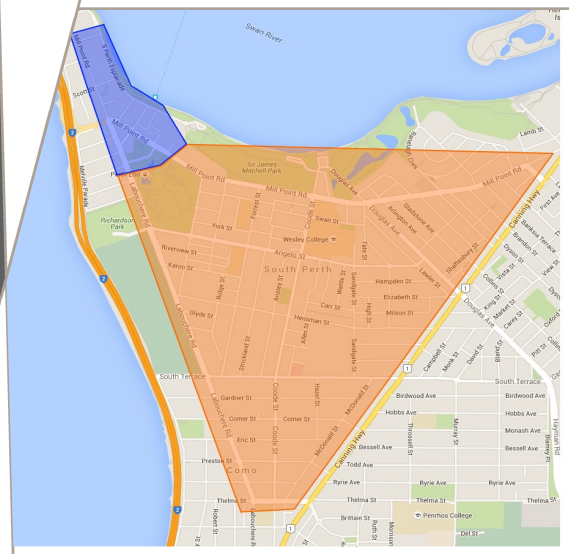
Model Documentation Report

South Perth Micro Simulation Model



Prepared for
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Revision	Date	Description of Revision	Prepared by:	Reviewed by:
A	30/8/2016	For issue	Andreas Wang	Ray Cook
B	10/10/2016	Final	Andreas Wang	Ray Cook
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1 Introduction

Cardno have been commissioned by the City of South Perth to develop a Micro-Simulation Traffic Model of the South Perth Station Precinct. This model was initially developed to include the roads located within the South Perth Station Precinct and is currently in the process of being extended to cover an extended area of influence. The extended model will allow for evaluation of traffic management measures on the network as a whole, instead of limited to separate intersections. As such, 2 revisions of the model currently exist (described further in **Section 3**).

The model coverage areas are shown in **Figure 1-1** and **Figure 1-2**.

Figure 1-1 South Perth Micro-Simulation Model Coverage

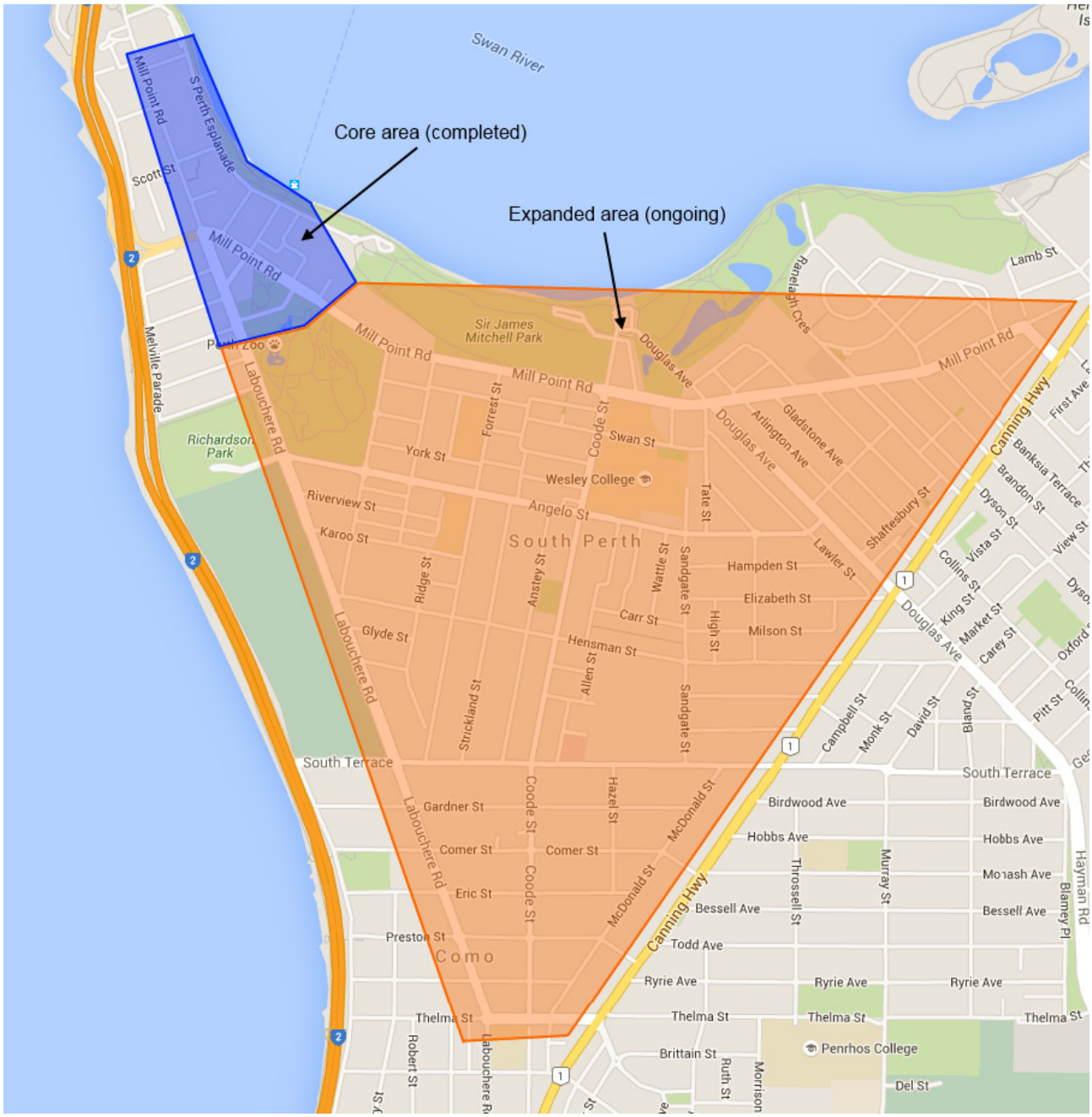
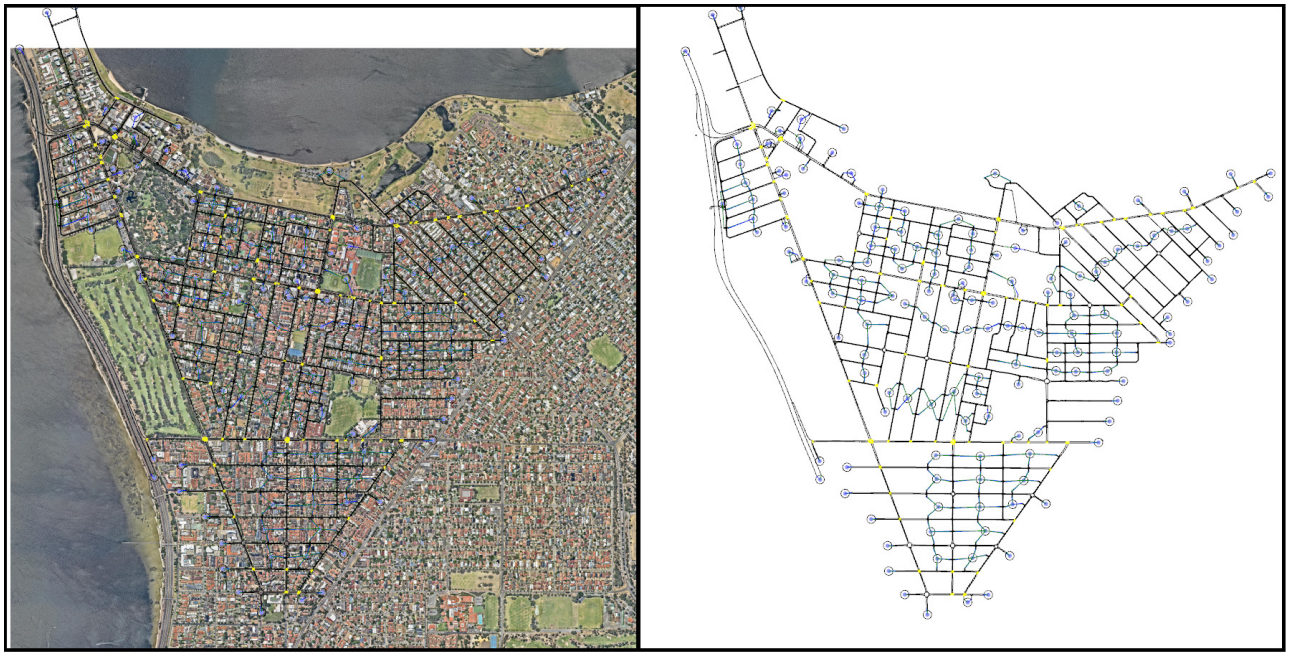


Figure 1-2 Extended Model Coverage and Zoning Structure With Background (Left) and Without Background (Right)



1.1 Micro-Simulation

While other traffic analysis software, such as SIDRA, is typically limited to the operation of single intersections, micro-simulation models allow for analysis of entire networks and is ideally suited for areas where there are likely 'interactions' between different road users and network features (such as closely spaced intersections, bus stops, lane merges, etc.).

A key feature of micro-simulation software is that each of the vehicles within the model are modelled as individual vehicles and have their own unique behaviour. This allows for development powerful 2D and 3D visual graphics (including videos) which can be used for public presentation purposes. An example of the types of 2D and 3D graphics that AIMSUN can produce is shown in **Figure 1-3**, while a screenshot of the South Perth micro-simulation model is shown in **Figure 1-4**.

This model has been developed in the AIMSUN version 8.1.3 microsimulation modelling suite.

Figure 1-3 Example of 2D and 3D Graphics in AIMSUN

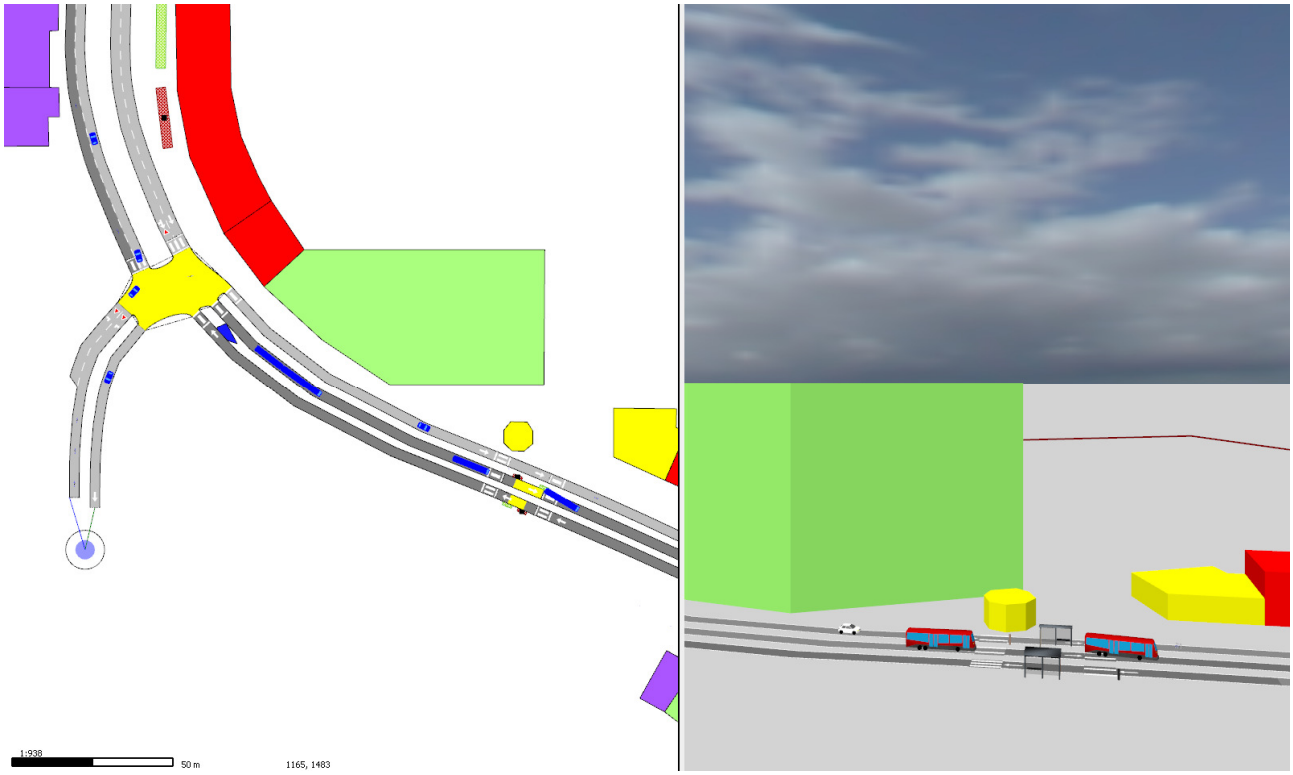
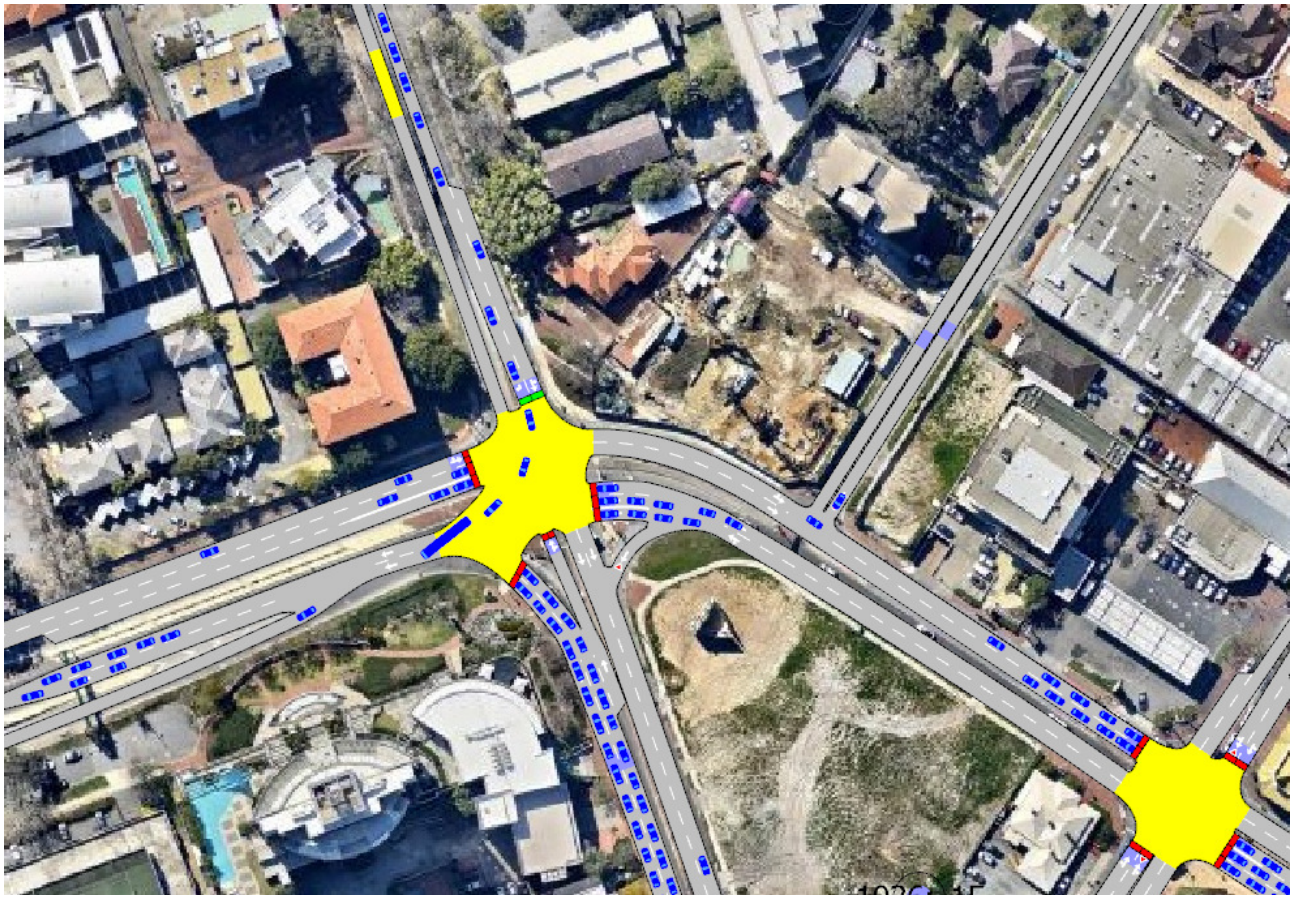


Figure 1-4 Screenshot from Calibrated Existing AM Model



2 Model Description

2.1 Data Sources

The data used for the model development is listed in **Table 2-1** below.

Table 2-1 Data Sources used for Development of Microsimulation Model

Data	Source/s	Purpose
Existing Traffic Volumes	SCATS, IDM (MRWA)	Model Calibration & Validation
	Pneumatic Tube Counts, City of South Perth (CoSP)	Model Calibration & Validation
	Intersection Turning Counts;	Model Calibration & Validation
Travel Time Surveys	Cardno, 2016	Model Calibration & Validation
Signalised intersection phase timing	SCATS, IDM (MRWA)	Model Calibration & Validation
Network speed and Road Hierarchy	MRWA Road Information Mapping	Model network development
Model validation and calibration criteria	NSW RMS *Traffic Modelling Guidelines*	Criteria for model calibration and validation
Intersection geometry	Visual site inspections, supplemented with NearMaps imagery	Model network development
Existing Public Transport Services	Public Transport Authority (PTA)	Model network development
AIMSUN Model Parameters and Default Values	AIMSUN Development Manual (DTEI, South Australia)	AIMSUN Model development
Development Approvals	City of South Perth	Development Traffic Impact Assessments

2.2 Model Periods

The models have been developed for the network peak hours, identified as:

> Weekday AM peak hour : 07:30 - 08:30

> Weekday PM peak hour: 16:30 - 17:30

2.3 Road and Intersection Layouts

The road and intersection layouts within the base model have been based on Nearmap imagery dated November 2015, while the posted speed limits for the roads have been based on data sourced from the MRWA Road Information Mapping.

2.3.1 Signalised Intersections

The signalised intersections within the study area have been modelled as fully actuated intersections, with signal phasing and cycle times estimated from SCATS and IDM data provided by Main Roads Western Australia (MRWA).

2.4 Public Transport Services

The public transport routes and headways have been based on route data sourced from the TransPerth (PTA) website.

3 Current Status of Models

As shown in **Figure 1-1**, the model covering the South Perth Station Precinct is considered complete but is regularly being updated as new developments are approved. The model is currently being used to evaluate proposed development impacts.

Cardno are currently undertaking calibration of the extended model (model Version 2.0, refer **Table 3-1**) to ensure that the resulting modelled traffic volumes (and other associated model outputs) are reflective of existing traffic conditions. Upon completion of the model calibration, Cardno will undertake model validation using independent data sets (independent to the data used for the model calibration) to ensure the robustness of the model.

3.1 Version History

The following versions have been developed to date of the South Perth micro-simulation models:

Table 3-1 Version History of South Perth Micro-Simulation Model

Version Number	Description of Version
1.0	Initial model of Station Precinct area
1.1	Changes to model as result of travel time data collected
1.2	Extension of model boundaries to include Frasers Lane and re-calibration*
1.3	Extension of model boundaries to include Queen Street and re-calibration*
2.0	Extension of model boundaries to (but not including) Canning Highway to the east and Thelma Street to the south

* Used for development of "Approved Development Scenarios*, as described in **Section 4**.

4 Approved Development Scenarios

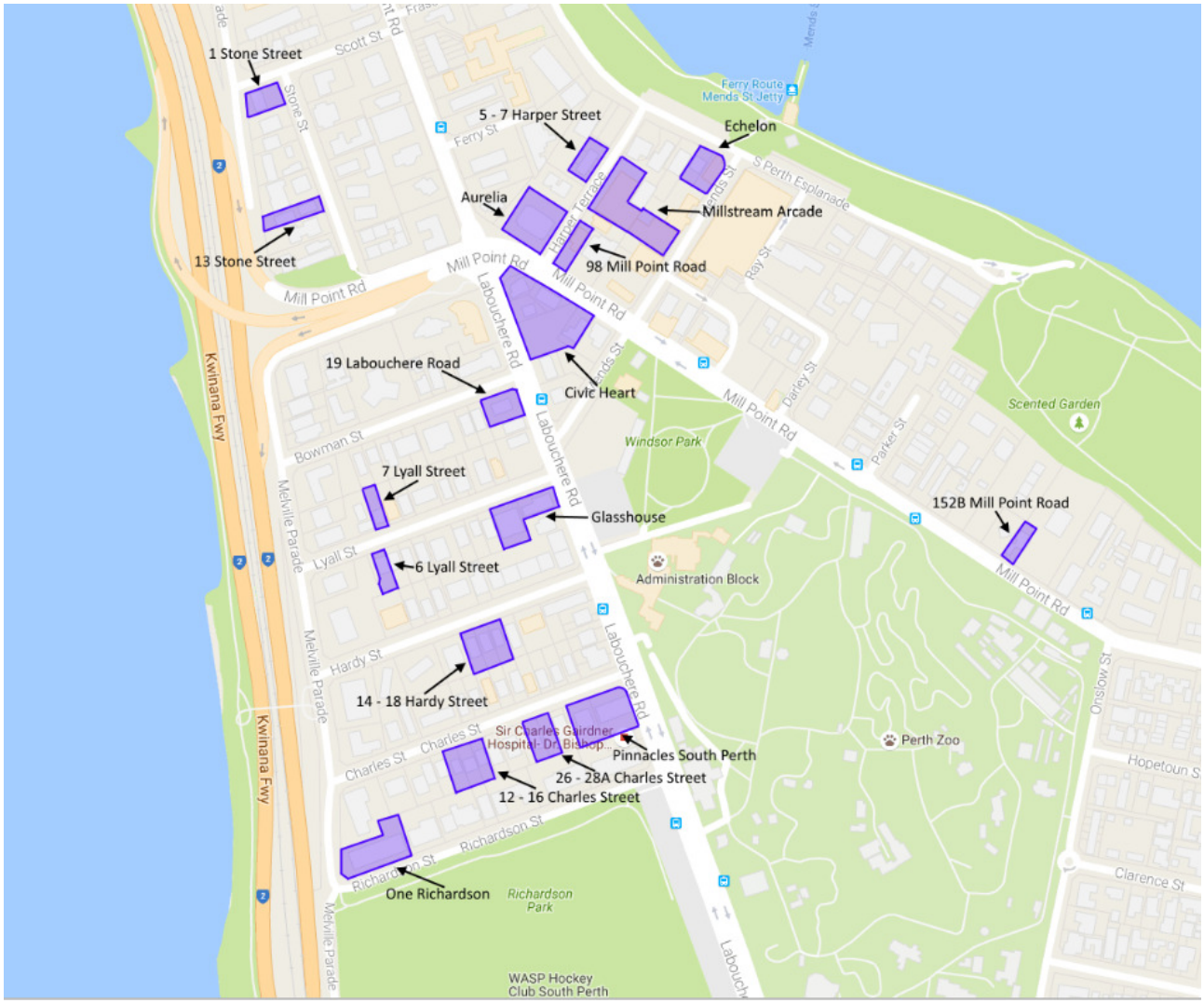
An 'approved development' Scenario has been developed for the South Perth Station Precinct model to include the following approved developments as a basis for evaluating the likely traffic impacts from other proposed developments within the study area. The current version of this Scenario includes the following approved developments:

- 12-16 Charles Street
- 7 Lyall Street
- One Richardson (1-3 Richardson Street)
- 6 Lyall Street
- Pinnacles South Perth (30-34 Charles Street)
- South Bank (98 Mill Point Road)
- Southstone Apartments (1 Stone Street)
- Aurelia (96 Mill Point Road)
- 14-18 Hardy Street
- Glasshouse (31 Labouchere Road and 24 Lyall Street)
- 13 Stone Street
- Civic Heart
- Echelon (77-79 South Perth Esplanade)
- 5-7 Harper Terrace
- 26-28A Charles Street
- 2 Harper Terrace
- 152B Mill Point Road
- Millstream Arcade (21 – 23 Mends Street)*
- 19 Labouchere Road*
- 11 Melville Parade*

* These developments were not included as approved developments for the assessments listed in Section 5 of this report as they were not approved at the time when the assessment was undertaken.

The locations of the approved developments listed above are indicatively shown in **Figure 4-1**.

Figure 4-1 Indicative Locations of Approved Developments



5 Current Model Uses

To date, the model has been used to evaluate the likely impact of the traffic generated by the following developments, with a summary of the key model findings summarised in **Section 6**:

- 74 Mill Point Road
- 86 – 90 Mill Point Road
- 1 – 3 Lyall Street & 56 Melville Parade
- 21 – 23 Mends Street

5.1 Proposed Future Model Uses

It is intended to continue the use of the micro-simulation models to evaluate the likely traffic impacts of development generated traffic from proposed developments within the study area, as well as for the following purposes:

- Evaluation of traffic management proposals;
- Evaluation of potential road network changes / upgrades; and
- Evaluation of changes to public transport services or infrastructure.

6 Model Findings to Date

Below is a summary of the key model findings from the modelling undertaken to date:

- 74 Mill Point Road
    - The modelling undertaken for 74 Mill Point Road suggested that the proposed development would have a substantial impact on vehicle delays and queue lengths on the southbound intersection approach at the intersection of Mill Point Road / Labouchere Road. This was primarily found to be due to the limited opportunities for freeway-bound vehicles to turn right to get on to the Kwinana Freeway (i.e. either at intersection of Mill Point Road / Labouchere Road or Mill Point Road / Mends Street)
- 86 – 90 Mill Point Road
    - The modelling undertaken for 86 - 90 Mill Point Road suggested that the proposed development would have a substantial impact on vehicle delays and queue lengths on the southbound intersection approach at the intersection of Mill Point Road / Labouchere Road. As the existing queue lengths are observed to occasionally extend past the intersection of Mill Point Road / Ferry Street, these queue lengths are shown in the model to more frequently extend past the intersection of Mill Point Road / Ferry Street as a result of the cumulative traffic generated by the proposed developments within the study area, thereby impeding the ability of vehicles to egress from Ferry Street during the peak hour periods. This was primarily found to be due to the limited opportunities for freeway-bound vehicles to turn right to get on to the Kwinana Freeway (i.e. either at intersection of Mill Point Road / Labouchere Road or Mill Point Road / Mends Street).
- 1 – 3 Lyall Street & 56 Melville Parade
    - The modelling undertaken for 1 – 3 Lyall Street & 56 Melville Parade suggested that the proposed development was found to be manageable as the development generated traffic was shown to distribute its impact over a number of intersections instead of concentrated at a single intersection.
- 21 – 23 Mends Street
    - The modelling undertaken for 21 – 23 Mends Street suggested that due to the relatively low proposed development yields and trip generation rates associated with the development yields, only minor localised intersection impacts are likely to occur as a result of the propose development.
- Due to the constrained road network to the north of Mill Point Road and the proposed level of development to be located within this area, vehicles originating from this area that intend to go to the Kwinana Freeway (i.e. westbound on Mill Point Road) are limited to turning right either at the intersection of Mill Point Road / Labouchere Road or at the intersection of Mill Point Road / Mends Street.

7 Expected Model Life-Time and Flexibility

The model has been developed by Cardno to include a large degree of flexibility in terms of implementing network changes. As such, the model will not become obsolete, so long as regular model maintenance and re-calibration is undertaken as the road network and land uses change, and updated traffic count data becomes available.

About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

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