4 TRAFFIC MODELLING APPROACH

4.1 OVERVIEW OF THE TRAFFIC MODELLING APPROACH

A micro-simulation model was developed for the core study area bounded by Darling Drive to the west, Harbour Street to the east, Hay Street to the south and Pyrmont Bridge to the north. AIMSUN (Advanced Interactive Microscopic Simulator for Urban and Non-Urban Networks) is a dynamic transport modeling software tool that has the ability to model the movements of individual vehicles and their interactions with other traffic and network constraints. This level of modeling is well suited for modeling traffic circulation in urban centres, and developments such as the SICEEP development. The network modelling was then supplemented by more detailed assessments of selected key intersections using the SIDRA intersection modelling software to test intersection performance at the isolated level during the selected peak hours and to identify potential measures to achieve improved outcomes.

The traffic modelling encompasses the Whole of Precinct (WOP) and investigates cumulative impacts from the development of the PPP, The Haymarket and the Hotel. The future modelling scenario represents 'worst case scenario' analysis and accounts for design proposals developed at this stage.

4.2 AIMSUN MODELLING

The base AIMSUN model was initially developed by Mott MacDonald[1] for INSW. The base model represented existing conditions on a Friday PM Peak (5:30 pm to 6:30 pm) with a network coverage consisting of 14 intersections. The Mott MacDonald base model employed the traffic state demand method and did not include pedestrian movements at the intersection. As agreed with the INSW, the base model developed by Mott MacDonald will be adopted by Hyder but further developed to incorporate Darling Harbour Live's masterplan, specifically:

- Reconfiguration and realignment of Darling Drive;
- Additional zones to represent car park access (ingress and egress); and
- Incorporate pedestrian movements at intersections.

Furthermore,

- A Saturday PM peak model was also developed; and
- Calibration and validation checks were undertaken

The future AIMSUN (Non-event and Event) models were developed to facilitate a more in-depth analysis of the operational impacts of key intersections within the SICEEP study area. The AIMSUN models were calibrated and validated in accordance with industry standards with reference to the RMS Paramics Modelling Guidelines to ensure that the models adequately represent reality. The models represented weekday and weekend afternoon (PM) peak periods, i.e.:

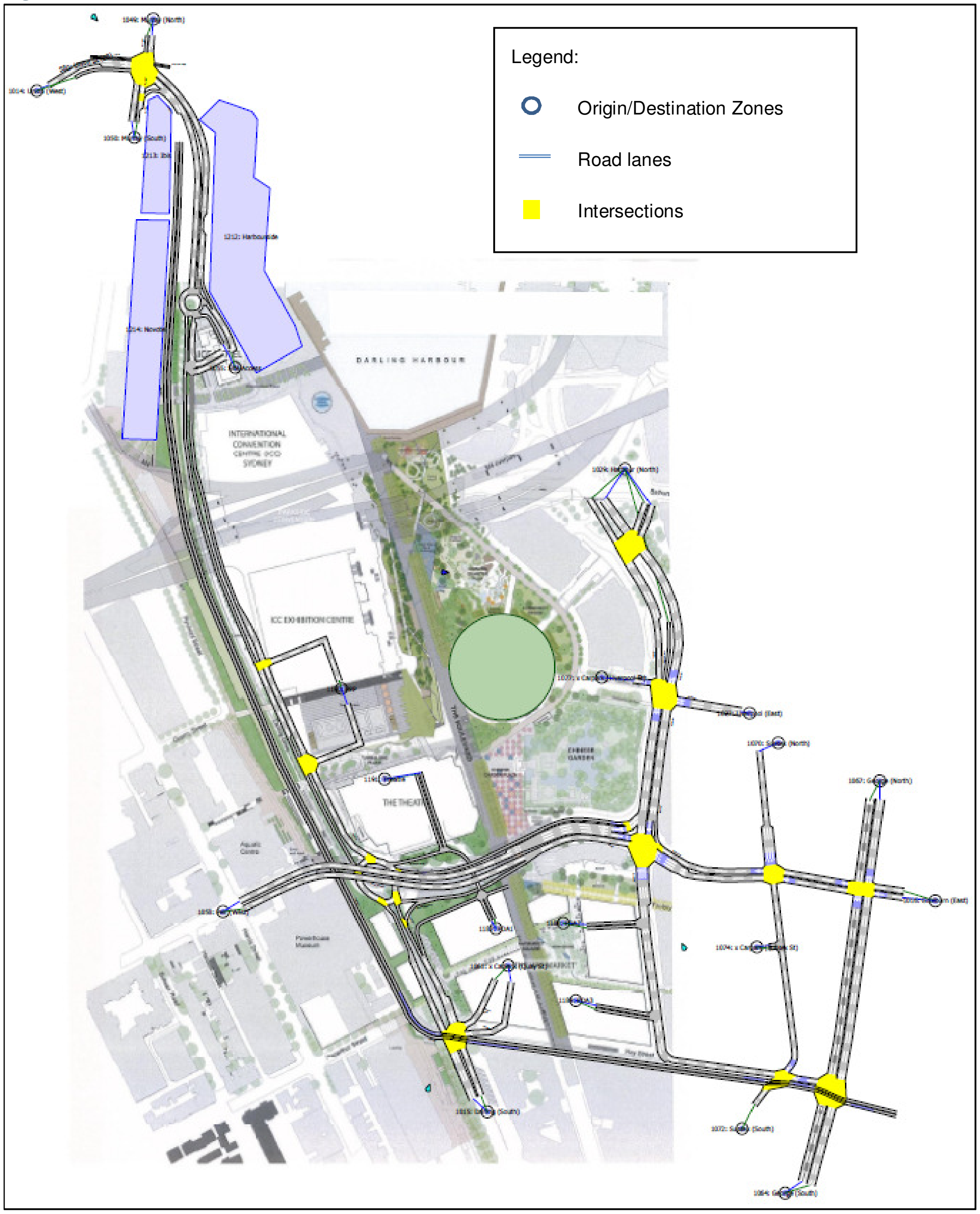
- Weekday (Friday) PM peak period between 5:30 pm and 6:30 pm, and
- Weekend (Saturday) PM peak period between 6:00 pm and 7:00 pm.

---

[1] SICEEP - Traffic and Transport Conditions – Mott MacDonald, May 2012

Figure 4-14 shows the amended future base network that includes the access nodes to the car parks within the SICEEP.

Figure 4-14 Amended Base Network



4.2.1 MODEL CALIBRATION AND VALIDATION

Model calibration is the process of matching the modelled flows with the observed traffic flows after adjusting the model parameter and inputs in a logical manner. The calibration of the model confirms the consistency of the future year model and assessment of the impact of increase traffic and network changes in the future.

The criteria for the calibration of a model include the GEH assessment criteria based on the UK Design Manual for Roads and Bridges requirements. This assessment criteria requires not less than 85% of the total modelled flows to be greater than a GEH value of 5. In addition, all GEH values are required to be less than 10.

The AIMSUN models for both the Friday and Saturday PM Peaks complied with these requirements. Table 4-14 presents the model calibration and validation results.

The models also have to comply with the following requirements for validation purposes which further confirm the robustness of the models.

- At least 85% of links with difference in flow within 100 vph for flows <700 vph;
- At least 85% of links with difference in flow within 15% for flows between 700 and 1700 vph; and
- At least 85% of links with difference in flow within 400 vph for flows >1700 vph.

The Base PM Peak (Friday and Saturday) models generally met the above requirements. All future scenario models ('non-event' and 'event') met the difference in flow criteria.

Table 4-14 Model Calibration and Validation Results

Criteria	Friday PM Peak		Saturday PM Peak	
UK Design Manual criteria for acceptable model performance	Target	Achieve	Target	Achieve
Link flows				
Links with difference in flow within 100 vph for flows <700 vph	85%	97%	85%	98%
Links with difference in flow within 15% for flows between 700 and 1700 vph	85%	64%*	85%	100%
Links with difference in flow within 400 vph for flows >1700 vph	85%	n/a	85%	n/a
GEH Statistics				
Links with GEH Statistic < 5	85%	85%	85%	94%
Note: * Large traffic flow difference is observed at Goulburn Street / Sussex Street (I-7) and Sussex Street / Hay Street (I-9) due to upstream and downstream congestion. However, it does not impact on the study area.				

4.2.2 MODEL RUNS

AIMSUN model runs were undertaken to determine future network performance. It should be noted that certain assumptions and limitations apply for the modelling. They include:

- Traffic count data from survey were used for existing model runs;
- Future turning movement volumes were calculated based on traffic generation and distribution parameters outlined in Section 6.1;

- For the existing and future scenario, all signalised intersections are modelled with the fixed SCATs phasing and signal settings. The current phasing plan sourced from the RMS has been assumed. It should be noted that in reality, the SCATS algorithm does not follow a fixed phasing plan but has the ability to adjust signal phasing to suit actual demand to improve operational efficiency thereby maximising throughput whilst reducing delay. This would imply that the outcomes of the model runs have limitations in terms of the approximation of the operational performance of the intersections.
- Cycle time is fixed at 120 minutes.
- Exit from the carparks assume a 30-minute discharge rate.
- Exiting vehicles from The Theatre car park and the public car park at The Haymarket will be directed to the one way southbound exit lane onto Darling Drive.

4.3 FIT FOR PURPOSE

The SICEEP AIMSUN model was further updated by Hyder for the specific purpose of investigating traffic impact within the SICEEP study area. The traffic forecasting model was developed to:

- Create a tool capable of simulating the traffic flows on study area under different access and network scheme scenarios, with outputs sufficiently detailed on network operational issues;
- Provide input for intersection geometry analysis and to assist in the decision process quantifying network impact from proposed development within precinct; and
- Prepare a traffic report which can be used as a basis for development approval.

4.4 SIDRA MODELLING

Detailed SIDRA modelling is employed to further confirm the outcomes of the micro-simulation modelling and to determine future intersection performance at key locations. The assumptions used for the modelling include:

- For the future scenario, all signalised intersections are modelled with optimum signal settings. SIDRA optimises the signal phasing time allocation based on the approach demand to achieve optimum results in terms of LoS;
- Demand volumes tested at the intersections were based on the assumed traffic distribution parameters; and
- Short lane effects were modelled for signalised intersections to account for adjacent lane spillover.

Section 3.1.5 outlines the parameters in the assessment of intersection performance and formats of the modelling outcomes.

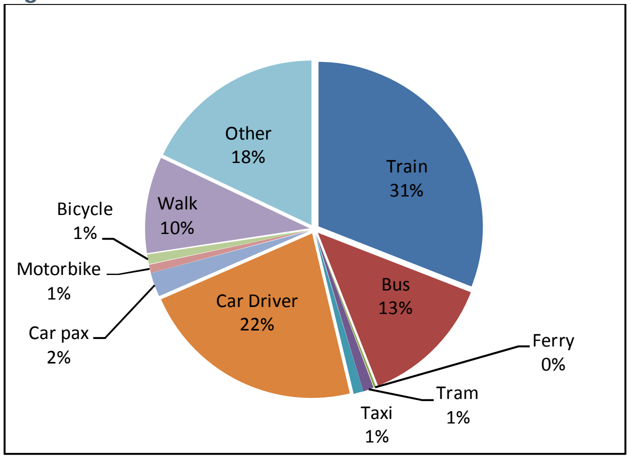
4.5 MODE SHARE TARGETS

4.5.1 JOURNEY TO WORK (JTW) – PRECINCT AS A WORKPLACE

The 2006 Journey To Work (JTW) data for the precinct as a destination for work (travel zones 0163 is the area north of the Western Distributor and travel zone 0164 is the area south of the

Western Distributor) revealed an existing mode share of 24% for car mode (22% as driver and 2% as passenger), 45% for public transport, 11% for walk and cycle mode and 20% for other modes. This mode profile provides indication of the likely mode share during typical business hours. Figure 4-15 below shows the breakdown.

Figure 4-15 JTW Mode Share



Source: BTS 2006 JTW Dataset

A target of 20% would equate to a reduction of around 9% in the current mode share for car driver and is considered to be achievable considering the improved access to alternative modes. This target has been adopted in determining peak parking demand for typical daytime events. However, for evening events, it is noted that the car mode share is more likely to be higher due to safety reasons and convenience for nightime travel. For events occurring in the evening, it is assumed that the mode share for car drivers would increase to around 26%.

4.5.2 HOUSEHOLD (HH) TRAVEL SURVEY – PRECINCT AS A DESTINATION

In terms of visitors to the precinct to attend major events, it is anticipated that visitors will be encouraged to travel by public transport for major events occurring at the SICEEP. Transport arrangements when coupled with entry tickets to events are likely to attract visitors to travel by public transport. Data from the BTS HH Travel Survey (linked trips) with Sydney LGA as a destination is used to provide indication of how people are likely travel to the precinct. The data revealed that linked trips to precinct as a final destination comprise mostly of walk trips and a similar proportion of public transport share. This implies that people visiting the precinct are likely to take the train, bus or other transport to a nearby destination then would walk to the precinct.

Figure 4-16 Mode Share – BTS HH travel Survey