mins
Circular Quay to Meadowbank 60 mins | 25 mins
Meadowbank to Parramatta 60 mins | 25 mins
Private Ferry Frequencies (indicative)^
(AM | PM)
Parramatta to Melrose 25 mins | 25 mins
Melrose to Parramatta 25 mins | 25 mins
Electric Bus Frequencies (indicative)^
(AM | PM)
To West Ryde Station (Loop) 15 mins | 15 mins
To Meadowbank Station (Loop) 15 mins | 15 mins
*Approximate Frequencies based on TfNSW timetable data as at November 2015 and frequencies for the Rapid Bus Route from Parramatta to CBD found in Sydney's Bus Future.
^ All routes and frequencies proposed are subject to relevant authority approvals.

1.0 Introduction

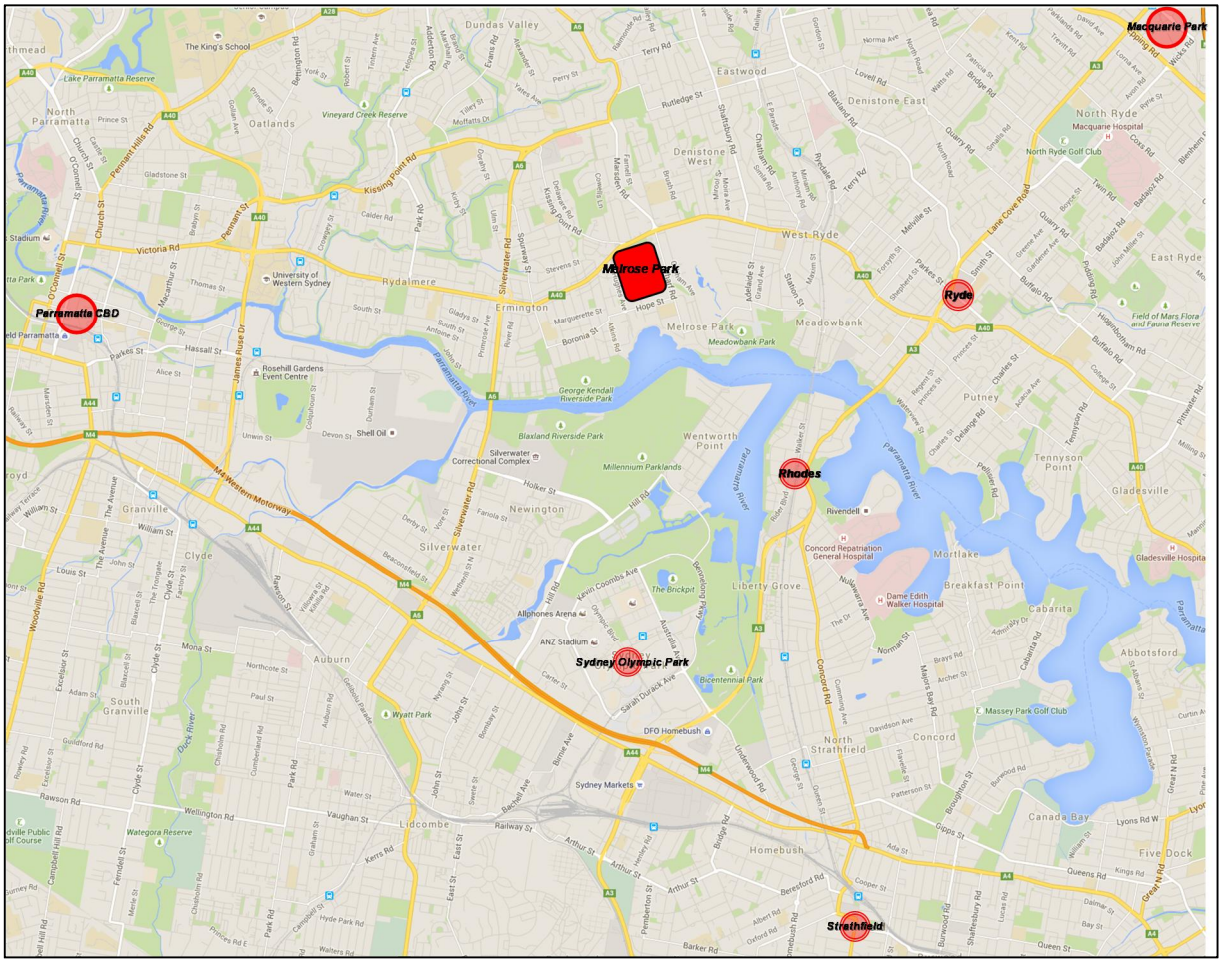
1.1 Purpose of report

AECOM has been engaged by Payce to determine the feasibility of rezoning a parcel of industrial land in Melrose Park to a mixed use residential development. To accommodate the proposed new development traffic and to encourage changes in travel patterns, a package of infrastructure and travel behaviour change initiatives need to be considered, including intersection upgrades, public and active transport provisions and other initiatives (eg. demand management, parking strategy).

1.2 The Site

The site being considered for rezoning is situated between north of Hope Street between Wharf Road and Hughes Avenue, as indicated in Figure 1. It currently incorporates a number of industrial and warehouse facilities that are primarily occupied by pharmaceutical, health, and hygiene companies including Pfizer, Reckitt Benckiser and Big Sister. The site is bounded by light industrial to the south and low-density residential housing to the east of Wharf Road and to the west of Hughes Avenue. This planning proposal excludes the land parcel that has been rezoned at Bartlett Park and the Putt Putt site (wedged between Victoria Road and the proposed Payce site).

Figure 1 Site location



Source: AECOM (2015)

Melrose Park is located strategically half-way between Parramatta, Macquarie Park and Sydney Olympic Park, three of Sydney's major employment centres. It is also surrounded by major road and transport infrastructure such as Victoria Road (A40), Silverwater Road (A6), Lane Cove Road / Homebush Bay Drive (A3), the Northern Rail Line (T1) and ferry services along Parramatta River.

1.3 The Project

A masterplan has been prepared for the Payce site, as shown in Figure 2. The northern site fronting Victoria Road at, 657-661 Victoria Road and 4-6 Wharf Road was rezoned in October 2012 into B4 (mixed-use) and the land owner is currently seeking planning approvals for a mixed use development.

The objective is to rezone the southern part of the site from Light Industrial to a range of Mixed Use zoning such as (B2 – Local Centre, B4 – Mixed Use, R4 – High Density Residential and RE1 – Public Recreation), for Payce. As shown in Figure 2, the estimated yield for the site to mixed use is:

- 5,200 high density residential apartments (including 150 affordable dwellings)
- 8,100m^2 GFA of retail
- 15,000m^2 GFA of commercial
- 1,500 m^2 GFA of child care
- 2,500 m^2 GFA of community facilities (including a multi-purpose centre, amphitheatre etc.)

1.4 Report Structure

The report is structured as follows:

- **Section 2** summarises the existing transport conditions in the area surrounding the site, including travel patterns and behaviour, existing bus, cyclist and pedestrian facilities as well as the current performance of the road network.
- **Section 3** considers the likely future transport context in the area without the Project, including committed developments and planned infrastructure upgrades.
- **Section 4** provides a description of the proposed development, the access arrangements and other public and active transport initiatives that could be undertaken to reduce dependency on vehicular travel.
- **Section 5** provides an impact assessment of the subject redevelopment of the site and identifies a package of intersection upgrades to cater for the proposed mixed-use development.
- **Section 6** provides the conclusions from the report.

Figure 2 Masterplan

Source: Payce (2015)

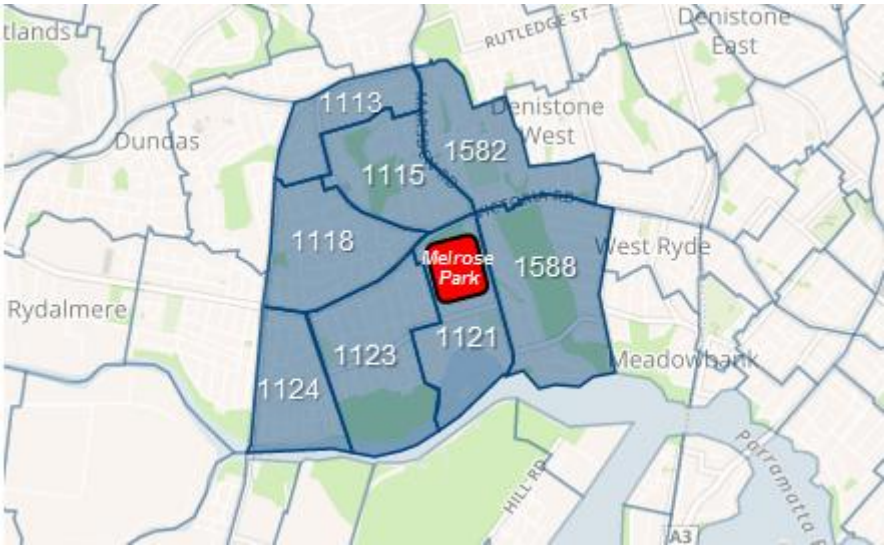
2.0 Existing Traffic and Transport Context

2.1 Travel behaviour

Travel characteristics for NSW residents travelling to work are gathered from the journey-to- work (JTW) data extracted from the Australian Bureau of Statistics (ABS) 2011 census. The journey-to-work data set provides details of the origin and destination zones of trips, as well as characteristics of the journey such as mode of travel.

Given the site is predominantly an industrial / employment area, the analysis of JTW data of surrounding travel zones was undertaken to gain an understanding of the potential travel patterns of the site. The travel zones analysed are shown in Figure 3.

Figure 3 Travel zones surrounding the site



Source: AECOM (2015)

The travel patterns of local residents are shown in Table 1 and Table 2. The JTW data shows that a majority of residents use cars for transportation, at 66 per cent. The highest used mode of public transport is the train service at 12 per cent.

Table 1 Mode use of local residents

	Car	Bus	Train	Ferry/Tram	Walked	No commute	Other
2011 mode share^	66%	5%	12%	0%	1%	12%	3%
Future target	▼	▲	▲	▲	▲	▲	▲

Source: Bureau of Transport Statistics (2015)

A further breakdown shows that more than half of the car trips are local, including Parramatta and Strathfield. For trips into the inner city 58 per cent of residents use non-car modes, indicating that the train service is the preferred mode of transport into the CBD. From the Melrose Park site there is currently a strong desire for eastbound travel, with 58 per cent of trips in this direction, to destinations such as Ryde, Chatswood, Sydney and North Sydney.

Table 2 Destination of local residents

Destination – SA3	Trips	Car	Non-car	Other
Ryde - Hunters Hill	1,448	68%	12%	20%
Sydney Inner City	1,007	30%	58%	12%
Carlingford	673	59%	9%	32%
Parramatta	413	68%	20%	12%
Auburn	351	82%	4%	14%
Other	2,479	79%	11%	10%
Total	**6,371**	**66%**	**19%**	**15%**

Source: Bureau of Transport Statistics (2015)

The travel patterns of workers in the study area are shown in Table 3 and Table 4. The JTW data shows that a majority of workers rely on cars for transportation, at 78 per cent. The JTW data also shows a low proportion of non-car trips at seven per cent, most likely due to a good parking supply on-site by each of the businesses.

Table 3 Mode use of workers in the area

	Car	Bus	Train	Ferry/Tram	Walked	No commute	Other
2011 mode share	78%	2%	3%	0%	2%	12%	3%
Future target	▼	▲	▲	▲	▲	▲	▲

Source: Bureau of Transport Statistics (2015)

Table 4 Origin of workers in the area

Origin – SA3	Trips	Car	Non-car	Other
Carlingford	697	59%	12%	29%
Ryde - Hunters Hill	607	63%	9%	28%
Parramatta	326	83%	9%	8%
Baulkham Hills	266	87%	2%	11%
Blacktown	213	88%	4%	8%
Other	2,530	85%	6%	9%
Total	**4,639**	**78%**	**7%**	**15%**

Source: Bureau of Transport Statistics (2015)

2.2 Public transport network

A map of public transport routes in the region is given in Figure 4. It highlights rail stations, ferry wharfs and local bus routes.

Figure 4 Public transport map of region

Source: Transport for NSW (2015)

2.2.1 Existing bus services

The site is accessible by bus with a number of bus routes operating along Victoria Road and Hope Street / Wharf Road. The site has very good accessibility to the Victoria Road Bus Corridor with the majority of the site (north of Hope Street) within a five-minute walk to this frequent bus corridor. There are currently just over 2,000 bus services provided along Victoria Road at Melrose Park on a weekly basis. Refer to **Appendix A** for a summary of existing bus services along Victoria Road at Melrose Park.

Service frequencies of the bus routes in the vicinity of Melrose Park are summarised in Table 5. It also shows the peak and inter-peak levels of service, based on frequency criteria defined in Transport Research Boards' Transit Capacity and Quality of Service Manual (2003).

On average, there are currently up to 14 bus services in the peak travel direction during the AM and PM hours (on average less than five minutes headway between buses), providing connections to major centres and public transport interchanges including Parramatta, Ryde, Auburn, Macquarie, Carlingford, Sydney CBD as well as West Ryde Station, Meadowbank Station and Meadowbank Ferry Wharf. Bus occupancy surveys completed recently (in July 2015) confirmed that almost all buses passing through the site has spare capacity to cater for additional demand.

Table 5 Public transport service frequency - bus

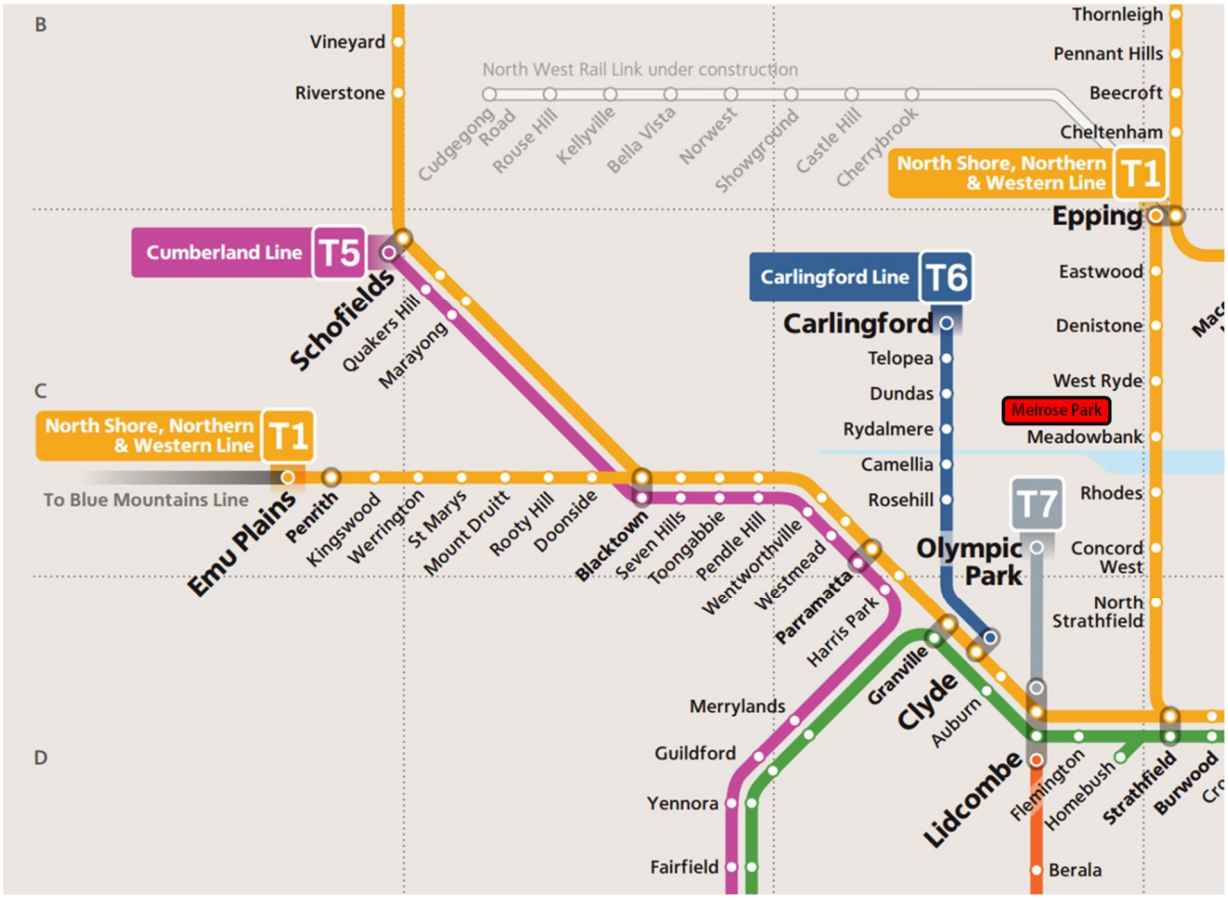
Bus Route	From-To	Buses per Hour		Level of Service Peak (Interpeak)
		AM/PM	Interpeak	
Hope Street / Wharf Road				
524	Parramatta to Ryde (Both ways)	2/2	1	D/D (E)
Victoria Road				
513	Carlingford to Meadowbank Wharf (Both ways)	2/2	1	D/D (E)
520	Parramatta to City – Circular Quay	2/2	1	D/D (E)
523	Parramatta to Ryde (Both ways)	2/2	1	D/D (E)
544	Auburn to Macquarie Centre(Both ways)	2/2	1	D/D (E)
M52	Parramatta to Circular Quay (Both ways)	6/6	4	B/B (C)

Source: Transport for NSW (2015)

2.2.2 Existing rail services

With the bus connections mentioned above, the site is located approximately 2.5 km west of West Ryde Station and Meadowbank Station. Both stations are served by the T1 Northern Line providing links to the rest of the Sydney Trains network.

Figure 5 Sydney trains network in region



Source: Sydney Trains (2014)

Service frequencies of the nearby train stations are summarised in Table 6. It also shows the peak and inter-peak levels of service, based on frequency criteria defined in Transport Research Boards' Transit Capacity and Quality of Service Manual (2003).

Table 6 Public transport service frequency - train

Station	City Trains per Hour		Level of Service Peak(Interpeak)
	AM/PM	Interpeak	
West Ryde	5/4	4	B/C (C)
Meadowbank	5/4	4	B/C (C)
Strathfield	20/20	10	A/A (A)

Source: Sydney Trains (2014)

2.2.3 Existing ferry services

The closest ferry wharf to Melrose Park is at Meadowbank Wharf, located approximately 2.5 km east of the site. Meadowbank Wharf is served by the F3 Parramatta River route providing ferry services between Parramatta and Circular Quay.

Service frequencies of the ferry services along Parramatta River are summarised in Table 7. It also shows the peak and inter-peak levels of service, based on frequency criteria defined in Transport Research Boards' Transit Capacity and Quality of Service Manual (2003).

Table 7 Public transport service frequency - ferry

From-To	Ferrys per Hour		Level of Service Peak(Interpeak)
	AM/PM	Interpeak	
Parramatta to Circular Quay	4/1	2	C/E (D)
Circular Quay to Parramatta	1/4	2	E/C (D)

Source: Transport for NSW (2014)

2.3 Active transport network

2.3.1 Pedestrian facilities

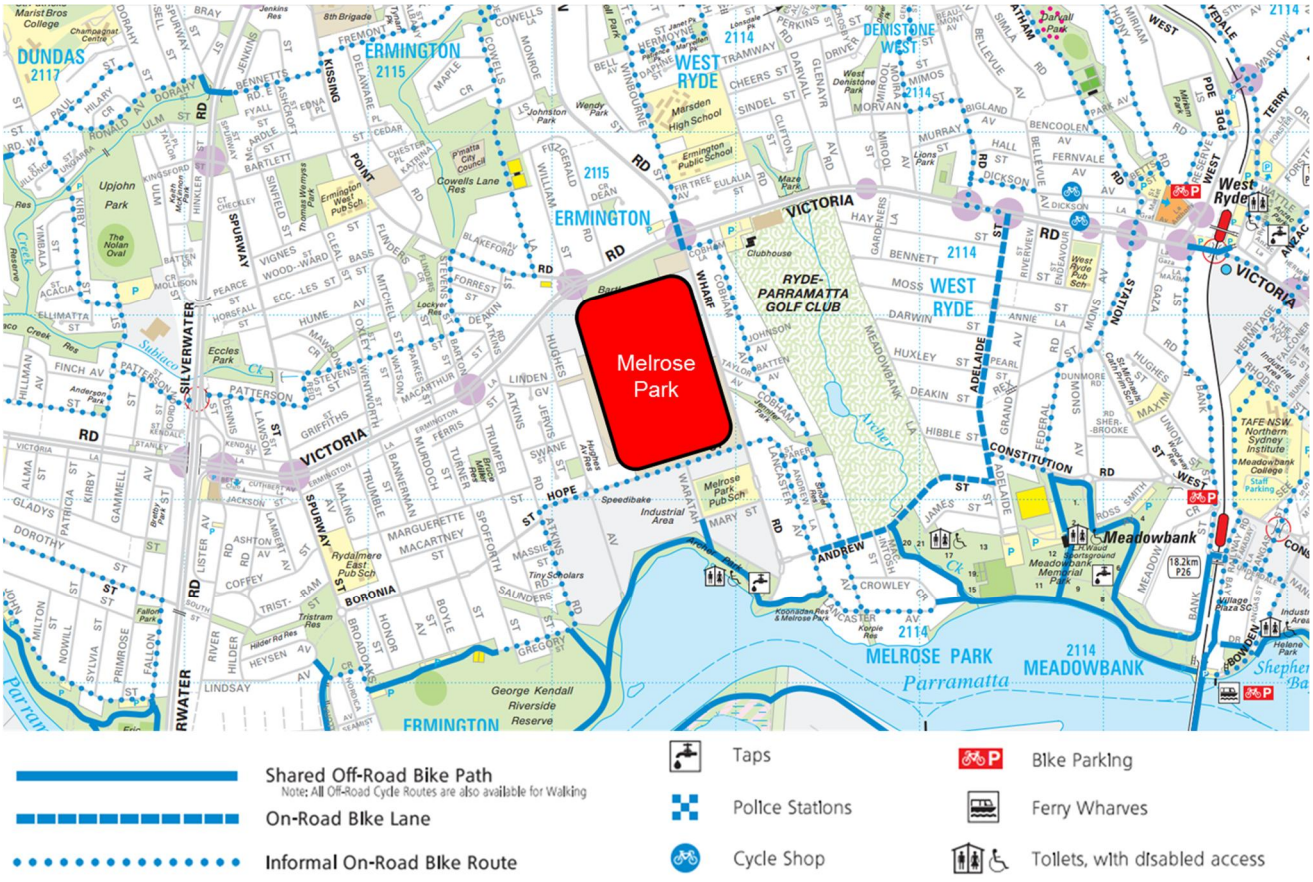
Surrounding the site, a number of pedestrian facilities are provided. Footpaths are provided on both sides of Victoria Road and Wharf Road; however there are limited opportunities to cross these roads. There is a signalised pedestrian crossing on the eastern approach of the Victoria Road / Marsden Road / Wharf Road intersection and a zebra crossing is provided on Wharf Road opposite Melrose Park Public School.

A refuge island is provided on Hope Street with footpaths along the south of Hope Street and intermittently on the north. Pedestrian facilities on Hughes Avenue are limited with footpaths intermittently on the eastern side.

2.3.2 Cycling routes and facilities

The existing cycling routes in the area are shown in Figure 6. On-road cycle route is provided along Hope Street which links to the Parramatta Valley Cycleway allowing cyclists to ride to Parramatta CBD.

Figure 6 Existing cycle routes in local area



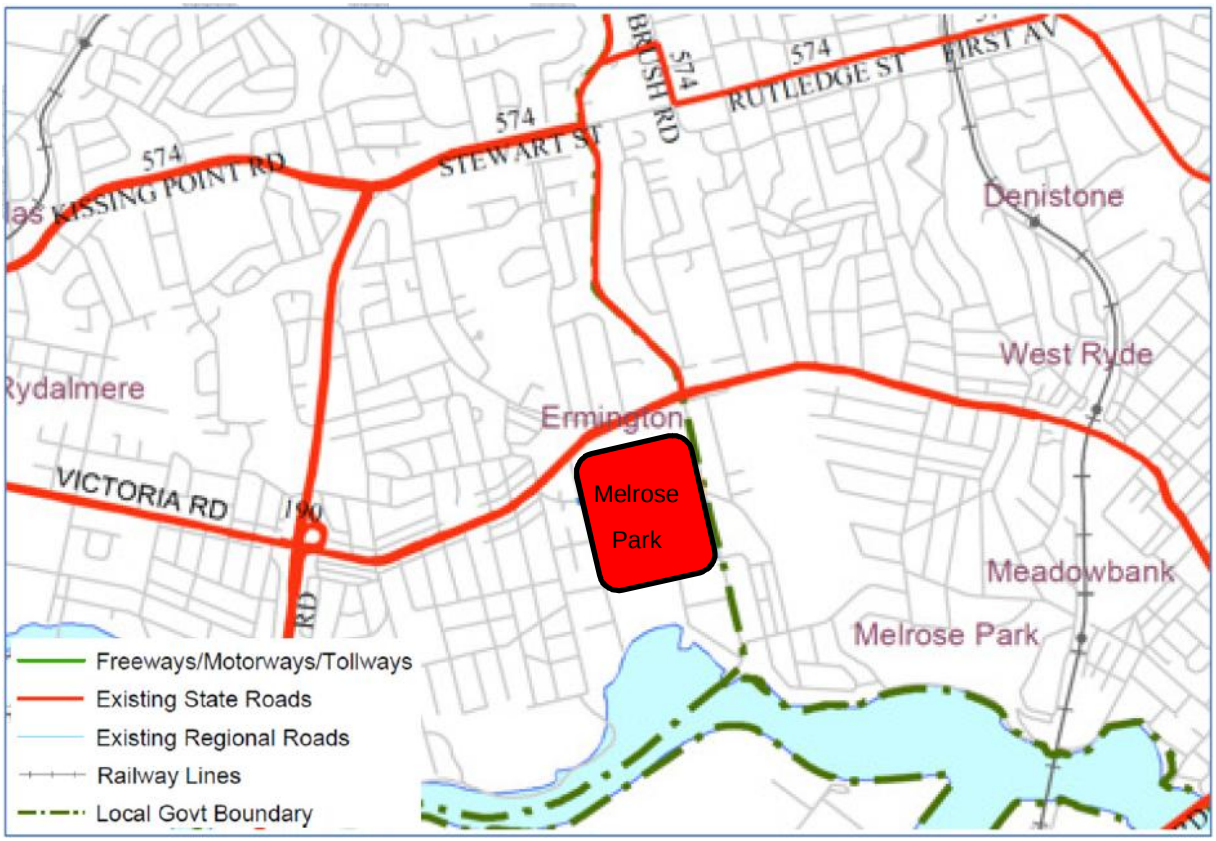
Source: City of Ryde (2015)

2.4 Road network

2.4.1 Road hierarchy

The site is in close proximity to several key state roads including Victoria Road, Silverwater Road, Marsden Road and Stewart Street / Kissing Point Road. Currently, the site is mainly accessed via Wharf Road and Hope Street.

Figure 7 Road network



Source: Roads and Maritime Services (2015)

2.4.2 Major roads

Victoria Road is a State Road providing access between Parramatta and the western end of Anzac Bridge. The site is currently dependent on Victoria Road (A40) for vehicular access. Other nearby arterial roads that would service the site are Silverwater Road (A6) and Homebush Bay Drive / Lane Cove Road (A3).

Victoria Road is identified as one of the five key constrained corridors in the NSW Long Term Transport Master Plan. It is currently carrying approximately 60,000 veh/day and there are currently approximately 2,000 bus services provided along Victoria Road on a weekly basis in the vicinity of the site. There is significant traffic congestion at nearby intersections on Victoria Road during peak hours. There are large delays and long queues eastbound in the AM peak at both signalised intersections with Wharf Road / Marsden Road and Kissing Point Road; similar delays and queues exist in the PM peak at the Wharf Road / Marsden Road intersection.

2.4.3 Local roads

Wharf Road is a local road providing access to existing land uses on either side of the road. This north-south road provides two traffic lanes with a parking lane on both sides. The road has a posted speed limit of 50km/h.

Hope Street is a local road with a posted speed limit of 50km/h and school zone adjacent to Melrose Park Public School. This east-west road provides two traffic lanes with a parking lane on both sides.

Hughes Avenue is a local road with two traffic lanes and a parking lane on both sides. The road provides access to residential properties and has a posted speed limit of 50km/h.

2.4.4 Key intersections

Key intersections surrounding the site are shown in Figure 8, which include:

- Victoria Road | Marsden Road / Wharf Road (signals)
- Victoria Road / Kissing Point Road (signals)
- Victoria Road / Hughes Avenue (left in / left out)
- Wharf Road / Hope Street (priority)
- Hope Street / Hughes Avenue (roundabout)

Figure 8 Key intersections

Source: AECOM (2015)

2.5 Traffic volumes

2.5.1 Daily traffic counts

There are high volumes of traffic using Victoria Road and other roads in the area. A summary of average weekday traffic volumes on major roads is given in Table 8.

Table 8 Average weekday traffic volumes

Road Name	Station Description	Daily		
		North / East	South / West	Total
Victoria Rd	Rydalmere-east of Vineyard Ck	33,800	34,280	68,080
Victoria Rd	Between Shephard And Belmore Streets, Ryde	31,900	27,500	59,400
Silverwater Rd	Silverwater-At Silverwater Bridge	32,200	31,400	63,600

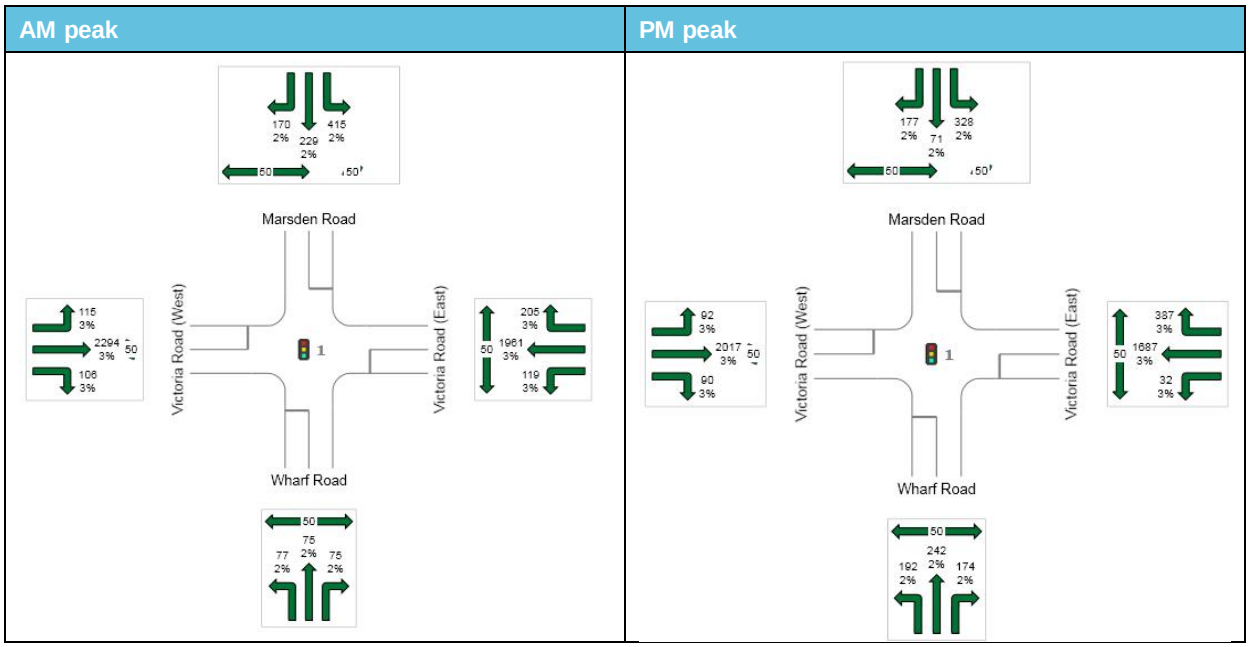
Source: RMS traffic counts (2012)

Notes: 1. Data are based on an average weekday (i.e.Tue, Wed, Thu) from Jan to Dec 2013, excluding public and school holidays.
2. Data includes only those that passed the RMS quality measure check.
3. Data in the table only include surveyed sites with daily flows > 50,000 veh/hr.

2.5.2 Intersection traffic counts

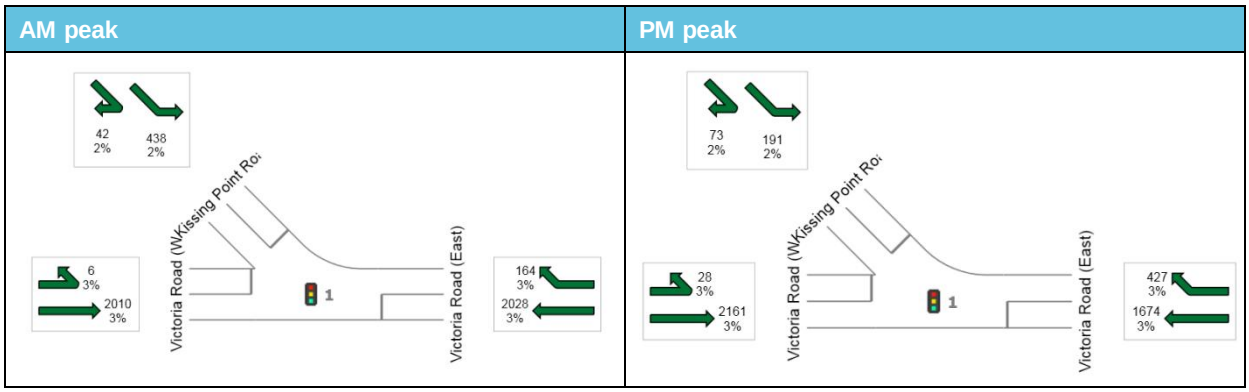
Peak hour intersection counts undertaken in 2014 by Bitzios Consulting have been used and relied on as part of this study. Intersection counts were conducted at the intersection of Victoria Road / Marsden Road / Wharf Road and Victoria Road / Kissing Point Road on 6 February 2014. Analysis of the traffic data identified the AM peak hour occurred between 7.30am – 8.30am and the PM peak hour occurred between 5:00pm – 6:00pm.

Figure 9 Traffic volumes at Victoria Road / Marsden Road/ Wharf Road



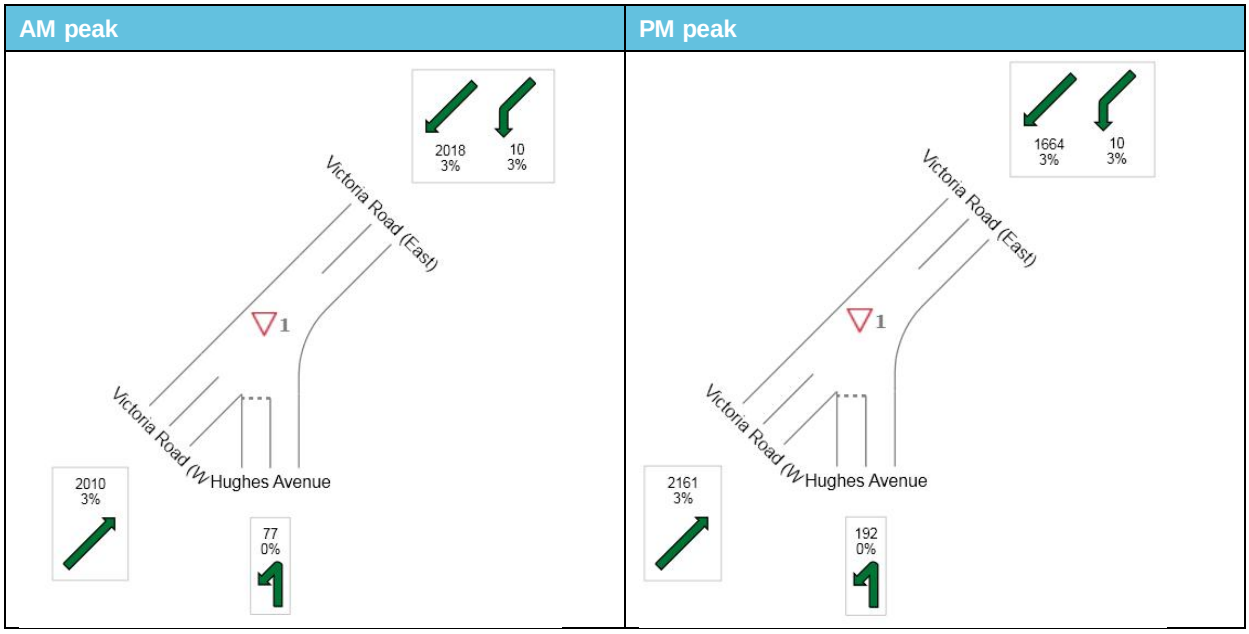
Source: Bitzios (2014)

Figure 10 Traffic volumes at Victoria Road / Kissing Point Road



Source: Bitzios (2014)

Figure 11 Traffic volumes at Victoria Road / Hughes Avenue



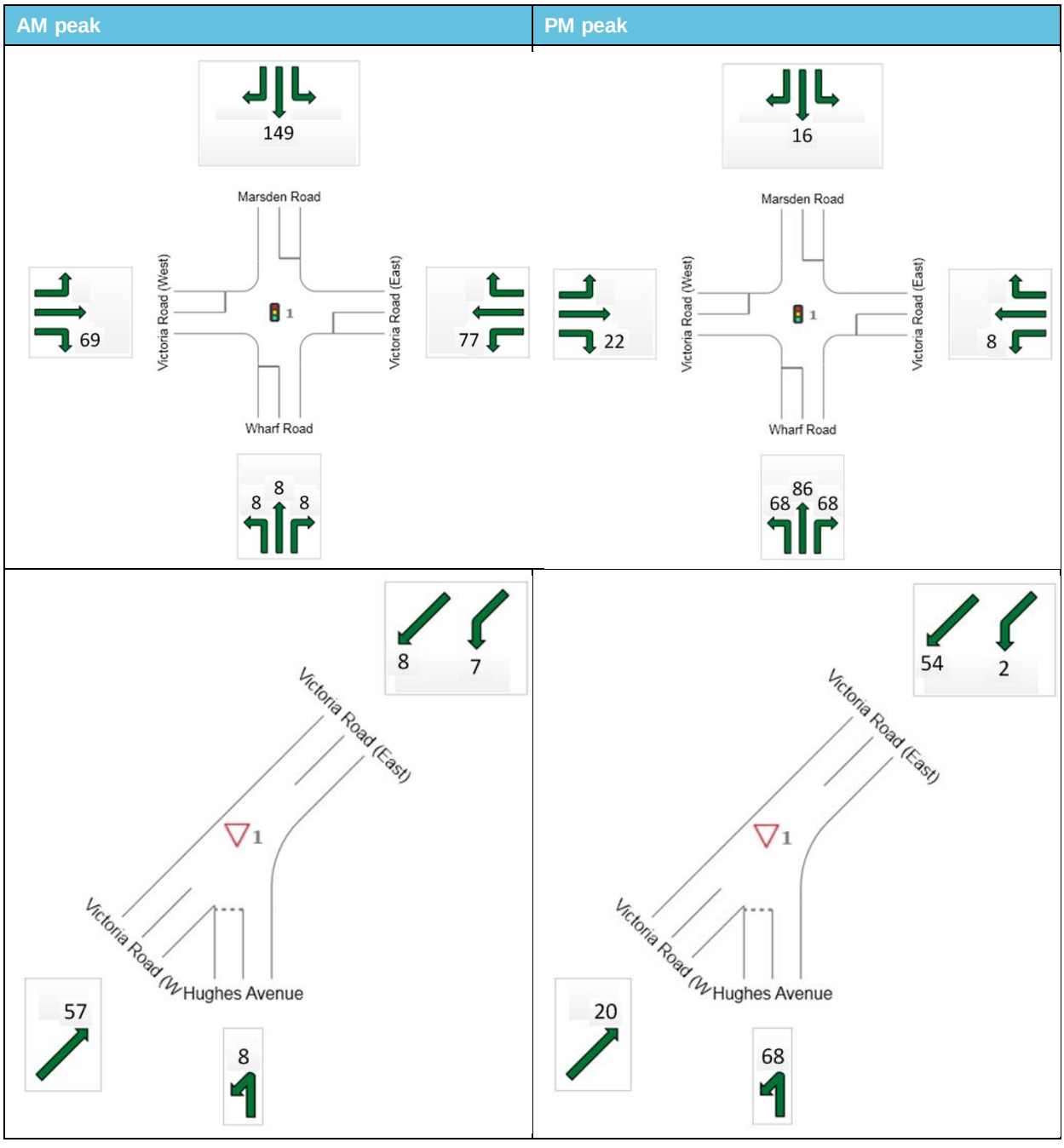
Source: Bitzios (2014)

* Intersection counts were not undertaken for the intersection of Victoria Road / Hughes Avenue, through traffic have been based on the intersection of Victoria Road / Kissing Point Road. The left in / left out movements have been assumed.

Given the land uses of the immediate area to the Wharf Road and Hughes Avenue intersections, it is expected that a proportion of the existing traffic is attributed to the current employment uses such as Pfizer and Big Sister (north of Hope Street) and other industrial uses south of Hope Street as well.

In order to understand the net impacts of the future proposed development that replaces the existing employment uses, an estimation of trip generation by the existing employment uses north of Hope Street has been undertaken based on first principles. Of the 33ha site north of Hope Street, approximately 25ha of the site are traffic generating employment uses and assuming an existing Floor Space Ratio (FSR) of 0.5:1, the existing land usage is approximately 125,000m^2 GFA. Using the average peak hour trip rate of 0.265 trips per 100m^2 of GFA based on three similar industrial estates surveyed by the RMS in 2012, the existing employment uses north of Hope Street is expected to generate 335 trips during the peak hours. The estimated distribution of traffic generated by the existing employment land uses North of Hope Street at the intersection of Wharf Road and Hughes Street are shown in Figure 9.

Figure 12 Traffic volumes at Victoria Road / Marsden Road/ Wharf Road



2.5.3 Network performance

With the traffic volume surveys applied to the model of the existing road conditions in SIDRA the initial results were compared to observed delay times, queueing and vehicle platooning. Parameters such as saturation flow and phasing timing were then adjusted to bring the results of the SIDRA analysis into line with the observed performance of the subject intersections.

A summary of existing conditions at nearby intersections on Victoria Road is given in Table 9. It shows that all intersections operate at a satisfactory level of service (i.e. D or better). Traffic conditions are near capacity in the PM peak, based on an assumed 2,050 veh/h saturation flow.

Table 9 Summary of existing traffic conditions

Intersection	Peak	Degree of Saturation	Average Delay	Level of Service	95% Back of Queue (worst two legs)
Victoria Road/Marsden Road/Wharf Road	AM	0.871	28.3	B	244m Victoria Road (WA) 184m Victoria Road (EA)
	PM	1.012	52.7	D	338m Victoria Road (WA) 267m Wharf Road (SA)
Victoria Road / Kissing Point Road	AM	0.672	8.2	A	151m Kissing Point Road (NA) 71m Victoria Road (EA)
	PM	0.938	40.2	B	323m Victoria Road (WA) 193m Victoria Road (EA)
Victoria Road / Hughes Avenue	AM	0.497	-	-	1.5m Hughes Avenue (SA)
	PM	0.532	-	-	4.1m Hughes Avenue (SA)

Note: WA – west approach; EA – east approach, NA – north approach, SA – south approach

Source: AECOM (2015)

3.0 Future Traffic and Transport Context (without project)

This section summarises the expected growth in the subregion as well as the planned provision of transport services and infrastructure upgrades to cater for this future growth.

3.1 Future urban growth

A Plan for Growing Sydney is the NSW Government's vision for the future of the Sydney Metropolitan Area over the next 20 years (2011 – 2031). The Plan sets out actions to make Sydney a strong global city and a great place to live which include four goals, 22 strategic directions and 59 detailed actions.

The Government is working with the six subregions that form the metropolitan area to implement The Plan. The site is located within Parramatta City Council which forms part of the West Central subregion. Over the next 20 years the West Central subregion will have a focus on infrastructure investment and intensive growth.

The population of the West Central subregion is projected to grow by more than 478,650 over the next 20 years, an annual growth rate of approximately two per cent. A total of 183,750 new homes are needed by 2031.

Figure 13 West Central – population change

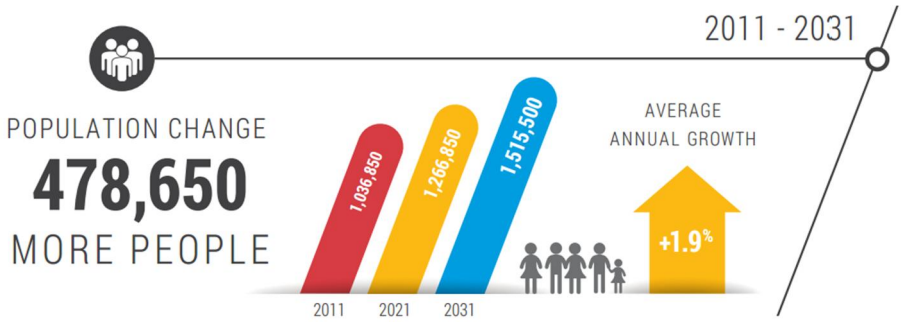


Figure 14 West Central – new homes needed

Source: A Plan for Growing Sydney (2015)

3.2 Public transport improvements

The *NSW Long Term Transport Master Plan* has identified 46 demand corridors connecting Sydney's many centres and where high concentration of travel demand occur during peak periods on all travel modes, including the Victoria Road corridor that provides connection between Parramatta and Sydney CBD.

The Victoria Road corridor is one of the constrained corridors in the region, requiring extra capacity in future. Expanding the capacity of this corridor will rely on improving bus priority and efficiency in the short term, and deploying higher capacity road-based transit in the longer term. Our review of existing NSW Government documents indicated a number of opportunities have been identified that would improve the network capacity and connectivity to support future population and employment growth of this site.

3.2.1 Sydney's Rail Future

Sydney's Rail Future – the long term plan for modernising Sydney's rail network, sets out in detail how the following four core elements can be provided to give Sydney a world-class rail network that can support the city's growth:

- High capacity mass transit services – where customers can simply turn up at the station and expect to get on a train within a short time. These mass transit services will be separated from the current suburban and intercity services.

- New rolling stock – higher capacity single-deck trains that can carry more customers and move around the network more quickly.
- More trains – operational changes to enable us to operate more trains an hour during peak times, alleviating capacity constraints.
- New capacity through the heart of the network – a new Harbour crossing and CBD line will address growing demand in Sydney's north-south travel corridor and provide greater flexibility to respond to future requirements.

Based on the fleet conditions, network performance and customer experience, major improvements to the existing rail network are required to meet current customer needs and to cater for future capacity demands. Rail patronage modelling shows that by 2031 if major capacity improvements are not made, the CBD, Western, Northern, North Shore, Bankstown, East Hills and Airport lines and North West Rail Link will reach crowding levels during the morning peak period that are deemed 'high' or above. This suggests that these lines will reach maximum capacity limits or even exceed capacity.

Planned increased service frequency on the local rail network as part of Sydney's Rail Future. This additional capacity will enable Sydney Trains to carry another 90,000 to 100,000 people per hour in the peak, delivering sufficient capacity to serve Sydney well into the future.

3.2.2 Sydney's Light Rail Future

Light rail has the potential to play a greater role in Sydney's future transport network, providing cross regional connections whilst also offering high transport capacity as the city grows.

The *NSW Long Term Transport Master Plan* has nominated a number of strategic transit network corridors to be considered for bus rapid transit or light rail. The NSW Government has shortlisted four potential routes for a new light rail line for Parramatta and Western Sydney. The four proposed routes are:

1) Parramatta to Macquarie Park via Carlingford
2) Parramatta to Castle Hill via Old Northern Road
3) Parramatta to Bankstown
4) Parramatta to Sydney Olympic Park and Strathfield/Burwood.

The State Government recently announced that Western Sydney's light rail network will connect Parramatta's CBD to the key hubs of Sydney Olympic Park, Westmead Hospital, Western Sydney University and Strathfield. A light rail line will also branch to Carlingford, replacing the existing heavy rail shuttle.

The Sydney Olympic Park / Rhodes line will benefit Melrose Park if a public / active transport bridge is constructed to connect Melrose Park with Wentworth Point and Sydney Olympic Park.

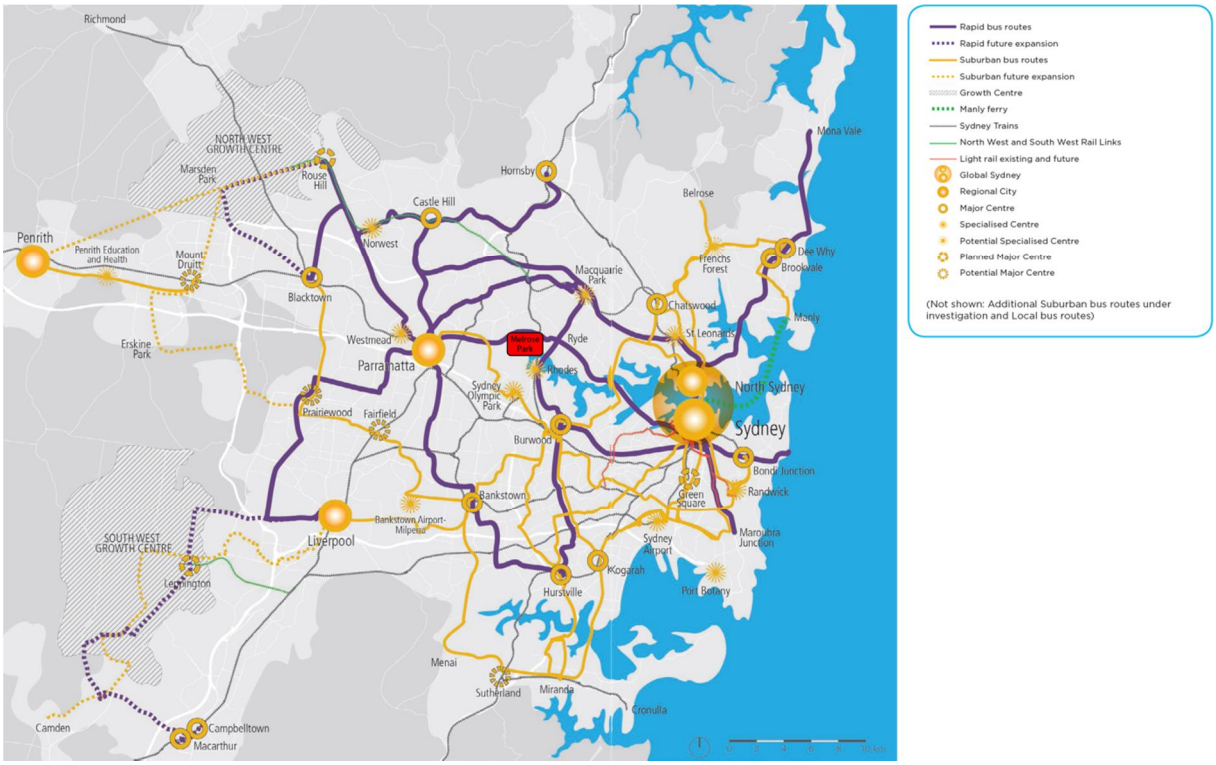
3.2.3 Sydney's Bus Future

Sydney's Bus Future outlines the context for bus services and has identified four areas to be improved (convenience, frequency and reliability, connectivity and comfort) to encourage people to use bus services throughout Sydney. With a customer focused bus system, the NSW Government is aiming to deliver a simpler, faster and better bus network.

The bus network will become more focussed on connecting major centres and key trip attractors, instead of providing a radial network where approximately 40 per cent of all routes travel through the CBD. The network will be simplified and buses distributed more evenly across the city to improve access and convenience for customers. Based on the integrated approach set out in the *NSW Long Term Transport Master Plan* buses will connect seamlessly to other transport modes to provide a high level of accessibility.

A three-tiered bus network consisting of rapid, suburban and local bus routes was identified in *Sydney's Bus Future*, with each level serving distinct travel purposes (see Figure 15).

Figure 15 Rapid and suburban bus network



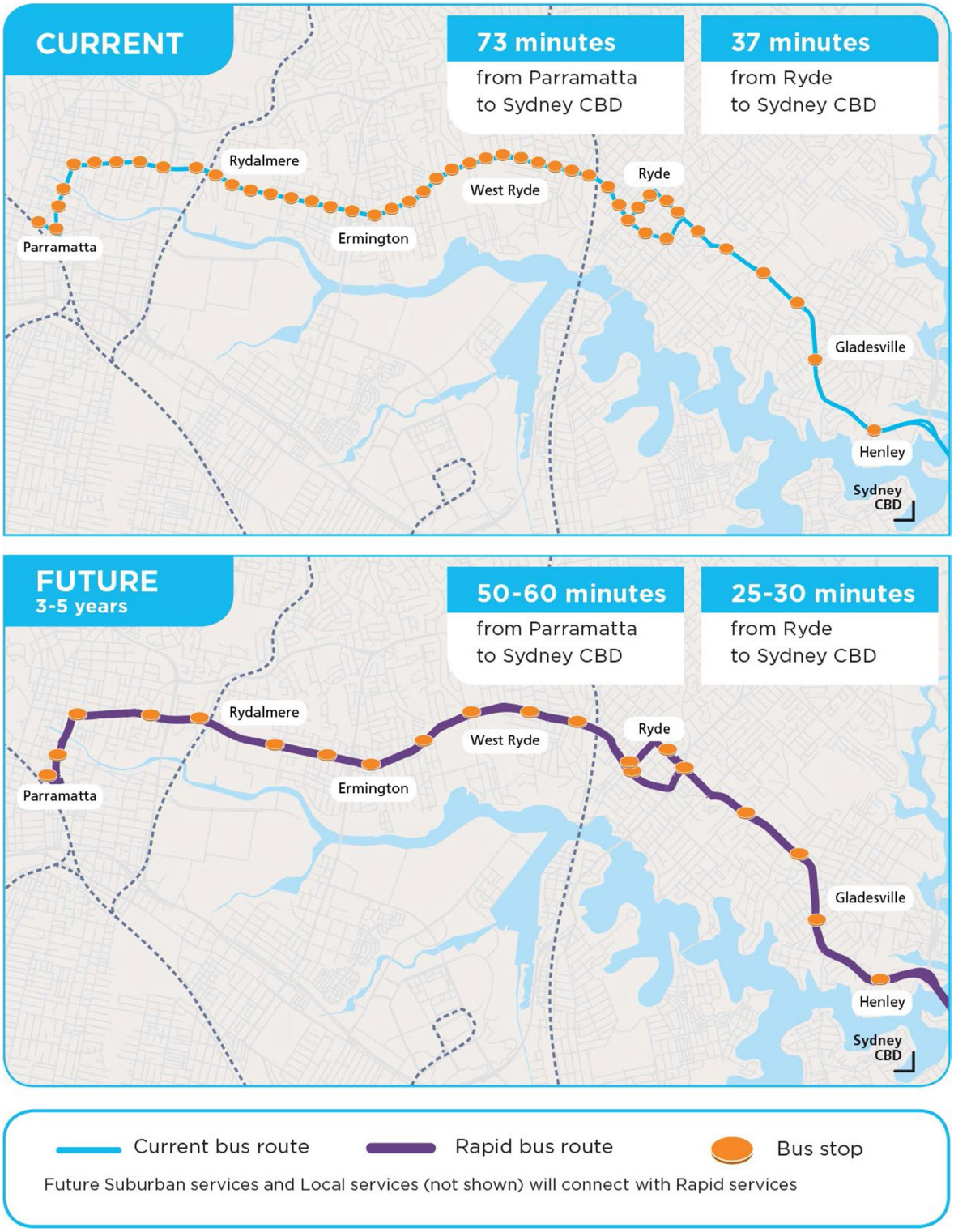
Source: Sydney's Bus Future (2012)

Sydney's Bus Future has identified a rapid bus route between Parramatta and the CBD via Ryde along the Victoria Road corridor. Proposed bus service improvements on Victoria Road are one of the key actions in Sydney's Bus Future, which include:

- Extra services planned through corridor with 40 extra rapid bus services per weekday are proposed in the Victoria Road corridor (over 200 extra services per week in addition to the existing 2,000 services provided on Victoria Road at Melrose Park on a weekly basis).
- Bus priority schemes on Victoria Road and extended bus lane operating hours.
- Reduced the number of stops along the corridor and therefore reduced travel time from Parramatta to CBD.
- Interchange facilities at Top Ryde for connections to Burwood, Hurstville, Macquarie Park.
- Bus Rapid Transit / Light Rail along length of corridor to be investigated.

Expected improvements in bus travel times in the corridor as a result of the planned improvements are shown in Figure 16.

Figure 16 Proposed Victoria Road bus service improvements



Source: Sydney's Bus Future (2013)

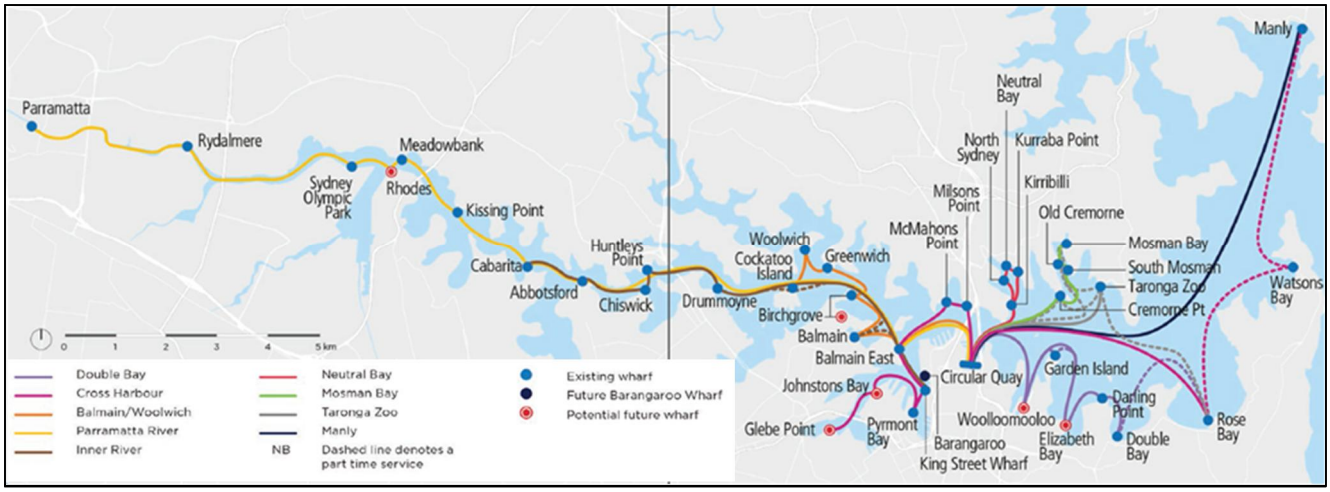
3.2.4 Sydney's Ferry Future

Sydney's ferry services will play an expanded role in our integrated transport system, enhancing Sydney's attractiveness as a place to live and visit. New services will be introduced to meet customer needs and demand. Modernisation and expansion of the ferry fleet and wharf infrastructure will support service delivery and enhance customer comfort.

Sydney's Ferry Future will provide customers with more frequent services, better connections and improved wharves to improve accessibility. The frequency of Parramatta River services will be enhanced for most wharf locations to reflect demand and growth potential and to achieve more efficient use of available capacity.

Sydney's Ferry Future indicates a future wharf at Rhodes (see Figure 17). Given Melrose Park's proximity to the Parramatta River, access to ferry services along the River will improve the overall accessibility of the site by alternative modes of public transport.

Figure 17 Proposed new ferry wharfs



Source: Sydney's Ferry Future (2013)

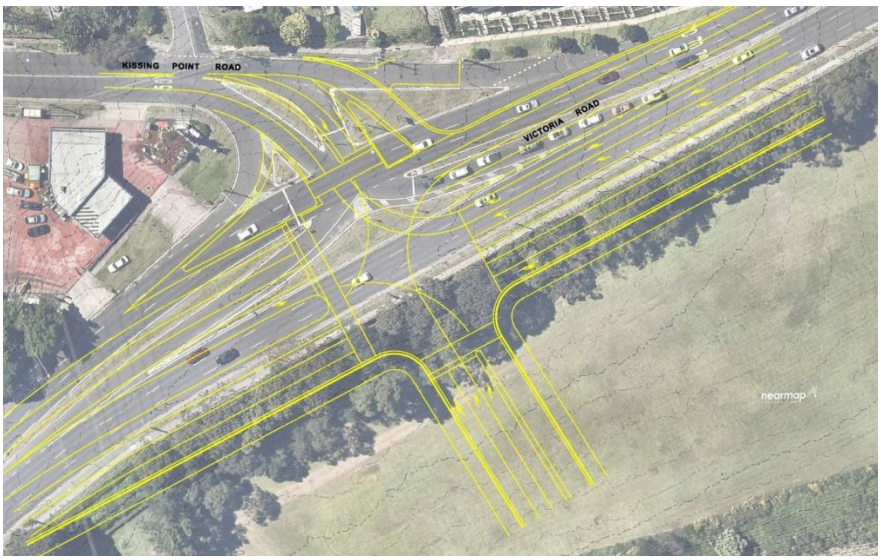
3.3 Road network upgrades

A number of intersection improvements are proposed as part of the Development Application for the site at 657-661 Victoria Road and 4-6 Wharf Road in order to ensure the satisfactory operation of the road network surrounding the site:

- Victoria Road / Wharf Road
  - Extension of eastbound right turn bay at Wharf Road and upgrade of the Wharf Road approach
- Victoria Road / Kissing Point Road
  - Upgrade intersection with additional approach to the site and extension of turning lanes on Victoria Road.

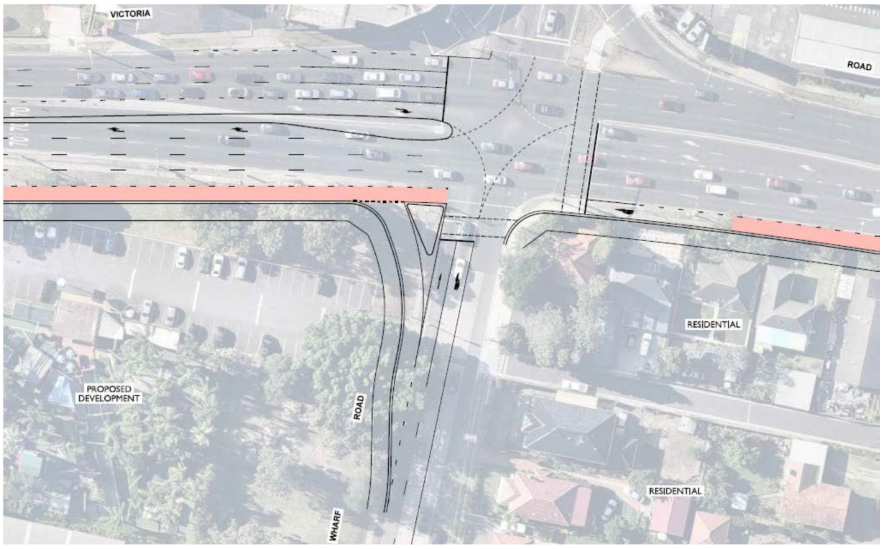
Concept design plans have been prepared as part of a Transport Impact Assessment for at 657-661 Victoria Road and 4-6 Wharf Road for the Wharf Road and Kissing Point Road intersection upgrades as shown in Figure 18 and Figure 19.

Figure 18 Victoria Road / Kissing Point Road Concept Design



Source: Northrop (2015)

Figure 19 Victoria Road / Wharf Road Concept Design

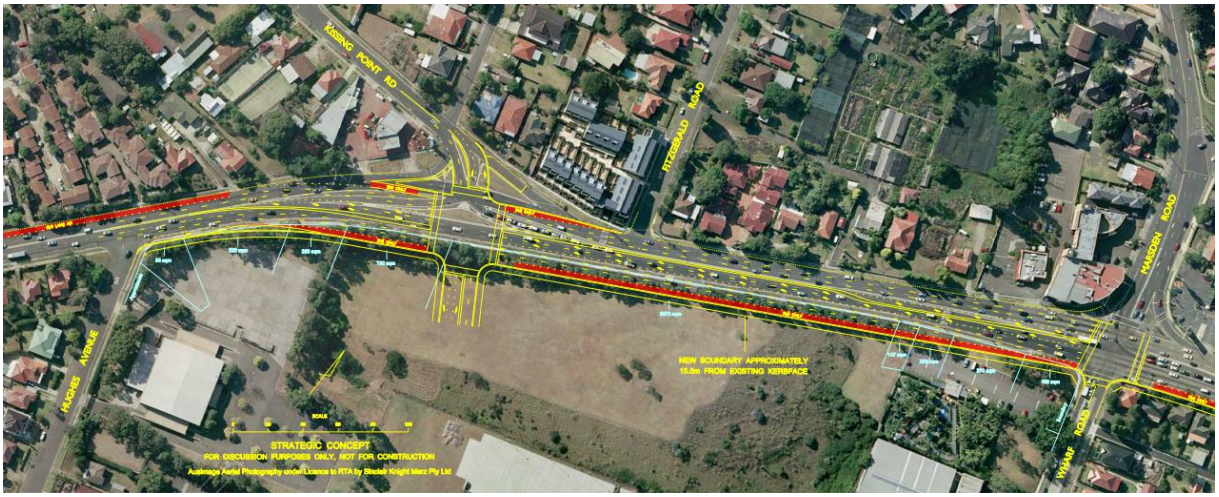


Source: GTA (November 2015)

In addition to the planned transport improvements, there is consideration by Roads and Maritime Services to upgrade Victoria Road between Wharf Road and Hughes Avenue with new bus lanes on Victoria Road to fill in the gaps between Hughes Avenue and Wharf Road.

JBA undertook a study in 2013 which included an assessment of the Victoria Road reservation to understand implications of future road widening by Roads and Maritime Services to facilitate a bus lane in conjunction with upgrading intersections to accommodate future traffic associated with the development at 657-661 Victoria Road and 4-6 Wharf Road as shown in Figure 20.

Figure 20 Proposed Victoria Road reservation plan



Source: JBA (2013)

3.4 Future traffic growth

A review of historical annual average daily traffic (AADT) data on Victoria Road – west of Marsden Road shows there has been a reduction in traffic volume since 1991, as shown in Table 8. The traffic station located in close proximity to the site indicates traffic volumes have declined at one per cent per annum between 1989 and 2005. The decline in traffic on key arterial corridors such as Victoria Road could be attributed by the current level of congestion experienced during the peak hours that limits the amount of vehicles travelling along the corridor as well as improvements in public transport services.

For the purpose of this assessment, as a worst case, it has been assumed there will be zero growth on the Victoria Road corridor.

Table 10 Historical traffic volumes (AADT) on Victoria Road

Station	1989	1991	1996	1999	2002	2005	Growth
50.041 – Victoria Road (West of Marsden Road)	55,900	56,012	51,737	50,995	49,844	49,523	-1%

Source: Roads and Maritime Services (2005)

4.0 The Melrose Park Project

This section provides a brief description of the development proposal and access arrangements as well as other potential public and active transport initiatives that have been considered to encourage change in travel patterns and behaviour to support a sustainable development at Melrose Park.

4.1 Proposed development and land use

The Melrose Park Project proposes to provide a number of land uses (refer to Figure 2) as follows over a 10-15 year project horizon:

- 5,200 high density residential apartments (including 150 affordable dwellings)
- 8,100m^2 GFA of retail
- 15,000m^2 GFA of commercial
- 1,500 m^2 GFA of child care
- 2,500 m^2 GFA of community facilities (including a multi-purpose centre, amphitheatre etc.)

4.2 Proposed vehicular access

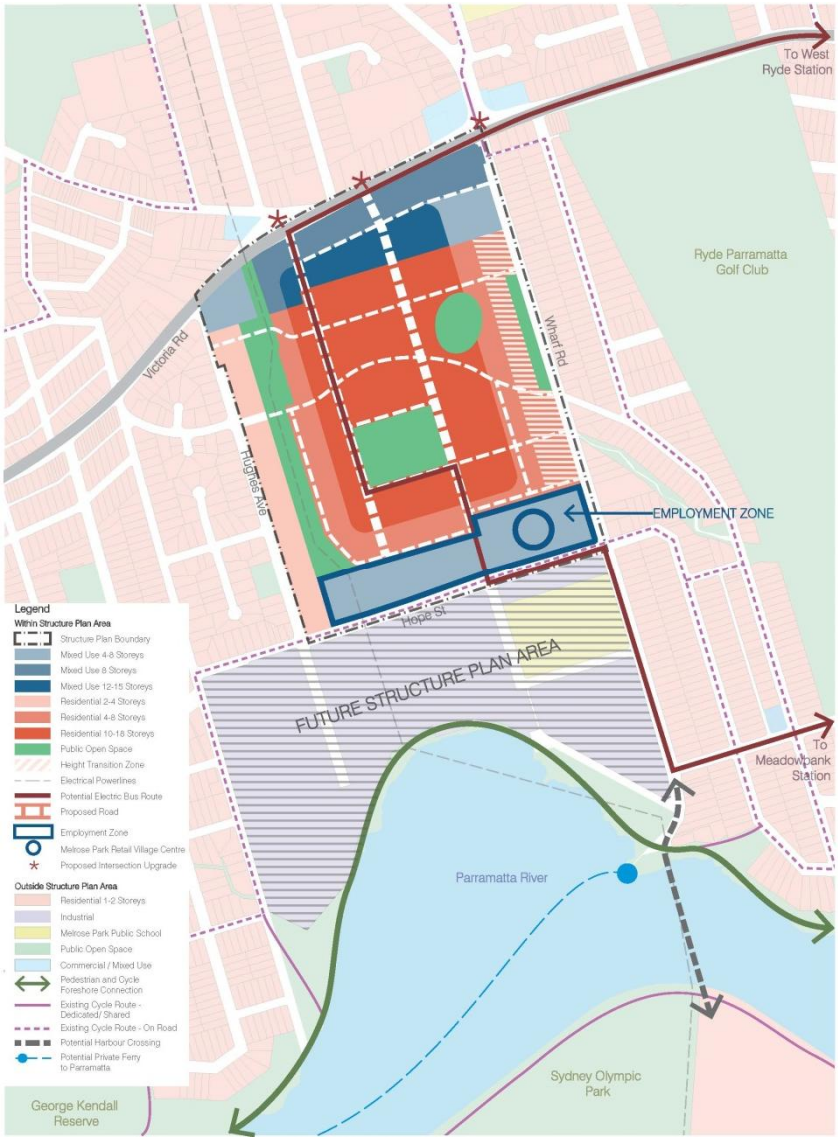
Victoria Road provides the primary access to the site at Melrose Park. The primary existing access to Victoria Road in the immediate vicinity of the proposed development is the signalised intersection with Wharf Road and Marsden Road; Wharf Road running along the eastern edge of the site. All movements are possible at the Wharf Road intersection and pedestrian crossing facilities are provided on the southern, eastern and northern legs. The intersection is currently congested during peak periods, but there are options being considered to increase the capacity of this intersection.

To the west of the site, Hughes Avenue provides direct access to Victoria Road, and is currently left-in / left-out. Traffic approaching the site from the west has the option of turning right at existing signals at Trumper Street and using nearby local streets that connect to the site. This would also take pressure off the Kissing Point Road and Wharf Road intersections.

The development to the north of the Payce site at 657-661 Victoria Road and 4-6 Wharf Road will provide additional accesses to Victoria Road, including a southern fourth leg to the existing signals at Kissing Point Road. Through connections between the two sites can be achieved, which integrate both development proposals and enable enhanced transport connections between Victoria Road and Parramatta River as shown in Figure 21.

There are local street connections including Hope Street at the southern boundary of the proposed development to Silverwater Road to the west and Concord Road to the east, but these streets have limited capacity and are generally circuitous between the site and Silverwater Road / Concord Road.

Figure 21 Melrose Park Structure Plan



Source: Allen Jack+Cottier, 2016

4.3 Active transport network and facilities

4.3.1 Short-term active transport provision

Opportunities exist for improvements to the active transport network in the area through the proposed development. In the short-term this could include:

- New and improved connections to local and regional cycleways on Hope Street, Cobham Street which extends to Marsden Road.
- Completion of a Parramatta River Foreshore pathway connection to Parramatta.
- Provision of neighbourhood bicycles to be used by residents for exercise, travel to train stations.
- Additional bike parking facilities within the development and at nearby train and ferry interchanges.

4.3.2 Long term active transport provision

In the medium to long term a new active transport connection across Parramatta River would greatly enhance access to communities and public facilities at Sydney Olympic Park and Wentworth Point. Figure 22 shows the proposed Parramatta River crossing that connects Melrose Park with Wentworth Point as well as the proposed Homebush Bridge (that connects Wentworth Point and Rhodes) and the two other existing active transport crossings of the Parramatta River. This crossing of the Parramatta River between Melrose Park and Wentworth Point Could facilitate:

- Alternative and faster connection from north of the River to major transport hubs / interchanges such as Sydney Olympic Park Ferry Wharf, Rhodes Train Station (taking advantage of the Homebush Bridge).
- Alternative and faster connection from south of the River to Victoria Road Rapid Bus Corridor.
- Alternative connections to community, recreational, leisure and retail facilities at Wentworth Point and Rhodes (south of the River) and West Ryde and Top Ryde (north of the River).

Figure 22 Potential active transport connections

Source: AECOM, using Google Maps (2015)

The proposed crossing could enable a 10-minute cycle trip between Melrose Park and Rhodes Station (compared to a 16-minunte trip now via other crossings) and a 10-15 minute walk across the Parramatta River.

There is limited provision for active transport (pedestrians and cyclists) to cross Victoria Road. The current demand for these users is low, but will grow as a result of development in the area. New retail facilities proposed as part of the mixed-use development could attract customers from north of Victoria Road. Enhancements to facilities along Parramatta River will also attract additional active transport across Victoria Road. In the long-term, consideration may need to be given to providing a pedestrian bridge across Victoria Road, possibly in the vicinity of Kissing Point Road. This would provide opportunities to modify at-grade provision for pedestrians at the signals, simplifying the signals and improving traffic operations.

4.4 Public transport network and facilities

4.4.1 Short-term public transport provision

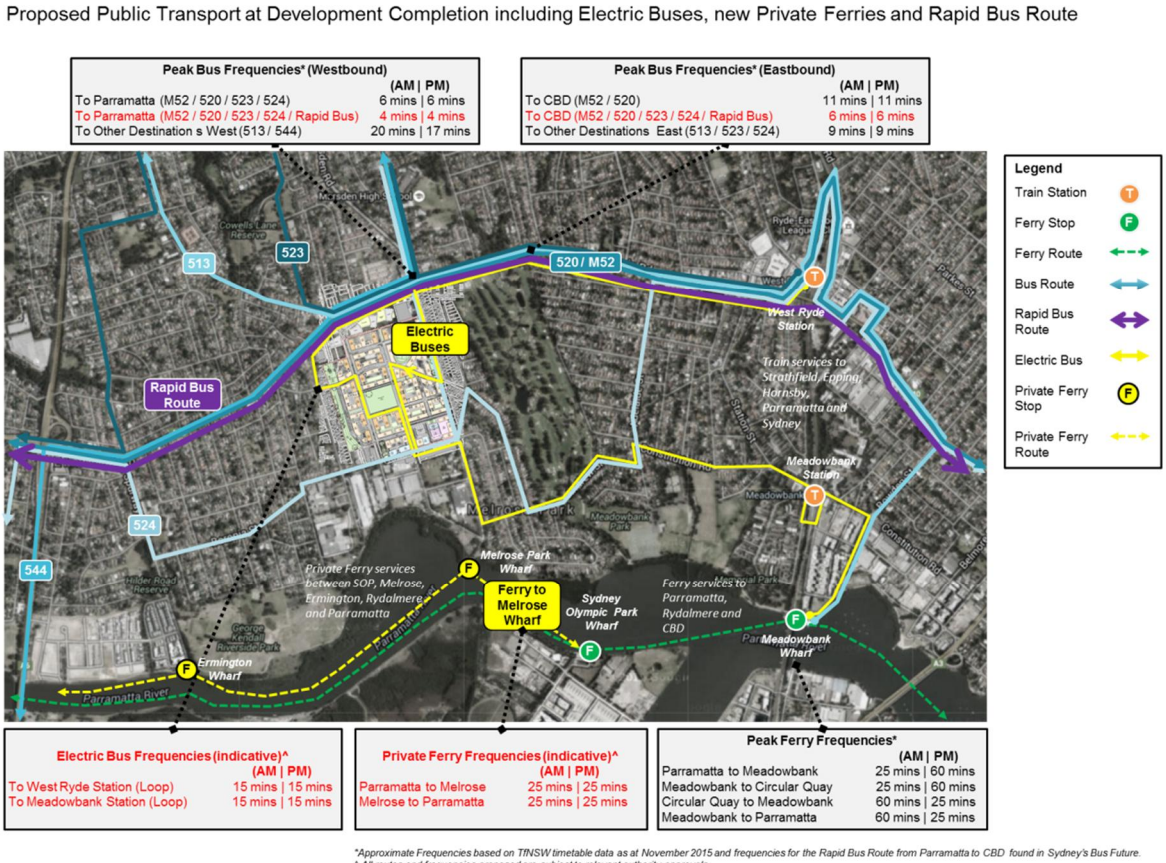
Opportunities exist for improvements to the public transport network in the area through the proposed development. In the short-term this could include:

- Additional bus services along Victoria Road identified and planned as part of the Sydney's Bus Future (over 200 extra services per week in addition to the existing 2,000 services provided on Victoria Road at Melrose Park on a weekly basis).
- New local electric bus services from Melrose Park to surrounding key transport interchanges such as West Ryde / Meadowbank Stations, Meadowbank Ferry Wharf or Top Ryde Shopping Centre (to be funded by the developer for local residents).
- New ferry wharf at Melrose Park to provide shuttle ferry services between Melrose Park and Sydney Olympic Park and Newington (to be funded by the developer for local residents).

The Victoria Road corridor is a major bus corridor and the NSW Government has identified it as a priority for improvements in Sydney's Bus Future. The plan will include providing more frequent higher speed bus services, simplifying timetables and making interchanges more convenient. It could also include a modern purpose built stop with real time information of approaching bus services. Improvements to the Victoria Road services will have a significant impact on changing travel behaviour over time, reducing car trip rates from the development.

Short-term improvements to public transport serving Melrose Park could also include new electric bus services to surrounding key transport interchanges. Potential bus routes to West Ryde and Meadowbank Stations / Meadowbank Ferry Wharf are shown in Figure 23. This figure includes the routes and frequencies of existing bus services, future committed rapid bus services along Victoria Road as well as the electric buses. Electric buses are ideal for stop / start operation for shorter bus journeys than diesel engines which are more suited to highway driving.

Figure 23 Potential new electric bus routes to connect Melrose Park development to transport interchanges



Source: AECOM (2015)

The new electric bus services would facilitate services that provide a ten-minute connection to the surrounding public transport interchanges. In future, the West Ryde service could extend to Top Ryde Shopping Centre. These bus services could also be progressively increased to meet the demand of future residents and employees. The proposed electric buses timetable during the peak hours is shown in Figure 24. The full service schedule of bus services with existing bus services, future committed rapid bus services along Victoria Road as well as the electric buses is shown in Appendix A.

Figure 24 Proposed electric buses timetable during the peak hours

Indicative Melrose Park Electric Bus Public Transport Timetable (Typical Weekday Morning)

Key Assumptions

1. Upon full Development completion (4 Electric buses)
2. PM peak timetable reflects AM peak timetable below (ie. same time frequency)
3. Regular interval pickup and dropoff
4. An Electric bus leaves Melrose Park every 7-8 minutes to either West Ryde or Meadowbank train stations

Indicative Electric Bus Timetable - West Ryde Station Loop

AM Peak

	Bus 1	Bus 2
Origin - Melrose Park Retail Plaza	6:30	6:45
Destination - West Ryde Train Station	6:40	6:55
Origin - West Ryde Train Station	6:45	7:00
Desitination - Melrose Park Retail Plaza	6:55	7:10
Origin - Melrose Park Retail Plaza	7:00	7:15
Destination - West Ryde Train Station	7:10	7:25
Origin - West Ryde Train Station	7:15	7:30
Desitination - Melrose Park Retail Plaza	7:25	7:40
Origin - Melrose Park Retail Plaza	7:30	7:45
Destination - West Ryde Train Station	7:40	7:55
Origin - West Ryde Train Station	7:45	8:00
Desitination - Melrose Park Retail Plaza	7:55	8:10
Origin - Melrose Park Retail Plaza	8:00	8:15
Destination - West Ryde Train Station	8:10	8:25
Origin - West Ryde Train Station	8:15	8:30
Desitination - Melrose Park Retail Plaza	8:25	8:40
Origin - Melrose Park Retail Plaza	8:30	8:45
Destination - West Ryde Train Station	8:40	8:55
Origin - West Ryde Train Station	8:45	9:00
Desitination - Melrose Park Retail Plaza	8:55	9:10
Origin - Melrose Park Retail Plaza	9:00	9:15
Destination - West Ryde Train Station	9:10	9:25

PM Peak

	Bus 1	Bus 2
Origin - Melrose Park Retail Plaza	16:30	16:45
Destination - West Ryde Train Station	16:40	16:55
Origin - West Ryde Train Station	16:45	17:00
Desitination - Melrose Park Retail Plaza	16:55	17:10
Origin - Melrose Park Retail Plaza	17:00	17:15
Destination - West Ryde Train Station	17:10	17:25
Origin - West Ryde Train Station	17:15	17:30
Desitination - Melrose Park Retail Plaza	17:25	17:40
Origin - Melrose Park Retail Plaza	17:30	17:45
Destination - West Ryde Train Station	17:40	17:55
Origin - West Ryde Train Station	17:45	18:00
Desitination - Melrose Park Retail Plaza	17:55	18:10
Origin - Melrose Park Retail Plaza	18:00	18:15
Destination - West Ryde Train Station	18:10	18:25
Origin - West Ryde Train Station	18:15	18:30
Desitination - Melrose Park Retail Plaza	18:25	18:40
Origin - Melrose Park Retail Plaza	18:30	18:45
Destination - West Ryde Train Station	18:40	18:55
Origin - West Ryde Train Station	18:45	19:00
Desitination - Melrose Park Retail Plaza	18:55	19:10
Origin - Melrose Park Retail Plaza	19:00	19:15
Destination - West Ryde Train Station	19:10	19:25

* Subject to authority approvals

	Time
Assumed trip duration	*10*
Assumed destination dwell time	*5*

Indicative Electric Bus Timetable - Meadowbank Station Loop

AM Peak

	Bus 3	Bus 4
Origin - Melrose Park Retail Plaza	6:37	6:52
Destination - Meadowbank Train Station	6:47	7:02
Origin - Meadowbank Train Station	6:52	7:07
Desitination - Melrose Park Retail Plaza	7:02	7:17
Origin - Melrose Park Retail Plaza	7:07	7:22
Destination - Meadowbank Train Station	7:17	7:32
Origin - Meadowbank Train Station	7:22	7:37
Desitination - Melrose Park Retail Plaza	7:32	7:47
Origin - Melrose Park Retail Plaza	7:37	7:52
Destination - Meadowbank Train Station	7:47	8:02
Origin - Meadowbank Train Station	7:52	8:07
Desitination - Melrose Park Retail Plaza	8:02	8:17
Origin - Melrose Park Retail Plaza	8:07	8:22
Destination - Meadowbank Train Station	8:17	8:32
Origin - Meadowbank Train Station	8:22	8:37
Desitination - Melrose Park Retail Plaza	8:32	8:47
Origin - Melrose Park Retail Plaza	8:37	8:52
Destination - Meadowbank Train Station	8:47	9:02
Origin - Meadowbank Train Station	8:52	9:07
Desitination - Melrose Park Retail Plaza	9:02	9:17
Origin - Melrose Park Retail Plaza	9:07	9:22
Destination - Meadowbank Train Station	9:17	9:32

PM Peak

	Bus 3	Bus 4
Origin - Melrose Park Retail Plaza	16:37	16:52
Destination - Meadowbank Train Station	16:47	17:02
Origin - Meadowbank Train Station	16:52	17:07
Desitination - Melrose Park Retail Plaza	17:02	17:17
Origin - Melrose Park Retail Plaza	17:07	17:22
Destination - Meadowbank Train Station	17:17	17:32
Origin - Meadowbank Train Station	17:22	17:37
Desitination - Melrose Park Retail Plaza	17:32	17:47
Origin - Melrose Park Retail Plaza	17:37	17:52
Destination - Meadowbank Train Station	17:47	18:02
Origin - Meadowbank Train Station	17:52	18:07
Desitination - Melrose Park Retail Plaza	18:02	18:17
Origin - Melrose Park Retail Plaza	18:07	18:22
Destination - Meadowbank Train Station	18:17	18:32
Origin - Meadowbank Train Station	18:22	18:37
Desitination - Melrose Park Retail Plaza	18:32	18:47
Origin - Melrose Park Retail Plaza	18:37	18:52
Destination - Meadowbank Train Station	18:47	19:02
Origin - Meadowbank Train Station	18:52	19:07
Desitination - Melrose Park Retail Plaza	19:02	19:17
Origin - Melrose Park Retail Plaza	19:07	19:22
Destination - Meadowbank Train Station	19:17	19:32

* Subject to authority approvals

	Time
Assumed trip duration	*10*
Assumed destination dwell time	*5*

Source: AECOM (2015)

Another short-term option to improve public transport connections to Melrose Park would be to provide a new ferry connection between Melrose Park and Sydney Olympic Park / Parramatta via Ermington and Rydalmere. This could operate prior to the construction of a bridge link across Parramatta River. Potential private ferry routes to Sydney Olympic Park / Parramatta are shown in Figure 23

Figure 25 Potential shuttle ferry route timetable

Indicative Melrose Park Private Ferry Public Transport Timetable (Typical Weekday Morning)

Key Assumptions

1. Upon full Development completion (2 Private Ferries)
2. PM peak timetable reflects AM peak timetable below (ie. same time frequency)
3. Regular interval pickup and dropoff
4. A Ferry leaves Melrose Park every 20 minutes to Parramatta
5. Potential stops include;
   - SOPA
   - Ermmington
   - Rydalmere

Indicative Private Ferry Timetable - Parramatta

AM Peak

	Ferry 1	Ferry 2
Origin - Melrose Park Ferry Wharf	6:30	6:55
Destination - Parramatta Wharf	6:50	7:15
Origin - Parramatta Wharf	6:55	7:20
Desitination - Melrose Park Ferry Wharf	7:15	7:40
Origin - Melrose Park Ferry Wharf	7:20	7:45
Destination - Parramatta Wharf	7:40	8:05
Origin - Parramatta Wharf	7:45	8:10
Desitination - Melrose Park Ferry Wharf	8:05	8:30
Origin - Melrose Park Ferry Wharf	8:10	8:35
Destination - Parramatta Wharf	8:30	8:55
Origin - Parramatta Wharf	8:35	9:00
Desitination - Melrose Park Ferry Wharf	8:55	9:20
Origin - Melrose Park Ferry Wharf	9:00	9:25
Destination - Parramatta Wharf	9:20	9:45

PM Peak

	Ferry 1	Ferry 2
Origin - Melrose Park Ferry Wharf	16:30	16:55
Destination - Parramatta Wharf	16:50	17:15
Origin - Parramatta Wharf	16:55	17:20
Desitination - Melrose Park Ferry Wharf	17:15	17:40
Origin - Melrose Park Ferry Wharf	17:20	17:45
Destination - Parramatta Wharf	17:40	18:05
Origin - Parramatta Wharf	17:45	18:10
Desitination - Melrose Park Ferry Wharf	18:05	18:30
Origin - Melrose Park Ferry Wharf	18:10	18:35
Destination - Parramatta Wharf	18:30	18:55
Origin - Parramatta Wharf	18:35	19:00
Desitination - Melrose Park Ferry Wharf	18:55	19:20
Origin - Melrose Park Ferry Wharf	19:00	19:25
Destination - Parramatta Wharf	19:20	19:45

* Subject to authority approvals

	Time
Indicative trip duration	*20*
Assumed destination dwell time	*5*

Source: AECOM (2015)

4.4.2 Long term public transport provision

As discussed in Section 4.3.2, an active transport bridge connection could facilitate better connection between Melrose Park and Sydney Olympic Park. Similar to the Homebush Bridge, this proposed Parramatta River crossing could also provide a public transport function. This could provide alternative public transport connections between Melrose Park, Wentworth Point and Rhodes as well as the Victoria Road Rapid Bus Corridor as shown in Figure 26. The proposed Parramatta River bridge crossing at Melrose Park could facilitate a 15-minute bus trip between Melrose Park and Rhodes Station (compared to a 25-30 min trip now via the existing crossing along Homebush Bay Drive).

Figure 26 Potential long term public transport connections via the Parramatta River Crossings

Source: AECOM (2015)

The rail mode is the primary means of transporting people to City; a key destination. The NSW Government has a long term plan to increase the capacity of Sydney's rail network through investment in new services and upgrading of existing infrastructure. This will mean more reliable and more frequent train services. This plan will eventually enable Sydney Trains to carry another 90,000 to 100,000 people per hour in the peak. Improvements to the Western Line will have a noticeable impact on changing travel behaviour over time, assisted by new bus connections to Melrose Park via the future active transport bridge across Parramatta River.

4.5 Parking provision

For the purpose of the rezoning application, it is generally assumed that an appropriate number of parking spaces would be provided in accordance with Council DCP guidance. The latest changes in Parramatta City Council LEP has encouraged all development to have lower car parking supply due to close proximity to excellent public transport services, as well as shopping and work facilities.

According to the Australian Bureau of Statistics (ABS) 2011 census data, approximately 30 per cent of residents in the Parramatta CBD area did not own a car, which indicates a strong market response to good quality public transport. Limiting car parking can also be an effective tool in encouraging further public transport use and reduce reliance on car uses.

With the planning of a high-density development at Melrose Park that has excellent accessibility to public and active transport provisions (as discussed in previous sections of the report) as well as good range of local shops, schools, services and facilities within walking distance, the need to own and operate a car could be significantly reduced. Therefore, parking provision for this development could be restrained to account for the availability of other travel options, as well as accessibility to local services. This will lead to reduced car dependence and encourage uptake of other modes. The implementation of this measure should be further discussed with Council and may need to prepare the site-specific DCP, if appropriate.

4.6 Sustainable travel measures to reduce car dependency

Sustainable transport and Travel Demand Management (TDM) strategies involve the application of policies, objectives, measures and targets to influence travel behaviour, to encourage uptake of sustainable forms of transport, i.e. non-car modes, wherever possible and to reduce the need to travel and hence reduce overall transport and travel demand and the impacts of new development.

A Green Travel Club (employers and residents) should be formed to deliver best practice travel programs and initiatives to manage travel demand. Key initiatives and measures could be developed to:

- Reduce the need to travel
  - Location of a childcare centre, gym, medical, community and retail services on site
  - Broadband and mobile phone discounts for employees to facilitate remote working and support flexible work practices including core hours.
- Improve non-car travel methods
  - Cycling:
    - Dedicated on-site cycle routes that connects to the regional routes and major transport hubs
    - Provision of good quality bike parking facilities at within the development and at nearby train and ferry interchanges
    - Provision of neighbourhood bicycles to be used by residents for exercise, travel to train stations
    - High quality end-of-trip facilities (secure bicycle storage, lockers and showers)
    - Promotion of bicycle initiatives – NSW bicycle week, cycle to work day
    - Establishment of a Bicycle User / Consultation Group
    - ‘Cycle Update’ newsletter.
  - Walking:
    - A highly permeable and safe pedestrian network throughout the development
    - Commissioning expert pedestrian audit of local streets
    - Production of local walking maps
    - New pedestrian infrastructure (eg: Shelter seating areas)
  - Public transport:
    - Reimbursement of public transport costs
    - Free electric bus services to be provided by developer for local residents
    - Tailored public transport services with maximum coverage of the development
    - Early provision of efficient and frequent public transport services to establish a non-car travel behaviour
    - Good quality bus stops with coverage throughout the development.
  - Communication and Information:
    - Online personalised journey planner
    - Pocket travel guide, travel information packs for residents and employees
    - Advertising in building lifts the timing of next bus departure as well as public transport timetables
    - Employee travel clinics prior to relocation.
  - Ensure the most efficient use of car parking spaces
    - Centralised parking
    - Car share scheme and car-share vehicles.

5.0 Traffic Impact Assessment

5.1 Introduction

This section of the report assesses the likely traffic impacts of the proposed rezoning on the local road network and recommends mitigation measures to alleviate any impacts if required.

5.2 Modelling approach and scenarios

The basis of the traffic modelling by AECOM to date is an analysis of peak hour traffic operations on Victoria Road between Hughes Avenue and Wharf Road. The purpose of this modelling was to understand the feasibility of the development and the level of intervention required to cater for this proposal.

Due to the observed congestion and the high degree of saturation along Victoria Road at peak hours, it is also assumed in the current traffic modelling that there will be negligible background traffic growth. The majority of growth is expected to occur outside peak hours.

Initially a Linked SIDRA model of the existing road conditions was generated and then calibrated to reflect existing delays and queueing. Using this model as a base future development and intersection upgrade scenarios were simulated and analysed in order to assess the effectiveness of the preferred road network improvement options.

5.3 Trip generation

5.3.1 High density residential uses

The RMS has recently undertaken additional traffic surveys for high density developments to understand the traffic impacts of this emerging land use changes. Eight surveys were conducted in 2012 in Sydney. All developments were (i) close to public transport, (ii) greater than six storeys and (iii) almost exclusively residential in nature. The average trip generation rates for these sites are provided in Table 11.

Table 11 High density residential flat dwellings trip generation rates

Peak	Average rate	Range
AM peak (1 hour) vehicle trips per unit	0.19	0.07-0.32
PM peak (1 hour) vehicle trips per unit	0.15	0.06-0.41

Source: RMS Traffic Generation Technical Direction (2013)

It is considered that that the proposed trip rate for the Melrose Park development would be similar to (or even slightly lower than) these recently surveyed average rate for the following reasons:

- The density of the proposed development is significantly higher than the ones surveyed. A review of 2011 Census JTW and HTS survey data (as shown in Table 12) suggested that other areas / suburbs with relatively higher density generally have lower car ownership rates and lower car share (around 45-50 per cent compared to 60-80 per cent) and higher public / active transport share (around 45-50 per cent compared to 20-40 per cent). Currently the low density dwellings in Melrose Park show higher car ownership, higher car use and lower public transport usage characteristics, but based on the empirical data there is potential for a much reduced car usage (at least up to 20% reduction and shift to public transport) in future, particularly with new public transport initiatives and increased urban density along major bus corridors such as Victoria Road.
- The site is close to Victoria Road which is one of Sydney's busiest bus corridors and is planned to be converted to a rapid bus route with further additional bus services which connects future residents and employees to major centres including Parramatta, Ryde and the CBD. The proposed development has excellent public transport coverage and access to public transport which will drive further reduction in trip generation rates.
- The proposed development will be a mixed-use development with retail and commercial activities supporting the local residents and employees. A local primary school is also located within close proximity to the proposed development just south of Hope Street. The mixed-use nature of the development (instead of the almost exclusively residential in nature for the development surveyed by RMS) will enable some level of trip

containment, up to as much as 25% internal trips based on historical data. Therefore the trip rate that would apply to understand the traffic impacts of the external strategic road network should also be reduced.

- Due to the longevity of the roll-out of this development (15-20 years), the travel behaviour and travel pattern of future residents could change or shift significantly from the current pattern due to flexibility in working arrangements such as increased opportunity for working from home and flexible working hours to minimise travel during the peak periods, as well as technology advancement which could minimise or negate a lot of car travel. All these factors could reduce the need for car travel, particularly during the peak hours.
- In addition, the creation of an active transport link across Parramatta River would provide improved transport connections to the growing areas of Rhodes, Sydney Olympic Park and Parramatta Road corridor. This will provide better access to jobs, businesses and services, as well as high capacity and frequency public transport services in the Parramatta Road corridor.

Table 12 Mode share range for areas with varying density

Location	Density (persons/Ha)	Car Ownership (vehicles per dwelling	Mode Share			
			Car	PT	Walk Only	Other
Melrose Park (current)	**22**	**1.6**	**77%**	**20%**	**1%**	**2%**
Maroubra Junction	187	1.3	51%	41%	5%	3%
North Parramatta	149	1.3	48%	35%	14%	3%
Rhodes	138	1.2	48%	44%	5%	3%
Kingsford	114	1.1	48%	36%	11%	5%
Lidcombe	92	1.4	46%	46%	5%	3%
Homebush	73	1.3	47%	47%	3%	3%
Meadowbank	42	1.2	54%	41%	3%	2%
West Ryde	33	1.4	60%	35%	3%	2%
Denistone East	30	1.8	74%	19%	3%	4%
Eastwood	27	1.8	60%	34%	5%	1%
Denistone West	24	1.8	68%	26%	3%	3%
Cabarita	15	1.9	77%	18%	1%	4%

Source: 2011 Census JTW & HTS

Based on the above considerations, a range of travel parameters were reviewed to consider how the vehicular trip rates could be varied in the long-term future. The travel parameters that could affect traffic using Victoria Road are noted as A1 to A7 in Table 13.

Table 13 Potential changes travel parameters

No.	Parameter	Measure	Likely Range	Comment on Change
A1	Trip containment	% local trips - local jobs, shops, schools	7-25%	Low now, so can expect increase to 25% if mixed use
A2	% workers at home	% work from home, % away, teleworking	12-20%	Highly likely to increase for office workers
A3	% workers in peak hour	% shift workers, % travel in peak	35-50%	Will gradually decrease
A4	Trip distribution	more jobs in Parramatta, more local jobs	29-33 W 13-15 N 36-51 E	Likely to change with more trips to Parramatta
A5	Rat running	% trips to/from Victoria Rd	0-15%	To be managed, but likely to increase
A6	Mode use	% car	60-77%	Highly likely to see shift to active / public transport modes with higher density developments
A7	Car occupancy	persons per car	1.1-1.2	Not likely to change much in peaks
A8	Car ownership	No. of cars own per household	1.2-1.6	Likely to reduce

Note: Current parameter values in black; future potential parameter values in red

Source: AECOM (2015)

If all these changes in travel parameters were to occur, then the peak hour trip rates for residential dwellings for Melrose Park could be reduced from the average rates to lower rates surveyed by RMS recently. This could be further confirmed and justified by surveys of actual trip generation rates for similar sites such as Victoria Park, Wentworth Point, etc.

Assuming a project horizon of 10 to 15 years, the peak hour trip increase will occur on the surrounding road network over a long period of time and are expected to be offset by an improving public transport system and an active transport network. Therefore, a lower trip generation rate can be justified.

However, for the purpose of this planning proposal, the RMS average rates have been adopted without application of any reductions to account for linked trips and trip containment within the mixed use development. All the other potential changes in travel parameters have not been accounted in the adopted peak hour residential trip rates for a conservative assessment.

5.3.2 Commercial, retail and community uses

For the proposed commercial uses as part of the development, standard RMS rates have been adopted for trip generation and traffic modelling purposes. These rates are considered appropriate given good public transport accessibility to the proposed development as discussed in Chapter 4 of the report.

For the retail rates, a recent traffic survey at the East Village Shopping Centre has been undertaken to determine the actual trip generation rate for centres of similar size to the proposed retail component. In this regard, the surveyed data indicated that the shopping centre – which has about 13,500m^2 of floor area including about 4,000m^2 of supermarket as part of a mixed use high density residential development – generated on average 525 peak hour trips during the Thursday PM period. This equates to a rate of 3.89 trips per 100m^2 of GFA, which is only 51% of the RMS quoted rates. The data indicates that there is a significant lower reliance in cars for retail shopping when the retail component is part of a mixed use high density residential development. Based on the same principles, a similar reduction to the RMS quoted rate (51% of 12.3 trips per 100m^2 of GFA – 6.2 trips per 100m^2 of GFA) for the retail component of this development has been used for this assessment for the PM peak.

It is accepted that the AM peak rates are generally significant lower as limited shopping activities are expected to be occurring during the AM peak hours. Therefore a rate similar to the commercial use has been assumed for the retail use for the purpose of this assessment. The same approach has been adopted and approved for other town centres such as Rouse Hill and Edmondson Park Town Centre.

For the child care centre component of the development, RMS trip rates have been applied which provide trip rates for different types of day care centres. As part of the assessment, it has been assumed it operates as a long-day care centre which as a trip rate of 0.8 and 0.7 trips per child during the AM peak and PM peak respectively. Given the trip rates occur during a two hour peak these trip rates have been halved. It also has been assumed the child care centre could accommodate 50 children per 500m^2.

Table 14 Mixed use vehicular trip generation rates

Uses	AM peak (1 hour)	PM peak (1 hour)
Commercial including community uses	1.6 trips per 100m^2 of GFA	1.2 trips per 100m^2 of GFA
Retail	1.6 trips per 100m^2 of GFA	6.2 trips per 100m^2 of GLFA
Child care centre (long-day care)*	0.4 trips per child	0.35 trips per child

** these trips rates have been halved and it has been assumed the child care centre accommodates 50 children per 500m^2.*

Source: RMS Traffic Generation Technical Direction (2013)

5.3.3 Summary

Based on the above trip generation rate assumptions, the overall trip generation summary for the mixed use development of Melrose Park is shown in Table 15.

Table 15 Trip generation summary

Land use	Development Yield	AM trip rate	AM peak hour total trips	PM trip rate	PM peak hour total trips
Residential (high density)	5,200 dwellings (incl. 150 affordable housing)	0.19 trips per dwelling	988	0.15 trips per dwelling	780
Commercial development	15,000m^2 GFA	1.6 trips per 100m^2 of GFA	240	1.2 trips per 100m^2 of GFA	180
Retail	8,100m^2 GFA (6,500m^2 GLFA)	1.6 trips per 100m^2 GFA	130	6.2 trips per 100m^2 of GLFA	402
Child care	1,500m^2 GFA	50 children per 500m^2 0.4 trips per child	60	50 children per 500m^2 0.35 trips per child	53
Total			1,418		1,415

Note: 2,500 m^2 GFA of community facilities has been assumed to not generate traffic during the peak hours.

Source: AECOM (2015)

Based on the above trip rate assumptions, the proposed development at Melrose Park (north of Hope Street) would be expected to generate just over 1,400 trips in the AM and PM peak hours. The following assumptions have been made with regards to trip movements in and out of the proposed development:

- 80% of the residential trips will leave the site in the AM peak and 20% will enter the site.
- 80% of the residential trips will enter the site in the PM peak and 20% will leave the site.
- 95% of the commercial / retail trips will enter the site in the AM peak and 5% will leave the site.
- 40% of the commercial / retail trips will enter the site in the PM peak and 60% will leave the site.
- 50% of the child care trips will enter the site in the AM peak and 50% will leave the site.
- 50% of the child care trips will enter the site in the PM peak and 50% will leave the site.

A comparative scenario was also undertaken to consider the likely trip generation if the current site were to be redeveloped with maximum yield under the IN1 (industrial) zoning with a Floor Space Ratio (FSR) of 1:1. This implies that the 33ha site could generate:

- Up to 3,300 peak hour trips if the site is developed to 100% industrial uses.
- Up to 2,000 peak hour trips if the site is developed to 100% business park uses.
- Up to 5,300 peak hour trips if the site is developed to 100% commercial uses.

These trips were estimated using standard RMS trip rates and the trip generation comparison shows that all the employment use scenarios could generate significantly higher than the mixed use development proposal. In addition to the general traffic movements determined above, the employment uses will also generate associated truck movements. Therefore, the rezoning would be expected to improve the local residential amenity due to the reduction of truck movements.

5.4 Trip distribution

Trip distribution and assignment for the development trips has been determined based on existing JTW pattern as described in **Section 2.1**, but adjusted to reflect additional employment opportunities in Western Sydney, particularly Parramatta.

The travel pattern of trips into and out of the selected travel zone at the subject site has been taken into account to determine the trip distribution pattern of the proposed development and the likely routes the trips will take on the strategic road network. Table 16 shows the travel directions of trips for the AM peak hour. It has been assumed that the reverse travel pattern will occur for the PM peak hour.

Table 16 Distribution of proposed trips – AM peak hour

Direction	Strategic road link	In	Out
East	Victoria Road	18%	55%
North	Victoria Road, Marsden Road, Kissing Point Road	41%	14%
West	Victoria Road	32%	10%
East / West	Hope Street	9%	21%
Total		100%	100%

Source: AECOM based on JTW data (2015)

5.5 Forecast traffic volumes

Development generated trips (including those generated by the development at 657-661 Victoria Road and 4-6 Wharf Road, Melrose Park) have been added to the 2014 base network according to the distribution pattern illustrated in Table 16. It should also be noted that the traffic generated by the existing development occupied for industrial employment purpose has been removed from the network for the purpose of this assessment.

The expected increase in traffic along Victoria Road during the peak hours are shown in Figure 27 and Figure 28. In all cases, given the access locations there are some noticeable increases in traffic using Wharf Road and the southern approach of Kissing Point Road intersection, ranging from 300 to 800 veh/h in peak hours. The delays at side streets may cause some retiming and redistribution of trips.

Figure 27 Expected traffic increase – Scenario 1 (4 accesses on Victoria Road) AM peak

Source: AECOM (2016)

Figure 28 Expected traffic increase – Scenario 1 (4 accesses on Victoria Road) PM peak

Source: AECOM (2016)

5.6 Intersection assessment

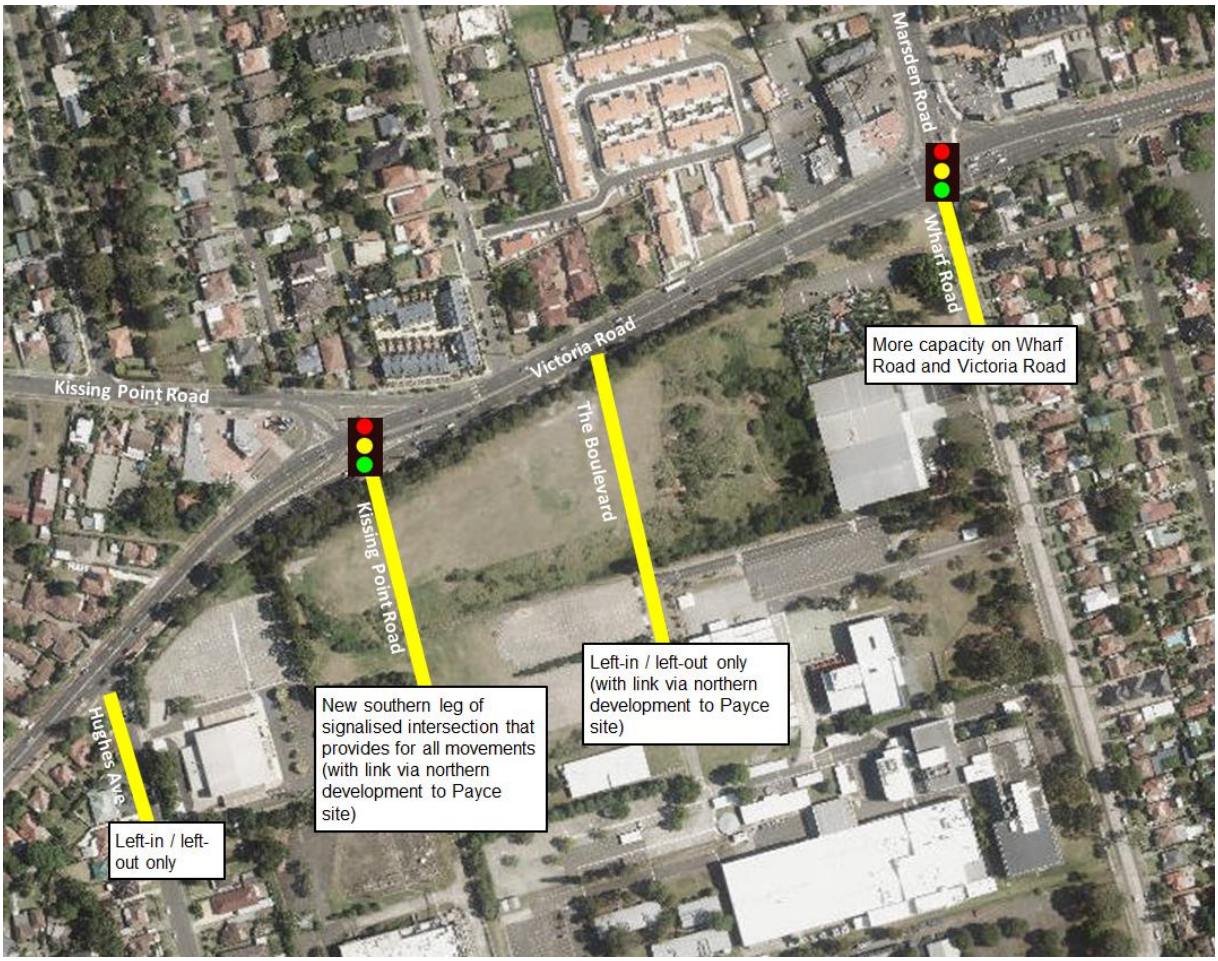
The key intersections in the vicinity of the proposed development on Victoria Road between Wharf Road and Hughes Avenue have been remodelled in *SIDRA 6.1* in the AM and PM peak hour. As historical traffic data in the area shows a negative average annual growth rate, the existing 2014 traffic flows have been used as background traffic with other committed development traffic (including development at 657-661 Victoria Road and 4-6 Wharf Road, Melrose Park), and subject development traffic added on top.

The access scenario on Victoria Road has been considered as part of this assessment:

1) Access of development trips via Wharf Road and Hughes Avenue at Victoria Road with two internal connections through the northern development at 657-661 Victoria Road and 4-6 Wharf Road, Melrose Park to access Victoria Road via Kissing Point Road extension (traffic signals) and The Boulevard (left-in left-out) – 4 intersections along Victoria Road.

The proposed upgrades that would be required to achieve satisfactory intersection performance are highlighted in Figure 29.

Figure 29 Proposed upgrades along Victoria Road



Source: AECOM (2016)

5.6.1 Intersection modelling outcomes

The intersection modelling indicates that it could be possible to achieve the proposed yield for full development of the site master plan. Table 17 provides a summary of future traffic conditions as a result of the proposed mixed use development north of Hope Street, with the proposed upgrades as shown in Figure 29. It shows:

- All intersections will continue to operate at a satisfactory level of service (i.e. D or better).
- All intersections will operate within capacity (DoS < 1).
- There will be small changes in delays and queues compared with the existing situation at the Wharf Road intersection.
- There will be relatively large increases in delays and queues at the Kissing Point Road intersection because of the additional southern approach of the intersection, with increased delays to Victoria Road traffic, particularly in the westbound direction.

Table 17 Summary of intersection performance

Intersection	Peak	Degree of Saturation	Average Delay	Level of Service	95% Back of Queue (worst two legs)	Comparison with Existing
Victoria Road / Marsden Road / Wharf Road	AM	0.996	39.7	C	326m Victoria Road (WA) 186m Victoria Road (EA)	Increase in delays (12s) and increased queueing on the western approach
	PM	0.907	41.9	C	326m Victoria Road (WA) 233m Victoria Road (EA)	Decrease in delays (11s) & decreased queueing on the western and eastern approach
Victoria Road / The Boulevard	AM	0.718	0.2	A	93m Victoria Road (WA) 60m Victoria Road (EA)	New intersection
	PM	0.618	0.3	A	38 Victoria Road (WA)	
Victoria Road / Kissing Point Road	AM	0.903	37.5	C	217m Victoria Road (WA) 326m Victoria Road (EA)	Increase in delays (30s) queueing on Victoria Road due to addition of southern approach
	PM	0.929	43.2	D	363m Victoria Road (WA) 219m Victoria Road (EA)	Small increase in delays (3s) & increase queueing on the western & eastern approach
Victoria Road / Hughes Avenue	AM	0.547	0.4	A	5m Hughes Avenue (SA)	Small increase in queuing (3m-Hughes Av)
	PM	0.616	0.5	A	8m Hughes Avenue (SA)	Small increase in queuing (4m-Hughes Av)

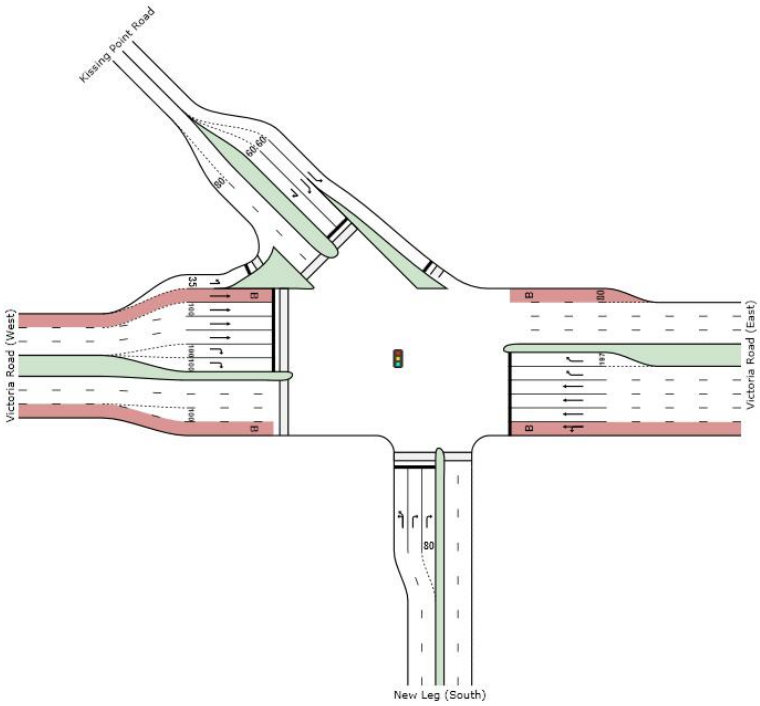
Note: WA – west approach; EA – east approach, NA – north approach, SA – south approach

Source: AECOM (2016)

Initially the layout as shown in the development at 657-661 Victoria Road and 4-6 Wharf Road TIA was modelled for the Kissing Point Road and Wharf Road intersections. The modelling has suggested that there is a need to provide a separate short through and a separate short through lane with dedicated dual right turn lane to maximise the right turn capacity at the Wharf Road intersection. It is also recommended that a dual eastbound right turn lane (short lane) is provided at the intersection of Kissing Point Road, which is consistent with the JBA concept design.

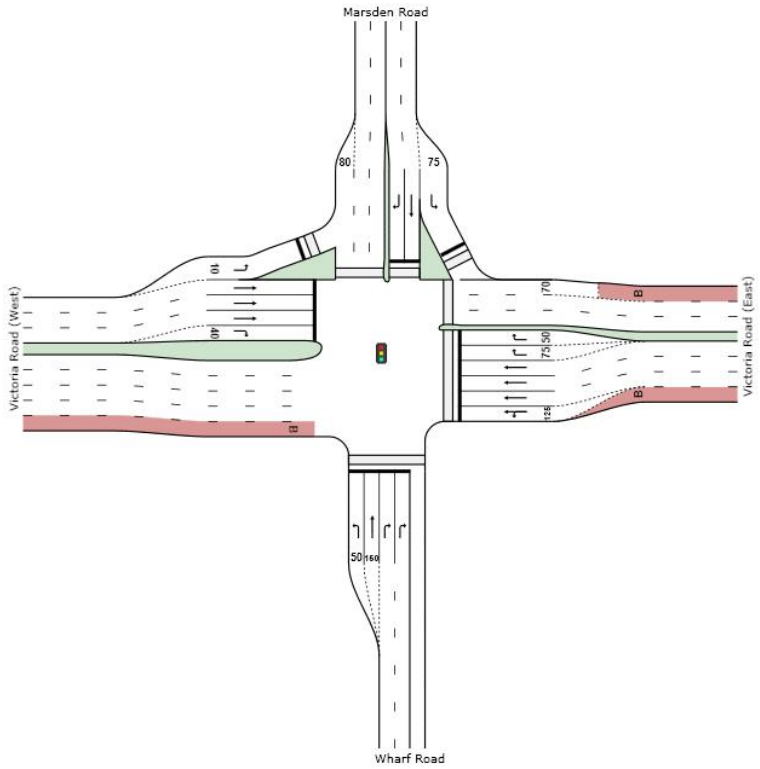
The proposed layout for Kissing Point Road and Wharf Road intersections with Victoria Road are shown in Figure 30 and Figure 31.

Figure 30 Victoria Road / Kissing Point Road Conceptual Layout



Source: AECOM (2016)

Figure 31 Victoria Road / Wharf Road / Marsden Road Conceptual Layout



Source: AECOM (2016)

6.0 Conclusions

The proposed Melrose Park mixed use development (refer to Figure 2) is feasible with progressive changes in transport infrastructure and changed travel behaviour identified in this report. To accommodate the proposed new development traffic and encourage changes in travel patterns, a package of infrastructure and travel behaviour change initiatives need to be considered, including intersection upgrades, public and active transport provisions and other initiatives (eg. demand management, parking strategy).

6.1 Proposed accesses

Victoria Road provides the primary access to the site at Melrose Park. The primary existing access to Victoria Road in the immediate vicinity of the proposed development is the signalised intersection with Wharf Road and Marsden Road; Wharf Road running along the eastern edge of the site. To the west of the site, Hughes Avenue provides an alternative means of access to the proposed development.

The development to the north of the Payce site at 657-661 Victoria Road and 4-6 Wharf Road will provide additional accesses to Victoria Road, including a southern fourth leg to the existing signals at Kissing Point Road. Through connections between the two sites will enable enhanced transport connections between Victoria Road and Parramatta River.

6.2 Proposed intersection upgrades

The proposed development is expected to generate just over 1,400 trips in the AM and PM peak hours. It is also expected that there will be a reduction of truck movements that currently service the industrial areas on the surrounding road network.

To accommodate the subject development traffic, the following intersection improvements are proposed in order to ensure the satisfactory operation of the road network surrounding the site:

- Victoria Road / Wharf Road
    - Changing of lane allocation on the Wharf Road approach (from the concept design plans presented in the 657-661 Victoria Road and 4-6 Wharf Road development DA with no physical infrastructure changes). It is proposed a dedicated dual right turn lane is provided on the Wharf Road approach with a short through and a short left turn lane.
- Victoria Road / Kissing Point Road
    - Upgrade intersection with additional approach to the site and extension of turning lanes on Victoria Road (to be undertaken as part of the Development Application for the 657-661 Victoria Road and 4-6 Wharf Road site). It is also proposed a dual eastbound right turn lane (short lane) is provided which is consistent with the JBA concept design.

In addition to the planned transport improvements, there is consideration by Roads and Maritime Services to upgrade Victoria Road between Wharf Road and Hughes Avenue with new bus lanes on Victoria Road to fill in the gaps between Hughes Avenue and Wharf Road.

6.3 Proposed active and public transport initiatives

The *NSW Long Term Transport Master Plan* has identified 46 demand corridors connecting Sydney's many centres and where high concentration of travel demand occur during peak periods on all travel modes, including the Victoria Road corridor that provides connection between Parramatta and Sydney CBD. Expanding the capacity of this corridor will rely on improving bus priority and efficiency in the short term, and deploying higher capacity road-based transit in the longer term. A number of opportunities have been identified that would improve the network capacity and connectivity to support future population and employment growth of this site:

- Sydney's Bus Future has identified a rapid bus route between Parramatta and the CBD via Ryde along the Victoria Road corridor, including:

  - Extra services planned through corridor with 40 extra rapid bus services per weekday are proposed in the Victoria Road corridor (over 200 extra services per week in addition to the existing 2,000 services provided on Victoria Road at Melrose Park on a weekly basis)
  - Bus priority schemes on Victoria Road and extended bus lane operating hours
  - Reduced number of stops along the corridor and therefore reduced travel time from Parramatta to CBD
  - Interchange facilities at Top Ryde for connections to Burwood, Hurstville, Macquarie Park
- Planned increased service frequency on the local rail network as part of Sydney's Rail Future
- Sydney's Ferry Future will provide customers with more frequent services, better connections and improved wharves to improve accessibility.
- TfNSW is working with Parramatta City Council to complete a Western Sydney Light Rail Feasibility Study. The Sydney Olympic Park / Rhodes line will benefit Melrose Park if a public / active transport bridge is constructed to connect Melrose Park with Wentworth Point and Sydney Olympic Park.

Other potential initiatives that can encourage change in travel patterns and behaviour for the Melrose Park Project, as well as to reduce car dependency include:

- New and improved connections to local and regional cycleways on Hope Street, Cobham Avenue which extends to Marsden Road.
- Upgrade of a Parramatta River Foreshore pedestrian and cycleway connection to Parramatta.
- Provision of neighbourhood bicycles to be used by residents for exercise, travel to train stations and the like.
- Additional bike parking facilities within the development and at nearby train and ferry interchanges, where possible.
- New active and public transport bridge crossing of the Parramatta River between Melrose Park and Sydney Olympic Park and Rhodes (via Homebush Bridge).
- New local electric bus services from Melrose Park to surrounding key transport interchanges such as West Ryde / Meadowbank Stations, Meadowbank Ferry Wharf or Top Ryde Shopping Centre (to be funded by the developer for local residents).
- New ferry wharf at Melrose Park to provide shuttle ferry services between Melrose Park and Sydney Olympic Park and Parramatta via Ermington and Rydalmere (to be funded by the developer for local residents).
- Car sharing scheme and parking policy changes / initiatives to reduce dependency on car use.
- TravelSmart – involving a range of information and education initiatives.
- Advertising in building lifts the timing of next bus departure as well as public transport timetables.

Appendix A

Existing and Proposed Bus and Ferry Service Schedule

Total Bus and Ferry Services Departing from Melrose Park

		Buses			Ferries		
	Time	Existing Buses	Sydney's Bus Future*	With development (Electric Bus)	Existing Ferries	With development (Private Ferries)	Combined Future Bus and Ferry Services
AM	06:30		(Rapid Bus Service to Parramatta)	(Electric Bus to West Ryde Station)		(Private Ferry to Parramatta,)	(Rapid Bus Service to Parramatta) (Electric Bus to West Ryde Station) (Private Ferry to Parramatta,)
	06:31						
	06:32	(M52 to Parramatta) (M52 to CBD)					(M52 to Parramatta) (M52 to CBD)
	06:33				(Ferry to Circular Quay)		(Ferry to Circular Quay)
	06:34	(524 to West Ryde)					(524 to West Ryde)
	06:35						
	06:36	(513 to Meadowbank Wharf)					(513 to Meadowbank Wharf)
	06:37			(Electric Bus to Meadowbank Station)			(Electric Bus to Meadowbank Station)
	06:38				(Ferry to Circular Quay)		(Ferry to Circular Quay)
	06:39	(M52 to CBD) (544 to Auburn)					(M52 to CBD) (544 to Auburn)
	06:40		(Rapid Bus Service to CBD)				(Rapid Bus Service to CBD)
	06:41						
	06:42	(523 to Parramatta)					(523 to Parramatta)
	06:43						
	06:44						
	06:45			(Electric Bus to West Ryde Station)			(Electric Bus to West Ryde Station)
	06:46	(520 to Parramatta)					(520 to Parramatta)
	06:47						
	06:48		(Rapid Bus Service to Parramatta)				(Rapid Bus Service to Parramatta)
	06:49						
	06:50						
	06:51						
	06:52	(544 to Macquarie Centre)		(Electric Bus to Meadowbank Station)			(544 to Macquarie Centre) (Electric Bus to Meadowbank Station)
	06:53	(M52 to Parramatta) (M52 to CBD)					(M52 to Parramatta) (M52 to CBD)
	06:54						
	06:55	(524 to Parramatta)				(Private Ferry to Parramatta,)	(524 to Parramatta) (Private Ferry to Parramatta,)
	06:56						
	06:57						
	06:58		(Rapid Bus Service to CBD)				(Rapid Bus Service to CBD)
	06:59						
	07:00	(M52 to Parramatta)		(Electric Bus to West Ryde Station)			(M52 to Parramatta) (Electric Bus to West Ryde Station)
	07:01						
	07:02						
	07:03				(Ferry to Circular Quay)		(Ferry to Circular Quay)
	07:04						
	07:05						
	07:06		(Rapid Bus Service to Parramatta)				(Rapid Bus Service to Parramatta)
	07:07	(523 to West Ryde) (513 to Meadowbank Wharf)		(Electric Bus to Meadowbank Station)			(523 to West Ryde) (513 to Meadowbank Wharf) (Electric Bus to Meadowbank Station)
	07:08	(M52 to CBD)			(Ferry to Circular Quay)		(M52 to CBD) (Ferry to Circular Quay)
	07:09	(544 to Auburn)					(544 to Auburn)
	07:10						
	07:11						
	07:12	(523 to Parramatta)					(523 to Parramatta)
	07:13						
	07:14						
	07:15			(Electric Bus to West Ryde Station)			(Electric Bus to West Ryde Station)
	07:16	(M52 to CBD)	(Rapid Bus Service to CBD)				(M52 to CBD) (Rapid Bus Service to CBD)
	07:17	(M52 to Parramatta)					(M52 to Parramatta)
	07:18						
	07:19						
	07:20	(524 to West Ryde)				(Private Ferry to Parramatta,)	(524 to West Ryde) (Private Ferry to Parramatta,)
	07:21						
	07:22			(Electric Bus to Meadowbank			(Electric Bus to Meadowbank Station)
	07:23	(M52 to Parramatta)					(M52 to Parramatta)
	07:24		(Rapid Bus Service to Parramatta)				(Rapid Bus Service to Parramatta)
	07:25						
	07:26	(M52 to CBD)					(M52 to CBD)
	07:27						
	07:28	(524 to Parramatta)					(524 to Parramatta)
	07:29						
	07:30			(Electric Bus to West Ryde Station)			(Electric Bus to West Ryde Station)
	07:31						
	07:32	(544 to Macquarie Centre)			(Ferry to Parramatta.)		(544 to Macquarie Centre) (Ferry to Parramatta.)
	07:33				(Ferry to Circular Quay)		(Ferry to Circular Quay)
	07:34	(M52 to Parramatta)	(Rapid Bus Service to CBD)				(M52 to Parramatta) (Rapid Bus Service to CBD)

07:35						
07:36	(523 to West Ryde)					(523 to West Ryde)
07:37	(544 to Auburn)		(Electric Bus to Meadowbank Station)			(544 to Auburn) (Electric Bus to Meadowbank Station)
07:38	(M52 to CBD) (513 to Carlingford) (513 to Meadowbank Wharf)			(Ferry to Circular Quay)		(M52 to CBD) (513 to Carlingford) (513 to Meadowbank Wharf)
07:39						
07:40						
07:41						
07:42	(M52 to Parramatta) (523 to Parramatta)	(Rapid Bus Service to Parramatta)				(M52 to Parramatta) (523 to Parramatta) (Rapid Bus Service to Parramatta)
07:43						
07:44						
07:45			(Electric Bus to West Ryde Station)		(Private Ferry to Parramatta,)	(Electric Bus to West Ryde Station) (Private Ferry to Parramatta,)
07:46						
07:47						
07:48	(M52 to CBD)					(M52 to CBD)
07:49	(M52 to Parramatta)					(M52 to Parramatta)
07:50	(524 to West Ryde)					(524 to West Ryde)
07:51						
07:52		(Rapid Bus Service to CBD)	(Electric Bus to Meadowbank Station)			(Rapid Bus Service to CBD) (Electric Bus to Meadowbank Station)
07:53						
07:54						
07:55						
07:56						
07:57						
07:58	(M52 to CBD) (524 to Parramatta)					(M52 to CBD) (524 to Parramatta)
07:59						
08:00		(Rapid Bus Service to Parramatta)	(Electric Bus to West Ryde Station)			(Rapid Bus Service to Parramatta) (Electric Bus to West Ryde Station)
08:01	(M52 to Parramatta)					(M52 to Parramatta)
08:02	(544 to Macquarie Centre)					(544 to Macquarie Centre)
08:03				(Ferry to Circular Quay)		(Ferry to Circular Quay)
08:04						
08:05						
08:06	(523 to West Ryde)					(523 to West Ryde)
08:07	(544 to Auburn)		(Electric Bus to Meadowbank Station)			(544 to Auburn) (Electric Bus to Meadowbank Station)
08:08	(M52 to CBD)			(Ferry to Circular Quay)		(M52 to CBD) (Ferry to Circular Quay)
08:09	(513 to Meadowbank Wharf)					(513 to Meadowbank Wharf)
08:10		(Rapid Bus Service to CBD)			(Private Ferry to Parramatta,)	(Rapid Bus Service to CBD) (Private Ferry to Parramatta,)
08:11						
08:12	(523 to Parramatta)					(523 to Parramatta)
08:13						
08:14						
08:15	(M52 to Parramatta)		(Electric Bus to West Ryde Station)			(M52 to Parramatta) (Electric Bus to West Ryde Station)
08:16						
08:17						
08:18	(524 to West Ryde)	(Rapid Bus Service to Parramatta)				(524 to West Ryde) (Rapid Bus Service to Parramatta)
08:19	(M52 to CBD)					(M52 to CBD)
08:20						
08:21						
08:22			(Electric Bus to Meadowbank Station)			(Electric Bus to Meadowbank Station)
08:23						
08:24						
08:25						
08:26						
08:27						
08:28	(524 to Parramatta)	(Rapid Bus Service to CBD)				(524 to Parramatta) (Rapid Bus Service to CBD)
08:29	(M52 to Parramatta)					(M52 to Parramatta)
08:30			Station)			(Electric Bus to West Ryde Station)
08:31						
08:32	(M52 to CBD) (513 to Carlingford)			(Ferry to Parramatta.)		(M52 to CBD) (513 to Carlingford) (Ferry to Parramatta.)
08:33	(544 to Macquarie Centre)					(544 to Macquarie Centre)
08:34						
08:35	(523 to West Ryde)				(Private Ferry to Parramatta,)	(523 to West Ryde) (Private Ferry to Parramatta,)
08:36		(Rapid Bus Service to Parramatta)				(Rapid Bus Service to Parramatta)
08:37			(Electric Bus to Meadowbank Station)			(Electric Bus to Meadowbank Station)
08:38						
08:39	Meadowbank Wharf)					(M52 to Parramatta) (513 to Meadowbank Wharf)
08:40	(544 to Auburn)					(544 to Auburn)
08:41						
08:42	(523 to Parramatta)					(523 to Parramatta)
08:43						
08:44	(M52 to CBD)					(M52 to CBD)

	08:45			(Electric Bus to West Ryde Station)			(Electric Bus to West Ryde Station)
	08:46		(Rapid Bus Service to CBD)				(Rapid Bus Service to CBD)
	08:47						
	08:48	(524 to West Ryde)					(524 to West Ryde)
	08:49	(M52 to Parramatta)					(M52 to Parramatta)
	08:50						
	08:51						
	08:52			(Electric Bus to Meadowbank Station)			(Electric Bus to Meadowbank Station)
	08:53						
	08:54	(M52 to CBD)	(Rapid Bus Service to Parramatta)				(M52 to CBD) (Rapid Bus Service to Parramatta)
	08:55				(Ferry to Circular Quay)		(Ferry to Circular Quay)
	08:56						
	08:57						
	08:58	(524 to Parramatta)					(524 to Parramatta)
	08:59	(M52 to Parramatta)					(M52 to Parramatta)
	09:00			(Electric Bus to West Ryde Station)		(Private Ferry to Parramatta,)	(Electric Bus to West Ryde Station) (Private Ferry to Parramatta,)
	09:01						
	09:02	(513 to Carlingford)					(513 to Carlingford)
	09:03						
	09:04	(M52 to CBD)	(Rapid Bus Service to CBD)				(M52 to CBD) (Rapid Bus Service to CBD)
	09:05	(523 to West Ryde) (544 to Macquarie Centre)					(523 to West Ryde) (544 to Macquarie Centre)
	09:06						
	09:07			(Electric Bus to Meadowbank Station)			(Electric Bus to Meadowbank Station)
	09:08						
	09:09	(M52 to Parramatta)					(M52 to Parramatta)
	09:10				(Ferry to Circular Quay)		(Ferry to Circular Quay)
	09:11						
	09:12		(Rapid Bus Service to Parramatta)				(Rapid Bus Service to Parramatta)
	09:13						
	09:14	(M52 to CBD)					(M52 to CBD)
	09:15			Station)			
	09:16						
	09:17						
	09:18						
	09:19	(M52 to Parramatta) (513 to Meadowbank Wharf)					(M52 to Parramatta) (513 to Meadowbank Wharf)
	09:20						
	09:21						
	09:22		(Rapid Bus Service to CBD)	(Electric Bus to Meadowbank Station)			(Rapid Bus Service to CBD) (Electric Bus to Meadowbank Station)
	09:23	(M52 to CBD)					(M52 to CBD)
	09:24						
	09:25					(Private Ferry to Parramatta,)	(Private Ferry to Parramatta,)
	09:26						
	09:27	(523 to Parramatta)			(Ferry to Parramatta.)		(523 to Parramatta) (Ferry to Parramatta.)
	09:28						
	09:29	(M52 to Parramatta)					(M52 to Parramatta)
	09:30			Station)			
PM	16:30	(524 to West Ryde)	(Rapid Bus Service to Parramatta)	(Electric Bus to West Ryde Station)		(Private Ferry to Parramatta,)	(524 to West Ryde) (Rapid Bus Service to Parramatta) (Electric Bus to West Ryde Station) (Private Ferry to Parramatta,)
	16:31						
	16:32	(M52 to Parramatta)					(M52 to Parramatta)
	16:33						
	16:34						
	16:35						
	16:36						
	16:37	(544 to Auburn)		(Electric Bus to Meadowbank Station)			(544 to Auburn) (Electric Bus to Meadowbank Station)
	16:38						
	16:39	(M52 to CBD)					(M52 to CBD)
	16:40		(Rapid Bus Service to CBD)		(Ferry to Circular Quay)		(Rapid Bus Service to CBD) (Electric Bus to Meadowbank Station) (Ferry to Circular Quay)
	16:41						
	16:42	(M52 to Parramatta)					(M52 to Parramatta)
	16:43	(523 to Parramatta)					(523 to Parramatta)
	16:44						
	16:45			(Electric Bus to West Ryde Station)			(Electric Bus to West Ryde Station)
	16:46						
	16:47						
	16:48		(Rapid Bus Service to Parramatta)				(Rapid Bus Service to Parramatta)
	16:49	(523 to West Ryde)					(523 to West Ryde)
	16:50	(M52 to CBD)					(M52 to CBD)
	16:51						
	16:52			(Electric Bus to Meadowbank Station)			(Electric Bus to Meadowbank Station)
	16:53	(M52 to Parramatta)					(M52 to Parramatta)
	16:54	(513 to Meadowbank Wharf)					(513 to Meadowbank Wharf)
	16:55					(Private Ferry to Parramatta,)	(Private Ferry to Parramatta,)
	16:56	(513 to Carlingford)					(513 to Carlingford)
	16:57	(544 to Macquarie Centre)			(Ferry to Parramatta.)		(544 to Macquarie Centre)
	16:58	(524 to Parramatta)	(Rapid Bus Service to CBD)				(524 to Parramatta) (Rapid Bus Service to CBD)
	16:59						

17:00	(M52 to CBD) (524 to West Ryde)		(Electric Bus to West Ryde Station)			(M52 to CBD) (524 to West Ryde) (Electric Bus to West Ryde Station)
17:01						
17:02						
17:03						
17:04	(M52 to Parramatta)					(M52 to Parramatta)
17:05						
17:06		(Rapid Bus Service to Parramatta)				(Rapid Bus Service to Parramatta)
17:07	(544 to Auburn)		(Electric Bus to Meadowbank Station)			(544 to Auburn) (Electric Bus to Meadowbank Station)
17:08						
17:09						
17:10	(M52 to CBD)			(Ferry to Circular Quay)		(M52 to CBD) (Ferry to Circular Quay)
17:11						
17:12						
17:13	(M52 to Parramatta) (524 to Parramatta)					(M52 to Parramatta) (524 to Parramatta)
17:14						
17:15			(Electric Bus to West Ryde Station)			(Electric Bus to West Ryde Station)
17:16		(Rapid Bus Service to CBD)				(Rapid Bus Service to CBD)
17:17						
17:18						
17:19						
17:20	(M52 to CBD) (523 to West Ryde)				(Private Ferry to Parramatta,)	(M52 to CBD) (523 to West Ryde) (Private Ferry to Parramatta,)
17:21						
17:22			(Electric Bus to Meadowbank Station)			(Electric Bus to Meadowbank Station)
17:23	(M52 to Parramatta)					(M52 to Parramatta)
17:24	(513 to Meadowbank Wharf)	(Rapid Bus Service to Parramatta)				(513 to Meadowbank Wharf) (Rapid Bus Service to Parramatta)
17:25						
17:26						
17:27				(Ferry to Parramatta.)		(Ferry to Parramatta.)
17:28	(523 to Parramatta)					(523 to Parramatta)
17:29						
17:30	(M52 to CBD)		(Electric Bus to West Ryde Station)			(M52 to CBD) (Electric Bus to West Ryde Station)
17:31	(524 to West Ryde)					(524 to West Ryde)
17:32	(544 to Macquarie Centre)					(544 to Macquarie Centre)
17:33	(M52 to Parramatta)			(Ferry to Parramatta.)		(M52 to Parramatta) (Ferry to Parramatta.)
17:34		(Rapid Bus Service to CBD)				(Rapid Bus Service to CBD)
17:35						
17:36						
17:37			(Electric Bus to Meadowbank Station)			(Electric Bus to Meadowbank Station)
17:38						
17:39						
17:40	(M52 to CBD)					(M52 to CBD)
17:41	(M52 to Parramatta) (544 to Auburn)					(M52 to Parramatta) (544 to Auburn)
17:42	(524 to Parramatta)	(Rapid Bus Service to Parramatta)				(524 to Parramatta) (Rapid Bus Service to Parramatta)
17:43				(Ferry to Parramatta.)		(Ferry to Parramatta.)
17:44						
17:45			(Electric Bus to West Ryde Station)		(Private Ferry to Parramatta,)	(Electric Bus to West Ryde Station) (Private Ferry to Parramatta,)
17:46						
17:47						
17:48						
17:49	(M52 to CBD)					(M52 to CBD)
17:50						
17:51	(523 to West Ryde) (513 to Meadowbank Wharf)					(523 to West Ryde) (513 to Meadowbank Wharf)
17:52		(Rapid Bus Service to CBD)	(Electric Bus to Meadowbank Station)			(Rapid Bus Service to CBD) (Electric Bus to Meadowbank Station)
17:53	(M52 to Parramatta)					(M52 to Parramatta)
17:54						
17:55						
17:56	(513 to Carlingford)					(513 to Carlingford)
17:57						
17:58	(M52 to CBD) (523 to Parramatta)					(M52 to CBD) (523 to Parramatta)
17:59						
18:00		(Rapid Bus Service to Parramatta)	(Electric Bus to West Ryde Station)			(Rapid Bus Service to Parramatta) (Electric Bus to West Ryde Station)
18:01						
18:02						
18:03	(M52 to Parramatta) (544 to Macquarie Centre)			(Ferry to Parramatta.)		(M52 to Parramatta) (544 to Macquarie Centre) (Ferry to Parramatta.)
18:04	(524 to West Ryde)					(524 to West Ryde)
18:05				(Ferry to Circular Quay)		(Ferry to Circular Quay)
18:06						
18:07	(M52 to CBD)		(Electric Bus to Meadowbank Station)			(M52 to CBD)

			Station)			(Electric Bus to Meadowbank Station)
18:08						
18:09						
18:10	(M52 to Parramatta)	(Rapid Bus Service to CBD)			(Private Ferry to Parramatta,)	(M52 to Parramatta) (Rapid Bus Service to CBD) (Private Ferry to Parramatta,)
18:11						
18:12	(524 to Parramatta)					(524 to Parramatta)
18:13				(Ferry to Parramatta.)		(Ferry to Parramatta.)
18:14	(M52 to CBD)					(M52 to CBD)
18:15			(Electric Bus to West Ryde Station)			(Electric Bus to West Ryde Station)
18:16						
18:17						
18:18	(544 to Auburn)	(Rapid Bus Service to Parramatta)				(544 to Auburn) (Rapid Bus Service to Parramatta)
18:19						
18:20						
18:21						
18:22	(523 to West Ryde)		(Electric Bus to Meadowbank Station)			(523 to West Ryde) (Electric Bus to Meadowbank Station)
18:23	(513 to Carlingford)					(513 to Carlingford)
18:24	(M52 to Parramatta)					(M52 to Parramatta)
18:25	(M52 to CBD) (523 to Parramatta)					(M52 to CBD) (523 to Parramatta)
18:26						
18:27						
18:28		(Rapid Bus Service to CBD)		(Ferry to Parramatta.)		(Rapid Bus Service to CBD) (Ferry to Parramatta.)
18:29						
18:30			(Electric Bus to West Ryde Station)			(Electric Bus to West Ryde Station)
18:31	(544 to Macquarie Centre)					(544 to Macquarie Centre)
18:32						
18:33	(M52 to Parramatta)			(Ferry to Parramatta.)		(M52 to Parramatta) (Ferry to Parramatta.)
18:34						
18:35				(Ferry to Circular Quay)	(Private Ferry to Parramatta,)	(Ferry to Circular Quay) (Private Ferry to Parramatta,)
18:36		(Rapid Bus Service to Parramatta)				(Rapid Bus Service to Parramatta)
18:37			Station)			(Electric Bus to Meadowbank Station)
18:38	(M52 to CBD)					(M52 to CBD)
18:39						
18:40	(M52 to Parramatta)					(M52 to Parramatta)
18:41						
18:42	(524 to Parramatta)					(524 to Parramatta)
18:43						
18:44						
18:45			Station)			(Electric Bus to West Ryde Station)
18:46	(M52 to Parramatta)	(Rapid Bus Service to CBD)				(M52 to Parramatta) (Rapid Bus Service to CBD)
18:47						
18:48	(544 to Auburn)					(544 to Auburn)
18:49	(524 to West Ryde)					(524 to West Ryde)
18:50	(513 to Meadowbank Wharf)					(513 to Meadowbank Wharf)
18:51	(M52 to CBD)					(M52 to CBD)
18:52			(Electric Bus to Meadowbank Station)			(Electric Bus to Meadowbank Station)
18:53	(513 to Carlingford)					(513 to Carlingford)
18:54		(Rapid Bus Service to Parramatta)				(Rapid Bus Service to Parramatta)
18:55	(523 to Parramatta)					(523 to Parramatta)
18:56	(M52 to Parramatta)					(M52 to Parramatta)
18:57						
18:58				(Ferry to Parramatta.)		(Ferry to Parramatta.)
18:59						
19:00			(Electric Bus to West Ryde Station)		(Private Ferry to Parramatta,)	(Electric Bus to West Ryde Station) (Private Ferry to Parramatta,)

Note:
*The timetable for the Sydney's Bus Future services assumes that rapid buses from Parramatta to CBD operate in peak periods only, with 20 buses in each direction per day. This timetable is indicative only and detailed timetabling is subject to further investigation by NSW Government.

BUS

	Bus services	Daily	AM Peak (6:30-9:00)	PM Peak (4:30-7:00)
East	To CBD	102	22	14
	To West Ryde	64	20	13
	To Macquarie Centre	21	4	2
	To Meadowbank Wharf	18	5	3
	Total East	**205**	**51**	**32**
West	To Parramatta	145	33	20
	To Auburn	20	5	3
	To Carlingford	17	2	2
	Total West	**387**	**91**	**57**

FERRY

	Ferry services	Daily	AM Peak (6:30-9:00)	PM Peak (4:30-7:00)
East	To Circular Quay	14	8	2
	Total East	**14**	**8**	**2**
West	To Parramatta	11	2	3
	To Parramatta (Private)	15	6	4
	Total West	**26**	**8**	**7**