

## 4 Transport

This Chapter is a summary of the transport specialist reports (Sinclair Knight Merz, 2001c, and Booz.Allen Hamilton, 2001), supplemented with information from other sources. It describes the transport situation in the inner northern suburbs, from available information and previous studies.

### 4.1 History of development

Traffic congestion has been a problem in Melbourne since at least the 1920s (for example it was the major topic addressed in the 1929 Plan of General Development). As Melbourne's population has grown and car ownership has increased, the share of travel undertaken by car has steadily risen. Traffic numbers on Melbourne's roads have also risen, as have truck volumes. Traffic volumes on key roads in the inner north have increased at a particularly high rate in recent decades, whilst public transport patronage has declined (see Table 4.1).

**Table 4.1 Past and present transport demand levels**

Road traffic (vehicles per day)	1964*	2000
Hoddle Street	Below 25 000	Up to 85 000
Johnston Street	Below 25 000	30 000
Princes Street	15 000	60 000
Public transport patronage (passenger boardings per day)	1964*	2000
Sydney Road and Smith Street trams	50 000	30 000
Lygon Street/Johnston Street buses	26 000	10 000

\* Source: 1969 Melbourne Transportation Plan

The 1954 Melbourne Metropolitan Planning Scheme proposed an arterial road network, including routes along the present day Eastern and Tullamarine Freeways, and an arterial link between the two along Alexandra Parade, Princes Street, College Crescent and Elliott Avenue. The 1969 Melbourne Transportation Plan recommended a substantial network of freeways, including:

- a freeway bypassing the CBD to the west and south (now built as City Link);
- a freeway from the east, through Fitzroy, Carlton and North Melbourne;
- an eastern bypass of the city through Collingwood, East Melbourne and Jolimont; and
- a freeway parallel to Brunswick Road.

The 1969 plan also recommended extensive rail works, including the city underground loop and new lines to Doncaster and Monash University.

In 1973 these plans were pruned, especially in the inner city, and the Eastern Freeway was opened from Hoddle Street eastwards in 1977, amid protests and a blockade of Alexandra Parade by local residents. The Alexandra Parade-Elliott Avenue route was designated as a State Highway in 1983 and later designated for use by B-double trucks and over-dimensioned vehicles.

Alexandra Parade was widened in 1995, and in 1997 the Eastern Freeway was extended to Springvale Road, increasing traffic levels at the western end of the freeway by approximately 30,000 cars per day. In 1999, the Kennett Government considered a number of possible road tunnels, primarily one linking the Eastern and Tullamarine Freeways and another from the Eastern Freeway to the edge of the CBD. Indicative costs for each ranged from \$600M to \$1000M.

In comparison, public transport in and around the inner north has changed little since the 1960s. The underground rail loop from the 1969 Transport Plan was built, but the Doncaster line was cancelled in 1983 and the reservation sold. The Upfield rail line has been marginally

viable for some time, but recently the line has been upgraded and Sunday and evening services restored. Eastern Freeway bus services were introduced following opening of the freeway in 1977. In the inner north, the last four decades have seen steadily declining service levels. Average frequencies have declined on trams and buses, as have operating speeds and service reliability, because of increasing traffic congestion.

## 4.2 Transport infrastructure

### 4.2.1 Road hierarchy

A road hierarchy based on a functional classification allows consistent traffic management by responsible agencies. Urban road function definitions and declared roads in the study area are given in Table 4.2.

**Table 4.2 Road classification definitions**

Classification	Definition	Declared in the study area
Freeway	Roads having limited access points with grade-separated intersections. Primary function is to provide high volume traffic movement and which: <ul style="list-style-type: none"> <li>- Form the principal routes in the metropolitan area and provide a continuous and regularly spaced network of major circumferential and radial routes;</li> <li>- Link airports to major activity areas.</li> </ul>	City Link Eastern Freeway Tullamarine Freeway
State Highway	Roads which: <ul style="list-style-type: none"> <li>- Form the principal routes in the metropolitan area and provide a continuous and regularly spaced network of major circumferential and radial routes;</li> <li>- Link airports to major activity areas.</li> </ul>	Alexandra Parade Hoddle Street south of Eastern Freeway Racecourse Road
Main Road	Roads which: <ul style="list-style-type: none"> <li>- Complete the major road network across the metropolitan area and carry significant through traffic and/or commercial and industrial volumes;</li> <li>- Form part of a regularly spaced network supplementary to the primary network.</li> </ul>	Brunswick Road Elliott Ave-Princes Street route Flemington Road High Street Hoddle Street north of Eastern Freeway Johnston Street Abbotsford Macaulay Road Nicholson Street Queens Parade Royal Parade/Sydney Road St Georges Road Victoria Street/Parade

Source: Sinclair Knight Merz 2001a

The remaining road network is under the control of City of Melbourne and City of Yarra, and includes some important routes such as Brunswick Street, Smith Street, Lygon Street, Grattan Street and others; councils have their own plans for road hierarchy and traffic management on the road network.

Over-dimensional vehicles need routes with adequate dimensional clearances. The Mount Alexander Road – Elliott Avenue – Macarthur Road – Cemetery Road – Princes Street – Alexandra Parade – Eastern Freeway route is designated as part of the over-dimensional vehicle permit route network.

### 4.2.2 Road characteristics

Most of the declared roads (and many of the major Council-controlled roads) in the area have four or more traffic lanes, although some have parking in the kerbside lane at certain times, and others have tram lines in the centre lanes.

Intersections are almost exclusively signal-controlled on major routes. Some intersections have turn bans in place, either all day or at peak times, but the majority are unrestricted.

There is extensive use of roundabouts on side streets, as road safety and traffic calming devices, and one-way streets to discourage 'rat running', especially in Fitzroy.

Peak period clearways are used on several of the major roads to provide more traffic capacity. Victoria Parade, Hoddle Street and Johnston Street also have morning peak bus lanes to help buses get through the peak hour traffic more quickly.

#### *4.2.3 Bicycle and pedestrian infrastructure*

Bicycles offer the community a healthy and low-cost form of transport, and assist in reducing traffic volumes and hence air pollution. Both Melbourne and Yarra City Councils have municipal bicycle strategies and provide a high level of on and off road bicycle facilities. The present bicycle network has gaps and missing components that will be filled on completion of the Principal Bicycle Network for Melbourne.

One particular shortcoming identified for the bicycle network is the fact that cycling is prohibited through some parks and gardens; a case in point is the Canning Street cycle route, which is well-frequented, but stops abruptly at the northern edge of Carlton Gardens.

Bicycle Victoria has said that the opportunity exists to develop a fine-grained and comprehensive bicycle network in the inner north. This could be developed as a pilot demonstration of the benefits of maximum provision for cyclists in urban areas.

The pedestrian network is fine-grained as a result of the grid street pattern. There are a few walking trails such as the Merri Creek Path, the Yarra Path and the Capital City Trail. Footpaths are quite variable in quality; surface irregularities and poor detailing present difficulties for the infirm and fragile. Some routes such as Brunswick Street and Smith Street are well lit and have resting places and crossing facilities.

#### *4.2.4 Public transport infrastructure*

Two rail lines pass through the study area; the Upfield line goes through Royal Park, and the Hurstbridge/Epping line runs through Abbotsford and Clifton Hill, east of Hoddle Street.

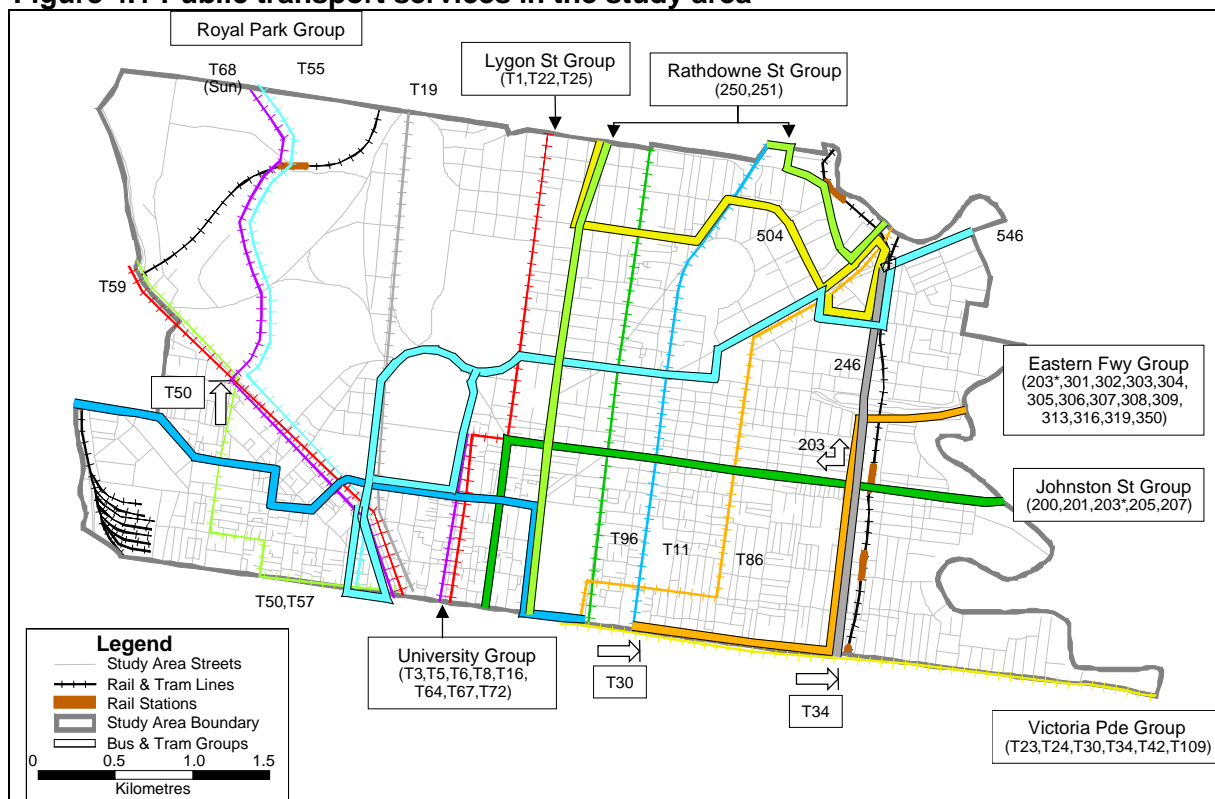
Tram lines are extensive in a north-south direction, with six main route corridors: Flemington Road/Royal Park, Royal Parade, Swanston/Lygon Street, Nicholson Street, Brunswick Street/St Georges Road, and Smith Street/Queens Parade. There are no east-west tram routes except for a short section of the Smith Street route (that runs along Gertrude Street), Elgin Street and the Victoria Parade/Street route along the southern edge of the area.

Several bus route groups serve and/or pass through the area, with Hoddle Street/Victoria Parade, Johnston Street and Rathdowne Street being the main routes. The University precinct is served by buses that link to Heidelberg Road through Clifton Hill.

### 4.3 Public transport services

Figure 4.1 shows public transport services in the inner north.

**Figure 4.1 Public transport services in the study area**



Source: Booz.Allen Hamilton, 2001

#### 4.3.1 Service Frequency

Peak period bus services vary in frequency from one every minute to and from the Eastern Freeway, to one every 30 minutes on the Queens Parade to University and Clifton Hill-Brunswick Road routes. Services on other routes such as the Johnston and Rathdowne Street groups typically provide services every 12-13 minutes in the peak.

Tram services are more frequent, with morning peak hour services every minute on routes to and from the University, and every 5-9 minutes on other routes.

Train services are most frequent on the Hurstbridge line (trains every 10 minutes in the peak), followed by the Epping line (17 minutes) and the Upfield line (20 minutes).

Bus services are considerably reduced in number on Saturdays and Sundays, whereas train and tram services are maintained at close to their weekday levels.

### 4.4 Demand and use levels

#### 4.4.1 Public transport patronage

Table 4.3 shows annual patronage of public transport for study area routes (along their full length). It shows that:

- Trams cater for 75% of patronage, with the Swanston Street/University group carrying the most followed by the Royal Parade/Sydney Road group.

- North-south services account for nearly 90% of public transport patronage, with east-west routes (Victoria Parade tram, Eastern Freeway bus and Johnston Street bus) only accounting for 11% of demand.

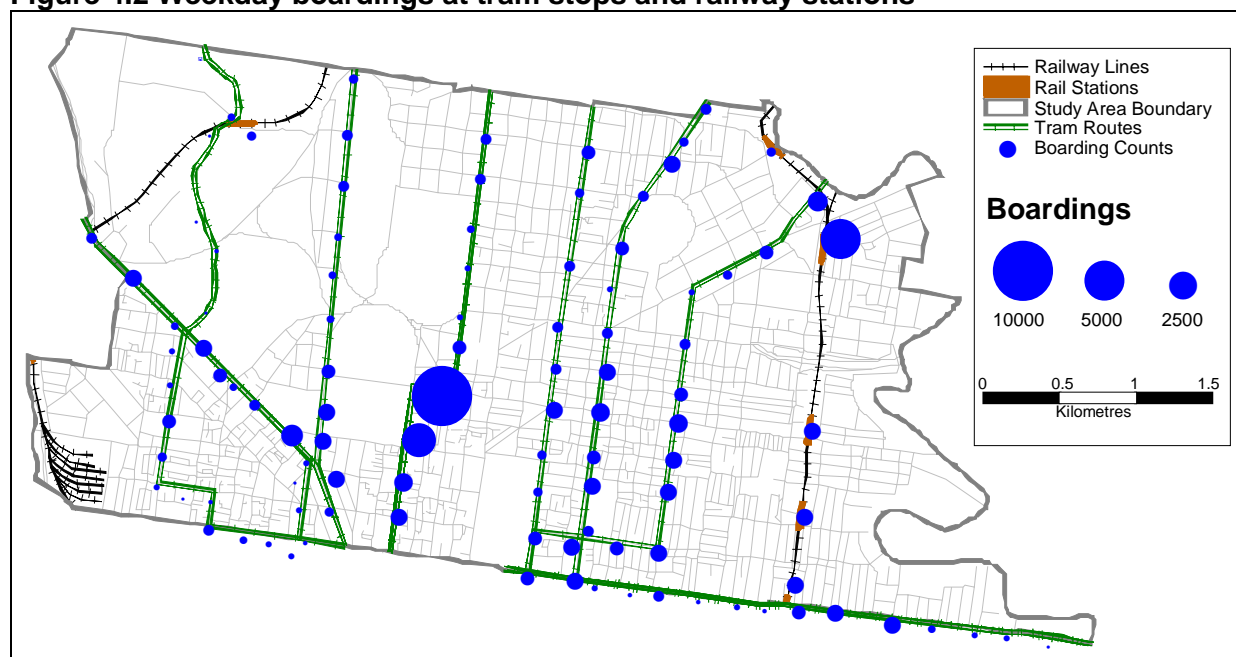
**Table 4.3 Annual public transport patronage by route group**

Route group	Patronage (000 passengers per annum)	% by mode
<b>Buses</b>		
Eastern Freeway group	2 740	27%
Johnston Street group	2 190	22%
Rathdowne Street group	2 350	23%
246 – Hoddle Street	1 770	18%
546 – Queens Parade-University	100	1%
504 – Clifton Hill-Brunswick Road	150	1%
402 – East Melbourne-Footscray	710	7%
<b>Sub total buses</b>	<b>10 020</b>	<b>100%</b>
<b>Trams</b>		
96 – Nicholson Street	8 630	10%
86 – Smith Street/Queens Parade	7 080	8%
11 – Brunswick Street/St Georges Road	7 900	9%
109, 23, 24 & 42 – Victoria Parade group	7 740	9%
3, 5, 6, 8, 16, 64, 67, 72 – University group	25 000	28%
1, 22 – Lygon Street	5 200	6%
19 – Royal Parade	10 000	11%
55, 68 – Royal Park	7 000	8%
50, 57 – North Melbourne	3 000	3%
59 – Flemington Road/Mount Alexander Road	7 000	8%
<b>Sub total trams</b>	<b>88 550</b>	<b>100%</b>
<b>Trains</b>		
Epping line	6 700	35%
Hurstbridge line	10 100	53%
Upfield line	2 300	12%
<b>Sub total trains</b>	<b>19 100</b>	<b>100%</b>

Figure 4.2 shows weekday passenger boardings at tram stops and railway stations in the study area. It shows that:

- Local tram stops have comparable boardings to most study area railway stations
- The tram interchange at the University of Melbourne has by far the most boardings (9,500 passengers per weekday), followed by Clifton Hill railway station (5,000/weekday) and the Grattan/Swanston Street tram stop (3,600/weekday).
- Busier tram stops include those along Brunswick and Smith Streets, and at Royal Melbourne Hospital, Clifton Hill and Brunswick Street/Victoria Parade.

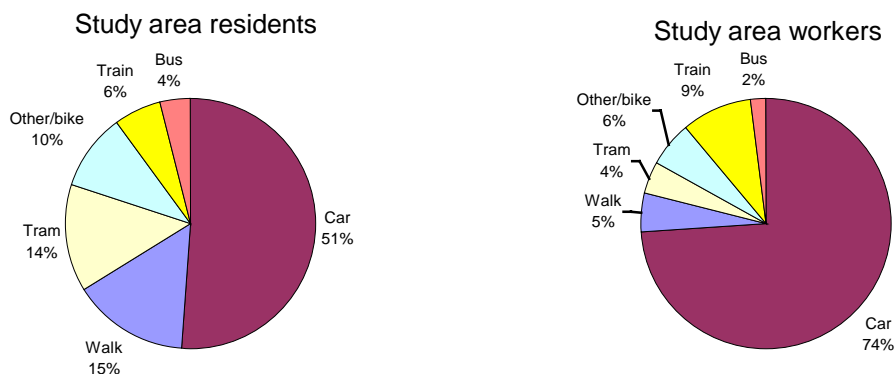
**Figure 4.2 Weekday boardings at tram stops and railway stations**



#### 4.4.2 Travel demand

At the time of the 1996 Census, about 25,000 study area residents made journeys to work; over half of them used cars (driver or passenger), 15% walked and 14% took trams. People who work in the study area made about 57,000 trips to work, of which 74% were by car. Although high, this is lower than the average for metropolitan Melbourne as a whole (82%).

**Figure 4.3 Mode used for journey to work**



Source: ABS (1996)

Comparison of journey-to-work data from past Censuses shows that public transport usage by study area residents has declined by 29% from 1981 to 1996. There was a small growth in tram and train use between 1991 and 1996, but this was offset by a continued decline in bus use. Between 1991 and 1996 there was also a sharp increase in bicycle use, possibly linked to implementation of bicycle facilities in the area and the demographic changes associated with inner city growth.

Analysis of Victorian Activity and Travel Survey (VATS) data shows that overall, travel to, from and through the inner northern suburbs (83% of trips) is substantially larger than travel wholly within the area (17% of trips). Figure 4.4 summarises the results

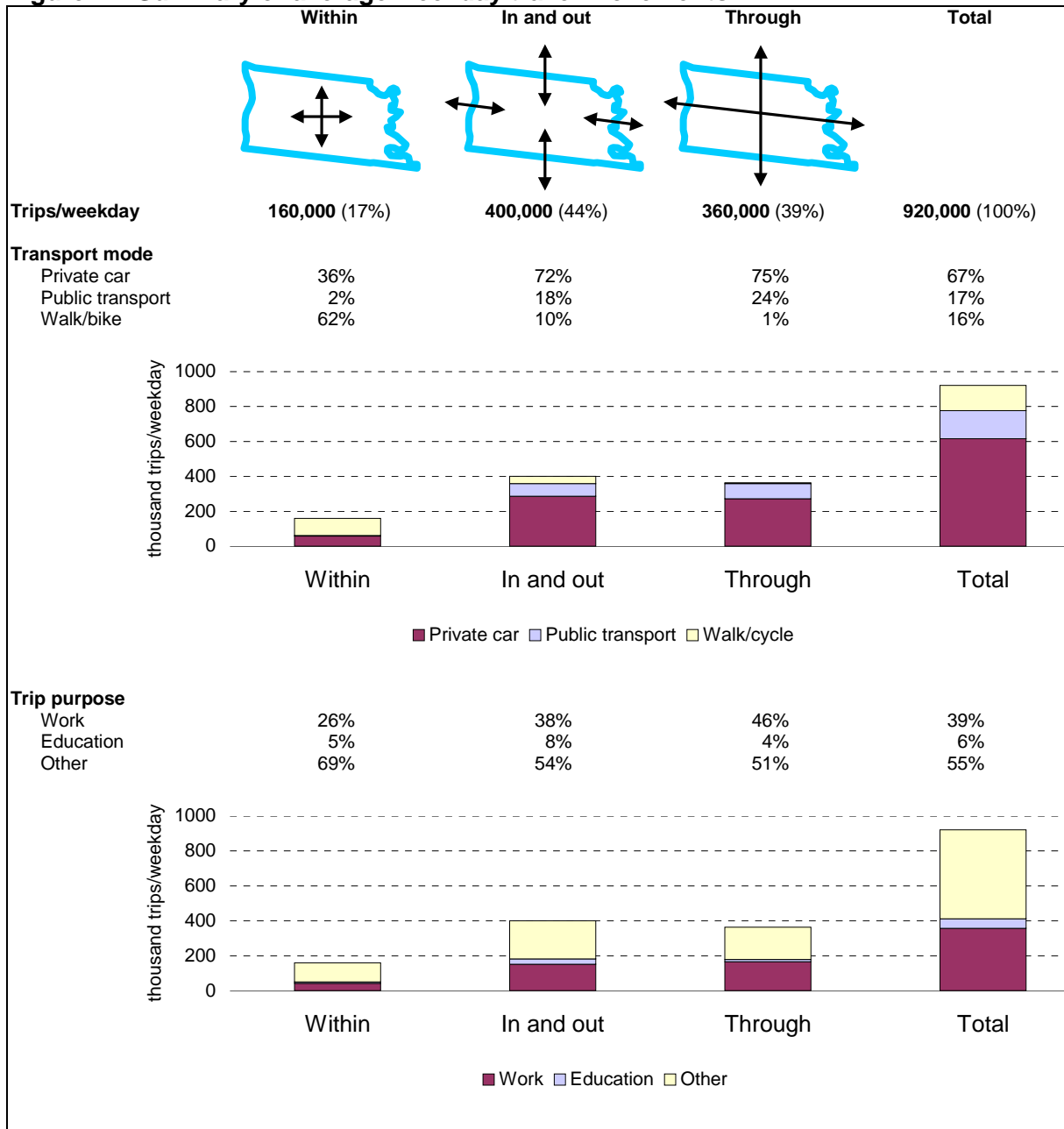
The majority of travel within the area (62%) is by walking or bicycle, with the remainder mostly by car. Only 2% of travel within the area is by public transport, probably because much of the internal travel demand is east-west whilst public transport services are mostly north-south.

Most travellers into and out of the area use car (72%), and 18% use public transport. The relatively high walk/bike component of trips into and out of the area is mostly because of the proximity of the CBD to the south.

Through travel is also mostly by car (75%), with 24% by public transport and only 1% walking or cycling.

Further analysis of more recent VATS data is under way and will be used to update this information and for the assessment of options.

**Figure 4.4 Summary of average weekday travel movements**



Source: Preliminary analysis of VATS data for 1994-1997, Booz.Allen Hamilton, 2001

#### 4.4.3 Eastern Freeway traffic

One of the most important roads entering the study area is the Eastern Freeway, which carries traffic to and from the eastern suburbs. Because of its significance and the studies into possible tunnel links carried out by the Kennett Government, consultants to VicRoads in 1999 examined available data sources to show the destinations of westbound traffic entering the study area from the Eastern Freeway. VATS data was examined alongside the outputs from the TRIPS and MITFEM travel models (TRIPS is the model used by the Department of Infrastructure, and MITFEM, now called Zenith, is developed by consultants Veitch Lister).

**Table 4.4 Estimates of Eastern Freeway traffic dispersal**

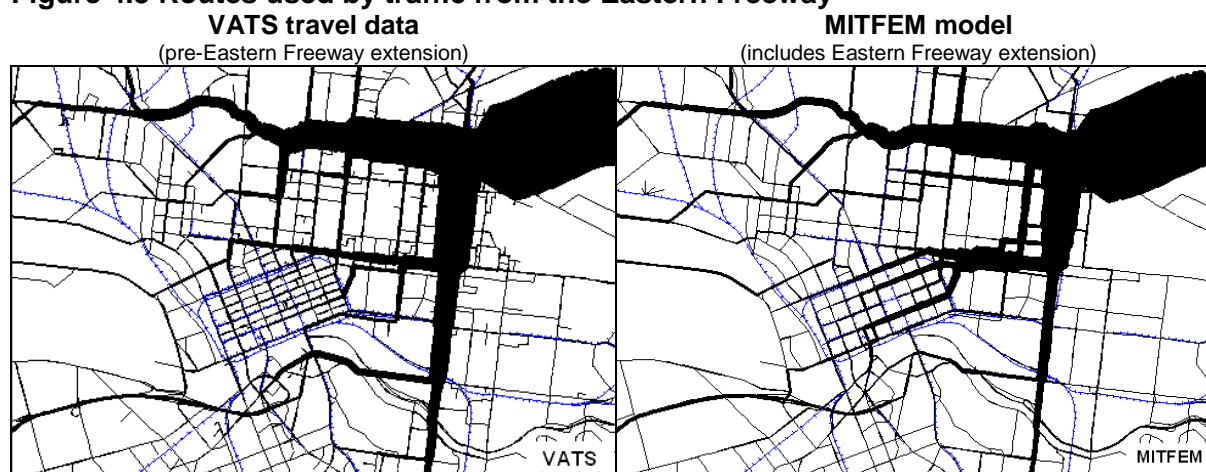
Destination	Average daily vehicle trips from Eastern Freeway					
	MITFEM		VATS		TRIPS	
	vehicles	%	vehicles	%	Vehicles	%
<b>Through study area</b>						
North	3 660	5%	6 337	12%	9 321	15%
North west	5 059	7%	2 738	5%	7 748	12%
Outer west & south west	10 367	15%	4 738	9%	10 653	17%
Richmond & East Melbourne	4 400	6%	2 336	4%	2 942	5%
Port & South Melbourne	8 908	13%	4 143	8%	4 531	7%
Melbourne CBD	12 143	17%	9 233	18%	11 535	18%
South (Punt Road)	2 035	3%	2 192	4%	1 169	2%
<b>Subtotal</b>	<b>46 572</b>	<b>66%</b>	<b>31 717</b>	<b>60%</b>	<b>47 899</b>	<b>75%</b>
<b>Into study area</b>						
North & West Melbourne	5 666	8%	5 676	11%	3 925	6%
Carlton	5 966	9%	6 300	12%	3 670	6%
Fitzroy & Collingwood	11 844	17%	8 800	17%	8 781	14%
<b>Subtotal</b>	<b>23 476</b>	<b>34%</b>	<b>20 776</b>	<b>40%</b>	<b>16 376</b>	<b>25%</b>
<b>Total</b>	<b>70 048</b>	<b>100%</b>	<b>52 493</b>	<b>100%</b>	<b>64 275</b>	<b>100%</b>

Source: Sinclair Knight Merz 2001c (from analysis carried out in 1999)

The results show reasonable correspondence, especially considering that the VATS data was collected before the extension of the Eastern Freeway to Springvale Road. The VATS total of 52,500 vehicles one-way equates to a two-way flow of about 105,000, which is close to observed 1997 traffic levels at the west end of the freeway (108,000 vehicles). The MITFEM total of 70,000 gives a two-way flow of 140,000, close to observed 1999 levels after the freeway was extended (137,000 vehicles).

The two traffic models (MITFEM and TRIPS) allocate more trips to the outer west and south-west and the CBD, whilst the VATS data shows more trips to the north than MITFEM. It is unlikely that these and other differences can be fully explained by the extension of the freeway to Springvale Road. The two models are therefore less accurate than the VATS survey (in which respondents were asked to describe their route by nominating up to six key roads used); refinement of the MITFEM model and examination of more recent VATS data is being undertaken for this study.

**Figure 4.5 Routes used by traffic from the Eastern Freeway**



Source: Sinclair Knight Merz 2001c (from analysis carried out in 1999)

The VATS data was assigned to the road network using the routes identified in the survey. Figure 4.5 compares this with MITFEM model predictions for an average weekday. The figures are closely comparable, and illustrate the 50:50 split of Eastern Freeway traffic between Alexandra Parade and Hoddle Street. A significant amount of traffic subsequently turns off Alexandra Parade both to the north and south, and the amount of traffic travelling all

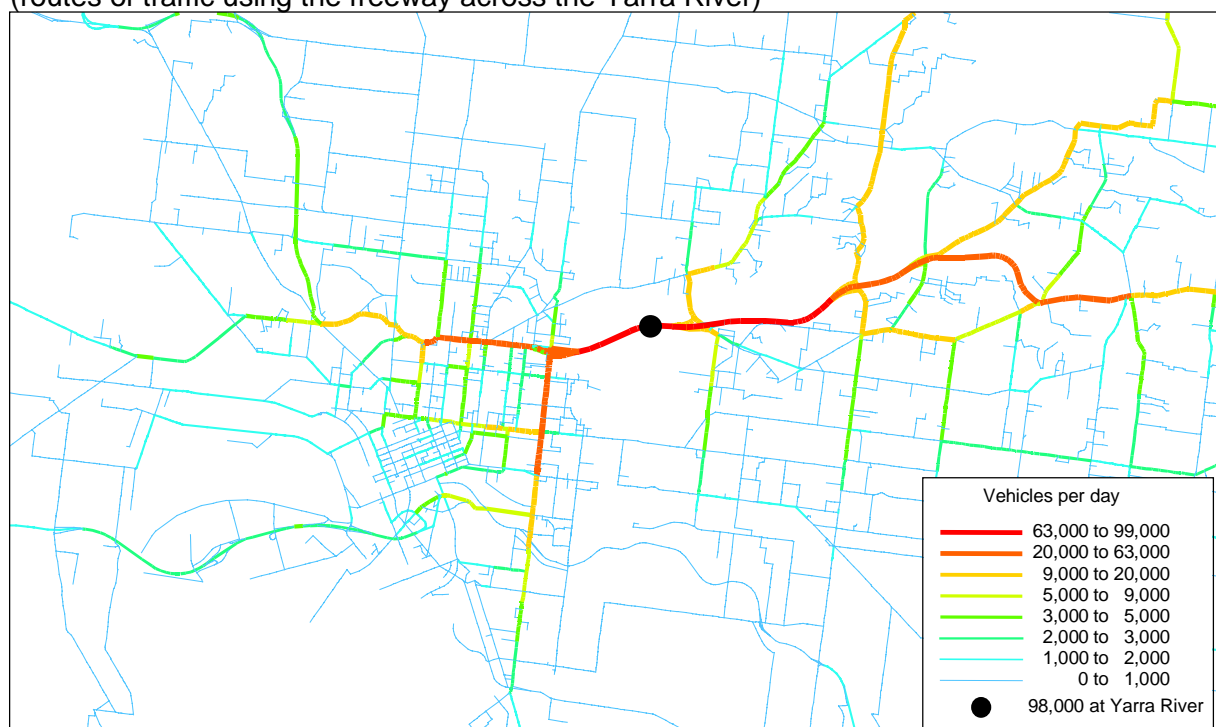


the way through the area east-west is quite small (only 9-15% of traffic from the Eastern Freeway is headed for the west and outer west).

The different routes used by traffic in the MITFEM model (especially the large volume appearing to use Wellington Street to the west of Hoddle Street) is a function of the level of detail in the model, which is being refined and updated for the purposes of this study.

Figure 4.6 shows the overall ‘catchment’ of the Eastern Freeway, by illustrating the routes taken by traffic that is on the freeway where it crosses the Yarra River, at the eastern edge of the study area (from an analysis of VATS data). The diagram shows the extensive area of influence of the freeway in the eastern suburbs, extending into the Eltham-Warrandyte area, and also illustrates again the importance of Alexandra Parade and Hoddle Street/Punt Road as the main ‘feeders’ to and from the freeway at the western end.

**Figure 4.6 Eastern Freeway catchment area**  
(routes of traffic using the freeway across the Yarra River)



Source: Analysis of 1994-1997 VATS data by Sinclair Knight Merz (1999)

#### 4.4.4 Cars and trucks

The area’s major roads carry large volumes of passenger traffic using all forms of road transport, including public transport, cycling and walking. Much of the vehicular traffic on these roads is from outside the study area, due in part to the proximity of the CBD to the south.

Several of these roads also carry significant volumes of larger trucks<sup>2</sup>. Although these are relatively small proportions of the total traffic volumes, they are important in an economic and commercial sense and they also cause considerable stress and concern to residents and other users of the area.

<sup>2</sup> Vehicles of more than 4.5 tonnes unladen weight – there are also considerable volumes of light commercial vehicles (vans and utes).

Traffic congestion is endemic in the area, especially during the afternoon peak. During the morning peak, queueing on the Eastern Freeway and other entry roads (notably Sydney Road) limits the amount of traffic that can enter the area and encourages rat running on residential streets (especially in Abbotsford and Carlton North).

The diagrams in Appendix B show the most recent weekday traffic counts and truck counts in the area. Worthy of note is:

- The high volume of car traffic on the Eastern Freeway (140,000 vehicles a day, of which less than 5,000 are trucks)
- Alexandra Parade carries 75,000 vehicles a day at Smith Street, increasing to 84,000 at Nicholson Street.
- Hoddle Street carries 70,000 vehicles a day at Johnston Street and Victoria Street.
- The proportion of trucks is 8.5% of total traffic on Elliott Avenue, reducing to only 5.7% on Alexandra Parade east of Nicholson Street.
- There are significantly more trucks on Elliott Avenue than on Flemington Road.
- Comparatively high volumes of trucks also exist on Arden Street and Macaulay Road in North Melbourne.

The traffic counts and travel data suggest that the Elliott Avenue-Alexandra Parade route serves both as a through route for east-west movements and a distribution route for north-south movements. Origin-destination surveys will be undertaken to examine this issue in more detail, for both trucks and cars.

Traffic congestion is widespread in the area at peak times (not only weekday commuter peaks, but also evening and weekend peaks associated with sporting events and the like). Problems exist on the following routes in particular:

- **Hoddle Street** – queueing in the mornings, often exceeding 3km in length, on the Eastern Freeway is largely due to capacity constraints on Hoddle Street.
- **Johnston Street** – significant delays in the morning and evening peaks.
- **Victoria Parade** – extended queueing during evening peaks, especially of traffic turning left into Hoddle Street to access the Eastern Freeway and High Street, Darebin.
- **Alexandra Parade/Princes Street** – evening peak queues of traffic headed for the Freeway, and delays to traffic at intersections to accommodate pedestrians, trams and north-south traffic movements.
- **Cemetery Road** – queues for right turns from Cemetery Road west into Royal Parade.
- **Elliott Avenue** – queues for right turns into Flemington Road/Tullamarine Freeway from Elliott Avenue.

#### 4.4.5 Walking

Walking accounts for 90,000 trips, or about 13% of all weekday trips. 75% are within the area, and 25% to areas close by, especially the CBD to the south. The following observations can be made:

- pedestrian flows in the southern part of the area could be expected to be higher than in the north;
- the retail areas and most public transport stops are distributed in a north-south direction along the major roads;
- the CBD just south of the study area has a significant influence on walking in the southern parts of Carlton, Fitzroy and Collingwood;
- unlike other modes, walking trips are likely to be to all points of the compass.

#### 4.4.6 *Cycling*

Bike travel accounts for 3% of all weekday trips in the study area, or 24,000 bike trips each weekday. Around one-third of these are internal, half are to and from the study area and the balance (one-sixth) are through the study area.

It is estimated that there are, on average, 0.37 bicycles per person in the cities of Melbourne and Yarra. Interestingly, there are also about 0.37 cars per person in the area, although the latter is probably increasing faster.

Cyclists in the inner metropolitan area make proportionally more commuting trips to work than in other areas of Melbourne. They also make proportionally fewer trips for education and recreation purposes than cyclists in the middle and outer suburbs. The inner metropolitan area has proportionally more adult cyclists than other areas of Melbourne, and also more female cyclists. Over 80% of cyclists in the area hold a driving licence.

#### 4.4.7 *Road accidents*

Distribution of road accidents is generally related to exposure risk; that is, along the more heavily trafficked road and pedestrian routes. Analysis of accidents leads to the following observations:

- Intersections of arterial roads are the main accident sites, eg. Victoria Street/Hoddle Street (70), Haymarket roundabout (42), and Boundary Road/ Flemington Road (37);
- some routes with significant residential amenity concerns do not have a high number of reported accidents eg Gatehouse Street, Rushall Crescent and Park Street.

The City of Yarra, the City of Melbourne and VicRoads are all receiving black spot funding to implement site specific counter measures at sites with poor accident records.

Many pedestrian accidents occur in locations of high walking activity, such as the Smith Street, Brunswick Street and Lygon Street shopping and entertainment areas. However the most concentrated number of pedestrian accidents occurs along the Elizabeth Street/ Flemington Road route. This route has service roads, trams, somewhat complex traffic movements and wide expanses of road to walk across. Hoddle Street also has high concentrations of pedestrian accidents, including two recent fatalities.

### 4.5 **Opportunities and constraints**

There are major opportunities and constraints to improving transport conditions in the study area. Many of the opportunities lie outside the core study area, although there is much scope for improvement within the area as well. These are discussed below under the headings of the emerging themes mentioned in Chapter 1.

#### 4.5.1 *Improving public transport*

It is important to focus public transport improvements on the major identified travel 'markets' to maximise the potential for patronage increases and mode shifts. Targeting the movements with the greatest volumes of travellers is likely to reap the greatest benefits.

For travel to, from and through the study area, the main reasons for public transport's poor mode share are considered to be:

- poor coverage of the area by public transport from outside, due to the radial focus of services on the CBD;
- poor coverage of external catchments by public transport;
- lack of or poor links with study area services (eg. rail/bus or rail/tram links); and
- poor reliability of bus and tram services due to traffic congestion.

The 'problem' transport corridors in this regard are:

- Upfield and Broadmeadows rail lines;
- Royal Parade/Sydney Road and Mount Alexander Road trams;
- Eastern Freeway corridor (potential for new/improved rail, tram and bus services, and improvements to the Hoddle Street/Victoria Parade bus route).

New transit solutions have been proposed utilising the median of the Eastern Freeway (for example, a rail line to link into the Clifton Hill line, a light rail line or a busway). These options will be further developed and assessed in the study.

Travel within the area by public transport is hampered by delays from road congestion, a general lack of east-west services, and poor access to key areas like Royal Park, North Carlton, the University and parts of Abbotsford near the Yarra River. Potential solutions include:

- traffic management along tram and bus routes to give faster, more reliable services;
- better coverage or routing of existing services, such as extending the Johnston Street buses to the University, and re-routing Eastern Freeway bus services throughout the study area;
- new east-west bus routes connecting to Royal Park station;
- new (mini) bus services penetrating into local suburbs;
- bus and possibly tram route deviations; and
- bus priority lanes.

Other, more general public transport opportunities include:

- improved information and marketing (including real time information);
- improved security at stations, stops and on board trams and trains;
- addressing the specific needs of students (particularly time and day of travel);
- improved access for the elderly and disabled;
- addressing fare and ticketing issues (such as availability of day tickets on trams); and
- reducing environmental emissions by public transport vehicles.

The upgrading of Route 109 will be monitored and successful techniques will be investigated for suitability on other tram routes.

#### *4.5.2 Improving cycling and walking:*

Addressing walking and cycling concerns in the area will assist in encouraging more use of the most sustainable forms of transport. Specific opportunities include:

- completing the principal bicycle network in the area;
- improving cycling and walking linkages, especially to and through parks and gardens;
- improving east-west walking conditions;
- improving end-of-trip facilities such as parking and lock-up facilities for cyclists
- providing better crossing facilities on major traffic arteries and at intersections; and
- addressing pedestrian safety concerns, especially in the southern half of the area.

#### *4.5.3 Reducing car dependency:*

Paradoxically, the reduced congestion and increased road availability brought about by reducing car use will simply make car travel more attractive again, unless the additional system availability is used for public transport and non-motorised transport solutions. Therefore it will be important to anticipate any expected savings and newly-available 'road space' created by reduced car use, and find ways to use it for more sustainable purposes. This could include:



- Bike lanes and wider footpaths
- Multiple-occupancy vehicle (MOV) lanes
- Freight and small commercial vehicle movements
- Urban design, heritage and landscape improvements
- Longer pedestrian crossing times at signalised intersections
- Greater priority for buses and trams at signalised intersections.

Other, wider measures to reduce car dependency could include:

- Better management of the cost and availability of parking, both in the study area and in the CBD
- Incentives for employers to provide public transport tickets in place of company cars
- Integrated public transport ticketing for major events.

#### *4.5.4 Managing the arterial road system and the movement of freight*

The major roads in the area are reasonably well-defined and carry the bulk of through traffic. However there are still some important considerations to be addressed:

- Focusing through traffic on key arterials using traffic management measures; this improves amenity by reducing “rat running”. This is still a problem in some areas although it has been improved by work already done.
- Defining and providing appropriate priority for truck routes to minimise delays and also reduce the amenity impact of heavy vehicles on the area. A key issue here is the role of the Macarthur Road/Elliott Avenue route through Royal Park and the impact that trucks have on this area.

#### *4.5.5 Enhancing amenity*

A key issue affecting the general amenity and livability of the inner north is the impact of traffic, especially trucks, on the quality of life. The number of major routes and the density of traffic on them require further rationalisation and management to improve conditions, as discussed above. This will provide opportunities for further amenity enhancements, which will benefit legitimate local street users.

## 5 Sustainability

### 5.1 Ecologically sustainable development

Ecologically sustainable development (ESD), has been defined in the National Strategy for ESD as follows:

*Ecologically Sustainable Development is using, conserving and enhancing the community's resources so that the ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased (NSESD 1992).*

A principal study objective is to improve the amenity of the study area. The study will also seek to establish a more sustainable transport solution for the area.

Transport is central to economic and social well-being. However, inappropriate transport development can also give rise to environmental, human health, road safety and mobility problems. Hence, there is a need to develop solutions that balance perceived needs with environmental values and quality of life. One of the key aims of this study is to determine how best to integrate the transport network with the planning and management of land use in the corridor.

### 5.2 ESD policies and legislation

In Australia, the Council of Australian Governments endorsed the National Strategy for Ecologically Sustainable Development in 1992. The National Strategy aims to achieve more sustainable use of energy and natural resources through integrated urban and transport planning and through more efficient sub-division and building design.

The Victorian Government is developing a triple bottom line approach to decision making, which aims to integrate sustainable economic growth objectives with social development and environmental stewardship. The Government is committed to integrating ESD principles into decision making, and is implementing a range of policies to promote ESD including:

- rewriting environmental legislation;
- considering environmental effects in Government processes; and
- establishing the Sustainable Energy Authority Victoria.

The *Melbourne Metropolitan Strategy* now being developed will establish a planning and development framework for the metropolitan region of Victoria for the next 20-30 years. The Strategy will focus on how land use and transport can best support economic, social and environmental needs. It will aim to integrate land use and transport, and incorporate ESD principles so that long term social, environmental and economic benefits are achieved.

Integration requires that policy responses and institutional arrangements be implemented across government. It also requires that:

- protection of environmental values is regarded as fundamental;
- environmental planning is broadened to include the impact of urban form on energy use, particularly transport energy use, and the impact of transport on urban form;
- effective institutional arrangements are made to uphold integration principles, provide supportive legislation where necessary, enforce implementation of policy and ensure cross sectoral coordination; and
- development proposals are assessed against a set of clearly stated criteria, including environmental criteria.

In the past, implementation of urban policy has often been contradictory, with social and environmentally-based policies conflicting with those catering for growth in development and mobility, eg. growth of car-based regional activity centres and the consequential expansion of the freeway system. Similarly, catchment management and land use planning have not been integrated. As Melbourne has grown, it has become increasingly dependent on road-based development. Demographic changes, shifting employment patterns and trends in public opinion may require alternative patterns of urban form. An integrated process of decision-making is therefore required, with adequate consideration given to environmental, economic and social factors.

The Northern Central City Corridor study area is in the City of Melbourne and the City of Yarra. Both municipalities have environmental projects and plans in place that address sustainability. For example, the City of Melbourne is developing *City Plan 2010*, for a thriving and sustainable city that enjoys economic prosperity, social equity and environmental quality. The City of Melbourne's Municipal Strategic Statement (MSS) is also being reviewed and is a key component of the Melbourne Planning Scheme. It addresses land use and development in the City and proposes a series of economic, social and environmental indicators against which progress towards achieving a sustainable city can be measured. The City also coordinates a number of environmental projects aimed at increasing sustainability, including *CityHealth 2002* which identifies current health issues and sets the way forward to a sustainable and healthy future, and the *Sustainable Energy and Greenhouse Strategy* which aims to contribute to the stabilisation of greenhouse gas concentrations in the atmosphere.

The *Yarra Environmental Strategy 2000* sets out clear objectives and actions for achieving ecological sustainability for the City of Yarra. An Environmental Charter has been developed that underpins the Environmental Strategy. The Charter includes a commitment to working with all stakeholders to help achieve ecological, social, cultural and economic sustainability. The Charter states that Yarra will show:

- A commitment to working with all stakeholders to help achieve ecological, social, cultural and economic sustainability.
- A recognition of the importance of the environment to the community's wellbeing.
- An acknowledgment that we are dependent upon natural systems and processes.
- A commitment to help reverse, where possible, adverse environmental trends.
- A recognition that humans share the environment with many other non-human species.
- A recognition that we must change accepted habits to find more sustainable ways of managing the environment.

### 5.3 Relevance to the study

The sustainability concept should cover the whole study. It is important that social, economic and environmental considerations are integrated and balanced to enable better decisions to be made and outcomes provided in terms of achieving more sustainable development. To achieve this the study will develop proposals that are aligned with the principles of sustainability and ESD outlined above. The policies and legislation at all levels (national, state and local) provide a framework for this.

The use of indicators and a 'triple bottom line' approach to assessing transport and land use strategy options is discussed in Chapter 11.

## 6 Social conditions

This Chapter is a summary of the social assessment specialist report (Sinclair Knight Merz, 2001b).

### 6.1 The nature of the community

There are broad groupings of people within the study area; each has different needs and aspirations with respect to transport and access:

- **Students** are either resident in the area (primarily in Carlton and Parkville) or travel into the area to attend the University of Melbourne or RMIT.
- **Public housing tenants** are concentrated mainly in Carlton (Rathdowne and Nicholson Streets) Fitzroy (Brunswick and Gertrude Streets), Collingwood (Hoddle Street) and North Melbourne (Melrose Street).
- **Young professionals** are living in increasing numbers in Collingwood and Fitzroy, often in group housing (eg. warehouse conversions) and are attracted by proximity to the city and lifestyle.
- **Families** of North Carlton and North Fitzroy are described as becoming increasingly professional, upwardly mobile people “rediscovering the city”.
- **Greek/Italian communities** are located predominantly in North Fitzroy.
- **Aboriginal communities** primarily reside in Fitzroy/Collingwood, often in public housing.
- **The elderly** are scattered throughout the area in private homes or elderly person’s accommodation – several in North Carlton or North Fitzroy including Brookes Crescent on Nicholson Street, North Fitzroy, Princes Hill village on Pigdon Street, North Carlton and Rushall Crescent, North Fitzroy.
- **Workers** come into the area to work mostly during weekdays, to hospitals, the university and other locations spread throughout the area.
- **Tourists and visitors** come to the area in large numbers, especially visiting restaurants (primarily Lygon Street and Brunswick Street), sporting venues at weekends (Optus Oval and the State Hockey and Netball Centre in Royal Park), the zoo or the museum.

The community of the area therefore varies considerably by time of day and day of week.

### 6.2 Social and spatial groupings

Analysis of a range of social factors from the 1996 Census indicates that:

- Economically successful people are located more in the northern half of the study area, whilst economically vulnerable people tend to live in southern areas, closer to the CBD.
- Tertiary students are concentrated in and around the University of Melbourne and RMIT, whilst more traditional families are spread throughout the rest of the area, with some concentrations in the north, although not in high percentages overall.
- Single, aged people are also spread across the whole area, with somewhat greater concentrations in the southern parts of Fitzroy and Collingwood.

### 6.3 Community health

Various health studies and reports in the Cities of Melbourne and Yarra emphasise the wide range of health issues that must be addressed. Of particular note is the relatively high incidence of poor health amongst older age groups, low-income groups and people living in isolation or with poor connections with social networks. The incidence of various serious diseases is high and death rates tend to be high. The area is characterised by a high mixture of social groups and extremes of need and access to resources.

A significant proportion of the population is at relatively high risk of poor health, exacerbated by poor housing and under-use of services.



The three health factors that are most directly affected by transport, and which are likely to be most directly changed by different transport strategies are:

- benefits of greater exercise from the transfer of trips from motorised transport to foot or cycle
- health benefits from reduced vehicle emissions from reduced traffic flows
- health benefits from reductions in noise from reduced traffic flows, smoother traffic flows or the attenuation of traffic noise.

Car drivers and passengers can be targeted to reduce their use of motorised transport, though transfers from public transport could also be considered if foot/cycle routes become more attractive or changes in land use mix reduce travel distances.

The greatest beneficiaries of reduced air and sound emissions are likely to be those with the poorest health, those living closest to major traffic routes or those least able to adapt their dwellings to reduce the emissions received there.

#### 6.4 Accessibility and severance issues

The major roads and transport corridors in the area tend to divide communities and make access to local facilities more difficult. Some examples are:

- **Carlton** is surrounded by Elizabeth, Princes and Nicholson Streets and Victoria Parade, but access by foot is considered to be quite good, especially to the CBD in the south. Nicholson and Princes Streets are seen as greater problems, especially Princes Street as a barrier between Carlton and North Carlton, where many community facilities are located. Lygon Street is regarded as the 'heart' of Carlton.
- **Carlton North** is somewhat separated from Carlton, by Princes Street and the new municipal boundary (it used to be part of the City of Melbourne but is now in the City of Yarra). Barkly Square shopping centre to the north attracts many Carlton North residents but most use their cars to get there. Park Street residents are concerned about the effects of rat-running traffic.
- **Clifton Hill** is bisected by Hoddle Street and the rail line, which separates many residents from relevant local facilities. The proximity of the rail line also enhances accessibility to the CBD for residents, however.
- **Collingwood and Fitzroy** are surrounded by major roads, especially Hoddle Street in the east and Alexandra Parade in the north; access to the CBD is good on foot, by tram or by train, although crossing Victoria Parade is a problem for pedestrians. Hoddle Street is seen as a major barrier, and a noisy, polluted thoroughfare, with Collingwood Town Hall and station somewhat isolated to the east. Brunswick and Smith Streets are major focal points in the area.
- **Fitzroy North** residents see Alexandra Parade as a major barrier, especially to access Brunswick Street and the Fitzroy Baths.
- **North Melbourne** residents have to cross Flemington Road to access Royal Park, or Victoria Street to access Victoria Markets, which are both important local resources for residents.
- **Parkville** residents are similarly 'hemmed in' by Flemington Road and Royal Parade, although the latter has better pedestrian crossing facilities.

#### 6.5 Valued features & problems experienced

Consultations have shown that residents and users of the inner north place significant value on many of its attributes, which include:

- accessibility to the city;
- strong sense of community and vibrancy;
- social diversity, mix of people, friendliness;



- range of shops, cafes, community services and facilities;
- compactness and human scale; and
- parkland and trees

They also highlighted some problems that undermine the valued features:

- Traffic levels and their attendant problems (noise, severance, safety, pollution)
- Major new developments such as expansion at the University of Melbourne, and the State Netball and Hockey Centre in Royal Park;
- Changes to local authority boundaries which put north Carlton (Princes Hill) in the City of Yarra, reinforcing the barrier effect of Princes Street;
- Delays to north-south public transport, and lack of effective east-west public transport;
- Safety concerns preventing more walking and cycling, especially by young people;
- Increasing demand for the limited amount of parking space; and
- More transient residents (students, tenants) undermining the sense of community.

## 6.6 Opportunities and constraints

Populations and residents of the study area tend to change with time. Around 53% of the 1996 population lived at a different address in 1991, and it is likely that a broadly similar level of change will have occurred more recently. Some of these changes include:

- increasing higher-income couples and families (“gentrification”), especially within the northern sections;
- decreasing numbers of middle income families;
- increasing polarisation in terms of socio-economic status (more pockets of economically vulnerable residents and an increase in the number of upper socio-economic households); and
- increasing numbers of students.

These changes will serve to reinforce the importance of good internal and external accessibility, especially considering the large percentage of the population that is dependent on (or chooses) walking and/or public transport to get around. This represents a considerable opportunity, given the value placed on the accessibility of the area by many in the community and the fact that many are not habitual car users.

However, the extent to which the area is divided by major roads and the increasing number of land uses attracting more visitors and trips to the area represent a threat to the level of accessibility and general livability of the area.

Health issues are already a significant concern (particularly in the City of Yarra) and many health issues are attributed to the physical environment, including the transport system. Enhancing access to services and facilities, and reducing noise and air pollution from transport, will help improve residents’ health.

## 7 Environmental considerations

This Chapter (and Chapter 5 on sustainability) is a summary of the environment specialist report (Maunsell McIntyre, 2001b).

### 7.1 Noise and vibration

Noise affects the community and may cause human health impacts such as sleep disturbance, annoyance and other physiological effects. Meetings with community representatives and the community attitude survey indicate that noise related issues are a major concern in the study area. Road traffic noise is the main issue, but noise from other sources such as sporting venues, music venues and trains is also of concern.

The community attitude survey (see Chapter 10) provides some insight into the level of concern over environmental noise. For example, 30% of respondents were “very dissatisfied” with the amount of truck traffic, and 26% of respondents were “very dissatisfied” with levels of traffic noise in the study area.

In 1993, a benchmark study was undertaken for the Australian and New Zealand Environment and Conservation Council (ANZECC). The study was of the road traffic noise exposure of people living in major cities in Australia. It was found that “...over 9% of the Australian population are exposed to  $L_{10}18hr$  of 68dB(A) or above...”

It is noted that noise levels over 68dB(A)  $L_{10}18hr$  are considered in an OECD report to be “unacceptable.”

Past noise monitoring has been examined from a Marshall Day database and measurements made by VicRoads at residences affected by high levels of traffic noise within the study area. Most of the noise measurements recorded are higher than the VicRoads noise limit of 63dB(A). Many are also higher than the OECD’s “unacceptable” level of 68dB(A). Noise monitoring is currently being undertaken adjacent to City Link to ensure that the 63dB(A) noise limit has been complied with.

**Table 7.1 Summary of historical noise monitoring**

Properties in:	Noise Source	Dates Monitored	Observed Noise ( $L_{10}18hr$ dB(A))
Abbotsford	Eastern Freeway	1978-1996	64-69
Carlton	Princes St	1978-1995	65-77
Carlton North	Park St	1976-1979	65-68
Clifton Hill	Eastern Freeway	1978-1992	61-79
Collingwood	Eastern Freeway/Alexandra Pde	1978-1997	68-74
Fitzroy	Eastern Freeway/Alexandra Pde	1978-1994	72-78
Fitzroy North	Eastern Freeway/Alexandra Pde	1979-1994	71-74
North Melbourne	Abbotsford St/Dryburgh St /Boundary Rd	1984-1992	57-81
Parkville	Tullamarine Freeway	1989-1993	69-72*

Note: VicRoads limit is 63dB(A), OECD ‘unacceptable’ limit is 68dB(A)

Source: Maunsell McIntyre 2001b

\* Before noise barrier construction as part of City Link

As shown in Table 7.1, particularly high noise levels were observed adjacent to the Eastern Freeway and Alexandra Parade, and Boundary Road in North Melbourne, prior to City Link. More high noise areas are to be expected adjacent to other roads with similar traffic levels.

Further noise monitoring is being undertaken at a variety of sites within the study area (including some of those in Table 7.1), to highlight changes since City Link and the Eastern Freeway extension opened, and the way in which the noise environment varies depending on local traffic volumes.

## 7.2 Air quality

There are strong community concerns about air emission sources including industrial facilities and traffic flows. Emissions from motor vehicles are the major source of air quality pollutants in the study area, and has been identified as the most significant contributor to Melbourne's air pollution. Industry is considered the second largest contributor.

As motor vehicles emit pollutants close to the ground, stable surface inversion layers can trap them. With little chance of dispersion, they can build up and persist over large areas especially where high traffic densities exist, such as in and around the CBD and alongside major arterial routes. Emission rates from vehicles vary with vehicle type, age, fuel type, traffic flow and grade of road. Decreasing emissions from unleaded petrol and catalytic converters is partially offset by the expected growth in traffic around Melbourne.

The Victorian Environmental Protection Authority (EPA) and the National Environment Protection Measure (NEPM) have identified the following air pollutants to have direct and measurable health implications:

- Ozone (O<sub>3</sub>);
- fine particles (PM<sub>10</sub> and PM<sub>2.5</sub>);
- Carbon Monoxide (CO);
- Nitrogen Dioxide (NO<sub>2</sub>);
- Lead (Pb);
- Sulphur Dioxide (SO<sub>2</sub>); and
- Volatile Organic Compounds (VOC).

Motor vehicles generate carbon monoxide, lead and a complex mix of organic compounds. On a typical summer day, 80% of nitrogen oxides, 50% of volatile organic hydrocarbons, 46% of airborne particles and over 70% of carbon monoxide is attributable to motor vehicles. Motor vehicles are the only significant source of airborne lead emissions.

**Table 7.2 Air quality guidelines**

Pollutant	Concentration	Averaging time
Ozone	100 parts per billion	1 hour
	80 parts per billion	4 hours
	50 parts per billion	8 hours
Sulphur Dioxide	200 parts per billion	1 hour
	80 parts per billion	24 hours
Particulate Matter <10mg/m <sup>3</sup>	50 mg/m <sup>3</sup>	24 hour maximum
Airborne Particulate Matter	2.35 Bscat*10 <sup>-4</sup> m <sup>-1</sup>	1 hour
Nitrogen Dioxide	120 parts per billion	1 hour maximum
	60 parts per billion	Annual maximum
Carbon Monoxide	9000 parts per billion	8 hour maximum
Lead	0.50mg/m <sup>3</sup>	Annual
PM <sub>2.5</sub>	65mg/m <sup>3</sup>	24 hour
PM <sub>10</sub>	50mg/m <sup>3</sup>	24 hour

*Source: Maunsell McIntyre 2001b*

Table 7.2 shows criteria to be used for assessing air quality, from NEPM/Victorian EPA goals where applicable.

These pollutants have been monitored from Air Quality Monitoring Stations located at Alphington, RMIT, Richmond and Collingwood. Data from 1999 and 2000 shows the following:

- Ozone concentrations are consistently higher in Alphington, and have exceeded the environmental objective in summer.
- Sulphur Dioxide concentrations are consistently higher at the RMIT site although all maximum concentrations recorded are below the environmental objective.

- Airborne Particulate Matter concentrations at both the Alphington and RMIT sites recorded concentrations above the environmental objective.
- Nitrogen Dioxide concentrations were consistently higher from the RMIT AQMS. No concentrations recorded were above the environmental quality objective.
- Carbon Monoxide concentrations recorded were generally higher in the winter months at the Alphington site and were fairly similar at both Alphington and RMIT for the remainder of the year.
- Lead concentrations recorded were significantly higher at Collingwood. Lead concentrations were decreasing from 1999 to 2000.
- Collingwood recorded the highest concentrations of PM10 on average. In winter 1999 the environmental objective was exceeded, this is likely to be due to additional emissions from wood fires.

The City of Yarra and the City of Melbourne have implemented programs to improve current air quality. These programs are aimed at reducing car dependency through integrated transport and land use planning strategies, encouraging industries to reduce emissions through implementing eco-efficient practical measures, best practice environmental guidelines and proven control technology.

### 7.3 Greenhouse gas emissions

Motor vehicles burn fuel and generate greenhouse gases that contribute to the global warming effect. These gases include carbon dioxide, methane and nitrous oxide; the latter two gases are emitted in smaller quantities but have far greater warming potential than carbon dioxide.

The transport sector is one of the largest sources of greenhouse gas emissions in Australia, and private transport is the largest urban land use related source.

Greenhouse gas emission reduction strategies are in place at National, State and Local Government levels. All these strategies recognise the importance of reducing emissions from transport activity as one of the primary ways to reduce greenhouse gas emissions.

Transport sector emissions are estimated at 73.9 million tonnes of carbon dioxide equivalents in 1999, an increase of 20.3% from 1990 levels. Transport emissions have increased steadily by 2% each year, making it one of the fastest growing sectors over this period. Road transport emissions have been the main contributor to this consistent growth. Passenger cars comprise over 60% of road transport's greenhouse gas emissions, and exhibited the greatest increase in emissions between 1990 and 1999.

### 7.4 Soil and groundwater

Contamination is defined in the National Environment Protection (Assessment of Site Contamination) Measure as:

*'...where any chemical substance or waste has been added at above the background level and represents, or potentially represents, an adverse health or environmental impact' (NEPM, Assessment of Site Contamination 1999)*

Impacts from soil and groundwater contamination are directly related to the contamination exposure pathways, which include, for humans, inhalation and ingestion of soil, and uptake and accumulation by plants and animals.

Potential soil and groundwater contamination is typically associated with current and previous industrial activities undertaken in the study area, including:



- heavy metal contamination associated with industrial activities such as dye works;
- polychlorinated biphenyl (PCB) contamination associated with electricity supply systems and electrical equipment maintenance depots;
- asbestos contamination associated with industrial and residential structures, and transport activities (eg. brake pads in vehicles);
- organochlorine contamination due to pesticide and herbicide use around industrial, residential and recreational areas;
- paint, oil and grease contamination from current transport and industrial activity (eg the old central railway link which passes through the area);
- hydrocarbon contamination from fuel storage tanks (eg at service stations);
- uncontrolled dumping on derelict sites; and
- potential contamination in imported fills.

The potential for soil and groundwater contamination will need to be assessed as further redevelopment and rezoning of the study area takes place.

## 7.5 Vegetation and habitat

Despite extensive development in the study area, there still remains a small amount of native vegetation and fauna habitat, generally located along waterways and in some parks. The small and localised nature of these remaining areas of vegetation and fauna habitat means that the impacts of any developments need to be recognised and considered.

Originally, Plains Grassy Woodland would have covered the bulk of the study area (away from rivers and streams). Riparian Woodland would have occurred along the Yarra River. Within and adjacent to the study area, Escarpment Shrubland, Riparian Scrub and Aquatic Herbland would have occurred along Merri Creek, with probably a similar range of Ecological Vegetation Classes<sup>3</sup> (EVCs) along Moonee Ponds Creek. Extremely little native vegetation remains in the study area. There are degraded remnants of Riparian Woodland along the Yarra River and degraded remnants of Escarpment Shrubland, Riparian Scrub and Aquatic Herbland along the Merri Creek, some of which have been the subject of intensive revegetation projects in recent years. Virtually no native vegetation remains along Moonee Ponds Creek. The past occurrence of Plains Grassy Woodland is indicated by the presence of remnant River Red Gums away from the riparian zone of the Yarra River, notably in Royal Park.

The Flora Information System database records 95 native flora species in the area, seven planted non-indigenous native species and 183 introduced species. The bulk of the records of native flora species are from the Yarra River and Merri Creek. One species (the Small Burr-grass) is of state significance although it is probably introduced in the area.

One hundred and forty-six native fauna species have been recorded from the study area on the Atlas of Victorian Wildlife (108 birds, 9 mammals, 14 reptiles, 4 frogs and 11 fish). Of these, one mammal (Eastern Quoll) is now extinct in Victoria and one is a marine mammal (Bottlenose Dolphin) that must have strayed up the Yarra River. Three of the fish species (Murray Cod, Macquarie Perch, and Yarra Pygmy Perch) have not been recorded since 1970 and are likely to be locally extinct. Five of the bird species have not been recorded since 1970, but all are species that are likely to still occasionally occur in the study area.

Two bird species of national significance (Swift Parrot, Regent Honeyeater) and six of state significance (Lewin's Rail, Royal Spoonbill, Great Egret, Nankeen Night Heron, Australasian

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<sup>3</sup> Ecological Vegetation Classes are the vegetation classification units used throughout Victoria to describe native vegetation; the EVC names and the typology of the vegetation they describe are administered by the Department of Natural Resources and Environment.

Shoveler, and Hardhead) have been recorded from or adjacent to the study area. The Swift Parrot and the Regent Honeyeater are nomadic species that feed on flowering eucalypts; both probably visit the study area infrequently in small numbers. These two species are listed under the EPBC Act. The other significant bird species are all waterbirds and are concentrated around the artificial wetlands in Melbourne Zoo and nearby parks, except for Lewin's Rail, which was recorded in Fitzroy in 1957, an area where no suitable habitat now remains. The study area does not provide more than minor habitat for any of these species.

One mammal of state significance (Grey-headed Flying Fox), one reptile of national significance (Striped Legless Lizard) and one frog of national significance (Warty Bell Frog) have been recorded from or adjacent to the study area. The flying fox is widely recorded in inner Melbourne, from the colony in the Botanical Gardens. The Striped Legless Lizard was recorded near the confluence of Merri Creek and the Yarra River in 1975; it is possible but unlikely that it still occurs. The Warty Bell Frog was recorded from the Exhibition Gardens, where it is highly unlikely to occur naturally – it may have been intentionally introduced.

The vegetation and habitat along the Yarra River and Merri Creek is of local to regional significance, depending on its condition, which is highly variable. The remnant River Red Gum stands in Royal Park are of high local to regional significance, also depending on their condition, which is highly variable.

## 7.6 Stormwater and water quality

In urban catchments, stormwater is a major contributor to the pollution of waterways. As the majority of the study area is urbanised, contamination of local waterways from urban stormwater runoff is a potential concern.

Urban drainage systems developed during the last century have focused solely on the management of urban flood events (often due to increased run-off from paved areas), and thus hydraulic capacity and water transport characteristics have been the principal considerations. However, urbanisation has also resulted in significant changes to the quality, as well as the quantity, of water transported.

The study area is bounded by Moonee Ponds Creek to the west, the Yarra River to the east, and Merri Creek to the north-east, forming the lower reaches of the Yarra catchment. The Yarra River channel within the study area has been modified considerably as a result of urbanisation. Parts of the river channel, particularly downstream of Dights Falls, have been modified to improve water drainage during periods of high flows and to protect nearby residential areas from flooding. Works have included straightening and realignment of the channel, as well as deepening and widening the river to increase flood channel capacity.

Historically, the Yarra River catchment has received highly contaminated discharges from industrial premises (such as tanneries, abattoirs, and breweries), unsewered areas, septic tanks, sewage treatment plants and sewer overflows. However, over the past 20 years there has been a general improvement in water quality resulting from the sewerage of catchments and the diversion of industrial discharges into the sewer system. There is still potential for urban stormwater to discharge to these waterways and impact water quality.

Water quality monitoring is conducted at stations along Moonee Ponds Creek, the Yarra River and Merri Creek as part of the Healthy Waterways Programme for Port Philip Bay and Western Catchments and the Merri Moonee Community Waterwatch programme. In 1999 the waterways were graded as fair to poor according to SEPP (State Environment Protection Policy) objectives. Of particular concern is the high level of nutrient and bacterial contamination in Moonee Ponds Creek, possibly caused by leakage or spills from sewers.



The waters of the Yarra catchment (incorporating Merri Creek and Moonee Ponds Creek tributaries) support a wide range of beneficial uses and values, including recreational use (eg swimming, boating and fishing), tourism and support for aquatic ecosystems. Many of these beneficial uses depend on acceptable water quality.

## 7.7 Opportunities and constraints

A summary of the environmental opportunities and constraints to consider in the study follows:

- **Noise** – residents living within the Northern Central City Corridor primary study area are affected by noise from stop-start traffic on several major arterial roads (and other heavily trafficked roads), but are also affected by noise from free-flowing traffic on the Tullamarine and Eastern Freeways. There are a number of opportunities for controlling road traffic noise, including road design, road surfacing materials, noise barriers, truck bans, intersection design and land use planning.
- **Airborne pollutants and greenhouse gas** – significant air pollutant and greenhouse gas reductions are unlikely in the short term without major changes to patterns of transport use. Medium term adjustments will probably depend on technological breakthroughs, and/or a marked change of attitude. Primary methods to reduce impact from private vehicles include change of travel mode, improved vehicle efficiency and fuel economy. Many of the opportunities to reduce emissions presented by this study will require significant attitudinal changes towards travel and the mode of transport used. This requires further government policy development (some of which will be covered by the Metropolitan Strategy currently being prepared) and intensive promotion to encourage community change.
- **Soil and groundwater contamination** – investigations suggest that the key soil and groundwater contamination constraint arises from the historical placement of contamination sources (such as industrial sites) close to contamination receptors (primarily watercourses, drains and residential areas). Opportunities are presented to create buffer zones between them, to contain and allow cleaning-up of contamination more readily.
- **Vegetation and habitat** – the Yarra River and Merri Creek are the major areas of ecological value in or adjacent to the study area and represent a significant constraint to any proposal. However, their condition varies greatly which may provide some areas where there are opportunities. Royal Park is the next most important area ecologically and also represents a significant constraint. The various artificial wetlands in the study area do not pose ecological constraints provided any disruptions are remedied. The remainder of the study area poses no or minimal ecological constraints.
- **Stormwater and water quality** – preservation and improvement of water quality in the Yarra River and creeks would be a beneficial by-product of improvements to the transport system and land use in the area. Opportunities to reduce direct runoff and/or intercept pollutants from urban development should be also explored for the options and projects that may be considered.



## 8 Heritage, landscape and urban design

This Chapter is a summary of the heritage, landscape and urban design specialist report (Helen Lardner Conservation and Design, 2001).

The history of the study area can be traced back to pre-contact Aboriginal tribal lands and to the earliest days of European settlement. It includes the first of Melbourne's developed suburbs (Fitzroy and Collingwood); the evolution of important transport routes; many landmark places; heritage precincts related to the industrial, ecclesiastical and social history of Melbourne; and the area's parklands and reserves, originally a vast green belt which surrounded the infant township and its suburbs. The study area is of great significance for the amount of physical evidence that remains to illustrate this history, especially the two periods of accelerated growth during the 1850s gold rush era and the 1880s boom years.

### 8.1 Pre-European settlement

The area has a rich Aboriginal history; Aboriginal people were living in the Maribyrnong Valley about 16,000 years ago. The south-eastern and eastern parts of the area have a more or less continuous history of occupation from deep in time to the present. Changes over such a long time, coupled with the ground disturbance in the course of the development of Melbourne, have erased most of the evidence, but a number of Aboriginal sites have been identified by archaeological surveys and excavations in the middle valleys of Yarra River, Moonee Ponds Creek and Merri Creek. The remarkable survival of such fragile sites is evidence that this was a region frequented by many generations of hunting and gathering communities.

### 8.2 Melbourne's development

A summary of some of the key points in Melbourne's development is given in Table 8.1. The information illustrates the significance of the study area to the early development of the city, its transport systems and the evolving relationship between Indigenous and non-Indigenous people.

**Table 8.1 Summary of development history**

Year	Major events
1835-1850	Robert Hoddle's Plan for Melbourne and its environs (early tracks to Heidelberg Road & Sydney Road shown). Old Melbourne Cemetery opened (site of present Queen Victoria Market). First sale of suburban lands in Fitzroy, Collingwood, Richmond. New Sydney Road alignment gazetted. Brunswick Street, Fitzroy becomes an early commercial centre for local area. Numerous corroborees held in vicinity of Royal Parade and Melbourne General Cemetery. Wurundjeri willam headman Billibellary died at the Yarra/Merri confluence encampment and was buried there. First Aboriginal school in Victoria at the confluence
1850-1880	Victoria separates from NSW, gold discovered in Victoria. Melbourne General Cemetery established in Carlton (replaced earlier cemetery on Queen Victoria Market site). Melbourne University in Carlton's first main buildings completed. Borough of Fitzroy formed. North Melbourne Railway Station built. Zoological & Acclimatisation Society's associations with Royal Park begin. Coranderrk Aboriginal station opened in Healesville for relocation of aboriginal people from Melbourne. Smith and Brunswick Streets become important commercial centres, said to be equal to Bourke Street. Development in Parkville, terrace housing etc.
1880-1900	Exhibition Building in Carlton Gardens. Fitzroy cable tram routes via Gertrude, Nicholson, Smith & Brunswick Streets. Victorian Aborigines Act passed. Aboriginal people of mixed descent evicted from the missions. Collingwood cable tram route via Johnston & Victoria Streets. Carlton North cable tram route via Rathdowne Street. Establishment of large commercial complexes in Fitzroy & Collingwood. Railway stations at Victoria Park, Clifton Hill, North Fitzroy (Nicholson Street), Fitzroy (Edinburgh Gardens), North Carlton (Langridge Street), Royal Park, Flemington Bridge, Macaulay (some part of Outer Circle line). Horse tramway to the Zoo in Royal Park.
1900-1920	Collingwood Station built on its present site.



Year	Major events
	Fitzroy & Collingwood's commercial streets in decline. Residents move to more desirable areas. Queen's Infectious Diseases Hospital opened at Yarra Bend.
1920-1940	Horse tramway to Zoo closed. Yarra Bend Lunatic Asylum closed; Yarra Bend gazetted as 'permanent reserve'. Rushall Station opened. Cable tram network closed, some replaced by buses using same routes. William Cooper set up the Australian Aborigines League in Victoria Parade Slum Abolition Board formed (concern about slum housing in Fitzroy & Collingwood).
1940-1960	Wurundjeri men go to the 2nd World War, men and women contribute to the war effort at home. Customers of shops in Smith and Gertrude Street shopping in other suburbs or CBD; middle class residents of Collingwood & Fitzroy have gone to outer suburbs. Electric trams replace buses on former cable tram routes. Last two Outer Circle railway stations close: North Carlton and North Fitzroy.
1960-1980	Housing estates built in Collingwood & Fitzroy (concrete towers); residential and commercial buildings demolished and local communities moved. Eastern Freeway built – widening of Alexandra Avenue and Hoddle Street. Revival of commercial streets in inner suburbs, particularly Brunswick and Smith Streets. North Carlton Railway Station becomes a community centre. Tullamarine Freeway constructed. Destruction of most the Aboriginal sites at the confluence. Aboriginal Lands Act passed. Aboriginal Health & Legal Services opened in Fitzroy. Child Care Agency founded in Brunswick Street, Fitzroy.
1980-2000	Middle class residents move into inner suburbs and restore 19th century houses. By 1980s Brunswick Street has become a popular, cosmopolitan shopping centre. Aboriginal and Torres Strait Islander Heritage Protection Act passed to protect Aboriginal sites and Places. Establishment of the Wurundjeri Tribe Land Compensation and Cultural Heritage Council. City of Yarra formed. Most of Melbourne's 5,986 Aboriginal people lived in Fitzroy, Northcote, and Preston (1986 Census). Eastern Freeway extended to Springvale Road, further widening of Alexandra Parade. Establishment of the Aboriginal Information Centre, Fitzroy, the Aboriginal Cultural Heritage Unit at the Museum of Victoria, and Aboriginal History Programme (Collingwood Aboriginal women).
2000 on	City Link Freeway built. Bunjilaka gallery in the new Melbourne Museum opened.

Source: Helen Lardner Conservation & Design 2001

### 8.3 Heritage protection

The study area has a well-established statutory framework relating to heritage, landscape and urban design. Protection of significant sites and control of landscape and urban design considerations is mainly provided at the Local Planning Scheme level through overlays, local policies and policy reference documents. Heritage Overlays, Design Development Overlays and Environmental Significance Overlays cover almost all of the inner north; the Heritage Overlays being the most extensive. Council Municipal Strategic Statements are committed to protection of heritage, retention of open space and consideration of urban design.

There are many sites of Aboriginal significance in the area that are protected by the Aboriginal and Torres Strait Islander Heritage Protection Act. The Merri Creek and Yarra River environs are of particular Aboriginal heritage significance; this is also reflected in their planning scheme protection.

The study area has a large number of places of cultural heritage significance, reflected in their statutory protection and supported by numerous heritage studies, survey work and individual assessments. There are approximately 170 places in the study area included on the Victorian Heritage Register. These sites are automatically mapped in the Local Planning Scheme Heritage Overlay maps. A large number are in the Fitzroy and Carlton areas. Large sites that are registered within the area include:

- Royal Melbourne Zoo, Parkville.
- Royal Exhibition Building and associated gardens, Carlton.
- Convent of the Good Shepherd, Collingwood.
- Numerous buildings within Melbourne University, Parkville.
- Foy & Gibson Complex, Collingwood.
- Melbourne General Cemetery, Parkville.

Other types of buildings included on the register include church buildings, terrace housing, individual residences and public buildings. Permits are required to make changes to places listed on the Heritage Register.

Most of the study area is subject to Heritage Overlay controls in local planning schemes. Councils are committed to heritage conservation through their Municipal Strategic Statements, local policies and heritage related studies.

#### **8.4 Summary of consultation findings**

Key places, journeys and themes emerged during community consultation and were documented by community photographers during investigation of this component of the study. The findings are summarised below.

Transport patterns, proximity to the city, and the historic layout:

- Evidence of historic development patterns creates a strong sense of continuity with the past.
- High degree of heritage significance with many intact streetscapes, individual places and precincts.
- Continuous link between Aboriginal people and the area since pre-contact.
- Physical layout of streets, properties and open space promotes community interaction and makes streets function as public places.
- Proximity to the city, both physically and as a visual link.
- Established transport routes, especially north-south or following landscape features.
- Variety of modes of travel used to appreciate the environs.
- Historic public transport patterns still evident today.
- Many vistas and landmarks orientating people and identifying their neighbourhood.
- Long range vistas available across open space.
- Recent impact of traffic through the area, which has caused Alexandra Parade/Princes Street and Hoddle Street to become major physical and emotional barriers to movement, isolating parts of Parkville and making parts of residential Abbotsford traffic through routes.

Rivers, parks, gardens and the open space network:

- Street trees, median strips and tree lined boulevards greening the urban environment.
- Rivers, parks and gardens forming an important linked open space network.
- Variety of parks and gardens, more formal in the south and flowing, open space to the north.
- Extensive remnant vegetation and habitat in the river corridors and other parts of the study area.
- Importance of the confluence of the Merri Creek and the Yarra River to Aboriginal culture.

Land use and development:

- Many landmark buildings and places providing destinations within the area.
- Residential development patterns retain substantial evidence of the two periods of accelerated growth, during the 1850s gold rush era and the 1880s boom years.
- Retention of many 19th century landmark buildings.
- Mix of industrial and residential development creates a special urban character in North Melbourne, east Fitzroy, Collingwood and Abbotsford.
- Fitzroy and Collingwood as Melbourne's first suburbs, with a high retention of 1850s building stock in Fitzroy.



- The layering of changes due to slum clearance, housing replacement programs, gentrification, post war immigration and increased institutional development over the 19th century strata.
- Consolidated strips of commercial development and café society in Smith Street, Brunswick Street, Lygon Street and Victoria Street, and the retention of many local shopping strips north of Alexandra Parade.
- The current high degree of statutory protection of heritage, landscape and urban design within the study area based on extensive research and reflecting strong commitment to these values.

## 8.5 Opportunities and constraints

Preservation of the strong and highly significant heritage, landscape and urban design features of the area should be regarded as a major constraint to the inappropriate development of infrastructure.

Opportunities exist to preserve and enhance heritage and urban design values in a number of key locations around the study area, including:

- **Royal Parade/Park Street/The Avenue** – the northern gateway to Royal Park with outstanding cultural and landscape significance.
- **Flemington Road/Elliott Avenue/Racecourse Road** – a highly functional intersection with few urban design, heritage or landscape attributes, and significant potential for amenity improvement.
- **Princes Street/College Crescent/Cemetery Road East and West** – part of the east-west route through the middle of the area, with well-defined entries at each end and very high landscape and heritage values. Opportunities exist for improvement especially at the east entry (Lygon Street intersection) in residential scale streets. There is also conflict between traffic and the cultural/ landscape values of Royal Park and south Parkville at the western end.
- **Alexandra Parade/Queens Parade/Nicholson Street** – one of the important junctions in the area where high heritage and landscape values are compromised by traffic functions and some poor development. Significant scope for improvement exists.
- **Arden Street/Courtney Street/Chetwynd Street, North Melbourne** – mix of industrial, institutional and residential development with distinctive urban character, but affected by traffic volumes including heavy vehicles on Arden Street.
- **Hoddle Street/Eastern Freeway** – a main gateway into the area from the east, dominated by the scale of the freeway infrastructure and with little of the original urban structure intact, save for the landmark shot tower.
- **Victoria Parade/Hoddle Street** – Hoddle Street divides Collingwood and Abbotsford; opportunities exist to create landscape relationship for Victoria Street and Victoria Parade, across the Hoddle Street intersection.
- **Abbotsford north of Victoria Street** – a major traffic link exists between Johnston/ Hoddle Streets and Victoria Street, utilising Victoria Crescent and other roads. The high traffic load includes heavy vehicles resulting in loss of amenity.

## 9 Engineering considerations

This Chapter is a summary of the initial engineering specialist report (Sinclair Knight Merz, 2001a).

### 9.1 Transport and land use engineering

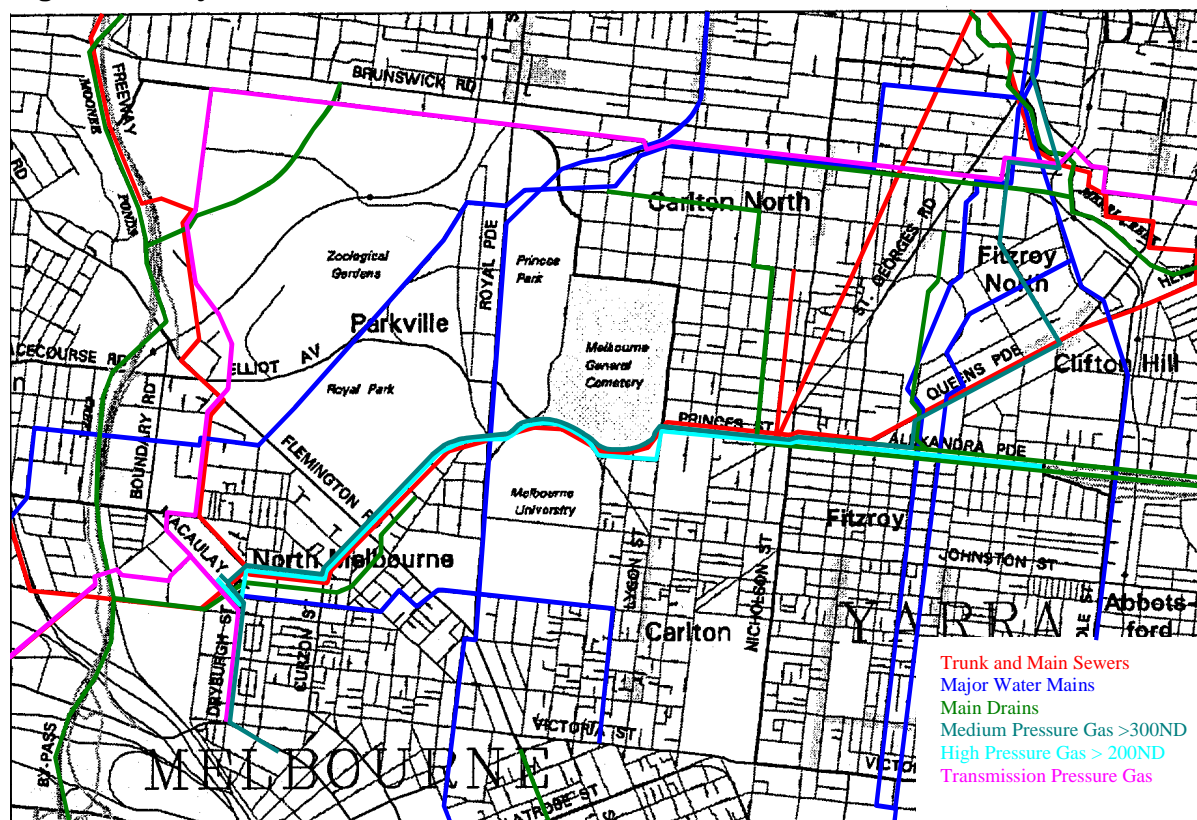
Transport infrastructure is described in Chapter 4. The existing transport infrastructure provides both opportunities and constraints to development and improvement, given the limitations of fixed widths, the multiple and often conflicting uses and transport functions, and the need to preserve and enhance amenity. Recognition of the historical development of the area, and its influence on present day movement patterns, is also important.

Engineering of transport and land use solutions for the area will require sympathy and integration with the existing urban fabric, avoiding any adverse effects such as demolition of valuable property or inappropriate encroachment on parks and open spaces.

### 9.2 Services and utilities

Major services and utilities (Figure 9.1) share the main transport corridors in the area, especially Princes Street/Alexandra Parade, Hoddle Street, Cemetery Road East, College Crescent, Gatehouse Street and Harker Street/Haines Street.

**Figure 9.1 Major services and utilities**



Source: Sinclair Knight Merz 2001a

#### 9.2.1 Drainage

Two major drains are located under the median in Alexandra Parade, both discharging into Merri Creek. Substantial lengths of the drains were upgraded in 1995.

Other main drains run through Royal Park and North Melbourne.

The only waterways are Merri Creek and Moonee Ponds Creek, and the Yarra River on the eastern edge of the area. Flood information is generally available for the study area and impacts on overland flow paths would need to be considered for specific initiatives.

### 9.2.2 Gas

Gas mains of different sizes traverse and serve the study area. Origin Energy operates/manages the gas distribution network east of the Tullamarine Freeway and TXU Networks operates the area west of the freeway. The assets are owned by Envestra Pipelines who would be signatories to contracts affecting them.

### 9.2.3 Electricity

Electricity supply infrastructure includes underground cables, poles, overhead lines, and electricity substations throughout the area. More specific constraints and costs would need to be identified as part of the detailed development of proposals.

### 9.2.4 Water and sewerage

A major trunk sewer that collects sewage from the northern suburbs runs east-west through the study area, and is located at depth beneath Carlton North and Parkville.

Major water supply mains from Preston into the CBD and inner suburbs run north-south through the area, in the vicinities of Smith Street, Royal Parade and beneath Royal Park.

### 9.2.5 Telecommunications

Telstra and Optus have telephone lines and fibre optic cable overhead and underground services throughout the study area. UE Comm has optic fibre assets along many major routes in the study area close to the CBD. Optus and UE Comm assets are usually found within conduit assets of other authorities such as Telstra and Citipower. Where there are no existing conduits they have constructed their own.

MK International manage fibre optic assets in the Melbourne CBD area only. At this time they have no plans to extend their assets into the study area.

## 9.3 Topography

Height above sea level in the study area ranges from about 10 metres to over 50 metres. In general, the eastern and western parts of the area are lowest (the Yarra River and Moonee Ponds Creek valleys respectively), and a higher ridge runs from the vicinity of the Victoria Parade/Brunswick Street intersection northwards through Carlton, the University and Royal Park.

## 9.4 Geology

The general stratigraphy of the study area is summarised in Table 9.1. The most commonly exposed geological units across the study area are the underlying Silurian aged sandstones of the Dargille Formation, and the Quaternary aged basalts of the Newer Volcanics. The Silurian sandstone forms the higher ground of the area, outcropping at various places on the ridge from south Fitzroy through to north-west Parkville and Royal Park. Quaternary alluvial sediments are restricted to the Yarra Valley, Yarra Delta and Merri Creek. The North Melbourne and Parkville areas are generally associated with Brighton Group alluvials and Older Volcanic Basalts (which are often weathered to clay). The North Melbourne area also has Coode Island Silt deposits present on the western side of Flemington Road.

The Werribee Formation, Moray St Gravels and Fishermens Bend Silt occur below the surface in parts of the study area.

**Table 9.1 Stratigraphy of the study area (from oldest to youngest)**

Age	General Geological Type	Code	Name	Description
Silurian	Mudstone and sandstone	Sla	Deep Creek Formation	Massive mudstone interbedded with thin sandstone and shale
		Sud	Dargile Formation	Sandstone interbedded with minor interbeds of mudstone and shale
Lower Tertiary	Alluvials	Tew*	Werribee Formation	Sand, sandy and silty clay
	Volcanics	Tvo	Older Volcanics	Basalt, often deeply weathered to clay
Upper Tertiary	Alluvials	Tpb	Brighton Group	Sand, sandy clay, silt and gravel
Quaternary	Volcanics	Qvn	Newer Volcanics	Basalt, scoria, minor tuff and sand, clay
	Alluvials	Qrp*	Moray St Gravels	Gravel and sand, minor silt, clay and carbonaceous clay
		Qpf*	Fishermens Bend Silt	Silty Clay, minor sandy clay and silt
		Qp	Coode Island Silt	Silt, silty clay, sandy clay, minor peat and shell beds
		Qrd	Port Melbourne Sands	Shelly sand, minor silty or clayey sand
		Qrc	Alluvial Fan Deposits	Gravel, sand, minor silt
		Qra	River Alluvium	Sand, silt, clay, minor gravel

Source: Sinclair Knight Merz 2001b

Geological implications for transport engineering solutions will be examined as part of the assessment of options in the study.

## 9.5 Hydrogeology

Groundwater will be encountered to varying extents in each of the geological sequences in the study area. The Silurian mudstones and sandstones are of low porosity, although joints and fractures may carry significant volumes of water. The volcanic deposits can be water bearing, but the degree is highly dependent on the amount of weathering, which is itself highly variable in the area. Alluvial deposits are also variable in their water-bearing capacity, depending on clay content and the extent of sand lenses. The Quaternary alluvial deposits probably have the greatest potential as aquifers.

Available data suggests that groundwater quality is relatively low, primarily because of high salinity.

Groundwater flow will probably be generally north-south, following the topography of the area, with some alterations towards the river and creek channels to the east and west. The water table is around 3.5 to 13 metres deep from available information, being closest to the surface in the south western parts of the area, and deeper over the rest where ground elevations are higher.

The implications that transport and land use options may have for the groundwater regime will be explored during the rest of the study.

## 10 Community consultation

The initial phase of the study has involved consultation with the community and a range of interest groups, headed by those represented on the study's Community Reference Group. The results of this consultation are summarised below.

### 10.1 Community Reference Group

A workshop was held with the Community Reference Group on 11 April 2001, with a follow-up session on 9 May 2001 for some members who could not attend the first. These workshops explored three main aspects:

- current problems and issues;
- desired future conditions; and
- initiatives to achieve the desired future

The results are summarised in Table 10.1 to Table 10.3 below, under each of the above headings.

**Table 10.1 Current problems and issues**

Category	Problem/issue
Public transport	Lack of encouragement to use Privatisation (of PT) should help Buses hampered by other traffic Public preference for light over heavy rail No PT infrastructure in outer areas PT set up in opposition to cars – need total package/funding Concentrations of students' locations and travel times makes it hard to service with PT Trucks on Brunswick and Smith Streets hamper the trams
Cars	Public dependence on cars – a mindset, especially for people in outer suburbs Low occupancy of cars – most with only one person Tax incentives encourage the use of cars, eg. by corporate executives – need disincentives Enormous demand for parking
Demographics/ growth	Demographic changes are changing transport needs – perpetuation of outer suburbs habits (re car use) Cultural facilities, development and weekend activities attract more people to inner city Amenity, health and environment are becoming key issues Better standards needed, eg. air quality Need local safety, clean air and a 'human scale' built environment
Traffic movements	Heavy vehicle movements between Tullamarine and Eastern Freeways Transport of hazardous goods on local roads City Link has failed (to take traffic off local roads) Congestion in peaks on both local and arterial roads Lack of understanding of origins and destinations - local through movements (including freight etc) Growing use of smaller commercial vehicles – smaller loads and more stops Increasing congestion outside peak times, eg. weekends, and early morning to the airport
Road Network	Trucks use local roads to avoid tolls New roads generate more demand for car travel Eastern Freeway extension and Scoresby will increase traffic at the city end of Eastern Freeway Majority of Eastern Freeway traffic is city-bound – only small amount goes to Tullamarine Freeway Major roads (eg. Hoddle Street, Princes Street) divide local areas – create 'rat runs' in local streets
Bikes	Difficult for bicycle users to travel east-west Lack of designated bicycle lanes Drivers' lack of understanding of the laws relating to bicycle lanes North-south cyclists find it hard to get across major roads (eg Johnston Street) Traffic light changes at large intersections take too long for cyclists Poor road/ track conditions and safety for cyclists Not enough information on how many people would cycle given better facilities Poor access to the CBD Discouragement of bike use in local parks and parkland
Parks/open spaces	Pressure to use open space for urban development and roads



**Table 10.2 Desired future conditions**

Improved amenity	Integrated land use and transport	Shift to public transport	Revitalised neighbourhoods	Transparent pricing policies	Designated freight routes
Reduced pollution: air, noise, particle	More intelligent use of roads	PT preferred mode of transport	Think local – reside, work and shop	User pays for road system	Essential freight on few selected routes
Healthier, less-stressed community	Well managed arterial network	Reduced car ownership	Revitalised shopping, business, network links	Know the cost of your trip	No deliveries during peak hours
Improved amenity standards	Less through traffic to local streets	Higher PT use (especially CBD)	Less asphalt	\$100 for car to enter CAD cordon	
Positive environmental benefits	Seamless transport system	Reduced traffic congestion	More of the same – lets not fix what's not broken	Transport funding from single pool	
	Less dependence on core CBD	Faster, more efficient PT	More mixed land uses	Reasonable public transport costs	
	Increased use of park-and-ride	PT more accessible		Lower registration and insurance costs	
	More integrated PT system			Increase fuel price, discourage car use	
				No tolls	
More open and green space	Improved safety	Heritage conservation	Sustainable solutions/outcomes	Open, enabling planning system	Bikes
Increased open space	Improved safety of all transport modes: pedestrian, cycling, car and PT	All buildings and open spaces preserved	Green fuels for PT	Planning laws support PT and reduce car dependency	An increase in the use of bikes
Parks are intact			Contribution to reducing the national green house gas output	Planning and decision-making is open and 'owned' by participants	Bike path on Eastern Fwy from Doncaster to Uni of Melbourne
More green/trees between buildings					Lots of bike parking
					Good E/W and N/S routes that are smooth, safe and well-connected

**Table 10.3 Initiatives to achieve the desired future**

Roads	
Road pricing	Increase cost of inner city parking Cars and trucks to "pay their way" to reflect actual costs Enforce tolls to encourage use of PT Increase price of petrol Toll on Eastern Freeway to fund PT initiatives
Improved networks	Better outer transport links and networks to keep traffic out of inner area Complete the outer ring road Create "serious" one-way road systems Use T2 lanes in the CBD grid Find traffic management solutions to Elliott Avenue/Macarthur Road corridor through Royal Park Discard old solutions of VicRoads and CRB to traffic problems – no underground tunnel link Eliminate rail crossings to reduce traffic hold ups Review road hierarchy in study area, with aim to downgrade Remove roundabout at Haymarket (junction of Royal Parade, Elizabeth Street and Flemington Road)
Traffic calming/management	Make roads narrower and increased planting to slow traffic Introduce more angle parking Local traffic only in South Parkville
Manage heavy vehicle traffic	Identify a primary truck route Load limits and curfews to encourage heavy vehicles to use defined routes Discount tolls for freight on City Link Draw on outputs from Transport Distribution Logistics Strategic Review
Reduce car dependency	Require analysis of public transport options for all new road projects Ban cars from new multi-unit developments (no car parks or permits) Run campaign to publicise the amenity impact of motor vehicles



<b>Public transport</b>	
Pricing/funding	Free PT (or free PT days) Subsidise PT services Target journey to work especially to study area Combine PT access with entry ticket for major events/attractions/special events Improve coordination and provision of PT for events All new sporting/events facilities to have integrated traffic management plan before opening Use commercial redevelopment of PT land to fund improvements and create a destination Amalgamate transport funding Federal government funding for PT projects instead of roads Greater priority for PT spending over roads funding
Route management	Give PT, walking and cycling priority by 're-signalising', design, transit lanes etc Improve service frequencies Enforce fairways and increase fines for blocking trams Improve PT travel times – more services and more non-stop or limited-stop trains More parking at outer metro stations (increase park-and-ride opportunities) Promote and enforce more transit lanes for PT River taxi services Park-and-ride at western end of Eastern Freeway (at Clifton Hill station?) Park-and-ride at main roads on freeways Eliminate free kerbside parking Detailed suggestions for improvements to #11 and #86 tram services Improve rolling stock, timetabling, PT connections, safety, speed, parking at transport nodes
Network management/ new services	Build light rail along Eastern Freeway, integrated with park-and-ride Shared tram/busway on Eastern Freeway, Alexandra Parade to Nicholson Street/Melbourne University. Use Johnston Street for trams to City/University of Melbourne Integrate light and heavy rail – make wider use of light rail Learn from Sydney Olympics experience making PT work Better integration of public transport modes and more park-and-ride Door-to-door transport services Light rail network in north/north east/east – outer suburbs Use taxis on low volume PT routes at night and increase frequency
User interface	Provide maps of where PT goes Set up real-time PT information for users Sell day tickets on trams Improve perceived security of PT Make PT more 'user friendly' Improve safety (lighting etc) at stations/stops
<b>Land use</b>	
Protect open space	Replace any parkland taken by three times the area Do not sacrifice inner urban open space to create new roads
Parking limitation	Amend planning to reduce/eliminate new car parking spaces Limit parking in the CBD, by fees and by the number of spaces Review planning/parking ratios of local planning schemes
Link land use and transport	Resurrect suburban hubs/transport nodes in metropolitan strategic planning Link residential development to PT, with stiff penalties otherwise (planning, financial etc) Improve understanding of what influences location choices for industry and commerce
Environmental issues	Urban design/visual improvements to PT routes Renew brownfield sites to attractive urban spaces Require environmental impact statements for all road/ transport developments Establish energy-efficient and unobtrusive road lighting controls Impose limits on building heights
<b>Amenity</b>	
Parking facilities control	Planning/development schemes to provide better off-street parking facilities for residents and visitors Reduce parking in the CBD
Traffic calming/local greening	Traffic calming measures to reduce road space and increase greening opportunities Better urban design solutions to car/bike/person interface Bring back the boulevard aesthetics of Princes Street, Queens Parade etc.
Environment (noise, air)	Enforce world's best standards for noise and air emissions and vehicle operation Transport corridors as green corridors, eg. for birds, native grasses and insects Convert trams and trains to renewable energy fuels
<b>Cycling and walking</b>	
Delineate/protect cycling facilities	Do not mix buses and bikes Bicycle lane between kerb and parked cars as in Montreal
Further develop bicycle network	Close some roads to cars to create full bike path networks Identify "off road" routes for bicycles and pedestrians Review and fully implement principal bike network in the study area
Develop/improve pedestrian links	Link walking and bicycle tracks and corridors Set signals to assist pedestrians crossing roads and reduce waiting time Improve pedestrian safety and networks



Other	
Review taxation incentives	Remove salary packaging for private vehicles Remove tax advantages for cars compared to PT Provide staff support for PT usage – eg. fares salary packaged
Attitudinal change	Better use of time to reduce numbers travelling at peak times Review origin and destination of travellers Campaign to change public and government attitudes from pro-roads and anti-PT
Institutional change	Make all Councillors use only PT Integrate VicRoads into Department of Infrastructure Govt to take a lead role in cleaner fuels, eg. gas conversion (of Govt fleet) Govt to encourage staff use of PT (eg. salary sacrificing of fares, location of offices etc)

## 10.2 Community forum

A community forum was held at Collingwood Town Hall on 23 May 2001. About 200 people attended. The forum was first addressed by the Minister for Transport, Peter Batchelor, who emphasised his support for the consultative process and the development of an integrated strategy to address transport and urban issues in the area. After a brief presentation outlining the study approach, the forum was opened to comments and questions from the floor. Participants were also provided with sheets to give written feedback. The comments received are summarised briefly in Table 10.4.

**Table 10.4 Summary of comments from community forum**

Category	Comment
Public transport	Improving PT will make it a more attractive alternative to car use Run PT 24 hours a day and at weekends Improve PT for the outer suburbs to reduce traffic problems in inner suburbs Rail line to Doncaster along Eastern Freeway (many suggestions made about this) Concerns about effectiveness of private ownership of PT Provide more park-and-ride (eg. at west end of Eastern Freeway) Lack of front-line staff makes PT unsafe for users Spend money on PT instead of roads Improve PT vehicles (low floors, loading areas for bicycles, surfboards and wheelchairs, etc) Need to improve the overall network of PT and linkage of services to each other Freight should go by rail Remove delays caused to trams by traffic (various specific suggestions made) Quality of life and social equality partly depends on reducing car dependence/providing quality PT
Road traffic	Strong concern that traffic levels are too high/should not get worse Concern over the effect of City Link (and its tolls) on Eastern Freeway traffic Suggestions for tolls on other routes (Eastern Freeway, Hoddle Street etc) – to fund PT projects Tolls should discriminate between peak and off-peak users Concern over level of truck traffic on various routes More street closures to discourage short car trips Cars are not sustainable for a long and equitable future There is not enough through traffic to warrant linking the Eastern and Tullamarine Freeways Linking Eastern and Tullamarine Freeways would sever the community and encourage car use Car based transport in cities is expensive, polluting, discriminatory and inefficient Downgrade Princes Street and redirect traffic to Hoddle Street/Victoria Parade, plus more PT from east Make Eastern Freeway less attractive for those who want to avoid tolls on City Link Tunnel linking Eastern Freeway and City Link Elevated expressway along Hoddle Street/ Punt Road
Bicycles	Bicycles must take priority over motor vehicles Get councils etc together to promote more bicycle use Bike travel should be strongly encouraged by providing more bike lanes and secure parking facilities Improve bicycle lanes along Eastern Freeway to provide more direct routes Need safer cycling conditions – wider bike lanes on arterial roads and smaller local streets Replace parking spots with wider bike lanes
Environment	Must address global warming and its accompanying impacts immediately Air quality is a major concern Tunnels etc can reduce pollution Users should pay for roads, especially commercial users, who produce most of the pollution Initiatives needed to reduce 'dirty' emissions like diesel buses and trucks
Consultation	If the Government wants a freeway, it will go ahead regardless ( <i>strong concerns expressed about this</i> ) The surveys and meeting seem to be nothing more than a public relations activity The study appears heavily biased towards freeways Need to involve community in outer areas, to see why residents aren't using public transport The study's Community Reference Group doesn't have enough power to change things The Community Reference Group inadequately represents the views of the public The study should adopt the measures favoured by the affected communities

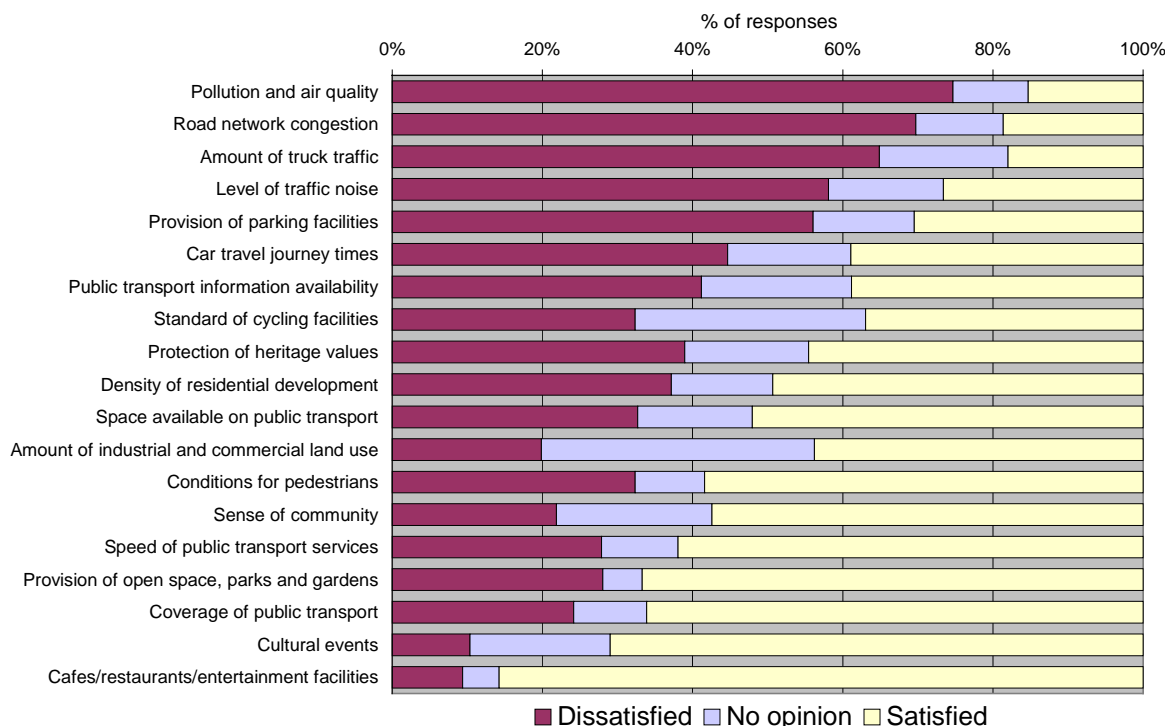
Category	Comment
	<p>Various concerns expressed about the questionnaire in Community Update No 1</p> <p>It was good to see so many people given the opportunity to speak at this forum</p> <p>Nobody supported a freeway at the forum (<i>several supported a freeway on the feedback sheets</i>)</p> <p>There were opportunities to expand the agenda to include a strategy for the whole of Melbourne</p> <p>The views which predominated at the forum do not represent the majority of the community</p>
Studies	<p>Can also conduct trials, eg. run buses in a certain area in the outer suburbs and see what happens</p> <p>All information needed has been collected before (eg. Town and Country Planning Assn reports)</p> <p>Look at Bill Russell's Eastern Freeway impact study</p> <p>Concern about the inaccuracies of past studies, especially traffic forecasts.</p> <p>Need to use latest methods for environmental assessment and make all information public</p> <p>Need to anticipate future problems to be able to deal with them pro-actively</p> <p>Community groups should be funded to conduct their own independent studies</p> <p>1970's Melbourne strategy planning process was much better; many recommendations are still relevant</p>

### 10.3 Questionnaire survey

Over 40,000 copies of Community Update Number 1 (which included a questionnaire) were distributed to residents and non-resident ratepayers in the inner northern suburbs.

Over 1,100 responses were received, which is regarded as a reasonably good response rate for a survey of this type; it represents around 2.7% of the original brochure distribution. However it was a voluntary, self-completion survey and so should not be interpreted too closely. For example, it should not be concluded that, because of the dissatisfaction expressed about the impacts of road traffic, the community would like improved roads. The clear message from other parts of the consultation is that people would prefer to see a reduction in car travel, rather than improved roads to accommodate it.

Figure 10.1: Results of questionnaire survey



Respondents are generally most **dissatisfied** with the following aspects of the inner northern suburbs:

- Pollution and air quality
- Road network congestion
- Amount of truck traffic
- Level of traffic noise

- Provision of parking facilities
- Car travel journey times
- Public transport information availability

Respondents are generally most **satisfied** with the following:

- Cafes/restaurants/entertainment facilities
- Cultural events
- Coverage of public transport
- Provision of open space, parks and gardens
- Sense of community
- Speed of public transport services

Some aspects generate notably divided opinions, with similar numbers of people satisfied and dissatisfied. These include:

- Public transport information availability
- Standard of cycling facilities
- Car travel journey times
- Protection of heritage values

The results hold generally true for respondents inside and outside the study area.

In general people are satisfied with many land use-related aspects of the area, whilst there is a strong predominance of road and traffic related aspects in the “dissatisfied” list.

It should be understood that community satisfaction with an aspect should not be interpreted as meaning that it is satisfactory in a broader sense. For example, respondents express a reasonably high degree of satisfaction with conditions for pedestrians, but there are many examples of poor and/or dangerous conditions in the area which will require attention as part of an integrated transport strategy.

#### **10.4 Other community feedback**

The questionnaire in Community Update 1 included space for comments to be noted. Comments were received by post, telephone and e-mail, in addition to the questionnaire and Community Forum already described.

Comments received show strong support for public transport-based initiatives and community concern over further development of freeways, although some support for freeway extensions was also apparent.

Consultation took place with Aboriginal community groups, who echoed many of the concerns of the wider community but also highlighted the significance of sites along the Merri Creek, Rushall station area, scarred trees and the need to have consultations before ground disturbance. The Merri Creek/Yarra River confluence is a very special place, and the old Health Service centre on Gertrude Street was also singled out as it has been a meeting place for many years. The importance of the community spirit in Fitzroy and Collingwood was emphasised, as was the need for Aboriginal people to be heard, as they often have different perspectives and concerns to non-Indigenous people.

All comments and suggestions are held in a database and will be addressed individually as the study proceeds.



## 10.5 Consultation conclusions

Community consultation to date has focused on gathering views and opinions from people within the study area. The main common themes are:

- dissatisfaction with traffic and related problems, namely pollution, congestion, truck volumes, traffic noise and parking facilities;
- opposition to linking the Eastern and Tullamarine Freeways, and to road-building in general;
- strong support for public transport improvements, including rail, light rail or bus expressway in the Eastern Freeway corridor;
- support for improved conditions for cycling and walking, especially improved networks and linkages; and
- a need to widen the scope of consultations to include those who travel to and from or through the area from outside (perceived to be the cause of many of the problems in the area).

# 11 Next steps for the study

## 11.1 Strategy development

There is a wide range of initiatives for the study to assess, arising from the community consultation (see Chapter 10) and the outcomes of technical studies summarised in earlier Chapters.

These initiatives will be grouped to reflect the following broad themes:

- improving public transport;
- improving walking and cycling;
- reducing car dependency;
- managing arterial roads and freight; and
- enhancing urban amenity.

They will also be grouped into the following:

- initiatives within the inner north
- projects outside the area (eg public transport improvements to the east and north)
- broader policy/regulatory/attitudinal measures, probably taken in a wider context

Some of the suggested initiatives involve system-wide changes that will need to be assessed in a wider context than the Northern Central City Corridor Study. The emerging Metropolitan Strategy will provide the framework for this, to ensure that the inner north strategy makes the necessary contribution to a more sustainable city as a whole.

A broad appraisal will be undertaken of the list of possible initiatives raised by the community (see Chapter 10) to identify those worthy of further assessment. These will be refined and subjected to more detailed evaluation, using a 'triple bottom line' approach as outlined below.

## 11.2 Assessment framework

To evaluate and assess the performance of a strategy for the Northern Central City Corridor from an ESD perspective, performance measures or indicators need to be identified. These indicators can be used as:

- a baseline to assist decision making;
- an ongoing monitoring tool to track progress towards sustainability; and
- a means to provide feedback to the management process.

Indicators can be used as an aid to show whether a strategy is moving towards sustainable development and to provide information on the current situation. There is a large amount of literature on the selection of indicators and research is still being conducted to refine which performance measures should be selected in different situations. Various agencies and organisations have established lists of indicators appropriate for inner-city strategies.

A draft checklist of indicators that could be used to evaluate and assess the effectiveness of a sustainable strategy for the Northern Central City Corridor Study is presented in Table 11.1. The indicators follow the 'triple bottom line' approach of identifying social, environmental and economic effects. It should be noted that the list is subject to further development; also it is important to understand that not every indicator will be measured for every initiative; only the ones which exhibit clear differences and are relevant to the choice of a strategy will be presented in the final assessment. Nonetheless it is important to have a comprehensive initial checklist to ensure that all aspects are covered.

**Table 11.1 Possible performance indicators**

Criterion	Measure	Indicator
<b>Social</b>		
Accessibility	Levels of PT use	Number, length of PT trips by mode
	Levels of car ownership	Car ownership forecasts/assumptions
	Road travel times	Car and truck travel times
	PT travel times	PT travel times (all of journey)
	PT accessibility	Public transport accessibility
	Walking and cycling	Provision for cycling and pedestrians
	Number of intermodal interchanges	% of PT trips involving interchange
	Interchange/waiting time	Waiting and interchange time per PT passenger
	Travel patterns	% of travel to CBD by time period
	Modes of access to PT	PT trips by access/egress modes
	Degree of interconnectivity	Interconnectivity between transport systems/modes
Amenity	Air quality	Compliance with emissions standards Transport emissions CO <sub>2</sub> , NO <sub>x</sub> , VOC, CO
	Transport noise	Compliance with noise legislation and objectives Transport noise exposure levels
	Community severance & access	Severance of communities by physical features and traffic Accessibility to facilities and services
	Subjective measure	Amenity assessment
	Heavy vehicle forecasts	Heavy vehicle forecasts on relevant roads
	Traffic volumes on local streets	Traffic volumes on local streets
	Properties required	Properties required by land use type
	Amount of open space land uses	Change in area, type and quality of open space
	Integrity of parks and open spaces	Change in severance of open spaces/creation of linkages
	Impact on heritage sites/values	Heritage/cultural aspects affected (impacts and enhancements)
	Self-containment	Employment/workforce and population/retail space ratios
	Number, use of links	Local road/path network linkage patterns/usage
	Road space	Road surface area by use (traffic, transit, bike, parking etc)
Land use	Change in land use - land use conflicts	
Health	Amount of cycling and walking	No, length of cycling and walking trips
	Air/noise related	People exposed to air and noise emissions exceeding standards
Safety	Road accident projections	Car & truck transport accident projections
	PT accident projections	Public transport accident projections
	Other accident projections	Cycling/walking accident projections
<b>Environmental</b>		
Contamination risk	Effect on contaminated sites	Impacts on and opportunities for clean-ups
Impact levels	Level of greenhouse gas emission	Gross emissions of CO <sub>2</sub> calculated from fuel consumption and standard emission factors
	Water quality	Compliance with water quality standards Stormwater management
	Industrial and Household Waste	Waste recycling, resource recovery
	Habitat & Biodiversity	Effect on remnant native vegetation, habitat and native species Effect on biodiversity
	Transport congestion levels	Veh/pax hours by time period and vehicle type (light, heavy, PT)
	Fuel/energy consumption levels	Energy/fuel consumption per person-km or tonne-km by mode
Sustainability	Take-up of alternative fuels	Fuel usage by type of fuel
	Urban Form	Sustainable building design
<b>Economic</b>		
Pricing	Pricing and revenue projections	Pricing, revenue projections - tolls, parking, PT fares
	Policy changes	Policy changes towards more transparency/hypothecation
	Level of PT fares, fuel, parking, etc.	Pricing assumed - fuel, rego, insurance, PT fares
Use of funds	Capital or initial costs	Capital/initial costs of initiatives
	Operating or recurrent costs	Operating and/or recurrent costs of initiatives
	Cost-benefit analysis	Economic analysis – BCRs, NCBs etc.
	Funding amounts	Funding implications – expenditure/revenue by year, PPP
	Funding sources	Public/private partnership potential

Note: this list is subject to further development.

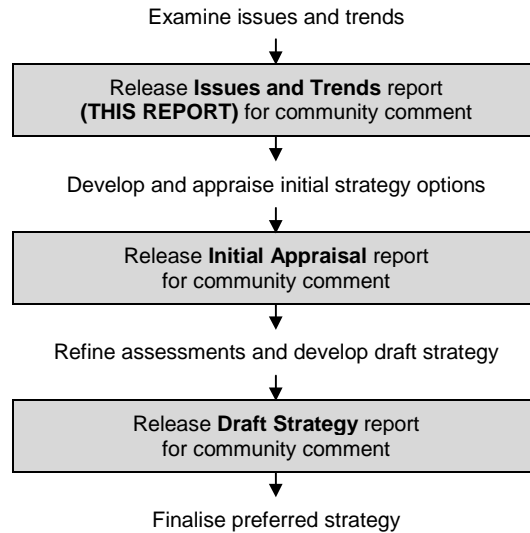
### 11.3 Assessing the options

The proposed assessment and consultation process is summarised in Figure 11.1. The Study Process Report<sup>4</sup> describes the process in more detail, although it has evolved somewhat since then as the study has progressed and is likely to do so further in response to community feedback.

<sup>4</sup> The Study Process Report (dated April 2001) is available for download from the study web site (<http://www.doi.vic.gov.au/innermorth>) or by contacting the study team on (03) 9655 6659.



**Figure 11.1 Study process summary**



The strategy options arising from the initial studies will be subjected to a strategic appraisal, using a relevant selection of the performance indicators shown in draft form in Table 11.1. An *Initial Appraisal* report will be prepared and released for community comment late in 2001. The report will present the initial appraisal of the strategy options, and will indicate an option or options for further assessment.

Following community comment on this initial appraisal, the strategy options will be refined and further evaluated against the performance criteria, and the preferred strategy will be identified. This will be presented in the *Draft Strategy* report, which will be released for a further round of community comment.

The draft strategy will be finalised following community input, and recommended for adoption by State and Local Governments as appropriate. The aim is to present the preferred strategy in the first half of 2002, with recommendations on the steps to take, from that date onwards, to implement the initiatives that form the strategy.