Appendix A

Public Transport Assessment (Urbanhorizon Pt Ltd)

SIMTA

SYDNEY INTERMODAL TERMINAL ALLIANCE

Part 3A Concept Plan Application

Traffic and Transport

August 2011

URBANHORIZON

Moorebank Intermodal Terminal Facility
Public Transport Analysis

Final Report

Hyder Consulting

August 2011

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Moorebank Intermodal Terminal Facility - Public Transport Analysis

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Executive Summary

This report details the findings of a review of the public transport needs and opportunities of an intermodal terminal facility at Moorebank in south western Sydney. The terminal and warehouse/distribution facility will provide container storage and warehousing with direct rail access.

A Transport Management and Accessibility Plan (TMAP) approach has been taken to the public transport analysis. The recommended package of measures should ensure that workers can travel to and from the Terminal facility sustainably and in a way that reduces growth in car use. The development proposal comprises terminal warehousing, distribution and ancillary uses arranged around north-south running rail line, north-south running heavy vehicle road and north-south running light vehicle road. A copy of the concept plan is provided in **Appendix A**. A total of 2,260 employees (under business as usual assumption) will be working on site at full development. The key findings are as follows:

There are a number of opportunities that can be targeted in the development of a sustainable transport plan for the development site, these include:

- The site’s proximity to the higher order road network which connects to Liverpool and Holsworthy rail stations.
- Existing favourable walk mode shares comparable with those across Sydney.
- Car passenger mode shares higher than the Sydney and Liverpool averages which suggests a propensity towards public transport node drop off and pick up.

Conversely, some of the constraints that will need to be overcome include:

- Existing low bus and train mode shares within the locality.
- Existing above average car ownership across Liverpool.
- Distances separating the development site from existing public transport nodes.
- Current inaccessibility to local and regional bus services.

A Travel Demand Management (TDM) approach involving the application of strategies and initiatives to change travel behaviour and reduce travel demand is recommended for the development site. In order to limit to extent of employee generated private vehicle trips to and from the site and enhancing the viability of a weekday express bus service to and from Liverpool and Holsworthy stations, an ambitious public transport mode share of at least 30% should be targeted. The package of measures required to deliver this target mode share comprises:

Measure 1 – Travel behaviour change program
Summary – Various measures including marketing, promotion campaigns, events and Workplace Travel Plans designed to influence the mode choice of individuals by better understanding their travel needs.
Timeframe – Year 0 to year 5.
Responsibility: Proponent

Measure 2 – Reduce On-Site Car Parking Supply
Summary – Subject to compliance with relevant planning instruments, consider reductions in the proposed DCP required on site employee parking by up to 680 spaces.
Timeframe – Years 1 to 10.
Responsibility: Proponent

Measure 3 – Liverpool Station Express Bus Services
Summary – Provision of a peak express bus service to and from Liverpool Station via Moorebank Avenue and Newbridge Road.
Timeframe – Years 1 to 5 (must be implemented early to influence mode choice). Ideally the express bus links to Liverpool and Holsworthy stations should be implemented concurrently, however, if funding availability prevents this, then the link to Liverpool should be actioned first.
Responsibility: Proponent

Measure 4 – Holsworthy Station Express Bus Services
Summary – Provision of a peak express bus service to and from Holsworthy Station via Anzac and Heathcote Roads.
Timeframe – Year 1 to 7 (must be implemented early to influence mode choice).
Responsibility: Proponent

Measure 5 – Bus Interchange/Waiting Area
Summary – Provide employee bus interchange/waiting areas near the Freight Management Office and in southern sector of terminal site.
Timeframe – Year 1 - 5.
Responsibility: Proponent

Measure 6 – Bus Priority Works
Summary – Bus priority measures at key intersections as required.
Timeframe – Years 5 to year 15.
Responsibility: Proponent

Measure 7 – Walking and Cycleways
Summary – Shared or separate walking and cycle paths connecting the warehousing areas to the employee bus interchange/waiting areas and to the Moorebank Avenue bus stops.
Timeframe – Years 0 to 5.
Responsibility: Proponent

Measure 8 – Extend Bus Services 901
Summary – Extend bus route services 901 to traverse the northern sector of the site.
Timeframe – Year 0 to 5.
Responsibility: DoT

1.0 Introduction

Urbanhorizon Pty Ltd has been commissioned by Hyder Consulting to undertake a review of the public transport needs and opportunities for a proposed Intermodal Terminal Facility Moorebank. The terminal and warehouse/distribution facility will provide container storage and warehousing with direct rail access. The 83 hectare site is located on Moorebank Avenue at Moorebank (**Figure 2.1**) and currently provides Defence Department storage and distribution services.

The development proposal comprises the following uses:

- Warehouse and distribution facilities.
- Freight village uses.
- Train terminal operations.

This public transport analysis assumes a workforce of about 2,260 employees (under business as usual assumption) at full development. Hyder's main traffic report (volume 1) detailed employee assumption.

1.1 Workshop Scope

The purpose of the investigation is as follows:

- To define public transport options to achieve a favourable mode share for employee travel to and from the site once developed.
- To identify constraints and opportunities to achieving a favourable public transport outcome for the development proposal.
- To provide feedback on the layout and design of the development master plan.

1.2 Report Overview

The report comprises five sections as follows:

Executive Summary
1.0 Introduction
2.0 The Terminal Proposal
3.0 The Existing Transport Situation
4.0 Forecast Traffic & Transport Outcomes
5.0 A Suggested Package of Measures

Bibliography
Glossary

Appendix A –Concept Plan
Appendix B – Photographs

2.0 The Intermodal Terminal Proposal

The key aspects of the development proposal are summarised below.

2.1 The Site

The 83 hectare site is located on the eastern side of Moorebank Avenue to the west of the Wattle Grove residential area. Vehicular access to the site will be via multiple locations along Moorebank Avenue, a private road under the care and control of the Department of Defence. The eastern boundary abuts Greenhills Road, which is unformed in front of the site. Moorebank Avenue comprises one through lane in each direction plus turning lanes.

2.2 Development Particulars

The proposal comprises terminal warehousing, distribution and ancillary uses arranged around north-south running rail line, north-south running heavy vehicle road and north-south running light vehicle road. A new rail link connecting the SIMTA site with the Southern Sydney Freight Line forms part of the proposal. A copy of the concept plan is provided in **Appendix A**. Vehicular access will be provided at three locations along the Moorebank Avenue frontage to the site.

Warehousing
The majority of staff will work in the warehouses and distribution centres unpacking containers or preparing the contents for distribution. The terminal warehouses will operate in two shifts over part of the day. It is expected that the first shift will start prior to 07:00 and finishing around 16:00. The second shift would start at around 16:00 and finish after 12:00 midnight. Actual start and finish times are expected to be staggered to spread out parking and traffic demand.

Freight Village
The majority of office and ancillary staff would work during the normal working hours, with some staff required to support early morning and late evening shifts. Retail facilities will mainly be services such as food outlets and convenience stores for other staff. The facilities will be required to provide services during each of the main warehouse shifts.

When the site is fully operational, the proposed vehicle accesses will be as follows:

The southern access will provide left turn entry for articulated vehicles collecting containers from the intermodal terminal. This access will also be used by Terminal operations staff to access the administration facility at the Southern end of the Terminal. It may also be used as a second access for emergency purposes. It will not be used to provide routine access to the warehouses.

The northern access will be the principal site access. It will accommodate vehicles leaving the Terminal with containers, vehicles delivering full or empty containers and vehicles accessing warehouses.

2.3 Access & Mobility Principles

Sustainable travel within, to and from the development will be underpinned by a number of important access, mobility and urban design principles:

1. Maximising employee and visitor safety by separating heavy and light vehicle traffic where possible.
2. Encourage the use of non-motorised personal transport for travel by employees and visitors to the site.
3. Provide linkages to existing public transport.
4. Facilitate internal bus access via the centrally located heavy vehicle spine road to reduce trip lengths, enhance the viability of buses and encourage walking and cycling.
5. Maximise the number of vehicular and non-vehicular access points on both sides of the development.
6. Consider the applicability of demand responsive bus services.
7. Maximise the use of information systems in support of public transport.

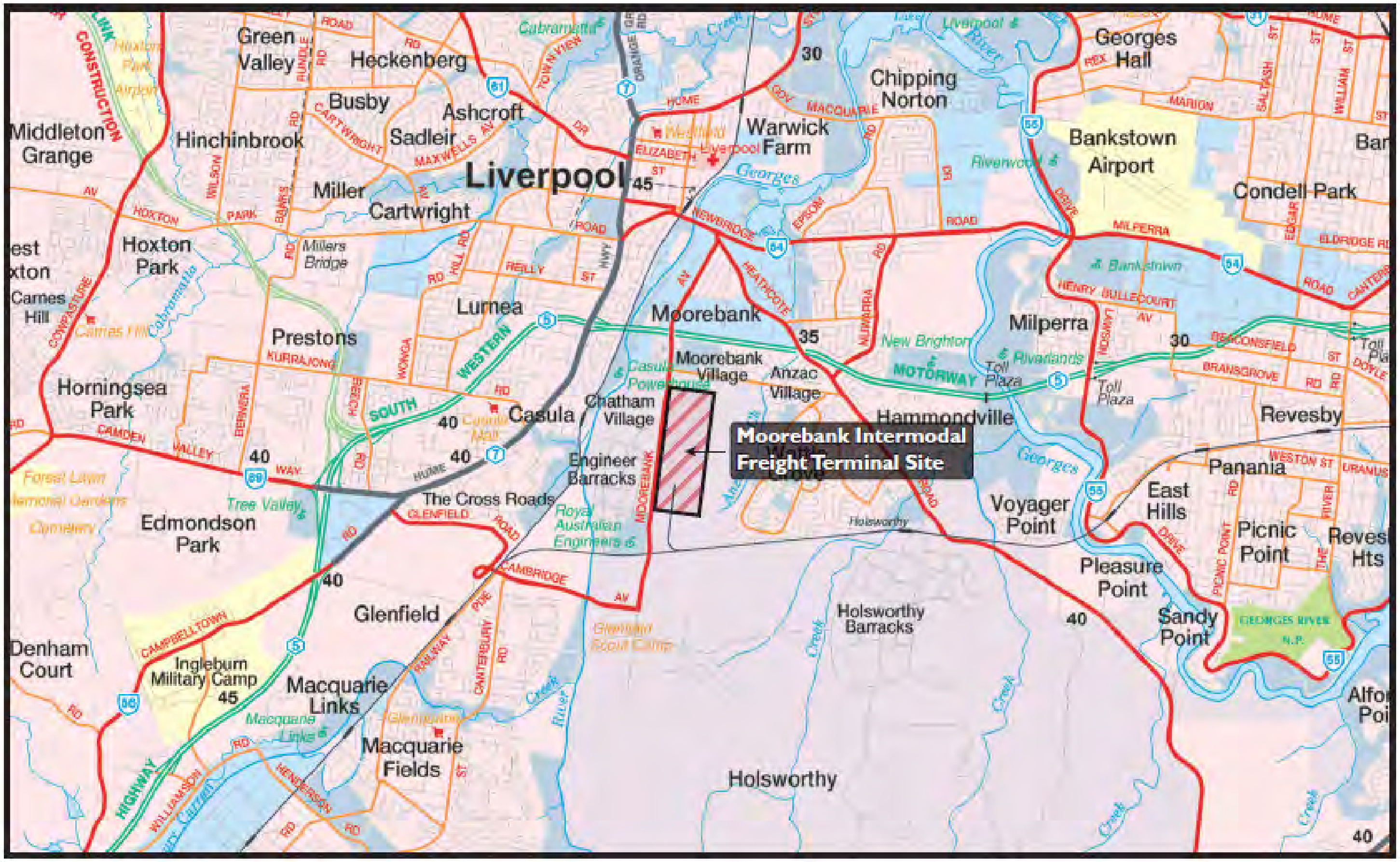

Figure 2.1 — Location of Proposed Moorebank Terminal Facility

3.0 The Existing Transport Situation

The strategic and operational context within which the development proposal sits is outlined below.

3.1 The Strategic & Policy Context

3.1.1 State Plan Targets

The State Plan describes the previous NSW Government's plans for service delivery across a range of areas. The Plan provides public transport related targets which serve as a useful base upon which to measure aspects of the development as proposed. The State Plan targets are as follows:

Improve the public transport system.
Increase the share of commute trips made by public transport:

- To and from the Sydney CBD during peak hours by 80% by 2016.
- To and from the Parramatta CBD during peak hours by 50% by 2016.
- To / from the Newcastle and Sydney CBD during peak hours by 20% by 2016.
- To and from the Wollongong CBD during peak hours by 15% by 2016.
- To and from the Liverpool CBD during peak hours by 20% by 2016.
- To and from the Penrith CBD during peak hours by 25% by 2016.

Increase the proportion of total journeys to work by public transport in the Sydney Metropolitan Region to 28% by 2016.

Provide reliable public transport.

- Trains – 92% of CityRail trains run on time across the network.
- Buses – 95% of Sydney buses run on time across the network.
- Ferries – 99.5% of Ferries run on time.

Improve the road network.

- Improve the efficiency of the road network during peak times as measured by travel speeds and volumes of Sydney's road corridors.
- 98% of incidents on principal transport routes are cleared, on average, within 40 minutes of being reported.
- Increase the proportion of container freight movement by rail out of Port Botany to 40% by 2016.

Increase walking and cycling.

- Increase the mode share of bicycle trips made in the greater Sydney Region, at a local and district level, to 5% by 2016.

Increase the number of jobs closer to home.

- Increase the percentage of the population living within 30 minutes by public transport of a city or major centre in Metropolitan Sydney.

3.1.2 Growing Liverpool 2021

Liverpool Council is developing a ten year community strategic plan called Growing Liverpool 2021. The purpose is to provide direction for the planning of the LGA in response to the anticipated increase in population from about 182,000 (2009) people to more than 220,000 people by 2021. The *State of the city Liverpool 2010* document provides a summary of some of the challenges facing the LGA. The document highlights the following travel and related statistics:

- Liverpool has grown from about 12,600 people in 1947 to about 182,000 in 2009. By 2036 a population of about 325,000 people is anticipated.
- By 2036 about 50,000 of this estimated 325,000 population will be over 65 years of age.
- Residents make an average of 3.4 trips per person on an average weekday.
- The average travel time for residents is about 34 minutes.
- Most trips are made by car, in 2006 about 62% of people in Liverpool drove to work compared with 54% for people in Sydney.
- Slightly more than 11% of people in Liverpool used public transport to travel to work compared to 18% for Sydney.
- By train in the peak hour, it takes about 54 minutes to get to Central station compared to about 40 minutes from Blacktown and 28 minutes from Parramatta.

The document highlights the following challenges:

- To maintain flexible planning controls that allow for changes in residential demand and traffic patterns.
- Continue to grow and develop Liverpool as a regional city for south western Sydney with major facilities and improved transport.
- To increase services and infrastructure in line with population growth.

3.2 The Road Network and Traffic

The development site has frontage to Moorebank Avenue, a north-south arterial road. Moorebank Avenue comprises one lane in each direction and carries about 15,000 veh/day on the average weekday. See Photographs in **Appendix B**.

The northern end of the site is about 600 metres from the M5 Motorway/Moorebank Avenue interchange. The northern part of the site is located about 2.7 kilometres from Liverpool rail station and the bus interchange located on the eastern end of Moore Street (**Appendix B**). Access to and from the site and Liverpool rail station is via Moorebank Avenue - Newbridge Road - Speed Street - Bigge Street - Moore Street. The introduction of the Liverpool to Parramatta Transitway and the volume of bus activity to and from the bus interchange means that several of the roads within the Liverpool city centre have lanes dedicated fully or partially to bus access.

3.3 Public Transport Services

3.1.1 Bus

Presently only one bus route, Route service 901 operated by Veolia, services the area in the vicinity of the site via Moorebank Avenue. 901 buses travel via Anzac Road to the north of the site with only one AM and one PM service accessing the site (south of Anzac Road to the existing DNSDC site). This is shown as a dotted line in **Figure 3.2**. These buses connect the area to Liverpool Station and then access Wattle Grove en route to Holsworthy rail station which is located about 3 kilometres to the east of the southern area of the site. The first 901 bus leaves Liverpool station at about 5:30am each weekday and the last bus returns to Liverpool station at about 8:50pm on weekday evenings. The weekday average peak frequencies are about 30 minutes and 60 minutes in the off peak.

The NSW Government has introduced a number of high frequency cross regional bus services across the Sydney metropolitan area. The network comprises 13 routes operating seven days a week departing every ten minutes during peak periods. Services operate every 15 minutes during the weekday and every 20 minutes until 8:30pm. Some services operate after 8:30pm at a frequency between 30 and 60 minutes. On weekends the buses run every twenty minutes between 7:30am and 7:30pm. The Metro services are operated by both STA and private operators.

Metro Bus M90 runs between Liverpool and Burwood via Milperra and Newbridge road. It is not accessible to the subject site, these road being located more than two kilometres to the north.

Table 3.1 – Bus Services (Routes 901, 902 & M90), 2011

Time	No. of Services per day					
	901		902		M90	
	NB	SB	NB	SB	WB	EB
Weekday AM	9	10	12	10	35	33
Weekday PM	15	14	13	13	45	39
Saturday AM	5	5	6	6	15	15
Saturday PM	7	7	7	7	26	27
Sunday AM	4	4	4	3	15	15
Sunday PM	7	6	5	7	26	27

Source: Urbanhorizon Pty Ltd, 2011

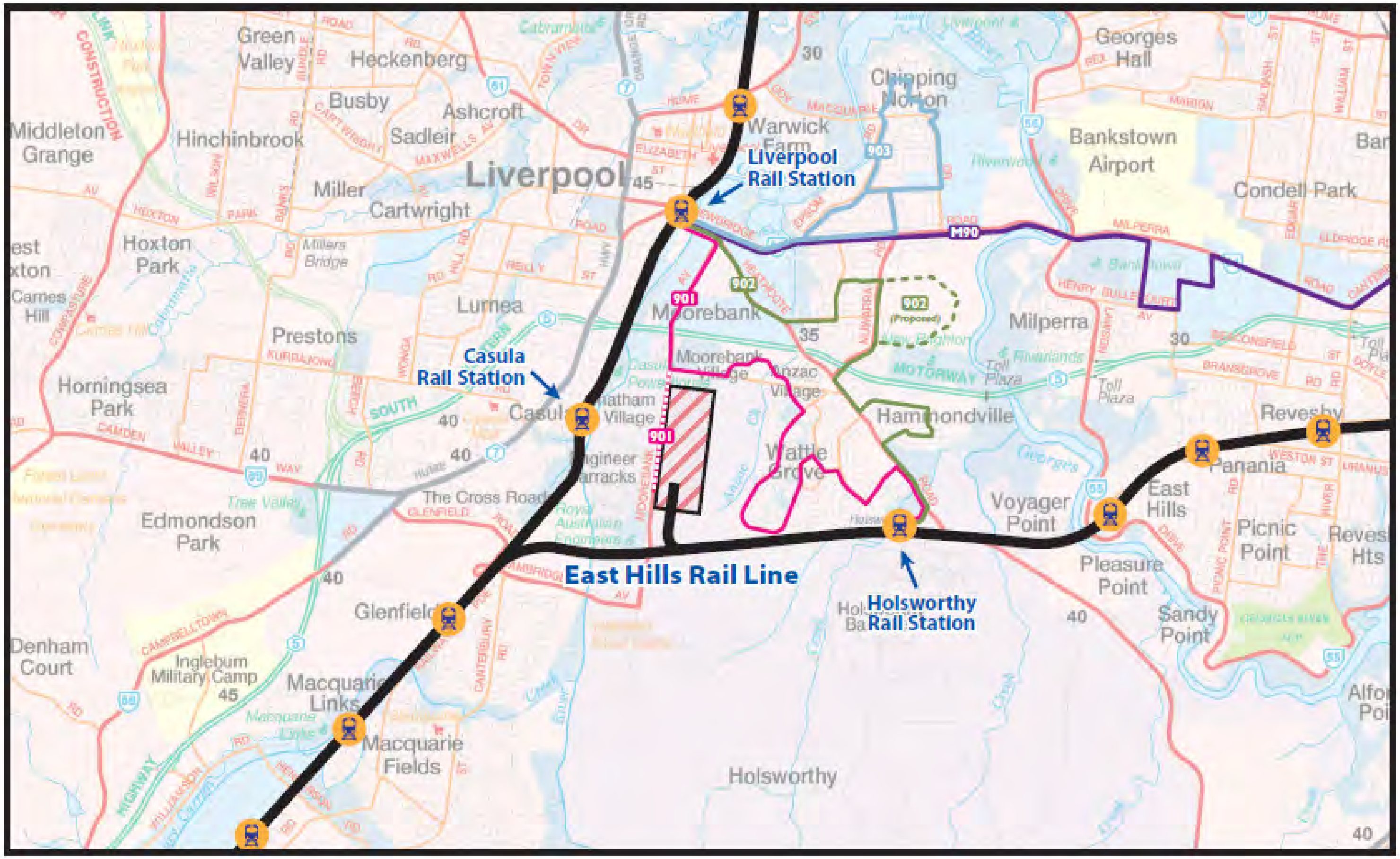

Figure 3.2 — Existing Bus Routes and Rail Network

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Table 3.1 shows the numbers of bus services across the average weekday and weekend day. Routes 901 and 902 provide a limited service on weekends. Route M90, although remote from the site, operates on both weekdays and weekends at much better frequencies.

3.1.2 Rail

The site is located near the junction of the Southern and East Hills rail lines. Three rail stations are located within a 3-4 kilometre radius of the site, these being Liverpool Station (Southern Line) to the north, Casula Station (Southern Line) to the west and Holsworthy Station (East Hills Line) to the south east. The Georges River is located between the site and Casula Station. This, and the existing arrangement of the road network means that Casula Station is not as accessible to the site as the other two rail stations.

Table 3.2 shows the 2009 weekday Station entries and exits at each of the three stations. By way of comparison, the number 1 ranked station in the network was Central station with AM (6:00-9:30am) entries and exits of 8,260 and 37,720, respectively. Twenty four hour entries and exits were 85,260 pax/day. This compares with the 8,570 and 2,840 entries and exits at Liverpool and Holsworthy stations, respectively.

Table 3.2 – 2009 Weekly Station Entries/Exits

Station	2:00-6:00		6:00-9:30		9:30-15:00		15:00-18:30		18:30-2:00		24 Hours		Rank
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	
Liverpool	160	80	2710	2250	2500	2230	2600	2890	600	1110	8570	8570	27
Holsworthy	20	30	2280	190	330	260	170	1640	40	730	2840	2840	81
Casula	0	0	100	20	40	40	30	90	10	30	180	180	233

Source: RailCorp, 2010

Vehicular access between the development site and the two nearest stations is as follows:

- Liverpool Station: Moorebank Avenue - Newbridge Road - Speed Street - Bigge Street - Moore Street.
- Holsworthy Station: Anzac Road - Wattle Grove Dr - Heathcote Road – Macarthur Dr - right into station car parking area.

3.4 Travel Behaviour & Trends

3.4.1 Transport Indicators

Table 3.3 summarises some of the key transport indicators for the Liverpool LGA and the Sydney Statistical Division sourced from the Bureau of Statistics (BTS) Household Travel Survey. Generally, Liverpool's residents exhibit higher trip making and car based mode shares than the average for Sydney. Total travel per person (km) and VKT's per person are both above the Sydney average. Mode choice in Liverpool is dominated by the car which is more than 10 percentage points higher than the Sydney Average (80% vs. 68.3%).

Table 3.3 – Transport Indicators, Liverpool LGA & Sydney SD, 2008-09

Indicator	Sydney	Liverpool
Population	4,269,000	171,000
Households	1,626,000	55,000
Trips per person	3.76	3.4
Total travel per person (km)	31.1	33.9
Model of travel (%):		
- Car Driver	47	56
- Car passenger	21.3	24
- **Car combined**	**68.3**	**80**
- Train	5.2	3
- Bus	5.8	4
- Walk	18.3	12
Vehicles per Household	1.51	1.72
Ave. trip length (km)	8.3	10.1
VKT per person	17.8	22.6
Ave. work trips (mins)	34	34
Daily travel time (per person)	81	75

Source: BTS HTS, 2011

There are, however, some potentially positive travel characteristics across Liverpool that may be targeted in the development of a public transport plan for the subject development site. Train is used by about 3% of Liverpool residents for journey to work trips which, although below that applying across Sydney (3% vs. 5.2%), does provide a good base upon which to develop a favourable public transport mode share for the future employees on the terminal site. The propensity to use heavy rail for JTW trips suggests that future workers on the development site may use rail in reasonable numbers providing links between the site and the rail stations are satisfactory.

Similarly, the mode share for bus use across Liverpool (4%) is also below the 5.8% average for Sydney. The review of travel patterns and mode shares at the Travel Zone (TZ) level shows that in the immediate area, current bus and rail mode shares are well below this LGA average, with only about 1% of (all purpose) trips in the AM peak from the locality currently taking place on bus. A successful public transport plan for the terminal site will need to target bus mode shares better than this current Liverpool LGA average.

The average trip lengths and travel times suggest that a high proportion of trips occur within the Liverpool LGA or to nearby areas. This propensity to 'local' travel suggests that the employment uses proposed for the site will attract workers from within or nearby the Liverpool LGA. This will assist in reducing overall trip lengths, travel times and increasing the likelihood that appropriately targeted bus services will be used for journey to work trips at the terminal site.

BTS data provided by Hyder Consulting and sourced from the 2006 Census provides information about how people travel currently in the locality. **Table 3.4** summarises this information. The local travel statistics provide an indication of how future terminal employees on the development site might travel, albeit in the absence of measures designed to achieve a more sustainable mode share. The data indicates:

- The mode share to car is above the Liverpool average.
- The mode share to car is well above the Sydney average.
- The mode shares to bus are significantly less than the Sydney average and below the Liverpool average.
- The mode share to train for production trips is less than both the Sydney and Liverpool averages.

Table 3.4 - Transport Indicators, Local Travel Zones, 2006

	Inbound Trips	**Mode Share (%)**
Train	148	2.1
Bus	62	1.0
Car driver	5,444	78
Car pax.	466	6.7
Car total	5,910	-
Other modes	328	4.7
Work home / not stated	534	7.5
Total	6,985	100

Source: Hyder Consulting, 2011 (BTS data)

The principal destinations for trips from the locality were extracted from the BTS Model trip tables. The BTS transport model produces trip information for Travel Zones (TZs) across Sydney. The review (see **Table 3.5**) reaffirms the dominance of trips made internal to the Liverpool area, about 30% of all AM peak trips (includes trips internal to the TZ). The Liverpool, Campbelltown and Fairfield LGAs are also important destinations for trips originating in the two largest trip generating TZs in the locality. Assuming that future terminal employees on the development site have the same or similar destinations, this information represents both a challenge and an opportunity. The dominance of trips made internal to the Liverpool LGA, that is, comparatively short trips, can lend itself to car based travel. Conversely, if appropriate public transport services are provided to meet the needs of these shorter trips it will be possible to achieve a mode share to public transport at the expense of car use. A good example is the provision of rapid and high frequency bus services between the terminal site and nearby rail hubs in the AM and PM peaks, and during site shift changes.

Table 3.5 – Distribution of Car Based Trips from Locality, AM Peak 2010

Zone	Dest.	Trips	%	Rank	Zone	Dest.	Trips	%	Rank
1110	Liverpool	224	28	1	**1113**	Liverpool	155	27	1
	Campbelltown	123	15	2		Campbelltown	86	15	2
	Fairfield	107	13	3		Fairfield	58	10	3
	Bankstown	65	8	4		Camden	42	7	4
	Sutherland	63	8	5		Blacktown	36	6	5
	Others	110	14			Others	89	15	
Total		**643**	**100**				**563**	**100**	

Source: Hyder Consulting, 2011

3.5 Constraints & Opportunities

There are a number of opportunities that can be targeted in the development of a sustainable transport plan for the terminal site, these include:

- A well established and under-utilised higher order road network providing direct access to and from the development site.
- The proposed terminal land use will generate mostly inbound trips in the AM peak resulting in a more balanced use of the surrounding road network.
- Employment uses that will attract workers from within or nearby the Liverpool LGA.
- Existing favourable walk mode shares comparable with those across Sydney.
- Car passenger mode shares higher than the Sydney average which may suggest a propensity towards public transport node drop off and pick up.

Conversely, some of the constraints that will need to be overcome include:

- Existing above average car ownership across Liverpool.
- Poor access to and use of rail for people within the immediate Moorebank Avenue locality.
- Distances separating the terminal site from existing public transport nodes.
- Current inaccessibility to local and regional bus services.

4.0 Forecast Traffic and Transport Outcomes

This section identifies a range of measures required to provide sustainable travel for terminal employees to and from the site over time.

4.1 Achieving a Favourable Public Transport Mode Share

An individual's decision to use public transport or car or a combination for a particular journey is a function of many factors; car availability, relative travel times and costs, availability and cost of parking and other non-quantifiable factors. Adopting a laissez-faire approach to the development will more than likely see mode shares mimic those found elsewhere in southern and western Sydney. A proactive demand management approach is required whereby public transport use is encouraged by ensuring services and facilities are in place to offer a realistic alternative to the car. The design and layout of the terminal facility must facilitate public transport use.

Travel Demand Management (TDM) involves the application of strategies and initiatives to change travel behaviour and reduce travel demand, especially for car based trips to and from the proposed development. A TDM approach seeks to bring about more efficient travel patterns and travel choices by:

- Improving transport and trip making choices.
- Providing incentives to modify the choice of mode, travel times and the need for travel.
- Enhancing land use accessibility.
- Changing policies.

There are many benefits of a TDM approach:

- Reduces car based trip making.
- Reduces road traffic congestion.
- Allows total on site car parking provision to be minimised and for land to be put to other uses.
- Encourages the use of less environmentally damaging modes such as walking, cycling and public transport.
- Health and fitness benefits through increased walking and cycling.
- Lessens the costs associated with car ownership and maintenance.

Achieving a favourable TDM outcome for the subject terminal site will require both infrastructure and non-infrastructure initiatives. Candidate initiatives include the following:

<u>Infrastructure based TDM initiatives:</u>

- Ensuring that the use of personal non-motorised transport is encouraged through appropriate warehouse layout / design and road intersection design.
- Designing and constructing the central spine road and other site roads to accommodate buses, bus infrastructure and cyclist use for employees.

- Construction of a covered bus drop off/pick up facility near the proposed Freight Management Office in the north sector of the site and another in the southern sector of the site to encourage the use of buses for access to and from the site.
- Review and rationalise the locations of 901 bus stops in the vicinity of the site to match the proposed northern terminal entry location and enhance accessibility.
- Monitor the need for additional bus priority at key intersections within and external to the site to accommodate the proposed bus service extensions forming part of the package of measures.

<u>Non-Infrastructure based TDM initiatives:</u>

- Reduce the total supply of car parking available to terminal employees on site and dedicate some of the land to the two bus drop off/pick up facilities.
- Provide peak period express buses to/from the site and Liverpool Station via Moorebank Avenue and Newbridge Roads.
- Provide peak period express buses to/from the site and Holsworthy rail station via Anzac Road, Wattle Grove Drive and Heathcote Road.
- Extend bus route 901 through the site via the light vehicle road.
- Increasing peak period 901 bus service frequencies (through the site) to better match the needs of existing and future employees of the locality as terminal development proceeds.
- The introduction of a travel behaviour change program for the terminal employees.
- Provide walkways and cycleways through the terminal site linking with the proposed on site bus facility.
- Initiate a marketing and awareness campaign for all new employees on the site and in the locality to promote the TDM initiatives including:
    - Bus services linking to Liverpool and Holsworthy stations.
    - Walking and cycling facilities linking to bus stops.
- Adopt a proponent designed and funded car sharing scheme.

4.1.1 Park and Ride

It is not proposed to link the site with the passenger rail network and as such the location of the site in relation to Holsworthy rail station is such that park and ride will not form part of a public transport plan for the site. The Transport Construction Authority (TCA) has been implementing a commuter car park and interchange program over recent years. A new 520 space commuter car park was opened at Holsworthy Station in December 2009 in recognition of the high demand for park and ride at this station. The commuter car park is available for CityRail patrons only and would not accommodate the travel needs of SIMTA employees. For example, a SIMTA employee could not drive and park at Holsworthy station in order to board one of the proposed express buses to the SITA site.

4.2 Traffic & Trip Generation Estimation

The *Technical Note 3 - Traffic Generation report, Hyder, June 2011 (Volume 2 of Main Traffic Report, Appendix F)* provides details of the traffic likely to be generated by the terminal proposal at full development. **Table 4.1** below details the estimated total person trips and associated trip mode shares for the development against two development scenarios:

- Scenario A – Development as proposed (Approximately 2,260 employees) without a TDM package of measures.
- Scenario B – Development as proposed (Approximately 2,260 employees) with a TDM package of measures.

For each development future the mode share impacts have been estimated under a no TDM scenario (i.e. a traditional approach without initiatives in support of public transport) and a scenario with a TDM package of measures.

The State Plan targets aim to increase the public transport share of commuter trips across Sydney from the current 24% to 28% by 2016, a 4% increase. A 4% increase across Sydney is an ambitious target and one that relies on developments such as that proposed for Moorebank pursuing a TDM approach. The comparatively higher than average car based mode shares in the Liverpool area and the inaccessibility of the development site require that the TDM package for the site target an ambitious development specific mode share shift. In order to ensure the viability of a weekday express (an all stops or limited stops service is unlikely to be patronised by employees as it will not deliver travel times better than or similar to the private car) bus service to and from Liverpool and Holsworthy stations, a public transport mode share of at least 30% should be targeted.

If, at full development, 30% of all employees working on the site, used a bus to access Liverpool and Holsworthy rail stations, this would equate to about 680 employees. The benefits of achieving such a mode share target would be as follows:

- 680 fewer peak car trips (one way) to and from the terminal site.
- It would reduce the total on site car parking provision by about 680 car spaces, equivalent to about 15,000 square metres or 1.5 hectares of site area which could be put to more productive use.
- It would provide the patronage required to support the viability of the express bus services proposed.
- It would take pressure off the already well patronised commuter car parking facilities at Holsworthy rail station.

Assuming about 75% of employees would have an origin (AM) and destination (PM) at Liverpool station, about 9 or 10 buses would need to depart the station in the morning peak 2 hours to accommodate likely patronage under a 30% scenario. Three to four buses would be required to accommodate the remainder of employees travelling to the site from Holsworthy station.

Table 4.1 shows that a public transport share of about 30% could be achieved if a range of TDM measures are implemented as part of the development, especially the peak period bus connections to and from the rail stations. These are addressed overleaf.

A 30% public transport share is anticipated for the terminal development based on the package of measures being able to influence travel choice for inbound employee trips to the site. Major improvements in the bus and rail mode shares have been forecast to 30%. Similarly, improvements in walk and bicycle mode shares (other modes) of more than 6% can be achieved where the appropriate shared facilities are provided into and through the site. A terminal employee car mode share of about 51.5% could be achieved which would be well below both the Sydney and Liverpool LGA averages.

Table 4.1 – Estimated Trip Generation with and without TDM Package

Development. Scenario	Estimated Trips and Mode Share			
	No TDM Package		With TDM Package	
	Trips	%	Trips	%
Total Person Trips				
P Trans Modes				
Train	95	2.1	226	5.0
Bus	45	1.0	1356	30
Total	140	3.1	1582	35.0
Car Mode				
Car dr	3,526	78	2,102	46.5
Car pax	303	6.7	226	5.0
Total	3,829	84.7	2,328	51.5
Other Modes				
Other	212	4.7	271	6.0
W home/stated	339	7.5	339	7.5
Total	551	12.2	610	13.5
Total	**4,520**	**100**	**4,520**	**100**

Source: Urbanhorizon Pty Ltd

1. TDM = Travel Demand Management.
2. 4,520 = Assumes the forecast 2,260 employees will generate 2 terminal trips per day.
3. 30% public transport mode share applied to bus only. Rail-bus trips will be linked trips.
4. Forecast 'work at home/did not work' % held constant.

The following measures are designed to influence and change travel behaviour to bring about sustainable travel to and from the development site. The costs of the measures are likely to be such that a staged approach would be required as development progresses across the site. The staging below assumes that development will occur over a 20 year period (full development in 2031).

4.2.1 Non Infrastructure Measures

A travel behaviour change program comprising a Moorebank Intermodal Terminal Facility car sharing scheme and marketing and awareness campaign will need to be implemented in the early phases of the development. The marketing and awareness campaign will embrace the following:

- Information explaining that a package of measures to support travel by modes other than just car will be implemented in a staged manner over time.

- Travel information on both a specific Moorebank Intermodal Terminal Facility website and Liverpool Council's website including a description of the measures to be put in place in the short, medium and longer term.
- Regular marketing and promotion campaigns and events designed to influence the mode choice of employees by better understanding their travel needs.
- The operators on the site will be encouraged to implement a Workplace Travel Plan for its employees to encourage and enable employees and visitors to take advantage of modes other than just car for trips to and from the site. Workplace travel planning information is available on the NSW Premier's Council for Active Living (PCAL) Website.
- An aggressive campaign to both promote the express bus services linking the site to the rail network at Liverpool and Holsworthy rail stations and communication that on site car parking provision for employees will be limited.
- Consideration of the imposition of pay and display parking for all day employee parking in conjunction with the introduction of parking time restrictions on streets external to the terminal site.
- Car sharing databases will need to be prepared and maintained.
- A bicycle loan scheme will be required for movement across the terminal site.

Bus Travel
The above non-infrastructure short term measures will need to be supported by one or more infrastructure measures designed to influence travel behaviour change for employees from day one. Having regard to the findings of the above TZ review, the provision of a peak express bus service to and from Liverpool Station via Moorebank Avenue and Newbridge Roads will be important. The service may need to be funded by the proponent and would need to provide travel times of less than 10 minutes between the site entry and station.

In order to achieve the ambitious mode shares it will be necessary to provide high service frequencies of not greater than 10 minutes in the AM and PM peaks periods. That is, in the AM peak (6-9am) as employees travel to the terminal site, a bus will need to depart the station every 5-10 minutes. Similarly, in the PM, return buses will need to operate on a 5-10 minute frequency or better. Outside the peaks, bus service frequencies of 30 minutes should be maintained. This measure may need to be supported by targeted bus priority measures at key intersections which can be monitored over time. See **Figure 4.1**.

Supporting a bus service during the early phases of development will be challenging and will necessitate proponent intervention and funding. For illustration purposes assume in the early phases there are 1,000 employees active on site all of whom could take public transport. If 30% or about 300 of these workers travelled by bus then it would require about 6 or 7 buses in the AM and PM peaks. This would grow over time as indicated above and depending on the split of demand between Liverpool and Holsworthy rail stations.

Rail Capacity

Liverpool station is located on the Southern Line. RailCorp data reaffirms that in March 2010 the average load factor (rail seats to passenger ratio) was about 125% between 7:50 and 8:50am. Given that a larger proportion of the terminal workers will choose to travel to and from the site outside the network peaks, the Southern line is expected to be able to accommodate the growth in demand generated by the ambitious public transport mode share target. Similarly, the East Hills line had average load factors above 100% between 7:50 and 8:50am but has the capacity to absorb the extra demand generated by the terminal development on the shoulders of the peak periods.

4.2.2 Other Measures

As development progresses, other measures would need to be put in place to encourage public transport use. On the western side of the site, a similar peak express bus service to and from Holsworthy Station via Heathcote Road will need to be implemented. As with the Liverpool station service, the service may need to be funded by the proponent and could provide travel times of about 5 minutes. No bus priority works would be required along the route.

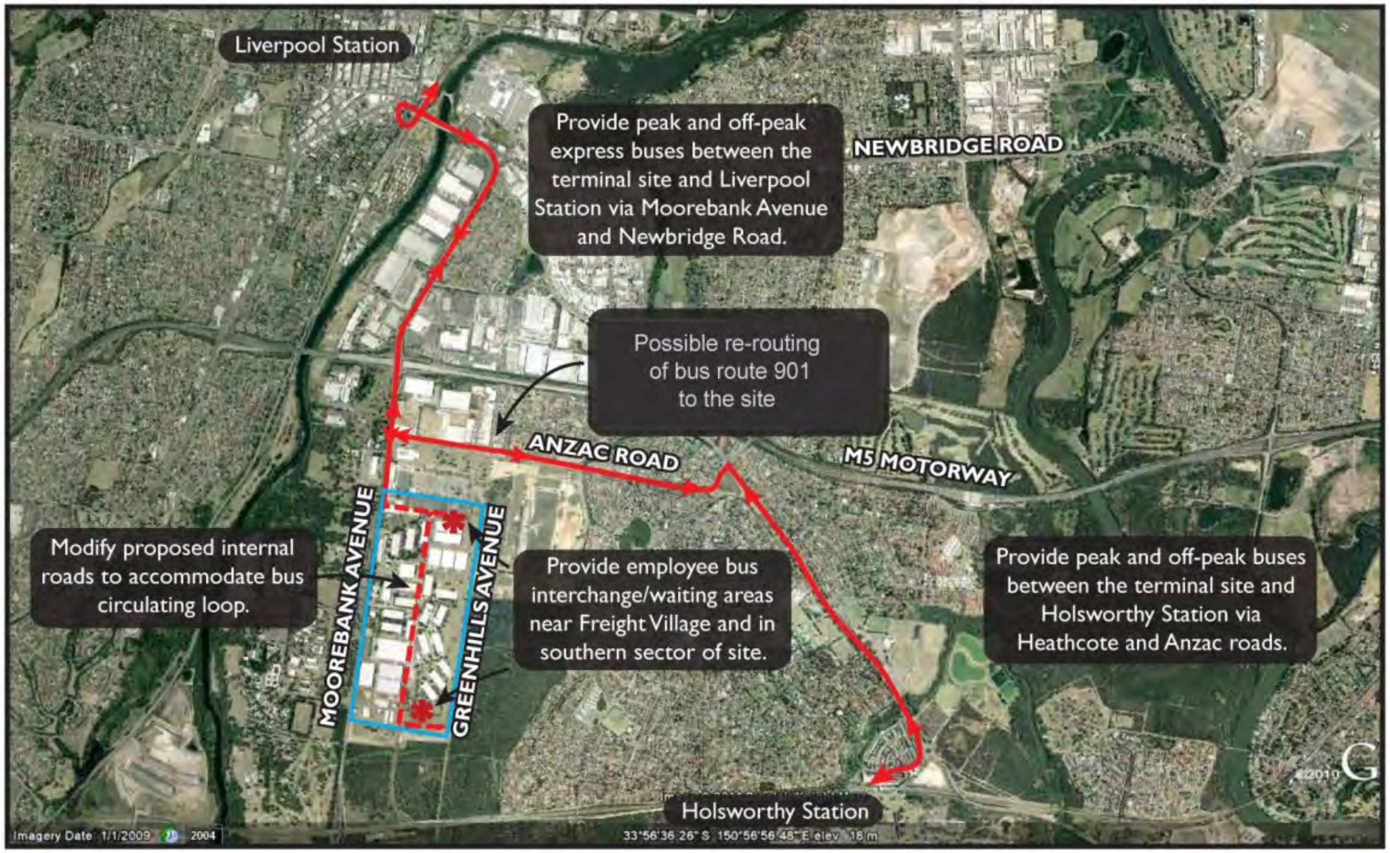
In addition to these peak period express services, the route of 901 buses could be altered to traverse the northern sector of the site. 901 buses currently travel east-west along Anzac Road, some of the buses could remain on Anzac Road while some route services could be deviated via the northern part of the terminal site. This would supplement the proposed express services to and from the rail stations. Critical to the success of the above measures will be the provision of accessible walking and cycle paths to ensure good access to bus stops within and on the periphery of the terminal site.

4.2.3 Possible Long Term Measures

In the longer term there may be the opportunity to introduce a cross regional Metro bus service that uses the M5 Motorway and deviates to access the terminal site and other nearby demand generators. Deviation of the existing M90 services from Newbridge Road would not be feasible.

4.2.4 Cumulative Mode Share Benefits

The combined impact of the bus and rail focussed measures will be to achieve terminal site specific mode share increases above those applying across Liverpool at the moment. A terminal employee public transport mode share shift of about 30% is considered feasible. If a reasonable proportion of employees work within the region, then substantial trip reduction benefits can be achieved. This could manifest itself in a 2-3% increase in walk mode share at the expense of car based trips.



Source: (C) Google 2010

Figure 4.1 — Suggested Package of (Infrastructure) Measures

5.0 A Package of Measures

Adopting a Transport Management and Accessibility Plan (TMAP) approach to the development will ensure sustainable trip making to and from the development. This will be achieved by investment in a suggested package of measures within and external to the site.

5.1 Suggested Package of Measures

Measure 1 – Travel behaviour change program
Summary – Various measures including marketing, promotion campaigns, events and Workplace Travel Plans designed to influence the mode choice of individuals by better understanding their travel needs.
Timeframe – Year 0 to year 5.
Responsibility: Proponent

Measure 2 – Reduce On-Site Car Parking Supply
Summary – Subject to compliance with relevant planning instruments, consider reductions in the proposed DCP required on site employee parking by up to 680 spaces.
Timeframe – Years 1 to 10.
Responsibility: Proponent

Measure 3 – Liverpool Station Express Bus Services
Summary – Provision of a peak express bus service to and from Liverpool Station via Moorebank Avenue and Newbridge Road.
Timeframe – Years 1 to 5 (must be implemented early to influence mode choice). Ideally the express bus links to Liverpool and Holsworthy stations should be implemented concurrently, however, if funding availability prevents this, then the link to Liverpool should be actioned first.
Responsibility: Proponent

Measure 4 – Holsworthy Station Express Bus Services
Summary – Provision of a peak express bus service to and from Holsworthy Station via Anzac and Heathcote Roads.
Timeframe – Year 1 to 7 (must be implemented early to influence mode choice).
Responsibility: Proponent

Measure 5 – Bus Interchange/Waiting Area
Summary – Provide employee bus interchange/waiting areas near the Freight Management Office and in southern sector of terminal site.
Timeframe – Year 1 - 5.
Responsibility: Proponent

Measure 6 – Bus Priority Works
Summary – Bus priority measures at key intersections as required.
Timeframe – Years 5 to year 15.
Responsibility: Proponent

Measure 7 – Walking and Cycleways
Summary – Shared or separate walking and cycle paths connecting the warehousing areas to the employee bus interchange/waiting areas and to the Moorebank Avenue bus stops.
Timeframe – Years 0 to 5.
Responsibility: Proponent

Measure 8 – Extend Bus Services 901
Summary – Extend bus route services 901 to traverse the northern sector of the site.
Timeframe – Year 0 to 5.
Responsibility: DoT

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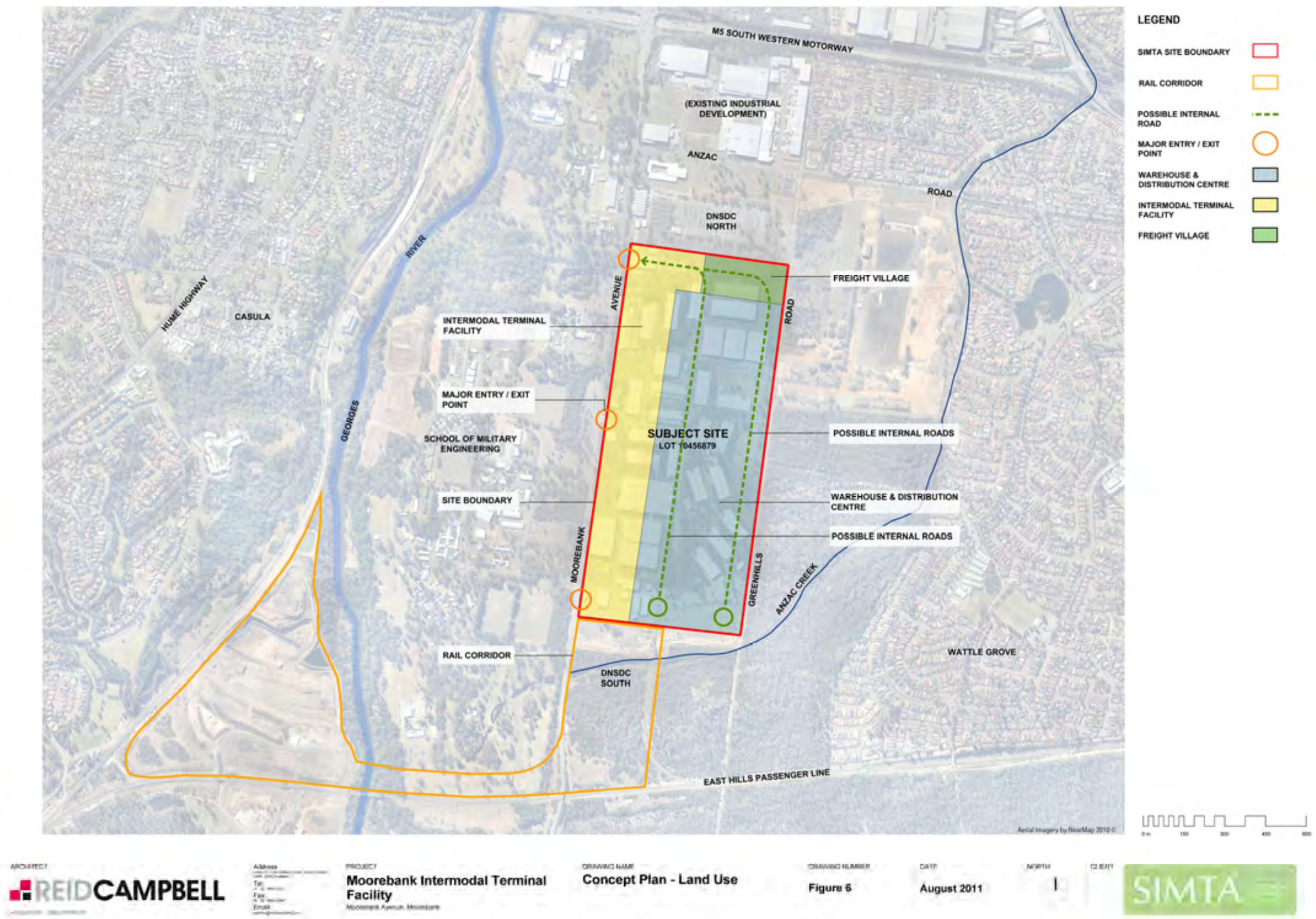
Glossary

AADT	Average Annual Daily Traffic
BTS	Bureau of Transport Statistics (Transport for NSW & formerly TDC)
COAG	Council of Australian Governments
DCP	Development Control Plan
DNSDC	Defence National Storage and Distribution Centre
DoP	Department of Planning (Now DP&I)
Down	Rail movement away from the Sydney CBD
EA	Environmental Assessment (formerly EIS)
ECRL	Epping to Chatswood Rail Link
EIS	Environmental Impact Statement (now referred to as EA)
EPA	Environmental Planning & Assessment Act, 1979
GFA	Gross floor area.
IA	Infrastructure Australia
JTW	Journey to Work
LGA	Local Government Area
LoS	Level of Service
Pax	Passengers
PCAL	(NSW) Premiers Council for Active Living
RTA	Roads and Traffic Authority
SEPP	State Environmental Planning Policy
STA	State Transit Authority.
STM II	Strategic Travel Model (mode share model operated by BTS)
TCA	Transport Construction Authority (previously TIDC)
TDM	Travel Demand Management
TIDC	Transport Infrastructure Development Corporation (now TCA)
TMAP	Transport Management and Accessibility Plan.
TOD	Transit Oriented Development
TZ	Travel Zone
Up	Rail movement towards the Sydney CBD
VKT	Vehicle Kilometres Travelled
VPD	Vehicles per day
VPH	Vehicles per hour

Appendix A – Concept Plan



Appendix B – Photographs

Photograph B1 - Looking south along Moorebank Avenue at Terminal Site, July 2011.

Photograph B2 - Looking east along Anzac Road near the Terminal Site, July 2011.

Photograph B3 - Looking north along Moorebank Avenue at the Terminal Site, July 2011.

Photograph B4 - Looking towards Moore Street entry to Liverpool Station bus interchange, July 2011.

Hyder

Appendix B

Technical Note 4
Existing Road Network Capacity

SIMTA SYDNEY INTERMODAL TERMINAL ALLIANCE

Part 3A Concept Plan Application

Traffic and Transport

August 2011

SYDNEY INTERMODAL TERMINAL ALLIANCE (SIMTA)

MOOREBANK INTERMODAL TERMINAL FACILITY (MITF)

TECHNICAL NOTE 4

EXISTING ROAD NETWORK CAPACITY ISSUES

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SYDNEY INTERMODAL TERMINAL ALLIANCE (SIMTA)

MOOREBANK INTERMODAL TERMINAL FACILITY (MITF)

TECHNICAL NOTE 4

EXISTING ROAD NETWORK CAPACITY ISSUES

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Report No	4	
Date	August 2011	

This report has been prepared for Sydney Intermodal Terminal Alliance (SIMTA) in accordance with the terms and conditions of appointment for Technical Note 4 dated July 2010. Hyder Consulting Pty Ltd (ABN 76 104 485 289) cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

REVISIONS

Revision	Date	Description	Prepared By	Approved By
A	28/03/11	DRAFT for client review	NC	MR
B & C & D	14/07/11	DRAFT	MR	
E	08/08/11	Updated in line with Halcrow's review and comments	MR	NM

CONTENTS

APPENDICES

EXECUTIVE SUMMARY

The Sydney Intermodal Terminal Alliance (SIMTA) is a joint venture between Stockland, Qube Logistics and QR National.

The SIMTA Moorebank Intermodal Terminal Facility (SIMTA proposal) is proposed to be located on the land parcel currently occupied by the Defence National Storage and Distribution Centre (DNSDC) on Moorebank Avenue, Moorebank, south west of Sydney. SIMTA proposes to develop the DNSDC site into an intermodal terminal facility and warehouse/distribution facility, which will offer container storage and warehousing solutions with direct rail access.

The SIMTA site, approximately 83 hectares in areas, is currently owned by SIMTA and tenanted by the Department of Defence to accommodate the Defence Storage and Distribution Centre. The SIMTA site is legally identified as Lot 1 in DP1048263 and zoned as General Industrial under Liverpool City Council LEP 2008.

Hyder has prepared this technical note to document the existing road network capacity issues around the Moorebank site using new traffic survey data and a micro-simulation model (Paramics) developed for assessing the SIMTA proposal.

The SIMTA site is located in the Liverpool Local Government Area. It is 27 kilometres west of the Sydney CBD, 16 kilometres south of the Parramatta CBD, 5 kilometres east of the M5/M7 Interchange, 2 kilometres from the main north-south rail line and future Southern Sydney Freight Line, and 0.6 kilometres from the M5 motorway.

The SIMTA proposal will be undertaken as a staged development. An annual operating capacity of one million TEUs is anticipated in the ultimate stage, when fully developed.

In order to understand and quantify the current road network capacity issues around the Moorebank site, Hyder have undertaken road network capacity assessment. This assessment involved the development and interrogation of a purpose-built micro-simulation model of the core Moorebank road network. Intersection analysis, based on the core area Paramics assessment, indicated some ten intersection-related operational issues within the “core” area (see Figure E1).

While some of these issues do not necessarily reflect an overcapacity situation for the entire intersection, any further increase on the demand from both future background and SIMTA site traffic at these locations should be assessed. A weaving analysis was undertaken on the M5 West Motorway between Hume Highway and Moorebank Avenue using Paramics. Based on the modelling analysis, there appears to have weaving problem on the M5 for the eastbound traffic.

The assessment has reviewed traffic modelling data contained in the Halcrow’s traffic and transport report prepared for the proposed M5 West Widening Project (M5 West widening, Environmental Assessment, September 2010, Roads and Traffic Authority). The report identified network capacity issues in a wider network. Hyder has summarised some eleven network capacity issues within the inner area (see Figure E1). Figure E1 shows ”core” and “inner” area road network in the context of SIMTA site.

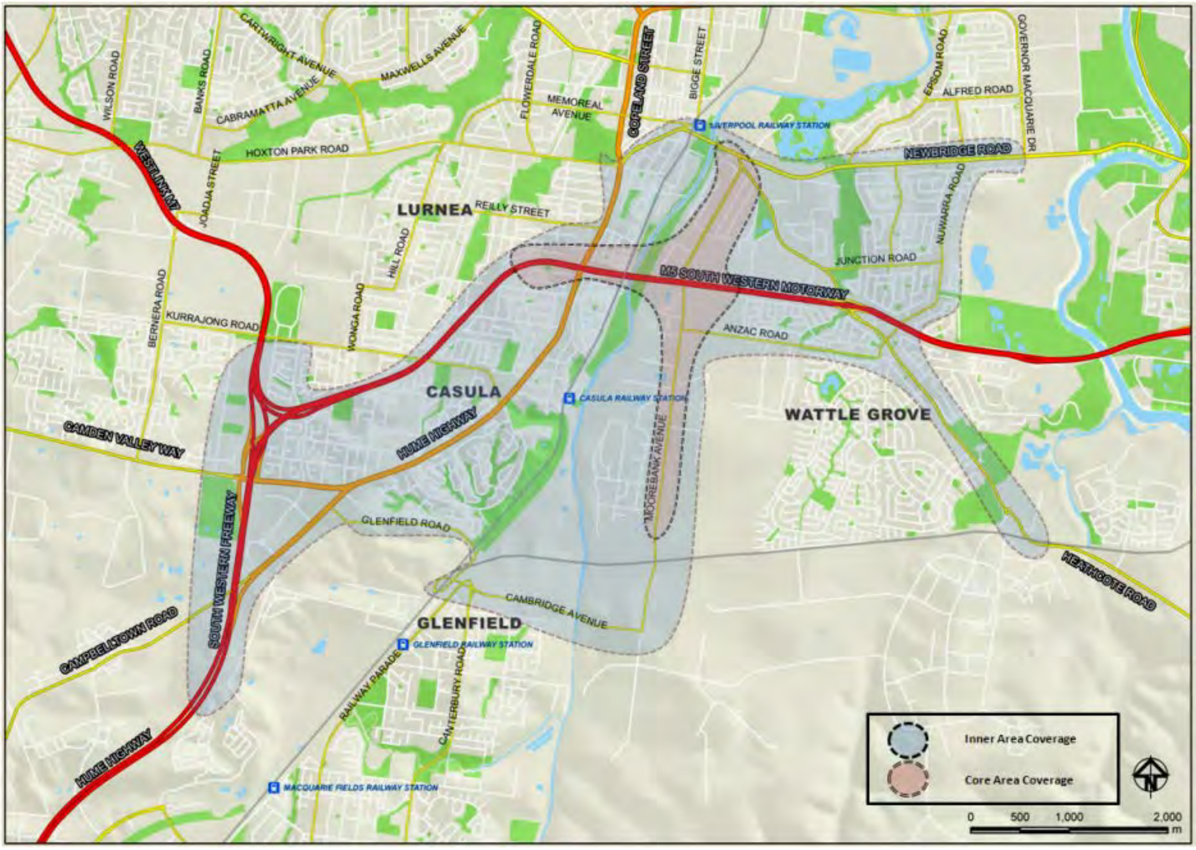


Figure E-1 Core and Inner Area Road Network

1 INTRODUCTION

Hyder has prepared this technical note to document existing road network capacity and operational issues around the Moorebank site.

1.1 Background

The Sydney Intermodal Terminal Alliance (SIMTA) is a joint venture between Stockland, Qube Logistics and QR National.

The SIMTA Moorebank Intermodal Terminal Facility (SIMTA proposal) is proposed to be located on the land parcel currently occupied by the Defence National Storage and Distribution Centre (DNSDC) on Moorebank Avenue, Moorebank, south west of Sydney. SIMTA proposes to develop the DNSDC site into an intermodal terminal facility and warehouse/distribution facility, which will offer container storage and warehousing solutions with direct rail access.

The SIMTA site, approximately 83 hectares in areas, is currently owned by SIMTA and tenanted by the Department of Defence to accommodate the Defence Storage and Distribution Centre. The SIMTA site is legally identified as Lot 1 in DP1048263 and zoned as General Industrial under Liverpool City Council LEP 2008.

The parcels of land to the south and south west that would be utilised for a proposed rail link are referred to as the rail corridor. The proposed rail corridor covers approximately 65 hectares and adjoins the Main Southern Railway to the north. Existing land use includes vacant land, golf course, extractive industries, and a waste disposal depot.

The SIMTA site is located in the Liverpool Local Government Area. It is 27 kilometres west of the Sydney CBD, 16 kilometres south of the Parramatta CBD, 5 kilometres east of the M5/M7 Interchange, 2 kilometres from the main north-south rail line and future Southern Sydney Freight Line, and 0.6 kilometres from the M5 motorway.

Figure 1 shows the SIMTA proposal in the context of road and rail network.

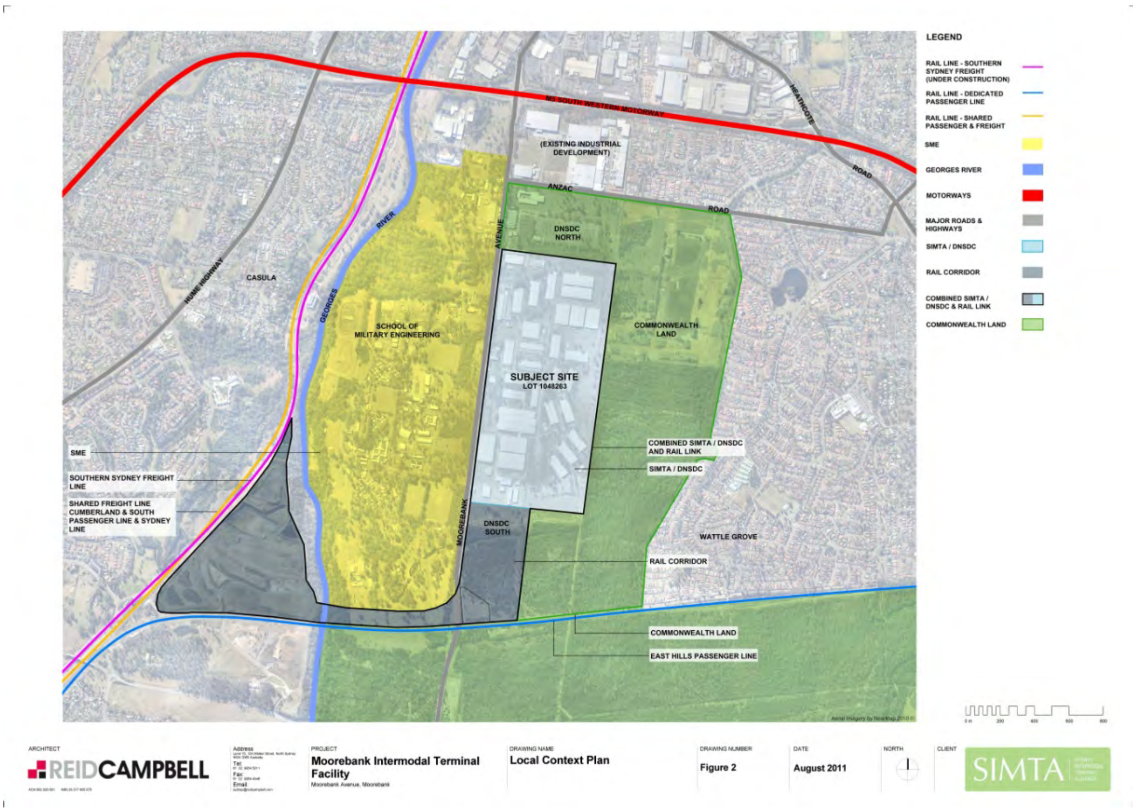


Figure 1 Moorebank Intermodal Freight Terminal Site (SIMTA proposal)

The SIMTA proposal for the Moorebank site comprises the following key components:

- **Rail Link** – new rail link connecting the SIMTA site with the Southern Sydney Freight Line. The detailed design of the rail infrastructure comprising the rail link will be subject to a further application and approval process.
- **Intermodal Terminal** – the terminal is proposed to include on-site freight rail sidings to accommodate local freight trains to Port Botany. Freight will arrive by rail and be transported to the warehouse and distribution facilities within the SIMTA site, or be directly loaded on to trucks for transport to warehouses and nearby logistics centres. Exports and empty freight containers will be transported to the facility by truck and then loaded onto rail for transport back to Port Botany. The terminal is expected to contain four rail sidings, with areas for container handling and storage, and is anticipated to have the capacity to handle up to 1 million twenty foot equivalent units (TEUs) per annum.
- **Empty Container Storage** – will be provided within the site. Empty containers would either be packed on-site ready for transport to the port by rail, or trucked to off-site locations where they would be packed and returned to the SIMTA site to be loaded onto rail and transported to the port.
- **Warehouse and Distribution Facilities -** approximately 300,000m^2 of warehouses with ancillary offices will be constructed to the east of the intermodal terminal. These buildings are proposed to be constructed in stages in response to site servicing availability and market demands. It is expected that warehouses will range in size, depending on tenant needs.
- **Freight Village** – approximately 8,000m^2 of support services will be provided on site. These may include site management and security offices, meeting rooms, driver facilities and convenience retail and business services.

The project will be undertaken as a staged development and it is intended that an overall Master Plan, for the entire site, be undertaken for the purpose of applying for Concept Plan approval under Part 3A of the Environmental Planning and Assessment Act 1979.

1.2 Purpose of Technical Note

The Director-General, along with the RTA, Transport NSW and Liverpool City Council are interested in understanding the potential impact of the proposed SIMTA proposal in Moorebank. These authorities have outlined their key concerns in their responses to the Director-General's Requirements (DGR's 24 December 2010). Transport network capacity issues are highlighted as a key area of interest in each response.

In order to understand and quantify the current road network performance around the Moorebank site, Hyder have undertaken road network capacity assessment for the core area. This assessment involved the development and interrogation of a purpose-built micro-simulation model (Paramics) of the core Moorebank road network. The assessment has reviewed traffic modelling data contained in the Halcrow's traffic and transport report prepared for the proposed M5 West Widening Project (M5 West widening, Environmental Assessment, September 2010, Roads and Traffic Authority).

- A Paramics model was developed using existing and available traffic modelling and survey data for core area.
- The core micro-simulation modelling study was undertaken to assess the current network operational issues.
- Typical week day peak hours (AM and PM) were considered as these represented the critical time periods for capacity assessment.

- Road traffic demand matrices for the core area micro-simulation model were estimated from recent traffic counts and an origin-destination survey on the M5 Motorway at Moorebank interchange.

1.3 Document Structure

This technical note is composed of the following sections:

Executive Summary – provides a summary of the network capacity assessment.
Chapter 1: Introduction – outlines the project context and purpose of this report.

Chapter 2: Scope and Key Network – defines the study area and key roads.

Chapter 3: Core Area Network Operation – summarises the network capacity and operational issues identified in the core area of impact through micro-simulation assessment.

Chapter 4: Broader Capacity Issues – summarises the capacity issues identified outside the “core” area from modelling data contained in the proposed M5 West Widening Traffic and Transport Report prepared by Halcrow for the RTA, September 2010.

2 STUDY AREA NETWORK

In general, the road network impacts of the SIMTA proposal will decline with greater distance from the site, Therefore, Hyder has adopted a three-tiered approach to the assessment of road network impacts:

1 “Core” area.

2 “Inner” area.

3 “Wider” area.

The “core” area, defined below, was modelled in Paramics and determined the SIMTA impact immediately to the surrounding road network. In general, the core area is bounded by the following roads:

- M5 Motorway between Hume Highway and Heathcote Road (east and west);
- Hume Highway (north and south);
- Moorebank Avenue between Newbridge Road and Cambridge Avenue (north and south);
- Anzac Road (east)

The inner area boundary was largely determined from Hyder’s strategic modelling investigation and network capacity issues identified in the Halcrow’s traffic and transport report prepared for the proposed M5 West Widening Project (M5 West widening, Environmental Assessment, September 2010, Roads and Traffic Authority). The SIMTA impact in the “inner area” is likely to be more homogeneous, travelling along the primary routes only (e.g. Hume Highway, M5 Motorway and M7 Motorway). The network operational impact from SIMTA in the “inner area” is expected to be low.

A strategic transport modelling assessment was undertaken for the “wider” area impact assessment.

2.1 Core Area

Within the local vicinity of the SIMTA site it is important to assess intersection capacities and network connectivity at a high level of detail. This will enable a robust assessment of the impact of traffic movements to and from the SIMTA site on the immediate road network. Hyder has undertaken a detailed micro-simulation modelling assessment of the “core area of impact” and forms the base-line for this level of assessment. The approximate core area is shown in Figure 2.

2.2 Key Roads

The core area includes the following key roads:

- **M5 Motorway (between Hume Highway and Moorebank Avenue)** – The M5 Motorway is a principal arterial from Sydney CBD to the South West and M7 Motorway. This motorway has up to four lanes in each direction between Moorebank Avenue and Hume Highway intersections.
- **Hume Highway** –Hume Highway is a main traffic route from the South West to the North East of Sydney. The core study area includes the Hume Highway interchange with the M5 motorway. This interchange provides access to M5 eastbound (on ramp) and can be

accessed through M5 westbound (off ramp). The interchange does not provide access to the M5 westbound and cannot be accessed through the M5 eastbound.

- **Moorebank Avenue** – Moorebank Avenue is currently a two lane undivided road (one lane on each direction) between Cambridge Avenue and M5 and four lane undivided road (two lane on each direction) between M5 and Newbridge Road. This road provides a north-south link between Liverpool and Glenfield. It also forms a grade separated crossing (Single Point Diamond interchange) with M5. The core study area includes the section between Newbridge Road and Chatham Avenue.
- **Heathcote Road** – This road is generally a four-lane arterial road and runs north-south between Moorebank and Heathcote, where it links to the Southern Freeway (F6). The core area includes Heathcote Road intersection with Moorebank Avenue.
- **Anzac Road** – Anzac Road is an east-west local road that connects Moorebank Avenue and Heathcote Road. It provides access to Moorebank Business Park and the residential area of Wattle Grove. This is generally a two-lane undivided road. The core study area includes the section between Yulong Close and Moorebank Avenue.

Figure 2 “Core” Area of Impact and Modelled Roads and Intersections

3 CORE AREA NETWORK OPERATION

This chapter summarises the road network capacity and operational issues identified within the core study area. These issues have been determined through the development of a micro-simulation model of the core study area. The findings were also based on field observations and traffic survey data.

3.1 Traffic Data

An extensive traffic survey was carried out in 2010. Data were collected across the core modelling area and used for micro-simulation calibration and validation. The traffic data surveys included for both AM and PM peak period:

- Mid-block tube counts for the period of one week for three mid block locations;
- Mid-block video counts during morning and afternoon peak periods on M5;
- Intersection turning counts during morning and afternoon peak periods for ten intersections;
- Queue length surveys for five key intersections;
- Origin-destination (OD) survey of the M5 eastbound weaving section.

All count data were used to calibrate the model. The OD survey was used for the supplementary M5 weaving analysis. Intersection queue data were further used for model validation.

Table 1 summarises the current traffic volumes at these key roads in the vicinity of SIMTA site. The results show that:

- Moorebank Avenue near the SIMTA site carries about 17,500 vehicles per day. Heavy vehicle proportion is about 5% of total traffic.
- Traffic volume on Anzac road is low, in the order of 9,500 vehicles per day.
- The M5 Motorway over the Georges River carries about 128,500 vehicles per day. Heavy vehicle proportion on M5 is about 10% and is consistent with data observed on other sections of M5, for example, at Hammondville Toll Plaza (about 10% heavy vehicle).

In general, on the M5, the highest morning and evening peak hour flows are observed between the Hume Highway and Moorebank Avenue in the order of 4,000 to 5,500 vehicles per hour in either east bound or westbound direction. There is a significant volume of traffic entering and leaving the M5 at Moorebank, Hume Highway and Heathcote Road interchanges.

Table 1 Traffic volumes on key roads in year 2010

Roads/Locations	Daily Traffic	Heavy vehicle percentage (%)
Moorebank Avenue - South of Anzac Road	17,500	5%
Anzac Road - East of Moorebank Avenue	9,500	6%
M5 Motorway - West of Moorebank Avenue [1]	128,500	10%
M5 Motorway – East of Moorebank Avenue [1]	110,000	10%
Cambridge Avenue - East of Canterbury Road [1]	16,000	4%

Note: 1 = Daily traffic was estimated from peak hour counts undertaken for this study. Peak to daily factors were estimated from BTS data. The count data has been rounded.

The RTA provided Hyder historical traffic growth on the M5 over Georges River between 2005 and 2009. The daily traffic data suggests that traffic on the M5 at this location has grown by 3.75% per annum significantly higher than growth data observed on the M5 at Hammondville Toll Plaza (between 1.5% and 1.7% per annum). The growth difference on M5 is driven by actual capacity available at different sections of the M5. The lower growth rate on the M5 (at Hammondville Toll Plaza) also suggests the peak period capacity constrains and in general the South West Motorway is reaching its ultimate capacity.

Appendix A described detailed traffic survey undertaken for this study.

3.2 Paramics Modelling

The Paramics models used for core area network capacity issues are described here briefly. Details of the model, including data collection, network and demand development, calibration and validation, is described in Appendix A (Micro-simulation Model Summary Report).

3.2.1 Calibration and Validation

Paramics models were calibrated and validated according to the RTA's Paramics modelling guidelines. The models represented 2010 traffic conditions for both AM peak and PM peak periods:

- AM peak period between 7:00 and 9:00, and
- PM peak period between 16:00 and 18:00

Hyder developed an analytical model based on HCM2000 methods to assess the performance of the M5 weaving section in AM and PM peak periods. The results of the HCM2000 modelling were compared with micro-simulation outputs to serve as an independent check of the model's ability to replicate weaving behaviour. Detailed model calibration and validations are documented in Appendix A.

3.3 Network Capacity

3.3.1 Level of Service (LoS)

Intersection Levels of Service (LoS) was assessed using the standard NSW Level of Service criteria for intersections (see Table 2 below).

Table 2 LoS Criteria for intersection capacity analysis

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	<14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode
F	>70	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing

Source: RTA Guide to Traffic Generating Developments

Tables 3 and 4 show AM and PM peak LoS results from Paramics model for the following five key intersections where operational issues are identified. They area:

- Moorebank Avenue / Anzac Rd
- M5 Motorway / Moorebank Avenue
- M5 Motorway / Hume Highway
- Moorebank Avenue / Heathcote Road
- Newbridge Rd / Moorebank Avenue

In Paramics, LoS value can be adversely affected by the effects of queue spill-back through upstream intersection. The length of approach over which the delay is measured can be limited to the distance between signalised intersections. Particularly this condition was found on the northern section of Moorebank Avenue near Heathcote Road and Newbridge Road. In both Tables 3 and 4, the LoS values are shown for all approaches to determine the operational issues for particular movements.

In general, the analysis determined LoS between B and E for key intersections. The modelling result indicates that some movements at these five intersections are operating close to or at capacity level with low LoS between D and F. Regular overflow queues are observed on Moorebank Avenue (north of M5) and Newbridge Road.

The following section 3.2.2 assessed detailed operational issues for five key intersections.

Table 3 Level of Service Summary AM Peak

Model :2010 AM					
Intersection	**Approach**	**Average Delay**	**LoS (Delay)**	**Overall Average Delay**	**Intersection LoS**
Moorebank Avenue-Anzac Road	North	33	C	24	B
	East	26	B		
	South	22	B		
	North Slip Lane	3	A		
M5 Motorway- Moorebank Avenue[1]	North -Right Turn	28	B	24	B
	North- Through	26	B		
	East	21	B		
	South - Right Turn	29	C		
	South – Through	28	B		
	West	24	B		
	North - Slip Lane	17	B		
	East -Slip Lane	14	A		
	South - Slip Lane	11	A		
M5 Motorway - Hume Highway	North	37	C	33	C
	East - Right Turn	69	E		
	South - Right Turn	61	E		
	South – Through	14	A		
	East - Left Turn	30	C		
	North - Slip Lane	63	E		
Moorebank Avenue-Heathcote Road[2]	North	17	B	67	E
	East	45	D		
	South - Right Turn	102	F		
	South – Through	86	F		
Moorebank Avenue-Newbridge Road[3]	East - Through	87	F	34	C
	East - Left Turn	24	B		
	South - Right Turn	31	C		
	South - Left Turn	11	A		
	West - Right Turn	50	D		
	West – Through	26	B		

1- Halcrow's traffic and transport report prepared for the proposed M5 West Widening Project indicates LoS B
2- Halcrow's traffic and transport report prepared for the proposed M5 West Widening Project indicates LoS F
3- Halcrow's traffic and transport report prepared for the proposed M5 West Widening Project indicates LoS D
Paramics Model Code: 2010 AM_TZ019_BC_RevL Link: F:\AA003210\D-Calculations\Traffic and Modelling_POST DGR\Modelling\Paramics\1- Hyder's Paramics\0- Pre DGR Base Models\1- 2010 AM\2010 AM_TZ019_BC_RevL

Table 4 Level of Service Summary PM Peak

Model :2010 PM					
Intersection	**Approach**	**Average Delay**	**LoS (Delay)**	**Overall Average Delay**	**Intersection LoS**
Moorebank Avenue-Anzac Road	North	24	B	19	**B**
	East	32	C		
	South	16	B		
	North-Slip Lane	2	A		
M5 Motorway-Moorebank Avenue[1]	North -Right Turn	27	B	17	**B**
	North- Through	30	C		
	East	28	B		
	South - Right Turn	35	C		
	South – Through	33	C		
	West	30	C		
	North - Slip Lane	16	B		
	East -Slip Lane	14	A		
	South - Slip Lane	14	A		
M5 Motorway-Hume Highway	North	23	B	35	**C**
	East - Right Turn	132	F		
	South - Right Turn	58	E		
	South – Through	7	A		
	East - Left Turn	57	E		
	North - Slip Lane	66	E		
Moorebank Avenue-Heathcote Road[2]	North	12	A	39	**C**
	East	62	E		
	South - Right Turn	83	F		
	South – Through	117	F		
Moorebank Avenue-Newbridge Road[3]	East - Through	39	C	47	**D**
	East - Left Turn	36	C		
	South - Right Turn	89	F		
	South - Left Turn	15	B		
	West - Right Turn	65	E		
	West – Through	6	A		

1. Halcrow's traffic and transport report prepared for the proposed M5 West Widening Project indicates LoS B
2. Halcrow's traffic and transport report prepared for the proposed M5 West Widening Project indicates LoS F
3. Halcrow's traffic and transport report prepared for the proposed M5 West Widening Project indicates LoS D

Paramics Model Code: 2010 PM_TZ019_BC_RevL Link: F:\AA003210\D-Calculations\Traffic and Modelling_POST DGR\Modelling\Paramics\1- Hyder's Paramics\0- Pre DGR Base Models\2- 2010 PM\2010 PM_TZ019_BC_RevL

3.3.2 Network Operational Issues

Further network operational analysis indicated some ten intersection-related issues within the "core" area. While some of these issues do not necessarily reflect an overcapacity situation for the entire intersection, any further increase on the demand from both future background and SIMTA traffic at these sections should be investigated thoroughly. The identified intersection operational issues are summarised in Figure 3.

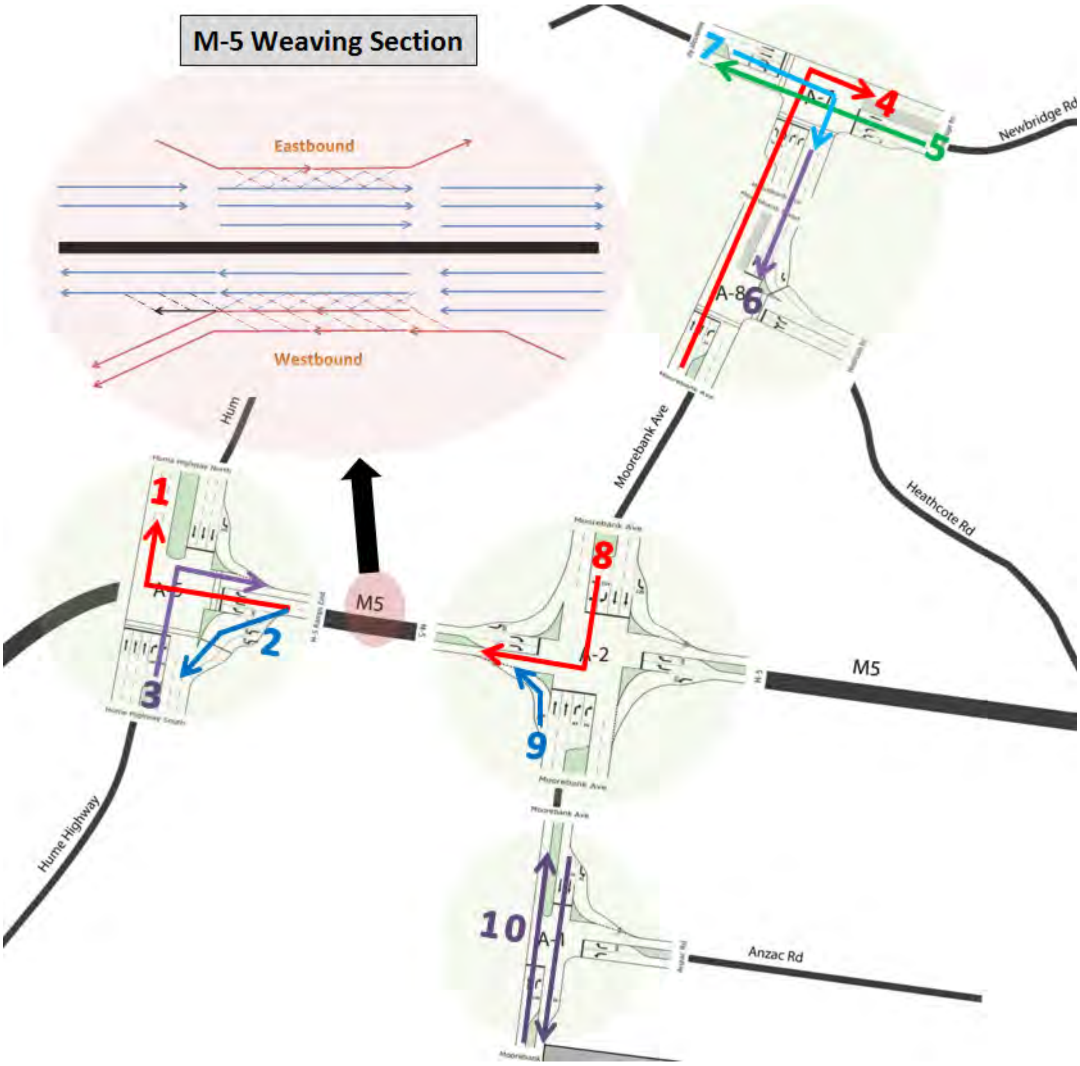
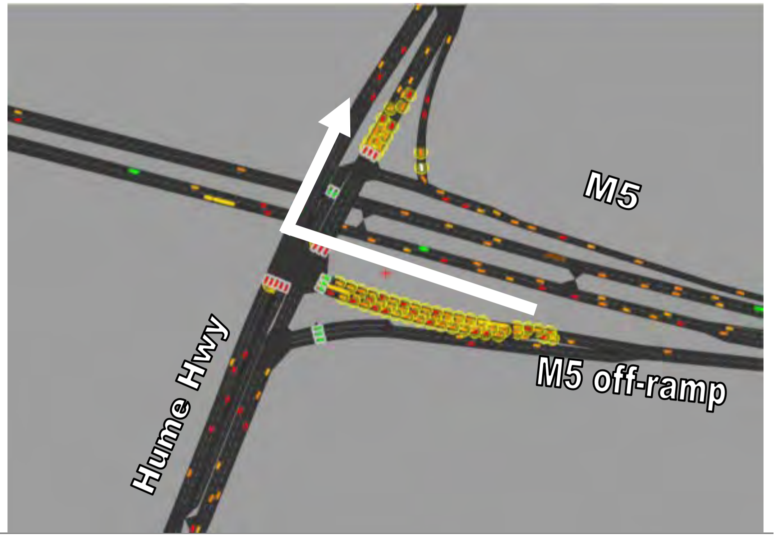
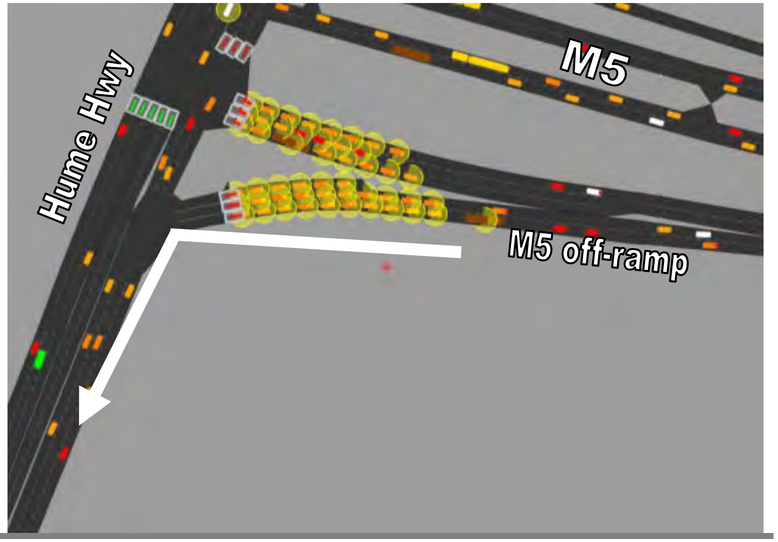


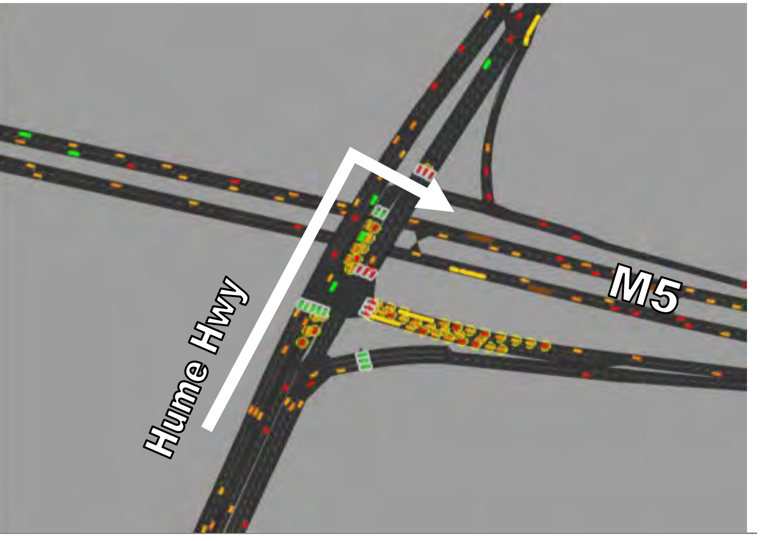
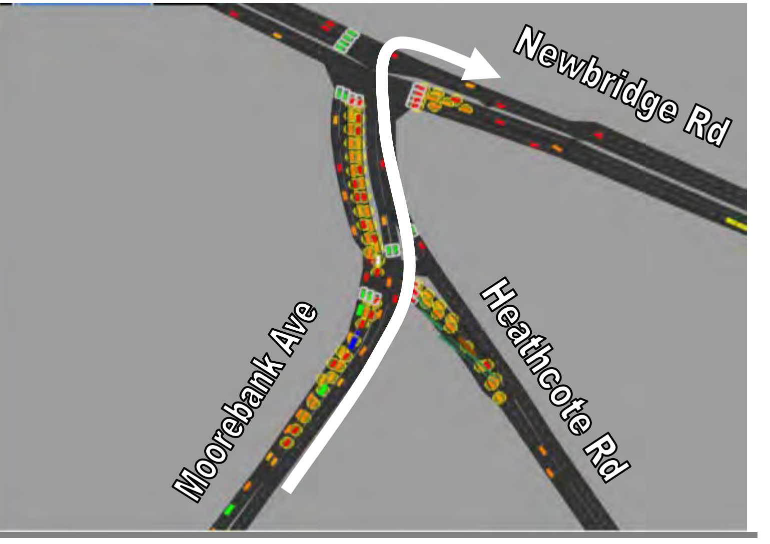
Figure 3 Core Study Area Capacity Issues

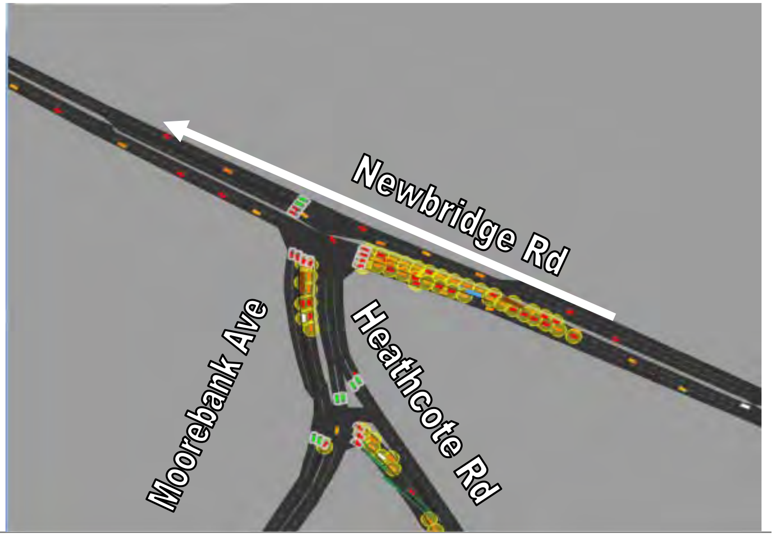
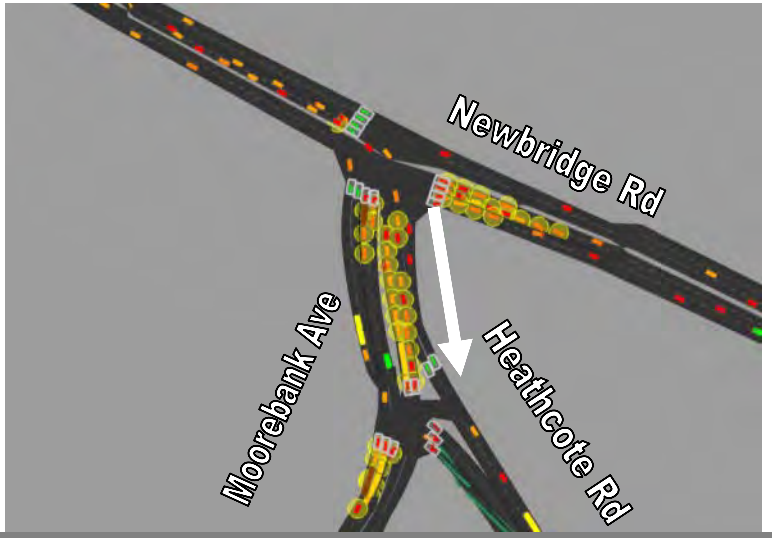
Screenshots from the Paramics models are shown in Table 5 to illustrate the location and nature of each of the "core" area issues. Vehicles highlighted in yellow are vehicles experiencing the queue / delay condition at the mentioned section(s). The turning volumes for AM and PM peak hour are shown as a stick diagram and included in Appendix B.

Table 5: Core Area Network operational issue

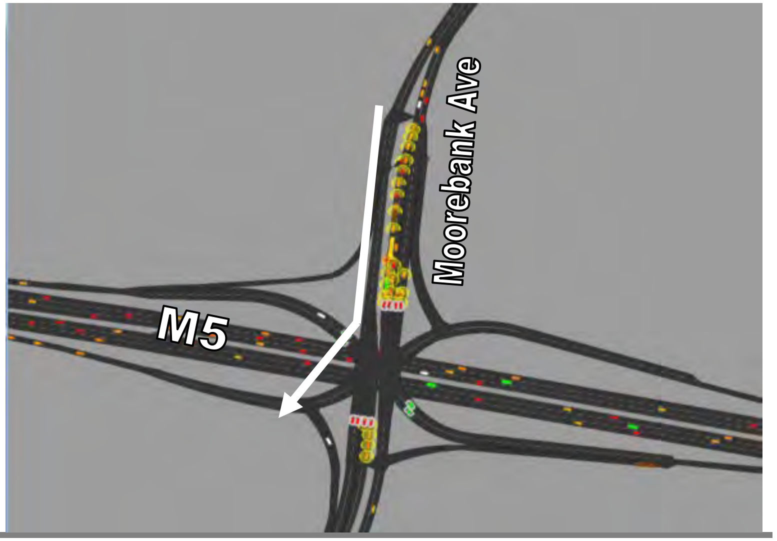
<table>
<tr><th>Intersection</th><th>Network operational issue</th><th>Paramics snapshot</th></tr>
<tr><td rowspan="2">M5 Motorway/Hume Highway Interchange</td><td>In general, north-south through movement demand on Hume Highway (4,800 veh/hr, two way, AM and PM Peak) is the highest. A major portion of green time is allocated for the major north south movement. Model predicts higher delays to the following movements:

1) Right turn from westbound M5 off-ramp experiencing higher delays during both AM and PM Peak (Avg Delays= 69-132 s, LoS=E/F), however no queue spills back from the off-ramp onto the M5 Motorway.</td><td></td></tr>
<tr><td>2) Left turn from westbound M5 off-ramp experience slightly higher delays during PM Peak (Avg Delays= 57 s, LoS=E), however no queue spills back from the off-ramp onto the M-5 Motorway.</td><td></td></tr>
</table>

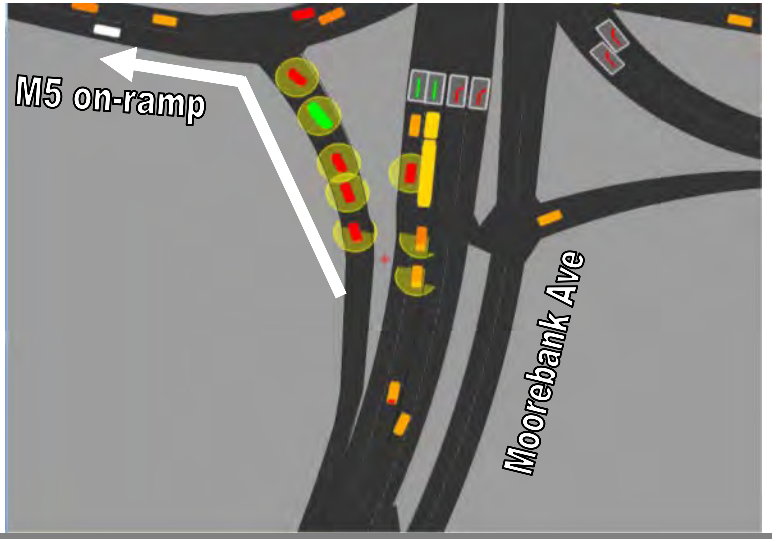
Intersection	Network operational issue	Paramics snapshot
M5 Motorway/Hume Highway Interchange	3) Right turn from Hume Highway south to M-5 eastbound on-ramp experiencing higher delays during AM and PM Peak (Avg Delays= 58-61 s, LoS=E), however queue exceeding right turn bay was not observed.	
Moorebank Avenue intersections with Heathcote Road and Newbridge Road	4) High turning traffic is observed at Newbridge Road/ Moorebank Avenue (1,200 veh/hr turning right and 1,100 veh/hr turning left during AM peak) intersection. Model indicates extensive delays to right turn movement from Moorebank Avenue to Newbridge Road. Model shows queuing spill back and affects the operation of adjacent Moorebank Avenue/Heathcote Road intersection (high delays to upstream northbound through movement with LoS F.	

Intersection	Network operational issue	Paramics snapshot
Moorebank Avenue intersections with Heathcote Road and Newbridge Road	5) Westbound through movement on Newbridge Road shows higher delays during AM and PM peak periods (Avg Delays=39-87 s, LoS=C/F).	
	6) Southbound queue on Moorebank Avenue/Heathcote Road intersection affects upstream operation of Moorebank Avenue/Newbridge Road intersection. Model predicts increase delays and long queues for right turn movement from Newbridge Road to Moorebank Avenue during PM peak (Avg Delays= 65 s, LoS=E);	

Intersection	Network operational issue	Paramics snapshot
Moorebank Avenue intersections with Heathcote Road and Newbridge Road	7) Right turn movement from Newbridge Road west to Moorebank Avenue experiences higher delays particularly during PM peak period (Avg Delays= 65 s, LoS=E). The queue occasionally spills back from right turn bay onto the main stream affecting eastbound through movement.	

Intersection	Network operational issue	Paramics snapshot
M5 Motorway/ Moorebank Avenue Interchange	8) High right turn volumes from Moorebank Avenue north onto M5 westbound on-ramp (1,200 veh/hr in PM peak) affect surface intersection performance. Model shows long queues during PM peak period. The queue occasionally spills back from right turn bay onto the main stream affecting southbound through traffic movement on the Moorebank Ave. Following Halcrow's audit report, this issue was further investigated. Reported links for LoS are amended [1].	

[1] In June/July 2011 Halcrow conducted a Paramics model audit for the core area. Based on Halcrow's audit report, Hyder revised core area Paramics network. The revised modelling results show minor change in LoS result

Intersection	Network operational issue	Paramics snapshot
M5 Motorway/ Moorebank Avenue Interchange	9) Left turn movement (Give-way slip lane) from Moorebank Avenue south onto M5 westbound on-ramp shows occasional queue. The queue was caused by high volume right turn demand from Moorebank Avenue north onto M5 westbound on-ramp. The issue 9 alone is not critical for existing condition. In the future this movement is expected to have impact from SIMTA traffic.	

Intersection	Network operational issue	Paramics snapshot
Moorebank Avenue/Anzac Road	10) Through movement along Moorebank Avenue shows occasional queue in northbound and southbound direction during AM peak and PM peak period respectively. However, these queues are clearing during each cycle time and the model does not indicate any residual queues.	 

Paramics Model Code: 2010 AM_TZ019_BC_RevL, 2010 PM_TZ019_BC_RevL

3.4 M5 Weaving Analysis

The core study area includes the M5 motorway between Moorebank Avenue and Hume Highway. These grade separated intersections are only separated by about 1km, resulting in a very limited weaving section for M5 traffic joining and leaving the M5. Figure 3 shows the lane configuration through the section.

In order to quantify the volume of weaving movements in the eastbound direction, an origin-destination survey was undertaken on the M5 between Moorebank Avenue and the Hume Highway. The survey was used in the development of the micro-simulation model, which was interrogated to understand weaving behaviour through this section. Figure 4 shows a Paramics screenshot of the M5 motorway weaving section during AM peak period. Vehicles highlighted in purple are attempting to make a lane change, but are being obstructed by other vehicles in an adjacent lane.

To quantify the performance of the M5 between Moorebank Avenue and the Hume Highway, weaving section speed (km/h), density (passenger car/km/lane) and weaving flow ratio (VR, or volume ratio) were determined from the Paramics models.

A weaving analysis using the US Highway Capacity Manual (HCM2000) method was undertaken to independently verify the findings from the Paramics model. The HCM2000 approach defines level of service (LoS) based on passenger car density, but also predicts weaving segment travel speed. The speed from HCM analysis was compared with Paramics model results. Overall the Paramics model showed weaving speeds that were reasonably consistent with the HCM2000 predictions.

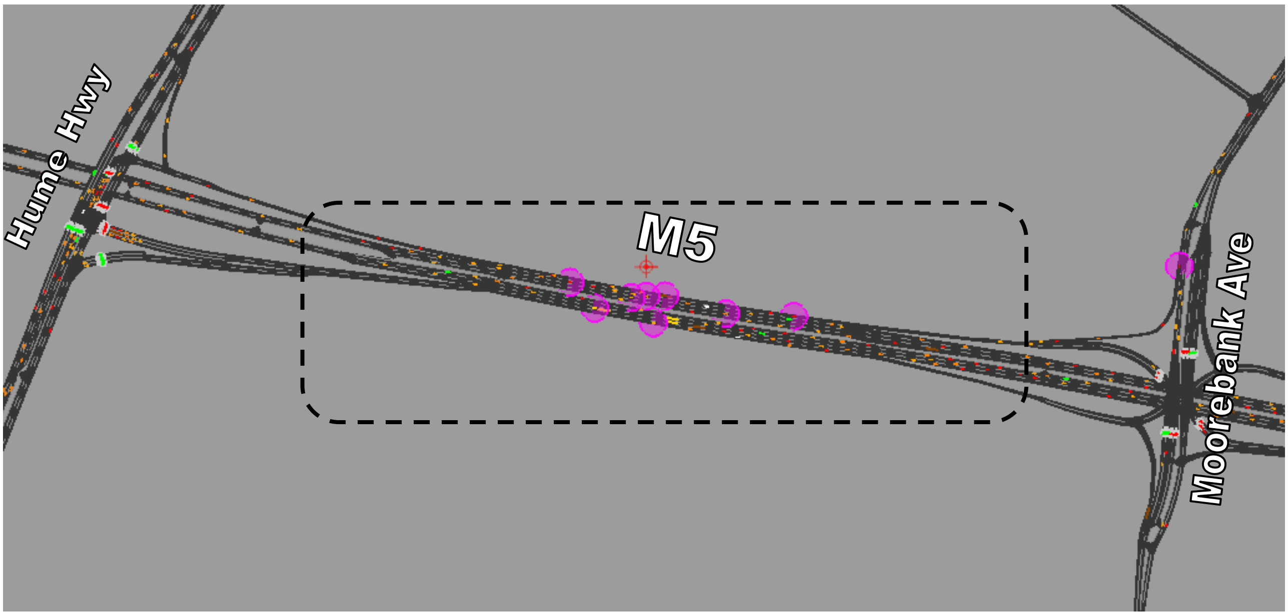


Figure 4 Paramics Screenshot: M5 Weaving Section

The weaving analysis based on the HCM2000 method and Paramics model outputs indicated low LoS E and a travel speed of approximately between 50 and 60km/h, compared with a sign-posted speed limit of 100km/h. In PM peak model predicts LoS C with travel speed approximately between 70 and 75km/h. Based on the modelling analysis, there appears to be a weaving problem on the M5 for the eastbound traffic.

4 BROADER CAPACITY ISSUES

Hyder has reviewed traffic modelling data contained in the traffic and transport report for the proposed M5 West Widening Project, prepared by Halcrow, for the RTA. The network capacity issues where they are likely to interact with the SIMTA site -generated traffic are identified and summarised in this section.

4.1 Capacity Issues

The proposed M5 West Widening Traffic Report identifies some eleven network capacity issues within the inner study area. These issues are described below. Figure 5 shows the broader location of capacity issues identified in that report.

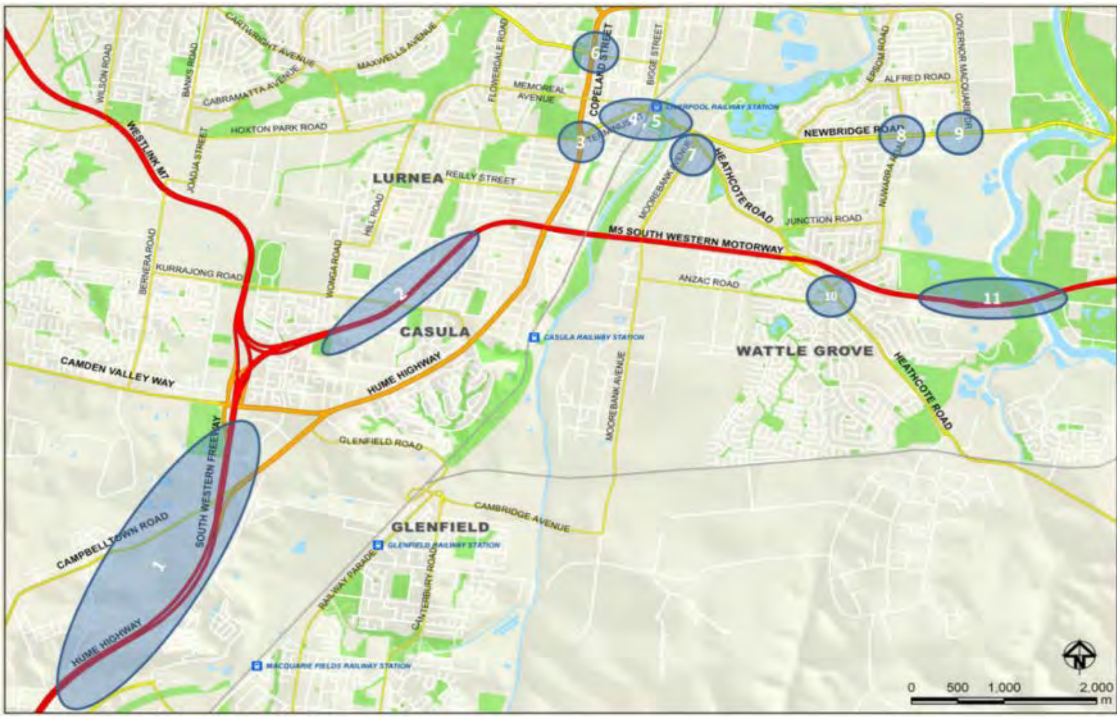


Figure 5 Location of Inner Area Capacity Issues

1 **M5 westbound, between Camden Valley Way and Brooks Road** – Travel time survey data from April-May 2010 show that this section of the M5 exhibited average speeds in the PM peak hour of 45km/h; significantly below the 80km/h speed limit. This speed reduction indicates congestion in this section due to traffic from the Westlink M7 and Camden Valley Way merging with M5 outbound traffic in the evening peak. The M5 southbound lane drop from four lanes to three prior to the Campbelltown Road merge may also contribute to slower traffic conditions.

2 **M5 eastbound between Camden Valley Way and Hume Highway** – This section of the M5 is fed by traffic from the M5 northbound, the Camden Valley Way northbound on-ramp and the southbound Westlink M7. There are only two lanes provided in each direction through this section. Based on an analysis of strategic model flows (2006 peak hour) this section of the M5 is operating at LoS E, with a volume/capacity ratio of 0.96. This assessment was based on a notional motorway capacity of 2,200PCUs per hour per lane.

3 **Hume Highway/Hoxton Park Road/Macquarie Street intersection** – This intersection is operating over capacity at LoS F in the AM and PM peak hour. This assessment was based on 2009/10 modelled traffic flows. The RTA is currently evaluating an upgrade to

this intersection. Upgrades will include the provision of an eastbound to northbound left turn lane from Hoxton Park Road to the Hume Highway.

4 **Terminus Street and Newbridge Road, westbound between Hume Highway and Heathcote Road** – Travel time survey data from April-May 2010 show that this section (westbound) had an average speed of 18km/h in the PM peak; significantly below the 60km/h posted speed limit. The low travel speed is likely to be due to the four closely-spaced signalised intersections and the regular property access points along this road.

5 **Terminus Street and Newbridge Road, eastbound between Hume Highway and Heathcote Road** – This section also shows low travel speeds in the eastbound direction during the PM peak. Survey data showed an average eastbound travel speed of 24km/h; significantly below the 60km/h posted speed limit. Again this is likely to be due to the closely spaced signalised intersections and the regular access points along this road.

6 **Hume Highway/Elizabeth Drive intersection** – This intersection operates over capacity with LoS F in the AM peak, based on 2009/10 modelled traffic flows. This is primarily due to the heavy northbound movement conflicting with eastbound traffic from Liverpool South and Hoxton Park, accessing the Hume Highway and the M5 South West Motorway.

7 **Heathcote Road/Moorebank Avenue intersection** – This intersection operates poorly in both peak periods with a LoS F and LoS E in the AM and PM peaks respectively. This assessment was based on 2009/10 modelled traffic flows. However, the poor performance of this intersection is largely due to the blocking back of queues from the Heathcote Road/Newbridge Road intersection. The close spacing of these intersections allows only up to 80m of queue storage between them.

8 **Newbridge Road/Nuwarra Road intersection** – This intersection operates at capacity (LoS E) in both peak periods, based on 2009/10 modelled flows. Any increase in traffic at this intersection is likely to degrade intersection performance significantly.

9 **Newbridge Road/Governor Macquarie Drive intersection** – This intersection operates at capacity (LoS E) during both peak periods, based on 2009/10 modelled flows. Any increase in traffic at this intersection is likely to degrade intersection performance significantly.

10 **Heathcote Road/Nuwarra Road intersection** – This intersection operates over capacity in the AM peak with LoS F. The poor performance of this intersection is due to significant demand from the residential areas of Holsworthy and Moorebank accessing the M5 South West Motorway and Newbridge Road.

11 **M5 westbound between Henry Lawson Drive and Heathcote Road** – Based on 2006 peak period modelled traffic flows this four-lane (two lanes each direction) section of the M5 operates at capacity, with LoS E and a volume/capacity ratio of 0.94. This assessment was based on a notional motorway capacity of 2,200PCUs per hour per lane. Operating conditions improve west of Heathcote Road, where three lanes are provided in each direction.

APPENDIX A

MICRO-SIMULATION MODEL SUMMARY REPORT CORE AREA

INTRODUCTION

Hyder Consulting (Hyder) has prepared this technical note to document the calibration and validation of the core area micro-simulation model of the Moorebank Intermodal Freight Terminal (MIFT) and surrounding area of impact.

Quadstone Paramics Microsimulation Package (Version 6.6.1) was used for core area modelling.

The microsimulation models were developed for both AM peak and PM peak periods as of follow:

- AM peak period between 7:00 and 9:00, and
- PM peak period between 16:00 and 18:00.

Road Network

The modelled road network is bounded to:

- **North** : New Bridge Road and Moorebank Avenue intersection
- **East** :M5 Motorway ,west to the M5/Heathcote Road interchange (not including M5/Heathcote Road interchange)
- **West** :M5 interchange with Hume Highway (including the interchange)
- **South** : Moorebank Avenue intersection with Chatham Avenue

Road Links

The following road links were coded in the microsimulation models

M5 Motorway – Between Moorebank Avenue and Hume Highway, including M5 interchanges with Hume Hwy and Moorebank Avenue. This section of M-5 applies 2 to 3 lanes on the eastbound and 2 to 4 lanes on the westbound direction and includes major weaving segments between two main interchanges.

Hume Highway – Between Meyrick Avenue and Congressional Drive. This section includes a six lane divided highway and a major interchange with the M5 Motorway

Moorebank Avenue – Between Chatham Avenue and Newbridge Road. This section mainly includes two lane undivided road (one lane each direction) up to south of its intersection with the M5 and provides a north-south link between Liverpool and Glenfield.

Heathcote Road – This road is generally a four-lane major road and extends north-south between Moorebank and Heathcote, where it links to the Southern Freeway (F6). .

Anzac Road – Anzac Road is an east-west local road that connects Moorebank Avenue and Heathcote Road. It provides access to Moorebank Business Park and the residential area of Wattle Grove. This is generally a two lane undivided road

Intersection Control

In total 13 traffic junctions were included in the micro simulation models. Table A1 shows the intersection name and control type.

Table A1 Major intersection in the micro simulation model

ID number	Intersection Name	Intersection Type	Control Type
A-12	Moorebank Ave/ Chatham Ave	On-Grade	Traffic Signal
A-4	Moorebank Ave/Car Park	On-Grade	Traffic Signal
A-3	Moorebank Ave/Car Park	On-Grade	Traffic Signal
A-1	Moorebank Ave/Anzac Road	On-Grade	Traffic Signal
A-2	Moorebank/M-5	Grade Separated	Traffic Signal
A-11	Moorebank Ave/Helles Ave	On-Grade	Priority
A-10	Moorebank Ave/Church Road	On-Grade	Priority
A-13	Moorebank Ave/M5 Industrial Park Access Road	On-Grade	Priority
A-9	Moorebank Ave/M5 Industrial Park Access Road	On-Grade	Signal
A-8	Moorebank Ave/Heathcote Road	On-Grade	Signal
A-7	Moorebank Ave/Newbridge Road	On-Grade	Signal
A-5	Hume Hwy/M-5	Grade Separated	Signal

Traffic Survey Data

For the study area four survey types were carried out:

- Mid-block tube counts for the period of one week for three mid block locations;
- Mid-block video counts during morning and afternoon peak periods on M-5 Freeway,
- Intersection turning counts during morning and afternoon peak periods for 10 intersections.
- Origin – Destination(O-D) survey on the M5 eastbound weaving section for AM and PM peak periods

Figure A1 shows the traffic count locations and types on the study area.

Figure A1 Mid-Block and Intersection count locations

TRAFFIC DEMAND

Source of Traffic Demand Data

In order to develop the demand matrices, available data sources in the study area were utilised. These data sets included Origin- Destination Surveys (between Hume Highway and Moorebank interchanges with M5 motorways), intersection turning counts for the peak periods, and Mid-block counts. The data sets were further processed and used in matrix estimation models. The matrix estimation was performed using TransCAD transport planning software package.

Figure A2 show the zoning system used in microsimulation models.

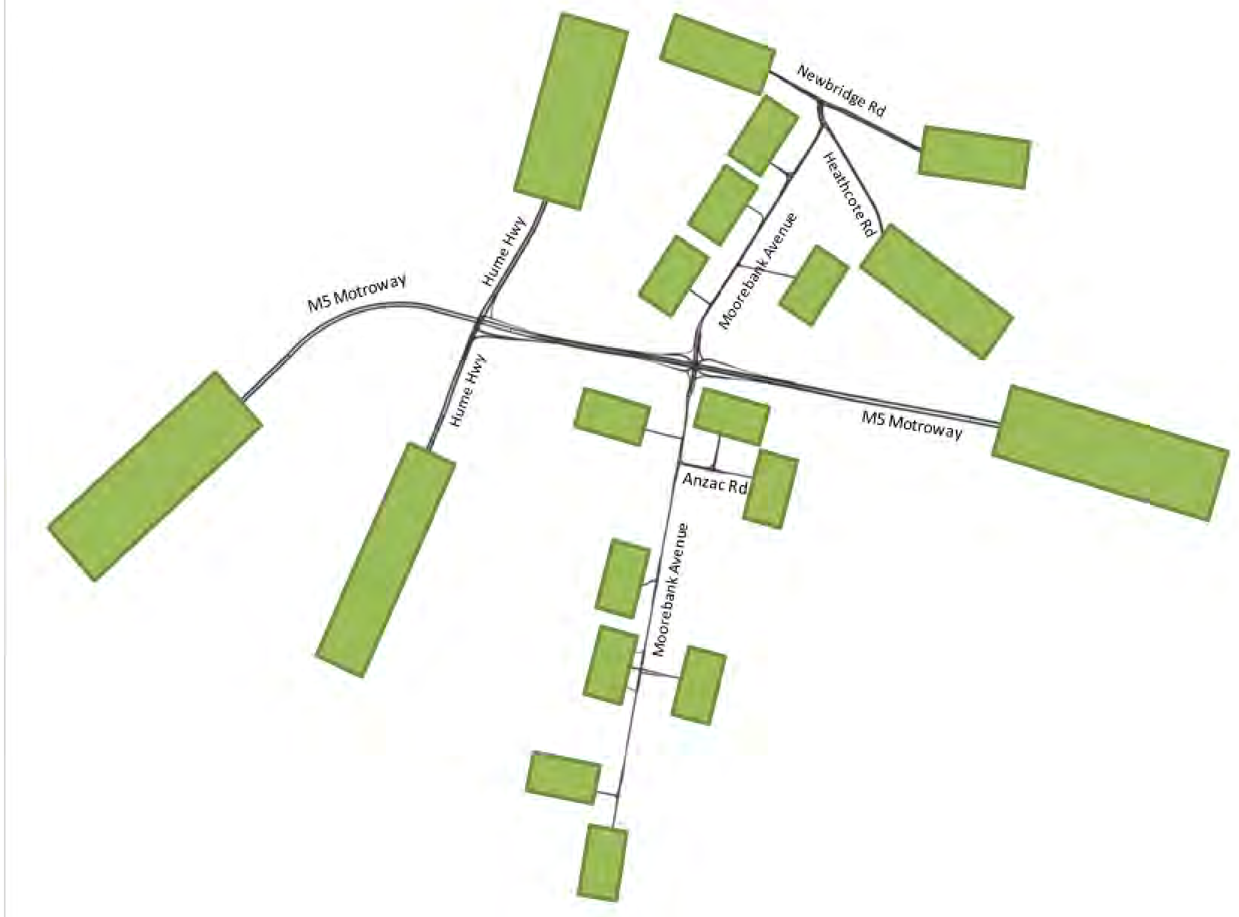


Figure A2 Paramics Models Zoning System

Vehicle Classification

The demand matrices were produced for three broad vehicle classes of:

12 Light Vehicles

13 Trucks/Bus

14 Semi Trailer and B-Double

Table A2 shows the proportion of the vehicles in the matrices. The proportions have been modified according to the RTA Paramics guideline

Table A2 Vehicle Type Proportion in the Micro simulation models according to the RTA recommendation

Matrix Number	Vehicle Type	Paramics Car Type	Proportion In Paramics Matrices
1	Private Car (Small)	type 1 car	31.223
	Private Car (Medium)	type 2 car	42.437
	Private Car (Large)	type 3 car	24.835
	Taxi	type 4 car	1.504
2	LGV	type 5 LGV	55.931
	STA Mini Bus – fixed	type 6 minibus	fixed route
	Non STA Mini Bus - fixed	type 7 minibus	fixed route
	STA Bus – fixed	type 8 bus	fixed route
	fixed route	fixed route	fixed route
	OD Bus	type 10 bus	0.786
	Rigid (Light)	type 11 OGV1	5.263
	Rigid (Medium)	type 12 OGV1	32.757
	Rigid (Heavy)	type 13 OGV1	5.263
3	Semi Trailer (Light)	type 14 OGV2	12.264
	Semi Trailer (Medium)	type 15 OGV2	69.811
	Semi Trailer (Heavy)	type 16 OGV2	12.264
	B-Double (Light)	type 17 OGV2	0.943
	B-Double (Medium)	type 18 OGV2	3.774
	B-Double (Heavy)	type 19 OGV2	0.943

Temporal Distribution

Temporal traffic profiles were developed for 15-minute periods across the two hour simulation period. In addition, 30 minutes warm-up and 30 minutes cool-down periods were applied based on the count data. Figure A3 and Figure A4 show the demand profiling for the AM and PM peak models.

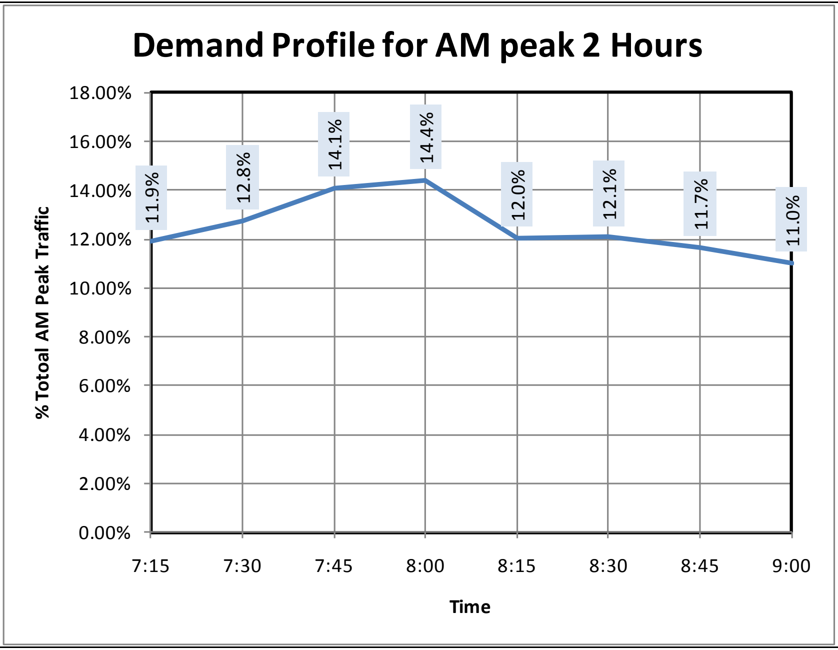


Figure A3 AM Peak Demand Profile

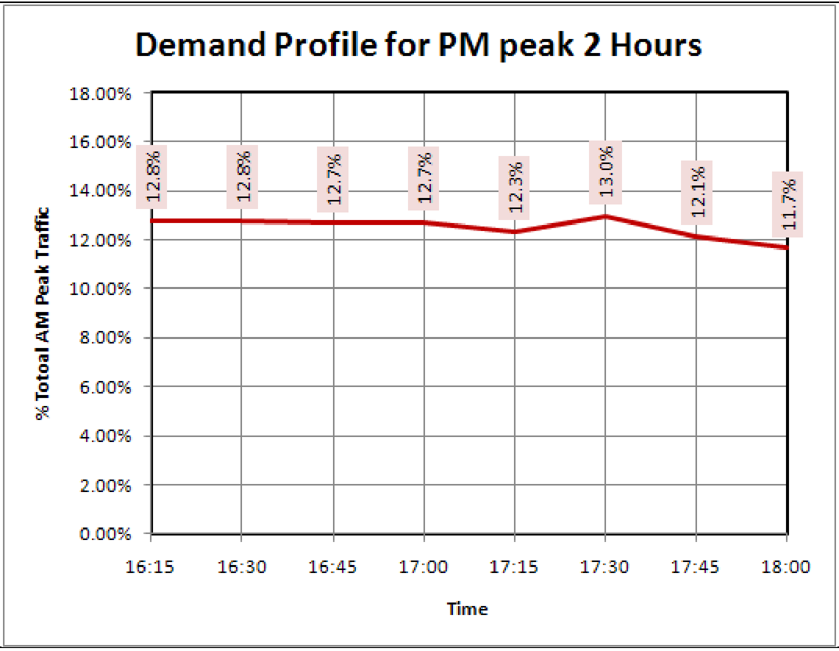


Figure A4 PM Peak Demand Profile

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CALIBRATION

The base year models were calibrated against set of survey data. Model calibration is the process that adjusts model parameters to adequately reflect the observed traffic behaviour and conditions in the study area. The microsimulation calibration main guidelines were based on the following sources:

- RTA manual – *Paramics Microsimulation Modelling* Version 1.0 issued in May 2009;
- UK Design Manual for Roads and Bridges (DMRB) issued by the Highways Agency, UK and last amended in November 2009.

Road Link Traffic Flows and Intersection Turn

Individual link flows and intersection turning volumes have been assessed based on the criteria detailed in Table A3

Table A3 Calibration Criteria

Calibration Criteria	Target
Difference in flow within 100 vph for flows less than 700 vph	85%
Difference in flow within 15% for lows between 700 and 2700 vph	85%
Difference in flow within 400 vph for flows more than 2700 vph	85%
GEH statistic less than 5	85%
Demand release for the base model	100%

Table A4 and Table A5 summarise the calibration achievements for the AM and PM peak models.

Table A4 2010 AM peak Paramics model calibration summary

Link			
Individual links			
Number of individual link flows (by direction)	10		
< 700 vhp	*4*		
700 - 2,700 vhp	*2*		
> 2,700 vhp	*4*		
Average link flow	2279	vph	
Meet the assessment criteria (UK-DMRB)	**Target**	**Achieved**	**Statues**
Difference in link flow within 100 for flows <700 vph	85%	100%	Pass
Difference in link flow within 15% for flows 700-2,700 vph	85%	100%	Pass
Difference in link flow within 400 for flows >2700 vph	85%	100%	Pass
GEH Statistic less than 5 of all individual modelled flow	85%	100%	Pass
Intersection			
Number of turn flows	68	(or 5 intersections)	
< 700 vhp	*54*		
700 - 2,700 vhp	*13*		
> 2,700 vhp	*1*		
Average turn flow	Mean Flow	vph	
Meet the assessment criteria (UK-DMRB)	**Target**	**Achieved**	**Statues**
Difference in link flow within 100 for flows <700 vph	85%	100%	Pass
Difference in link flow within 15% for flows 700-2,700 vph	85%	100%	Pass
Difference in link flow within 400 for flows >2,700 vph	85%	100%	Pass
GEH Statistic less than 5 of all individual modelled flow	85%	99%	Pass
Demand Release			
Meet the assessment criteria (RTA Guideline)	**Target**	**Achieved**	**Statues**
Release for the base model	100%	100%	Pass

Table A5 2010 PM peak Paramics model calibration summary

Link			
Individual links			
Number of individual link flows (by direction)	10		
< 700 vhp	*4*		
700 - 2,700 vhp	*2*		
> 2,700 vhp	*4*		
Average link flow	2289	vph	
Meet the assessment criteria (UK-DMRB)	**Target**	**Achieved**	
Difference in link flow within 100 for flows <700 vph	85%	100%	Pass
Difference in link flow within 15% for flows 700-2,700 vph	85%	100%	Pass
Difference in link flow within 400 for flows >2700 vph	85%	100%	Pass
GEH Statistic less than 5 of all individual modelled flow	85%	100%	Pass

Intersection			
Number of turn flows	68	(or 5 intersections)	
< 700 vhp	*50*		
700 - 2,700 vhp	*17*		
> 2,700 vhp	*1*		
Average turn flow	Mean Flow	vph	
Meet the assessment criteria (UK-DMRB)	**Target**	**Achieved**	
Difference in link flow within 100 for flows <700 vph	85%	100%	Pass
Difference in link flow within 15% for flows 700-2,700 vph	85%	100%	Pass
Difference in link flow within 400 for flows >2,700 vph	85%	100%	Pass
GEH Statistic less than 5 of all individual modelled flow	85%	100%	Pass

Demand Release			
Meet the assessment criteria (RTA Guideline)	**Target**	**Achieved**	
Release for the base model	100%	100%	Pass

Model Stability

The stability of the Paramics models was checked by running the model for five different seeds recommended by the RTA (seed 560, 28, 7771, 86524 and 2849) and producing the zone release graphs over time. Figure A5 and Figure A6 show the model stability graphs

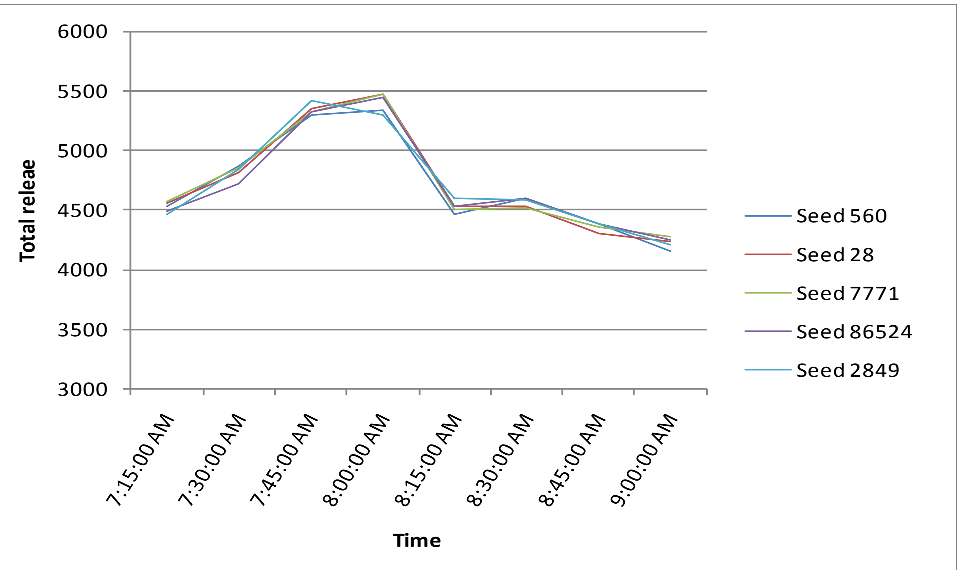


Figure A5 Model stability check - AM Peak model

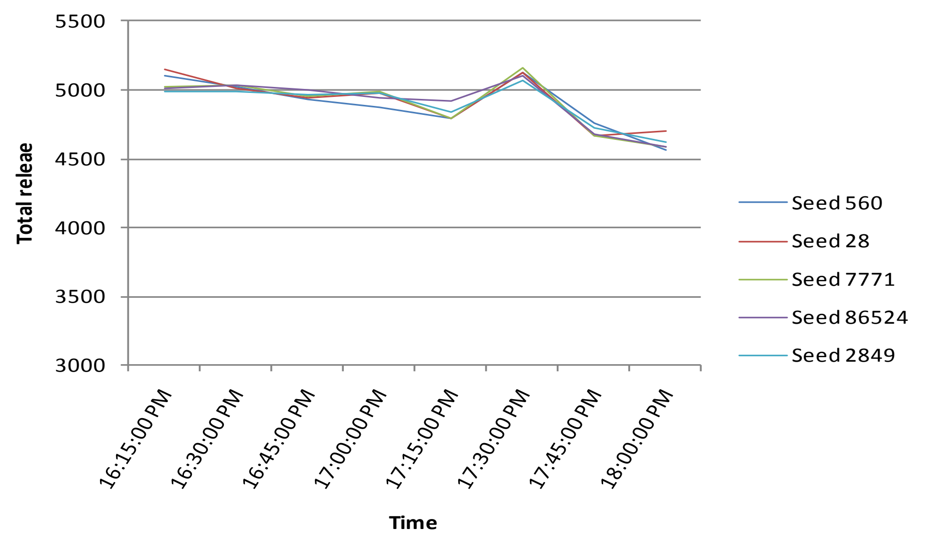


Figure A6 Model stability check - PM Peak model

VALIDATION

The Paramics models were validated against observed queue length. In addition, an analytical model based on HCM 2000 was developed to assess the performance of the weaving section in AM and PM peak periods. This was based on the Origin-Destination survey on M5 eastbound between Hume Highway Interchange and Moorebank Interchange .The results of the HCM 2000 modelling were further compared with microsimulation results to provide an independent verification of the modelled weaving section.

Queue Length Validation

In order to validate the observed queue length, extensive queue surveys were carried out during AM peak (between 7:00 to 8:00) and PM peak (between 4:00 to 5:00) for the five following key intersections in the study area:

- Moorebank Avenue/Anzac Road
- Moorebank Avenue/ M-5 Interchange
- Hume Highway/ M-5 Interchange
- Newbridge Road/Moorebank Avenue; and
- Heathcote Road/ Moorebank Avenue

The queue length data were compared for minimum, maximum, average, and 95th percentile queue length.

The results of this comparison are shown in Table A6 and A7.

Table A6 AM peak Queue length Comparison

Intersection	Approach	Lane	Paramics Models (AM Peak) Minimum	Paramics Models (AM Peak) Average	Paramics Models (AM Peak) Maximum	Paramics Models (AM Peak) 95 Percentile	Queue Surveys (AM Peak) Minimum	Queue Surveys (AM Peak) Average	Queue Surveys (AM Peak) Maximum	Queue Surveys (AM Peak) 95 Percentile
Newbridge Rd / Moorebank Ave	E	1	0	3	6	5	1	5	11	10
	E	2	0	2	4	3	2	6	14	12
	E	3	10	14	17	17	9	15	21	20
	E	4	9	12	16	16	9	14	21	20
	S	1	2	5	7	7	6	10	15	14
	S	2	2	3	5	5	1	6	12	11
	S	3	9	11	13	12	7	12	18	17
	S	4	10	11	12	12	13	20	30	28
	W	1	10	14	19	18	7	9	14	12
	W	2	10	13	16	16	5	9	13	12
	W	3	3	6	9	8	0	2	5	5
	W	4	2	5	8	7	1	3	7	6
Heathcote Rd / Moorebank Ave	N	1	0	1	3	3	0	5	8	7
	N	2	0	0	2	1	0	2	16	4
	N	3	0	2	4	3	0	3	18	6
	N	4	2	3	6	6	2	6	11	10
	E	1	0	0	0	0	0	0	0	0
	E	2	7	12	18	17	9	13	17	16
	E	3	5	7	9	9	2	10	13	16
	S	1	15	29	40	39	1	31	42	40
	S	2	5	16	26	26	1	25	37	35
	S	3	0	2	4	3	0	1	5	3
M5 / Hume Hwy	N	1	0	0	0	0	0	0	0	0
	N	2	9	13	17	17	6	12	16	15
	N	3	8	11	14	13	6	11	13	13
	N	4	8	10	13	12	7	10	16	14
	E	1	0	2	4	4	0	2	5	4
	E	2	0	1	2	2	0	2	3	3
	E	3	0	1	2	2	1	2	3	3
	E	4	6	11	16	15	10	15	21	20
	E	5	5	11	14	13	7	11	17	16
	E	6	6	13	16	15	5	11	15	15
	S	1	10	15	20	19	2	8	22	18
	S	2	11	15	23	21	3	9	21	17
	S	3	10	17	21	20	5	9	21	16
	S	4	2	5	9	8	0	4	8	7
	S	5	2	4	7	6	2	3	6	6
M5 / Moorebank Ave	N	1	0	2	3	3	0	1	3	3
	N	2	0	2	4	3	0	2	4	3
	N	3	3	4	7	7	0	4	7	6
	N	4	3	5	6	6	4	6	9	8
	E	1	0	1	4	3	0	2	7	5
	E	2	0	2	4	3	1	3	4	3
	E	3	0	1	3	3	0	2	5	4
	S	1	0	0	2	1	0	1	10	7
	S	2	4	6	8	7	5	8	10	10

Intersection	Approach	Lane	Paramics Models (AM Peak)				Queue Surveys (AM Peak)			
			Minimum	Average	Maximum	95 Percentile	Minimum	Average	Maximum	95 Percentile
M5 / Moorebank Ave	S	3	4	7	9	8	5	8	12	11
	S	4	0	2	3	3	1	3	8	6
	S	5	3	6	8	8	3	5	7	7
Anzac Rd / Moorebank Ave	N	1	0	0	0	0	0	0	0	0
	N	2	2	3	5	4	0	1	4	3
	N	3	7	10	15	15	4	10	20	16
	E	1	0	2	3	3	3	6	12	11
	E	2	2	8	12	11	3	7	10	9
	S	1	8	13	25	22	2	16	34	30
	S	2	4	9	13	13	0	3	8	6

Table A7 PM peak Queue length Comparison

Intersection	Approach	Lane	Paramics Models (PM Peak)				Queue Surveys (PM Peak)			
			Minimum	Average	Maximum	95 Percentile	Minimum	Average	Maximum	95 Percentile
Newbridge Rd / Moorebank Ave	E	1	5	12	18	17	3	7	14	13
	E	2	8	13	18	17	3	9	13	13
	E	3	10	15	20	20	5	15	24	23
	E	4	10	14	18	17	7	15	24	23
	S	1	2	4	8	7	6	10	14	14
	S	2	0	3	7	6	3	7	10	10
	S	3	8	11	13	12	3	8	11	11
	S	4	6	9	12	12	6	9	16	13
	W	1	0	3	7	7	2	4	9	8
	W	2	0	2	6	5	1	3	6	5
	W	3	5	11	18	17	9	12	15	14
	W	4	5	11	18	17	6	10	13	13
Heathcote Rd / Moorebank Ave	N	1	0	4	11	9	0	2	10	7
	N	2	1	2	4	4	0	1	4	3
	N	3	3	6	9	8	4	10	13	13
	N	4	2	7	10	10	6	11	16	15
	E	1	0	0	0	0	0	0	0	0
	E	2	7	12	16	15	10	15	21	20
	E	3	3	7	12	11	4	9	13	12
	S	1	3	6	14	13	3	8	15	14
	S	2	0	1	5	4	2	6	15	12
	S	3	0	2	6	5	0	1	3	2
M5 / Hume Hwy	N	1	0	0	0	0	0	0	0	0
	N	2	12	17	23	21	5	14	19	19

Intersection	Approach	Lane	Paramics Models (PM Peak)				Queue Surveys (PM Peak)			
			Minimum	Average	Maximum	95 Percentile	Minimum	Average	Maximum	95 Percentile
M5 / Hume Hwy	N	3	15	21	24	23	8	13	22	19
	N	4	16	19	23	22	3	11	18	18
	E	1	9	12	16	16	6	9	12	11
	E	2	5	10	15	14	4	9	14	12
	E	3	3	5	7	6	4	8	11	11
	E	4	12	14	19	18	8	15	22	21
	E	5	10	14	21	20	9	14	19	18
	E	6	11	14	21	20	7	12	19	18
	S	1	3	5	7	7	2	4	7	6
	S	2	3	5	7	6	1	4	10	8
	S	3	3	5	7	6	2	5	9	8
	S	4	0	1	2	2	0	2	3	3
	S	5	0	1	4	4	1	2	4	4
M5 / Moorebank Ave	N	1	2	6	11	10	0	4	7	6
	N	2	3	4	7	7	4	5	6	6
	N	3	4	9	12	11	5	12	18	17
	N	4	6	10	16	14	9	15	21	20
	E	1	0	1	4	3	0	3	7	6
	E	2	0	2	4	3	1	2	3	3
	E	3	0	1	3	3	0	1	3	2
	S	1	2	3	5	5	0	6	17	14
	S	2	0	2	4	4	0	3	6	5
	S	3	2	3	5	5	1	4	6	6
	S	4	0	2	4	3	1	3	4	4
	S	5	2	4	6	5	1	5	7	7
Anzac Rd / Moorebank Ave	N	1	0	0	0	0	0	0	0	0
	N	2	2	5	8	7	0	2	4	4
	N	3	7	14	17	17	7	15	22	21
	E	1	3	6	9	9	3	10	15	14
	E	2	5	9	12	12	4	8	13	12
	S	1	0	4	7	7	1	6	15	12
	S	2	2	4	8	7	0	4	12	9

In addition, the queue survey results were coupled with an extensive intersection video survey. The results of the video surveys were compared with the simulation videos for the aforementioned intersections.

Results comparison between observed and modelled queue lengths showed a good correspondence between the model and the existing intersection conditions.

Weaving Validation

Paramics models result on the M5 weaving section was compared with weaving analyses suggested by the Highway Capacity Manual (2000). This comparison provided a high level verification on the Paramics modelling results. Noting there are differences between the two modelling methods.

The average weaving section speed and density for the M5 eastbound between Hume Highway and Moorebank Avenue were recorded from the Paramics models. The corresponding weaving level of service (LoS) was determined based on the observed weaving density. The LoS results were then compared with HCM 2000 analytical models.

According to HCM 2000, level of service (LoS) criteria for weaving areas are based on average vehicle density in the section. LoS Criteria for weaving segments based on HCM 2000 is shown in Table A8.

Table A8 Weaving Segment Level of Service

	Density (pc /km/ ln)	
LOS	Freeway weaving segment	Multilane and collector-distributor weaving segments
A	≤6.0	≤8.0
B	>6.0–12.0	>8.0–15.0
C	>12.0–17.0	>15.0–20.0
D	>17.0–22.0	>20.0–23.0
E	>22.0–27.0	>23.0–25.0
F	>27.0	>25.0

Source: *HCM 2000*

Table A9 presents comparison of weaving results based on Paramics and HCM 2000. The result in Table A9 showed close match when LoS was compared. The speed prediction in weaving section from Paramics (AM peak) is relatively lower than HCM. However difference in speed predictions are within 2 to 10 km/h. Overall, both analyses predicted a lower speed and LoS in the M5 weaving section.

Table A9 Weaving Segment Analyses

	AM Peak (7-8 am)		PM Peak (5-6 pm)	
	HCM 2000	**Paramics**	**HCM 2000**	**Paramics**
Weaving segment speed (km/h)	62.96	52.29	72.82	74.58
Weaving segment density (pc/km/ln)	23.60	26.70	16.50	15.46
Weaving segment LoS	E	E	C	C
Weaving flow Ratio (VR)	0.39*		0.32	

SUMMARY

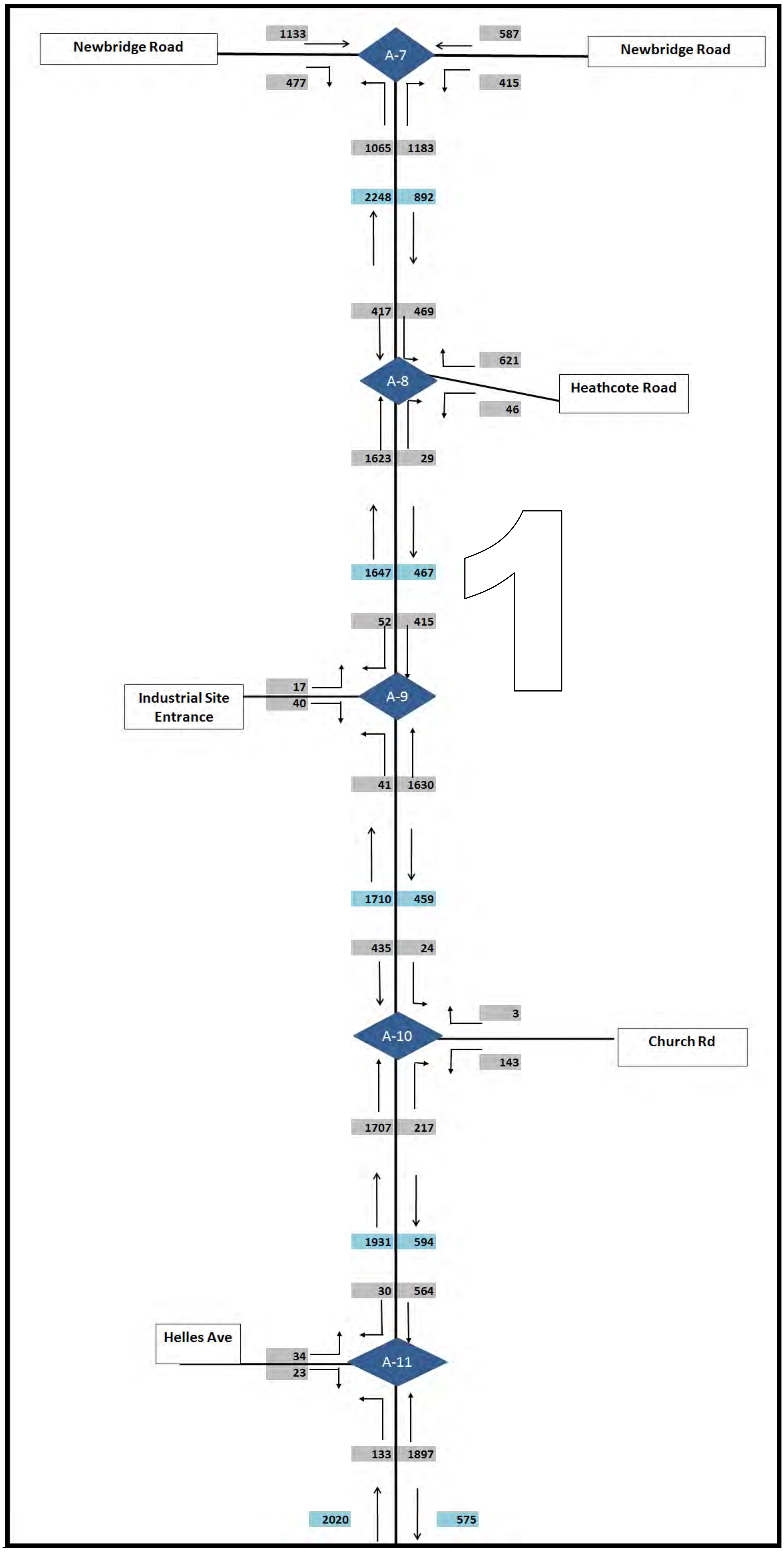
The modelling results presented above confirmed that both AM and PM peak Paramics models for core area were calibrated and validated adequately and models are fit for this study purpose.

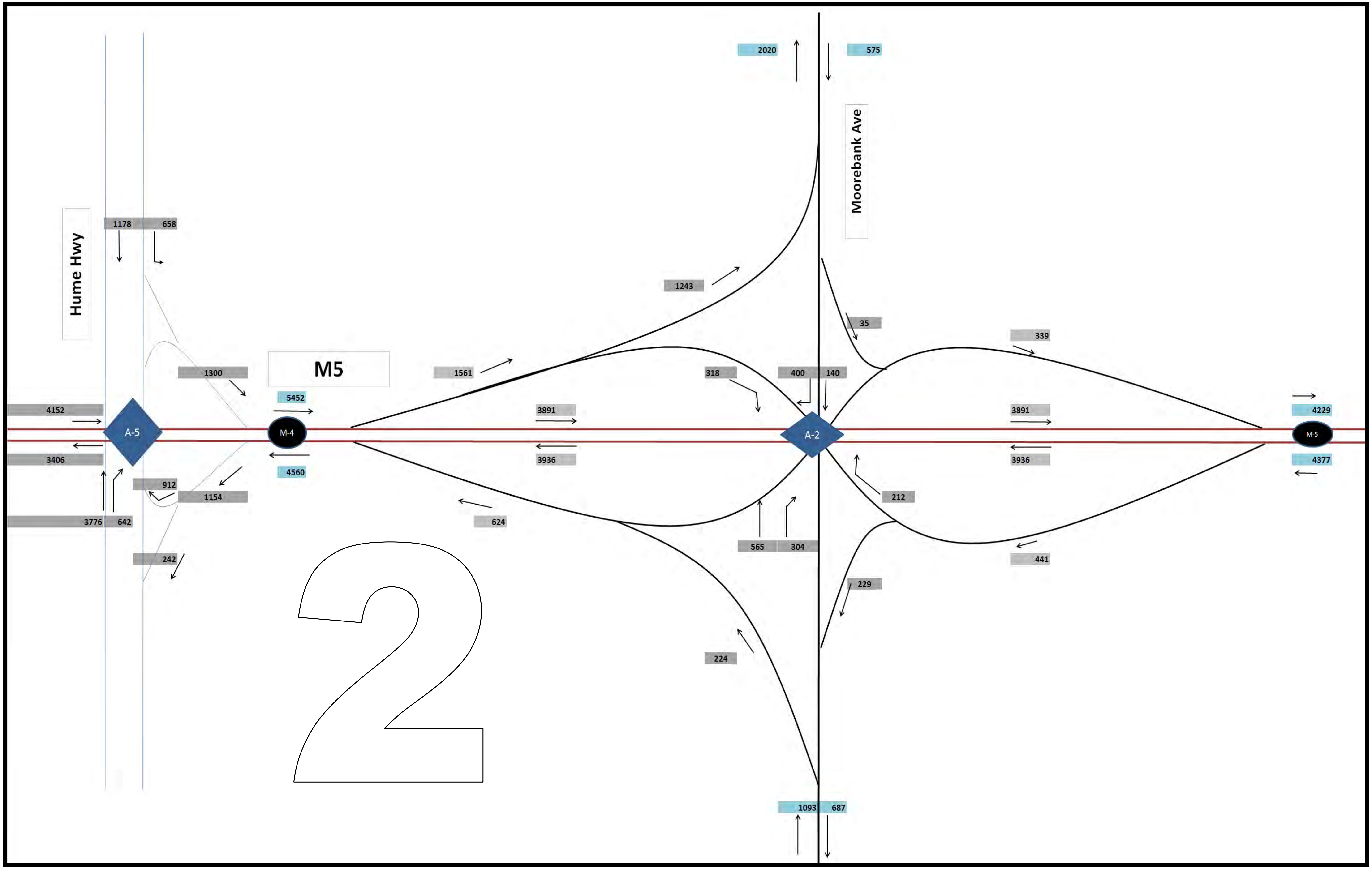
APPENDIX B

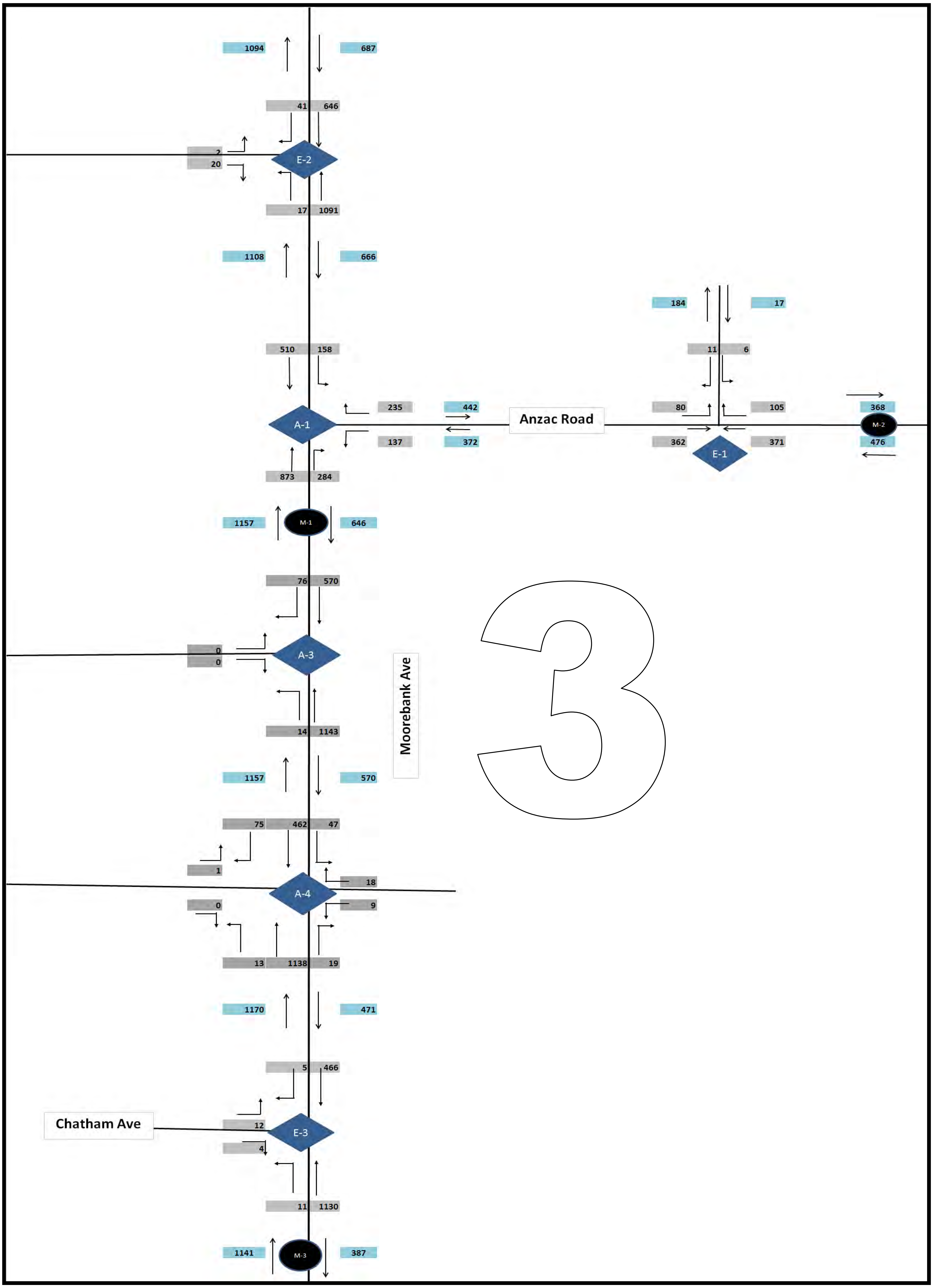
STUDY AREA TURN AND LINK COUNTS

The following Figures show the hourly turn and link count diagrams for the AM and PM peak periods. The Stick diagrams are split in three sections as of the following figure.

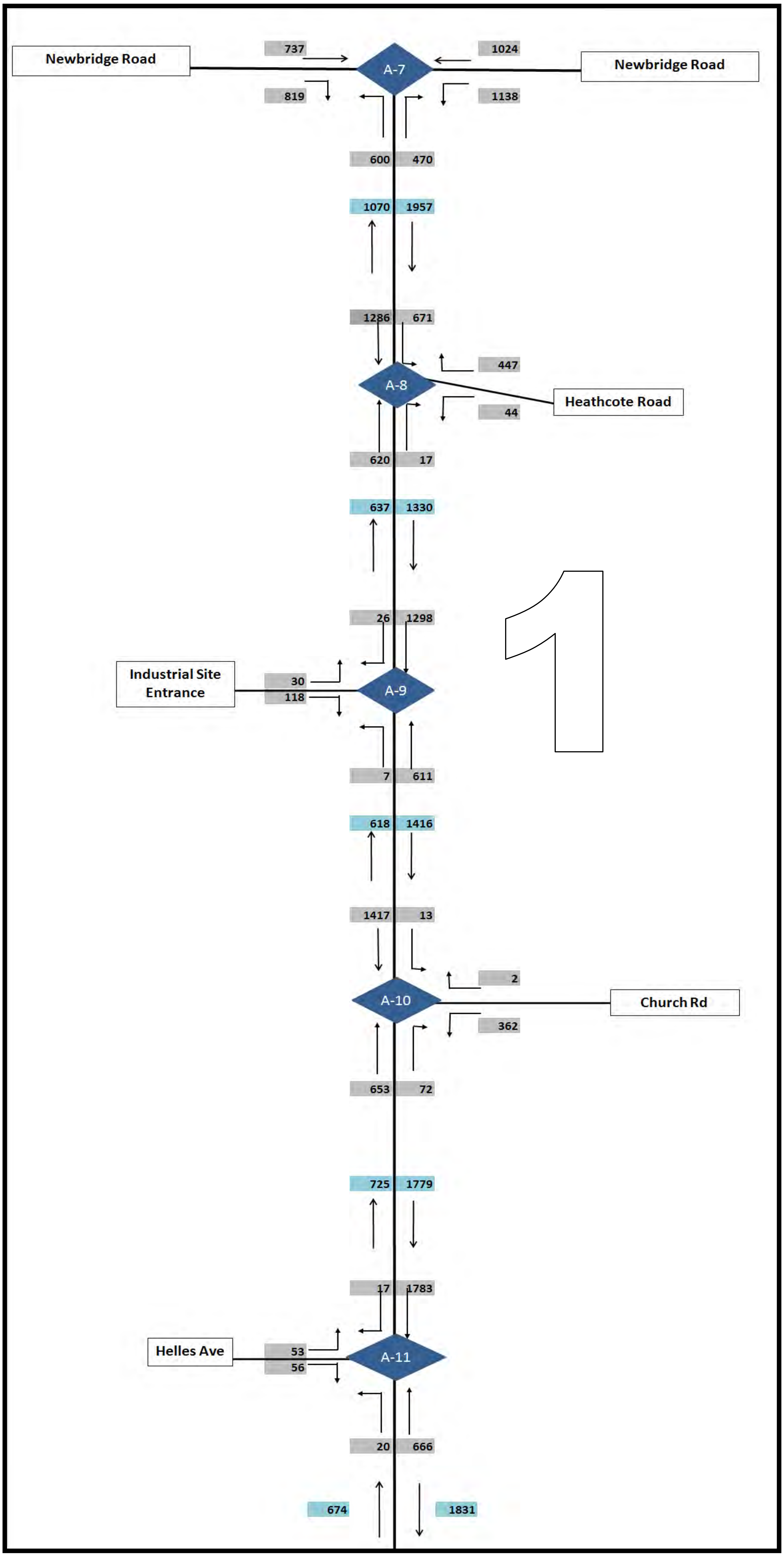
AM Peak Turn and Link Counts Stick Diagram

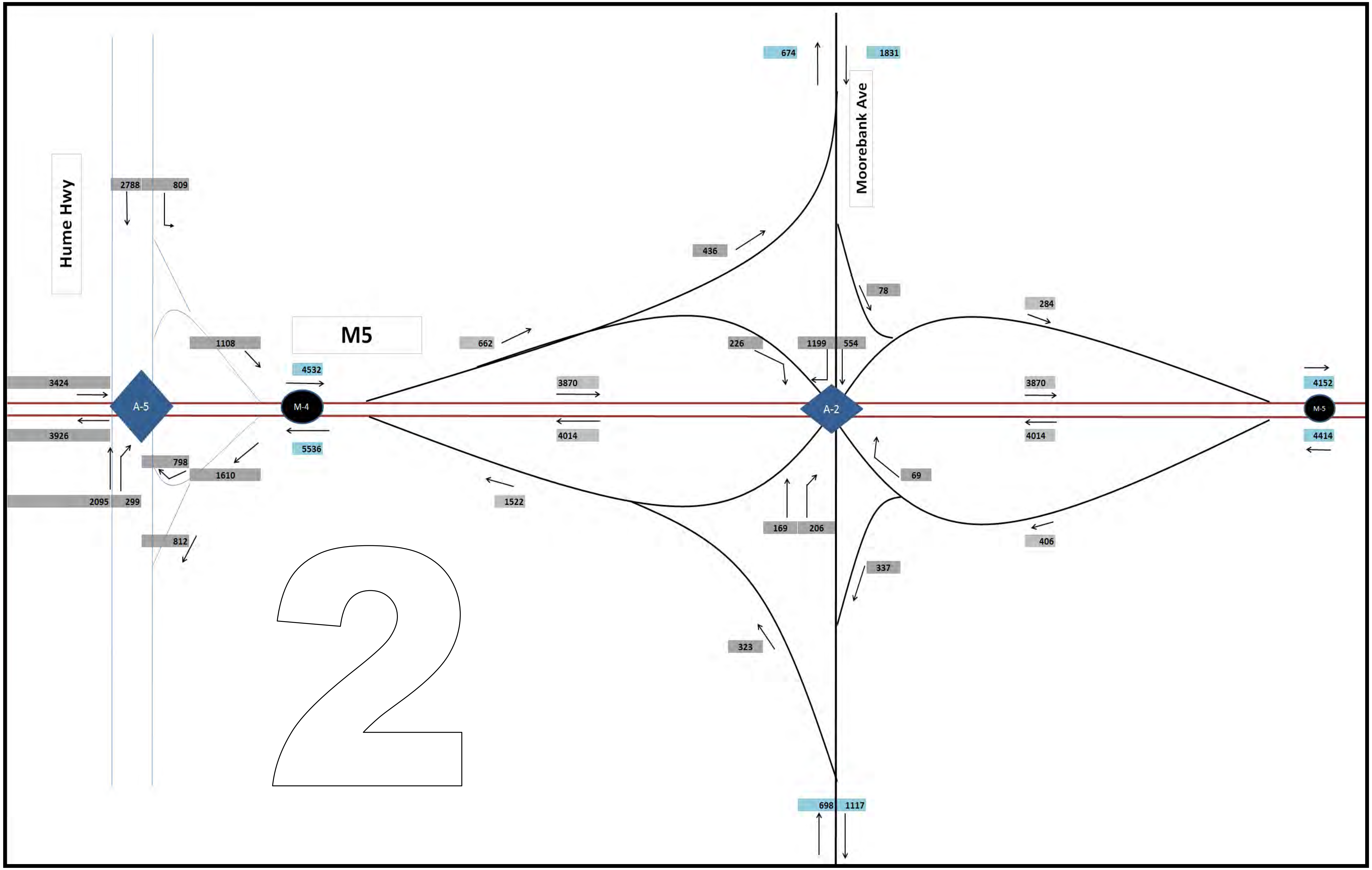



Hume Hwy
M5
Moorebank Ave
A-5
M-4
A-2
M-5
1178
658
1300
4152
3406
5452
4560
912
1154
3776
642
242
1561
624
1243
3891
3936
318
400
140
35
2020
575
565
304
224
212
229
339
3891
3936
441
4229
4377
1093
687
2


1094
687
41
646
2
20
E-2
17
1091
1108
666
184
17
510
158
11
6
235
442
Anzac Road
80
105
368
A-1
M-2
137
372
362
371
476
E-1
873
284
1157
M-1
646
76
570
0
0
A-3
Moorebank Ave
3
14
1143
1157
570
75
462
47
1
18
A-4
0
9
13
1138
19
1170
471
5
466
Chatham Ave
12
E-3
4
11
1130
1141
M-3
387

PM Peak Turn and Link Counts Stick Diagram




Hume Hwy
Moorebank Ave
M5
A-5
M-4
A-2
M-5
2788
809
3424
3926
2095
299
798
1610
1108
812
4532
5536
662
3870
4014
1522
436
226
1199
554
78
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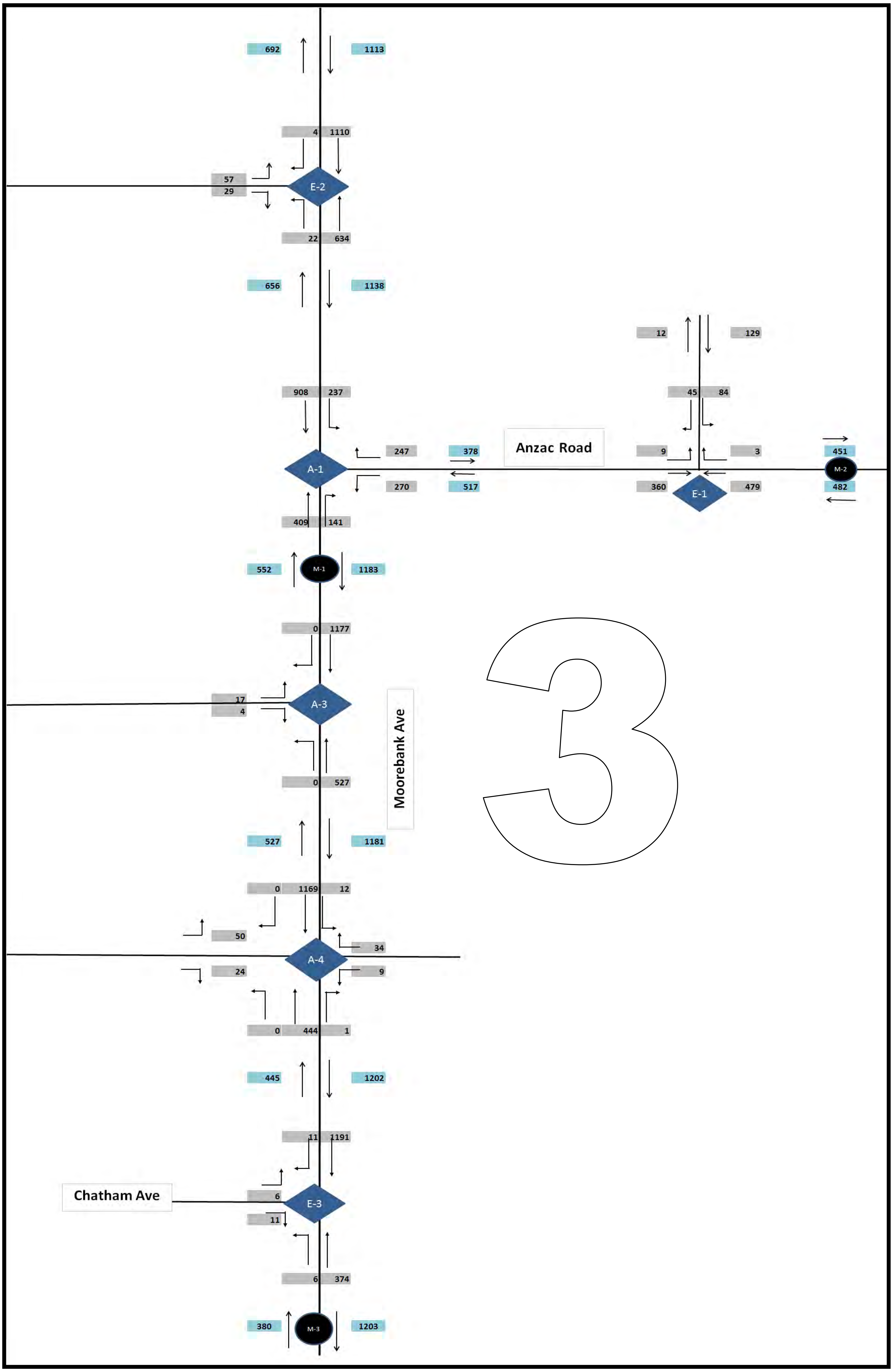
406
337
323
698
1117
2


692
1113
4
1110
57
29
E-2
22
634
656
1138
12
129
908
237
45
84
247
378
Anzac Road
9
3
451
A-1
M-2
270
517
360
E-1
479
482
409
141
552
M-1
1183
0
1177
17
4
A-3
Moorebank Ave
3
0
527
527
1181
0
1169
12
50
34
A-4
24
9
0
444
1
445
1202
11
1191
Chatham Ave
6
E-3
11
6
374
380
M-3
1203

Appendix C

Technical Note 2
Needs Assessment for Moorebank Intermodal Terminal Facility
(by PWC)

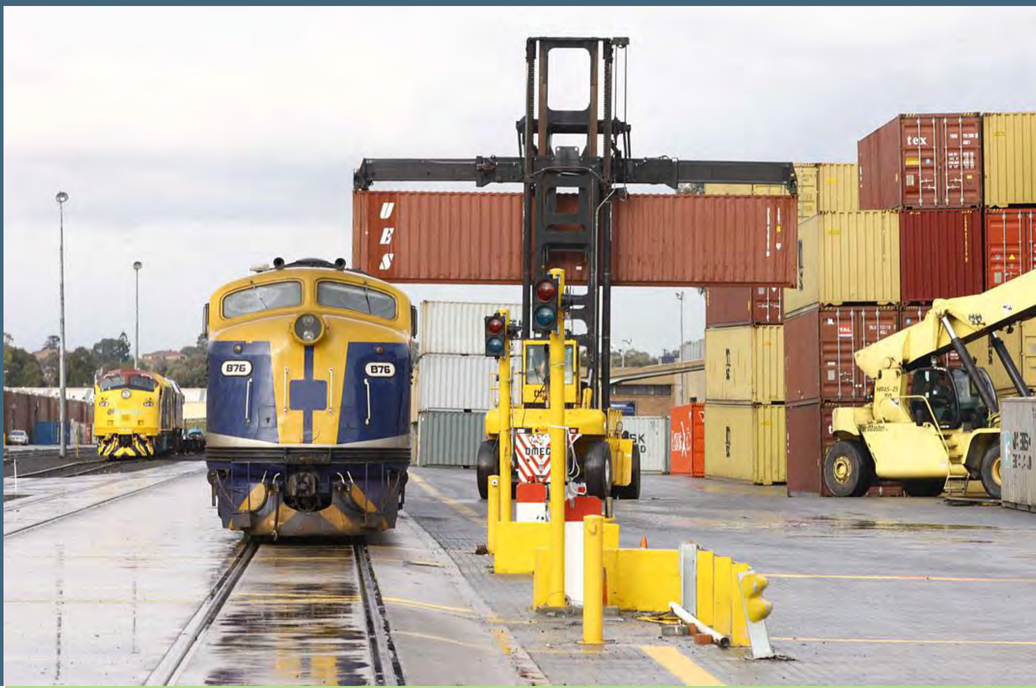
SIMTA SYDNEY INTERMODAL TERMINAL ALLIANCE

Part 3A Concept Plan Application

Traffic and Transport

August 2011

Needs Assessment for Moorebank Intermodal Terminal Facility



SIMTA

SYDNEY INTERMODAL TERMINAL ALLIANCE

Part 3A Concept Plan Application

25 / 08 / 2011

whatwouldyouliketogrow.com.au

Sydney Intermodal Terminal Alliance

Moorebank Intermodal Terminal Facility

Needs Assessment for Moorebank Intermodal Terminal Facility

August 2011

What would you like to grow?

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Contents

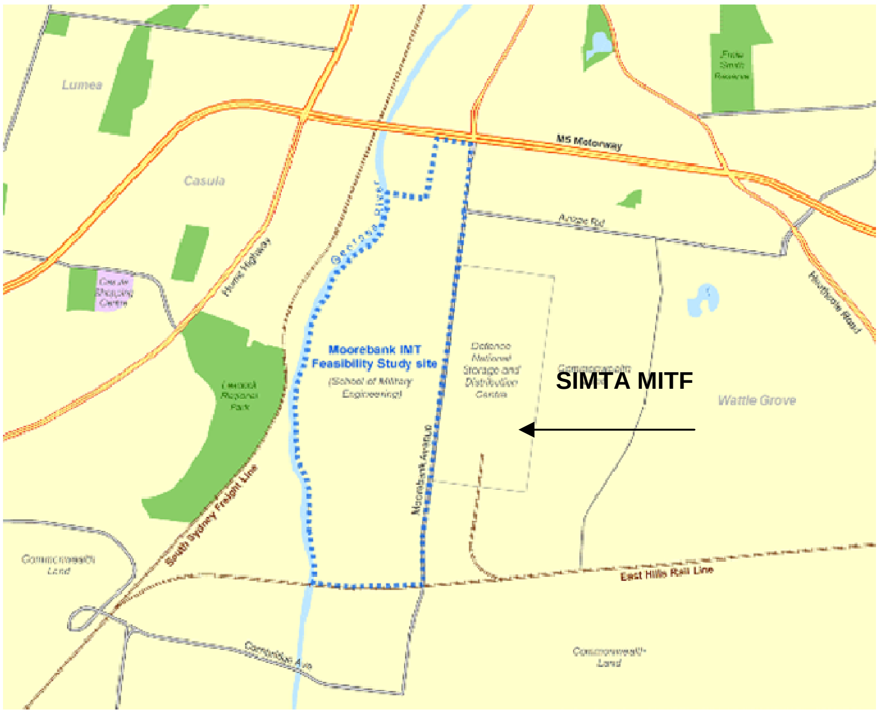
Executive Summary

Scope of Assessment

PricewaterhouseCoopers (PwC) was commissioned by Evans & Peck, acting on behalf of the Sydney Intermodal Terminal Alliance (SIMTA), to prepare a needs assessment that evaluates likely demand for the proposed SIMTA Moorebank Intermodal Terminal Facility (MITF) and how the objectives for this facility relate to the NSW Government's Freight Strategy and Port Botany's Rail Strategy. This report analyses the future container freight needs of Port Botany and the resulting requirement for additional intermodal terminal (IMT) capacity in the Sydney region. The SIMTA MITF is particularly important in light of the NSW Government's objective to achieve a target of 40 per cent of container freight movement by rail out of Port Botany by 2016.

The site of the proposed SIMTA MITF is at SIMTA-owned land at Moorebank which is currently occupied by the Defence National Storage and Distribution Centre (DNSDC). This report focuses on that site, but we note that there is a larger, adjacent Commonwealth Defence site which is also planned to be an IMT facility. The Commonwealth proposal is not as far progressed as the SIMTA MITF proposal and is not a subject of this assessment. The SIMTA MITF site and the Commonwealth Moorebank site (IMT Feasibility Study site) are shown in Figure ES.1 below.

Figure.ES.1: Schematic of proposed Moorebank intermodal terminals



Source of information used in this figure: Commonwealth Government, Department of Finance and Deregulation.

Port Botany container freight demand

Projected growth in trade volumes will lead to an increase in freight movements across the Sydney metropolitan area. This will pose substantial challenges for the intermodal logistics chain in relation to Port Botany. To meet this challenge it is considered necessary to invest in new IMT capacity, to develop dedicated rail freight lines, to widen the orbital motorway and ideally to complete the missing links in the orbital motorway, and to improve the rail interface at Port Botany.

Port Botany accounts for almost the entire volume of containerised import/export (IMEX) trade throughput in NSW. Total container trade through Port Botany was 1.9 million twenty foot equivalent units (TEU) in 2009/10, up from 1.8 million TEU in 2008/09, representing an increase of 8 per cent.[1] Full container imports in 2009/10 were 1.0 million TEU, up nearly 9 per cent on 2008/09, while full container exports were 0.4 million TEU, unchanged from 2008/09. The export of empty containers increased by over 16 per cent in 2009/10 to 0.5 million TEU, driven by the imbalance of imports over exports and the need to repatriate the empty containers.

The projected growth of container trade at Port Botany, of 6.7 per cent per annum based on Sydney Ports Corporation (SPC) planning assumptions, would result in trade throughput at the port reaching approximately 5.0 million TEU by 2025.[2] The fully-developed container throughput capacity of Port Botany, as determined by the Minister of Planning in 2005 under the *Environmental Planning and Assessment Act*, is 3.2 million TEU per annum. Whilst post the opening of Terminal 3, the Port Botany facility will have technical capacity of reportedly over 5.0 million TEU, going over 3.2 million TEU will be subject to further environmental assessment. The projected increase in the container trade at the port means that Port Botany is likely to reach 3.2 million TEU by around 2018.[3]

Figure ES.2 below shows the relationship between the fully developed container throughput capacity of Port Botany, the projected container trade throughput of the port and the NSW Government's policy target in relation to container freight movement by rail out of the port.

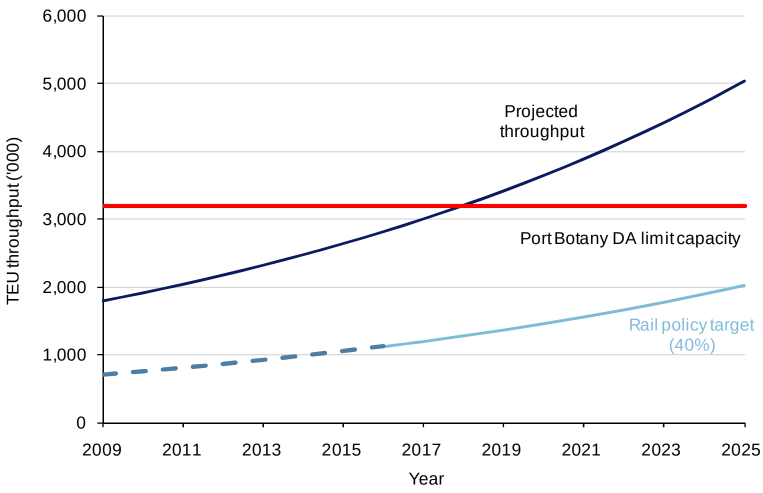
---

[1] Sydney Ports Corporation, Trade Statistics 2009/10, December 2010.

[2] Sydney Ports Corporation data, as applied in the assessment for the NSW Government by SAHA International, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010.

[3] Hyder 2011, Technical Note 1: Strategic Freight Demand, p.7

Figure ES.2: Container trade growth at Port Botany (import and export)



Source of data used in this figure: SAHA International Limited (SAHA), NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010 and the NSW Department of Planning.

NSW Government freight policy

The NSW Government has identified the importance of improving the performance of the NSW road network to grow Sydney's value and move commodities efficiently to assist the productivity of businesses.[4] To address this objective, the NSW Government has issued the following key policy documents relating to freight, which support an increase in rail freight in order to ease road congestion:

- NSW Government, State Infrastructure Strategy, June 2008
- NSW Government, Action for Air, November 2009
- NSW Government, Metropolitan Transport Plan, February 2010
- NSW Government, NSW State Plan 2010, Investing in a Better Future, March 2010
- NSW Transport, Container Freight Improvement Strategy, July 2010
- NSW Government, Metropolitan Plan for Sydney 2036, December 2010.

These NSW Government policies are complemented by the SPC document, the Port Botany Landside Improvement Strategy (PBLIS).

The above policies outline the importance of managing the expected increase in container freight in a manner that is sustainable and which minimises the effects of congestion.

[4] NSW Government, NSW Container Freight Improvement Strategy, August 2010.

Infrastructure Australia (IA) provides a priority list to guide proponents of infrastructure projects to present an economic and societal basis for their developments. The process involves a number of steps to define and assess economic monetised and non- monetised costs and benefits of projects that are to be pursued in the interest of national productivity. In this report we have followed a similar process to IA in assessing the need for the SIMTA MITF and intermodal capacity more generally – through the processes of issue identification, issue assessment and analysis, consideration of the MITF option and assessment of whether this option provides a solution to the problem identified (being the requirement for additional IMT capacity in Sydney).

In order to relieve congestion on the road network in Sydney, the NSW State Plan 2010 sets out the specific target to increase the proportion of container freight movement by rail out of Port Botany to 40 per cent by 2016.[5] The targeted percentage reflects analysis and recommendations of the report, *Port Botany's Containers: Proposals to Ease Pressure on Sydney's Roads*, released by the Freight Infrastructure Advisory Board in July 2005.

This target would be achieved through investment in intermodal capacity within Sydney and through appropriate rail connections to Port Botany. Moorebank, in south west Sydney, has been considered an appropriate site for IMT capacity by both the Commonwealth and NSW Governments since 2004. This is due to its location within close proximity to motorways, the Southern Sydney Freight Line and proximity to south west industrial areas and employment zones.

During 2008/09, only 23 per cent of the Port Botany IMEX container trade, of 1.8 million TEU, was transported by rail, with the rail mode percentage share being higher for exports and lower from imports due to diverse destination patterns.[6] The assessment contained in the NSW Government document, *NSW Container Freight Improvement Strategy Preliminary Economic Evaluation*, projects that total TEU demand will be around 2.8 million TEU by 2016. Even if the rail mode share remains at the current level of 23 per cent, then existing Sydney IMT capacity would be exhausted around 2016. With growth forecast at 6.7 per cent per annum, a further 0.39 million TEU would be added by 2018, taking Port Botany close its approved 3.2 million TEU DA limit. If the NSW Government container rail freight policy objective is to be met, around 1.1 million TEU would need to be moved by rail by 2016. This represents approximately a threefold increase on the 2008/09 throughput level. To meet this rail percentage target, new IMTs will be required, as well as a range of PBLIS reforms to boost the competitive proposition of rail.

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[5] NSW Government, NSW State Plan 2010, March 2010.

[6] NSW Government, NSW Container Freight Improvement Strategy, August 2010.

Business as usual - existing capacity vs Port Botany container needs

In 2008/09, total annual IMT container throughput capacity in Sydney was 0.37 million TEU, across the Yennora, Minto and Villawood IMTs.[7] The Enfield IMT, which is nearing completion, will increase the network capacity by a further 0.3 million TEU, consistent with the approved throughput limit of that terminal, to 0.67 million TEU. With annual throughput at Port Botany projected to increase to 2.8 million TEU by 2016, further additions to the capacity and efficiency of the freight and logistics network are needed to increase the share of rail container freight transport so that Sydney has over 0.95 million TEU of IMT capacity and 85 per cent of Port Botany volume originates or is delivered to a destination within 40 km of the Port. The development of the SIMTA MITF will be an important component in achieving that objective, by providing greater capacity to move freight by rail, potentially decreasing the distances freight is required to be transported by road, in addition to generally decreasing the need for road transport from Port Botany.

The SIMTA MITF is likely to increase employment opportunities in the west Sydney region, both directly related to the terminal and indirectly as a result of the new activities introduced to the region. Previous work undertaken by PwC for the SIMTA on the MITF indicated that approximately 213 direct positions would be supported during construction phase of the project.[8] Ongoing direct operational employment is estimated at a maximum of 2,223 positions supported, once the terminal reaches throughput of 1.0 million TEU per annum, with a further 5,136 jobs supported indirectly.[9] The staged development of the SIMTA MITF is expected to commence in 2013 and the first stage to be operational by 2016. [10]

In the absence of the SIMTA MITF, intermodal capacity in the Sydney region would be limited to 0.67 million TEU, comprising the aggregate capacity of the Enfield, Yennora, Minto and Villawood intermodal facilities. The existing capacity would be unable to fulfil the policy target, of 40 per cent container freight movement by rail out of Port Botany by 2016. The relationship between existing intermodal capacity in the Sydney region (business as usual) and the achievement of the policy target in the NSW State Plan is presented in Figure ES.3 below. Figure ES.3 shows the level of the 40 per cent policy target rate before 2016 as a dashed line, given that the target is to be achieved by 2016.

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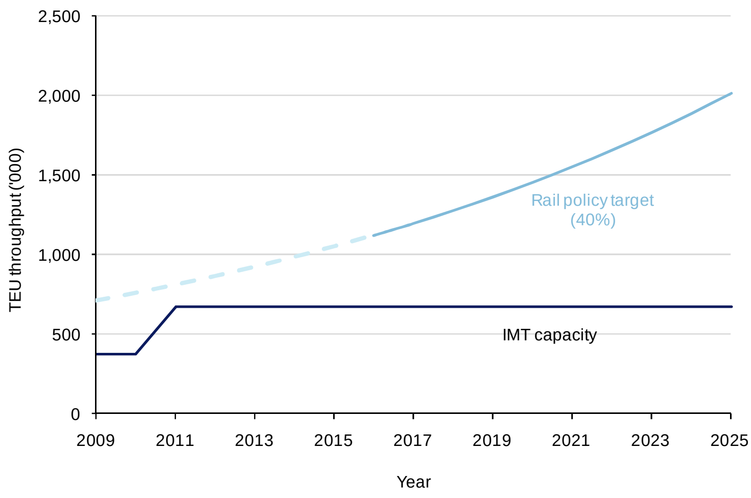
[7] SAHA, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010

[8] PwC, Employment Forecasts for the SIMTA Moorebank Intermodal Terminal, June 2010.

[9] Urbis 2010, Moorebank Intermodal Terminal: Economic Impact Assessment, p.36

[10] SIMTA, From road to rail: Planning for a new freight facility at Moorebank, July 2010.

Figure ES.3: Capacity of Port Botany IMT shuttle network without the MITF



Source of data used in this figure: SAHA, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010 and the NSW Department of Planning.

Table ES.1 below compares the Sydney IMT capacity requirements to maintain the current 23 per cent rail mode share and achieving the Government's target of 40 per cent. It also summarises capacity of the existing IMT facilities (including the Enfield facility currently being completed) and to the capacity of those facilities plus the proposed SIMTA MITF.

Table ES.1: Capacity of Port Botany IMT shuttle network with & without the MITF

	2010	2016	2021	2025
	IMT Capacity (million TEU per annum)			
Existing intermodal capacity				
Minto	0.15	0.15	0.15	0.15
Yennora	0.17	0.17	0.17	0.17
Enfield	0.00	0.30	0.30	0.30
Villawood	0.05	0.05	0.05	0.05
Total	0.37	0.67	0.67	0.67
Rail share at 23 per cent	0.44	0.65	0.89	1.16
Rail share at 40 per cent	0.76	1.12	1.55	2.01
Policy gap at 40 per cent *	0.61	0.55	0.12	-0.34
SIMTA MITF	1.00	1.00	1.00	1.00
Total with SIMTA MITF	1.37	1.67	1.67	1.67

Source of data used in this figure: SAHA, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010, PwC calculation of rail share values.

* The policy gap at 40 per cent is calculated based on Sydney IMT capacity inclusive of the SIMTA MITF.

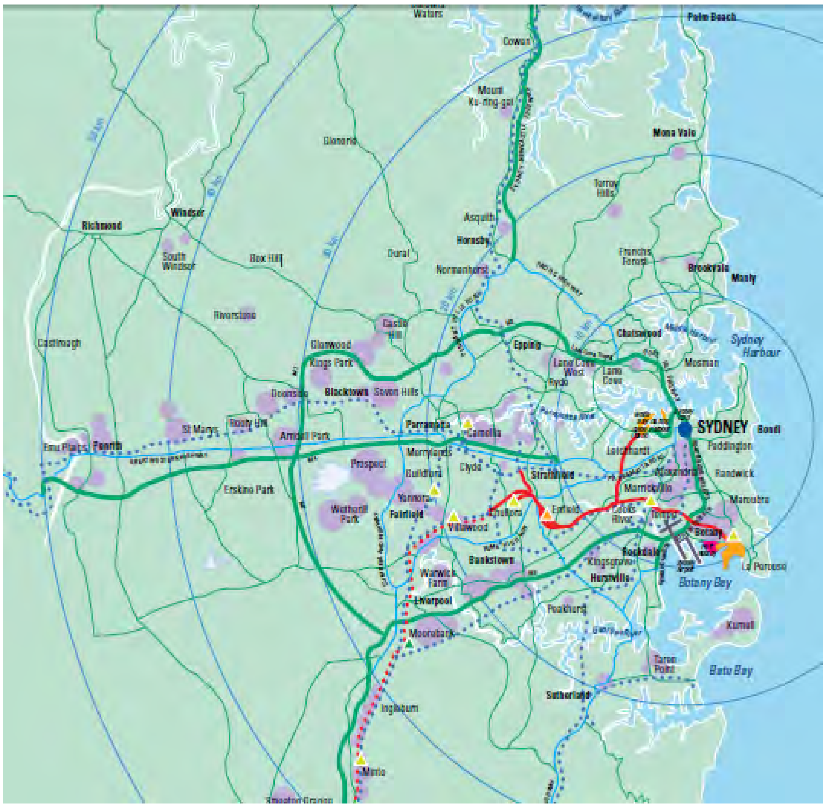
Conclusion

Under the 'business as usual' scenario based on current Sydney region IMT capacity of 0.67 million TEU, it is estimated that only 24 per cent of containers would be transported by rail in 2016. The SIMTA MITF would allow the government policy objective to be achieved, although this would also depend on related transportation initiatives.

The commencement of the proposed SIMTA MITF in 2016 would provide capacity for an additional 1.0 million TEU throughput for the Sydney network, bringing the total IMT capacity to 1.67 million TEU. This would represent around 60 per cent of the total projected TEU throughput of 2.8 million at Port Botany by 2016. This compares to the NSW State Plan target objective of 40 percent of container freight to be moved by rail out of Port Botany by 2016. That is, around 1.1 million TEU would need to be moved by rail by that time for the policy objective to be achieved.

The SIMTA MITF site is well-positioned in the centre of the logistics and warehousing precinct of south-west Sydney. The site is near the junction of the M5 and M7 motorways and the Southern Sydney Freight Line, giving excellent access to high capacity transport infrastructure. Figure ES.4 below depicts the networks of major arterial roads and rail links in the Sydney region, with the Moorebank site highlighted. It can be seen from Figure ES.4 that there is significant concentration of industrial activity along the south-west corridor and around the Moorebank site.

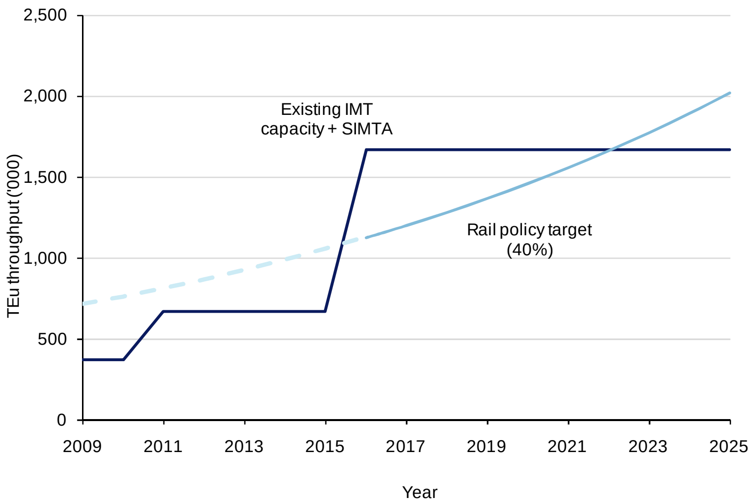
Figure ES.4: Metropolitan road and rail links.



Source: Sydney Ports Corporation, Logistics Review, Improving Our Supply Chain, 2008/09.

Achievement of the Government's policy objective will depend on related transportation initiatives, such as those included in the NSW Container Freight Improvement Strategy. The Strategy represents a package of projects to provide the infrastructure required to achieve and maintain the NSW State Plan target. The Strategy includes investments in intermodal facilities and port and rail efficiency enhancements to meet the rail target. Figure ES.5 below shows the current TEU capacity in the Sydney region, the additional capacity which would be provided from 2016 by the SIMTA MITF and how this capacity compares to the NSW Government policy target.

Figure ES.5: Capacity of IMT network with the SIMTA MITF



Source of data used in this figure: SAHA, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010, the NSW Department of Planning, and SIMTA capacity data.

Based on the forecast 1.0 million TEU annual throughput of the proposed SIMTA MITF, this development has the potential to: support NSW freight policy objectives. It will provide enough capacity to allow the 40 per cent target to be met up to 2022. It will improve container throughput, thus increasing productivity of freight rail and eliminate a significant number of truck movements from major arterial roads around Port Botany. Even if the 40 per cent target is not met, increased capacity is still required by 2016 in order to maintain the current 23 per cent rail mode share.

1 Scope of the report

PwC was commissioned by Evans & Peck on behalf of the SIMTA to prepare a needs assessment in relation to the proposed SIMTA MITF to evaluate likely demand for this facility including how it relates to the NSW Government's Freight Strategy and Port Botany's Rail Strategy. This report analyses the future container freight needs of Port Botany and the resulting requirement for increased IMT capacity in the Sydney region. This report considers the particular role that may be performed by the SIMTA MITF in light of the NSW Government's objective to achieve a target of 40 per cent of container freight movement by rail out of Port Botany by 2016.

The SIMTA MITF site at Moorebank is well-positioned in the centre of the logistics and warehousing precinct of south-west Sydney. The site is near the junction of the M5 and M7 motorways and the Southern Sydney Freight Line, giving excellent access to high capacity transport infrastructure.

The M5 and M7 motorways are part of the Sydney–Melbourne corridor and are recognised as vital arteries in the national transport system. The M5 corridor connects the economic centres of Sydney's central business district, Sydney Airport and Port Botany with greater western Sydney. The area of greater western Sydney is Australia's third largest economy after the Sydney central business district and South East Queensland. The Moorebank site, near the M5 and M7 junction and the Southern Sydney Freight Line, is highlighted in Figure 1 below.

Figure 1: Sydney transport corridors and Moorebank site

Source: Roads and Traffic Authority, M5 West widening environmental assessment

Methodology

The approach undertaken in this report is to establish a 'business as usual' case to determine whether the NSW Government's policy target can be met in the absence of the SIMTA MITF. This report then assesses whether the development of the SIMTA MITF would allow the Government's policy target to be achieved.

This report also discusses the need for the MITF on a locality basis (ie the south-west subregion of Sydney) and notes the potential economic impacts from this project determined from previous work undertaken by PwC.[11]

Key data sources

This report uses existing information relating to current and projected freight throughput at Port Botany. In particular, we have applied data obtained from the following sources:

- SAHA, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010
- NSW Transport, Container Freight Improvement Strategy, July 2010
- Sydney Ports Corporation
- Information from SIMTA on the capacity of the MITF.

[11] PwC, Employment Forecasts for the SIMTA Moorebank Intermodal Terminal', June 2010.

2 Port Botany container freight needs

This chapter describes the container freight needs in NSW, based on projected demand for intermodal terminal capacity. It also describes the NSW Government freight policies and how they may impact on the needs of the State's freight sector. Chapter 3 following compares the existing intermodal terminal capacity with Port Botany container freight needs and, in Chapter 4, these needs are assessed against the additional IMT capacity to be provided by the proposed SIMTA development.

2.1 Port Botany container freight demand

Projected demand for container throughput at Port Botany

Port Botany accounts for almost the entire volume of containerised IMEX trade throughput in NSW. Total container trade, including import, export, empty and transhipment through Port Botany was 1.9 million TEU in 2009/10, up from 1.8 TEU in 2008/09, representing an increase of 8 per cent.[12] This annual rate exceeds the average growth in total throughput TEU over the past 20 years of around 7 per cent,[13] driven by strong domestic demand for overseas consumer imports.

Full container imports in 2009/10 were 1.0 million TEU, up nearly 9 per cent on 2008/09, while full container exports were 0.4 million TEU, unchanged from 2008/09. The export of empty containers increased by over 16 per cent in 2009/10 to 0.5 million TEU, driven by the imbalance of imports over exports and the need to repatriate the empty containers.

The future demand for container freight through Port Botany and the resulting freight task was analysed by SAHA its report, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010. The SAHA paper assessed the possible growth of container trade throughout at Port Botany and the intermodal infrastructure in south and western Sydney. SAHA estimated that the growth in throughput may follow one of three growth scenarios based on SPC planning assumptions, as follows:

- Low growth of 4.8 per cent per annum
- Likely growth of 6.7 per cent per annum
- High growth of 7.2 per cent per annum.

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[12] Sydney Ports Corporation, Financial Year 2009/10 Trade Statistics Fact Sheet.

[13] SAHA, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010.

For the purpose of this needs analysis, we have adopted the 'likely growth rate' indicated above. This growth is conservative in light of the favourable economic outlook in the world economy (particularly in Asian economies) and in light of the historical long run average growth rate at Port Botany of approximately 7 per cent per annum over the 20 years to 2008/09.

The trade forecast presented in Figure 2 below was established based on the current level of trade throughput at Port Botany and escalated by the "likely" growth rate above. On this basis, the projected trade throughput at Port Botany may reach 5.0 million TEU by 2025, compared to the current level of 1.9 million TEU. We note that the new third container terminal at Port Botany will provide capacity to accommodate up to 3.2 million TEU annually. Trade above 3.2 million TEU may be shifted to the Port of Newcastle or potentially, to Port Kembla.[14] The maximum throughput of 3.2 million TEU was determined by the Minister for planning in 2005, based on the findings of an independent expert panel.[15] We understand that some port stakeholders may hold the view that the capacity of Port Botany could be up to twice the approved limit.

During 2008/09, around 23 per cent of the Port Botany IMEX container task, of 1.8 million TEU, was transported by rail.[16] SAHA projected that total TEU demand would be around 2.8 million TEU by 2016. Even if the rail mode share remains at the current level of 23 per cent, then existing Sydney IMT capacity would be exhausted around 2016. With growth forecast at 6.7 per cent per annum, a further 0.39 million TEU would be added by 2018, taking Port Botany close its approved 3.2 million TEU DA limit. If the NSW Government container rail freight policy objective is to be met, around 1.1 million TEU would need to be moved by rail by 2016. This represents approximately a threefold increase on the 2008/09 throughput level.

Figure 2 below shows the relationship between the 3.2 million TEU capacity of Port Botany, the projected container trade throughput of the port and the NSW Government's policy target of 40 per cent container freight movement by rail out of the port by 2016.

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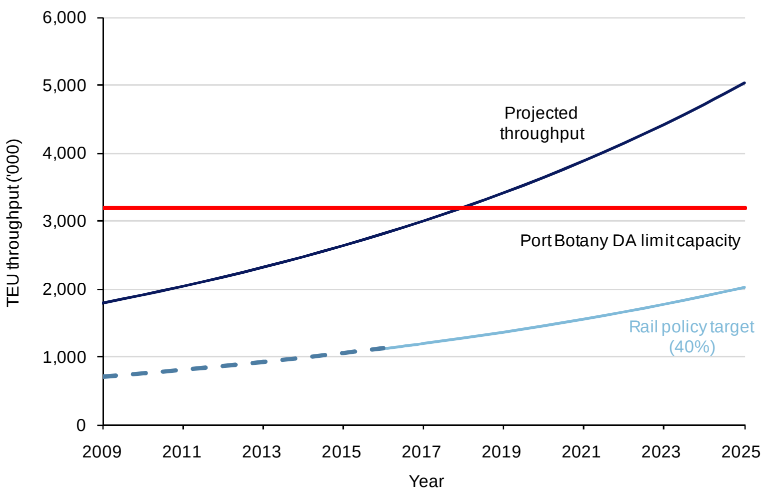
[14] NSW Government, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010.

[15] Finlay, Ron and Gillespie, Robert, Port Botany Expansion Stage 2, 'Independent Export Panel report', available at: http://www.planning.nsw.gov.au/asp/pdf/05_0047_final_report-090806.pdf.

[16] NSW Government, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010.

Figure 2: Container trade growth at Port Botany (import and export)



Source of data used in this figure: SAHA, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010 and the NSW Department of Planning.

Impact on the NSW economy from the Port Botany projected container demand

Port Botany is 15 km from the CBD. It is situated along an important economic corridor that includes Sydney airport. Congestion along the corridor has broad negative consequences for the NSW transport network and the NSW economy. During 2005, the cost of congestion in Sydney was estimated at $3.5 billion.[17] In particular, the M4, M5 and the M7 are heavily affected by road freight congestion during peak periods of the day. At Port Botany, average truck queue times are frequently above 30 minutes.[18]

The seaborne container freight task is expected to almost double by 2020.[19] Given this outlook, it will be important to minimise the impact on the already congested road network by reducing the road share of containerised freight transport from its 2009 level of 77 per cent.

The expansion of Port Botany Terminal 3 will create efficiencies for port stevedores and assist in catering for the projected two fold increase in the container freight task by 2020. The development of a more efficient IMT network can assist in optimising and extending the life of Port Botany infrastructure by dispersing the freight task more efficiently.

[17] NSW Government, Metropolitan Plan, February 2010.

[18] Sydney Ports Authority, Port Botany Road Taskforce, Daily Operation Report, 24 October 2010.

[19] NSW Government, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010.

Only 23 per cent of container freight was transported from Port Botany by rail during 2009[20]. Below are some of the possible causes of the disparity between road and rail transport of containers:

- Lack of access to intermodal facilities
- Stevedoring costs have tended to be higher for rail handing than for truck handling
- Transhipment associated with rail freight
- Destination diversity makes around 7 per cent of container transport less amenable to rail.

2.2 NSW Government freight policy related to Port Botany

The NSW Government identifies freight transport improvement as a key requirement to improve productivity of businesses.[21]

The Government's key policies relating to freight, which support an increase in rail freight to ease road congestion, are contained in the following:

a. NSW Government, State Infrastructure Strategy, June 2008
b. NSW Government, Action for Air, November 2009
c. NSW Government, Metropolitan Transport Plan, February 2010
d. NSW Government, NSW State Plan, Investing in a Better Future, March 2010
e. NSW Transport, Container Freight Improvement Strategy, July 2010
f. NSW Government, Metropolitan Plan for Sydney 2036, December 2010.

The main elements of these policies are discussed below.

a. State Infrastructure Strategy

In June 2008, the NSW Government released its State Infrastructure Strategy. The strategy links the 10-year State Plan and the 25-year metropolitan and regional strategies. The main project in the strategy related to freight is the Terminal 3 expansion to Port Botany.

b. Action for Air

In November 2009, the NSW Government released its 25-year air quality management plan for Sydney. The policy focuses on reducing vehicle emissions, as these make a large contribution to ozone formation in Sydney. The plan highlights the need to make better use of the rail network as a means for freight transport.

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[20] Sydney Ports Corporation, Port Botany Landside Improvement Strategy Road Update, May 2010.

[21] NSW Government, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010, p ii.

c. Metropolitan Transport Plan

The NSW Government Metropolitan Transport Plan, released in February 2010, includes a number of freight objectives, acknowledges the efficient management of freight movements is vital to the growth of the economy.

The Transport Plan identifies the need to improve freight infrastructure across Sydney. In particular, the strategy highlights the potential for western Sydney as a growth centre, requiring efficient and reliable public transport to the region's centres and dedicated freight routes to employment areas.

d. NSW State Plan

NSW Government, NSW State Plan – Investing in a Better Future, released in March 2010, sets out the main area of planned investment in public infrastructure. The plan prescribes the NSW policy position of increasing the proportion of container freight movement by rail through Port Botany to 40 per cent by 2016.

The policy target is designed to promote an efficient and productive freight rail network in Sydney that encourages a modal shift to rail from road thereby reducing road congestion and its associated costs.

The basis of the 40 per cent target in the NSW State Plan was adopted from the analysis and findings of the report, Port Botany's Containers: Proposals to Ease Pressure on Sydney's Roads, released by the Freight Infrastructure Advisory Board in July 2005. That report recommended that IMT capacity should be located at Moorebank. The report is discussed further in section 4.1 below.

e. NSW Transport Container Freight Improvement Strategy

The NSW Container Freight Improvement Strategy is a package of projects to provide the infrastructure required to achieve and maintain the NSW State Plan target of a 40 per cent container freight rail share target for Port Botany by 2016. The strategy includes investments in intermodal facilities and port and rail efficiency enhancements to meet this rail target.

The first stage of the NSW Container Freight Improvement Strategy will provide an initial capacity boost to the network through the duplication of the Port Botany freight line. In addition, the completion of the Australian Rail Track Corporation Limited (ARTC) Southern Sydney Freight Line will improve the competitiveness of the metropolitan freight network by creating a dedicated freight line between Macarthur and Sefton in southern Sydney.

The second stage of the NSW Container Freight Strategy will be to build the western Sydney dedicated freight line to the planned Eastern Creek intermodal facility, to be operational by 2026.

f. Metropolitan Plan for Sydney

In December 2010, the NSW Government released its Metropolitan Plan for Sydney 2036. The Plan aims to strengthen the capacity at Port Botany to improve the efficiency of freight movements. The Plan states an intention to release a 25 year freight plan in 2011 which is to outline the projects and measures needed to ensure the transport system is able to accommodate the growing freight task into the future.

Additional to the government policies above the Sydney Ports Corporation's Port Botany Landside Improvement Strategy complements the NSW Container Freight Improvement Strategy and the NSW State Plan container freight objectives by seeking to improve efficiencies at the port interface. One of the key enhancements of the Sydney Ports' strategy will be the provision of rail sidings at the stevedore terminal which will accommodate 600m trains. Trains of 600m length currently account for 90 per cent of all rail services entering the port. [22]

2.3 Commonwealth Government policy related to freight

The Commonwealth Government freight policies that have bearing on freight strategy in NSW are set out in the following policies:

a. Commonwealth Government, Commonwealth National Port Strategy (Draft), December 2010
b. Commonwealth Government, National Land Freight Strategy (Discussion Paper), February 2011.

The above Commonwealth Government policies are described below.

a. Draft National Port Strategy

In December 2010 the Commonwealth Government developed the draft National Ports Strategy for consideration by the Council of Australian Governments (COAG). The purpose of the draft strategy is to "drive the development of efficient sustainable ports and related freight logistics that together balance the need of a growing Australian community and economy with the quality of life aspirations of the Australian people."[23] The impact of the Draft Strategy on Port Botany will be the need to develop long-term master plans of 15-30 years detailing expected growth in demand and the capacity that will be provided to handle that growth.

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[22] Sydney Ports Corporation, Port Botany Landside Improvement Strategy Future Directions, May 2010.

[23] Commonwealth Government, National Ports Strategy cover note, December 2010.

b. National Land Freight Strategy

Infrastructure Australia released in February 2011 a draft discussion paper that lays out key priorities for a land freight network including indicative projects and programs. In particular, the discussion paper indentifies the need for intermodal capacity at Moorebank. As the strategy is developed, it will draw on various state government freight plans.[24]

[24] Commonwealth Government, Infrastructure Australia National Land Freight Strategy, Discussion Paper, February 2011.

3 Business as usual – existing capacity v's Port Botany container needs

This chapter describes the gap between NSW intermodal terminal capacity and the NSW Government's objective to achieve a target of 40 per cent of container freight movement by rail out of Port Botany by 2016. The 'business as usual' case has been defined in this report to establish whether current intermodal capacity within the Sydney network is sufficient to meet the future rail freight task and the NSW Government's policy objective.

The key assumptions of the business as usual case are:

- The current IMT capacity is the existing capacity across the Sydney freight network before the Enfield IMT comes on stream and excluding the planned SIMTA MITF (current IMT capacity is set out in column 3 of Table 1 below)
- The projected total container freight forecast to 2025 for Port Botany is sourced from the SAHA document, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010
- The current IMT capacity remains constant over the period to 2016.

Table 1 presents the IMT container capacity assumptions of the current IMT capacity and future capacity, representing the current IMT capacity plus that of the Enfield IMT and the planned SIMTA MITF (future capacity values are set out in column 4 of Table 1).

In 2008/09, total annual IMT container throughput capacity in Sydney was 0.37 million TEU, across the Yennora, Minto and Villawood IMTs. The Enfield IMT, which is nearing completion, will increase the network capacity by a further 0.3 million TEU, consistent with the approved throughput limit of that terminal. With annual throughput at Port Botany projected to increase to 2.8 million TEU in 2016, further additions to capacity and efficiency are needed to increase the share of rail container freight transport. As noted above, even if the rail mode share remains at the current level of 23 per cent, existing Sydney IMT capacity would be exhausted around 2016.

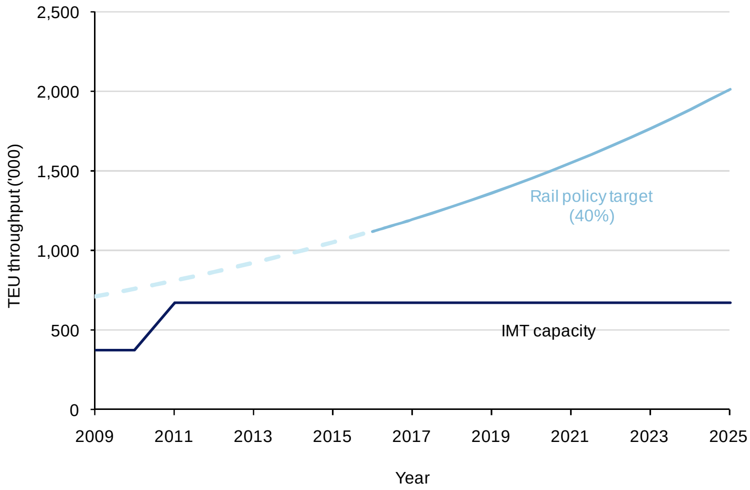
Table 1: Sydney IMT capacity (Port Botany shuttle capacity), million TEU per annum

Terminal	Sydney Region	2010 Capacity – bus. as usual TEU p.a.	Future Capacity – scenario TEU p.a.
Current and committed IMT			
Yennora Distribution Centre	Central west	0.17	0.17
Minto	Outer west (south)	0.15	0.15
Villawood	Central west	0.05	0.05
Enfield	Central west	0.00	0.30
Sub total		**0.37**	**0.67**
Planned IMT			
Moorebank (SIMTA)	Outer west (south)		1.00
Total		**0.37**	**1.67**

Source of data used in this table: SAHA, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010, PwC calculation of rail share values.

As shown in Table 1, the current IMT capacity in Sydney can accommodate up to a maximum of 0.37 million TEU (0.67 million TEU when Enfield comes on stream). Figure 3 and Table 2 below set out the gap between the current IMT capacity and the policy target prescribed in the NSW State Plan.

Figure 3: Business as usual - capacity of Port Botany IMT shuttle network without the MITF



Source of data used in this figure: SAHA, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010 and the NSW Department of Planning.

Table 2 below sets out the existing Sydney IMT capacity (including Enfield) and contrasts this to the capacity that would be required in order to continue to achieve the current 23 per cent rail mode share, and to achieve the government's target of 40 per cent rail mode share from Port Botany by 2016. It can be noted from the table that, aside from a potential alignment of capacity with the 23 per cent rail mode share at 2016, generally the existing IMT capacity would not be sufficient to achieve these targets from that date.

Table 2: Business as usual vs policy target, million TEU per annum

Year	TEU 'midrange' forecast	Existing IMT Capacity	Rail share (at 23%)	Gap (at 23%)	Rail Share (at 40% target)	Policy Gap (at 40% target)
2016	2.81	0.67	0.65	0.02	1.12	-0.45
2017	3.00	0.67	0.69	-0.02	1.20	-0.53
2018	3.20	0.67	0.74	-0.07	1.28	-0.61
2019	3.41	0.67	0.78	-0.11	1.36	-0.69
2020	3.64	0.67	0.84	-0.17	1.46	-0.79
2021	3.88	0.67	0.89	-0.22	1.55	-0.88
2022	4.15	0.67	0.95	-0.28	1.66	-0.99
2023	4.42	0.67	1.02	-0.35	1.77	-1.10
2024	4.72	0.67	1.09	-0.42	1.89	-1.22
2025	5.04	0.67	1.16	-0.49	2.01	-1.34

Source of data used in this table: SAHA, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010, PwC calculation of rail share values.

Without the SIMTA MITF, intermodal capacity in the Sydney region would be limited to 0.67 million TEU, comprising the aggregate capacity of the Enfield, Yennora, Minto and Villawood intermodal facilities. The existing IMT capacity would be unable to fulfil the NSW State Plan target, of 40 per cent container freight movement by rail out of Port Botany by 2016 and would not be able to support the maintenance of the current rail mode share of 23 per cent at that time. The relationship between the current IMT capacity in the Sydney region (business as usual) and the achievement of NSW Government policy target is highlighted in Figure 3 and in Table 2 above.

4 The SIMTA MITF - relationship to Port Botany container needs

This chapter assesses the need in the Sydney region for additional IMT capacity and for the proposed SIMTA MITF in particular.

4.1 Overview of the SIMTA MITF project

Proposed site

The site for the proposed SIMTA MITF is at Moorebank, 27 km south-west of the Sydney CBD and approximately 26 km west of Port Botany. The site is around 2 km to the south of the Liverpool CBD in Sydney's outer west (south) region. The site was purchased by Stockland in 2007 from the Commonwealth Government. The site is currently under lease to the Commonwealth and houses the Defence National Storage and Distribution Centre (DNSDC)..

The DNSDC provides direct supply support to many Australian Defence Forces (ADF) operations. The DNSDC facility directly employs approximately 400 permanent employees with extra 160 casual employees.[25] Should the re-development of this site proceed these jobs will not be lost. It is understood that the functions of the DNSDC, and the associated positions, would be transferred to other ADF sites in Sydney.

Proposed development

The SIMTA terminal would provide close access to the M5 and M7 and the Southern Sydney Freight line. The project has both Commonwealth and NSW Government support and will complement SPC's terminal strategy by promoting the efficient distribution of containers. The SIMTA terminal will allow for high economic value add operations to support freight and logistics employment.

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25 Parliament of Australia, Audit report No.5, 2004-05 http://www.aph.gov.au/house/committee/jpaa/auditor_generals/report/chapter8.pdf.

Catchment area

The potential catchment area of the terminal has been estimated by Hyder Consulting.[26] The terminal appears to exhibit some of the characteristics of a regional hub - in addition to its key characteristics as a metropolitan hub. In this regard, we note the views of the Victorian Freight Logistics Council that generally, a metropolitan hub would have a catchment of around 10 kilometres from customers, although regional hubs can service areas of 100 kilometres. We also note the views of the Council that, as a minimum, a hub should have a committed freight task of greater than 10,000 TEU per annum, but some hubs - typically regional hubs - may have achieved sustainable operations with lower volumes.[27]

We note that the potential share of Sydney TEU volumes at the SIMTA MITF will be influenced the competing supply chains that are in place to service the container freight market. These supply chains include all transport options between the port and customer as well as empty container return and export movements.

Need for the MITF from a policy perspective

As discussed in chapter 2, the NSW Government aims to double the proportion of container movements though Port Botany by rail from the current level of 23 per cent to 40 per cent by 2016 (as outlined in the NSW State Plan, the NSW Container Freight Improvement Strategy and the Sydney Metropolitan Strategy). This target would be achieved through investment in intermodal capacity within Sydney and appropriate rail connections to Port Botany, particularly as specified in the NSW Container Freight Improvement Strategy.

Moorebank has been considered an appropriate site for IMT capacity by both the Commonwealth and NSW Governments since 2004 due to its location within close proximity to motorways, the Southern Sydney Freight Line and the south west growth centre.

As noted in section 2.2, the basis of the 40 per cent target in the NSW State Plan was adopted from the analysis and findings of the report, Port Botany's Containers: Proposals to Ease Pressure on Sydney's Roads, released by the Freight Infrastructure Advisory Board in July 2005.That report recommended that IMT capacity should be located at Moorebank and that the Moorebank site should be secured for an intermodal terminal to be development by the private sector

The Draft Subregional Strategy for the South West Subregion prepared by the NSW Government and released in December 2007 further outlined the strategic need for IMT capacity at Moorebank in order to connect to the Southern Sydney Freight Line and cater for the growing demands of freight movements in the west of Sydney. The Subregional Strategy sets out the need for 200 hectares of

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[26] Hyder Consulting, Technical Note 1: Strategic Freight Demand, June 2011

[27] Victorian Freight and Logistics Council, A Toolkit for the Development of Intermodal Hubs in Victoria, May 2007.

land to be retained specifically for industrial purposes and recognises the opportunity that Moorebank offers to improve freight rail movements between ports, cities, suburbs and other destinations across the State.

Economic benefits from the development

Development of the Moorebank site is considered to provide several key benefits to stakeholders and the Sydney region:

- SAHA International estimated that the wider economic benefits associated with the construction of the proposed SIMTA MITF by 2016 represent a benefit: cost ratio of 2.2. The benefit: cost ratio represents the present value of the benefits of a project divided by the present value of its costs (a project is considered worthwhile if the ratio is greater than 1.0.).[28] Accordingly, the project is assessed to provide strong positive benefits
- increasing employment opportunities in the region, both directly related to the terminal and indirectly as a result of the new activities introduced at the site. Based on previous work undertaken by PwC for SIMTA on the MITF, it is projected that approximately 213 direct positions would be supported during construction phase of the project.[29.] Ongoing direct operational employment is estimated at a maximum of 2,840 positions, supported, once the terminal reaches throughput of 1.0 million TEU per annum. with a further 4,260 jobs supported indirectly
- introducing efficiencies into Sydney's supply chain logistics activities, providing greater capacity to move freight by rail, potentially decreasing the distances the freight is transported by road and the need for road transport from Port Botany
- facilitating competition in the downstream logistics sector which, amongst other things, could be expected to narrow the cost gap between road and rail freight transport
- assisting stevedores to balance activities over 24 hour /7 days per week operations
- allowing greater movement of freight from Port Botany[30] and removing a significant number of trucks from major arterial roads around Port Botany
- facilitating efficient utilisation of the investments made on the Terminal 3 expansion at Port Botany.

4.2 The SIMTA MITF contribution to NSW IMT capacity

The construction of SIMTA's MITF would provide additional capacity to the network of 1.0 million TEU. Incorporating the existing and committed IMT, the capacity of the Sydney network would achieve 1.67 million TEU on construction of the MITF in 2006.

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[28] SAHA, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010.

[29] PwC, Employment Forecasts for the SIMTA Moorebank Intermodal Terminal', June 2010.

[30] PwC, Employment Forecasts for the SIMTA Moorebank Intermodal Terminal', June 2010.

This chapter compares the SIMTA MITF to the objective in the NSW State Plan to increase the proportion of container freight movement by rail out of Port Botany to 40 per cent by 2016.

The NSW Government has identified potential IMT capacity at Eastern Creek as part of its Container Freight Improvement Strategy. It is understood that development would not proceed until after completion of the Western Sydney Freight line in 2031. The Commonwealth Government has also identified IMT potential at Moorebank adjacent to the SIMTA site. Analysis of the potential throughput at the Commonwealth Moorebank defence site and at the NSW Government Eastern Creek site has not been undertaken as part of this review.

The SIMTA MITF will chiefly accommodate port shuttle services whereas the Commonwealth Moorebank would be developed to accommodate longer trains than the MITF and, as such, is considered to be more suited to interstate freight. Accordingly, the Commonwealth site may not materially affect Port Botany Shuttle Capacity due to a potential focus on domestic transport.

In its report accompanying the NSW Government's 2010 submission to Infrastructure Australia, SAHA recommend that the introduction of the SIMTA MITF is preferable during 2016.[31]

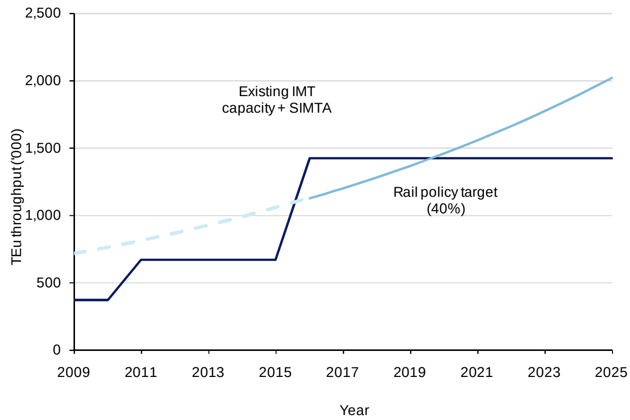
Assuming the proposed stage 1 of SIMTA MITF commences from 2016 and reaches full capacity by 2025, Figure 4 presents the total network capacity incorporating the MITF.

As shown in Figure 4, the commencement of stage 1 of the proposed SIMTA MITF in 2016 would provide capacity for an additional 750,000 TEU throughput for the Sydney network, bringing the total IMT capacity to 1.42 million. This would represent around 51 per cent of the total projected TEU throughput of 2.8 million at Port Botany by 2016. This compares to the NSW State Plan target objective of 40 percent of container freight to be moved by rail out of Port Botany by 2016. That is, around 1.1 million TEU would need to be moved by rail by that time for the policy objective to be achieved.. The potential 0.3 million capacity surplus provided by the MITF could provide a contingency should container throughput at Port Botany grow at a faster rate than the projected 'likely' growth rate of 6.7 per cent per annum.

This additional capacity would diminish over time under the medium growth forecast as container growth through Port Botany increases over time. This is shown in Figure 4 and the additional capacity is set out in Table 3.

[31] SAHA, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010.

Figure 4: Capacity of IMT network with the SIMTA MITF



Source of data used in this figure: SAHA, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010, the NSW Department of Planning, and Hyder Consulting, Technical Note 1: Strategic Freight Demand, June 2011.

Table 3 below shows the Sydney IMT capacity (in terms of existing capacity plus the capacity of the proposed SIMTA MITF) and whether that capacity would support ongoing achievement of the current 23 per cent rail mode share, and achievement of the Government's target of 40% rail mode share from Port Botany by 2016. It shows that the expanded IMT capacity would enable these targets to be achieved (in the case of the Government's target, this is until 2022).

Table 3: Capacity of Port Botany IMT shuttle network with the SIMTA MITF, million TEU per annum

Year	TEU 'midrange' forecast	Existing IMT + SIMTA MITF	Rail Share (at 23%)	Gap (at 23%)	Rail Share (at 40% target)	Policy Gap (at 40% target)
2016	2.81	1.42	0.65	1.02	1.12	0.55
2017	3.00	1.42	0.69	0.98	1.20	0.47
2018	3.20	1.42	0.74	0.93	1.28	0.39
2019	3.41	1.42	0.78	0.89	1.36	0.31
2020	3.64	1.42	0.84	0.83	1.46	0.21
2021	3.88	1.42	0.89	0.78	1.55	0.12
2022	4.15	1.42	0.95	0.72	1.66	0.01
2023	4.42	1.42	1.02	0.65	1.77	-0.10
2024	4.72	1.42	1.09	0.58	1.89	-0.22
2025	5.04	1.42	1.16	0.51	2.01	-0.34

Source of data used in this figure: SAHA, NSW Container Freight Improvement Strategy Preliminary Economic Evaluation, August 2010, Hyder Consulting, Technical Note 1: Strategic Freight Demand, June 2011, PwC calculation of rail share values.

As shown in Figure 4, the capacity provided by the proposed SIMTA MITF would allow the network capacity to meet the initial policy target in 2016. Given a projected growth rate of 6.7 per cent, the SIMTA MITF could provide seven years of capacity before the policy target again exceeds the network capacity. Accordingly, while the SIMTA proposal forms only part of the overall IMT capacity requirements in Sydney over the long term, it would be able to play an important role assisting the NSW Government to achieve its target for freight rail mode share in the medium term.

Furthermore, the potential capacity of 1.0 million TEU at the SIMTA development would potentially remove a significant number of trucks from major arterial roads around Port Botany, in support of NSW Government objectives to reduce urban traffic congestion.

5 Conclusion

Under the ‘business as usual’ scenario based on current Sydney region IMT capacity of 0.67 million TEU, it is estimated that lack of IMT capacity would mean less than 24 per cent of containers would be transported by rail in 2016, well below the government policy target of 40 per cent.

The commencement of the proposed SIMTA MITF in 2016 would provide capacity for a potential additional 1.0 million TEU throughput for the Sydney network, bringing the total IMT capacity to 1.67 million TEU. This would represent around 60 per cent of the total projected TEU throughput of 2.8 million at Port Botany by 2016. This compares to the NSW State Plan target objective of 40 per cent of container freight to be moved by rail out of Port Botany by 2016. That is, around 1.1 million TEU would need to be moved by rail by that time for the policy objective to be achieved. Even if the 40 per cent target is not met, increased capacity is still required by 2016 in order to maintain the current 23 per cent rail mode share.

Based on the forecast 1.0 million TEU annual throughput of the proposed SIMTA MITF, the development has the potential to: support NSW freight policy objectives by providing enough capacity to ensure the 40 per cent target can be achieved up to 2022; improve container import and export throughput to increase the productivity performance of freight rail; and eliminate a significant number of truck movements from major arterial roads around Port Botany. The latter potential outcome from the development is important in view of the findings of the Freight Infrastructure Advisory Board report, Railing Port Botany’s Containers: Proposals to Ease Pressure on Sydney’s Roads, which presents that:

> “*Unless there is a significant shift to rail, annual container truck volumes on the M5 Motorway are likely to increase by more than 150 per cent by 2021. Even with a 40 per cent rail share, container truck volumes on the M5 are projected to increase by approximately 75 per cent*.”[32]

The proposed SIMTA development, given its potential to assist in moving container freight from road to rail, would provide support to the Government’s broader objectives to reduce urban traffic congestion.

[32] Freight Infrastructure Advisory Board, Railing Port Botany’s Containers: Proposals to Ease Pressure on Sydney’s Roads, June 2005, p.28.

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