

FIVE-YEAR FOCUS

Immediate actions
to tackle congestion

April 2018





Fast facts

What the future looks like:

- There will be an estimated 3.5 million extra trips daily across Melbourne's transport network in 2030.
- Cars are likely to still account for 70% of trips in 2030.
- By 2030, time spent on congested roads across Melbourne will increase by 20%.

What people told us:

- 1 in 4 of our surveyed peak period drivers said they could change their time of travel.
- 1 in 3 of our surveyed peak period drivers said they could change their mode of travel.
- Only 17% of survey respondents who regularly drive during peak pay for parking.
- People who said they sometimes chose not to drive cited parking as being the number one reason.

The opportunities:

- Melbourne's public transport system is estimated to take 540,000 cars off the road in peak periods every day.
- Early bird train fares shift around 2,600 people from the morning peak every weekday.
- Off-peak fares could shift around 3,000 people from car to public transport.
- Off peak fares could also shift around 3,000 people out of the peak, equivalent to more than three train-loads of people.
- The existing car parking levy is estimated to have removed around 3,900 vehicles from the road every morning.
- Buses only account for 16% of public transport trips.
- 40% of the bus network is considered to be underperforming.
- After an overhaul of the bus network in Brimbank, patronage grew by 10% within the first six months.
- The introduction of SmartBus services to areas such as Doncaster and Rowville saw a 70% increase in patronage in the first two years, and steady growth over the past decade.
- High quality cycling infrastructure can accommodate 4,600 cyclists per hour.



Executive summary

Delivering an efficient transport system in a growing city is no easy task. As Melbourne grows, so too does the challenge of providing a transport network that allows people to move around easily.

People moving around the city to get to work, appointments and activities supports the thriving economy and vibrant culture that Melbourne is known for, but also puts enormous pressure on the transport network.

Easing this pressure must be a priority if Melbourne is to maintain its appeal and liveability.

Melbourne's roads increasingly struggle to cope with growing demand. Road congestion is forecast to get worse over the next 15 years and on some parts of the network, increases in travel times and declines in reliability will be significant.

Not all locations will experience congestion to the same extent, so we have focussed on where the issues are expected to be felt the most.

Current initiatives which seek to improve the performance of the road network – including major investments in road and rail projects – must be complemented by additional measures that manage rather than accommodate demand.

In *Victoria's 30-year infrastructure strategy*, we said a comprehensive and fair transport network pricing regime would be the most efficient and effective way of managing congestion and should be implemented in 5-15 years. There are actions that can be taken in the next five years to improve the performance of Melbourne's roads in advance of this.

We have developed a package of recommendations which are practical, low cost, could be delivered quickly and build on existing measures that have proven effective.

These include expanding off-peak fares on the metropolitan public transport network, overhauling Melbourne's bus network, and expanding and increasing the car parking levy.

We know that for many people, driving is the only option. But our recommendations aim to make other transport modes more attractive to those who can travel in other ways.

Our community research has indicated that a third of people who drive during peak periods could use a different mode, while a quarter could travel at a different time. Most of our recommendations aim to encourage these people to travel differently.

Improved bus services aim to give people a good alternative to driving, off-peak fares provide an incentive to travel at a different time and expanding the car parking levy helps to discourage people from driving in areas well served by public transport. All have significant potential to shift how and when people travel.

Other recommendations encourage government to think differently about how it invests in and manages the transport network.

Establishing a transparent public transport fare-setting regime is important to ensure the effectiveness of fares in achieving clearly defined objectives that can be measured. Victoria lags behind other states in its approach to setting fares and remedying this could deliver network wide benefits.

Better allocation of road space to prioritise efficient movement is essential to manage competing interests for limited road space.

Targeted active transport investments could also help ease pressure on roads and public transport for short trips into inner Melbourne and key employment areas in peak periods.

Our analysis also indicates there are parts of Melbourne where travelling by private vehicle is the most efficient way for people to get around. In some of these locations we recommend initiatives to improve road connectivity to ensure these car trips occur as efficiently as possible.

Together, our recommendations provide practical actions for government to give people more travel choice and reduce the impacts of increasing road travel times and declining reliability on people's daily lives.

Recommendations

Shifting demand

1. Expand off-peak fares on the metropolitan public transport network
 - a. Introduce a small difference between peak and off-peak fares as part of the regular planned fare rise in January 2019, and adjust this annually to balance peak and off-peak travel
2. Expand and increase the car parking levy
 - a. Expand the Category 2 levy area to include Richmond, South Yarra, Windsor and Prahran
 - b. Establish revenue sharing arrangements with each local council covered by the levy
 - c. Regularly review and increase the levy to reflect increasing congestion
3. Maximise opportunities to encourage travel behaviour change during disruptions to the transport network
 - a. Increase bus services on Doncaster bus routes and maintain bus priority along the Eastern Freeway during North East Link construction disruptions

Better use of existing infrastructure

4. Overhaul existing bus services, expanding successful routes and replacing poor performing routes with low cost, customer-responsive services
 - a. Undertake a systematic review of all poor-performing networks to identify opportunities to reprioritise services
 - b. Introduce innovative public transport services such as on-demand bus and ride sharing
 - c. Establish arrangements for demand responsive and ride sharing services to integrate them into the public transport mix
5. Establish a transparent fare-setting regime
 - a. Set clear policy objectives to guide the setting of public transport fares, focussed on efficiency and equity
 - b. Align public transport fare setting with the approach in the Victorian Cost Recovery Guidelines
6. Better allocate road space to prioritise efficiency on identified movement corridors
 - a. Identify a priority list of road space allocation initiatives to be delivered over the next five years
 - b. Ensure the list of priority initiatives is based on the Movement and Place Framework and focuses on congested movement corridors with competing uses, such as roads in the City of Yarra and City of Stonnington

Invest in new networks and services

7. Increase investment to introduce additional bus services in areas of high demand

- a. Introduce a more direct and frequent shuttle bus service between Parkville and Victoria Park Station in Abbotsford
- b. Provide additional bus services to access the Monash and La Trobe National Employment and Innovation Clusters, beginning with:
 - i. Wellington and Blackburn Roads in Monash
 - ii. Services between the Hurstbridge and Mernda rail corridors in La Trobe

8. Prioritise active transport investments to high potential areas

- a. Prioritise investment, which could be partly funded from the proposed changes to the car parking levy, in the following locations:
 - i. Trips to inner Melbourne and Parkville from
 - Richmond
 - Brunswick, Brunswick East and Brunswick West through Carlton
 - South Yarra, Prahran, Windsor and Toorak
 - ii. Trips to the Monash NEIC from Clayton, Springvale, Oakleigh and Huntingdale
 - iii. Trips to the La Trobe NEIC from Preston, Reservoir and Heidelberg West

9. Improve road connectivity on parts of the network where private vehicle use works best

- a. Identify and prioritise investment to improve road connectivity to dispersed employment centres, such as Dandenong South, Laverton and the Melbourne Airport area





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1. About our research

Being able to move easily around Melbourne to access jobs, education, services and leisure activities is a key element of Melbourne's appeal and liveability. Victoria's economy is also reliant on an efficient and effective transport network to support industry and business activity.

As Melbourne grows, the demands placed on this network will increase. At the same time, technology is enabling a step change in the way transport services are delivered to the community. The coming decades present both great challenges and opportunities for Victoria's transport system.

Infrastructure Victoria's Managing Transport Demand research program is examining ways to tackle this challenge. The research is building on the work undertaken for *Victoria's 30-year infrastructure strategy*, which included a recommendation for transport network pricing to be implemented within 15 years in order to best manage demand. Our subsequent discussion paper *The road ahead* explored different road pricing regimes that could be implemented in Melbourne. It highlighted the work that needs to be undertaken and the issues that need to be addressed before any recommendation on a preferred pricing regime can be made. This work is ongoing and will be a feature of the updated 30-year strategy in 2019.

The Victorian Government's 2017 *Victorian Infrastructure Plan* committed to exploring demand management options as part of long-term integrated transport planning. With this in mind, our research program includes identifying ways that demand for transport in Melbourne could be more effectively managed.

Effective demand management requires a holistic examination of the transport network. It cannot be focussed on one mode or one type of intervention. Rather, a range of interventions that allow different transport services to complement each other is required.



This paper explores a number of alternatives to manage demand. It uses the framework presented in the 30-year strategy which focussed on three approaches to better manage the network and is consistent with our guiding principle to consider non-build solutions first:

- shifting demand for infrastructure by providing incentives to lower demand, or spread demand more evenly, across different modes and different times of day
- enabling better use of existing infrastructure by improving governance and coordination, utilising technology and ensuring efficient maintenance
- increasing investment in new assets or services where this is proven to be needed, and once demand management and better use strategies are exhausted or are not feasible.

The focus of this research is on metropolitan Melbourne. This does not mean there are no transport demand challenges in regional Victoria. The issues in less populated areas, however, are likely to require more targeted solutions, which we address in the 30-year strategy. Similarly we have not specifically focussed on freight movements, but the measures proposed will deliver benefits for freight by improving road performance overall.

Our research uses a new transport model for Melbourne to demonstrate how travel demand will grow and change over the next 15 years. This technical work is supported by community research, which explored the attitudes and behaviours of peak period drivers. Using this data, we considered the opportunities available to government over the next five years to manage growing transport demand.

Development of the Melbourne Activity-Based Model

The 30-year strategy recommended government improve its modelling tools to better assist long-term strategic transport planning. The development of the Melbourne Activity-Based Model (MABM) with KPMG and Arup is a key step towards this. The Managing Transport Demand program is the first research of its kind to use the model.

MABM is intended to complement existing strategic transport models used by the Victorian Government. MABM is well suited to understanding policy changes that could alter how people use the transport network. MABM also provides a better understanding of impacts on transport users, such as whether lower socio-economic groups are likely to benefit from changes to the transport network.

We have used the model to understand how people travel now, and forecast how people are likely to travel in 2030, and the impacts of this on the transport network.

Community research

We have also undertaken community research to explore people's travel behaviours and attitudes towards driving in the peak period. We wanted to better understand the impacts of road congestion for regular drivers and identify some of the current causes of frustration and the willingness to shift to another mode of transport. The research provides us with an indicative snapshot of today's perceptions of congestion and real day-to-day experiences on the roads, picking up on matters that are not captured in strategic transport models, such as incidents, weather effects and road works.

The community research offers some compelling results and highlights where there are opportunities to change people's behaviour or make travel options more appealing.

MABM results and information from the community research were combined with in-house research and analysis to determine a range of actions government could take in the next five years to help manage Melbourne's growing transport demand. Diagrams, tables, figures and maps used throughout this report are all based on this Infrastructure Victoria analysis, unless otherwise stated.

For more technical information about the model or to see the full results of the community research, visit infrastructurevictoria.com.au.

2. Transport demand and network performance between 2015 and 2030

Our research provides new insights into how Melburnians are predicted to use roads and public transport in 2030.

The level of demand on the transport network can have significant impacts on the performance of the transport system and how efficiently people and goods can move.

As demand on the transport network grows, the performance of the network changes. These changes manifest in a number of ways: trip times increase, delays grow, speeds decline and reliability problems emerge.

Drivers of transport demand

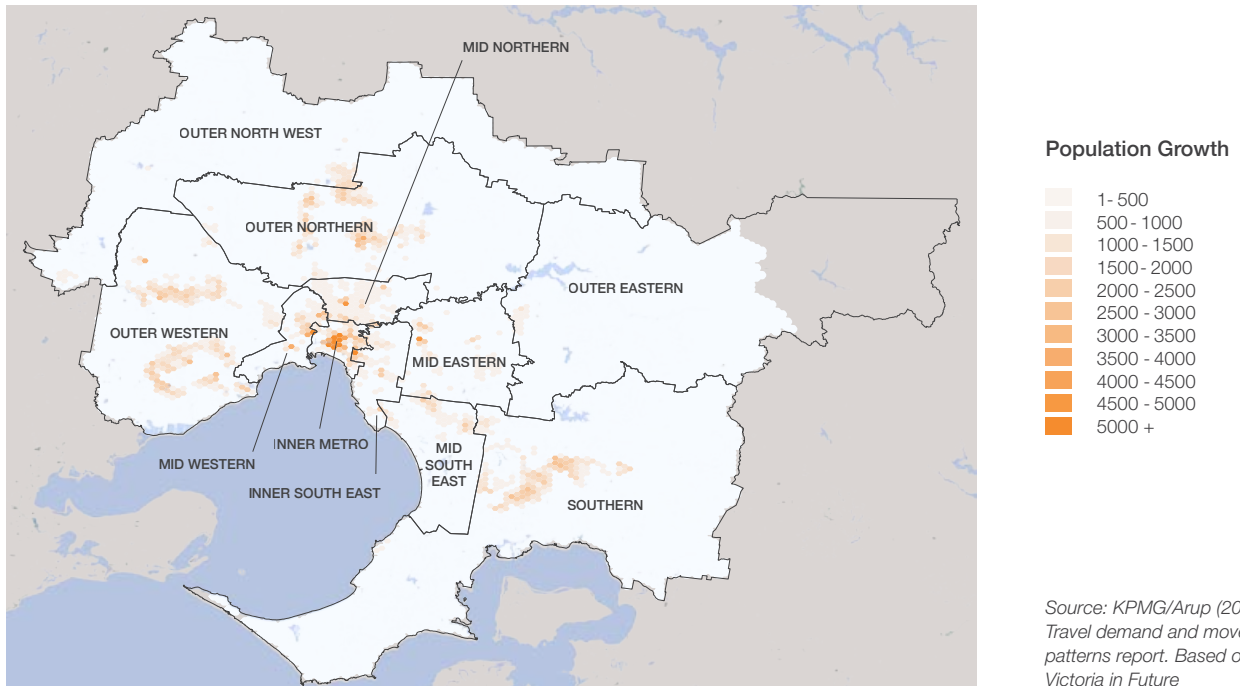
By 2030, the population of metropolitan Melbourne is estimated to grow from 4.5 million people in 2015 to almost six million people. Employment is also expected to grow significantly over the same period, with an additional 400,000 workers expected by 2030, increasing the number of daily trips to work in metropolitan Melbourne to just over two million.

The distribution of this population and employment is not predicted to be even. Approximately two-thirds of the population increase is expected to occur in the existing growth corridors in Melbourne's outer south east, north and west, as well as the inner metro region (Figure 1). However over three-quarters of the projected increase in employment is forecast to occur in the inner and middle suburbs of Melbourne (Figure 2).

The distribution of population and employment growth presents a significant transport challenge for Melbourne. More people are projected to live in the outer suburbs, with many needing to travel long distances, often at the same times, to access jobs.

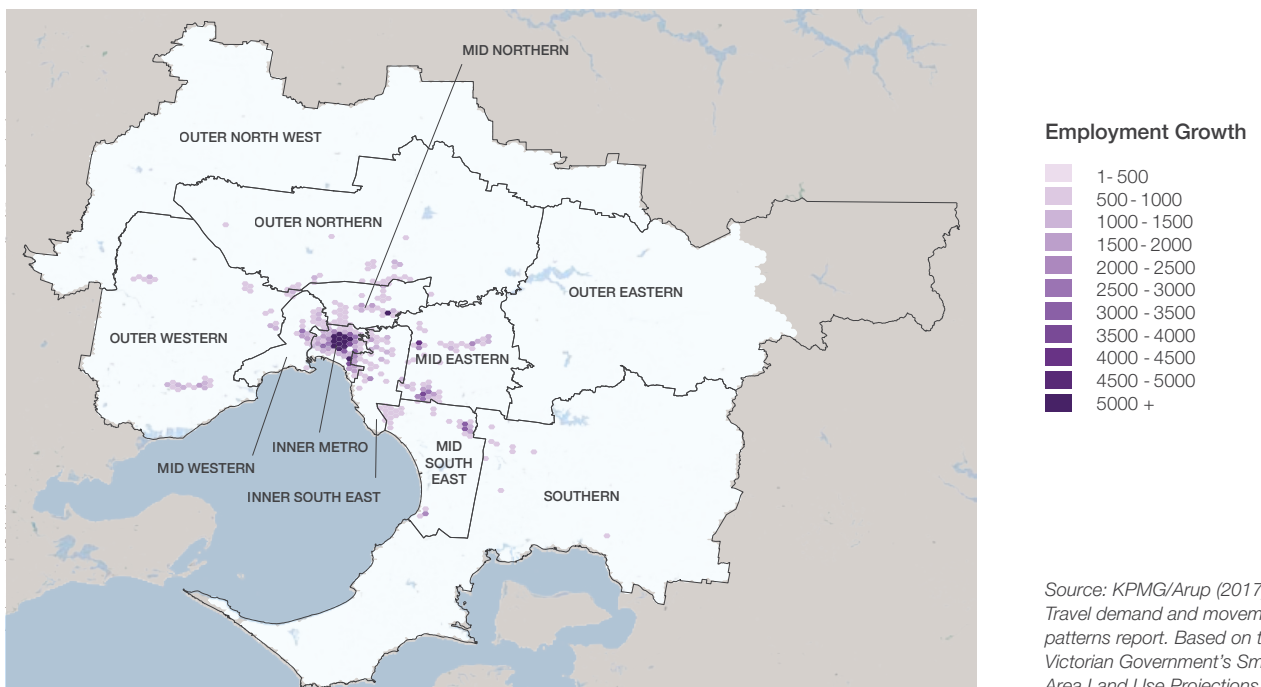
Aside from changes to population, demographics and employment, and its spatial distribution, demand is influenced by the supply and management of the road network and the provision of alternative modes of transport.

Figure 1 Change in population 2015-2030



Source: KPMG/Arup (2017),
Travel demand and movement
patterns report. Based on
Victoria in Future

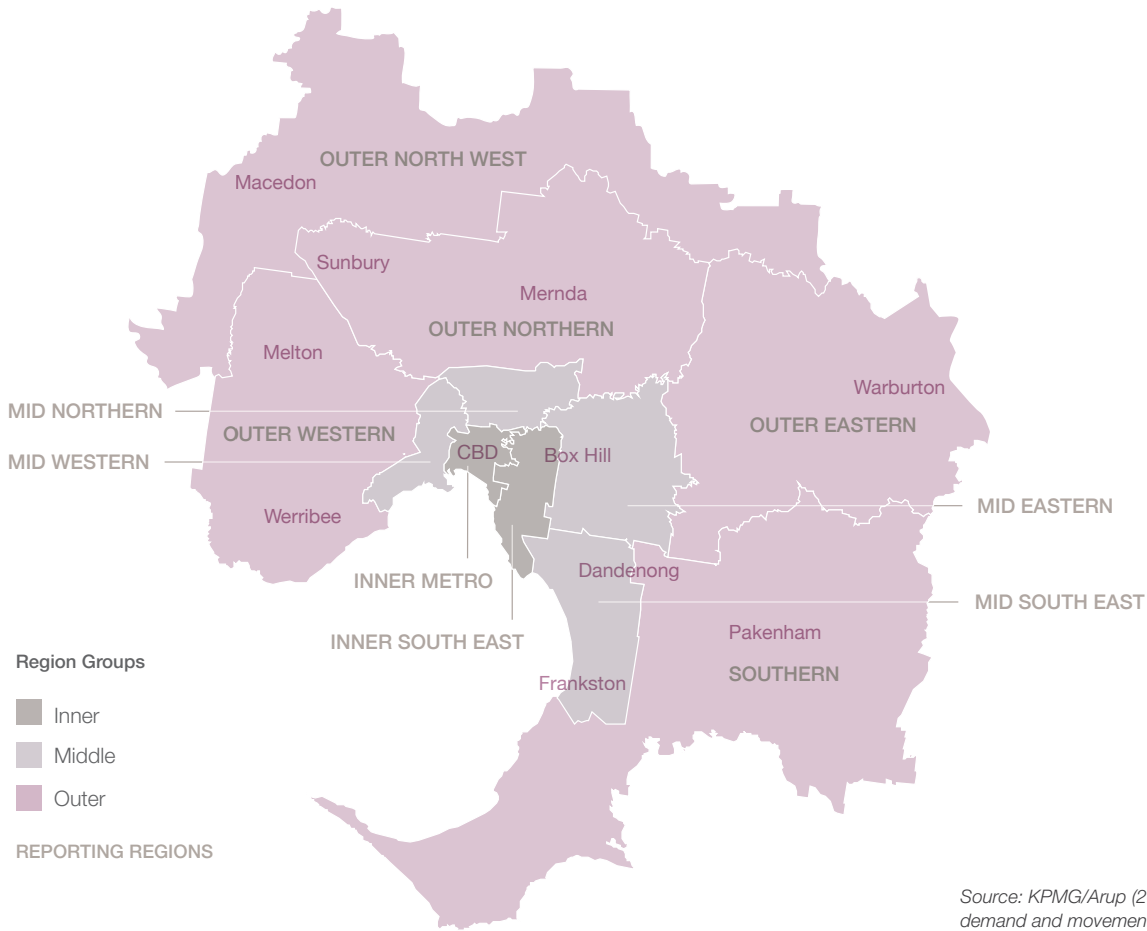
Figure 2 Change in employment 2015-2030



Source: KPMG/Arup (2017),
Travel demand and movement
patterns report. Based on the
Victorian Government's Small
Area Land Use Projections

To get a picture of how the current and planned transport network is likely to respond to growing demand, we have used MABM to model travel across Melbourne in 2015 and then again in 2030. For this network-wide picture, the modelling divides Melbourne into 11 sub-regions and then grouped these regions into inner, middle and outer bands, as shown in Figure 3 below.

Figure 3 Sub-regions of Greater Melbourne – Coverage of the Melbourne Activity-Based Model

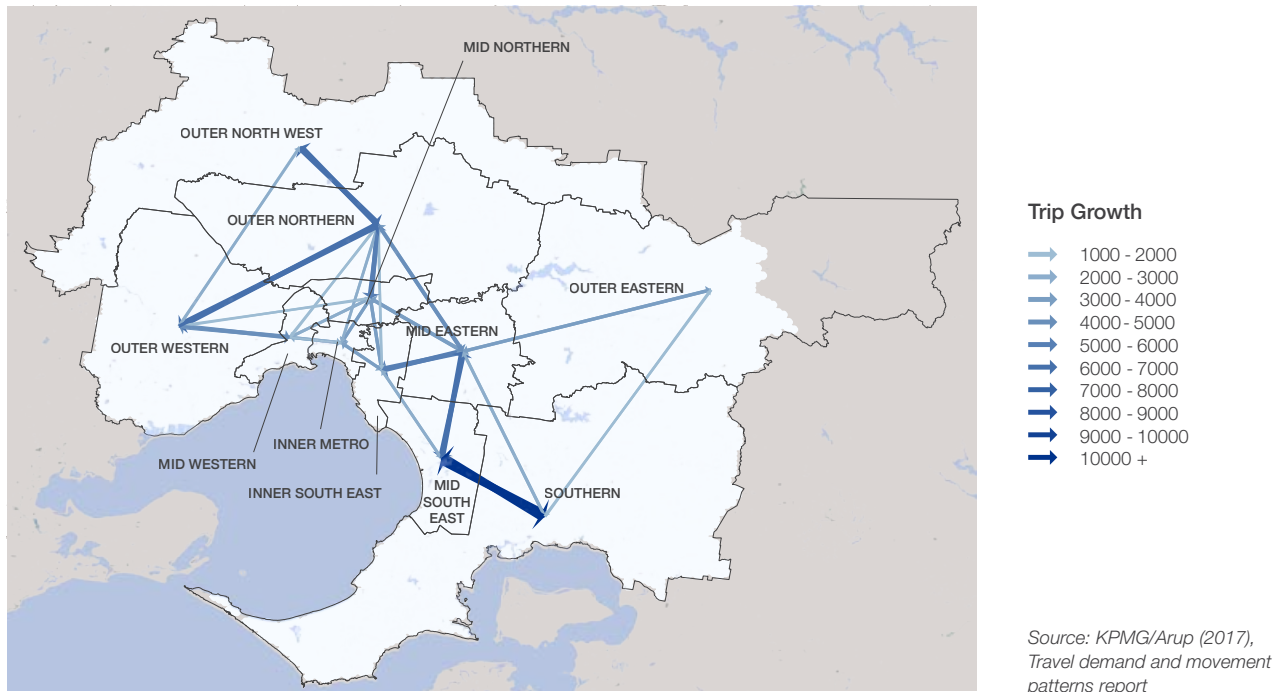


MABM demonstrates how people respond to changing transport constraints by changing their behaviour, and the resulting impact of this on the transport network.

In line with Victorian Government population forecasts¹, MABM predicts an increase in trips by 2030 of 3.5 million, rising from over 11.5 million trips in 2015 to nearly 15 million trips in 2030. This growth in trips will put significant extra pressure on Melbourne's transport network, in particular because it will not be evenly spread (as we can see in Figure 4). There is an estimated increase in daily vehicle kilometres travelled of around 25% by 2030, with particular corridors being in the south east and north west of the city.

¹ Victoria in Future, see <https://www.planning.vic.gov.au/land-use-and-population-research/victoria-in-future-2016>.

Figure 4 Daily car trip (driver or passenger) growth 2015-2030



Measuring congestion

When thinking about how to measure congestion for this report, we wanted to understand what matters most to people and how it affects them.

We looked at Austroads' examination of the 'acceptable level of congestion' in its *Congestion and Reliability Review*², as well as our community research results to get a picture of what matters to people.

Austrroads finds that while different road users travel differently – commuters, commercial and freight users require access at different times, with different economic costs and benefits – reliability is a particular concern for all users. However, the definition of 'acceptable' congestion is subjective and driven by a range of factors including not just travel time and reliability, but also less customer-focussed factors such as the productivity of road assets and efficient levels of road supply.

The majority of respondents in our community research reported experiencing congestion regularly, with their descriptions principally defining congestion as slow or stopped traffic. Around 85% of respondents said congestion had worsened in the last five years, and the most common behavioural response was to allow extra time. Respondents indicated that they preferred a predictable journey time that takes longer, rather than an unpredictable journey time that is usually quicker.

Taken together, the Austrroads analysis and community views suggest that the two most important indicators of transport congestion are travel time and reliability.

Travel time is a measure of the total time that it takes to complete a journey, while reliability is a measure of how dependable travel time is.

² Austrroads (2016), *Congestion and Reliability Review*.

How will the transport network perform in different regions of Melbourne?

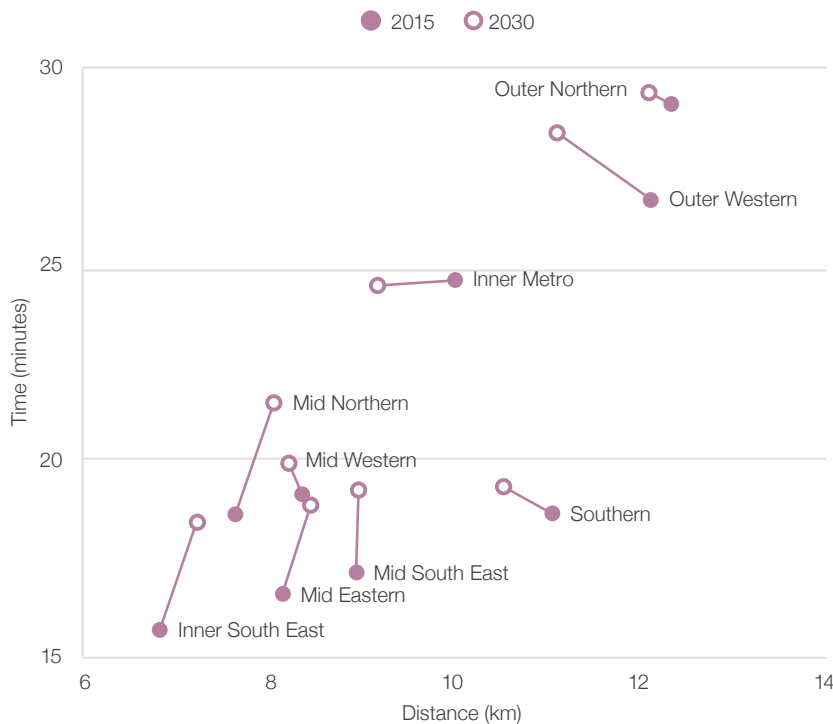
Travel time deterioration

There will be more trips in 2030 and they will be on average longer than in 2015. The impacts of this will be different in different parts of Melbourne (see Figure 5 below). This is due to a number of factors including infrastructure provision and changes in travel patterns.

Two key findings emerge from this comparison:

- In the outer northern, southern and outer western suburbs, trip distances fall as the growing population leads to the provision of more local jobs and services, and investments in the road network provide more direct links. Despite the reduction in trip distances, trip times increase, reflecting increasing road demand within these areas.
- In the middle areas of Melbourne (including the inner south east), trip distances are relatively stable; however, trip times increase markedly. These are areas where the road network is largely fixed with little scope for increased capacity. These areas represent the most significant decline in performance between now and 2030.

Figure 5 Average daily private vehicle trips by origin, 2015 to 2030



Source: KPMG/Arup (2017),
Travel demand and movement
patterns report

Reliability

Melbourne's roads will become less reliable in coming years. Reliability indicates how dependable and consistent travel times are along a particular stretch of road at a particular time of the day.

As a road approaches capacity, reliability deteriorates. This is because roads have a finite capacity depending on a number of factors including number of lanes, speed limit, intersection frequency and geometry. As traffic volumes on a road near its capacity, traffic flow slows and driver behaviours start to change – resulting in increasing travel times and reduced travel time reliability.

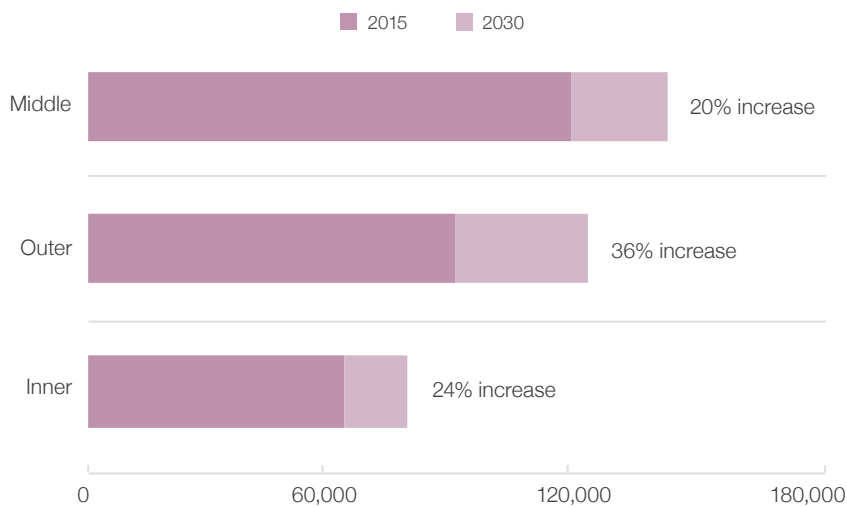
In our analysis we use a 70% capacity threshold as a benchmark³ for when traffic flow and speeds start to be significantly impacted.

Across the network, the hours spent travelling on roads exceeding this benchmark increase between 2015 and 2030. It is most pronounced during the morning and evening peak periods.

Deterioration in reliability is felt most significantly in outer areas where there is a 36% increase in hours spent travelling on roads exceeding the benchmark (see Figure 6).

Beyond the two key measures of congestion, MABM also provides insights on how the peak period is spreading and on the impact of increasing demand on public transport system. This is the key strength of MABM – it can show how people might shift their time and mode of travel.

Figure 6 Hours travelled on roads at or above 70% capacity during the morning peak period



Source: KPMG/Arup (2017),
Travel demand and movement
patterns report

³ We have used a volume-to-capacity benchmark to measure reliability based on the New Zealand Transport Authority (NZTA) Economic Evaluation Manual method using modelled volume-to-capacity ratios for Melbourne.

Peak periods

For many Melburnians, travel times are relatively fixed. Work and school start and end times tend to be relatively uniform across Melbourne. This results in two large peak periods, in the morning and evening. The morning peak period tends to be more concentrated than the evening peak period, as the finishing times of activities tend to be more variable than the start times.

It is during these peak periods that the impacts of increasing transport demand on changes in travel time and reliability are most evident.

As demand for travel on roads grows to 2030, people are predicted to respond by changing their times of departure to avoid the peak periods at both ends of the day, in effect widening the peak periods. For example, some people travelling from the outer suburbs during the morning peak period are predicted to leave up to 45 minutes earlier than they do today in order to avoid the heaviest traffic.

This behaviour change results in longer peak conditions (compared to 2015) by around five hours on an average weekday in Melbourne's outer suburbs (Figure 7). However, if not for the spreading of the peak period, anticipated travel time and reliability deterioration would be significantly worse.

Figure 7 Peak spreading across the outer regions in 2015 and 2030



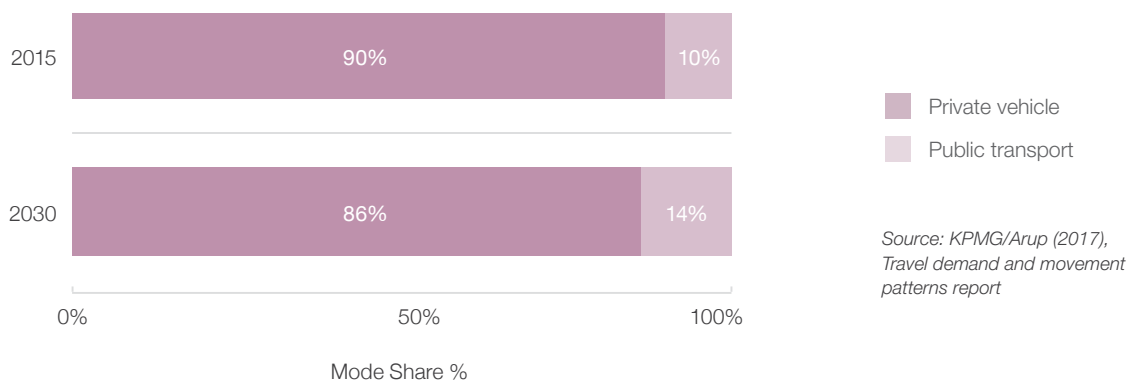
Source: KPMG/Arup (2017), *Travel demand and movement patterns report*

Public transport impacts

Melbourne's public transport network is expected to experience increased demand between 2015 and 2030. MABM predicts a 76% increase in public transport trips across Melbourne, or 878,000 additional public transport trips each day.

Public transport's share of motorised transport is forecast to increase from 10% to 14% (Figure 8).

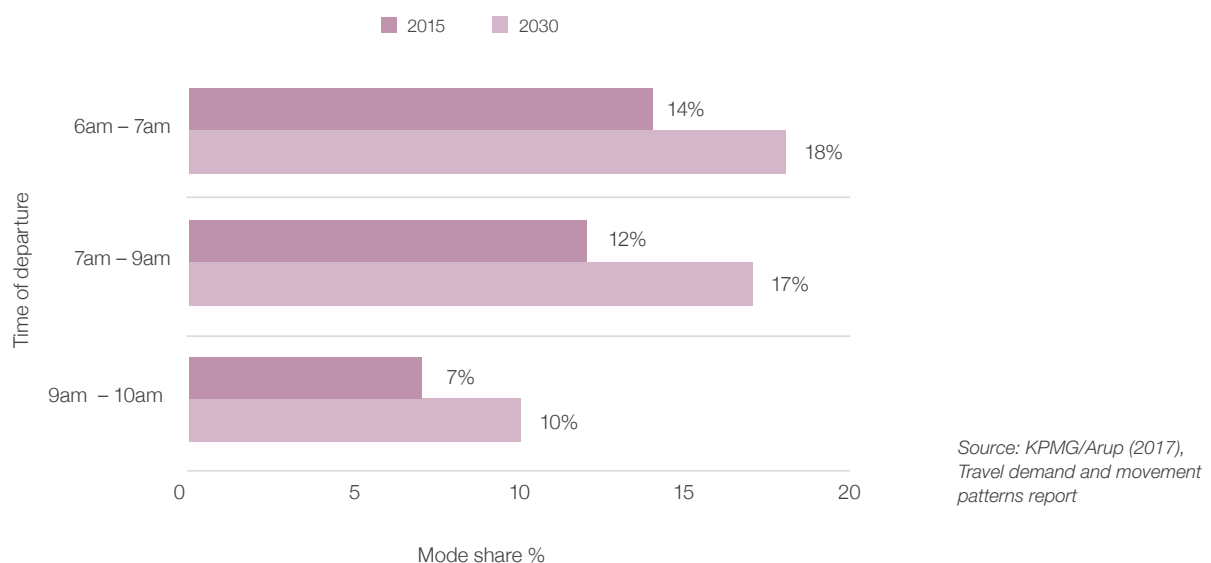
Figure 8 Public transport and private vehicle mode share, 2015-2030



The most significant growth in public transport share occurs in the peak periods (see Figure 9). For trips departing in the morning peak hours (7.00am – 9.00am), the share of public transport as a proportion of motorised travel is projected to increase from 12% to 17%.

Despite higher service frequencies across many areas of Melbourne compared with today, this large increase in demand puts significant pressure on the public transport network. By 2030, some of the key rail groups – Clifton Hill, Caulfield and Northern groups – will be at or over capacity for a longer time during the morning peak period.

Figure 9 Change in public transport mode share (motorised travel)



Our five-year focus

Many of the key actions available to government in seeking to address network-wide problems are long term. In particular, network pricing, significant shifts in land use (to bring jobs and homes closer together) or major uplifts in public transport capacity are measures that could have network-wide benefits, but could also take many years to fully deliver.

The focus of this report is to consider the opportunities available to government over the next five years. This requires going beyond network-wide analysis to a more detailed examination of travel times and reliability by place of travel destination.

To identify short-term opportunities we have focussed on targeted problem areas that have a significant potential for demand management in the short term. These are areas that experience a large number of trips combined with poor or significantly declining road performance, as measured by travel times and reliability.

On this basis, we have focussed on trips to the Melbourne central business district⁴ (CBD) and National Employment and Innovations Clusters⁵ (NEICs) in the morning peak period. More than a third of morning peak trips have either the CBD or a NEIC as their destination. In general, travel times and reliability to these destinations are deteriorating and will continue to worsen. However the story is not uniform and there are different challenges across different areas.

Access to the CBD and NEICs from some parts of Melbourne is set to significantly decline by 2030, even in areas which are presently performing well. Some areas are already experiencing significant travel time and reliability impacts and are not expected to see an improvement by 2030. In other areas, due to significant infrastructure investments, travel times and reliability to the CBD and NEICs are expected to improve by 2030.

We analysed changes in travel times and reliability for trips to the CBD and all of the NEICs in the morning peak. We identified key priority movements that would benefit from action in the short term using the following criteria:

- trips to the CBD and NEICs that occur in significant volumes and that:
 - require travel through areas with significant road network reliability issues
 - demonstrate average travel time deterioration of more than 10% out to 2030.

The key priority movements identified are shown in Table 1. Appendix A provides detailed discussion of our analysis.

Table 1 Priority movements in the short term

Destination	Trip origin by local government area
CBD	Darebin, Moonee Valley, Moreland, Stonnington and Yarra.
La Trobe NEIC	Hume, Moonee Valley, Moreland, Stonnington, Whittlesea and Yarra.
Monash NEIC	Bayside, Boroondara, Glen Eira, Manningham, Maroondah, Stonnington and Whitehorse.
Parkville NEIC	Darebin and Moreland.

Parts of Melbourne's transport network with lower trip volumes than the CBD and NEICs, such as metropolitan activity centres and local networks, will also experience issues with travel time and reliability. However, due to the lower trip volumes going to these areas compared to the CBD and NEICs, they have not been the focus of this analysis. Some of the actions government can target towards the CBD and the NEICs will also have benefits for these areas. We will also be looking more closely at local network issues when updating *Victoria's 30-year infrastructure strategy*.

⁴ In our MABM analysis, we used an expanded CBD which includes the Hoddle Grid, Docklands and the northern part of Southbank. This is in recognition of the broader functioning of the city beyond the grid.

⁵ There are seven National Employment and Innovation Clusters (NEICs) identified in Plan Melbourne.



3. What government can do to manage transport demand

There are a range of measures in place to help manage demand across Melbourne's transport network.

Current measures to manage Melbourne's transport demand

Investment in networks and services

Direct investment in more transport infrastructure and services is currently the dominant means of responding to transport demand in Victoria.

Public transport

A key part of the current efforts to manage demand is the provision of public transport which provides an alternative to road travel. Infrastructure Victoria analysis, based on average car occupancy in 2016, shows that at peak times in 2016, Melbourne's public transport system removed around 540,000 vehicles from the road.⁶

Public transport delivers significant benefits to the wider economy, including lower road congestion which constitutes a significant proportion of the external benefits of public transport.⁷ Key new public transport projects helping to shift demand away from roads include new high capacity trains, new rail line upgrades and the Melbourne Metro project.

According to the Bureau of Infrastructure, Transport and Regional Economics, road congestion in 2015 across all roads in Melbourne cost \$4.6 billion.⁸ This means that if the public transport network did not exist, these congestion costs could be far worse.⁹

We examined the external benefits of public transport for Victoria in 2016 as a way of assessing the value that public transport brings to the wider community (Box 1).

BOX 1: EXTERNAL BENEFITS OF PUBLIC TRANSPORT FOR VICTORIA

We estimated the external benefits of public transport for Victoria by adopting an approach used by the NSW Independent Pricing and Regulatory Tribunal (IPART)⁹ in its determination of maximum public transport fares for Sydney.

Using public transport leads to lower road congestion and lower pollution than if the trips were made by private vehicles. The methodology attempts to quantify external benefits of public transport as a way to measure the value that public transport brings to the wider community. IPART used this approach in NSW to determine what an appropriate public subsidy level should be for public transport – that is, how much should users pay and how much should be paid from general government revenue.

To estimate the external benefits of public transport for Victoria, we undertook demand modelling using the Victorian Integrated Transport Model (VITM) to see how people might respond to changes in public transport fares. We then estimated the economic benefits of a change in public transport fares based upon how many people would shift from driving to public transport. Key external benefits quantified include:

- Reduced travel time
- Reduced vehicle operating costs
- Reduced pollution
- Increased health benefits

This gives us an indication of the value of public transport to the Victorian community using standard economic techniques. Our indicative analysis suggests that the external benefits of public transport could be up to \$2.5 billion in 2016.¹⁰

6 This figure is based on an estimate of the number of public transport users in the peak period and a car occupancy rate of 1.38 in 2016.

7 External benefits are benefits that accrue to people other than the individual using public transport – as a result of someone taking a trip on public transport rather than by car. For example, a benefit of public transport is reduced cars on the road that can result in increased safety for those driving.

8 Bureau of Infrastructure, Transport and Regional Economics (2015), *Information sheet 74: Traffic and congestion cost trends for Australian capital cities*.

9 The NSW Independent Pricing and Regulatory Tribunal provides independent regulatory advice and decisions to protect and promote the ongoing interests of consumers, taxpayers and citizens of NSW.

10 The estimate is sensitive to different values of externalities. Depending on the rates assumed, the estimated benefit can range from \$1.5 billion to \$2.5 billion.

Roads

Victoria has an extensive network of tollways, freeways, highways, arterials and local roads. A number of key new projects that will help accommodate growing demand include:

- North East Link – this project will connect the Eastern Freeway and the M80 Ring Road.
- West Gate Tunnel – this project will provide an alternative route from the West Gate Freeway to the CBD, including direct links to the Port of Melbourne.
- Outer Suburban Arterial Roads Program – this program includes a combination of duplication and widening works to high-priority western arterial roads.

Parking charges

Car parking charges imposed by private companies, local government and the Victorian Government increase the cost of travel by car. Parking costs provide a disincentive to use private vehicles and are therefore a key lever for government in managing demand. Analysis by the Grattan Institute found that Melbourne's car parking costs were significantly lower than comparable cities such as Sydney¹¹, and so using parking costs to better manage transport demand likely represents a particular opportunity for Melbourne.

In 2006, the Victorian Government introduced a "congestion levy" (the levy) on non-exempt long stay car spaces in the Melbourne CBD. It was intended to reduce traffic congestion in central Melbourne by increasing the cost of driving and therefore encouraging more motorists to regularly use public transport.¹²

At the same time the Victorian Government entered into a Memorandum of Understanding with the City of Melbourne for a lump sum annual payment of \$5 million from the proceeds of the levy, with the funds to be spent in accordance with the council's transport strategy.

In 2014 the levy was expanded to cover both short and long stay non-exempt parking spaces and increased from \$950 to \$1,300. In 2015, an additional levy area was added to the north and south of the city (category 2 levy) which was set at \$950. The lump sum annual payment to the City of Melbourne was also increased to \$7 million.

A number of exemptions apply including residential parking, hospital visitor parking, disabled parking and loading bays. Exemptions also include parking at the Melbourne Zoo, temporary public parking at Yarra Park and Melbourne and Olympic Parks and land owned by the Abbotsford Convent Foundation.

Analysis shows that the levy has been successful in reducing the supply of leviable car parking spaces in affected areas, and it is correlated with a reduction in private vehicle mode share for trips in the CBD (see Appendix B). Between 2015 and 2017, there has been a 2% reduction in the number of leviable car parking spaces in category 1 zones, and a 9% reduction of spaces in category 2 zones. This is estimated to be around 3,900 vehicles off the road in the morning peak period in 2017 compared to 2015. By way of comparison, two lanes of freeway would need to be built to accommodate an additional 3,900 peak period vehicles on the road network. The recent widening of CityLink effectively added an extra lane in each direction, with an estimated cost of nearly \$1.3 billion.

The levy is currently indexed annually in line with the consumer price index.

11 In its report, *Stuck in traffic? Road congestion in Sydney and Melbourne* the Grattan Institute found that Melbourne's CBD has 15% more commercial car spaces than Sydney and that parking is cheaper. For instance, the Grattan Institute found that all day early bird parking in Melbourne costs an average of \$17.74 per day compared with \$27.74 in Sydney. State government levies are also cheaper in Melbourne compared to Sydney at \$1,380 per year compared to \$2,390 in Sydney.

12 The second reading speech for the *Congestion Levy Act 2005* states that the levy will provide an incentive for those currently commuting by car to and from the city during peak hours to look at other options, such as car pooling, public transport and walking.

Public transport fares

Given the important role played by public transport in managing transport demand, it follows that a major lever for government is the price or fare charged for public transport.

Fares manage demand by altering the price of public transport relative to alternative modes, as well as the price of travel on public transport at different times of the day. Currently in Melbourne, there are two fare features that could be viewed as particular demand management tools:

- **Early bird train travel** – introduced in March 2008, early bird train travel provides free travel on Melbourne metropolitan train services if passengers touch their myki on and off before 7.15am on a weekday. It is estimated to have encouraged between 2,000 and 2,600 passengers to shift from the peak to pre-peak travel period.¹³
- **Peak/off-peak pricing on V/Line** – peak fares apply to any myki journey where the customer touches off in Zone 1 before 9.00am on weekdays or touches on in Zone 1 between 4.00pm and 6.00pm on weekdays. All other journeys including travel on public holidays and weekends are covered by an off-peak fare; the discount for off-peak travel is 30%.

Road regulation

Government can also influence transport demand through the way it manages the use of Victoria's road network with measures such as road rules, clearways, priority lanes for public transport and allocation of reserved freeway lanes for high occupancy vehicles. A range of such measures is in place across Melbourne, with a mixture of state and local government jurisdiction.

Land use planning

The strategic land use settings put in place by government – such as in *Plan Melbourne* – also influence demand for the transport network, albeit mostly in the longer term as Melbourne grows and changes in line with strategic settings. For example, a land use planning strategy that aims to locate jobs and services close to where people live may reduce demand for transport because people will have less distance to travel to get to their destination. Some of the land use settings in *Plan Melbourne* that may ultimately reduce demand for travel across the city include:

- supporting new housing in activity centres and other places that offer good access to jobs, services and public transport
- locating schools and other regional facilities near existing public transport
- facilitating investment in Melbourne's outer areas to increase local access to employment.

Opportunities for better demand management

Analysis of future transport demand forecasts from MABM suggests the Victorian Government will need to take additional action in the short term in order to minimise predicted increases in travel times and declines in reliability in particular parts of the network.

In developing recommendations to government, the decision-making framework developed by Infrastructure Victoria to support *Victoria's 30-year infrastructure strategy* can usefully be applied to managing transport demand. Box 2 outlines the framework.

¹³ As cited in Currie (2011), *Design and impact of a scheme to spread peak rail demand using pre-peak fares*.

BOX 2: A DECISION-MAKING FRAMEWORK FOR MANAGING TRANSPORT DEMAND

The major categories of potential government action to manage demand, in order of preference, are:

1. Shifting demand

Changing behaviours to shift demand can help relieve pressure on the transport network. These solutions are most needed where infrastructure use is heavy at different times of the day or across particular parts of the network, but much lower at other times or locations. In other words, to rationalise our use of infrastructure to its highest value. Rather than building something new and providing additional capacity during peak periods and locations, these options seek to shift demand either by spreading it more evenly, reducing it overall or moving to another mode of transport where there is capacity.

Tools that are available to provide incentives or disincentives for how people use infrastructure include:

- pricing to influence decision making, for example, road pricing or public transport fares
- providing better information to help people make informed choices, such as real-time information across the entire transport network to help people plan their journey
- long-term strategic planning settings establishing guidelines for where people live and work.

2. Better use of existing infrastructure

There are many opportunities to use existing transport infrastructure in better, more efficient ways. Most of the infrastructure we will have in the future exists now. This means we need to be smart about how we operate and maintain our existing infrastructure to ensure it lasts and is responsive to changing needs.

This can be achieved through:

- better coordination, regulation and governance processes so services can be delivered efficiently
- technological innovations to adapt to changing service delivery models
- regulatory changes that enable or prohibit certain choices, such as road rules
- refurbishment, modifications or whole-of-life maintenance that improves the operation and efficiency of the infrastructure.

3. Invest in new networks and services

Building new infrastructure is appropriate in areas of demonstrated under supply where net benefit can be proven, and when shifting demand and better use solutions have been exhausted or found not to be viable. Examples include extending the rail network to high growth areas, providing new bus services or improving road connectivity.

This broad approach is supported by the Victorian Auditor-General's 2013 audit on Managing Traffic Congestion, which noted that:

“...the state’s approach to congestion management remains dominated by expensive supply-side initiatives focussed on increasing capacity with little evident attention to demand management alternatives...there is a pressing need to explore more fiscally sustainable strategies that leverage demand management to tackle Melbourne’s growing congestion.”

Measures that reduce demand by shifting it towards other modes or times of the day, or by increasing supply, will eventually lose effectiveness as new demand for road travel emerges as capacity increases over time (via 'induced' or 'generated' demand). See Box 3. Infrastructure Victoria recommends network pricing as the best long-term solution. However the measures proposed in this report will deliver interim improvements in targeted areas, and more enduring travel time savings and reliability benefits for those people who opt to shift their time or mode of travel. Our community research indicates this could be up to a third of Melbourne's peak travellers.

Because our focus is on short term actions, we have prioritised measures which are low cost and practical to implement over the next five years. We emphasise opportunities in Melbourne's public transport system and car parking costs. A comprehensive and efficient public transport system is essential to effectively manage transport demand going forward, including if and when network pricing is introduced. Where good public transport is in place, increased parking costs can mirror the impact of direct pricing and deliver significant reductions in car trips. We also identify opportunities for reform in the areas of active transport, behaviour change and the regulation and management of roads.

BOX 3: ROAD SUPPLY AND INDUCED DEMAND

Most measures that divert demand away from existing roads, either by building new roads or creating capacity on the road network by people switching to public transport, will not permanently reduce congestion. Eventually these measures lose their effectiveness as new demand is generated through trips diverted from other times or modes, and new trips are generated as travel times improve. There is a wide body of literature that discusses these effects e.g. see the Victorian Transport Policy Institute analysis at vtpi.org/gentraf.pdf.

This does not mean that any new roads or public transport investments cannot have an impact on congestion at the network level. The development of a complete and efficient road and public transport network is a pre-requisite for a well-functioning city. Where there are demonstrated gaps in a city's network (such as the North East Link), these should be filled and can have an enduring positive impact on overall transport system performance.

Due to induced demand, however, continued expansion of the transport network is unlikely to deliver reasonable travel times and reliability within reasonable cost. In the long term, a comprehensive and fair transport network pricing regime could directly target demand at its source and deliver permanent reductions in demand, while optimising the network.



4. Shifting demand

RECOMMENDATIONS

1. EXPAND OFF-PEAK FARES ON THE METROPOLITAN PUBLIC TRANSPORT NETWORK

Introduce a small difference between peak and off-peak fares as part of the regular planned fare rise in January 2019, and adjust this annually to balance peak and off-peak travel

2. EXPAND AND INCREASE THE CAR PARKING LEVY

Expand the Category 2 levy area to include Richmond, South Yarra, Windsor and Prahran

Establish revenue sharing arrangements with each local council covered by the levy

Regularly review and increase the levy to reflect increasing congestion

3. MAXIMISE OPPORTUNITIES TO ENCOURAGE TRAVEL BEHAVIOUR CHANGE DURING DISRUPTIONS TO THE TRANSPORT NETWORK

Increase bus services on Doncaster bus routes and maintain bus priority along the Eastern Freeway during North East Link construction disruptions

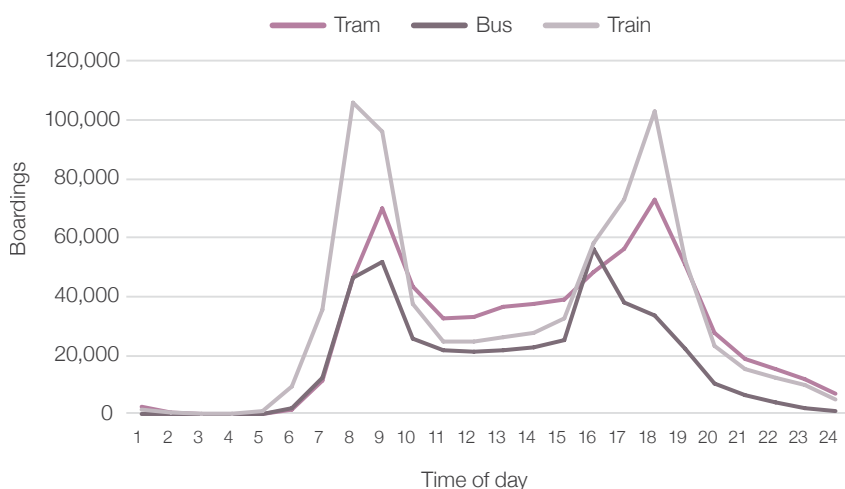
Off-peak public transport fares

Public transport fares directly impact the way people choose to use the system. We have identified some short-term opportunities with fares to both encourage mode shift from private vehicles and to better manage demand during peak times on the public transport network. In the longer term, there will be a need for a comprehensive review of the way that public transport fares are set and structured to support efficient outcomes across the whole of the transport system.

Differential peak and off-peak pricing is about having a different price for travel in the peak compared to the off-peak. It has the potential to shift demand both across the day and modes directly and indirectly – directly by encouraging time-flexible trips outside of peak times and indirectly by freeing up capacity during the peak period to support mode shift from away from private vehicles. Its potential effectiveness is even greater when combined with other time and mode shift recommendations.

In Melbourne, around 60% of public transport travel in 2016 occurred at peak times, equivalent to around one million peak boardings across all public transport modes. The trends are similar across all public transport modes (Figure 10) suggesting there is ample capacity or underutilisation of the system in off-peak travel periods.

Figure 10 Melbourne's public transport travel profile across an average weekday in 2016



Source: Public Transport Victoria

There is currently limited use of fares-based demand management on Melbourne's public transport network. There is no equivalent to the train 'early bird' product on metropolitan trams or buses, and there is no off-peak equivalent in the afternoon. This is in contrast to V/Line, which has off-peak fares available at various parts of the day.

Peak and off-peak pricing is widely used across the world. Box 4 provides some examples.

BOX 4: NATIONAL AND INTERNATIONAL EXPERIENCE WITH OFF-PEAK PUBLIC TRANSPORT FARES

Off-peak public transport fare regimes are widely used across the world in cities such as Singapore, Berlin, London, Los Angeles, Sydney, Tokyo, Vancouver and Washington DC.

In 2013, Singapore's Land Transport Authority trialled free and discounted travel on its mass rapid transit (MRT) rail network for trips before the morning peak. Commuters had to end their journey before 7.45am for a free trip, with a 50% discount for commuters exiting between 7.45am and 8.00am. After one year, the Authority reported a 7% shift of trips out of the morning peak (8.00am-9.00am), with the ratio of trips in morning peak (8.00am-9.00am) to pre-peak (7.00am-8.00am) falling from 2.7 to 2.1.¹⁴ This approach was recently changed. Now any trips which are initiated before 7.45am on the MRT or light rapid transit networks will receive a 50% discount. This is yet to be evaluated but the Authority is targeting a larger number of commuters (estimated at 300,000 or 10% of all rail commuters in Singapore) who would never have considered completing a trip before 8.00am, but now have the option of starting a trip before this time.¹⁵

An alternative approach is to apply a peak period surcharge, as is the case for London's rail travel. Peak fares apply Monday to Friday (not on public holidays) between 6.30am and 9.30am and between 4.00pm and 7.00pm.¹⁶

14 Singapore Land Transport Authority (2014), *Extension of Free Pre-Peak Travel by One Year* – media release from 9 May 2014.

15 Tan, S and Abdullah, Z (2017), *Cheaper MRT rides for pre-peak weekday travel*, article in the Strait times – published online on 31 October 2017.

16 See Transport for London's website for more information, www.tfl.gov.uk/fares-and-payments/fares/peak-and-off-peak-times.

We used MABM to test a scenario where there was a price difference between time periods by lowering off-peak fares (Box 5).

The modelling showed that lowering off-peak fares would result in both time and mode shift (to public transport). This suggests introducing a difference between peak and off-peak fares could help to manage transport demand. The size of the difference would likely need to be adjusted over time to reflect the response of Melbourne's travellers to price changes.

As a first step towards shifting demand using the metropolitan public transport system, Government should introduce a small difference between peak and off-peak fares as part of the regular planned fare rise in January 2019.

This would enable data to be collected on the responsiveness of travellers to the change which could then be used to inform annual price adjustments.

The introduction of differential peak and off-peak fares will be more effective in managing transport demand if teamed with increases in car parking charges. Our community research has indicated that a third of people who drive during peak could use a different mode. The implementation of these two recommendations could provide a powerful prompt to people to change their travel behaviour.



BOX 5: INDICATIVE IMPACTS OF INTRODUCING A PEAK/OFF-PEAK FARE DIFFERENCE

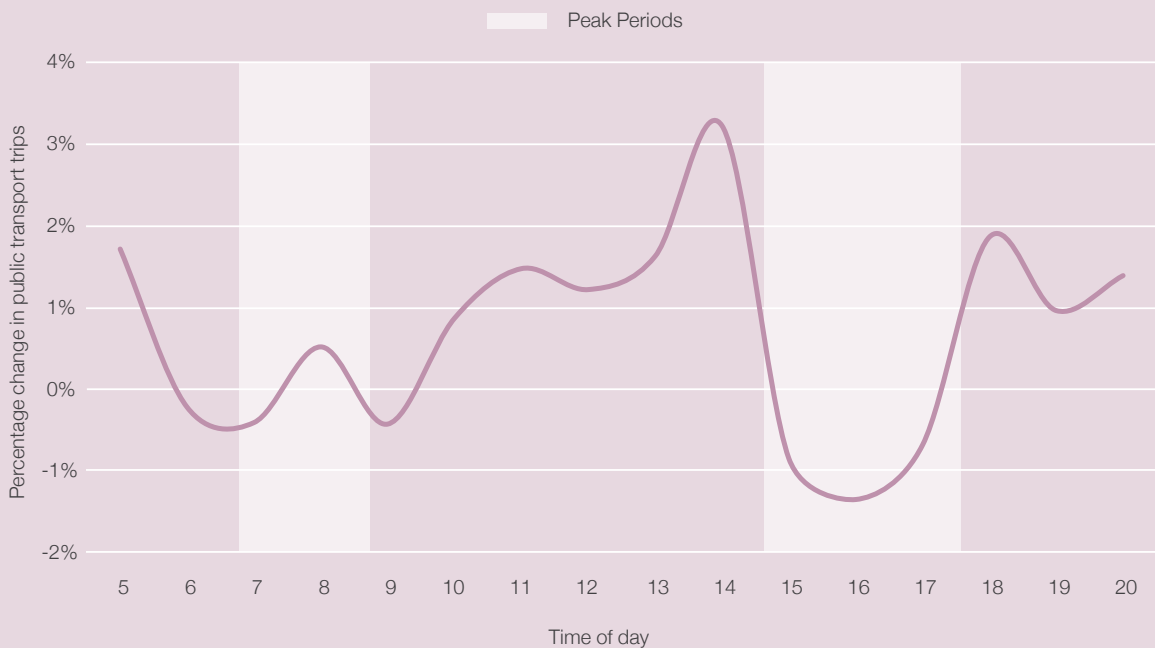
Infrastructure Victoria commissioned KPMG to model the potential impact of differential peak and off-peak fares in MABM, testing a \$0.50 difference between peak and off-peak average fares (equivalent to a reduction in average fare per trip from \$2.58 to \$2.09 outside of peak periods).

The modelling showed that this could result in an extra 3,000 public transport trips, equivalent to around 2,200 cars off the road. At the same time, the modelling showed that it could shift around 3,000 trips from peak to outside the peak periods, which is equivalent to more than three train-loads of people.

As shown in Figure 11, a reduction in fares outside of peak periods results in an approximate reduction in peak period public transport trips by around 0.5% to 1.5% on average as some users shift to off-peak travel. The modelling also shows that some car users may also switch to using public transport, increasing the use of public transport services across the day.

Indicative Infrastructure Victoria analysis suggests that this scenario could result in a revenue loss of around \$70 million to \$80 million per annum.¹⁷ A revenue neutral outcome could be achieved by increasing peak fares to offset reductions in off-peak fare revenue.

Figure 11 Change in public transport trips after lowering off-peak fares



Source: KPMG

¹⁷ The change in fare revenue is based on a combination of patronage changes as a result of the different average fares in the peak and outside peak time periods, as well as a result of the change in the fare prices itself. A 2015-16 network average fare, taking into account concessions and fare evasion, was used in the analysis. A 20% lower fare was applied to the lower outside peak time periods fare scenario. This was annualised using a factor of 242 days for peak periods and 357 days for off-peak periods.

Car parking levy

Car parking availability and prices are important components of people's travel decisions. The availability of free or low cost parking can be a strong determining factor in the decision to use a car in everyday travel. Conversely, high parking costs or difficulty finding a parking spot can be a strong deterrent. Our community research shows that the availability of free, time unlimited parking at the destination is a critical determining factor in driving during the weekday peak (Box 6).

BOX 6: THE ROLE OF PARKING IN THE DECISION TO DRIVE

The availability of time unlimited, free parking provides a strong incentive for people to drive.

Our community research found that 55% of people who regularly drive during the weekday peak have access to free, time unlimited parking, while another 27% have free, time limited parking. Only 17% of those who regularly drive during the weekday peak pay for parking.

Of respondents who indicated they sometimes used another mode to travel during the weekday peak, the reason most commonly cited was that parking was a problem.

These findings suggest that, where there is good public transport in place, making parking less freely and readily available could be an effective lever in helping to manage road demand.

Source: Quantum Market Research (2017), Community research – Part 2.

Since the introduction in 2006 of the car parking levy, also known as the congestion levy, it has been effective in reducing the supply of leviable car spaces in the CBD and other areas to the north and the south (see Appendix B for analysis). The levy does not yet, however, cover areas to the east of the CBD such as Richmond and Prahran which experience significant congestion (Figure 12). These areas also have good access to public transport.

During the development of *Victoria's 30-year infrastructure strategy*, we considered if the levy could be more effectively applied to reduce the attractiveness of commuting to the CBD by car. We did not recommend this option in the 30-year strategy as it was unlikely to be as effective as a comprehensive and fair transport network pricing scheme in the long term.¹⁸

However, when looking at short term actions government can take to manage demand the levy has significant potential. It is likely to continue to be the principle pricing mechanism used by the government to address congestion in the city and has already proven to be effective in shifting demand.

To address the growing transport demand challenges government should build on the levy in the following ways:

- **Expand the Category 2 levy area to include Richmond, South Yarra, Windsor and Prahran¹⁹** to address travel time and reliability issues in these areas.
- **Establish revenue sharing arrangements with each of the local councils covered by the levy** that are consistent with City of Melbourne – Victorian State Government Memorandum of Understanding. These arrangements should support the development of active transport alternatives in these areas of high demand.
- **Regularly review and increase the levy to reflect increasing congestion.** Availability of good public transport, combined with off-peak pricing, would complement this recommendation by improving transport choice.

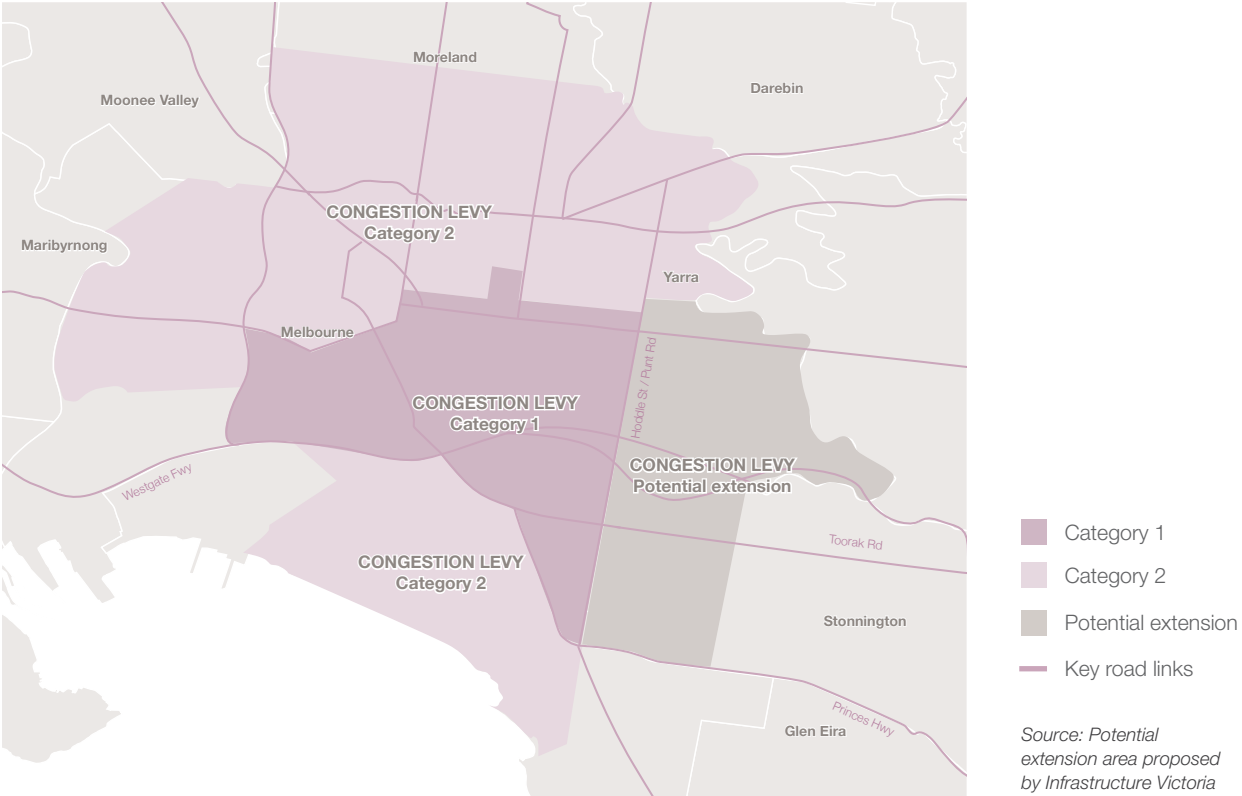
The levy should be reviewed if network pricing is introduced in the future.

18 Discussion of this option is included in the *Options Book – A supporting document for Victoria's 30-year infrastructure strategy*, December 2016, pp201-203.

19 Richmond includes parts of Abbotsford, Cremorne and Burnley. This recommendation is not intended to affect any existing exemptions.

There are other opportunities for government to discourage driving into the CBD, particularly for those who currently receive free CBD parking from their employers. Government could lead by example by reviewing the provisions of its vehicle schemes to ensure they are consistent with demand management objectives. Consideration could also be given to requiring employers to provide alternatives to free parking where these are included in an employment package (Box 7).

Figure 12 Congestion levy map – category 1 levy area, category 2 levy areas and potential congestion levy expansion



BOX 7: EMPLOYER PARKING ‘CASH OUT’

Our community research indicates the availability of free unlimited parking is a critical determining factor when people choose to drive. This is consistent with our analysis of the congestion levy, which indicates that it has been effective in reducing the supply of leviable car parking spaces within the levy area (see Appendix B). However, the levy is likely to be effective in changing individual behaviour when employees are the ones who are paying for the space. Many employers offer free onsite parking for their employees. This generally comes as a cost to the employer but not the employee.

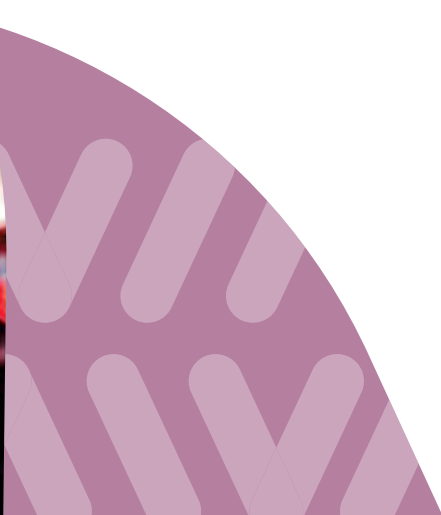
In 1992, California enacted legislation that required certain employers to offer employees the option to ‘cash out’ their car parking space, with the intent of the legislation to reduce private vehicle commuting trips and emissions. Where employers provided subsidised parking for their employees, they were required to offer a cash allowance in lieu of a parking space. This law is called the parking cash-out program.

A report into the effectiveness of the program, based on eight case studies, found that after cashing out:

- solo driving to work fell by 17%
- carpooling increased by 64%
- transit ridership increased by 50%
- walking and cycling increased by 33%.

These mode shifts reduced total vehicle commuting miles travelled by 12%. Putting this reduction into perspective, this is equivalent to removing one of every eight vehicles used for driving to work. In total, cashing out reduced 1.1 million vehicles miles travelled per year in California.

Source: Shoup (1997), Evaluating the effects of parking cash out – eight case studies.



Non-price related behaviour change

Off-peak public transport fares and car parking initiatives attempt to bring about behaviour change using financial incentives. There may be opportunities to support the implementation of these measures using other actions targeted at behaviour change but that are not related to price, such as capitalising on network disruptions to break habitual behaviours.

To understand the potential for non-price related behaviour change we commissioned a literature review from the University of New South Wales to understand the effectiveness of transport behaviour change interventions.²⁰

The research showed that people would make the decision to not drive when the alternatives to driving are perceived as equal as or better than their current driving behaviour. In reality, this means that driving needs to become more difficult or alternatives to driving, such as public transport, need to become better.

Disruptions to transport networks are opportune times for people to reconsider their transport options. Evidence shows that people change their travel behaviours after transport disruptions.²¹ A transport network disruption over multiple weeks is an example of what the literature calls an opportunity for habit discontinuity.²²

It's important to note though, that people who previously drove will only continue new travel behaviour after the disruption if they deem it to be better than driving or as good as driving. This means that appropriate alternatives to driving should be improved during and after periods of disruption.

The construction of North East Link presents a good opportunity for a behaviour change intervention.

We recommend the Victorian Government increase bus services on Doncaster bus routes and maintain bus priority along Eastern Freeway during North East Link construction disruptions.

This could allow people to continue or even adopt a new behaviour on a high-quality public transport service. This could support transition to the future Doncaster busway, which has been committed to by the government as part of North East Link.

20 Ortmann, A and Dixit, V (2017), *Nudging towards a more efficient transportation system – A review of non-pricing (behavioural) interventions*.

21 For instance, Zhu, S and Levinson, D (2011), *Disruptions to transportation networks – A review*; Larcom, S, Rauch, F and Willems, T (2017), *The benefits of forced experimentation – Striking evidence from the London Underground network*; and van Exel, N and Rietveld, P (2001), *Public transport strikes and traveller behaviour*.

22 Verplanken, B, and Wood, W (2006), *Interventions to break and create consumer habits*.

5. Better use of existing infrastructure

RECOMMENDATIONS

4. OVERHAUL EXISTING BUS SERVICES, EXPANDING SUCCESSFUL ROUTES AND REPLACING POOR PERFORMING ROUTES WITH LOW COST, CUSTOMER-RESPONSIVE SERVICES

Undertake a systematic review of all poor-performing networks to identify opportunities to reprioritise services

Introduce innovative public transport services such as on-demand bus and ride sharing

Establish arrangements for demand responsive and ride sharing services to integrate them into the public transport mix

5. ESTABLISH A TRANSPARENT FARE-SETTING REGIME

Set clear policy objectives to guide the setting of public transport fares, focussed on efficiency and equity

Align public transport fare setting with the approach in the Victorian Cost Recovery Guidelines

6. BETTER ALLOCATE ROAD SPACE TO PRIORITISE EFFICIENCY ON IDENTIFIED MOVEMENT CORRIDORS

Identify a priority list of road space allocation initiatives to be delivered over the next five years

Ensure the list of priority initiatives is based on the Movement and Place Framework and focuses on congested movement corridors with competing uses, such as roads in the City of Yarra and City of Stonnington

Reprioritising Melbourne's bus network

Melbourne's metropolitan bus network is the largest of all public transport services in Victoria by service kilometres. It has the biggest operating and maintenance expenditure by mode after trains yet accounts for just 16% of public transport use²³ (Figure 13).

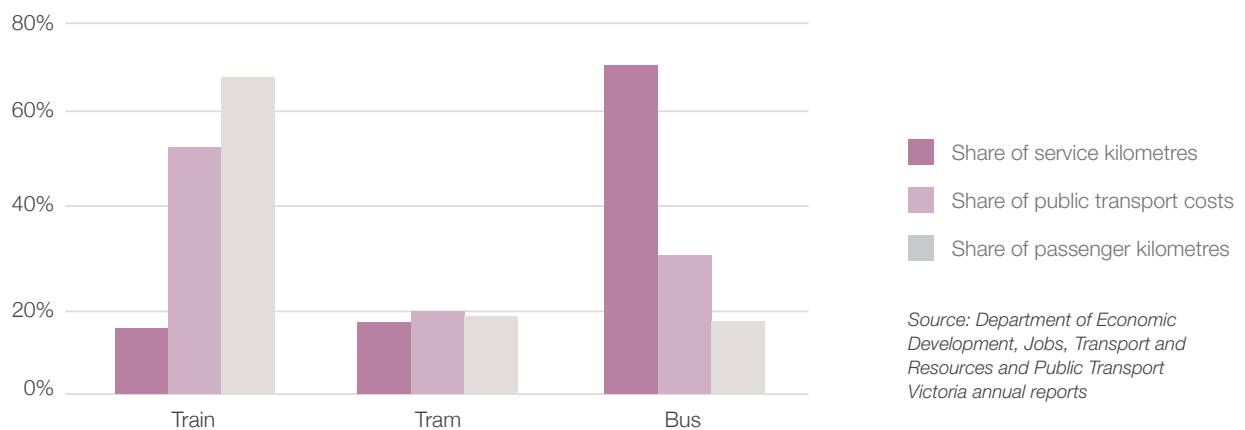
In many parts of the city, buses provide a quality transport service and are likely to play a greater role in the future, particularly in the NEICs. Where improvements to bus networks have been delivered, there have been substantial increases in patronage. However the high cost of running bus services compared to usage, means that opportunities to improve efficiency should be explored.

In *Victoria's 30-year infrastructure strategy*, we made a number of bus recommendations including growth area bus service expansion and SmartBus network extensions and service increases. These recommendations had longer timeframes but align strongly with the analysis undertaken for this work to understand the different markets for buses, in particular for areas of high density or those undergoing transition.

Our research has examined the performance of Melbourne's bus network in more detail, looking at where it is performing well, where it is underperforming and how it might be improved or repurposed to better meet the needs of users. Buses are the most flexible public transport mode. They do not require expensive, fixed and protracted infrastructure investments and are able to operate almost anywhere on the road network. They are an ideal solution to better manage transport demand in the short to medium term, as their relatively low capital cost means that services can be increased or decreased quickly depending on shifts in technology, policy and behaviour.

²³ Public transport use is measured by overall passenger kilometres.

Figure 13 Public transport supply and cost share by mode in 2016 – metropolitan network



We undertook a performance assessment at the route-level using benchmarking analysis based on international best practice.²⁴ Using a benchmark of 20 boardings per service hour as a measure of economic viability, our analysis showed only 60% of the metropolitan bus network (around 345 routes) is considered to be performing at efficient levels (Figure 14).

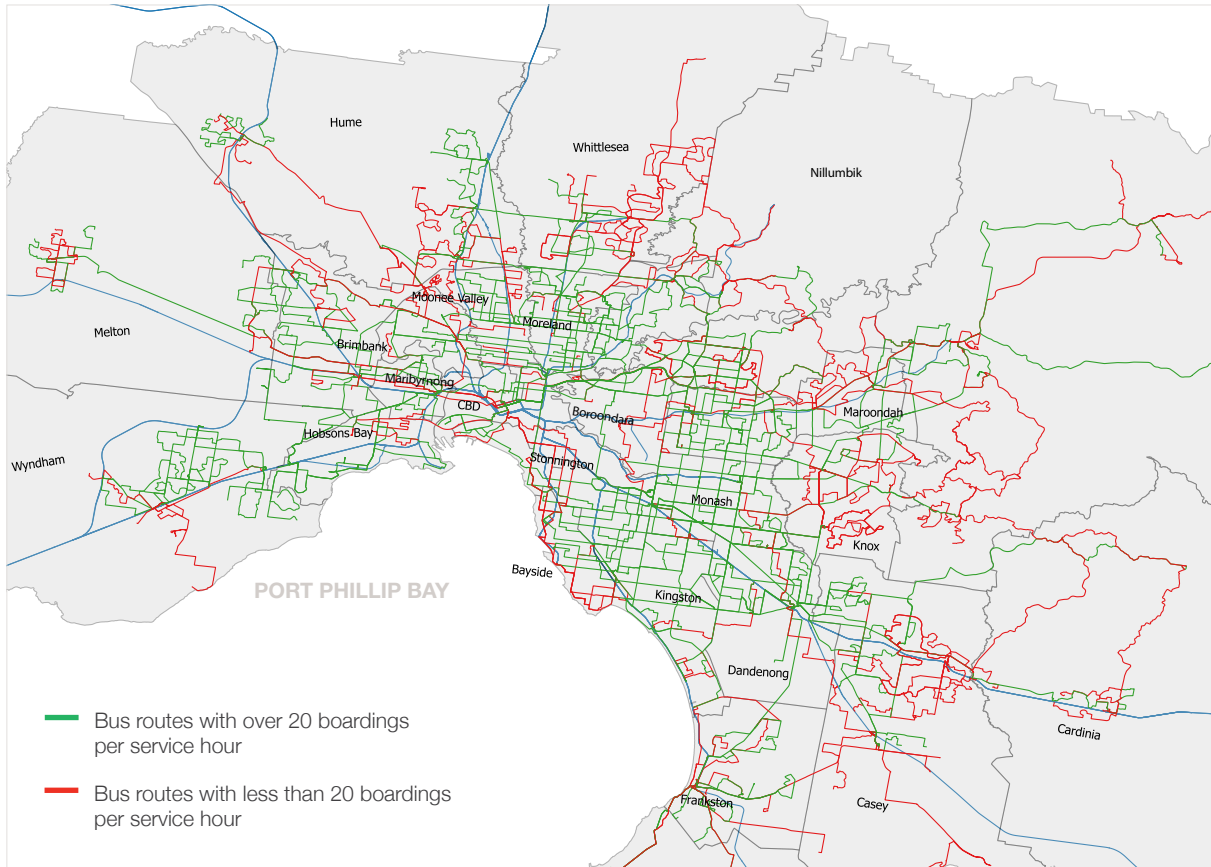
In general, the success of routes is largely due to the density of the residential catchment and the number of destinations or job-rich centres the routes service. Efficient routes are typically those in areas that either serve or connect to universities, other public transport services or key activity centres.

The remaining 40% of the bus network is considered to be underperforming against the 20 boardings per service hour benchmark. There is significant opportunity to optimise service provision, performance and attractiveness of these bus services. These routes generally:

- serve sparsely populated areas with a high proportion of car ownership, or
- provide infrequent services along meandering routes with a limited span of hours.

24 The CIE (2015), *Efficiency of NSW public transport services – report for IPART*.

Figure 14 2016 Melbourne bus network performance



Source: Analysis based on Transport for Victoria 2016 patronage data

Opportunities to improve bus performance

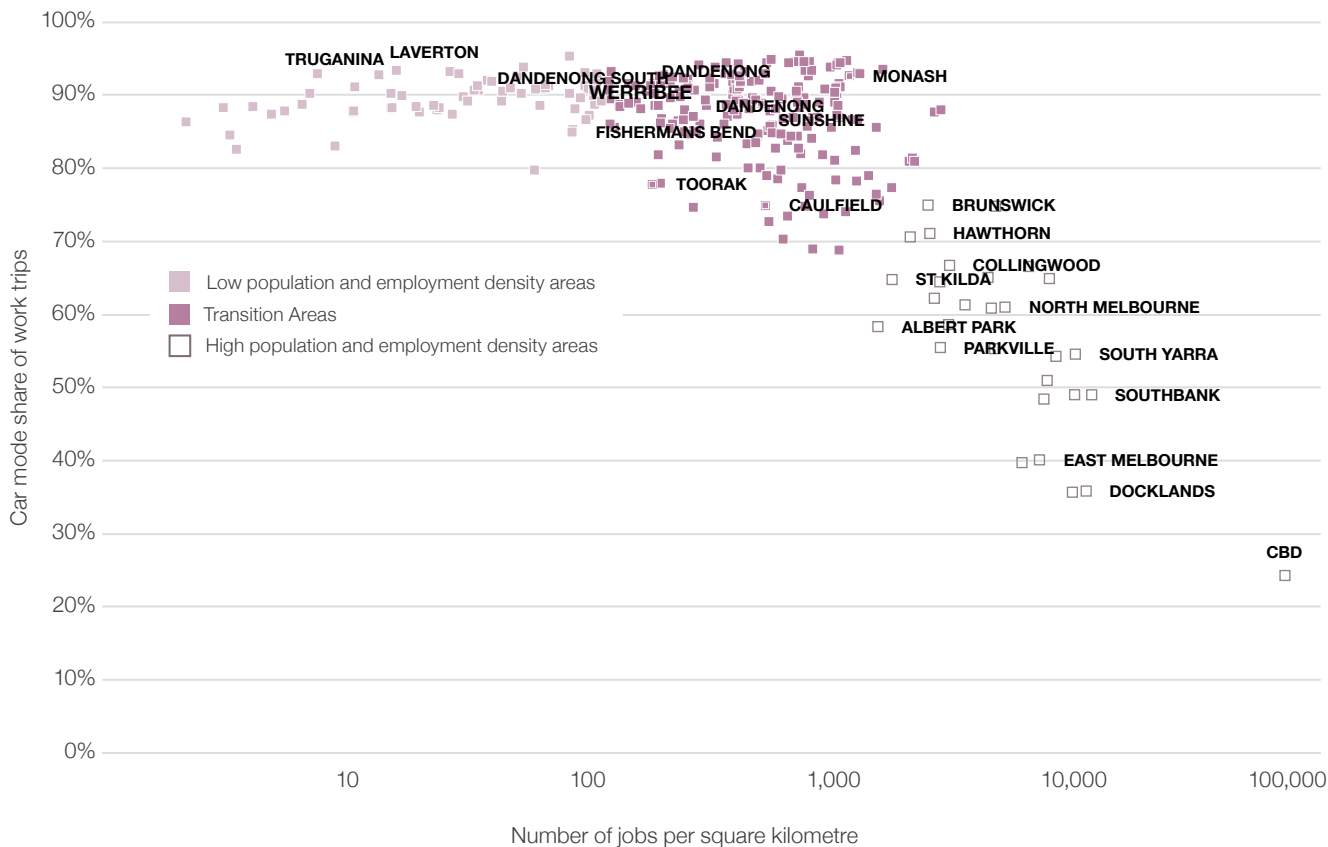
The performance of bus services across Melbourne can be linked to the nature of the market the particular routes are serving. A high level analysis of Melbourne’s changing travel patterns, based on job density and car use, highlights three different market types for travel, with each destination type needing a different response from the bus network (Figure 15).

These cluster into:

- low population and employment density areas
- high population and employment density area
- transition areas.

As centres become more dense over time the bus network is best placed to provide these services initially due to the relatively low upfront costs and ease of responding to changing demand (scalable) and demand centres (re-routable with minimal redundant infrastructure).

Figure 15 The distribution of Melbourne's job density and declining car mode share by suburb



Source: ABS Census (2016), Journey to Work

Low population and employment density areas (Figure 15) are typically outer suburban centres and industrial areas such as Truganina and Laverton which commonly have a low density of jobs and people. In these areas, people predominately drive. Parking restrictions are limited and it is difficult and expensive to provide competitive bus services. In these areas the bus network largely feeds the rail network and acts as a 'safety net' for social inclusion and equitable access.

High population and employment density areas (Figure 15) are typically the CBD and inner and selected suburban centres. These areas have a relatively high density of jobs and people, which is increasing as Melbourne grows. These areas have existing and worsening traffic congestion, are subject to parking restrictions and levies and are well serviced by the light and heavy rail networks. In these areas, the bus network acts as a feeder to the rail network and as a radial service where rail services aren't present (such as to Doncaster or parts of Fishermans Bend to Southbank and the CBD).

Transition areas (Figure 15) are typically major activity centres such as Box Hill and the NEICs. In these areas, an increasing density of jobs and people is placing growing pressure on the transport network, leading to worsening traffic congestion. These areas, as they transition towards characteristics similar to Melbourne's higher density areas, present an opportunity for the bus network to act as an instigator of mode shift, with targeted investment in higher quality services. As these centres densify, the bus network increasingly has a role to act as a feeder service to these centres, alongside being a link between the rail network and last mile option.

The Victorian Government is in the process of negotiating new bus service contracts for 70% of Melbourne's bus network which aim to be more flexible and customer-focused. These new contracts present an opportunity to deliver significant benefits for public transport users and are critical for the delivery of our recommendations.

Boxes 8 and 9 show that targeted reprioritisations of the bus network, combined with the provision of alternative services to better match demand and provide a safety net in some areas, have demonstrated effectiveness in achieving mode shift and improved efficiency of the bus network. **Government should overhaul existing bus services, expanding successful routes and replacing poor performing routes with low cost, customer-responsive services.**

Reprioritisation of bus resources should focus on the underperforming networks in the low population and employment density areas and transition areas (Figure 15). In particular:

- growing corridors where densities are too low to support a high frequency bus route, but are likely to increase in the future
- areas with low population growth and an ageing population.

BOX 8: SERVICE DELIVERY MODELS - DEMAND RESPONSIVE TRANSPORT

Demand responsive transport, ride share and community transport are innovative transport services that have the potential to improve the suitability, accessibility and efficiency of the public transport service in Melbourne.

These pre-booked, shared transport services are flexible and adapt to customer demand. Unlike a typical bus, demand-responsive transport changes its routes and vehicles to suit the number of passengers who want to travel and their destinations. Demand-responsive transport sends out smaller vehicles like sedans or mini vans to pick up several passengers at once and take them to selected destinations, such as bus or train stations and selected local facilities, for example, shops and medical centres.

The development and implementation of these services can be done using local partnerships, but could also be procured and provided by the state government as part of the public transport mix.

Demand responsive or community transport services can be delivered in a way that:

- establishes sustainable land use and travel patterns in new communities early. In areas where patronage is not currently sufficient to efficiently provide a bus service but will be in the future (such as growth areas), demand-responsive or peak-only services should be explored. Funding for these services could be done through a mixture of private, state or local government funding, including the Growth Areas Infrastructure Contribution
- utilises available taxis or other commercial passenger vehicle providers
- unlocks the capacity of community transport resources and vehicles
- provides a safety net for travellers who rely on public transport
- considers the more appropriate and efficient use of buses, including the provision of smaller buses on existing services
- considers the application of recent advances in location-based technology and asset sharing schemes that could result in better outcomes for this market.

Analysis undertaken for Independent Pricing and Regulatory Tribunal (IPART) on bus operations in NSW has highlighted the potential for new methods of delivering local and low demand transport services.²⁵ A key recommendation of this study highlighted the need to realign the provision of buses to demand, with the shift to periodic reviews of bus fleet size and whether a service should shift to a demand responsive service. These recommendations have been incorporated into recent refranchising of Sydney's bus services, with new contracts such as the Inner West retendering incorporating lower cost on-demand minibus services in low demand areas such as Canada Bay, Concord and Strathfield. Similar routes are currently being explored in Brisbane and Auckland for similar services.

²⁵ AECOM (2017), *Efficient costs of rural and regional bus operators* – report for IPART.





Latrobe Uni 548
via Ivanhoe

WRY 790

DAU

ZMC 963

As patronage grows, demand responsive bus services can be appropriately scaled to cater for increased travel demand until demand justifies upgrading to standard bus services. Case studies show that patronage growth and improved public transport mode shares can be achieved, even without the addition of significant new funding. The Brimbank example below provides strong evidence of this approach (Box 9).

BOX 9: THE SUCCESSFUL BRIMBANK BUS NETWORK RE-STRUCTURE CASE STUDY

Cost: Low additional cost

Patronage uplift: 10% increase in the first six months

In July 2014, Public Transport Victoria (PTV) introduced a restructured bus network in the City of Brimbank in Melbourne's western suburbs. The design emphasised providing a cost-effective network that addressed community needs.

Developed in response to a need to provide better services to connect to a new Regional Rail Link train line within a defined budget, PTV developed a cost-effective bus network design solution where it improved the efficiency of the existing network and reinvested these savings into targeted new services. The approach sought to better use existing assets and considerably improved the efficiency of the existing network.

The new Brimbank network featured more direct and frequent services, better connections to trains, bus timetables finishing later at night, Sunday services on all routes and better connections to key local destinations. Efficiencies within the existing network were achieved through better utilising school buses outside the afternoon school peak period, increasing route directness and reducing services in low demand areas.

The redesigned bus network in Brimbank allowed PTV to increase the proportion of Brimbank residents within 800 metres of a service operating every 20 minutes in peak periods from 66% to 90%, with only one new bus added to the network fleet. This new local network saw a 10% growth in patronage within the first six months, relative to a 16% increment in timetabled service hours with growth in patronage on these services continuing to outgrow comparable unoptimised services in other areas of Melbourne. The success of the new local bus network in Brimbank demonstrates that demand can be better managed by a combination of increased service levels and improved network design.

Source: Loader C, Langdon, N and Robotis, E (2015), Bringing better buses to Brimbank – Implementing bus network reform in Melbourne

On the basis that transitioning markets represent growth markets for buses in the future, there are a number of interventions that should be employed to improve the efficiency and performance of the bus network, including improved network design and increased service frequency, and better connections with other modes. **Government should undertake a systematic review of all poor-performing networks to identify opportunities to reprioritise services.**

We also recommend maintaining a safety net for those who rely on public transport by replacing existing underperforming bus services with more fit for purpose services, such as on-demand buses or ride-sharing. Consideration needs to be given to how these new and innovative services can be delivered as part of the broader public transport service offering.

Government should establish arrangements for demand responsive and ride sharing services to integrate them into the public transport mix.

Arrangements for setting public transport fares

The nature of transport in Melbourne is likely to change significantly in the future. Technology is enabling a range of new and diverse transport services – such as autonomous vehicles, ride sharing and on-demand public transport – that have the potential to make getting around Melbourne easier for everyone. At the same time, growing demand means more is needed from all of Melbourne’s transport services in order to meet the challenges that a larger city will bring.

The price of all transport including public transport will be a major driver of outcomes in the future. As we’ve noted, what people pay for transport – in terms of both price and time – is the key determinant of how and when they choose to travel.

The best outcomes will be achieved across the system if relative prices across modes and time of the day are set in a way that directs demand towards the system in the most efficient way. When demand for travel on one mode (or time) is high, the price of other modes (or times) should reduce to spread demand across the system, delivering better service levels across the board in the most efficient way. Network pricing requires road and public transport to be priced in a way that distributes demand efficiently.

The level and structure of public transport fares can also have a significant impact on the fiscal sustainability of the public transport network, which will become increasingly important as Melbourne grows and the demand for more public transport services increases.

In this context, we sought to determine if Victoria’s current public transport fare arrangements are well-placed to adapt to a future with dynamic, integrated transport services and efficient pricing. Our analysis has identified significant opportunities for improvement. Box 10 highlights some anomalies in the current fares arrangements.

BOX 10: EXAMPLES OF ANOMALIES IN VICTORIA’S CURRENT PUBLIC TRANSPORT FARES

Infrastructure Victoria has identified a number of inconsistencies and inequities in the current fare charges to users, further highlighting the need for a clearer policy framework and public discussion about the trade-offs being made in setting fares. For instance:

- A person making a trip that is two stops pays the same as someone who travels the network for two hours.
- Those living in inner areas have more mode choice (trains, trams and buses) and more services, yet pay the same amount as those who have limited access to public transport in outer areas.
- A person travelling to the CBD at 8.00am pays the same as someone travelling in the off-peak period, even though the total cost of providing peak period services is much higher than off-peak.
- A person travelling 5km to the CBD is charged the same as a person travelling 60km from the CBD (a maximum of up to \$8.60 per day).
- People in metropolitan Melbourne have access to an ‘early bird free travel’, where any journey made before 7.15am on a weekday on the metropolitan train network is free. However, this is not available on metropolitan buses or trams.
- A person travelling on the metropolitan network pays a fixed or flat fare across all modes of travel, regardless of whether they travel by train, tram or bus, or what time of day they travel (except for the early bird on a metropolitan train), while a person travelling in regional Victoria pays different prices based on time of day of travel (peak/off-peak) and quality of service offering (first class and economy service).
- A person travelling 120km, such as from Pakenham to Lara in the metropolitan boundary, is charged a maximum of \$8.60 per day, while a user travelling 120km from regional areas to the CBD could be paying up to around five times more, or \$43.20 per day.

Source: Victorian Fares and Ticketing Manual (2018) and calculators found on Public Transport Victoria website – <https://www.ptv.vic.gov.au/tickets/fares/regional-fares/>

Current fare setting arrangements

In metropolitan Melbourne, fares are:

- set on the basis of a 2-hour trip
- subject to a daily cap
- based on a 2-zone system (with the exception of the free tram zone in Melbourne's CBD)
- the same across modes (except for the early-bird fare).

Recent practice has been to increase the historical level of fares annually by Consumer Price Index (CPI) plus 2.5%.

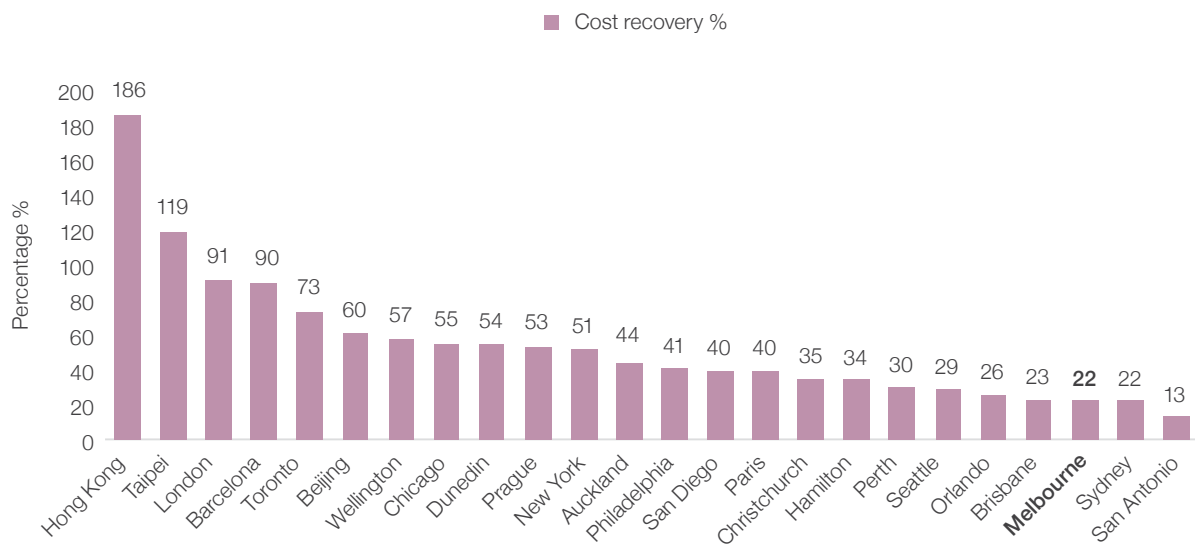
The existing fare structure sends few price signals to manage demand. The daily cap effectively negates any demand management potential once travel reaches the threshold. Off-peak fares are not widely used despite some indications that they have been successful in reducing peak demand.

In recent years, there have been a number of structural changes made to public transport fares that have likely increased rather than reduced demand. These include:

- Reducing the original three-zone metropolitan system to two zones in March 2007, with most travel now priced at the Zone 1 fare
- The introduction in January 2015 of the free tram zone in Melbourne's CBD.

Benchmarked against other cities, Melbourne has a relatively low rate of cost recovery (Figure 16).

Figure 16 Estimated international cost recovery rates for public transport (2012-13)



Source: Based on Tourism and Transport Forum Australia and L.E.K Consulting (2015), Public Transport Barometer – A review of key public transport indicators for Australia

Objectives of public transport fares

As the transport system as a whole becomes more dynamic and integrated and overall investment in public transport grows, it will become increasingly important that fares are set and amended in a way that properly and transparently reflects the public objectives of the system.

Public transport can have a range of objectives. While its key role discussed in this report has been about taking cars off the road at congested times, the system also has the objective of providing equity (but not necessarily equality) of access to transport that enables communities to be connected to jobs and services. It can also have the objective of fairness, in that those who use the system should contribute to the costs of operating the system, balanced with social objectives including programs such as the Multi-Purpose Taxi Program for people with a disability, and concessions for low income travellers.

These multiple objectives are not clearly articulated in the way public transport fares are managed. For instance, fare levels – and changes to these over time – could be aimed at recovering costs, encouraging patronage, increasing social inclusion or a combination of these things.

There is little transparency or consultation around how public transport fares decisions are made, reviewed or amended. Box 11 provides a contrasting example of the highly transparent approach to fare setting in New South Wales, while Box 12 summarises the legislative and regulatory arrangements currently governing public transport fares in Victoria.

BOX 11: PUBLIC TRANSPORT FARE SETTING IN NEW SOUTH WALES

New South Wales has a transparent and evidence-based approach to setting public transport fares that seeks to balance a clear set of objectives. In New South Wales, the Independent Pricing and Regulatory Tribunal (IPART) is the independent pricing regulator for some government services, including public transport. The closest Victorian equivalent to IPART is the Essential Services Commission (ESC), although the ESC has no role in public transport pricing.

In 2015, IPART received a terms of reference from the New South Wales government to conduct a major review of public transport fares in Sydney and surrounding areas. It was asked to determine the maximum Opal fares to apply from 1 July 2016 for all modes of public transport: rail, buses, ferries and light rail. This meant the public transport system could be analysed as a whole as well as how fares can encourage travel behaviour.

IPART took into consideration a large number of matters, which were synthesised into six objectives for its review. Fares should:

- encourage the efficient use of public transport
- promote the efficient delivery of public transport
- encourage greater use of public transport
- minimise impacts on customers
- be logical, predictable and stable over time
- increase farebox revenue or cost recovery.

Throughout 2015, IPART conducted a public review into public transport fares that included issues, information and methodology papers, as well as public hearings. Over 1,200 submissions to the draft report were considered, with the final report delivered in May 2016 recommending a package of fare reforms.²⁶

In undertaking the review IPART identified the two most important elements in its review processes as being to actively engage with consumers, and to undertake research and analysis, seeking expert advice where necessary.

²⁶ See Independent Pricing and Regulatory Tribunal (2016), *More efficient, more integrated Opal fares – Final report*.

BOX 12: PUBLIC TRANSPORT FARES – LEGISLATIVE AND REGULATORY UNDERPINNING

The *Transport (Compliance and Miscellaneous) Act 1983* provides that the Secretary of the Department of Economic Development, Jobs, Transport and Resources may determine the conditions for use of public transport, including the setting of fares. Before the Secretary determines the conditions of use, including the structure and level of fares, he or she must consult with Public Transport Victoria.²⁷ These conditions must be published in the *Government Gazette* and are subsequently set out in the *Victorian Fares and Ticketing Manual*.

However, the legislation does not provide any guidance as to what the Secretary should consider when setting fares, the objectives that should be sought to be achieved by the fares regime or provide for any public consultation on proposed fares.

The *Transport Integration Act 2010* (the TIA) is Victoria's principal transport statute, which sets out how decisions affecting the transport system should be made within the same integrated decision-making framework and supporting the same objectives. The TIA sets out a number of decision-making principles, including the principle of transparency (s.21), which sets out that members of the public should have access to reliable and relevant information in appropriate forms to facilitate a good understanding of transport issues and the process by which decisions in relation to the transport system are made. However, tax payers, as subsidisers of the system, and public transport users, who directly contribute to the cost of running the system, do not currently have access to this information.

Subordinate Legislation Act 1994

In addition, Victoria's regulatory framework also includes regulatory impact statements and consultation processes when government is considering changes to regulation that are likely to have a significant impact on the community. This framework is legislated through the *Subordinate Legislation Act 1994* and applies for both statutory rules and legislative instruments.

Public transport fares are recognised as a legislative instrument; however, they have been excluded from the requirements of the *Subordinate Legislation Act 1994*, including the requirement to prepare a regulatory impact statement and associated consultation processes.

Many government fees and charges in Victoria are set with reference to the Department of Treasury and Finance Cost Recovery Guidelines (the Guidelines).²⁸ These Guidelines set out well-established frameworks and policies for setting user charges. They are clear about situations where full cost recovery may not be appropriate, including government services where objectives of income redistribution or social insurance are important. The Guidelines also emphasise the potential for user charges to advance efficiency, equity and fiscal sustainability objectives and the need to balance these objectives against each other when determining cost recovery arrangements.

There is a clear opportunity for government to better use fares as a tool for achieving a range of potential objectives, particularly given the significant challenges with growing transport demand in Melbourne in coming years.

We recommend government set clear policy objectives to guide the setting of public transport fares, focussed on efficiency and equity. Government should also align public transport fare setting with the approach in the Victorian Cost Recovery Guidelines.

²⁷ Section 220D of the *Transport (Compliance and Miscellaneous) Act 1983*.

²⁸ Examples include: court fees such as fees payable for proceedings issued by VCAT; fees where persons use Victoria Police resources for private or commercial purposes such as event management services, providing a witness statement, interview or affidavit or other police information services such as vetting police records; Victorian Registration and Qualifications Authority fees for the registration of providers, accreditation of VET courses and the issue of apprenticeship certificates.

Road space allocation

A third area for potential 'better use' relates to how we allocate space on the transport network to different uses: movement – of cars, public transport, freight, bikes or walking – parking, commercial activity, construction, maintenance and public activity (such as parades or marathons).

The allocation of space on the transport network is set out in the policies and regulations that govern use of Melbourne's transport network and implemented through things like parking restrictions, ICT traffic management systems and priority lanes for public transport as well as physical infrastructure.

Changing these policies and regulations can impact on how well the network performs for different uses. Clearways for example remove parking during specified times of day to prioritise movement on the network.

In the 30-year strategy we recommended that government accelerate the roll-out of changes to road space allocation, whether physical changes or alterations to road signals, to improve throughput of people, particularly in areas of high congestion, over 0-15 years.

VicRoads and Transport for Victoria are working together to develop the Movement and Place Framework (the Framework). The Framework recognises that every transport link has two functions, regardless of its size, location and what surrounds it. At its simplest, every transport link has a movement function (e.g. enabling journeys), and a place function (e.g. as a destination).

However, the design objectives for creating successful places can conflict with those for creating successful movement conduits.

The Framework identifies that it is important to recognise the competing outcomes between movement and place uses and decide on the balance that needs to be achieved for each of these functions at the desired locations.

The Movement and Place approach helps to establish the strategic role of a link, balancing the need for movement and accommodating its destination requirements. Road and street design reflects the strategic role of a link within the wider network: not all links can be popular destinations, just as not all links should prioritise vehicle movement.

This Framework has the potential to deliver better demand management outcomes on the network by helping government to prioritise road space allocation interventions to priority movement roads which are not meeting their movement objectives.

Identifying roads which have been classified as priority movement corridors but are experiencing poor and declining travel time and reliability could help the government develop a priority action list for road space reallocation.

We recommend government identify a priority list of road space allocation projects to be funded and delivered over the next five years, using the Movement and Place Framework.

These projects should focus on congested movement corridors with competing uses, such as roads in the City of Yarra and City of Stonnington (Box 13).

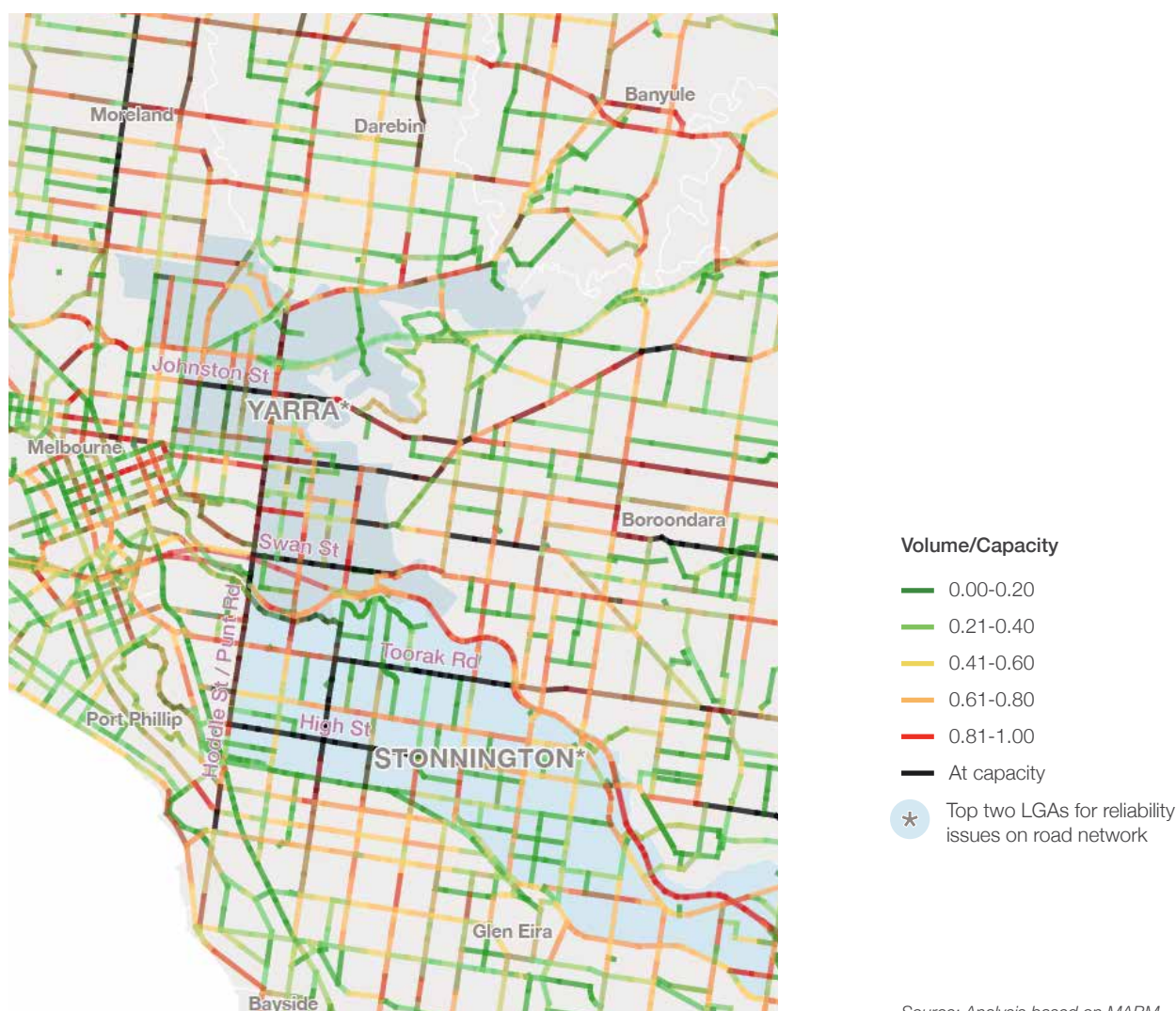


BOX 13: POSSIBLE PRIORITISATION OF MOVEMENT CORRIDORS BASED ON MABM

In our analysis of the performance of the road network by LGAs, we found that the City of Yarra and the City of Stonnington were the top two LGAs for road unreliability in 2015. Figure 17 provides an illustration of the capacity within these areas. In these two LGAs, many road links have reached capacity. For example, a number of roads in Stonnington, such as High Street and Toorak Road, are at capacity. These roads support many functions including tram services, cars, parking and access for walking and cycling.

Given the unreliability of the road network in the City of Yarra and the City of Stonnington, the number of roads already at or near capacity and the draw of people to these areas, there is a significant opportunity to apply the Movement and Place framework to focus on improving reliability of the network.

Figure 17 Volume/Capacity of inner east roads in 2015



6. Invest in new assets and services

RECOMMENDATIONS

7. INCREASE INVESTMENT TO INTRODUCE ADDITIONAL BUS SERVICES IN AREAS OF HIGH DEMAND

Introduce a more direct and frequent shuttle bus service between Parkville and Victoria Park Station in Abbotsford

Provide additional bus services to access the Monash and La Trobe NEICs, beginning with:

- Wellington and Blackburn Roads in Monash
- Services between the Hurstbridge and Mernda rail corridors in La Trobe

8. PRIORITISE ACTIVE TRANSPORT INVESTMENTS TO HIGH POTENTIAL AREAS

Prioritise investment, which could be partly funded from the proposed changes to the car parking levy, in the following locations:

- Trips to inner Melbourne and Parkville from
 - Richmond
 - Brunswick, Brunswick East and Brunswick West through Carlton
 - South Yarra, Prahran, Windsor and Toorak
- Trips to the Monash NEIC from Clayton, Springvale, Oakleigh and Huntingdale
- Trips to the La Trobe NEIC from Preston, Reservoir and Heidelberg West

9. IMPROVE ROAD CONNECTIVITY ON PARTS OF THE NETWORK WHERE PRIVATE VEHICLE USE WORKS BEST

Identify and prioritise investment to improve road connectivity to dispersed employment centres, such as Dandenong South, Laverton and the Melbourne Airport area

More bus services

Investment in additional services to help manage transport demand should focus on flexible modes with low capital costs, such as buses. In areas where government has flexible and customer-focussed contracts in place and where bus services are performing well, opportunities to further enhance these services with new investment should be considered. This would create more efficient use from the road network, moving more people with fewer vehicles. This is particularly the case for those markets that have the characteristics of 'high density' areas as described in Figure 15 in chapter 5.

We have identified two case studies to help illustrate the Melbourne experience of providing enhanced bus services.

BOX 14: THE SUCCESSFUL ROLL-OUT OF MELBOURNE'S PREMIUM BUS SERVICES

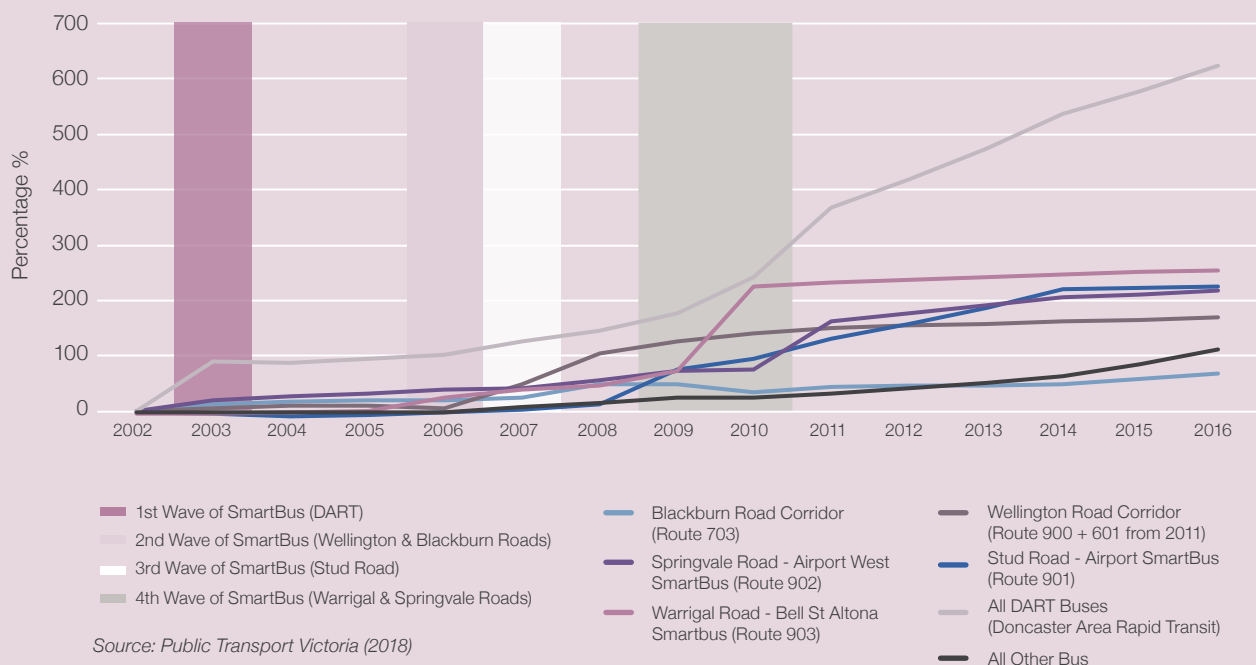
Cost: Low capital, step change in operational costs

Patronage uplift: 70% increase in the first two years; steady growth over the past decade

A higher quality service in Melbourne's bus network has been introduced on a number of corridors across Melbourne over the past decade. These services, branded as SmartBus, include the three orbital routes as well as additional services to Doncaster and Rowville and the CBD and Monash respectively.

As part of this premium service, a number of on-road measures to improve bus reliability and travel time were introduced, as well as improvements to service frequency, operating hours and customer information. With the roll out, patronage increased up to 70% within the first two years. Patronage on the SmartBus routes has continued to grow, outpacing the rest of the Melbourne bus network (*Figure 18*).

Figure 18 Growth in bus boardings post SmartBus upgrades – 2001 to 2016



In suburban Melbourne, residents have increasingly seen these premium services as a viable alternative to car travel to major activity centres such as Box Hill, Dandenong, Heidelberg and Ringwood. Following SmartBus and other bus upgrades between 2006 and 2011, there was a 2.5% mode shift to bus use within 800m of a SmartBus service, compared to a 1.3% mode shift to bus use elsewhere in Melbourne. This growth continued between 2011 and 2016, as overall bus patronage growth slowed or declined.

The success of these routes in generating mode shift away from private vehicle use has been attributed to the combination of direct routing and linking major activity centres and rail corridors.²⁹ As such, the premium SmartBus routes have formed the core of the cross-town public transport network in Melbourne, with similar service principles increasingly being rolled out on other routes around the city. New customer-focussed contracts across the majority of Melbourne's network provide further opportunity to deliver more of these improved services.

29 Loader, C. and Stanley, J (2009), *Growing bus patronage and addressing transport disadvantage – The Melbourne experience*.

Infrastructure Victoria recommends the government increase investment to introduce additional bus services in areas of high demand.

A more direct, frequent shuttle bus service between Parkville to Victoria Park Station in Abbotsford would provide a faster access to the Parkville NEIC and help manage growth of trips into the Parkville NEIC and the CBD in the morning peak.

Additional bus services in Monash and La Trobe, such as along Wellington and Blackburn roads in Monash, and between the rail corridors in Hurstbridge and Mernda in La Trobe, would help alleviate deteriorating travel time and reliability to the Monash and La Trobe NEICS.

BOX 15: THE SUCCESSFUL UNIVERSITY BUS SHUTTLE

Cost: Relatively low cost of \$1 million-\$1.5 million per year

Patronage: High patronage uplift, some of the busiest bus services in Melbourne

Over recent years, university shuttle services have been introduced to link the rail network, major activity centres and university campuses in inner and suburban Melbourne. The first of these services between North Melbourne Station and Melbourne University (Parkville, Route 401) and Huntingdale and Monash University (Clayton, Route 601) have demonstrated the value of direct, fast and frequent services between busy transport and demand nodes.

At the busiest times, these direct services run every two to three minutes, offering reduced travel times between key destinations. As a result, these services are an attractive alternative to driving or congested tram services.

These services have been highly successful, with strong and growing patronage even outside of peak university times. Routes 601 and 401 are among the two highest performing routes in Melbourne with each having a peak daily usage of around 7,000 passengers each. Building on the success of these routes, similar services were rolled out in 2016 between Reservoir Station and La Trobe University (Bundoora, Route 301) and between Box Hill and Deakin University (Burwood, Route 201).

Active transport

International evidence shows that measures to support active transport can reduce demand for car use and public transport in key corridors at peak times.³⁰ Active transport is also efficient – high-quality cycling infrastructure can accommodate 4,600 cyclists per hour compared to 1,900 cars.³¹

Active transport has strong potential to assist with managing transport demand as Melbourne grows, diverting people off roads and public transport and providing active transport users important benefits, including improved health.

Walking and cycling can also deliver high levels of reliability and predictability even though total travel times might be higher. Our community research shows that Melburnians strongly prefer a predictable journey time that takes longer, than an unpredictable journey time that is usually quicker.³²

In *Victoria's 30-year infrastructure strategy*, we recommended the accelerated roll out of pedestrian networks and strategic cycling corridors over the next 15 years, particularly for the central city. Government has recently announced projects under the 2015 Safer Cyclists and Pedestrians Fund that primarily target safety outcomes. Investment targeted at transport demand management is not the focus of the fund.

To understand where active transport can play a role in managing transport demand, we have developed a picture of potential additional active transport trips in priority areas, specifically inner Melbourne³³ and the seven NEICs.

We drew upon the methodology developed by Transport for London³⁴ and made some assumptions around when the average person could walk or cycle instead of using motorised transport.

30 See FLOW Project (2016), *The role of walking and cycling in reducing congestion – A portfolio of measures*, available at www.h2020-flow.eu.

31 Transport for Victoria (2017), *Victorian Cycling Strategy 2018-28: Increasing cycling for transport*.

32 Quantum Market Research (2017), *Community research – Part 1*.

33 For this analysis, we drew a slightly larger area than the expanded CBD to ensure we were not missing any trips ending in areas such as North Melbourne, Fitzroy or Collingwood.

34 See Transport for London (2010), *Analysis of cycling potential – Policy analysis research report*, available at www.tfl.gov.uk/corporate/publications-and-reports/cycling.

MABM tells us that in 2015 there were over 12 million daily trips across Melbourne by all modes of transport to all destinations and for all trip purposes. Of these, we used the following criteria to identify those trips that had the potential to manage demand by shifting to active transport:

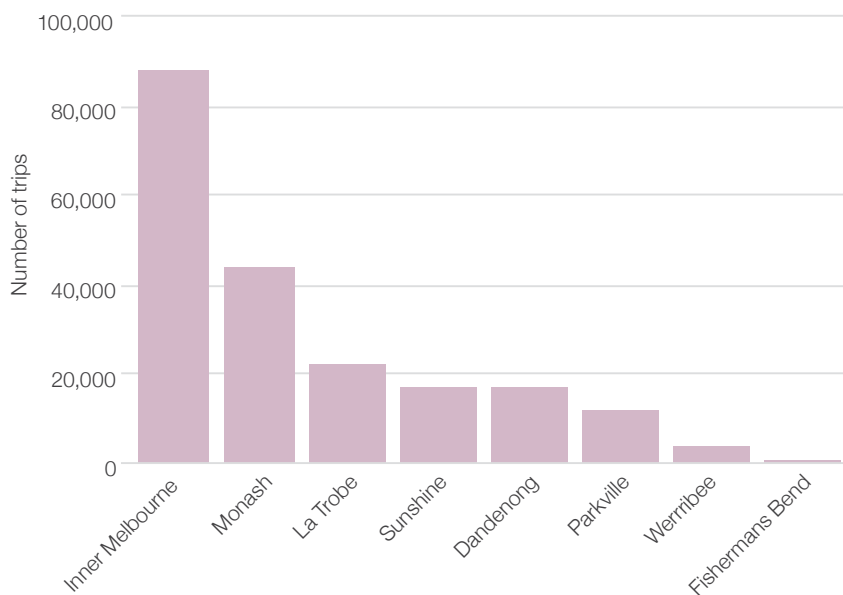
- return journeys from home to inner Melbourne and the seven NEICs
- trips that occur during peak times (7am to 9am and 3pm to 6pm³⁵) currently not taken using active transport (i.e. in cars, public transport and taxis)
- trips that were no greater than 10km in distance (from home or to home) to reflect a reasonable maximum distance for a cyclist (noting that shorter distances within this range may be suitable for walking)³⁶
- trips undertaken by people under 65
- trips taken by tradespeople were excluded, recognising that these trips are likely to require carrying heavy equipment or tools.

While we recognise this approach has some limitations, it has provided a useful starting point for an examination of active transport potential.

Based on this approach, we estimated that over 204,000 trips on an average weekday in 2015 taken by car or public transport had the potential to have been walked or cycled into or back from inner Melbourne and the seven NEICs in the morning and afternoon peak periods. As shown in Figure 19, inner Melbourne was the destination with the largest potential for additional active transport trips (87,900), followed by the Monash NEIC (43,400) and La Trobe NEIC (22,600).

Our priority movements to manage demand over the next five years relate to trips into the CBD and NEICs (Parkville, Monash and La Trobe) from a number of LGAs which align closely to these areas of high potential for additional active transport.

Figure 19 Potential additional active transport trips by destination



Source: Analysis based on MABM

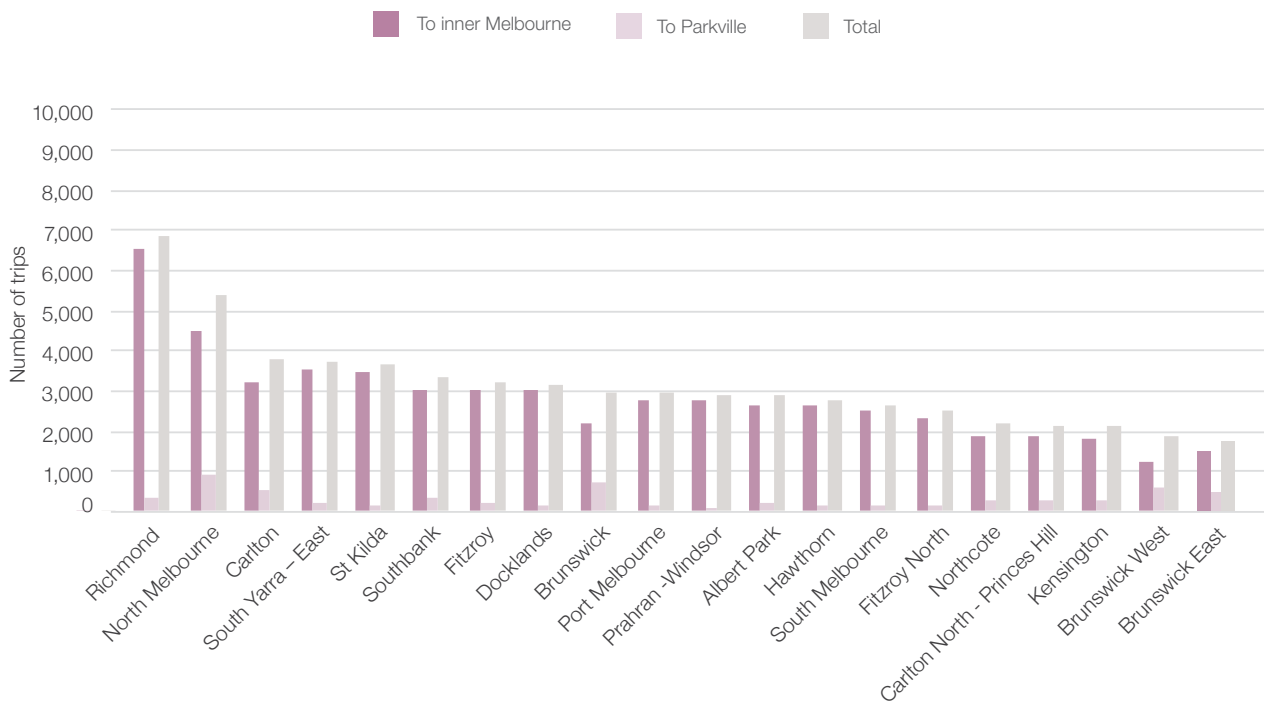
35 That is, trips that depart within these times.

36 Transport for London applied a 10km distance filter for commuting which we adopted.

Active transport potential to inner Melbourne and Parkville

Figure 20 below shows where the highest volumes of potential additional active transport trips into inner Melbourne and Parkville originate. For trips into inner Melbourne, the greatest number of additional potential trips originate in Richmond (6,880 trips) and North Melbourne (5,400 trips).³⁷

Figure 20 Number of potential additional active transport trips to inner Melbourne and Parkville by origin



Source: Analysis based on MABM

While volumes are important in identifying areas of potential for additional active transport, those which have a lower active transport mode share compared to similar areas elsewhere should be the focus of action to improve the attractiveness of active transport.

To get a picture of where there might be barriers to greater uptake of active transport we have compared areas of high potential for additional active transport trips with the actual levels of active transport trips (in 2015 based on MABM) applying the same trip criteria. Adding current active transport trips with the potential additional active transport trips gives the total active transport market.

This analysis identified corridors to inner Melbourne and Parkville from both South Yarra/Prahran-Windsor/Toorak and Richmond as the corridors with the lowest proportion of market captured in 2015 (Table 2). These two areas also correspond with our earlier recommendation on the car parking levy.

³⁷ We have excluded trips from within the suburb of Melbourne to inner Melbourne and Parkville, which has the highest potential active transport volume in the analysis. This does not mean that the suburb of Melbourne is not an important area of focus for active transport, rather those trips are not identified as priority movement.

Table 2 2015 actual versus potential additional active transport trips by origin to inner Melbourne / Parkville

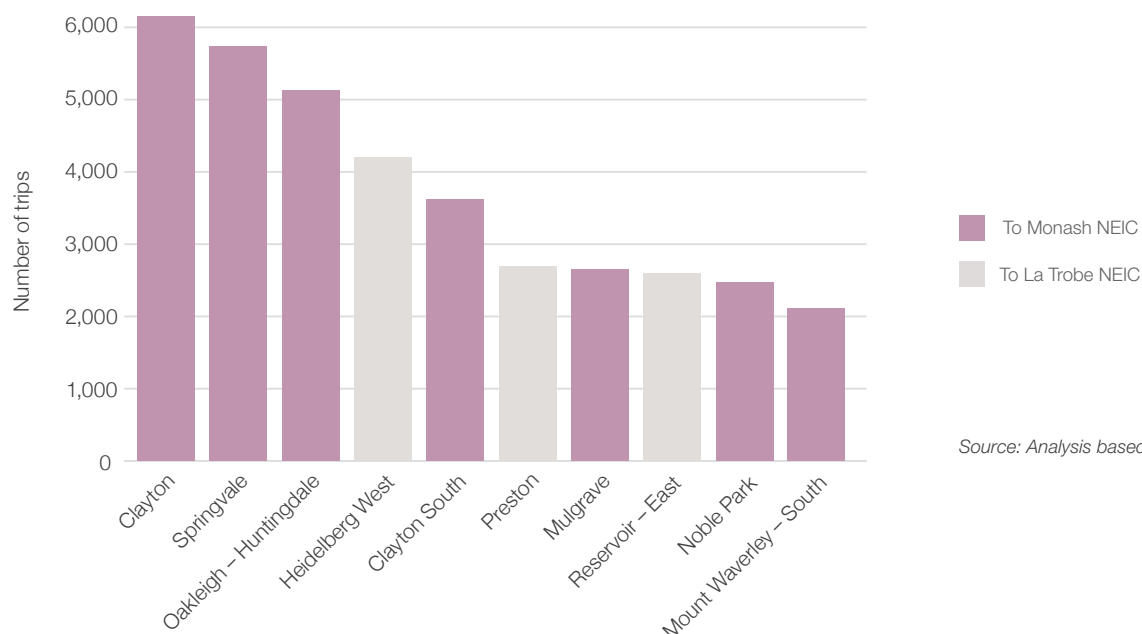
Locations	Actual trips (2015)	Potential additional trips	Total market (actual plus potential)	% of market captured (2015)
South Yarra – East and West/ Prahran-Windsor / Toorak	790	8,350	9,140	9%
Richmond	1,010	6,880	7,890	13%
Flemington / Kensington	1,250	3,960	5,220	24%
Brunswick / Brunswick West / Brunswick East	2,300	6,680	8,980	25%
Northcote / Thornbury	980	2,910	3,890	25%
North Melbourne	5,470	5,400	10,860	50%
Carlton / Carlton North – Princes Hill	6,330	5,980	12,300	51%

Source: Analysis based on MABM

Active transport potential to NEICs

Focussing on Monash and La Trobe ahead of the other NEICs, significant volumes of potential additional active transport trips were estimated as shown in Figure 21.

Figure 21 Number of potential additional active transport trips to Monash and La Trobe NEICs by origin



Source: Analysis based on MABM

Again, to get a picture of where there might be barriers to greater uptake of active transport we have compared areas of high potential for additional active transport trips with the actual levels of active transport trips (in 2015 based on MABM) applying the same trip criteria.

This analysis identified corridors into Monash from Clayton, Springvale, Oakleigh and Huntingdale with a low proportion of the market captured and higher volumes of trips. For La Trobe, corridors from Preston, Reservoir and Heidelberg West were identified with a low proportion of the market captured and higher volumes of trips (Table 3).

Table 3 2015 actual versus potential additional active transport trips by origin to Monash / La Trobe NEICs

Locations	Actual trips (2015)	Potential additional trips	Total market (actual plus potential)	% of market captured (2015)
Noble Park (to Monash)	210	2,430	2,640	8%
Preston (to La Trobe)	230	2,680	2,910	8%
Mulgrave (to Monash)	260	2,630	2,890	9%
Clayton (to Monash)	770	6,090	6,860	11%
Oakleigh-Huntingdale (to Monash)	830	5,070	5,900	14%
Clayton South (to Monash)	600	3,580	4,190	14%
Reservoir – East and West (to La Trobe)	570	3,130	3,700	15%
Heidelberg West (to La Trobe)	940	4,160	5,100	18%
Springvale (to Monash)	1,320	5,660	6,990	19%
Mount Waverly South (to Monash)	580	2,080	2,660	21%

Source: Analysis based on MABM

We recommend prioritising active transport in the following areas as our analysis has identified they are the locations with the greatest potential:

- Trips to inner Melbourne and Parkville from:
 - Richmond
 - Brunswick, Brunswick East and Brunswick West through Carlton
 - South Yarra, Prahran, Windsor and Toorak
- Trips to the Monash NEIC from Clayton, Springvale, Oakleigh and Huntingdale
- Trips to the La Trobe NEIC from Preston, Reservoir and Heidelberg West

This could be partly funded from our proposed changes to the car parking levy.

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Road connectivity

The majority of transport movement across Melbourne is carried on our road network, through a combination of private vehicle, commercial passenger vehicle, tram, bus and active transport trips. There are parts of Melbourne's transport network where roads will continue to provide the best transport solution in the future. For some of these areas, investment in improved road connectivity will be the best approach to managing demand over the next five years.

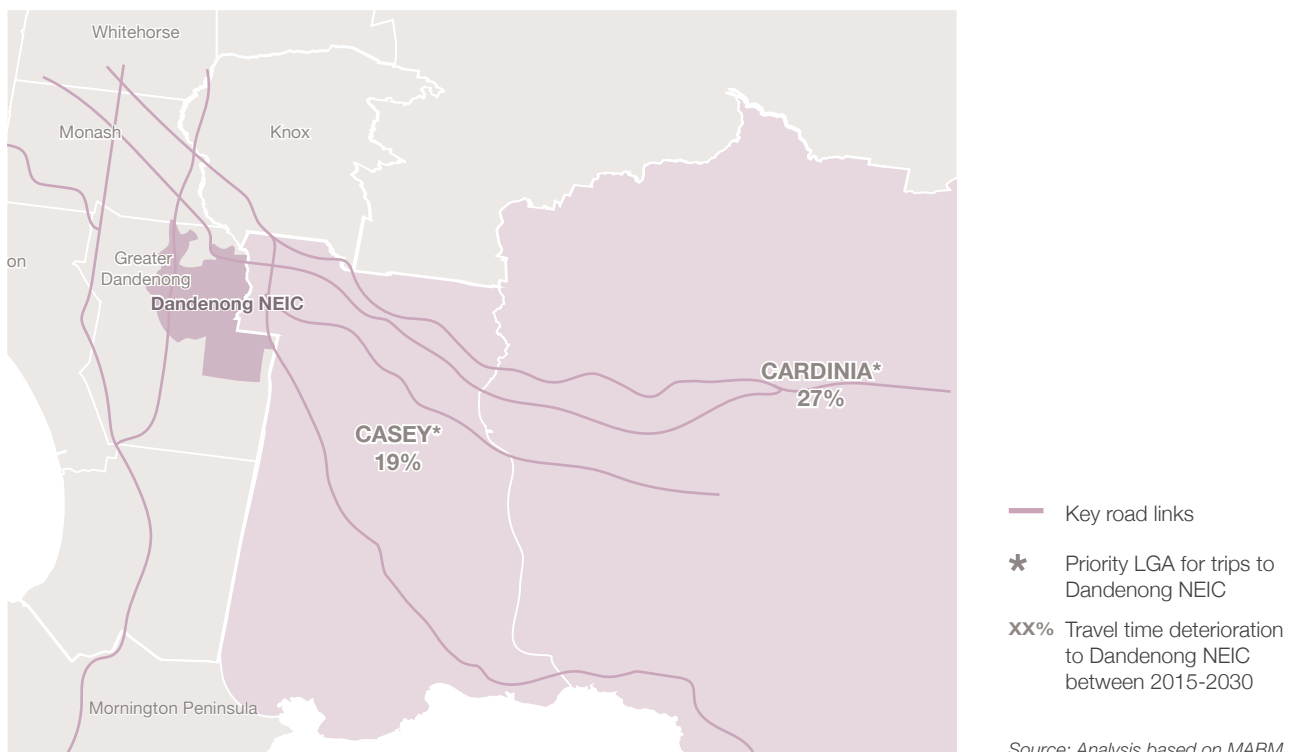
Road networks are a particularly crucial link in areas where jobs and economic activity are spread over large areas of land, such as in heavy industrial, warehousing and manufacturing areas. These areas are dependent on the road network due to the lack of viable public and active transport alternatives.

While we identified the La Trobe, Monash and Parkville NEICs as key areas for priority movement, this was based upon our criteria which included that the trips occur in significant volumes. Trips to the other NEICs were of less volume in comparison, but we did find some more local issues worth highlighting.

As one example, our examination of trips to the Dandenong NEIC found that most people are dependent on private vehicles to access jobs and services. Using the modelling, we found that trips from Casey and Cardinia made up a large number of overall trips to the Dandenong NEIC, with travel times and reliability expected to worsen as population and employment grow in this area.

Despite the close proximity to Dandenong NEIC, the average travel time from the adjacent Casey growth area is forecast to increase to 45 minutes by 2030. The increasing travel times also leads to worsening travel time reliability for trips in this area.

Figure 22 Local government areas with major travel time deterioration to Dandenong NEIC between 2015 and 2030



While access to the northern segment around Dandenong Station is well supported by the public transport network, Dandenong South in particular is heavily reliant on the road network. This is due to the types of jobs within Dandenong South, staggered start times for those jobs and the dispersed nature of industrial precincts in general. The relatively low density of trip destinations compared to other clusters leads to bus services being an inefficient and unattractive alternative for access, particularly outside of peak periods, leading to a preference for driving to work in the precinct.

The low density of jobs in Dandenong South spread out across wide areas reflects the large footprints of the industrial facilities. Similar cases of dispersed employment centres, albeit on a smaller scale, exist across Melbourne, such as Laverton in the west and the vicinity of Melbourne Airport in the north. These two areas of Melbourne in particular share similar catchment and road network characteristics with the Dandenong NEIC, and are likely to experience similar issues over the next 15 years. To support the movement of goods and services to places with similar characteristics, barriers to road connectivity should be investigated and prioritised investment should be provided.

Based on our analysis, **we recommend in some of these locations initiatives to improve road connectivity to ensure these car trips occur as efficiently as possible where private vehicle use works best.**

As constraints in the network are location-specific, initiatives would need to be targeted and may include:

- freeway interchanges where roads to connect or go over a freeway are planned
- road corridors where cross town links have been delivered in sections but are yet to be connected
- road upgrades such as roads at rural standards but are now carrying urban traffic levels.

There are parts of Melbourne's transport network where roads will continue to provide the best transport solution in the future. For some of these areas, investment in improved road connectivity will be the best approach to managing demand over the next five years.

7. Implementation of recommendations

Figure 23 outlines a potential implementation pathway for how our recommendations could be delivered over the next five years. These would complement existing projects and commitments.

Figure 23 Potential implementation pathway

Recommendation	Year				
	2018/19	2019/20	2020/21	2021/22	2022/23
1. Expand off-peak fares	<ul style="list-style-type: none"> Introduce a differential between peak and off-peak fares from 1 January 2019 	<ul style="list-style-type: none"> Each year assess the effectiveness of the fare differential in balancing peak and off-peak demand and adjust as needed 			
2. Expand and increase the car parking levy	<ul style="list-style-type: none"> Expand the existing congestion levy into recommended areas Establish an MOU with affected local councils to determine revenue sharing arrangements Develop a framework to govern annual increases linked to changes in congestion 	<ul style="list-style-type: none"> Each year review the levy and adjust to reflect annual increase in congestion 			
3. Encourage behaviour change	<ul style="list-style-type: none"> Plan to maintain bus priority on the Eastern Freeway during North East Link disruptions 		<ul style="list-style-type: none"> Increase bus services along the Eastern Freeway and maintain priority 		
4. Overhaul existing bus networks	<ul style="list-style-type: none"> Review underperforming networks Begin planning to introduce alternative public transport services such as ride-share and on-demand buses in relevant areas 	<ul style="list-style-type: none"> Undertake network design, consult with the community and stakeholders and implement new bus networks Monitor, evaluate and adjust as needed 			

Recommendation	Year				
	2018/19	2019/20	2020/21	2021/22	2022/23
5. Transparent fare setting	<ul style="list-style-type: none"> Review arrangements for public transport fare setting including development of clear policy objectives 	<ul style="list-style-type: none"> Align changes in public transport fares with objectives and the Cost Recovery Guidelines 	<ul style="list-style-type: none"> Maintain a transparent and evidence-based approach to setting fares 		
6. Better road space allocation	<ul style="list-style-type: none"> Complete and publish the Movement and Place Framework 	<ul style="list-style-type: none"> Establish a list of priority road space allocation initiatives based on this framework and aligned with areas of conflicting road priority Each year, deliver identified road space allocation initiatives 			
7. Investment in new bus services	<ul style="list-style-type: none"> Develop a business case for a program of recommended bus services 	<ul style="list-style-type: none"> Deliver new bus services to areas of high demand 			
8. Active transport investment	<ul style="list-style-type: none"> Work with local councils to develop business cases for active transport investments 	<ul style="list-style-type: none"> Deliver active transport infrastructure improvements 			
9. Improved road connectivity	<ul style="list-style-type: none"> Develop a business case for a program of road connectivity improvements in identified areas 	<ul style="list-style-type: none"> Deliver road connectivity infrastructure improvements 			

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Glossary

Term	Definition
Active transport	Active transport refers to walking and cycling modes of transport (i.e. non-motorised transport).
Car parking levy / congestion levy	An existing state government levy on off-street private and public car parking spaces (excluding residential) in two specified areas in Melbourne. The car parking levy was established by the Congestion Levy Act 2005 and is formally known as the congestion levy.
CBD	The Central Business District of Melbourne is typically defined as the area within the Hoddle Grid (bounded by Flinders Street, Spring Street, La Trobe Street, and Spencer Street). In our MABM analysis, we used an expanded definition of the CBD which includes the Hoddle Grid, Docklands and the northern part of Southbank.
Clearway	A clearway is a length of road where it is prohibited under the road rules for a driver to stop (or park) unless driving a public bus, public minibus and is dropping off or picking up passengers. Under the <i>Road Management Act 2004</i> and relevant regulations and Codes of Practice, VicRoads has the power to declare clearways on arterial roads (state controlled roads).
Delay	Delay is the difference between how long a trip takes compared to the same trip undertaken in free-flow conditions (i.e. when there are no other vehicles on the road).
External benefits of public transport	External benefits of public transport are benefits that accrue to people other than just those travelling on public transport. For example, reduced pollution, health benefits and avoided congestion.
Melbourne Activity-Based Model (MABM)	The Melbourne Activity-Based Model is a new strategic transport model for Melbourne that links activities with travel. The model seeks to reflect the behaviour of individuals travelling on the network, now and in the future. Infrastructure Victoria engaged KPMG and Arup to develop the model.
Metropolitan activity centres	These are identified in Plan Melbourne as areas to provide a diverse range of jobs, activities and housing for regional catchments that are well served by public transport. They are: <ul style="list-style-type: none"> • Dandenong • Footscray • Fountain Gate – Narre Warren • Epping • Sunshine • Ringwood • Broadmeadows • Box Hill • Frankston • Toolern (future) • Lockerbie (future)
Mode share	Mode share refers to the share that each transport mode has. It generally includes all transport modes: vehicles, public transport, walking and cycling. Motorised mode share is another type of mode share, but refers to private vehicles and public transport only.

Term	Definition
Motorised transport	Motorised transport refers to trips made by private vehicles and public transport.
Movement and Place	<p>Movement and Place is a framework under development by VicRoads and Transport for Victoria, and is a way of defining the strategic role and function of a road. At its simplest, every transport link has a movement function with the objective of providing enabling journeys with features that are important to users, such as those that are reliable and a reasonable travel time; and a place function, which is a destination in its own right with the objective of increasing time spent engaging at a place for visitors and workers.</p> <p>The framework identifies that it is important to recognise the differing outcomes between movement and place uses and to decide on the balance that needs to be achieved for each of these functions at the desired locations.</p>
National Employment and Innovation Clusters (NEICs)	<p>These are areas identified in Plan Melbourne to be developed as places with a concentration of linked businesses and institutions providing a major contribution to the Victorian economy, with excellent transport links and potential to accommodate significant future growth in jobs and in some instances housing. We have used the NEICs as the key focus in prioritising trips/movements due to their potential as major trip attractors. The NEICs are:</p> <ul style="list-style-type: none"> • Monash • Parkville • Dandenong • Fishermans Bend • La Trobe • Sunshine • Werribee
On-demand transport services	On-demand transport services are a flexible service that can be pre-booked and are responsive to passengers' time of travel.
Passenger kilometres	Passenger kilometres is the sum of total public transport users multiplied by the average travel distance.
Potential additional active transport trips (or active transport potential)	<p>Potential additional active transport trips are trips that could have been taken by walking or cycling, instead of motorised transport.</p> <p>We used a criteria to identify potential additional active transport trips from 2015 MABM as follows:</p> <ul style="list-style-type: none"> • return journeys from home to inner Melbourne and the seven NEICs • trips that occur during peak times (7am to 9am and 3pm to 6pm) currently not taken using active transport (i.e. in cars, public transport and taxis) • trips that were no greater than 10km in distance (from home or to home) • trips undertaken by people under 65 • trips taken by tradespeople were excluded, recognising that these trips are likely to require carrying heavy equipment or tools.

Term	Definition
Reliability	<p>Reliability tells us about how dependable and consistent travel times are along a particular stretch of road at a particular time of the day. A stretch of road that takes between 10-15 minutes to travel during the evening peak, as a result of local traffic conditions, is considered less reliable than an equivalent road that takes between 10-12 minutes at the same time.</p> <p>In our analysis we have used a volume-to-capacity benchmark to measure reliability, based on the New Zealand Transport Authority (NZTA) Economic Evaluation Manual method using modelled volume-to-capacity ratios for Melbourne.</p>
Ride share	<p>Ride share is a form of transport service where a passenger travels in a private vehicle driven by its owner for a fee, especially as arranged by means of a website or app.</p>
Road capacity	<p>Road capacity relates to the physical attributes of the road in terms of how many vehicles it can carry at a maximum.</p>
Road space allocation	<p>Road space allocation is a prioritisation of roads between its different uses. Road space allocation usually refers to a range of tools to achieve the prioritised outcomes. For instance, priority lanes for certain types of vehicles, clearways and traffic signalling.</p>
Volume to capacity	<p>Volume to capacity is a unit of measurement which is a ratio between traffic volumes to the physical maximum carrying capacity of a road. As a road approaches capacity, reliability deteriorates. We used a 70% capacity threshold as a benchmark for when traffic flow and speeds start to be significantly impacted by increasing travel times and reduced reliability.</p>

Appendix A – Analysis of key focus areas

The Melbourne Activity-Based Model (MABM) provides a vast range of predictive information about future travel behaviour and outcomes. In order to focus our analysis on areas of greatest potential for managing demand, we concentrated on identifying trips to the CBD and National Employment and Innovation Clusters (NEICs) that occur in significant volumes and that:

- require travel through areas with significant road network reliability issues
- demonstrate average travel time deterioration of more than 10% out to 2030.

Using this criteria, we identified key priority movements that would benefit from action in the short term. In the following analysis, ‘travel time’ is the average travel time of all road users travelling from LGAs to their destination (i.e. CBD or NEIC) in the morning peak period. ‘Reliability’ is the average standard deviation for travel time on roads within each LGA in the morning peak period. Figures used are forecasts from 2015 to 2030 using MABM.

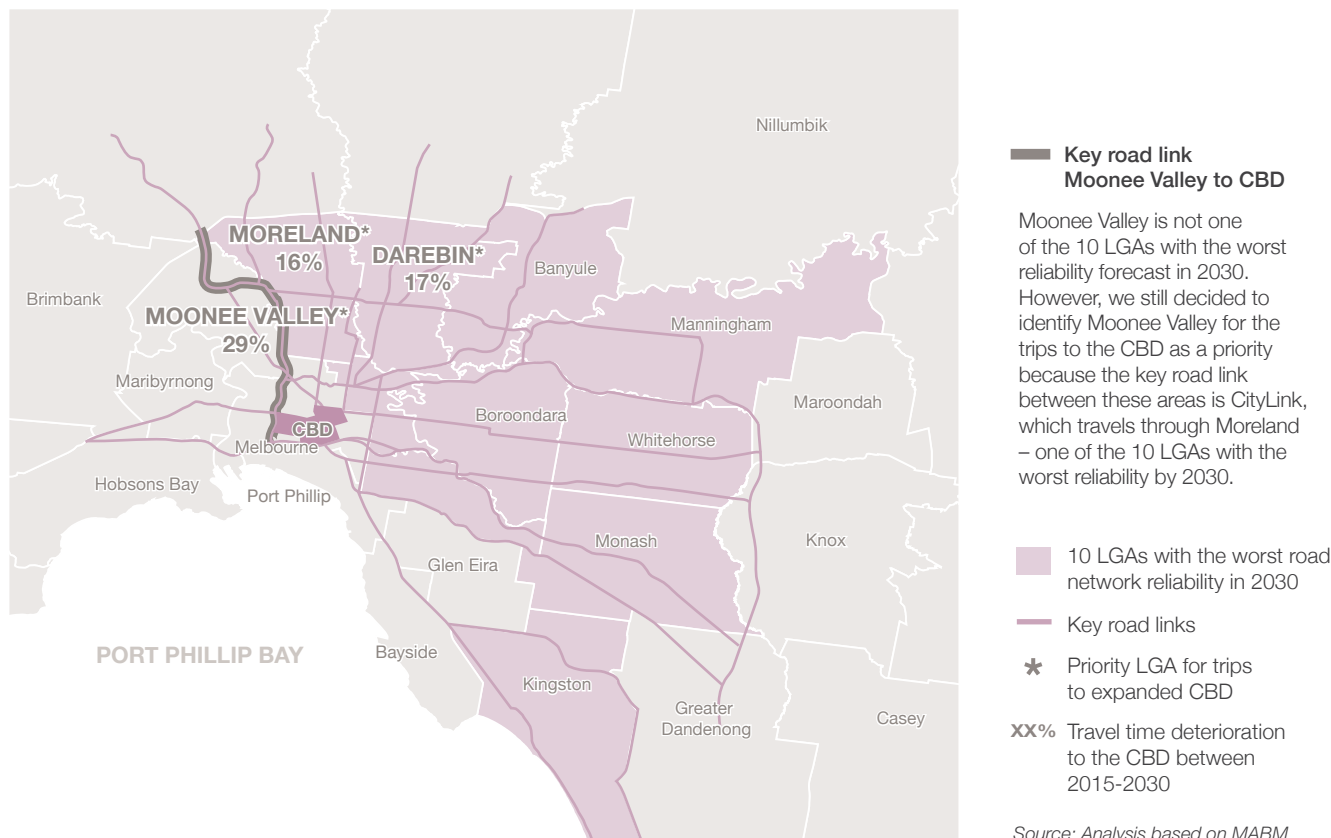
Trips to the CBD

In our analysis, we used an expanded CBD which includes the Hoddle Grid, Docklands and the northern part of Southbank. This is in recognition of the broader functioning of the city beyond the grid. The expanded CBD is the employment centre with the highest number of jobs and the highest job density in Victoria. This is a consequence of economic activities congregating in areas with good access to markets. Victoria’s radial rail network provides good access to the CBD.

In identifying priority movements, travellers from the City of Moreland, City of Darebin and City of Moonee Valley are forecast to experience travel time and reliability issues on trips to the CBD in the future, according to the criteria. Average travel times for trips from the City of Moreland and City of Darebin into the CBD in the morning peak period deteriorate by 16% and 17% respectively, and roads in these LGAs are ranked amongst the worst in terms of reliability in 2030 (see Figure 24). Further, because of the LGAs’ elongated shape, much of the travel into the CBD from these LGAs must be on their own road networks. The City of Darebin road users travelling to the CBD would also deal with reliability issues on the City of Yarra’s road network.

Even though the City of Moonee Valley is forecast to experience an average travel time deterioration into the CBD in the morning peak period of 29%, it does not have significant road network reliability issues in 2030. However, because the key road linking the City of Moonee Valley and the CBD is CityLink and it travels through the City of Moreland – one of the 10 LGAs with the worst road network reliability forecast for 2030 – it is appropriate to include trips from the City of Moonee Valley into the CBD as a key priority movement.

Figure 24 Priority movement identification for trips to the CBD



Reliability issues in City of Yarra and City of Stonnington

From the modelling, the City of Yarra and the City of Stonnington are the two LGAs with the worst road network reliability in 2015 and 2030. This means that the high volumes of car traffic through these areas cause a wide variance in travel time. For example, a trip on a particular day along Swan Street in Richmond might take 15 minutes, whereas an identical trip on another day could take 30 minutes. These reliability issues are worst in the morning peak period travelling towards the CBD. Even though these areas do not experience a deterioration in travel time between 2015 and 2030, reliability is forecast to get worse and, therefore, we have identified trips from these LGAs into the CBD as key priority movements.

Trips to National Employment and Innovation Clusters

There are seven NEICs around Melbourne identified in Plan Melbourne – Dandenong, La Trobe, Monash, Werribee, Fishermans Bend, Parkville and Sunshine.

Our analysis of the seven NEICs shows that travel times and reliability for trips to the Dandenong, Werribee, Fishermans Bend and Sunshine NEICs do not deteriorate significantly according to MABM, with only isolated issues present for these employment centres.

However, travel time issues affect travellers taking trips from numerous LGAs to the La Trobe, Monash and Parkville NEICs, and potential travel time reliability issues may exist for certain corridors to these NEICs.

La Trobe NEIC

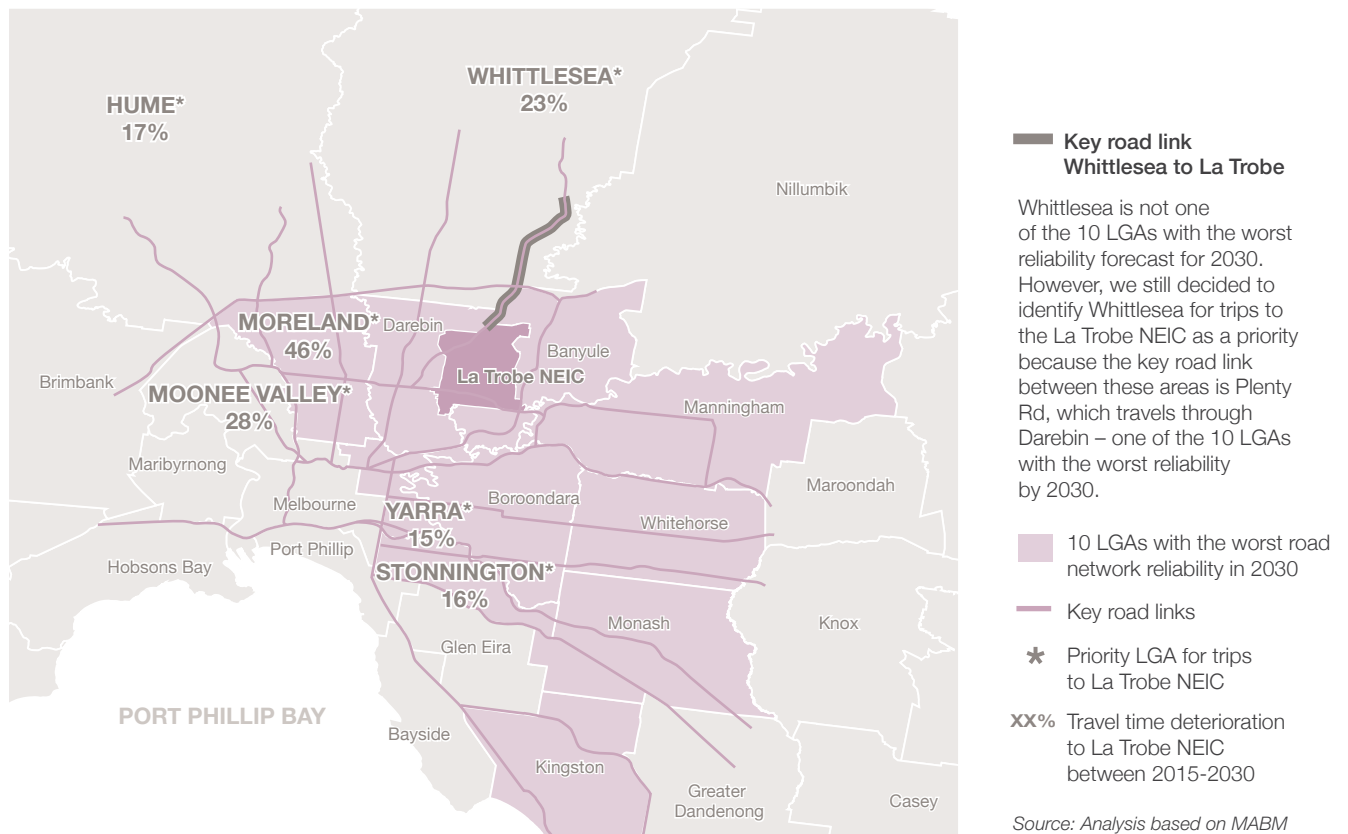
According to Plan Melbourne, there are 28,700 jobs in the La Trobe NEIC. There are three major employment areas within the broader area of the NEIC. These are La Trobe University and industrial surrounds, the Northland Shopping Centre and the Austin Biomedical Alliance Precinct. It is important to recognise that there is no distinct centre of the NEIC. Each of these centres has different transport challenges based on existing networks, as well as different user needs and preferences.

For trips to the La Trobe NEIC, we identified trips from the City of Moonee Valley, City of Hume, City of Moreland, City of Whittlesea, City of Yarra and City of Stonnington as priority movements with current and future travel time and reliability issues from the modelling (Figure 25). Trips from all of these LGAs to the La Trobe NEIC see their average travel times in the morning peak period deteriorate by more than 15%. The City of Moreland, City of Yarra and City of Stonnington are three of the 10 LGAs with the worst road network reliability forecast for 2030, with travel to the La Trobe NEIC from these LGAs also requiring travel through road networks with reliability issues.

Even though the City of Moonee Valley, City of Hume and City of Whittlesea are not one of the 10 LGAs with the worst road network reliability forecast for 2030, many trips from these municipalities to the La Trobe NEIC require travel through road networks with future potential reliability issues. For instance, some trips from the City of Moonee Valley use Bell Street, some from the City of Hume use the Western/Metropolitan Ring Road and some from the City of Whittlesea use Plenty Road (Figure 25). On this basis, trips from these LGAs have been included as priority movements.

It is worth noting that the modelling shows travel time reductions to the La Trobe NEIC for the City of Banyule, City of Manningham, City of Boroondara and City of Whitehorse by 2030. North East Link is incorporated in the modelling for 2030 which would benefit these LGAs in the future.

Figure 25 Priority movement identification for trips to La Trobe NEIC



Monash NEIC

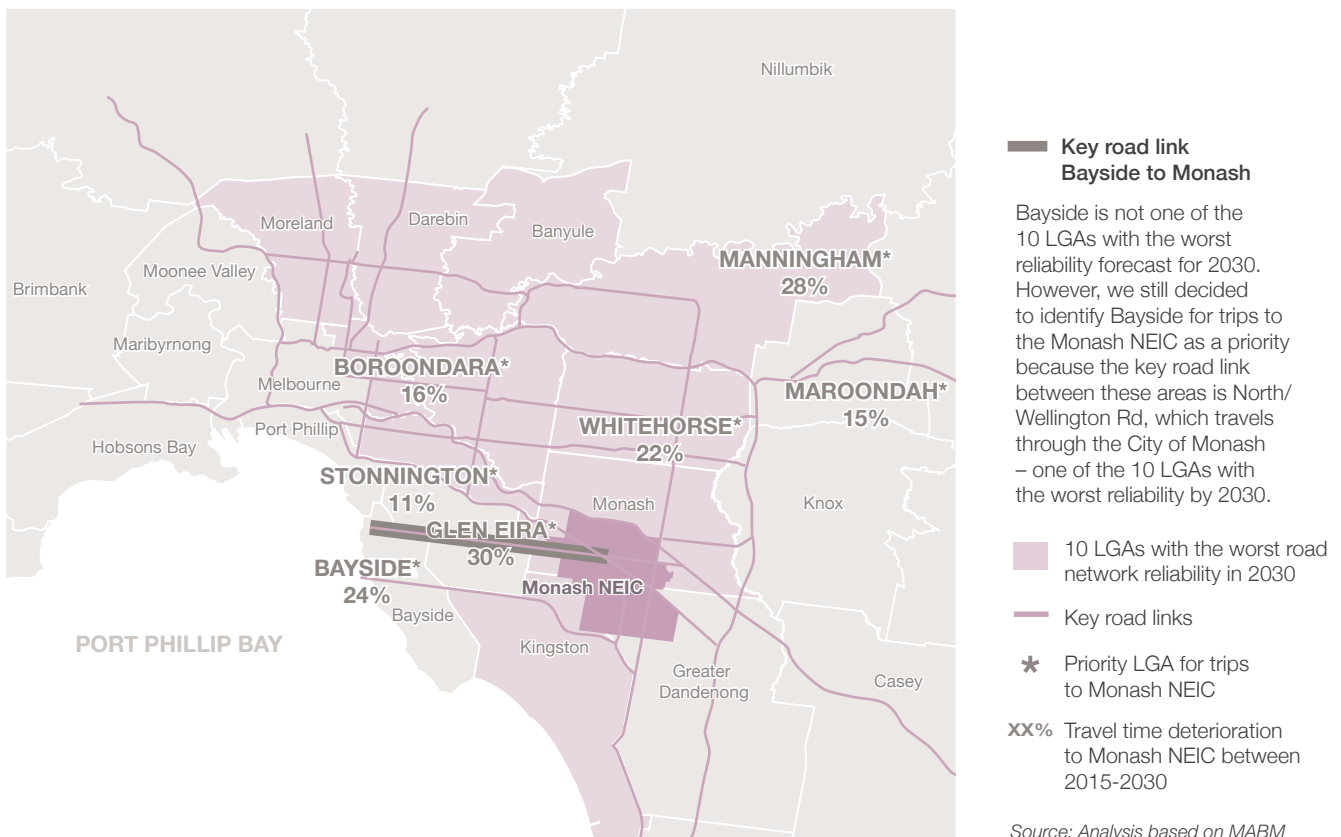
The Monash NEIC is Melbourne's largest employment centre outside of the CBD with approximately 75,000 jobs. It is home to Monash University, Monash Medical Centre, Monash Children's Hospital, CSIRO's largest site in Victoria, and numerous research institutes and industrial and commercial businesses. Despite the number and density of jobs, it is still a car-dependent centre.

Trips to the Monash NEIC from the City of Boroondara, City of Manningham, City of Stonnington, City of Whitehorse, City of Maroondah, City of Bayside and City of Glen Eira are priority movements with current and future travel time and reliability issues from the modelling (Figure 26). Average travel times from these LGAs in the morning peak period are forecast to deteriorate by more than 10%.

The City of Boroondara, City of Manningham, City of Stonnington and City of Whitehorse are among the 10 LGAs with the worst road network reliability forecast by 2030. Trips with travel to the Monash NEIC from these LGAs also require travel through road networks with reliability issues.

Even though the City of Maroondah, City of Bayside and City of Glen Eira are not among the 10 LGAs with the worst road network reliability forecast by 2030, many trips from these municipalities would require travel through road networks with future potential reliability issues. For instance, some trips from the City of Maroondah use Springvale Road, some from the City of Glen Eira use the Monash Freeway and some from the City of Bayside use the North Road/Wellington Road corridor (Figure 26). Therefore, trips from these LGAs have also been included priority movements.

Figure 26 Priority movement identification for trips to Monash NEIC



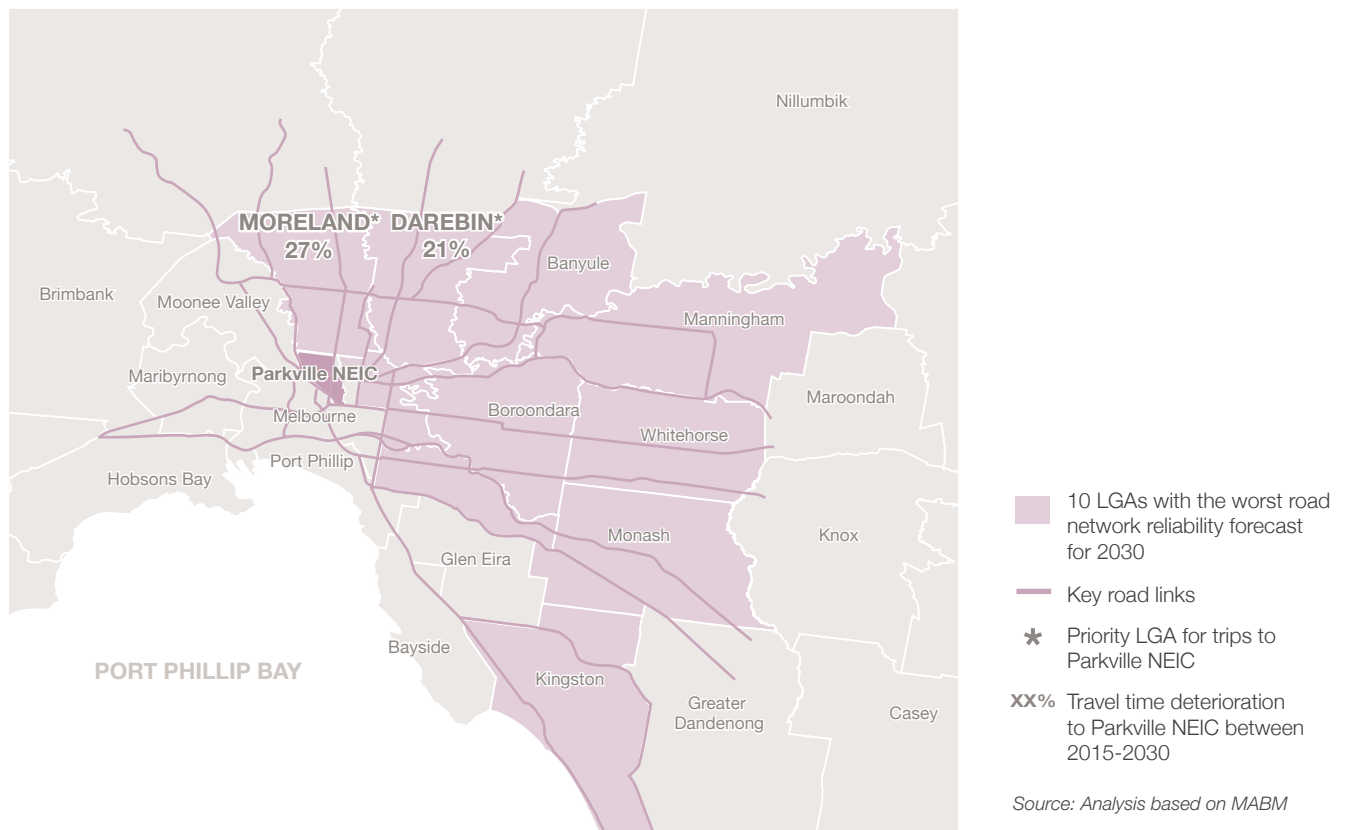
Parkville NEIC

According to Plan Melbourne, there are 40,100 jobs in the Parkville NEIC. Parkville NEIC includes the University of Melbourne, RMIT University, Monash University's Faculty of Pharmacy and Pharmaceutical Sciences, the Royal Melbourne Hospital, the Royal Children's Hospital, the Royal Women's Hospital, the Victorian Comprehensive Cancer Centre and numerous research institutes. By 2030, Parkville will have a heavy rail connection to its centre with Melbourne Metro; however, even with a rail connection, Parkville is forecast to have a higher car mode share than the CBD in 2030.

For trips to the Parkville NEIC, those from the City of Moreland and City of Darebin are most likely to experience travel time and reliability issues from the modelling. Trips from the City of Moreland and City of Darebin see average travel times in the morning peak period deteriorate by 27% and 21% respectively, and are among the 10 LGAs with the worst road network reliability forecast for 2030. Further, because of their elongated shape, many trips to the Parkville NEIC from these LGAs require travel on local road networks.

The analysis of trips to the CBD identified the City of Moonee Valley, City of Moreland and City of Darebin as trip origins with travel time and reliability issues. As the Parkville NEIC is 'on the way' to the CBD from these LGAs, solutions aimed at trips to the CBD are likely to benefit the Parkville NEIC as well.

Figure 27 Priority movement identification for trips to Parkville NEIC



Appendix B – Effectiveness of the congestion levy

A Department of Treasury and Finance review of the congestion levy in 2010 found that it reduced average weekday traffic volumes in the levy area by around 6% between February 2005 and August 2009, despite a significant increase in employment in the City of Melbourne over that time.³⁸

While other factors, such as rising petrol costs, may have contributed to the decline in traffic volumes, survey data suggests the levy and increasing parking costs have had an impact in discouraging commuters from travelling into the levy area by car.³⁹

In 2014 the levy was expanded to cover both short and long stay non-exempt parking spaces. In 2015, an additional levy area was added to the north and south of the city, a category 2 levy set at \$950 per annum. The levy in the original area, category 1 levy, was increased by 40% from \$950 to \$1,300 per annum in 2014 (both are indexed for inflation). The Memorandum of Understanding with the City of Melbourne was also increased to \$7 million per annum following the changes.

Our analysis of outcomes since 2015 found that the expanded congestion levy has been successful in reducing the supply of leviable car parking in the levy areas. In the CBD, a category 1 area, there has been a 2% reduction in the number of leviable car parking spaces between 2015 and 2017. The levy has been particularly successful in reducing the supply of leviable car parking spaces in the expanded category 2 zones, reducing supply by 9% over the same time period.

This is estimated to be around 3,900 vehicles off the road in the morning peak period in 2017 compared to 2015.⁴⁰ By way of comparison, two lanes of freeway would need to be built to accommodate an additional 3,900 peak period vehicles on the road network. The recent widening of CityLink effectively added an extra lane in each direction, with an estimated cost of nearly \$1.3 billion.

This reduction in supply has occurred during a period of growth in the number of jobs in the City of Melbourne⁴¹, which would typically result in an increasing demand for commercial and private off-street car parking spaces.

The overall supply of car parks could be expected to decline as land values rise, as parking would be displaced to make way for higher value uses such as residential and commercial developments. However an assessment of the City of Melbourne's census of land use and employment (CLUE) data indicates that overall car parking has continued to grow. Therefore, it would not appear that development for higher value uses is displacing car parking in general.

38 Victorian Department of Treasury and Finance (2010), *Review of the effectiveness of the congestion levy*.

39 *ibid.*

40 On the basis that there are limited substitutes for long-stay commercial car parking in the CBD, we have assumed a one-for-one relationship between the reduction in car spaces and the resulting reduction in vehicle numbers. Where reductions in car spaces relate to short-term parking, while substitutes do exist, the one-for-one estimate is likely to be conservative given daily turnover associated with short-term parking.

41 City of Melbourne (2016), *Census of land use and employment* (CLUE) data.

CLUE data on the number of commercial and private non-residential car spaces demonstrates that in the CBD between 2014 and 2016 the number of these spaces declined while residential continued to increase.⁴²

An analysis of the ABS Census Journey to Work data on the levy areas between 2011 and 2016 shows a reduction of private vehicle mode share across all levy areas, with the majority of this mode shift going to public transport⁴³. Mode share changes over the same time period across the greater Melbourne region also showed reduced private vehicle share, but on a smaller scale compared to the levy areas.⁴⁴

We can therefore conclude that the levy has been successful in reducing the supply of leviabile spaces within the levy areas, and is achieving its objective of reducing traffic congestion in central Melbourne.

BOX 16: WHAT THE CONGESTION LEVY HAS FUNDED

Every year the City of Melbourne is required to report to the state government on how it has spent its allocation of revenue from the levy. From its first allocation in 2006, there was initially a focus on funding the planning, research and consultation on a number of projects. Key projects over the first five years included bridges (e.g. Yarra Pedestrian Bridge and Convention Centre Bridge) and cycling treatments (e.g. Manningham Street and Albert Street). The funding in this period also went to new signage, pedestrian and wayfinding projects and information provision, as well as travel demand management programs.

In 2011, the council focussed its expenditure on the Swanston Street redevelopment, which, aside from the major works along that road, included upgrades to the urban realm such as new street furniture, lighting and plantings. After the Swanston Street redevelopment was delivered, the council continued to use the funding for the upgrade of streetscapes – in particular bluestone paving and kerb and channel replacement – to improve pedestrian safety, amenity and city presentation. Significant bicycle improvement works continue to be funded including Albert Street, as well as new pedestrian infrastructure such as crossings, consistent with the council's walking and cycling strategies.

Source: City of Melbourne

42 Infrastructure Victoria analysis of CLUE data supplied by the City of Melbourne.

43 Analysis of ABS Census Journey to Work (comparing 2011 to 2016) shows a 5% reduction in private vehicle mode share to the Category 1 Congestion Levy Area with a corresponding 5% increase in public transport mode share. For Category 2 Congestion Levy (North) the private vehicle mode share decreased by 6.5% while public transport mode share increased by 4.7% and active transport increased by 1.7%. For Category 2 Congestion Levy (South) the private vehicle mode share decreased by 5% while public transport mode share increased by 4.1% and active transport increased by 0.8%.

44 Analysis of ABS Census Journey to Work (comparing 2011 to 2016) shows a 2% decline in private vehicle mode share and a 2% increase in public transport mode share.

Appendix C – Recommendations in Victoria’s 30-year infrastructure strategy

The following table presents recommendations we made to government as part of *Victoria’s 30-year infrastructure strategy* that are relevant to this report.

Table 4 Relevant 30-year infrastructure strategy recommendations

Recommendation name	Recommendation Number
Growth area local buses	1.3.2, 11.5.2
SmartBus network	1.3.3, 11.5.3
Metropolitan bus network	10.4.5, 11.3.4
Transport modelling	10.2.1, 11.2.1, 13.1.1
Transport network pricing	10.2.2, 11.2.2, 13.1.2
Cycling corridors/walking improvements	4.1.3, 10.3.2
Cycling/walking data	4.1.2, 10.3.1
Public transport real-time information	10.4.1
Road space allocation	10.6.3, 11.3.5
Doncaster bus system	10.6.4
Innovative transport services	1.3.1, 10.7.1, 12.2.2
North East Link	11.5.6, 13.5.2
On-demand transport services	2.1.3, 6.2.1, 12.2.6

For more detail, see *Victoria’s 30-year infrastructure strategy* and *Options book – A supporting document for Victoria’s 30-year infrastructure strategy* at infrastructurevictoria.com.au.



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