ENGINEERS AUSTRALIA

Transport Australia society

Urban Transport Systems

Policy and planning advice

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Urban Transport Systems – Policy and Planning Advice

The report can be downloaded at engineersaustralia.org.au

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Introduction

This paper has been developed by Engineers Australia's Transport Australia Society (TAs) to provide expert advice to governments, policy makers and other stakeholders with a role in policy, planning, operating and delivery of Australia's urban transport systems. It draws on information from TAs Urban Transport Systems and other TAs thought leadership discussion papers and Engineers Australia's Future of Transport discussion paper.

These papers can be found on Engineers Australia's website: engineersaustralia.org.au

About Engineers Australia

Engineers Australia is the peak body for the engineering profession in Australia. With over 115,000 individual members, we represent people from a wide range of disciplines and branches of engineering. Engineers Australia is constituted by Royal Charter to advance the science and practice of engineering for the benefit of the community.

This paper is guided by our Royal Charter and Code of Ethics, which state that engineers act in the interests of the community, ahead of sectional or personal interests, working towards a sustainable future.

Transport Australia Society is a technical society for transport professionals in Australia. It focusses on key transport decisions affecting the wellbeing, productivity and sustainability of our cities and regions.

Urban Transport Systems Discussion Paper

The *Urban Transport Systems discussion paper*, prepared by Transport Australia Society, was released for public comment by Engineers Australia in December 2021.

For more than a year, numerous presentations and webinars were held with a view to soliciting feedback from stakeholders on the range of policy changes advocated in the discussion paper. Overall, there was widespread support and no outright challenges received to any of the policy changes and guiding principles in the discussion paper.

The consensus from this engagement with stakeholders is that land use and transport policy changes are required. In view of the significant overlap of interests and agreement on many strategic transport and land use planning matters, the Planning Institute of Australia (PIA) and TAs have agreed to collaborate on shared advocacy and development of future transport and land use policy.

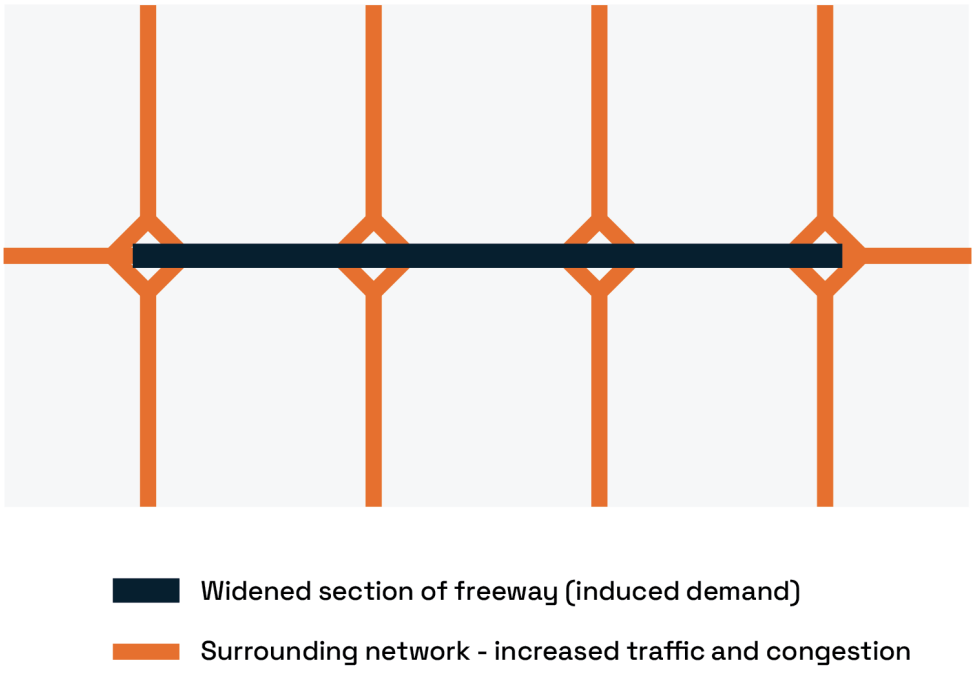
Policy Change is Needed

Urban transport systems in Australia are not as well integrated and connected as they should be. Too much emphasis and funding has been directed to road widening projects to the detriment and serviceability of other modes of transport. While car drivers have a good choice of travel on a connected road network, potential walkers and cyclists are significantly constrained, due to a lack of safe routes and road crossings. Public transport users are impacted by inadequate network connectivity and proximity to services in outer areas and a lack of priority routes in congested inner areas.

Over recent decades, the predominant urban transport policy in Australia, has been to increase road capacity to accommodate growth. Over this period, congestion has continued to increase, greenhouse gases from transport have grown, road safety targets have not been met and objectives to improve liveability in urban areas have not been realised (refer Engineers Australia,2021). In large part, these failures of policy are due to increased dependence on and use of cars for urban travel and a funding bias in favour of road construction.

Our research has found that the phenomenon known as induced demand influences how people travel. It also influences the effectiveness of infrastructure designed to increase capacity and reduce congestion. When a road or freeway is widened, or a new road is built, in an area where roads are congested or near capacity, induced traffic on the widened road increases traffic on the surrounding roads that have not been widened, resulting in system wide increased congestion. Figure 1 shows a diagrammatic representation of how the widening of a length of freeway can result in increased traffic and congestion on the surrounding network.

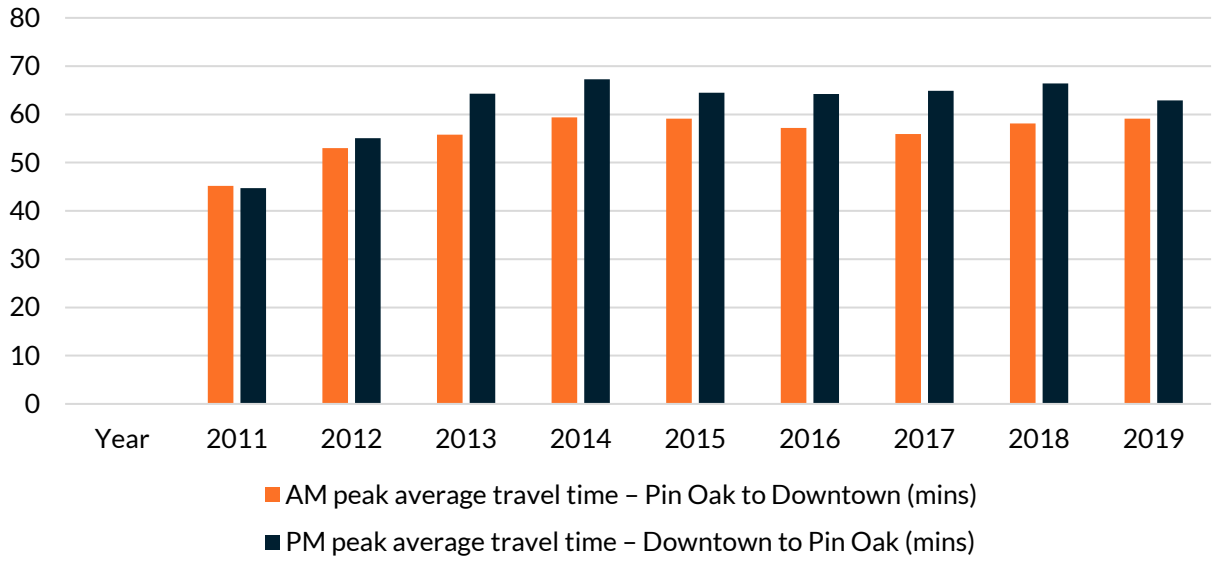
Figure 1: Network impact of induced demand



The fact induced traffic exists and is significant in congested urban areas is now widely accepted (SACTRA, 1994 and Department of Transport, WA, 1999). At a system wide level, Noland and Lem (2001) have estimated that about a quarter of vehicular traffic growth in American cities can be attributed to induced traffic. The case study of the Katy Freeway, in central Houston illustrates this. This freeway was widened in 2011, to more than 20 lanes in some segments and demonstrates the negative impacts of induced demand on travel time. The Katy Freeway widening project cost $2.8 billion.

"When it was finished, travel times out of downtown increased, by some estimates, as much as 30 per cent, during the busiest portions of the day" (Ehrenhalt, 2021).

Figure 2: Peak hour travel times on Houston's Katy Freeway grow after widening



Source: Houston Transtar Website.[1]

Induced demand also occurs when improvements are made to public transport and cycling (Richardson and Burgess, 2005). This induced demand can be as much or greater than for car traffic. However, the impact in Australian cities, where active and public transport networks are often not at capacity, can be positive. Increased use of public and active transport can result in reduced levels of traffic and congestion on the road traffic network. For example, the construction of the Northern Suburbs Railway in the centre of Perth's Mitchell Freeway resulted in a patronage of 28,000 persons per day, 6 months after opening, which was 12 per cent above predictions. This was a 30 per cent increase on the previous bus only network travel. Prior to this, 23 per cent of the rail patrons travelled by car.

This paper advocates for a Sustainable Mobility Management (SMM) approach.

Drivers for Change in Transport Policy

The following are important drivers for change to transport policy in Australia.

Climate change

Since 1990, greenhouse gas (GHG) emissions from transport have increased by 60 per cent (Engineers Australia, 2021). The Grattan Institute (Wood, Reeve and Ha, 2021) noted that GHG emissions from transport increased by 23 per cent between 2005 and 2019 from 82 million tonnes to 101 million tonnes. The transport sector is now the second highest contributor to GHG emissions in Australia, resulting in 19 per cent of national emissions in 2020.

If Australia is to meet its targets of net zero by 2050 and a reduction of GHG emissions of 43 per cent by 2030, there is an urgent need to reverse the growth of emissions in the transport sector, that has

[1] Houston Transtar 'Historical Freeway Travel Times' 2023. https://traffic.houstontranstar.org/

occurred over the past three decades. This is a topic explored further in Engineers Australia Future of Transport report.

Unacceptably high level of vehicle emissions that are harmful to health

In an average year, more people die from exposure to tailpipe vehicle pollution than die from road crashes. The Australian Government (Commonwealth of Australia, 2023) stated "*Air pollution from vehicle emissions is estimated to have caused as many as 1,715 deaths in Australia in 2015, 42 per cent more than the road toll that year.*"

Recent estimates by the University of Melbourne indicate mortality associated with vehicle emissions may have been significantly underestimated – with researchers suggesting emissions may result in as many as 11,105 premature deaths in Australian adults each year (Walter & Say 2023).

Continuing increase in congestion

Attempts to "bust congestion" with major road widening projects have been unsuccessful. Average travel time for commuter journeys in Melbourne increased by 23 per cent from 44 minutes to 54 minutes over the past 2 decades (Hilda surveys, 2019). The estimated cost of congestion in Australia's five largest cities is estimated to increase from $10.6 billion per annum in 2005, to $16 billion in 2015, to $30 billion in 2025. (BITRE, 2015).

Road fatalities and serious injuries has plateaued

The introduction of safer vehicles and improved medical procedures could be expected to result in a reduction in road fatalities and serious injuries, but exposure to growing numbers of vehicles on the network cancel that potential benefit. Australia has fallen behind leading nations on road safety, after being a world leader 30 years ago (Engineers Australia, 2019). Increasing dependency on cars for travel and continued growing levels of car use are likely contributing factors to this trend.

Community Health and Fitness

Ensuring you get enough exercise is an important factor in preventing and managing chronic illnesses, such as type two diabetes and cardiovascular disease. Yet, in 2017/18 (latest survey year before covid), only a minority of people met Australia's physical activity guidelines – two per cent for 15 – 17-year-olds; 15 per cent for 18 – 64-year-olds; and 17 per cent for over 64-year-olds. (ABS, 2017/28)

The Western Australian TravelSmart behaviour change program found improving health and fitness was a major motivator to drive less and walk, cycle or use public transport more, because it was found this was a convenient way to build some exercise into their daily routine.

Cost of Travel

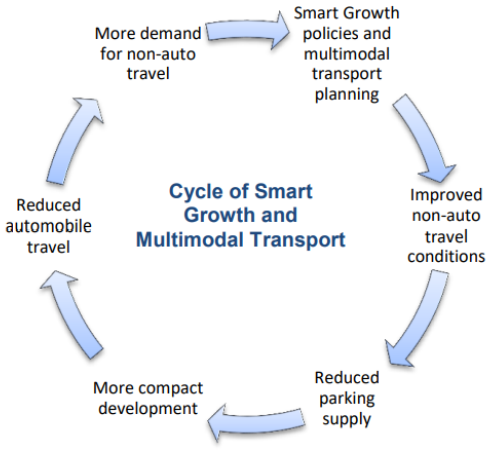
The RAC has estimated the average cost of owning and operating a small car is $12,250 and a medium car is $15,800 per annum (RAC, 2022). Medium and large SUVs cost more to operate. This imposes a significant cost on households in Australian cities, many of which are car dependent. A substantial proportion of households have decided they require more than one car to meet their travel needs. Car dependent cities with high car use spend a much higher proportion of their wealth on transport than do cities with higher proportion of travel by walking, cycling and public transport. If public and active transport were to be improved and car dependence reduced, there would be potential for some people to reduce car ownership, change their mode of travel and reduce travel costs.

Sustainable Mobility Management Approach

Sustainable mobility management (SMM) is a systems approach that seeks to balance travel across all of the modal networks, rather than concentrate additional traffic onto already congested roads. It supports a move away from the past approach of "predict and provide" based largely on an extrapolation of past trends, to a more forward looking "vision and validate" model.

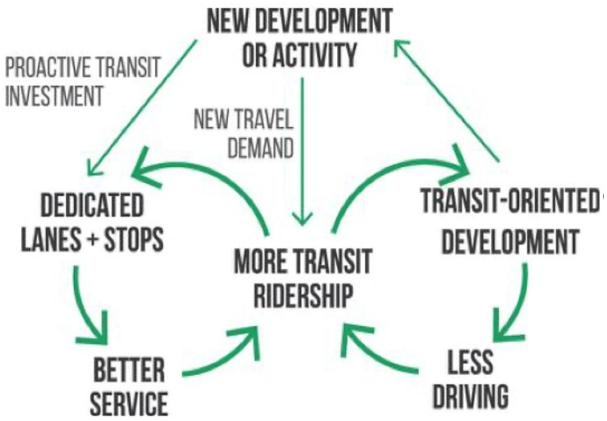
There is a high degree of uncertainty about future travel due to the rapid evolution of digital connectivity and disruption from new technologies. Under these circumstances, the rationale of continuing to plan based on past practice, or even an evolution from past practice is flawed. Whereas the previous system was based on a repeating cycle of more road capacity that induced more traffic, the proposed new approach aims to decrease the level of road traffic on the network, particularly during peak periods, when congestion is highest.

Figure 3: Virtual cycle of smart growth and multimodal transport



Source: Litman (2023)

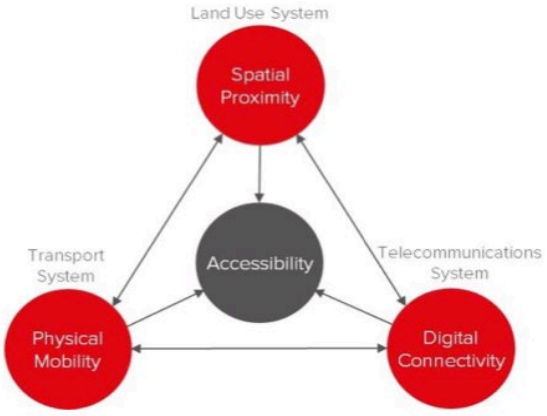
Figure 4: Virtuous cycle – transit passenger increase.



Source: NACTO (2016)

A key objective of the SMM approach is to improve accessibility for all without increasing car usage on already congested urban streets.

Figure 5: Triple access planning



Source: Lyons and Davidson (2016)

Triple access planning (Figure 5) demonstrates how integrated land use, transport system and digital connectivity planning can be utilised to provide more practical options to access jobs, education and other activities, by all demographics in the community.

SSM supports a long-term planning horizon of more than 50 years in planning transport infrastructure, that is more consistent with the long life of the assets. Towards the end of the 21st century, there is a likelihood our largest capital cities will have populations in the eight to 12 million range. The new paradigm we are proposing for transport planning will not only need to address current and immediate challenges, as outlined in the "Drivers for Change", it will need to have the capability to offer high capacity for movement and access needs well into the latter part of the 21st century. This will require a change in development patterns, increased urban infill and high-capacity rail, light rail or equivalent systems, as used in successful international cities of comparable size.

A transport system that is more space efficient, sustainable and adaptable will be better able to meet the long-term challenges of city growth. Refer to Engineers Australia (2021) for guiding principles on integrated transport and land use plan development.

Developing a city's urban transport plan using a SMM approach

Each city will need to develop a transport strategy and plan with clear objectives, a forward-looking vision and an integrated and sustainable plan for delivery, the core components of which are outlined below.

Agree a Vision to Guide the Plan

Each city should develop a vision that is unique to its own circumstances, but should consider:

- Improved global and local environmental outcomes
- Liveable streets and neighbourhoods
- Safe well connected street systems for all users
- Accessible city with a reduced level of car dependence

Objective of the Plan

Each City should agree objectives to guide plan development and assessment. The following objective is consistent with the SMM approach:

- Fully integrated city development and supporting transport infrastructure that is planned for delivery in a timely manner and is:
    - safe
    - sustainable
    - efficient
    - affordable and value for money
    - beneficial for the global and local environment and for regional and local economies and social cohesion

Core Components of the Plan

These core plan components are consistent with the sustainable mobility management approach and principles advocated in this report.

- **Land development plans**
    - enable more people to live closer to jobs, schools, other activities and public transport.
    - increase housing and housing density in and around city and activity centres where jobs significantly outnumber workers.

- provide medium density development in mixed use centres and corridors and in station precincts, where there is good quality frequent public transport or where it is planned for delivery in the short term.

- **Road and street network**
  - For new developments, plan and design a connected network with safe, convenient travel paths for all users, particularly pedestrians and cyclists.
  - For mature networks, that are at or near saturation, give priority to travel options that are space efficient and sustainable in the longer term. Do not increase capacity for low space efficiency car travel, to meet peak car demand, as this will induce more car use.
  - Modify streets, where appropriate, to improve safety for vulnerable road users by reducing speed, particularly in or near mixed use centres and schools.

- **Travel Demand Management.** Manage transport demand to reduce the level of car traffic on the network.

  This has been supported by a growing number of state agencies. For example, Infrastructure WA (2022) states that "*Managing demand can help to divert, delay or avoid the need for more costly services and facilities and deliver sustainability and resilience in our infrastructure systems. This includes achieving better outcomes from existing infrastructure and investing in ways that can prevent increased demand elsewhere. Investing in alternatives to major infrastructure projects can diffuse demand by enabling new ways of doing things. Similarly, behaviour-change programs can influence demand, typically at a fraction of the investment cost required to expand networks and often resulting in better outcomes"*. Travel demand management measures designed to reduce car travel will assist in:
  - the reduction of GHG and other emissions
  - reducing congestion across the road system
  - improving health and fitness of the community
  - reducing deaths and serious injuries from road crashes
  - improving liveability, amenity and segregation in communities, and
  - deferring costly infrastructure spending by governments.

- **Public transport.** Network improvements to be introduced progressively by 2030:
  - **Improve service frequency standards.** Recommend time between services be:
    - Less than 5 minutes on major routes
    - Less than 10 minutes on other routes during peak periods
    - Less than 15 minutes between peaks
    - No more than 30 minutes at other times on a connected network of routes
  - **Provide priority for on road public transport**
    - Always for light rail, trackless trams and other tier 2 systems
    - Where required for other services based on frequency and delay to services
  - **Metro rail services**
    - Finalise the network between high growth outer suburbs and sub-regional and city centres
    - Upgrade to high capacity when needed – more rolling stock, improved signalling etc
  - **Light rail (or, trackless tram or other tier 2 services)**
    - Develop a priority high-capacity network linking city and other mixed-use centres along medium density corridors
    - Continue to upgrade to increase capacity or to provide priority on older systems, as necessary (Melbourne)

- **Cycling.** Make cycling safer and more convenient for cyclists of all ages and experience, to enable and encourage more people to cycle.

  Currently the level of cycling is constrained. This is because there is no safe connected network of cycling routes in any Australian city. The vast majority of potential cyclists will not even consider cycling if required to share the roadway with motorists at speeds above 40 km/hr. Experience in Australia and internationally has shown that "business as usual" planning will not increase the mode share of cycling, other than marginally. A few cities, most notably Dutch and Danish cities, have achieved and sustained cycling mode shares of above 20 per cent. Of greater relevance to the Australian context, some cities have increased cycling mode share from very low levels to between eight per cent and 10 per cent over a relatively short time. The American city of Portland increased cycling from two per cent to eight per cent in 12 years and has now set a target for cycling to be 25 per cent of all trips of more than three miles (five kms) by 2030 (City of Portland, 2011). In the inner suburbs of most Australian capital cities, the average car trip is less than five kms. An increase in cycling mode share of over 400% (from below two per cent to eight per cent) in Australia's capital cities would reduce the mode share of car driving by over 10 per cent.

  - **Vision: set targets to increase cycling in all major cities:**
    - in inner city areas, where suppressed demand is greatest and distances shorter (less than five kms, on average) -target to increase cycling to about 10 per cent of all travel by 2040
    - city wide – target to increase cycling to about eight per cent of all travel by 2050
  - **Develop a comprehensive network of safe, well connected cycling routes:**
    - Complete the principal bicycle network that provides strategic links between major centres – physical separation of cyclists from traffic
    - Develop a secondary bicycle network – finer grained connected network linking with the primary network and providing access to activity centres, employment centres and community and shopping facilities – mainly physical separation of cyclists from traffic
    - Complete network with safe local cyclist connections – provide safe access in local neighbourhoods- mainly shared use with cars on low-speed streets with speed limits of 30kph
  - **Develop supporting policies and design guidelines for cyclists**
  - **Introduce behaviour change programs and travel plans for cyclists**
  - **Deliver education programs for cyclists, motorists and other road and path users**
  - **Promote benefits of cycling**
  - **Increase funding to at least five times current funding levels over a sustained period of more than 10 to 15 years.** Even with this increase in the level of funding for cycling infrastructure, it will remain well below that expended on urban road or public transport projects.

- **Walking.** Walking is the most universal, sustainable and energy efficient mode of transport, but it is being under-utilised. Increase the level of walking in urban areas, by making streets safer, more convenient for travel, more attractive and better connected. Shift the emphasis in urban design, from providing priority for motor vehicles, to the creation of quality urban spaces and streets and convenient movement patterns for pedestrians.

  While walking use has declined over the last two or three decades, due to an increase in car dependence, walking trips are estimated to be between one quarter and one third of all trips in

many inner-city municipalities in Sydney and Melbourne (Eady and Burt, 2019 and Transport for NSW, 2013). Walking provides an independent means of travel for many for stand-alone trips and as part of public transport travel. Many people without access to a car, including young people below driving age, are reliant on walking as their principal means of travel. In the longer term, increased urban infill and more mixed-use precincts will make walking more available and viable.

To improve accessibility through walking in the shorter term, some local governments are setting up programs to develop integrated local transport and urban design plans with the objective of making streets safer and better connected. As well as increasing opportunities for more walking and reducing dependence on cars, these programs contribute to the development of more liveable streets, places and precincts throughout our cities. Key components of these plans include:

- 30kph maximum speed on streets with high numbers of walkers and cyclists
- More frequent, safer road crossings, including conveniently place zebra crossings
- Safer walking routes to schools, train stations, bus stops, shops, parks etc
- Taking opportunities to make walking routes more comfortable (eg more tree shade), more interesting and more direct.

To assist with the development of safer urban streets, Australia needs a new urban street design guideline, similar to the UK's Manual for Streets (MfS) (Department of Transport, UK, 2007 and Chartered Institute of Highways and Transportation, 2010), that broaden design criteria beyond designing for vehicles. MfS states in its preface:

"*For too long the focus has been on the movement function of residential streets. The result has often been places that are dominated by motor vehicles to the extent that they fail to make a positive contribution to the quality of life. MfS demonstrates the benefits that flow from good design and assigns a higher priority to pedestrians and cyclists*". MfS recommends "*revised key geometric design criteria to allow streets to be designed as places, in their own right, while still ensuring that road safety is maintained*".

Benefits of Sustainable Mobility Management

SMM benefits people, and the cities and environments they inhabit in several important ways:

- It will bring about a reduced level of traffic on crowded city streets, reducing greenhouse and other (harmful to health) emissions and congestion, improving safety, and increasing amenity and liveability.
- The development of an integrated and sustainable transport system with greater travel choices for more people will deliver improved accessibility for all, global and local environmental benefits, and a more equitable society with tangible community health benefits.
- The proposed high-capacity public transport routes will provide higher transport system capacity that cannot be provided by the current car-based system and will future proof city growth, urban infill and more vibrant communities.
- Planning for reduced levels of traffic will enable public funding of infrastructure to be re-directed to areas where there has been significant under-investment over many years, such as public and active transport systems.
- The proposed strategy will be instrumental in delivering a transport system that is more affordable for more users.

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