4. MELROSE PARK STRUCTURE PLANS

4.1 Overview

The land uses within the Melrose Park northern and southern precincts will generate activity that will result in demand for travel. This section provides a guide to the location of the proposed land uses and activities generated by the planned development. This section describes the transport planning vision and objectives for Melrose Park to ensure that planning and investment in the transport network will result in positive outcomes, address the areas of highest priority, and cater for increased future transport demands resulting from the planning proposal.

4.2 The structure plans

The overall structure plans will provide public space that will connect Victoria Road to Parramatta River Foreshore with Melrose Park. The structure plans will also have a rich land-use mix, including housing, offices, town centre, retail, and amenities, connected by public landscape elements. Throughout the day, different happenings in the public domain, including daily work and leisure activities, and urban intersections will enable encounters between different users on site.

The structure plan has been developed in two parts, a northern and southern precinct separated by Hope Street. The structure plans have been developed by the respective proponents of the sites however they have been done so in a collaborative and consistent manner.

The TMAP process has considered the development as an entire combined precinct as agreed by the Project Coordination Group (PCG) in order to develop a consistent and coherent plan for transport and accessibility throughout the whole site, and its connection with the wider GPOP.

4.2.1 Northern structure plan

The northern structure plan has been adopted by City of Parramatta and is shown in Figure 4.1. It has been developed based on the following guiding principles:

- Urban Renewal in the Right Location
- Creating New Employment Opportunities
- Creating New Communities
- Connected Urban Renewal
- Well-Mannered and Environmentally Conscious

The land use plan has higher densities at key locations, increasing the potential for public transport share at key transit nodes. The major activities of Melrose Park are concentrated along the Victoria Road rapid bus corridor and planned light rail corridor along Hope Street. This improves access and provides the opportunity to increase walking and cycling, with the aim of reducing car dependency and overall parking requirements.

The former Bartlett Park site located on Victoria Road forms part of the northern precinct and has been re-zoned with DA approval for 1,200 dwellings.

A new town centre located on Hope Street will provide the focal point for the mixed use development and will contain the major commercial and retail uses. All this will be supported by a series of high quality public spaces which are to be dedicated to he City of Parramatta. The proposed development will create at least 1,500 full-time jobs within the town centre.

As part of the northern structure plan, upgrades on Victoria Road have been proposed as outlined in Figure 4.2. These upgrades have been planned in order to:

- Increase the accessibility of Melrose Park for all road users. Increased capacity at the Wharf Road intersection and new access via a southern leg at Kissing Point Road will allow vehicle demand to be efficiently dispersed across the network
- Improve the efficiency of the Victoria Road corridor. Additional stopline capacity on Kissing Point Road, Wharf Road and Marsden Road as well as for turning movement into these roads will ensure that regionally significant trips on Victoria Road are not adversely impacted by the development.
- Reinforce bus priorty by filling in gaps in existing bus lanes along Victoria Road and facilitating increased public transport use along the corridor.

Further investigations will be required in order determine the final layout of these upgrades. It is noted that all traffic modelling presented in this TMAP assumes full one-stage pedestrian crossings on all legs of Victoria Road intersections with Kissing Point Road and Wharf Road.

The proposed land use programme for the northern precinct is shown in Table 4.1

Table 4.1 : Land use summary (northern precinct)

Land use	GFA/dwellings
Residential	
Dwellings	6,850 dwellings
Non-residential	
Commercial	15,000m²
Retail	12,500m²

Figure 4.1 : Northern structure plan (adopted by CoP)

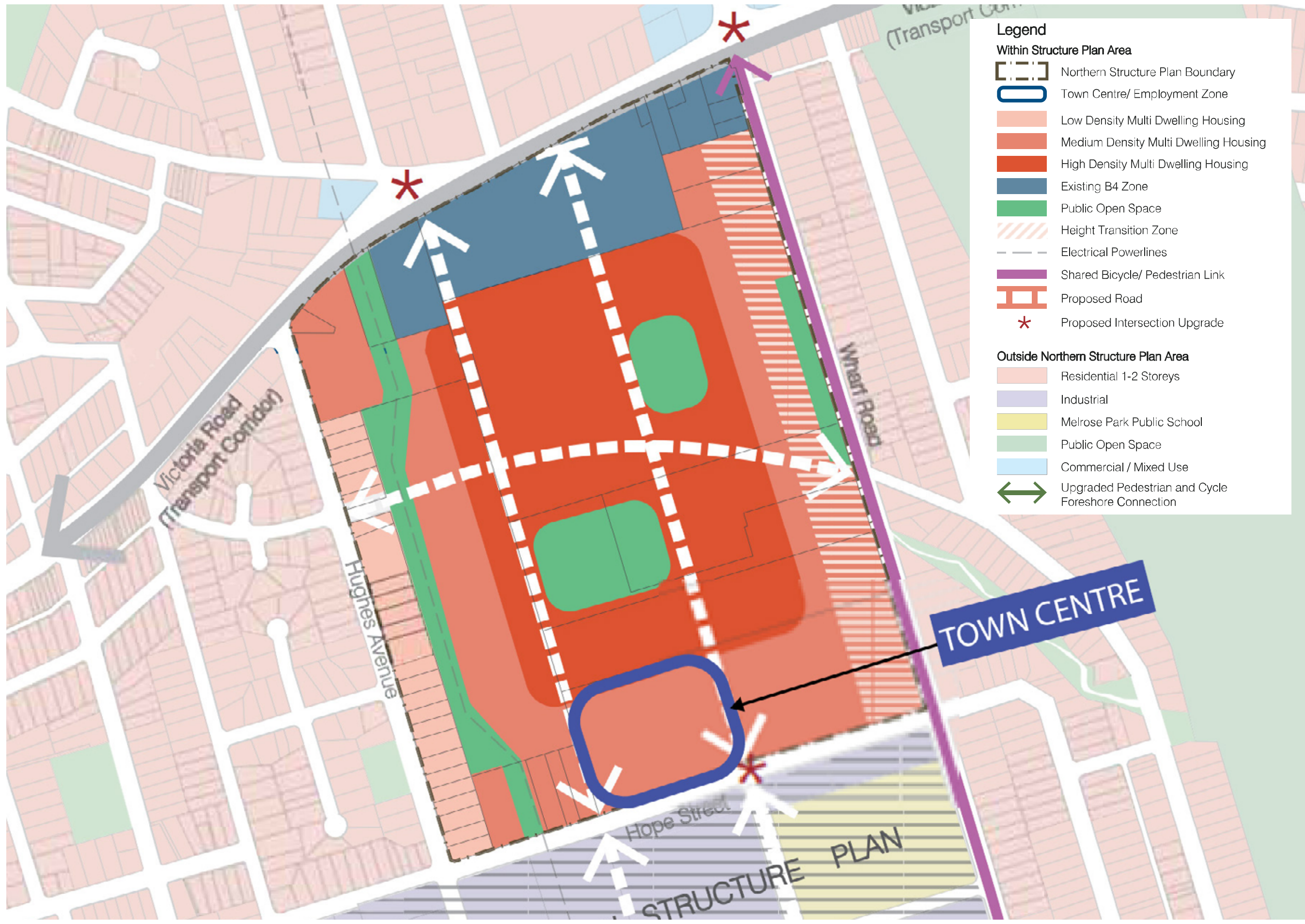


Figure 4.2 : Proposed Victoria Road Upgrades (Northrop)

4.2.2 Southern draft structure plan

The southern draft structure plan is shown in Figure 4.3 and has been developed based on the following guiding principles:

- A New Waterfront Community
- A Connected Precinct
- An Appropriately Scaled Precinct
- A Sustainable Precinct.

Built form in the Southern Precinct will be consistent with the scale of new development along Parramatta River and shall relate to the height of new development in the Northern Precinct.

- Built form will reduce in scale at the east and west edges of the precinct to affect a good transition in height to protect the amenity of adjoining low-rise neighborhoods.
- Along the riverfront park, scale will be limited to ensure a reasonable scale is achieved behind the mangrove line.
- There is to be no overshadowing of endangered Coastal Salt Marsh between 9am and 3pm at mid-winter, and no overshadowing of existing and new open space.

Higher density development is to be located at the heart of the precinct to facilitate a built form response that manages transitions adjoining low-rise residential. Densities will be reduced along the waterfront park edge.

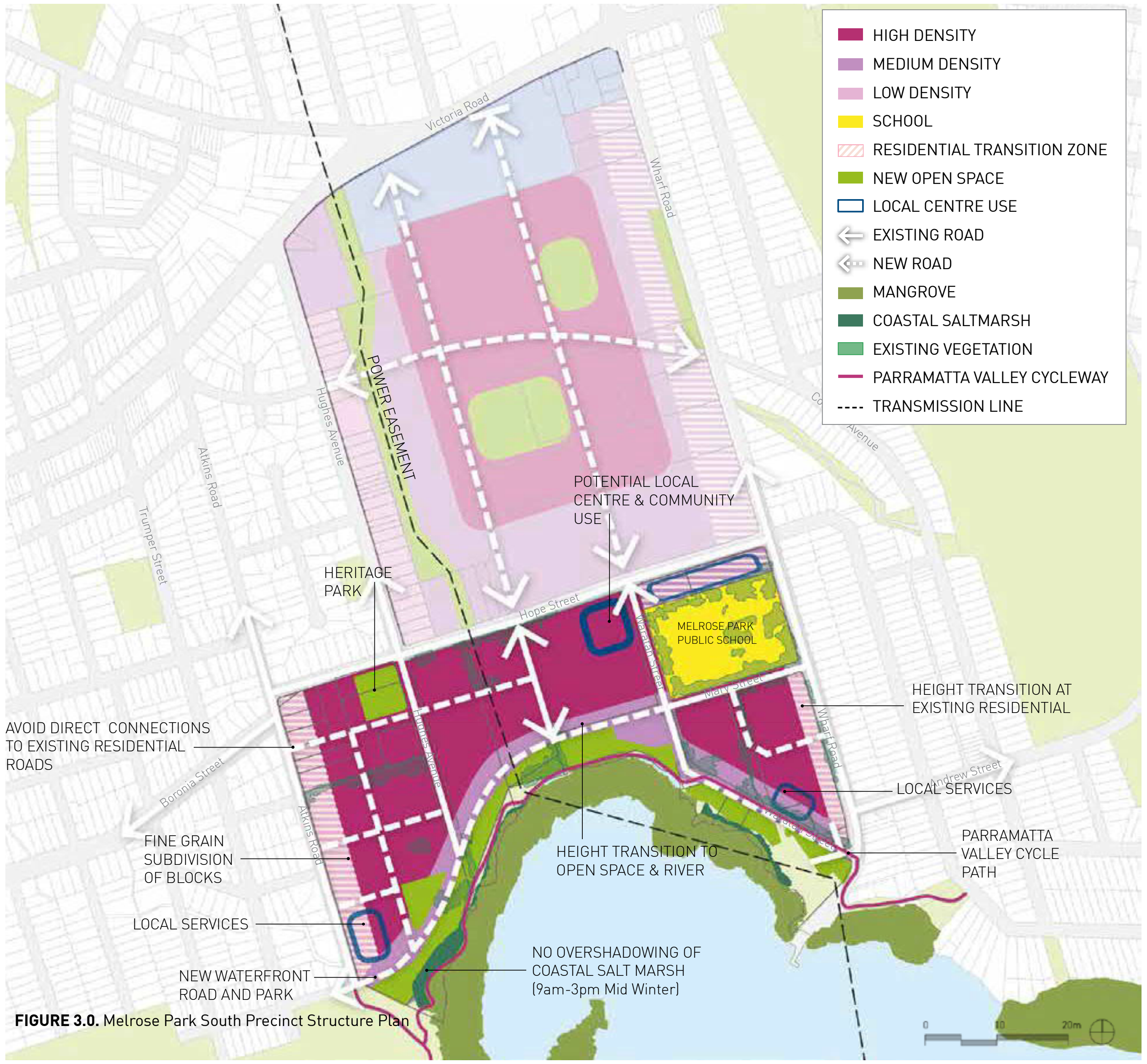
At least 15% of the precinct and 15% of privately owned land has been identified as new open space.

The proposed land use programme for the northern precinct is shown in Table 4.2

Table 4.2 : Land use summary (southern precinct)

Land use	GFA/dwellings
Residential	
Dwellings	4,238 dwellings
Non-residential	
Commercial	4,400m²
Retail	3,100m²

Figure 4.3 : Southern draft structure plan



4.3 Transport planning objectives and indicators

The Melrose Park precinct has been planned with the goal of delivering balanced, integrated and sustainable outcomes that will potentially achieve the proposed transport targets of:

- Walking and cycling mode share - 5%.
- Public transport mode share - 45%.
- Car mode share - 50%.

These targets are shown in Figure 4.4. It is noted that these mode shares are for peak hour trips external to the development. It is anticipated that trips within the development will be primarily undertaken by active transport.

The Melrose Park TMAP leverages off and facilitates existing, planned and potential future transport options and accommodates the staged implementation of these proposals. Table 4.3 shows the overall, integrated transport strategy for the Melrose Park TMAP. Specific transport objectives and indicators in the integrated network are discussed below to support the overall Melrose Park vision and respond to the constraints outlined in Section 3.0.

Figure 4.4 : Melrose Park peak hour mode share targets - excluding trips internal to development

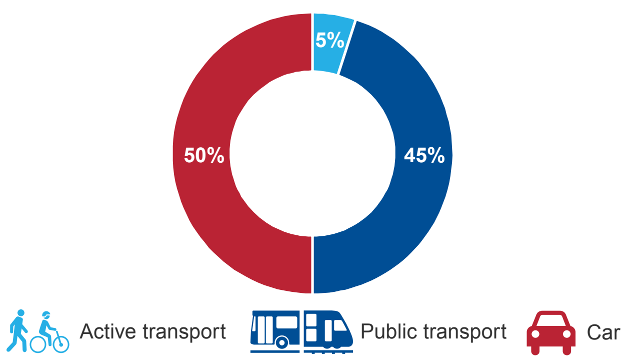


Table 4.3 : Melrose Park integrated transport objectives and indicators

Objective	Melrose Park indicators
1. Contribute to a general mode shift to public and active transport and reduce non-car mode share for peak trips to / from Melrose Park	Reducing the reliance on private car travel will provide significant benefits for future residents of Melrose Park whilst also minimising the impacts of the proposed developments on existing users of the road network. A non-car mode share of 50% represents a sizeable shift from the existing travel characteristics of the area. The delivery of significant new infrastructure – PLR Stage 2 and Sydney Metro West – will enable this step change in travel behaviour. These new public transport options will directly connect Melrose Park to the cores of the Eastern and Central CBD's, enhancing accessibility and reducing travel times to jobs and services.
2. Ensure that the transport network and services reflects the future growth and importance of key activity centres to / from Melrose Park	Melrose Park is perfectly located to provide 30-minute access to both the Eastern and Central CBD by public transport. Other nearby strategic centres include Sydney Olympic Park, Rhodes Business Park. This goal of 30-minute access to centres has been a key driver throughout the TMAP process and will be a key indicator for the overall success of the precinct.
3. Ensure all new residents in Melrose Park are within a safe walking distance of open space, social infrastructure and retail facilities.	The proposed development will deliver important non-residential facilities with retail, commercial and community uses as well as public open space. In order to maximise the benefits from these uses it will be imperative that a convenient, comfortable and safe walking environment is provided.
4. Minimise travel times along key public transport and movement corridors	Victoria Road is a regionally significant movement corridor. The efficiency and productivity of the corridor will need to be protected and the Melrose Park development will need to be implemented in a way that does not lead to travel time increases of more than 5% through the study area. This TMAP shall seek to meet this performance indicator through the provision of appropriate infrastructure upgrades and the minimisation of car use for trips to and from Melrose Park.
5. Ensure that the future transport network and services are attractive to the trip patterns of future residents	Melrose Park will be well served by existing and planned public transport services but there is a need to ensure patronage from the development does not exceed the planned future capacity of the network. The TMAP process will ensure that the staged development of the precinct occurs in lock-step with the provision of public transport infrastructure and services. The development will seek to focus highest intensity land uses around the primary public transport network such that 90% of the potential passenger catchment is within a 800 metre radius of a stop on the intermediate public transport system and/or within 400 metres of a local and suburban public transport route.
6. Ensure the key road network performs at acceptable levels of service during the highest impact peak hour.	The two key access points for the precinct will be on Victoria Road at Kissing Point Road and Wharf Road. Maintaining intersection level of service at LOS E or better will ensure that Victoria Road through traffic is not adversely impacted by the development whilst also allowing efficient access into and out of the precinct. It is noted that Victoria Road/Wharf Road currently performs at LOS F.
7. Prioritise active and public transport, and demand management measures to support sustainable travel behaviour and encourage reduced car use	Maximising the use of active and public transport will have significant benefits for the future residents and visitors of Melrose Park and will reduce the impacts of the development on the wider transport network. A key driver of active and public transport use will be the prioritisation of these modes throughout the precinct. This can primarily be done through best-practice urban and public realm design and by designing the precinct with pedestrians and cyclists as a primary consideration.

4.4 Movement and place framework

In recognition of these various functions, TfNSW has prepared new guidelines for street planning in NSW. The NSW Road Planning Framework (2017) proposes five different road types, as shown and described in Figure 4.5. Ultimately the classification of a road corridor to one of these types is based on a corridor's Movement needs and Place function.

The proposed road network within the Melrose Park precinct and hierarchy is shown in Figure 4.6. The hierarchy of the road has many functions on which the future precinct will rely on, including:

- Connecting communities through the movement of people and goods
- Supporting places and public spaces in urban areas and regional centres
- Facilitate economic growth and prosperity
- Facilitating social activities such as events and celebrations.

The Melrose Park structure plan is based on an interconnected, legible, urban-scale grid street pattern that will provide a pedestrian-friendly environment and provide optimal opportunities for bus servicing and access. The road network has been planned and dimensioned in conjunction with the spatial and land use planning of the precinct. This has ensured that the design of each street and its position in the movement and place hierarchy is appropriate to its role and the traffic demands placed upon it.

The internal road network has been conceived as a 'grid-like' system. Beginning from the higher order road network, each road type in the hierarchy branches into a smaller road with reduced speed environment. The hierarchy has been designed so that as individual blocks and access are approached, the level of speed of traffic decreases. The road network comprises three major elements:

1. The road hierarchy and street pattern
2. Road widths
3. Intersections

Figure 4.5 : Movement and Place

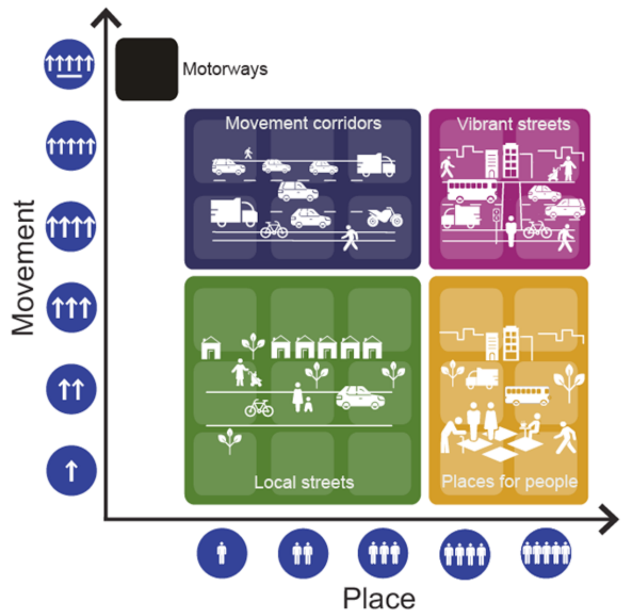


Figure 4.6 : Indicative internal street hierarchy

These elements have been integrated with a firm view of the broader aims of the structure plan to ensure the following outcomes:

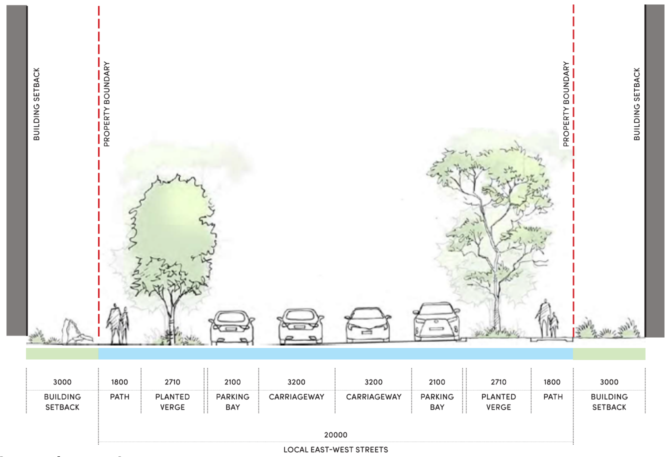
- An interconnected, legible, urban-scale grid street pattern that will provide a pedestrian-friendly environment and optimal opportunities for bus servicing and access
- The proposed Town Centre at the south east corner of Hope Street and Wharf Road is developed on the basis of promoting local access rather than regional traffic
- The road hierarchy is compatible with the land use and range of roles that each street serves. This incorporates a grid of local collector roads to distribute traffic within the Centre and to provide access into parking areas
- The alignment of roads and intersections support the urban structure and form. The structure plan includes proposed upgrades to Victoria Road in order to provide a new access into the precinct via the Victoria Road/Kissing Point Road intersection. Minor capacity upgrades to the Wharf Road/Victoria Road intersection are also proposed

Carriageways have been dimensioned to support the aims of the structure plan:

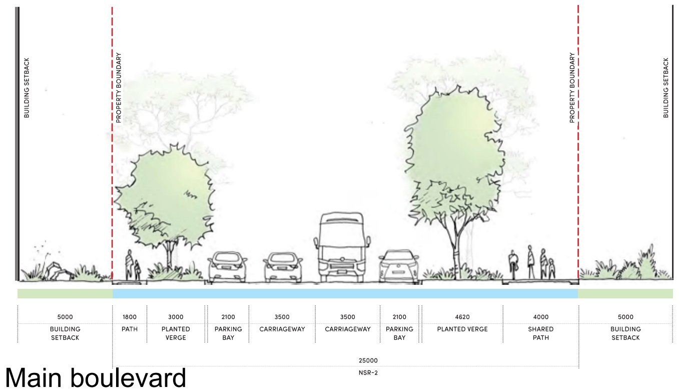
- Main roads in the core are proposed to each have a width capable of providing either four travel lanes or two travel lanes and two parking lanes
- Appropriate setbacks provided along the northern side of Hope Street (between Hughes Avenue and Waratah Street), future proofing the land to enable implementation of PLR Stage 2
- Some of the lesser roads are proposed to have 8.5m wide carriageways which would be capable of providing two travel lanes plus a parking lane on one side
- Roads in the residential areas are proposed to have carriageways typically 8m wide. These allow parking on each side plus a single travel lane between or parking on one side plus room for two vehicles to pass in opposing directions
- On-street parking (indented parallel parking bays) to be provided within the internal road network to provide for overspill of resident and visitor vehicles
- Comprehensive pedestrian and bicycle network providing sufficient footpath width that will provide permeability and a high degree of convenience for walkers and cyclists.

The right-of-way and typical cross sections associated with the northern and southern structure plans are shown in Figure 4.7 and Figure 4.8. It is noted these figures are indicative only and will be subject to refinement during detailed design and precinct delivery.

Figure 4.7 : Internal road sections - northern precinct

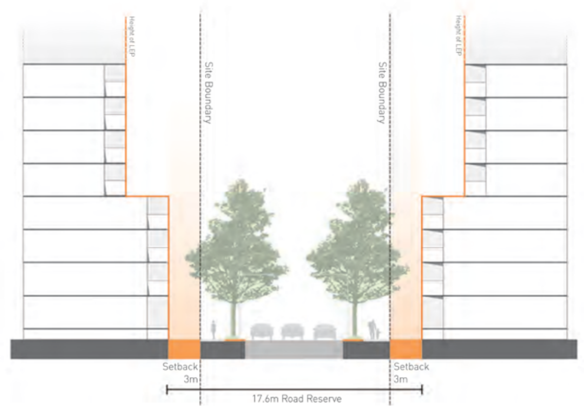


Local road



Main boulevard

Figure 4.8 : Internal road sections - southern precinct



5. TRANSPORT MODELLING

JACOBS

5. TRANSPORT MODELLING

5.1 Overview

Transport modelling is a core part of the Melrose Park TMAP. The modelling process forecasts the traffic and transport impacts of the overall Melrose Park precinct. This section outlines the various platforms and processes used throughout the modelling components of the TMAP.

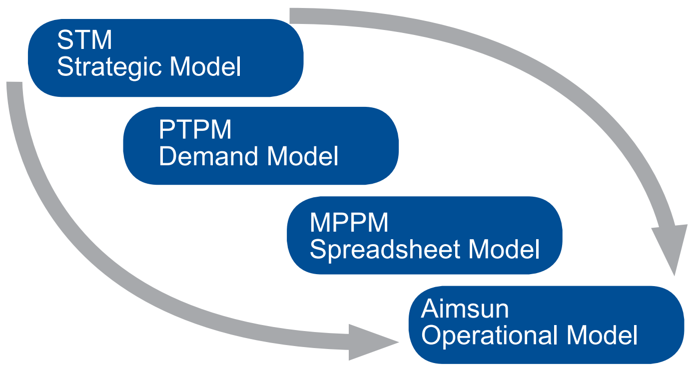
5.2 Modelling framework

The transport modelling approach was tailored to the needs of the Melrose Park TMAP included the use of three (3) separate models with linkages, as outlined in Figure 5.1. Transport modelling has been undertaken using a multi-tiered modelling approach using a combination of strategic, mesoscopic and microscopic modelling. Strategic modelling has been used for demand forecasting and mode split, while mesoscopic modelling has been undertaken to determine key performance indicators for general traffic, buses and light rail for the base and future scenarios.

The transport modelling approach and included the use of three (3) models with linkages as follows:

- **Public Transport Project Model (PTPM)** - used to determine future travel patterns based on population and employment forecasts from STM and estimate public transport patronage.
- **Melrose Park Precinct Model (MPPM)** - bespoke precinct wide spreadsheet modelling tool to derive high level patronage forecasts, and potential mode shares to assist in understanding the initial feasibility of various transport scenarios
- **Aimsun mesoscopic traffic model** - developed to assess transport impacts on the road network of the proposed land use changes and to ascertain the requirements for transport infrastructure and services to support this growth.

Figure 5.1 : Modelling process



5.2.1 Public Transport Project Model (PTPM)

PTPM (Public Transport Project Model), currently being used for PLR Stage 1 and 2, is an incremental multi-modal demand model developed for and operated by the Transport Performance Analytics (TPA) within TfNSW to assist in the evaluation of major public transport projects. It is closely related to the Strategic Travel Model (STM) which provides the overall growth factors before PTPM undertakes the mode choice and assignment functions using generalised costs. A key strength is the underlying observed demand, which provides a solid platform to forecast patronage and demand related impacts of public transport projects and policies.

In this context, the Melrose Park TMAP Project Coordination Group advised the use of PTPM to investigate the following for a 2026 and 2036 forecast year:

- Determine regional trip distribution across the Sydney Metropolitan Area
- Determine potential future travel patterns based on population and employment forecasts
- Estimate public transport patronage and future services through the study area.

5.2.2 Melrose Park Precinct Model (MPPM)

As part of the Melrose Park TMAP, Jacobs developed a bespoke precinct wide spreadsheet modelling tool (MPPM) in conjunction with Dr Neil Prosser to derive high level patronage forecasts, and potential mode shares to assist in understanding the initial feasibility of various transport scenarios. The MPPM is a combination of mode choice modelling with tailored assumptions trip generation, trip distribution, and travel attributes based on background data. The MPPM is a finer grain precinct wide model based on benchmarking future demand based on proposed developments near the vicinity of Melrose Park such as Meadowbank, Wentworth Point, Rhodes and Liberty Grove etc.

A summary of the development and operation of the model is provided below:

- A combination of mode choice modelling with assumptions about trip generation, distribution and travel attributes based on an analysis of JTW (2011) and HTS (2015/16) data
- Coarse representation of zones outside the study area – modelling of key origins and destinations
- No modelling of the road and traffic network – car travel times are obtained from STM
- Public transport – travel attributes, including travel time, walk time, wait time, transfers and fares, are estimated within the PT model based on specified public transport routes and services
- Walking and cycling – walk and cycle travel times are estimated based on specified average speeds and distance factors.

The MPPM has benefits associated with the modelling approach undertaken for the Melrose Park TMAP including:

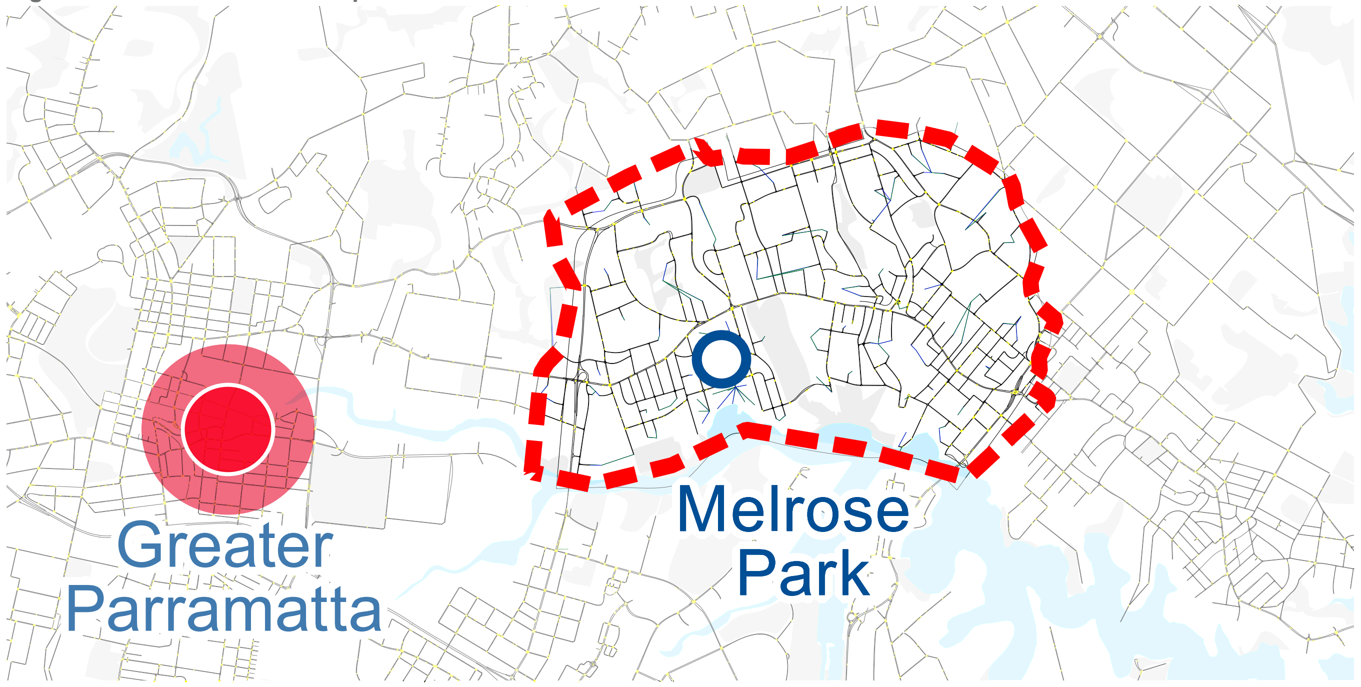
- More accurate modelling of higher density land use at a block by block level near transit nodes
- Finer disaggregation of travel zones within the precinct when compared to PTPM
- Detailed modelling of bus, light rail and future rail services with 'walking up' components incorporated in mode choice
- Estimation of trip generation for work and non-work trips
- Modelling of public transport travel and mode share to and from Melrose Park during the AM and PM peak hours.

Detailed documentation of MPPM background and model development is provided in Appendix A.

5.2.3 Mesoscopic and microscopic modelling

A mesoscopic model is a mid-level modelling tool which uses features from both strategic modelling and micro-simulation modelling to forecast the future transport demand on the road network by considering the predicted land use changes (population and employment). Operational modelling of the study area has been undertaken using the Aimsun modelling platform using a hybrid combination of mesoscopic and microscopic modelling. The extent of the model area is shown in Figure 5.2.

Figure 5.2 : Aimsun mesoscopic model area



Mesoscopic modelling allows for simulation to be undertaken using dynamic assignment that takes into account the effects of congestion on the network and allows for the identification of network constraints at the arterial and sub-arterial level. Microscopic level modelling allows for more detailed examination of specific locations using microsimulation for selected areas. This hybrid configuration of mesoscopic/ microscopic modelling has been undertaken for the TMAP, with microsimulation at the immediate development interface and mesoscopic modelling for the wider network.

The adopted hybrid modelling configuration provides sufficient detail to determine the performance of the network under proposed future land use demands and provides guidance on the need for further road infrastructure improvements. In addition, the hybrid simulation allows for true dynamic equilibrium assignment, where vehicles can select their optimum travel routes based on their previous travel experiences. This provides confidence that the modelled pattern of traffic represents a realistic response to all of the delays and capacity constraints that would be experienced on the network.

The Aimsun model calibration report is provided in Appendix B.

5.3 Mesoscopic Modelling – Calibration and validation

The Melrose Park Traffic Model has been calibrated and validated according to the principles outlined in the RMS Traffic Modelling Guidelines, 2013. Calibration and validation of models is essential to ensure that they are an accurate reflection of observed traffic conditions.

Further detail on the calibration and validation process is provided in the *Melrose Park Mesoscopic Model Calibration and Validation Report* (Jacobs, 2018).

5.3.1 Data sources

The model has been calibrated using turning movement counts collected across the study area in August 2017. Travel time surveys were undertaken along key corridors in order to provide a basis for model validation. Travel times were collected for:

- Victoria Road
- Silverwater Road
- Wharf Road/Marsden Road.

5.3.2 Model coverage

The Melrose Park mesoscopic model is a sub-area model derived from the Sydney GMA model. The Melrose Park sub-area extends from Silverwater Road in the west to Church Street/Devlin Street in the east. The Parramatta river forms the southern boundary and the model extends to Stewart Street and Rutledge Street in the north.

The model is comprised of:

- Over 1,267 individual road sections
- Over 100 traffic generating centroids
- Over 40 signalised intersections.

5.3.3 Calibration

Through a process of demand adjustment and refinement of traffic signal settings and route attractiveness, the models were calibrated to the observed counts. The Melrose Park model has been calibrated according to the following criteria:

- R^2 of greater than 0.95
- Regression slope between 0.95 and 1.05

Whole model:

- At least 80% of flow comparisons with GEH less than 5
- At least 95% of flow comparisons with GEH less than 10

Core/microsimulation area:

- At least 85% of flow comparisons with GEH less than 5
- 100% of flow comparisons with GEH less than 10

The GEH statistic is used in the calibration of traffic models to compare the differences between modelled and observed traffic flows

The R^2 value generally represents the closeness of fit of the observed data points with the modelled data points and the slope of the trendline provides an indication of whether the model is generally over assigning (slope greater than 1) or under assigning (slope less than 1) traffic across the network.

Review of the GEH and regression statistics, see Table 5.1, Table 5.2 and Figure 5.3 shows that the model is sufficiently well-calibrated on the basis of turning movement flows, for both peak periods in aggregate and for each hour within those peak periods.

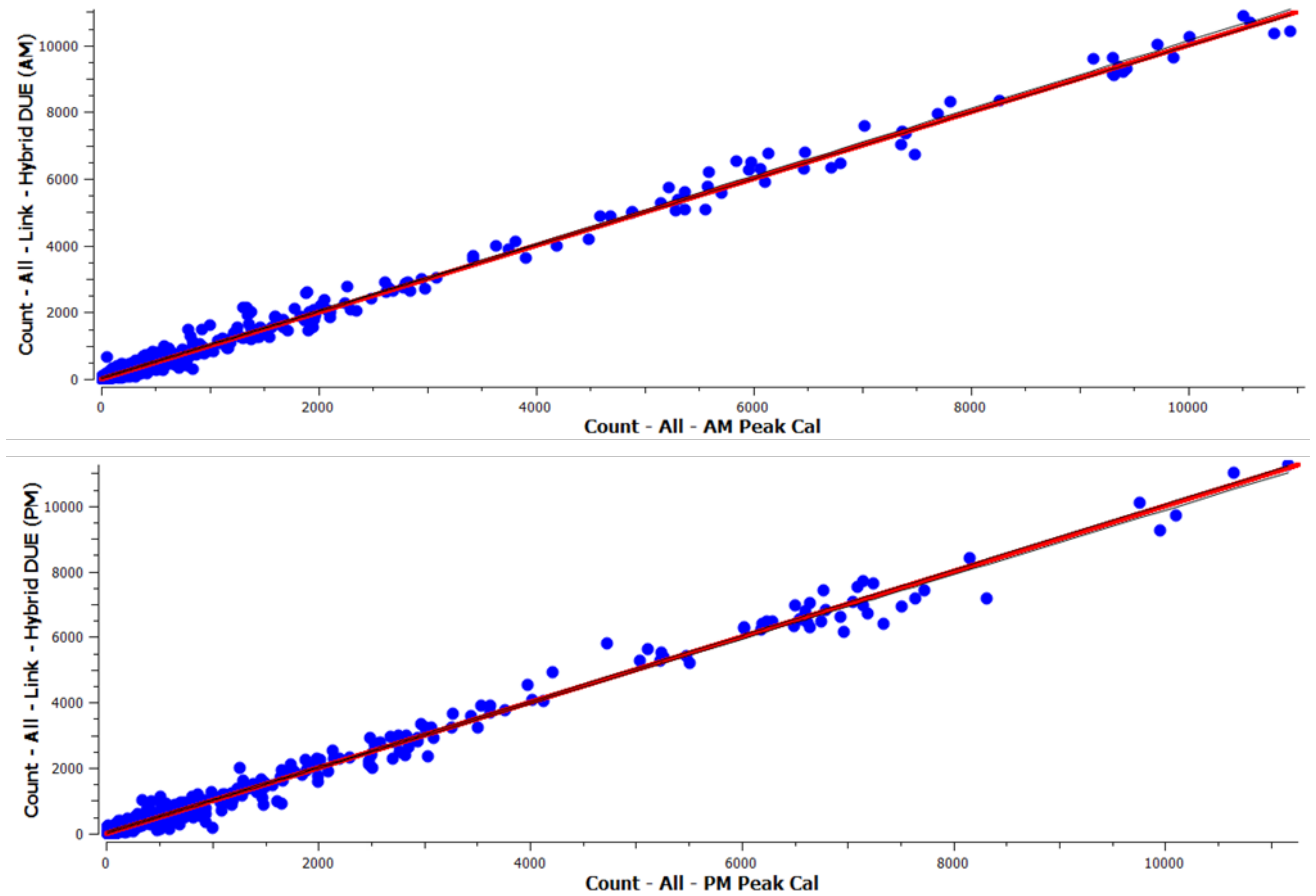
Table 5.1 : GEH statistics

Measure	Target	Hour starting				
		All hours	6:00am	7:00am	8:00am	9:00am
Whole model						
GEH<5	80%	85%	78%	80%	78%	80%
GEH<10	95%	98%	98%	99%	95%	98%
Core area						
GEH<5	85%	91%	82%	88%	86%	85%
GEH<10	100%	100%	100%	100%	100%	100%

Table 5.2 : Regression statistics

AM Peak	R^2	Slope
6:00 - 10:00 (Aggregate)	**0.992**	**0.989**
6:00 - 7:00	0.988	0.974
7:00 - 8:00	0.990	0.981
8:00 - 9:00	0.981	0.975
9:00 - 10:00	0.982	1.014
PM Peak	**R^2**	**Slope**
15:00 - 19:00 (Aggregate)	**0.987**	**0.979**
15:00 - 16:00	0.973	0.950
16:00 - 17:00	0.986	0.986
17:00 - 18:00	0.986	0.989
18:00 - 19:00	0.977	0.982

Figure 5.3 : Regression graphs



5.3.4 Validation

In order to determine the suitability of the Melrose Park model in forecasting future traffic conditions, it was necessary to validate the model against a set of data that is independent from that used in the demand estimation and calibration process. Validation of the Melrose Park model has been undertaken using travel time surveys outlined above and results for Victoria Road are shown in Figure 5.4 and Figure 5.5. Results indicated that the model was sufficiently validated in accordance with RMS Traffic Modelling Guidelines.

Figure 5.4 : Victoria Road travel time validation (AM peak hour)

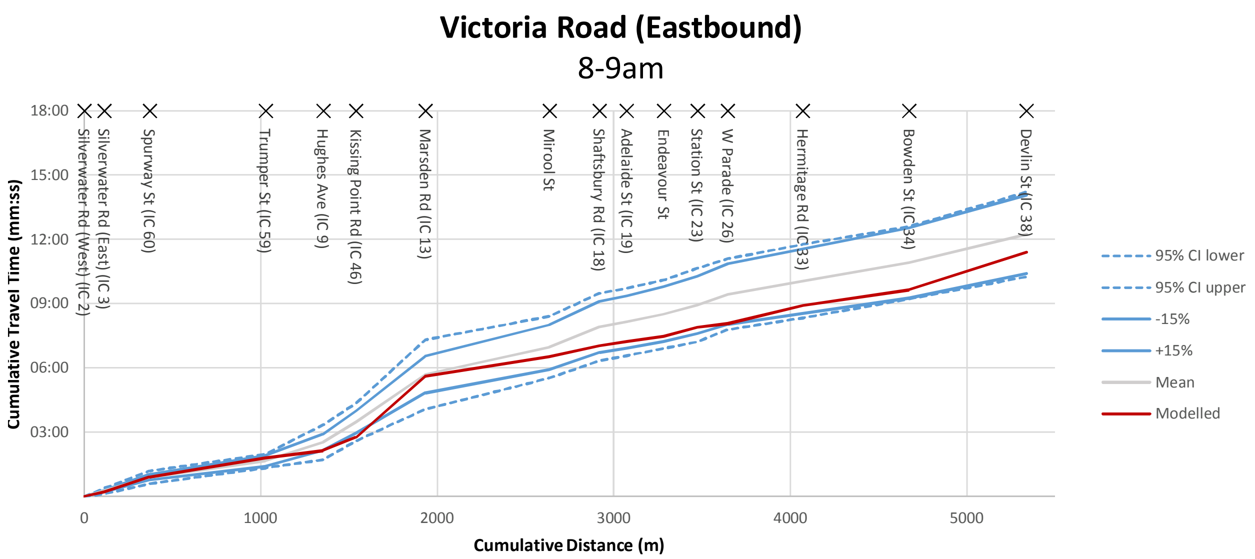
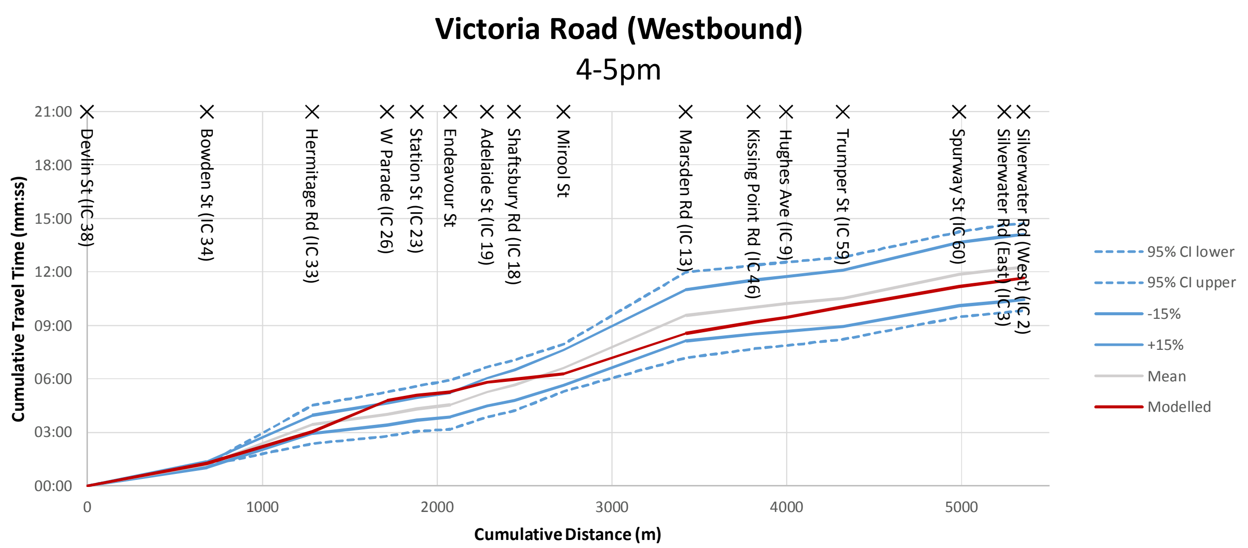


Figure 5.5 : Victoria Road travel time validation (PM peak hour)



5.4 Model inputs and assumptions

The transport models developed for the Melrose Park TMAP required a number inputs and assumptions, including population/employment forecasts, wider network changes, road network configurations and public transport service provision. Key assumptions in the immediate area impacting the Melrose Park TMAP included:

- Population and employment across Sydney GMA consistent with LU16 forecasts
- Major public transport projects – Parramatta Light Rail Stages 1 and 2 connecting Rydalmere and Sydney Olympic Park via Melrose Park (via new bridge across Parramatta River (in 2026), and Sydney Metro West connecting Parramatta CBD, Sydney Olympic Park and Sydney CBD in 2036
- Major motorway road projects – WestConnex Stages 1&2 by 2026 and WestConnex Stage 3 and Western Harbour Tunnel by 2036.
- Major arterial road projects – proposed structure plan incorporates widening of Victoria Road (from Wharf Road to Hughes Avenue), upgrades to Victoria Road signalised intersections at Wharf Road and Kissing Point Road in 2026
- Local road network changes – all intersections along Boronia Street-Hope Street between Spurway Street and Wharf Road along the PLR Stage 2 corridor have been assumed to be signalised with other intersections 'left-in' and 'left-out' in 2026

5.5 Trip generation

5.5.1 Approach

As agreed with the Melrose Park PCG, two methods were used to estimate the overall trip generation of the overall Aimsun model study area. The first method involved the application of the STM/PTPM, and the second method was based on the RMS Guide to Traffic Generating Developments (2002) and High Density Residential Car Based – Trip Generation Surveys Analysis Report (2017) undertaken on behalf of RMS.

5.5.2 Traffic generation calculations

The estimation of future traffic volumes to be used in the Aimsun model has been developed using a combination of both the STM/PTPM and RMS guidelines as follows:

- PTPM has been used to generate 'external trips' only with neither originating or ending in the study area
- RMS guidelines have been used to generate 'internal trips' into and out of Melrose Park precinct based on a combination of RMS updated surveys (TDT 2013/04a) and more recent surveys undertaken in 2017 on behalf of RMS.
- Commercial vehicle trip rates are based on rates from RMS updated surveys (TDT 2013/04a)
- Retail rates are based on surveys undertaken at East Village Shopping centre as outlined in the *Melrose Park Planning Proposal Traffic and Transport Study (2016)*.

An analysis of the above data along with an extensive benchmarking process led to the following rates being proposed and agreed with the PCG:

- The traffic generation rate for the former Bartlett Park site incorporating 1,200 dwellings has based on an AM and PM rate of 0.19 and 0.15 trips per dwelling per hour respectively as part of previously approved rezoning proposal
- The traffic generation rate for the remaining 9,855 dwellings for Melrose Park has been based on a rate of 0.25 trips per dwelling per hour for both the AM and PM periods.
- Retail rates includes a 20% reduction to account for linked trips already captured by the residential generation rates, as is appropriate for a high density mixed use development.

The expected generated trips for the AM and PM peak hours for the 'ultimate build-out' (2036) is shown in Table 5.3.

Table 5.3 : Melrose Park traffic generation (ultimate build-out)

		AM PEAK HOUR		PM PEAK HOUR	
		Trip generation rate	Vehicle trips	Trip generation rate	Vehicle trips
Dwellings (Bartlett site)	1,200	0.19 per dwelling	228	0.15 per dwelling	180
Dwellings	9,886	0.25 per dwelling	2,471	0.25 per dwelling	2,471
Commercial GFA	19,400m²	1.6 per 100m²	310	1.2 per 100m²	233
Retail GFA	15,600m²	2.5 per 100m²	390	5.0 per 100m²	780
Total			**3,399**		**3,664**

5.6 Trip distribution

The distribution of all trips in the network has been based on the outputs of PTPM. Overall trip distribution for the Melrose Park Traffic Model has been undertaken on the basis of revealed travel patterns from the PTPM, and by extension the STM. Trip distribution in STM is an iterative process that distributes trips based on the proximity of jobs and population for the whole Sydney metropolitan area.

The PTPM trip matrices provide the most appropriate source of future trip distribution for all trips within and through the study area. The future land use projections for the entire Sydney metropolitan area are included in the PTPM hence the distribution of trips within PTPM takes into account the location of future jobs, dwellings and services likely to generate and attract trips which interact with the Melrose Park study area.

Figure 5.6 and Figure 5.7 show the distribution of trips leaving Melrose Park in the 2036 AM peak periods. There remains a relatively strong desire line to Sydney CBD, however there is a noticeable shift away from the Eastern City as a whole. More trips from Melrose Park remain in the Central City where a significant number of new jobs and services are expected to be provided within the next 20 years. Less than half of all trips originating from Melrose Park are expected to have destinations in the Eastern City, compared with almost 60% in 2016.

This change in trip distribution patterns will lead to shorter trips and will help to relieve the existing pressure on existing transport infrastructure which is currently constrained by the significant number of eastbound trips towards the Eastern City in the AM peak period.

Figure 5.6 : Distribution of trips departing Melrose Park - SA3 level (2036 AM)

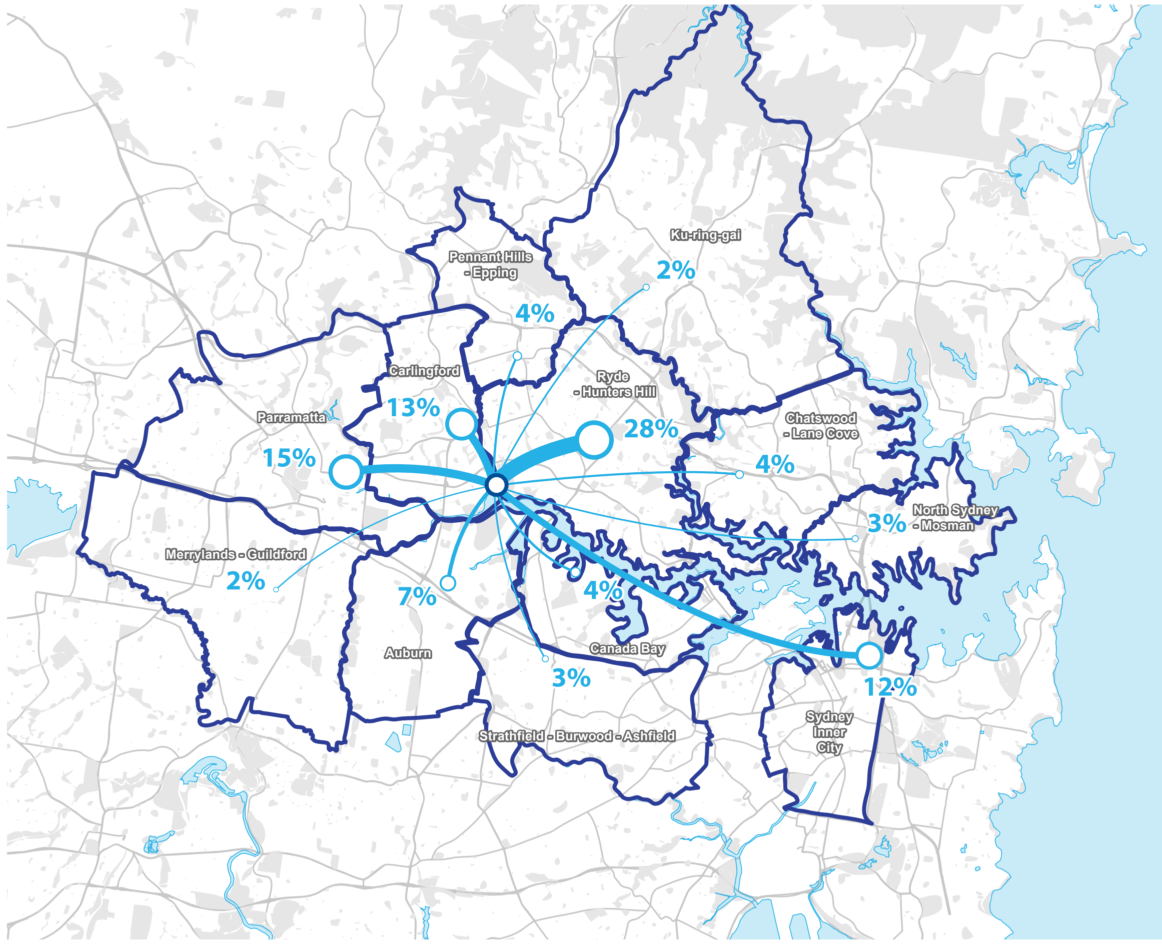
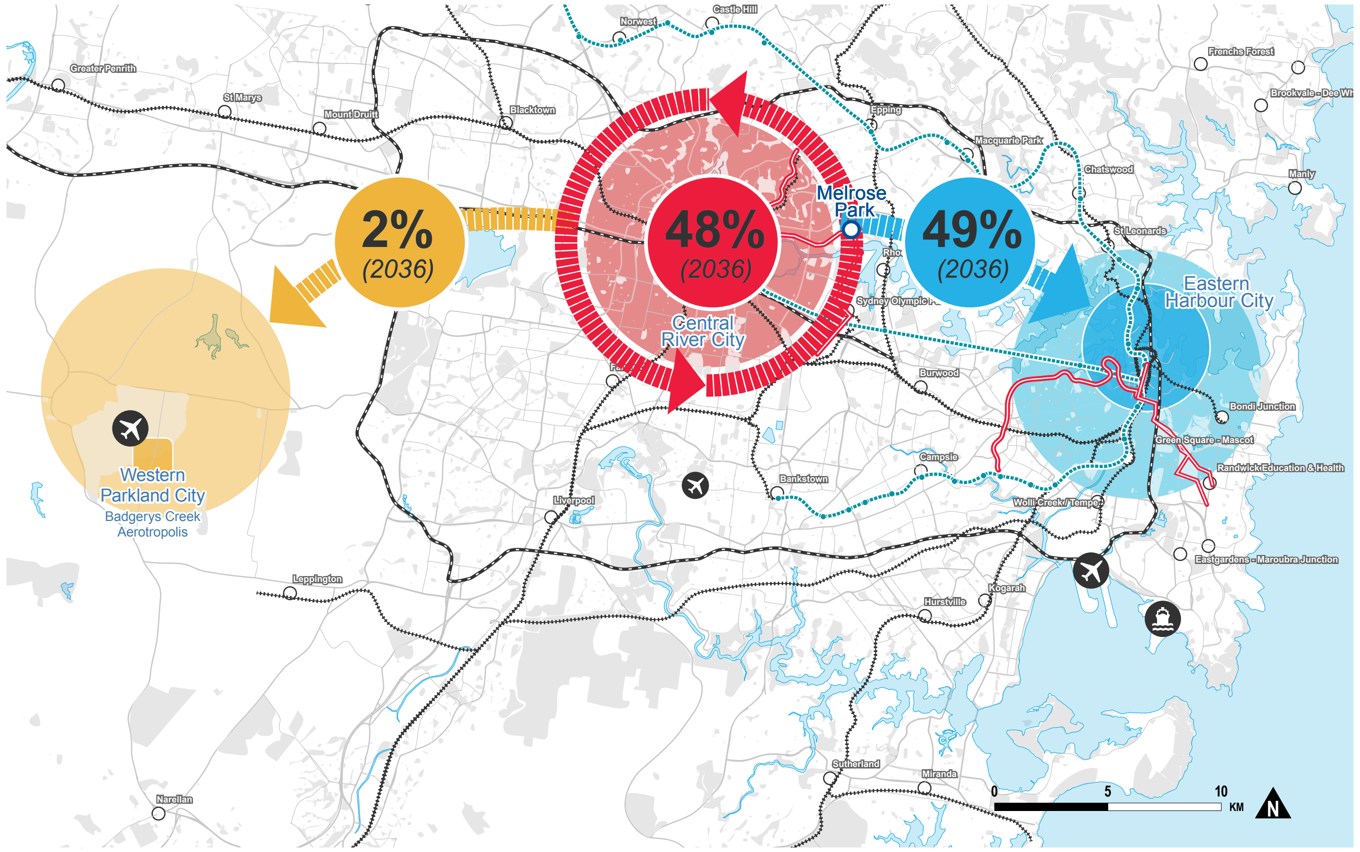


Figure 5.7 : Distribution of trips departing Melrose Park - 3 cities level (2036 AM)



5.7 Mode choice

Potential future mode shares for Melrose Park have been assessed using a combination of the PTPM and MPPM models. Both models use an assessment of the generalised cost of travel time to forecast mode choices for a particular journey.

The potential for reduction in car dependency by implementing the public transport initiatives (see Section 6.0) for Melrose Park is considerable, and preferable to the alternative of the traditional car-based solution. As discussed earlier, the Melrose Park site represents a major opportunity to influence travel through initiatives that encourage transport alternatives that will reduce car dependency.

The proposed PLR Stage 2 and its connection to Sydney Metro West via a new bridge across the Parramatta River represents a major commitment to promoting public transport, as a competitive and preferable mode to private vehicle use, which will be demonstrated later in this report.

The mode share for trips from Melrose Park derived from both the PTPM and MPPM is provided in Figure 5.8. It is noted that PTPM is forecasting higher car mode shares for all future horizon years compared to the MPPM results. Several points are noted regarding this difference:

- PTPM 'pivots' off the existing base conditions using a combination of incremental and absolute forecasting methods. The existing land use in Melrose Park is industrial and non-residential and existing car mode shares for trips from Melrose Park are therefore very high. The incremental forecasting component of PTPM is potentially unable to fully quantify the change in mode share that will result from the delivery of a highly accessible mixed use precinct and major public transport infrastructure.
- The MPPM results are based on an assessment of generalised costs for all mode options in the network. They are also founded on benchmarking of travel patterns from existing centres and developments similar in composition to the proposed Melrose Park precinct.

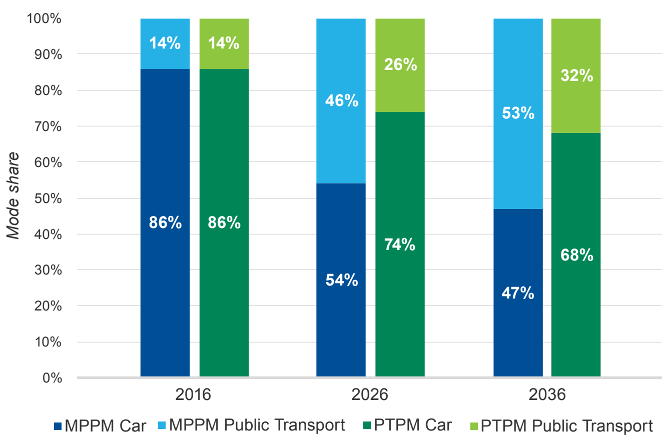
5.8 Trip assignment

The assignment of vehicle trips has been undertaken in two stages:

- Stage 1: Static traffic assignment in PTPM to determine sub-area traffic demand based on a traversal matrix from STM
- Stage 2: Dynamic user equilibrium assignment in Aimsun mesoscopic model

This assignment methodology is detailed below.

Figure 5.8 : Melrose Park mode share



5.8.1 Static assignment

The static assignment step has been undertaken to generate a sub-area traversal of the whole Sydney Greater Metropolitan Area model, suitable to be used as an input for future traffic demand within the smaller Melrose Park traffic model.

5.8.2 Dynamic user equilibrium assignment

Traffic generation as previously described was assigned to the Melrose Park traffic model Aimsun model using a Dynamic User Equilibrium (DUE) assignment method. DUE is an extension of the concept of static equilibrium however vehicle simulation is used to generate route costs, rather than a theoretical speed/flow curve. This has the advantage of taking into account the capacity constraints of the network in greater detail including traffic signals and intersections, merging and weaving on freeways and the accumulation of traffic in queues.

5.8.3 Assignment of Melrose Park trips

Figure 5.9 and 5.10 shows the assignment of trips in the 1-hour AM and PM peak periods generated by the Melrose Park development only. The origin and destination of trips has been defined by the PTPM strategic model whilst the route taken through the model is a result of DUE assignment. It is noted that:

- The majority of Melrose Park trips travel in an east-west direction, either via Victoria Road or the Andrews Street/Constitution Road corridor
- The Hope Street and Marsden Road corridors also serve as a key access for the Melrose Park precinct
- These volumes are not purely in addition to volumes in the do minimum scenario. It is noted that the development will replace existing traffic generating land uses and so the net increase in traffic would be lower than the total trip generation volumes in these figures.

Figure 5.9 : Traffic volume - 2036 AM peak hour (only trips generated by development)

Figure 5.10 Traffic volume - 2036 PM peak hour (only trips generated by development)

5.9 Development of future traffic forecasts

5.9.1 Future background traffic growth

Initial testing and analysis of the future year 2036 forecast travel demands – without Melrose Park development - showed that there was insufficient capacity on the network to accommodate forecast traffic growth. Demand capping was undertaken using simulation of the forecast traffic demand on the mesoscopic network and comparing forecast demand with model throughput across the network to:

- Identify network constraints where proposed demand exceeded capacity and resulted in either excessively low average speeds or vehicles being unable to enter the network
- Cap the growth in trips for any origin-destination pairs that must pass through identified capacity constraints
- Allow trips to change their departure time to avoid capacity constraints and maximise available traffic network capacity.

The process accounts for the fact that strategic model outputs from PTPM, are likely to overestimate the growth in peak hour trips. Historic traffic counts demonstrate that peak period vehicle trips have experienced limited growth despite significant population growth. PTPM forecasts significant growth (1-2% per annum) on Victoria Road and Silverwater Road which have experienced flat or negative growth since 2009 (-2% and -4% per annum respectively.) To account for this, traffic growth was capped to the modelled network capacity under the Do-Minimum scenario (without Melrose Park development).

The quantum of capped trips assumed to not depart during the modelled 4-hour period is shown in Figure 5.11 and equates to less than 2% of the total uncapped future demand from PTPM.

The primary result of the demand capping process has been to shift trips from the peak hour to the shoulder periods. This is consistent with the observed pattern of growth along Victoria Road and Silverwater Road, where peak hour volumes have remained relatively constant, but the peak period has expanded to cover a longer time period.

A difference plot comparing capped and uncapped static assignment hourly volumes is shown in Figure 5.12. It is noted that the majority of capped trips are those that use the Church Street/Devlin Street corridor in the far south east of the model area. The number of capped trips is also observed to be very low through the study area.

5.10 Trip generation summary

A summary of the AM peak 1-hour trip generation of Melrose Park for all modes is presented in Table 5.4. Trips are shown for the two major proposed staging scenarios i.e. 'No-bridge' representing the period prior to the implementation of the new bridge over Parramatta River and 'Post-bridge' representing the ultimate 11,000 dwelling scenario with the bridge in place. (See section 6.4.3 for a more detailed description of staging)

Table 5.4: All modes trip generation (AM peak hour person trips)

	No-bridge (approx 6,700 dwellings)	Post-bridge (approx 11,000 dwellings)
Private Vehicle[1]	2,525	4,080
Bus only	150	30
Bus/Train	1,590	450
Light Rail only	-	280
Light Rail/ Train	-	2,390

[1] Assuming vehicle occupancy of 1.2 people per vehicle

Figure 5.11 : Demand capping results (AM 4-hour period)

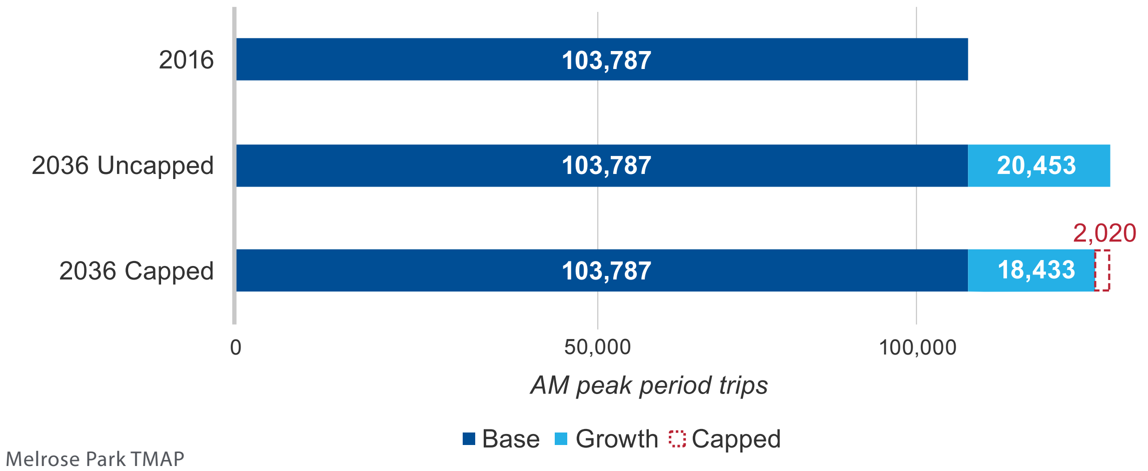


Figure 5.12 Difference plot comparing capped and uncapped 2036 AM demand (average hourly flows over 4-hour modelled period)

6. APPRAISAL OF MELROSE PARK STRUCTURE PLANS

JACOBS

6. APPRAISAL OF MELROSE PARK STRUCTURE PLANS

6.1 Overview

Transport modelling has been used as the basis for assessing the surface transportation network presented in the Melrose Park structure plans. This section examines the overall road network performance based on the land use estimates of 11,000 residential dwellings proposed for overall Melrose Park precinct and assesses future infrastructure enhancements for 2026 and 2036. In assessing the adequacy of the Melrose Park road network to meet the proposed future land-based demands, a desired assessment criteria for strategic road network planning and intersection performance has been developed.

This section addresses the potential impacts of the public transport system in the study area in the context of the mode shift objectives. This section also recognises the role walking and cycling replaces car-based trips within Melrose Park, and how the provision of improved transport facilities and opportunities can help drive positive mode change in the future.

6.2 Approach to appraisal

The appraisal of the Melrose Park structure plans was tested using the PTPM, MPPM and the Melrose Park Traffic Model (using Aimsun) to examine the potential impacts on transport infrastructure and services on the local and regional road network, public transport and walking and cycling. The key stages of the Melrose Park TMAP approach were as follows:

- Land use development scenario of 11,000 dwellings for the combined northern and southern precincts
- Update the TfNSW PTPM model to forecast travel demand and mode share
- Traffic forecasts and assessments for the road network produced by the Melrose Park traffic model based on:
  - 'Do Minimum' (without Melrose Park development)
  - 'With Project' (with Melrose Park development)
- Identify future system problems and user needs for the public transport network
- Develop appropriate transport network infrastructure and services
- Define appropriate travel demand management measures.
- Iteratively test staging scenarios to develop a strategy that ensures adequate capacity for both road and public transport networks at all stages of development.

6.3 Road network performance

6.3.1 Introduction

The Melrose Park Aimsun traffic model has been used as the basis for assessing the surface transportation road network presented in the structure plan. This section examines the overall road network performance based on the land use estimate of 11,000 dwellings proposed for Melrose Park and assesses future road infrastructure enhancements 2036. The following key performance indicators were used to assess the strategic merits of the structure plans and proposed road infrastructure enhancements:

- Midblock flow and density (measures of congestion in mesoscopic models)
- Intersection Level of Service (based on average delay)
- Travel times on key movement corridors (i.e. Victoria Road).

The above performance indicators have been extracted from the Melrose Park traffic model for the highest impact peak hour, under a future 'do minimum' (no development) and a future 'with project' (with development) scenario for 2036.

6.3.2 Desired service criteria

Midblock traffic density

The Melrose Park traffic model has traffic flows constrained by capacity whether due to saturation flows in midblock sections or due to capacity limitations at intersections. When traffic demand exceeds capacity, traffic queues form and these are depicted within the mesoscopic model as increases in traffic density. Traffic density is the average number of vehicles per kilometre on each section of road.

In this context, the road network traffic density was used to examine key capacity constraints within the road network developed for the structure plan. Higher densities indicate vehicles are closer together and therefore traveling more slowly and spending more time queuing (i.e. higher densities indicate more congestion). The assessment of network performance on the basis of traffic density was used to resolve capacity constraints (if any). Road network infrastructure improvements identified on the basis of traffic density were assessed according to whether they increased the volume of traffic that could be assigned to the network.

Intersection level of service

The performance of an urban road network is largely dependent on the operating performance of key intersections, which are critical capacity control points on the road network. It is therefore appropriate to consider intersection operation as a measure of the capacity of the road network.

The criteria for evaluating the operational performance of intersections is provided by the RTA Guide to Traffic Generating Development (2002); these criteria are shown in Table 6.1. The criteria for evaluating the operational performance of intersections is based on a qualitative measure (the level of service) which is applied to each band on the basis of average delay. This average vehicle delay is equated to a corresponding level of service from A (best) to F (worst).

Based on the performance measures shown in Table 6.1 a target maximum level of service threshold for new intersections of level of service E (as agreed with PCG) has been adopted for peak period conditions for future signalised intersection performance where practicable.

Table 6.1 : Intersection level of service criteria

Level of Service	Average delay (sec/veh)	Signalised intersections and roundabouts	Give way and stop signs
A	<14	Good operation	Good operation
B	15 – 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29-42	Satisfactory	Satisfactory but accident study required
D	43-56	Operating near capacity	Near capacity and accident study required
E	56-70	At capacity; incidents will cause excessive delays	At capacity, requires other control mode
F	>70	Over capacity, unstable operation, excessive queuing	Over capacity. Unstable operation

Travel times

Victoria Road is a regionally significant movement corridor which carries more than 60,000 vehicles per day through the study area. It is also a key east-west bus corridor with up to 30 services per hour projected by 2026. The efficiency and productivity of the corridor will need to be protected and the Melrose Park development will need to be implemented in a way that does not lead to private vehicle travel time increases of more than 5% through the study area.

6.3.3 Future road link and segment performance

Future traffic volumes

The traffic volume plots in Figure 6.1 to Figure 6.4 show the 2036 forecast volume of traffic in the model area for Melrose Park. They provide a useful indication of the volume of traffic using a road and helps to understand the demand for access to the road network. This demonstrates the areas on the road network expected to experience an increase in traffic volumes as a result of the development. More detailed plots showing only traffic generated by the development are presented in Figure 5.9 and Figure 5.10.

The future traffic volume plots show:

- In the 'with development' scenario, Victoria Road is forecast to carry over 3,000 vehicles per hour in the peak direction (eastbound in AM and westbound in PM) an increase of approximately 300 vehicles per hour in the morning peak and 900 in the evening peak, compared to the do minimum scenario
- The largest increase in traffic volumes occurs in the westbound direction on Victoria Road in the morning peak. This is due to the fact that trips towards the Eastern City in the morning peak are more likely to use proposed public transport options (further discussed in Section 6.4)
- The Andrews Street-Constitution Road corridor carries between 800 and 1,000 vehicles per hour in the peak direction. This is an increase of approximately 300 vehicles per hour in the morning peak and 100 in the evening peak
- Increases in volumes on the local road network would not lead to adverse impacts to the performance or amenity of the network.

It is noted that some links would experience a reduction in volume in the 'with development' scenario. This is generally a result of the upgraded road network leading to a change in traffic assignment. Some morning peak southbound trips on Marsden Road and Kissing Point Road traveling from the north-west of the model to the east, for example, are observed to re-direct to Silverwater Road due to the improved performance and hence attractiveness of Victoria Road eastbound.

Figure 6.1 : Traffic volume - 2036 AM do minimum - no development

Figure 6.2 : Traffic volume - 2036 AM with development