

Reducing Through Traffic

INNER MELBOURNE ACTION PLAN

Final Report

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Reducing Through Traffic

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Project manager: Katie Mitchell
Author: Katie Mitchell and Craig McPherson
File name:

Sinclair Knight Merz Pty Ltd (Jacobs)
ABN 37 001 024 095
Floor 11, 452 Flinders Street
Melbourne VIC 3000
PO Box 312, Flinders Lane
T +61 3 8668 3000
F +61 3 8668 3001
www.jacobs.com

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1. Introduction

1.1 Purpose

The purpose of this study is to research the causes and impacts of through traffic in the municipalities of Melbourne, Port Phillip, Stonnington, Yarra and Maribyrnong. The investigation identifies present areas of concern, assesses opportunities and constraints in the local transport network and recommends practical future actions that IMAP councils might consider for reducing the impact of through traffic.

1.2 Background

The original Inner Melbourne Action Plan (IMAP), adopted in December 2005, is a collaborative project between the Cities of Melbourne, Port Phillip, Yarra and Stonnington (west of Kooyong Road). The City of Maribyrnong recently joined IMAP as an associate member. The most recent 2010-11 Inner Melbourne Action Plan contains eleven regional strategies and identifies 57 actions to strengthen the liveability, attractiveness and prosperity of the inner Melbourne region.

In inner Melbourne, as elsewhere, the quality of transport is an important contributor to liveability and productivity, and has a strong influence on the environment as well. The transport system provides access to jobs, family, schools and social activities as well as delivering goods and services. Travel by car accounts for around 77 per cent of all weekday trips in Melbourne. Public transport accounts for eight per cent, walking 12 per cent and cycling two per cent¹. With significant growth forecast in Melbourne's outer suburban growth areas in the coming decades, the number of trips made by private vehicles is also expected to grow significantly (although this expectation is under 'business-as-usual' conditions, which are open to challenge). Outer suburban growth has a flow-on impact on inner suburbs, with central Melbourne maintaining (indeed strengthening) its role as the state's largest employment and activity hub.

Traffic congestion on arterial routes can lead to traffic filtering through residential areas as drivers attempt to bypass peak-period traffic queues, causing annoyance to residents and degrading local amenity. Local governments, including the IMAP municipalities, have traditionally used local area traffic management (LATM) techniques, such as speed humps, reduced speed limits, turn bans and road closures, to discourage 'rat-running'.

While the impacts of traffic intrusion are readily perceived, the origins and destinations of through traffic are less well-understood. With a better understanding of through traffic, this study aims to assist the IMAP councils to develop strategies for dealing with the impacts of traffic originating from outside their municipalities.

1.3 Study overview

The following questions will be addressed by this study:

- What is the nature and extent of through traffic in the member councils' areas?
- Where do the principal through routes clash with local "places" where traffic intrusion is unwelcome?
- What are the economic, social, environmental, and political impacts of through traffic (positive and negative)?
- Which stakeholders would be affected by changes in the management of through traffic?
- What measures could be effective in reducing the negative impacts of through traffic?

The study report is structured as follows:

- Chapter 2 defines the concept of through traffic in the context of this study and discusses its impacts.
- Chapter 3 presents an analysis of the spatial characteristics of through traffic in the IMAP municipalities.

¹ Source: Government of Victoria (2013), *Managing Congestion: Victorian Auditor General's Report*, April 2013.

- Chapter 4 discusses the causes of through traffic, drawing on the spatial analysis of traffic routes and a broader review of the driving forces contributing to growth in vehicular travel.
- Chapter 5 suggests further actions that could be considered by the IMAP councils for addressing through traffic issues in their municipalities.

Appendix A provides further information on current government policies and strategies that are relevant to managing traffic congestion.

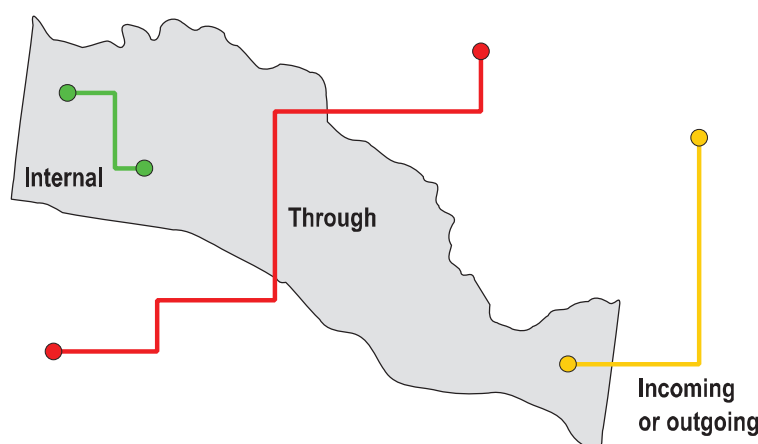
2. Through traffic and its impacts

This chapter provides a definition of through traffic and discusses its impacts in general terms.

2.1 Definitions

When discussing traffic movements in each municipality, we make a distinction between through traffic, internal traffic and incoming and outgoing traffic. In simplest terms, **through traffic** is defined as traffic that has an origin and destination outside the municipality, and passes through the municipality. **Internal traffic** has both its origin and destination within the municipality. **Incoming and outgoing traffic** has one end of its trip inside and the other outside the municipality. These three classifications are shown in Figure 1.

Figure 1: Three types of trips and their classifications



Traffic that passes through a municipality but makes a brief stop en route (e.g. for petrol or a quick shopping task) could also arguably be classified as through traffic. For the purposes of this study, we have used the information contained in the Victorian Integrated Survey of Travel and Activity (VISTA 2009-10) to determine whether a journey should be classified as a through trip. If a survey respondent reported a stop in a municipality, then the journey was not considered to be a through trip. If a stop was not reported in the municipality and the route passed through the municipality, it was considered a through trip.

2.2 “Acceptable” and “unacceptable” through traffic

In considering the impacts of through traffic, participants at an IMAP workshop held in January 2013² posed the question of whether all through traffic was necessarily “bad”. The collective view of the participants was that through traffic using freeways, tollways and primary arterial routes was generally acceptable in terms of limiting the impact on surrounding local areas. However, through traffic that filters through local streets or activity centres was generally thought to be undesirable. The question was also raised about the appropriate classification of roads for example arterial roads that are being managed for through traffic purposes at the expense of local needs.

In any given precinct, it could be argued that through traffic (from the point of view of precinct residents, workers or users) includes traffic with origins and destinations outside that area but still within the municipality. This is especially true of through traffic in local streets. Municipalities are defined by administrative boundaries rather than being a distinct place (it is in fact a collection of distinct places in the wider urban fabric). Identifying all such precincts and analysing through traffic in each one would obviously produce more impacts and effects to consider, but the available data does not really support such a detailed analysis. We will return to this issue later in the report.

² Inner Melbourne Action Plan through-traffic stakeholder workshop held at Melbourne Town Hall on 17 January 2013. The workshop was attended by representatives of the cities of Stonnington, Port Phillip, Yarra, Melbourne and Maribyrnong, as well as VicRoads, Department of Transport and Public Transport Victoria staff.

The analysis of through traffic presented in the following chapter considers the relationship between through traffic routes and the road hierarchy (freeways, primary arterials, secondary arterials, local streets and so on).

3. Spatial analysis of through traffic

3.1 Overview

To provide a more objective basis for assessing through traffic impacts in the IMAP municipalities, a spatial analysis of trip-making in the Melbourne metropolitan area was undertaken. The spatial analysis sought to establish the levels of through traffic, incoming/outgoing traffic and local traffic in each municipality as well as the geographic distribution of these trips.

The analysis used the 2009-2010 Victorian Integrated Survey of Travel and Activity (VISTA) as the primary data source for trip-making behaviour. VISTA is a survey of household travel in Melbourne and several regional Victorian centres. The survey was conducted over a 12-month period, with 10,909 responding metropolitan households and more than 135,000 reported journey segments. It is important to note that VISTA can under represent off peak data by up to 30%.

Traffic routes were modelled by extracting information about car-driver trips from VISTA, and assigning the travel to a detailed road network³. By assessing the roads used by each vehicle trip, estimates of through traffic could be made for each municipality. These were compared with anecdotal evidence of popular traffic routes to determine whether the analysis matched expectations.

This chapter presents the results of the analysis and discusses the implications for each municipality.

3.2 Data source

The VISTA survey was chosen as the source of travel data for this study. Use of VISTA data with a customised route-choice model provided several benefits for the analysis:

- each survey respondent could specify the actual roads used to travel between their origin and destination, allowing traffic routes to be estimated with greater accuracy;
- the vehicle routing model was able to use local streets, not only arterial roads (as is the case with the strategically-oriented Victorian Integrated Transport Model);
- other trip characteristics (such as trip purpose, vehicle type and time of day) could be assessed if required.

There were several limitations to using this approach, however:

- previous experience suggests that VISTA under-represents travel in the off-peak periods by as much as 30 per cent⁴;
- because only a sample of households were surveyed, the origins and destinations reported in the survey tended to be “clumped” near the surveyed households and the activity locations associated with those households⁵;
- where survey respondents did not specify complete routing information (which occurred in 50% of cases), the model used a simple quickest- path procedure to estimate vehicle routes. Congestion effects were not fully considered.

These limitations were handled by aggregating results to the local government area (LGA) level. This ensured sufficient sample size for most metropolitan LGAs. The results have also been released with the proviso that actual volumes will inevitably differ from those shown in the analysis, but the general distribution of traffic should be indicative of the main traffic routes in each municipality and their relative significance for through movement.

³ The road network was based on the VicMap road centre line database adapted for use with the RoadLink model.

⁴ See Veitch Lister Consulting (2013), *Review of VISTA07*, Zenith Model of Victoria Technical Note 2. Available at <http://zenith.veitchlister.com.au/documents>.

⁵ Note that origin and destination information was coded at the census collection district (CD) level, so individual households could not be identified.

3.3 Spatial analysis methodology

3.3.1 Analysis technique

The spatial analysis of routes was conducted using the following procedure:

- the origin and destination of each car-driver trip was extracted from the VISTA dataset along with the names of streets used en route⁶;
- the path used for each journey was assigned to the road network using a customised software package called *RoadLink*⁷;
- each route was analysed to determine in which LGAs the route started and finished, and whether the route passed through the municipality under review;
- through routes, incoming/outgoing routes and local routes were identified;
- the total amount of traffic on each road was calculated for each route type;
- through traffic origins and destinations were aggregated by LGA to determine the biggest contributors to through traffic in the municipality.

3.3.2 Routes on LGA boundaries

Several municipalities have major routes running along their boundaries. For example, City Link runs along the boundary of Stonnington and Yarra, Dandenong Road runs along the boundary between Stonnington and Glen Eira. Punt Road and Hoddle Street border the Cities of Melbourne, Yarra, Stonnington and Port Phillip. Traffic using boundary roads were included in the analysis for all adjacent municipalities, as they form significant through traffic corridors that have an impact upon all adjacent areas.

3.3.3 Tollways

To account for the diversion of traffic from tollways onto arterial roads, a simple assumption was made that 23 per cent of traffic that would otherwise have used a toll road is diverted onto parallel routes. The 23 per cent figure was derived from toll road studies by D'Este (2010) that show around 20 to 30 per cent of toll road traffic diverts to other routes when an initial toll-free period reverts to a full toll⁸. This figure is used to provide a rough estimate of toll effects and has not been verified for the Melbourne context nor tested for sensitivity.

3.3.4 Public transport

In addition to the car driver through-traffic analysis, a similar analysis of public transport trips was carried out (also using VISTA) to determine the relative magnitudes of public transport trips passing through the municipality.

The results from these analyses are presented in the following sections.

⁶ The data was extracted from the VISTA "stops" database which includes car trips made as part of multi-modal journeys (as well as trips made completely by car). For example, if a person drives from home to a local railway station then takes a train to work, the car leg of the journey (home to station) will be included in the analysis.

⁷ See McPherson, C.D. "RoadLink: a Model for Analysing Vehicle Routes from Household Travel Surveys." In Papers of the 23rd Australasian Transport Research Forum. Vol. 2, 1999.

⁸ See D'Este, G. "What happens to toll road ramp-up profile when there is an initial toll-free period, and the broader implications for demand forecasting", Proceedings of the Australasian Transport Research Forum, 2010

3.4 City of Melbourne

3.4.1 Through traffic routes

Figure 2 and Appendix B shows the modelled distribution of through traffic, incoming and outgoing traffic, and local traffic in the City of Melbourne.

The City of Melbourne is located at the centre of the metropolitan transport network, and is spatially analogous to the hub of a wheel, with arterial roads and public transport routes radiating like spokes. The City therefore attracts very large volumes of through traffic, with many high capacity routes passing through the municipality. The analysis indicates that the through main traffic routes are:

- City Link (Tullamarine and Monash sections)
- West Gate Freeway
- Princes Street
- Kings Way (South Melbourne section)
- Hoddle Street and Punt Road
- Elliott Avenue
- Smithfield Road

There are several other routes that carry moderate volumes of through traffic. These include:

- Nicholson Street, Lygon Street and Rathdowne Street (Carlton North)
- Spring Street, Exhibition Street, King Street and Russell Street (CBD)
- Flemington Road, Royal Parade, Curzon Street, Dryburgh Street, Macaulay Road and Boundary Road (North Melbourne)
- Peel Street and Dudley Street (CBD)
- Olympic Boulevard, City Road and Southbank Boulevard (South Melbourne)
- Wellington Parade and Brunton Avenue linking to Flinders Street (CBD)

While these routes carry some through traffic, their primary function is to provide access to destinations within the Melbourne LGA. The analysis shows higher volumes of incoming/outgoing traffic using these routes than through traffic in most cases.

Other major roads in the municipality generally perform an access function for incoming and outgoing traffic, with relatively few internal private car trips being made within the municipality (refer to Table 1).

City of Melbourne - Traffic Distribution

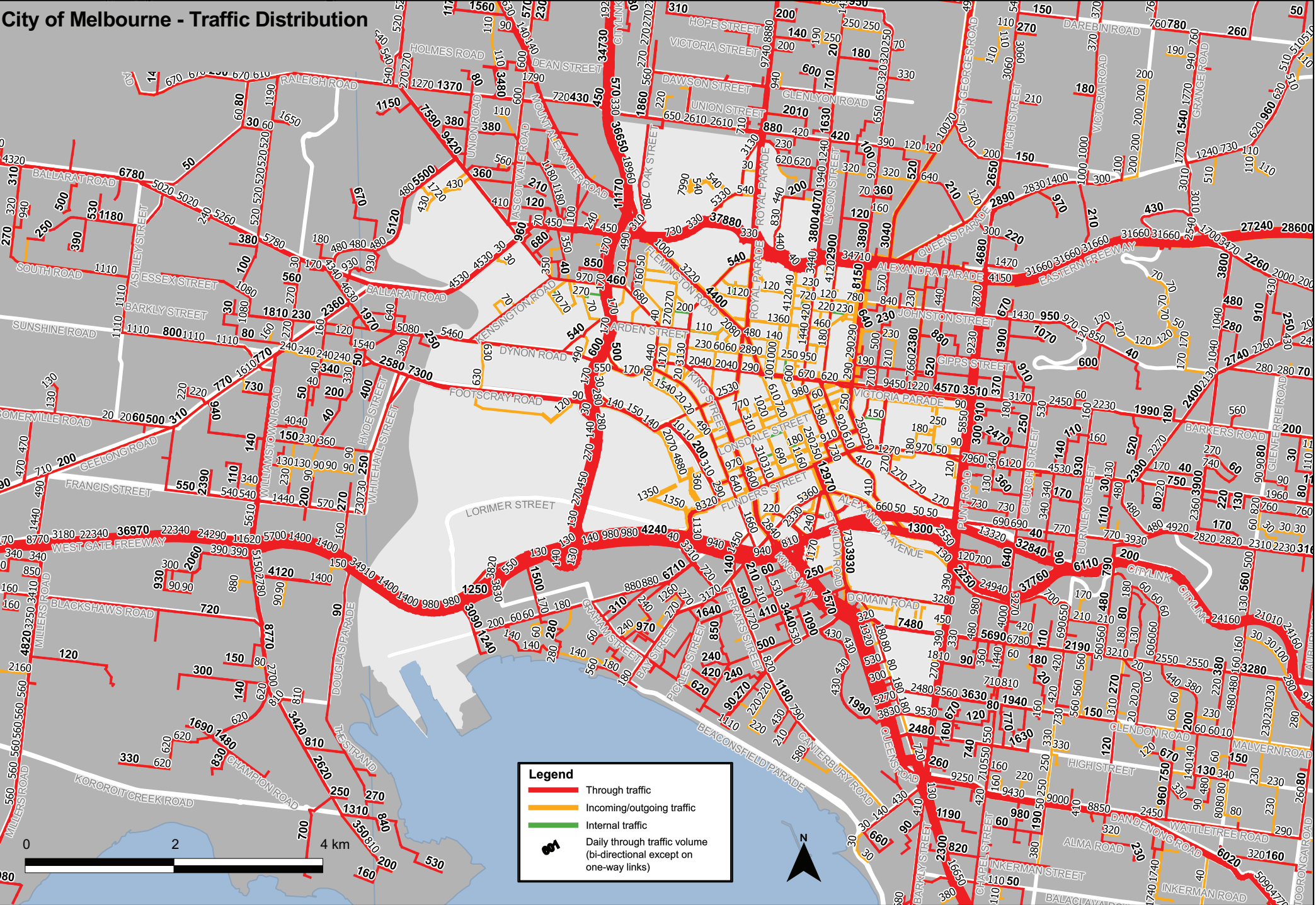


Table 1 : Traffic Volumes (two way) on selected City of Melbourne roads

Responsibility	Road	Location	Through Traffic	Incoming / Outgoing Traffic	Internal Traffic
Melbourne CC	Spring Street	Nicholson St – Collins St	8,740	19,110	250
Melbourne CC	Flinders Street	Spring St – Russell St	5,260 – 5,710	10,920 – 13,290	1,050 – 3,890
		Russell St – Swanston St	13,040	25,140	2,870 – 3,600
		Swanston St – Queens St Bridge	70	4,830 – 14,060	1,660 – 1,730
		Queens St Bridge – King St		2,320 – 6,050	
VicRoads	King Street	Flinders St – Dudley St	9,230 – 9,450	14,660 – 2,4890	1,830 – 5,170
		Dudley St – Victoria St	4,460	5,330 – 8,370	1,460 – 2,010
VicRoads	Dynon Road	Lloyd St – Kensington Rd	4,540	5,320 – 5,860	-
VicRoads	Peel Street	Victoria St – Dudley St	5,700	14,330	2,980
Transurban	Batman Avenue		3,440	11,400 – 16,110	410 - 720
VicRoads	Elliott Avenue	Royal Parade – Flemington Rd	37,880 – 39,400	9,060 – 17,620	330 - 730
VicRoads	Flemington Road	Royal Parade – Elliott Av	4,400 – 8,270	15,570 – 27,550	1,000 – 3,390
VicRoads	Royal Parade	Brunswick Rd – Macarthur Rd	21,550	11,750 – 13,480	540

Table 2 : Percentage of Traffic Type on selected City of Melbourne roads

Responsibility	Road	Location	Through Traffic	Incoming / Outgoing Traffic	Internal Traffic
Melbourne CC	Spring Street	Nicholson St – Collins St	31%	68%	1%
Melbourne CC	Flinders Street	Spring St – Russell St	25 - 31%	58 - 63%	6 - 17%
		Russell St – Swanston St	31 - 32%	60 - 61%	7 - 9%
		Swanston St – Queens St Bridge	0 - 1%	74 - 89%	11 - 25%
		Queens St Bridge – King St	1 - 2%	57 - 77%	22 - 41%
VicRoads	King Street	Flinders St – Dudley St	24 - 36%	57 - 63%	7 - 13%
		Dudley St – Victoria St	30 - 40%	47 - 56%	13 - 14%
VicRoads	Dynon Road	Lloyd St – Kensington Rd	44 - 46%	54 - 56%	0%
VicRoads	Peel Street	Victoria St – Dudley St	25%	62%	13%
Transurban	Batman Avenue		17 - 23%	75 - 79%	3 - 4%
VicRoads	Elliott Avenue	Royal Parade – Flemington Rd	68 - 80%	19 - 31%	1%
VicRoads	Flemington Road	Royal Parade – Elliott Av	21%	70 - 74%	5 - 9%
VicRoads	Royal Parade	Brunswick Rd – Macarthur Rd	61 - 64%	35 - 38%	2%

3.4.2 Origins of through traffic

Figure 3 and Figure 4 show the modelled origins of through traffic and public transport trips respectively passing through the City of Melbourne. Figure 5 and

Figure 6 show the same information expressed as the number of trips per capita originating from each local government area.

Most through traffic originates from the neighbouring municipalities, notably Port Phillip (52,000vpd⁹) and Yarra (43,700vpd), but also Moreland, Moonee Valley, Maribyrnong, Hobson's Bay and Stonnington. This is likely to be caused by simple proximity effects; the Melbourne LGA has a higher probability of intercepting traffic originating from nearby municipalities than more distant areas.

Apart from the higher contributions from adjacent municipalities, the plots show a reasonably broad dispersal of traffic across the metropolitan area. The public transport patterns show a similar pattern, with slightly higher contributions from municipalities that have high access to public transport including Yarra (53,800ppd¹⁰), Stonnington (35,100ppd) and Moonee Valley (24,300ppd).

3.4.3 Access to rail stations

Table 3 shows the proportional Estimated Weekday Entries by Access Mode (2011-12). There are 11 train stations in City of Melbourne which have varying levels of access by different modes. Due to the fact most stations do not have station car parks access by car is very low. The predominant mode of transport to access the station is walking (refer to Table 3) or public transport. Access by bicycle is very low to all stations in the municipality.

Table 3 – Access to rail stations in Melbourne by mode

Station	Proportional Estimated Weekday Entries by Access Mode FY2011-12 (%)						
	Bus	Car	Cycled	Other	Train	Tram	Walked all the way
Flagstaff	0.5%	0.5%	0.5%	0.0%	22.4%	4.9%	71.2%
Flemington Bridge	0.0%	1.0%	0.0%	0.0%	0.0%	5.0%	94.1%
Flinders Street	0.3%	0.8%	0.9%	0.0%	33.4%	16.4%	48.2%
Kensington	4.1%	11.5%	0.0%	0.0%	0.0%	0.0%	84.4%
Macaulay	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Melbourne Central	0.3%	0.6%	0.0%	0.0%	16.9%	17.6%	64.6%
North Melbourne	15.3%	3.0%	0.7%	0.4%	66.0%	0.0%	14.6%
Parliament	0.0%	2.0%	0.0%	0.0%	12.6%	14.6%	70.7%
Royal Park	2.7%	4.1%	0.0%	0.0%	0.0%	25.7%	67.6%
South Kensington	0.0%	17.5%	2.1%	0.0%	0.0%	0.0%	80.4%
Southern Cross (Spencer St.)	3.8%	2.3%	0.5%	1.8%	25.1%	10.0%	56.5%

⁹ VPD – Vehicles per day

¹⁰ PPD – persons per day

Figure 3: City of Melbourne through traffic origins

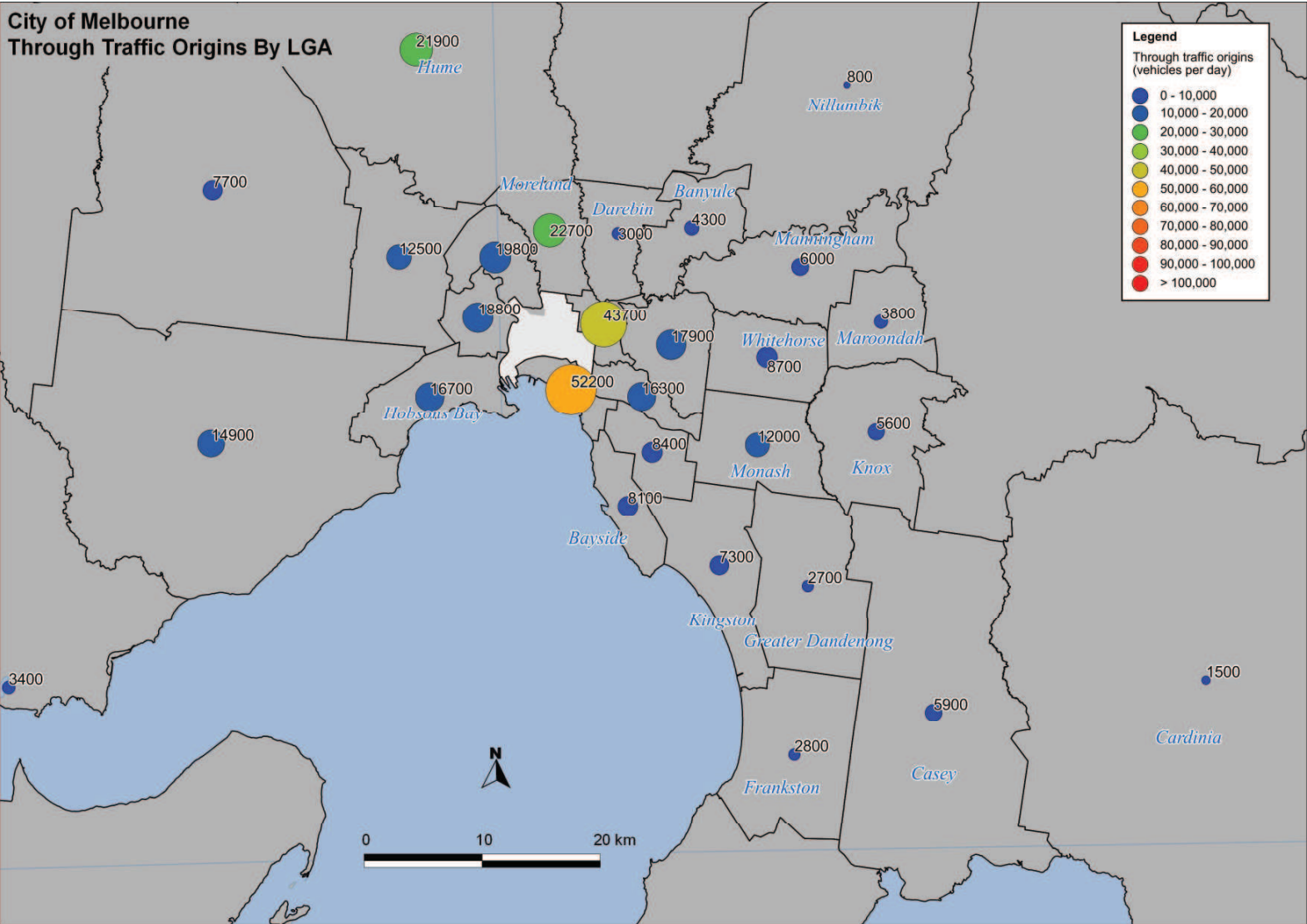


Figure 4: City of Melbourne through public transport origins

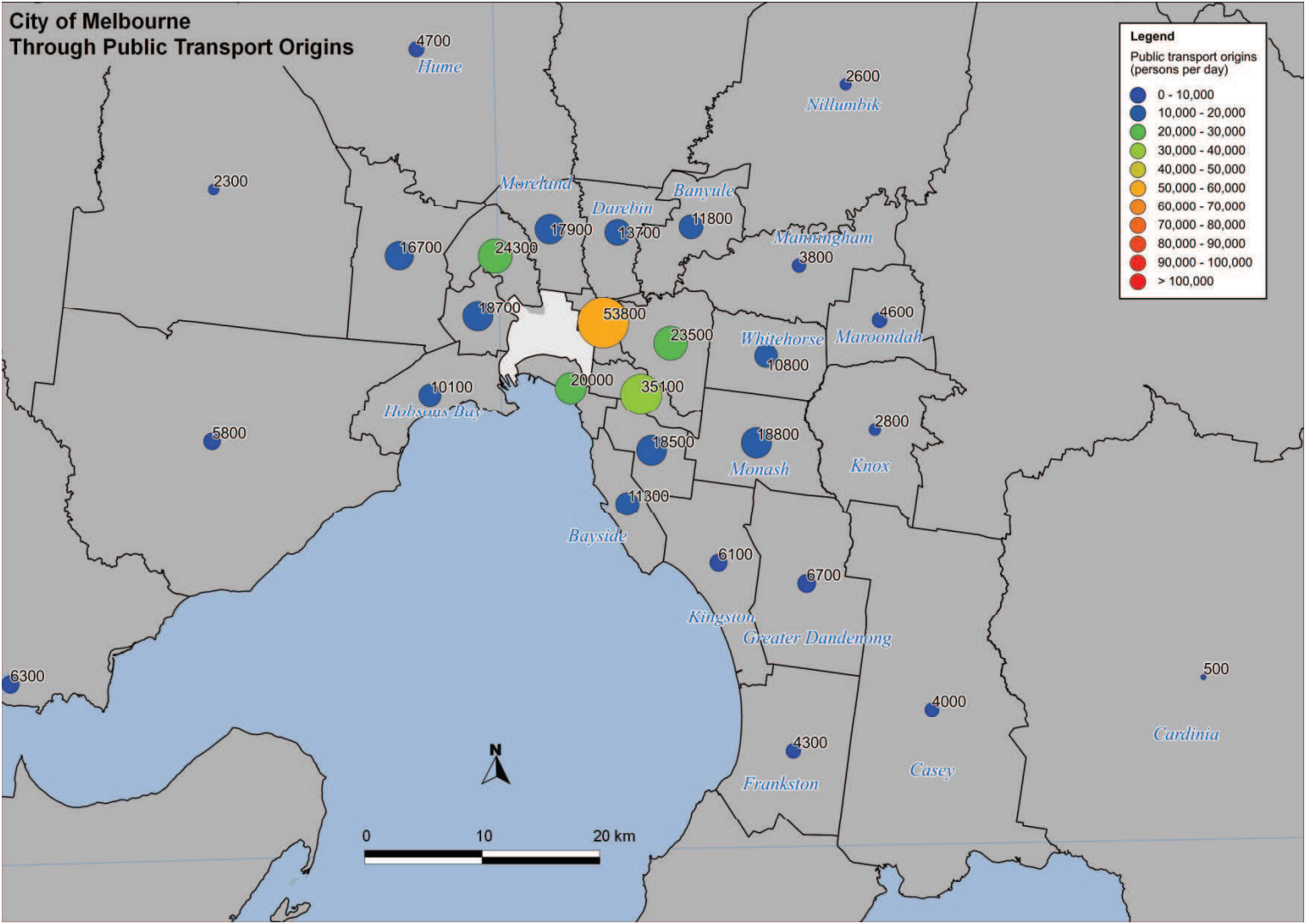


Figure 5: City of Melbourne through traffic volumes per capita by origin LGA

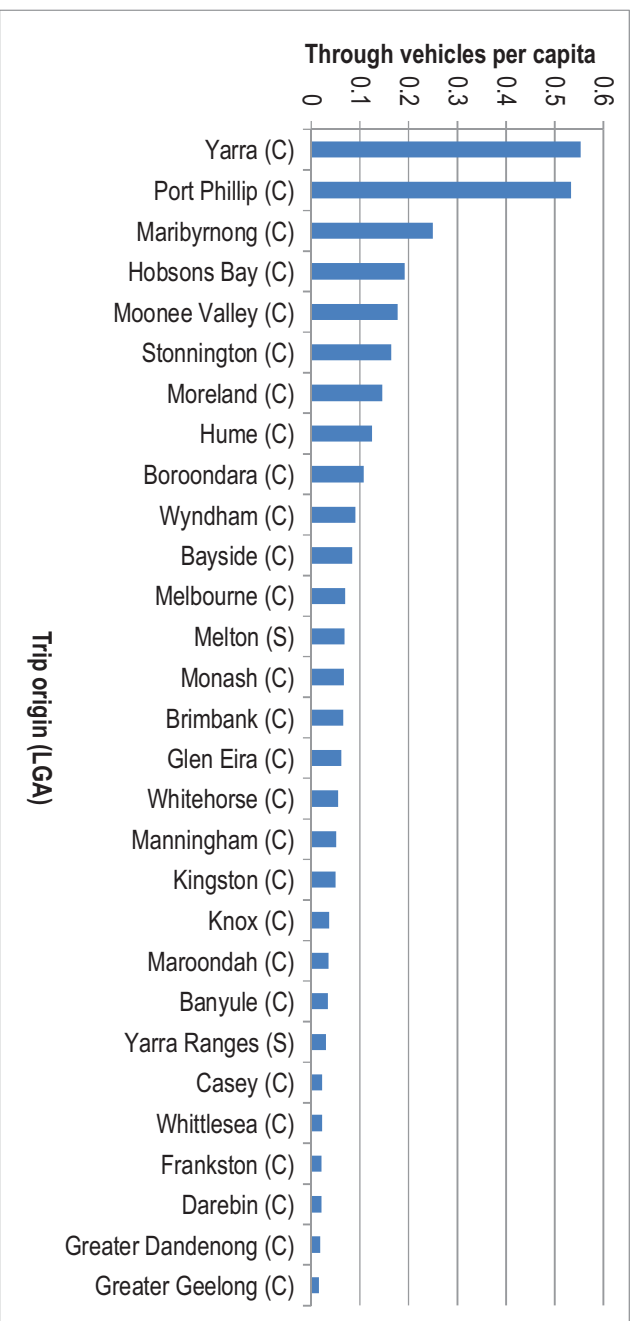
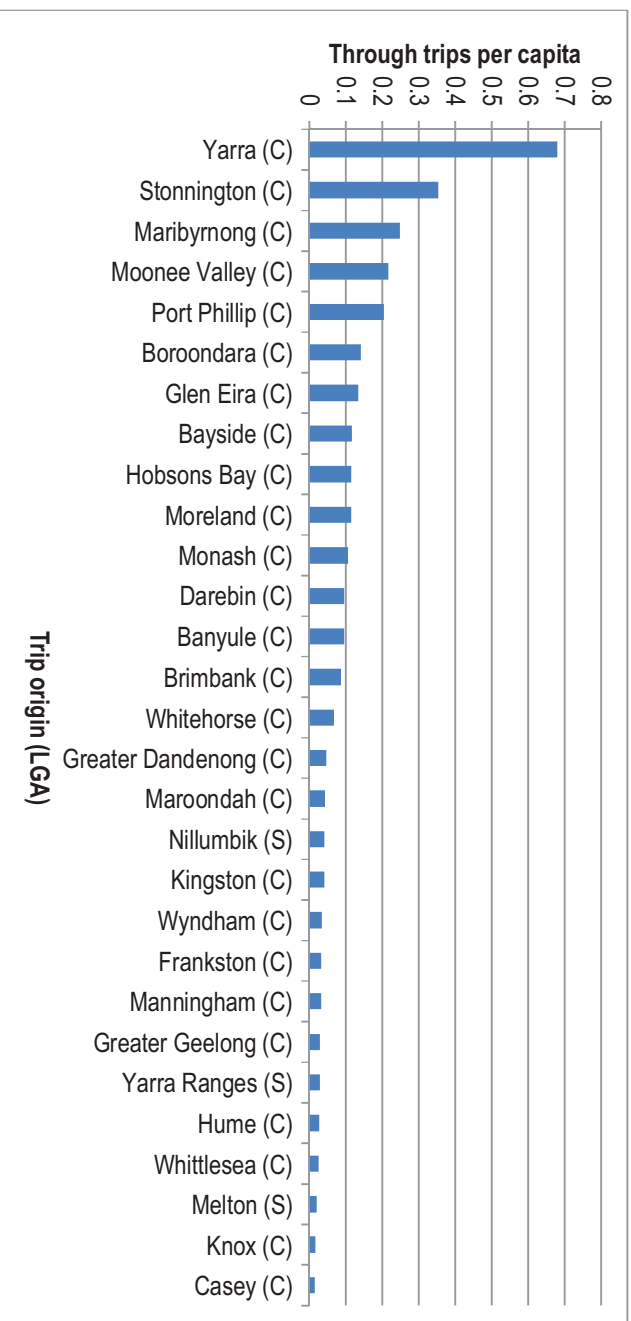


Figure 6: City of Melbourne through public transport trips per capita by origin LGA



3.4.4 Conclusions

The following conclusions were drawn from the Melbourne analysis:

- The Melbourne LGA attracts large volumes of through traffic, most of which is carried by the major freeways and City Link, but also by Kings Way, and Hoddle Street/Punt Road.
- City of Melbourne also attracts through traffic due to its geographic location at the northern end of Port Phillip Bay.
- Secondary routes, generally skirting the Melbourne CBD, also carry moderate volumes of through traffic, but these roads play a more significant role in providing access for vehicles to destinations in and around the CBD.
- The informal “ring road” formed by the Bolte Bridge, West Gate Freeway, Kings Way, Punt Road, Hoddle Street and Alexandra Parade stands out as being critical to the movement of through traffic in the Melbourne LGA. Tolls and congestion on this ring will cause some traffic to divert to internal secondary routes – however, through traffic presently using these secondary routes appears to be fairly moderate.
- Due to the radial nature of the public transport network feeding into the CBD, public transport origins are widespread although levels reduce the longer the travel journey.